

**THE PERCEPTIONS OF UNIVERSITY  
AND IMMIGRANT WOMEN AGED 18 TO  
25 ABOUT THE HUMAN  
PAPILLOMAVIRUS VACCINES: A  
CROSS-SECTIONAL STUDY**

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By

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## Table of Contents

LIST OF TABLES .....	v
LIST OF FIGURES .....	vi
ACKNOWLEDGEMENTS .....	vii
ABSTRACT.....	ix
CHAPTER 1: INTRODUCTION .....	1
1.1 Significance of the Problem.....	1
1.2 Human papillomavirus.....	1
1.2.1 Prevalence of HPV Infection.....	1
1.2.2 HPV Subtype Classification .....	2
1.2.3 Transmission Route .....	3
1.2.4 Role of HPV Infection in the Development of Cervical Cancer.....	4
1.3 Vaccine Development.....	5
1.4 HPV Vaccination Program.....	7
1.5 Cervical Cancer Screening Guidelines .....	11
1.6 Importance of Studying HPV Vaccination in University Women.....	11
1.7 Summary .....	13
1.8 Objectives and Primary Question .....	14
CHAPTER 2: METHODS.....	15
2.1 Study Design.....	15
2.2 Identification and Recruitment of Survey Participants .....	15
2.3 Method of Data Collection.....	18
2.4 Sample Size.....	19
2.4.1 Primary Calculation of Sample Size .....	19
2.4.2 Effect of Response Rate on Sample Size.....	20
2.5 Questionnaire Development.....	21
2.5.1 Instrument Design .....	21
2.5.2 Cognitive Interviews .....	26
2.5.3 Pilot Test.....	27
2.5.4 Final Instrument.....	28

2.6 Focus Groups .....	32
2.6.1 Rationale for Including Focus Groups .....	32
2.6.2 Purpose of Focus Groups .....	32
2.6.3 Focus Group for Students .....	33
2.6.4 Focus Group for Immigrant Women .....	34
2.7 Statistical Analysis .....	35
2.7.1 Questionnaire Analysis .....	35
2.7.2 Focus Group Analysis .....	37
2.8 Ethics .....	38
CHAPTER 3: RESULTS .....	39
3.1 Participant Characteristics.....	39
3.2 Intention toward HPV Vaccination.....	44
3.2.1 Intention to complete vaccination program .....	44
3.2.2 Intention to receive the vaccine program.....	45
3.3 Perceptions about HPV Vaccination: Beliefs about consequences of the vaccine and attitudes toward the vaccine .....	46
3.4 Barriers to HPV Vaccination .....	50
3.5 Factors that Promote the Uptake of the HPV Vaccines .....	53
3.6 Multivariate Models.....	55
3.6.1 Comparison of respondents who do and do not intend to be vaccinated.....	56
3.6.2 Comparison of respondents who are vaccinated and those who intend to be vaccinated .....	57
3.7 Influence of HPV Vaccination on Future Cervical Cancer Screening Decisions .....	63
3.8 The Effect of HPV Vaccination on Safe Sex Practices.....	64
3.9 Knowledge and Effect of that Knowledge .....	64
3.10 Focus Group for Students .....	66
3.11 Focus Group for Immigrant Women.....	69
CHAPTER 4: DISCUSSION.....	74
4.1 Overview of Study Results .....	74
4.2 Prevalence of HPV Vaccination .....	74
4.3 Characteristics Associated with HPV Vaccination .....	78
4.4 Attitudes toward HPV, HPV Vaccination and Cervical Cancer Screening .....	81
4.5 Barriers to HPV vaccination .....	83

4.6 Factors that Promote Vaccine Uptake.....	85
4.7 Effect of HPV Vaccination on Safe Sex Practices and Cervical Cancer Screening .....	86
4.8 Other Issues Discussed in the Focus Groups .....	87
4.9 Strengths and Limitations of the Study.....	89
4.9.1 <i>Strengths of the Study</i> .....	89
4.9.2 <i>Limitations of the Study</i> .....	90
4.10 Significance of the Thesis .....	94
4.11 Future Directions .....	96
4.12 Conclusion .....	97
REFERENCES .....	99
APPENDIX A: Canadian Provincial and Territorial Publicly Funded HPV Vaccination Programs .....	110
APPENDIX B: English and French Questionnaires .....	111
APPENDIX C: Question Routes for Focus Groups.....	136
APPENDIX D: Supplementary Tables .....	140
APPENDIX E: Cognitive Interview Questions .....	142
APPENDIX F: Ethics Documents .....	147

## LIST OF TABLES

Table 1: Prevalence of HPV vaccination .....	40
Table 2: Patient characteristics by vaccination status .....	42
Table 3: Intentions to complete the vaccination program .....	45
Table 4: Intentions to be vaccinated .....	46
Table 5: To me, getting vaccinated against HPV was (would be...).	47
Table 6: Decreasing my risk of getting genital warts is .....	47
Table 7: Decreasing my risk of getting cervical cancer is .....	48
Table 8: Efficacy of HPV vaccination .....	48
Table 9: Attitudes to HPV vaccination and beliefs about vaccine efficacy by ethnicity and immigrant status .....	49
Table 10: Vaccinating all eligible girls who are sexually active .....	50
Table 11: Vaccinating all eligible girls who are not sexually active .....	50
Table 12: Barriers to vaccination .....	52
Table 13: Motives for HPV vaccination uptake .....	54
Table 14: Comparison of respondents who intend and do not intend to be vaccinated .....	59
Table 15: Univariate linear regression predicting overall attitude to HPV vaccination .....	60
Table 16: Comparison of respondents who are vaccinated and who intend to be vaccinated .....	62
Table 17: Univariate linear regression predicting overall attitude to HPV vaccination .....	63
Table 18: Effect of vaccination of future safe sex practices .....	64
Table 19: Knowledge by vaccine status .....	65
Appendix D: Supplementary Tables .....	140
Questionnaire development and draft changes.....	140
Response rate by faculty .....	141

## LIST OF FIGURES

### Chapter 2: Methods

Figure 1: Faculties and departments approached for the study ..... 16

Figure 2: Theory of Planned Behaviour ..... 25

### Chapter 3: Results

Figure 3: Likelihood of being vaccinated ..... 44

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## **ABSTRACT**

Persistent infection with certain subtypes of Human papillomavirus (HPV) is a necessary cause of cervical cancer, the second most common cancer among women worldwide. Uptake of HPV vaccines in the targeted Canadian female population has been lower than anticipated. This study's primary objective was to determine undergraduate women's perceptions about HPV vaccination. A total of 401 female University of Ottawa undergraduate students completed a newly developed cross-sectional web survey. The prevalence of HPV vaccination was 49%. While the overall attitude towards receiving the vaccine was positive, vaccinated respondents had more favorable attitudes toward the vaccine. Lack of vaccine knowledge and cost were the primary barriers that have prevented HPV vaccination among non-vaccinated respondents. Offering HPV vaccination for women aged 18 to 25 presents a strategy for addressing suboptimal vaccination coverage in the targeted female population and may reduce health inequities demonstrated by variations in cervical cancer incidence within jurisdictions.

# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Significance of the Problem**

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Cervical cancer is the second most common cancer afflicting women and the third leading cause of cancer mortality among women worldwide (1, 2). This disease affects more than 530 000 women annually, 85% of whom live in the developing world (2, 3). Although this carcinoma is preventable with proper implementation of screening programs and precancerous lesion treatment, approximately 270 000 women die annually from cervical cancer (2, 4, 5). Persistent infection with Human papillomavirus (HPV) has been established as the primary cause of this malignancy, accounting for upwards of 90% of all cervical cancer cases (5). The vast majority of HPV infections are asymptomatic or sub-clinical, which has contributed to the rapid transmission and spread of the virus (6-8). The sequelae of this infection is not limited to cervical cancer but includes genital warts, oropharyngeal cancers and other anogenital cancers, such as cancer of the vulva, vagina, penis and anus (9, 10).

### **1.2 Human papillomavirus**

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#### **1.2.1 Prevalence of HPV Infection**

The Human papillomavirus is a DNA virus which is only capable of replicating itself in terminally differentiating cells in one epithelial layer of the cervix; the stratified squamous epithelium (11). This is advantageous to the virus as it delays the stimulation of an effective immune response. More than 100 different HPV strains have been identified, with varying degrees of infectivity and disease potential (9, 12). The dissemination of the diverse viral strains varies by geographic region and population, while the severity of disease associated with the virus depends on the strain itself (12, 13). HPV infections are so commonly transmitted that

nearly 75% of Canadian adults are infected with the virus at some point in their life, (14) while the highest rates of infection are in the population under the age of 25 (15, 16). Although the prevalence of the virus in the population is very widespread, the immune system is generally capable of spontaneously clearing the infection by itself. Thus the point prevalence of the viral infection is substantially lower than 75% in Canada (17) .

A study which observed the prevalence of HPV across 11 countries found that it varied by a factor of almost 20 (18). At its lowest, the age-standardized prevalence of HPV DNA was 1.4% (95% CI [0.5-2.2]) in Spain, while in Nigeria the prevalence reached 25.6% (95% CI [22.4-28.8]) (18). In another review, a meta-analysis compared the prevalence of HPV subtypes, as well as their age distribution. This study found that the global HPV prevalence of women without abnormal cervical cytology was 10.45% (95% CI [10.2-10.7]) (13). The distribution of HPV subtypes was heterogeneous among women from different populations, with women in sub-Saharan Africa significantly less likely to be infected with the HPV-16 subtype than women in Spain, but more likely to be infected with other subtypes included in the study (18). While HPV-16 generally was the most prevalent virus type, three types not covered by either of the currently available vaccines (discussed below), HPV-31, 52 and 58, were among the most common HPV types in the world.

### 1.2.2 HPV Subtype Classification

Specific HPV subtypes have been classified as either high-risk or low-risk subtypes. High-risk subtypes of HPV have been defined as those with an ability to infect the genital region and with high oncogenic potential (1, 9). Currently, the WHO International Agency for Research on Cancer has identified 13 high-risk HPV types. These particular strains have been identified as likely a necessary cause of cervical cancer (19). One study which assessed HPV DNA

prevalence in invasive cervical cancer across 22 countries found an initial worldwide HPV prevalence of 93% in cervical cancer cases (20); however when this study's prevalence was reassessed and its samples reanalyzed, it was observed that the actual overall prevalence of HPV DNA in these cases was 99.7% (19). This second assessment was done by verification of the HPV-negative samples through a sandwich technique, which looked at the sample's inner section through use of a molecular assay and the outer section microscopically (19). Consequently, HPV infection represents the highest global attributable fraction categorized for a specific cause of a major cancer (19), as only 0.3% of cervical cancer cases tested negative for HPV DNA. High-risk HPV types 16 and 18 together account for 70% of cervical cancer cases (9, 21).

Low-risk types of HPV are associated with less invasive infection of the genital region (17) and are often asymptomatic, thereby going undiagnosed (9). Certain low-risk types, such as HPV-6 and HPV-11, cause a visible infection and can result in genital warts. These two HPV types account for the majority of anogenital warts cases (22, 23). Although the immune system is capable of clearing these infections for nearly 70% of women within three years (24), genital warts is still one of the most common outcomes of sexually transmitted viral infections (22). According to Canadian studies, the prevalence of diagnosed genital warts in the general population is 0.15%, based on retrospective database or chart review (25, 26) and approximately 1.10% in the female population aged 15 to 49, based on genital examination (15).

### **1.2.3 Transmission Route**

HPV is primarily sexually transmitted, mainly through vaginal and anal sex. This virus can also be transmitted during oral sex and through genital-to-genital contact. Asymptomatic carriers of the virus are equally capable of spreading the infection, even if they have never been diagnosed with an HPV infection. Since the virus is capable of being transmitted via genital-to-

genital contact, condoms do not ensure 100% protection against transmission of this STI. Rarely, this virus is capable of being vertically transmitted from mother to child. This only occurs if a woman develops genital warts during her pregnancy which continue into the latter part of her term and could potentially lead to the child being born with recurrent respiratory papillomatosis, where the child is born with warts in the throat (27).

#### **1.2.4 Role of HPV Infection in the Development of Cervical Cancer**

Persistent infection with a high-risk type of HPV, if left untreated, can result in the development of cervical cancer (19). The phases of cervical cancer development begin with HPV infection of the cervix with a high-risk type of the virus, which is followed by progression to a precancerous state, if the infection is not cleared, and the invasion of the surrounding cells (28). Clinically, 5 stages of development of cervical cancer have been identified. At each subsequent stage, the carcinoma extends further into the surrounding cells, eventually reaching cells beyond the pelvis in the final stage (29).

Cervical abnormalities are generally assessed through Papanicolaou (Pap) tests or smears, in which a sample of cervical cells is swabbed for analysis. This form of screening is important to capture cervical abnormalities as early as possible, as treatment for cervical cancer is highly dependent on the stage of carcinoma, as well as the location of the cellular transformation in the cervix, age and physical condition (30). Depending on the stage of the carcinoma, the treatments can vary from laser surgery and loop electrosurgical excision procedure (LEEP) to radiation therapy, chemotherapy and surgery. By stage IV B, in which the cancer has spread beyond the pelvic region to other parts of the body, treatment options are pursued in order to alleviate the symptoms of the carcinoma, but are unlikely to cure the cancer condition (30).

### **1.3 Vaccine Development**

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Recently, 2 different HPV vaccines, a quadrivalent vaccine (Gardasil) developed by Merck Frosst and a bivalent vaccine (Cervarix) developed by GlaxoSmithKline Inc, were approved for use in Canada. These vaccines were designed to be used prophylactically to prevent specific types of HPV infection (5). The quadrivalent vaccine (Gardasil) was designed to protect against the oncogenic HPV strains 16 and 18 and the strains 6 and 11 that are estimated to account for 90% of genital warts and are associated with recurrent respiratory papillomatosis (5, 31, 32). The bivalent vaccine (Cervarix) was designed to induce a high level of response to the oncogenic strains 16 and 18; it contains an adjuvant that has been demonstrated to enhance immune responses (33). A certain amount of cross-protection has also been observed in those vaccinated with either vaccine. The bivalent vaccine (Cervarix) has demonstrated cross-protection to 3 other oncogenic viral strains, 31, 33 and 45, while the quadrivalent vaccine (Gardasil) is thought to offer potential cross-protection to strain 31 (5). For both vaccines, the manufacturers recommend a vaccine schedule comprising a series of three injections into muscle tissue over a 6-month period. However, in the school vaccination program in Quebec, fourth graders are vaccinated according to an extended schedule: two doses administered in grade 4 and the third dose in Secondary 3. It is considered that the two doses in grade 4 provides protection comparable to the manufacturer's recommendation, while the third dose in Secondary 3 offers the additional benefit of ensuring optimal protection around the age of onset of sexual activity (34).

Cervarix has been approved in Canada for females only, while Gardasil has been approved for both sexes (35). Both vaccines have been shown to offer protection for a minimum of 5 years against the specific viral strains included in the vaccine (35, 36). The potential advantages of HPV vaccination include prevention of HPV infections, cervical cancer and in the

case of Gardasil, genital warts (36-38). Although the vaccine is most effective prior to onset of sexual activity, it can still be given to women who are sexually active, since it is rare for women to be infected with all the viral strains included in the vaccine (35, 39). Furthermore, the vaccine has been designated as safe (10) and has to date been associated with only a few side effects that are common to most vaccines, such as redness, pain, soreness and swelling (27). One side effect that has led to some debate in the media is the pain associated with the injection. Although most girls and women who receive the vaccine have stated that the pain connected with receiving the vaccination is of short duration, some vaccine recipients have experienced more severe soreness, which hindered their abilities to perform tasks such as driving (40). Merck Frosst, the developer of the quadrivalent vaccine, has affirmed that their vaccine can cause increased soreness. They have theorized that the pain is a result of the virus-like particles that constitute part of the vaccine.

Several studies have been conducted both by the pharmaceutical industry and the scientific research community to assess vaccine efficacy and safety over extended periods of time. There are currently ongoing research studies to validate the long-term immunogenicity of the vaccines. Since cervical cancer is a condition that only develops in certain cases, after a lengthy period of time, efficacy has been measured using surrogate endpoints such as cervical lesions (36, 41). The phase 3 trial for Gardasil, which was part of the FUTURE I study, found that after 48 months, vaccine efficacy was 100% for the coprimary composite endpoints, which were the incidence of genital warts, vulvar or vaginal intraepithelial neoplasia or cancer and the incidence of cervical intraepithelial neoplasia, adenocarcinoma or cancer associated with vaccine-type HPV (37). Vaccine efficacy in this study was based on a comparison of diagnoses of the aforementioned endpoints between the vaccine and placebo groups (37). A systematic

review of six studies, including the trial just described, compared outcomes in vaccinated and non-vaccinated women for both Cervarix and Gardasil (36). Efficacy was defined as prevention of cytologically and/or histologically proven lesions (reduction in rate of lesions in the cervix, vulva, vagina and anogenital region), when compared to control groups under an intention to treat analysis method (36). The results suggested that between 14 to 44 months following vaccination, women immunized with Cervarix had fewer cervical, vulval, vaginal and anogenital lesions relative to unvaccinated controls and that this vaccine was 93% efficacious (95% CI [87, 96]) (36). Efficacy was defined as prevention of cytologically and/or histologically proven lesions, when compared to control groups under an intention to treat analysis method (36). Efficacy was measured by reduction in rate of lesions in the cervix, vulva, vagina and anogenital region (36). The efficacy of Gardasil was determined to be 62% (95% CI [27,70]) (36). The disparity between the efficacy of Gardasil in the FUTURE I study and in the systematic review could be due to differences the methods of FUTURE I relative to the other reviewed studies: specially FUTURE I only included women whose number of lifetime sex partners did not exceed four and an age range (15-26) that was slightly wider than the other studies included in the systematic review.

#### **1.4 HPV Vaccination Program**

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In 2006, Health Canada licensed the use of Gardasil (42) and allocated \$300 million to provinces and territories in 2007 on a per-capita basis to promote HPV vaccination in young girls (43). The bivalent vaccine, Cervarix, was approved for use in girls and women aged 10 to 25 in 2010 (44), while the quadrivalent vaccine Gardasil, though previously approved for women from 9 to 26, has recently been approved up to the age of 45 (35). Although both vaccines are

approved for use in Canada, only Gardasil is publicly funded. Appendix A describes the publicly funded HPV vaccination program for each province and territory (45).

National guidelines to establish provincial and territorial vaccination programs were developed through a collaboration of the Canadian Immunization Committee and the National Advisory Committee on Immunization. These guidelines have the following goals for HPV vaccination programs:

- 1) To reduce by 60% the cervical intraepithelial neoplasia (CIN) 2/3 caused by HPV 16/18 in Canada within 20 years of introduction of an HPV vaccination program.
- 2) To reduce by 60% the incidence of cervical cancers (and other HPV-related cancers) caused by HPV 16/18 in Canada within 30 years of introduction of an HPV vaccination program
- 3) To reduce by 60% mortality due to cervical cancer caused by HPV 16/18 in Canada within 35 years of introduction of an HPV vaccination program.

(42)

The first two goals were established based on the assumptions that the vaccine efficacy was 95% or higher, the vaccine coverage was 85%, 80% and 75% for girls aged 11, 14 and 17 respectively and that immunity from the vaccine was life-lasting. The supposition was also that HPV vaccination would not preclude the need for organized cervical cancer screening programs. The third goal was based on the notion that there is a delay between cervical cancer diagnosis and death, and that the end result of a medical intervention for cervical cancer is known within 5 years of the initial diagnosis. These national vaccine program guidelines also specified targets for uptake of the HPV vaccine, including vaccinating 80% girls between grades 4 and 8 with the whole vaccine series within 2 years, and 90% within 5 years. In anticipation that actual uptake

rates may not meet these targets, catch-up initiatives were also developed as options on a provincial basis, which included the routine program, the routine program plus one or two additional female age groups, or all females who were initially in the approved age range of 9 to 26 (42).

In 2007, the NACI recommended that girls aged 9 to 26 should be vaccinated against HPV, though the cost per quality-adjusted life year (QALY) increased after the age of 14. For women over the age of 26, girls under the age of 8 and males, no recommendations were made regarding the HPV vaccines in the 2007 NACI report (31). These NACI recommendations have since been altered, in April 2011, to include women up to the age of 45 and males aged 9 to 26 (42).

The HPV vaccination program began in Ontario in 2007 and the province chose to target girls in the eighth grade (46). This immunization is distributed through each of the 36 Ontario local public health agencies, principally through school based vaccine clinics (43). Although all three doses of the vaccine are issued to the girls through this program, this vaccination series is optional and parents or guardians can choose to opt-out.

Although the Canadian government had anticipated that vaccine uptake rates would cover 80% of eligible girls in the first 2 years of vaccination, by the end of 2009 in Ontario, only 56.6% of eligible girls had received the first dose of the three dose vaccine series (43). Of this proportion, 85.3% had received all three doses of the vaccine (43), resulting in an overall vaccine uptake rate of 48.3% in Ontario. This uptake rate is insufficient to ensure herd immunity, which requires coverage of 80% of the population (47). The uptake of HPV vaccination is also lower relative to other vaccines administered through school clinics, such as the hepatitis B vaccine, which has uptake rates that are at least 20% higher (43).

As a result of this lower rate of vaccine uptake, the Ontario vaccination program has expanded to offer a catch-up program. As of September 2012, Ontario school girls between grades 9 and 12 who did not begin or complete the vaccine series in the eighth grade, were eligible to receive the missing doses free of charge until the end of high school. The program to complete the vaccine series was also expanded on a non-precedential basis to women who were in Grade 8 in the 2007/2008 school year, until June 30<sup>th</sup> of this year (48).

Government recommendations in Canada have mostly been toward younger girls, aged 9 to 14 (33). The main reason that pre and early adolescent girls are targeted is that the vaccines are most effective prior to becoming sexually active. Although the literature offers little information about physician attitudes about vaccinating women over the age of 18 against HPV (49), HPV immunization for women who may be sexually active is not necessarily ineffectual. In Australia, HPV vaccination has been extended for women up to 26 years of age (50), while the UK has a catch up program for girls aged 13-18 years (51, 52). HPV vaccination policies and catch-up policies also exist in several other European countries, including the Netherlands, Belgium and Luxembourg, for girls up to 18 in the Netherlands and 17 in the other 2 countries (53). Although 1 in 2 women aged 18 to 22 have been exposed to HPV, it is unlikely that they would have been exposed to all the strains against which the vaccines provide protection (14). Additionally, since both vaccines target multiple strains, in addition to promoting cross-protection to other HPV strains, prior exposure to HPV does not negate the potential benefits associated with Gardasil and Cervarix. Thus, women aged 18 to 45 are potentially still good candidates for the vaccine: the vaccine would likely be efficacious for this age group although as noted by the NACI, a program targeting older women may be less cost-effective.

## **1.5 Cervical Cancer Screening Guidelines**

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The guidelines for cervical cancer screening were recently changed in Ontario, primarily to reduce the rates of false positive results. The new guidelines stipulate that cervical cytology screening (Papanicolaou/Pap test or smear) should commence at 21 years of age for women who are or have ever been sexually active. Women 21 years of age who are not sexually active should only be screened after becoming sexually active (54). According to the new guidelines, once screening is started, it should be repeated every three years unless there is a cervical abnormality. Screening should continue until the age of 70, if the last 3 cytology tests were negative (54). This compares with the previous guidelines, which stated that women who are or have been sexually active should be screened for cervical cancer within three years of first vaginal sexual activity (55). These women should then be screened annually until they have had three successive negative Pap smears, after which the screening interval could be widened to two or three year (55). Furthermore, these earlier guidelines indicated that women who had not been screened in the previous five years should be screened annually until they have three negative Pap smears. Akin to the new guidelines, it was recommended that cervical screening ceases at the age of 70 if there have been three or four negative tests in the previous decade (55).

Regardless of a woman's HPV vaccination status, the guidelines for cervical cancer screening remain the same. Since vaccine efficacy over a long term period has not been assessed, it is important for vaccinated women to continue to be screened regularly.

## **1.6 Importance of Studying HPV Vaccination in University Women**

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Due to a lower than expected uptake, many girls were not vaccinated against HPV through school programs in Grade 8 in Ontario and many women who may benefit from the vaccine were not in the right age group when the vaccine was initially recommended in 2007.

Thus, a sizeable number of Ontario women over the age of 18 years may benefit from being offered a HPV vaccine. As previously mentioned, certain countries have developed catch-up HPV vaccination programs for women who were not initially offered the vaccine as part of a school or health-based vaccine program. In Ontario, some women over the age 18 may have been offered a vaccine as part of the limited-time catch-up program (for those who were in grade 8 in 2007/2008) and it is possible that an expanded catch-up program may be considered. However, young adult women may not wish to be vaccinated for a variety of reasons, including concerns about vaccine safety, efficacy and cost (56). To inform the current and any future catch-up program for young adult women in Ontario, it is therefore important to study women in this age group to assess their willingness to obtain the vaccine and factors associated with potential uptake.

Women attending university are one easily defined sub-population of young adult women for the purpose of investigating attitudes toward HPV vaccination. Though some Ontario female university students may be vaccinated against the main HPV strains, a considerable proportion of them have received either incomplete vaccination programs or no vaccine at all and thus may be in the target group for a future catch-up vaccination program. Comparing the attitudes of those who have and have not been vaccinated may also help to identify the key barriers to vaccine uptake in this age group. In addition to understanding their vaccination status and attitudes toward vaccination, it is also important to investigate the connection between vaccination behaviour and cervical cancer screening behaviour among young women. In particular, if the same women who do not receive the vaccine also become part of the subgroup of women who are not regularly screened for cervical cancer, this would identify a subgroup with higher vulnerability to the risk of cervical cancer.

Since HPV and cervical cancer are distributed unevenly throughout the population, certain subgroups of women are more prone to the disease. These groups include immigrant women, First Nations women and women of lower socioeconomic status (42, 57-59). HPV vaccine campaigns, however, have not singled out women in higher risk subgroups. The concept of HPV vaccination in an immigrant population is particularly important within the Canadian context, as immigrants account for an increasing proportion of the Canadian population. Despite a potentially higher risk profile for cervical cancer, recent immigrants to Canada may have less access to health services such as screening. One compromise of targeting university women in a study of attitudes toward HPV vaccination is the possibility of under representing women who fall into these higher risk groups, whose attitudes may differ from the general population of young adults.

For reasons of feasibility and because this is one of the first studies of its kind in Canada, this thesis primarily focused on assessing the attitudes and perceptions of female university students towards the HPV vaccines, through a sample survey. However, in recognition of the need to consider the applicability of the findings to higher risk groups, we included post-survey focus groups with both the surveyed population and a group of young immigrant women. We also included questions on the survey about ethnicity and immigration status, to investigate these associations in the university population.

## **1.7 Summary**

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HPV infection is associated with a spectrum of effects, varying from asymptomatic infection to genital warts to persistent infection leading to cervical dysplasia. HPV is the most common sexually transmitted viral infection, with the highest incidence in people under the age

of 25, and is a necessary cause of cervical cancer. Two vaccines against HPV infection have recently been approved for use in Canada, though only the quadrivalent Gardasil is publicly funded. Across the country, each province or territory has chosen a specific cohort of girls to vaccinate. In Ontario, girls in Grade 8 are offered the vaccine. Vaccine uptake rates, however, have been lower than anticipated and thus catch-up programs have been initiated and have the potential to be expanded. To determine the potential effectiveness of such programs, and to better understand facilitators and barriers to uptake, there is a need to understand the attitudes of young adult women in the target population for expanded HPV vaccination.

### **1.8 Objectives and Primary Question**

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The primary goal of this thesis is to determine the perceptions of women in university, aged 18 to 25, about the HPV vaccines. The specific objectives were:

- 1- To estimate the proportion of women in this age group who have been vaccinated with an HPV vaccine (as well as the number of doses they have received)
- 2- To estimate the proportion of women who would be interested in receiving the vaccine, among those who have not been vaccinated, or completing their vaccine program, among those who have not completed their HPV vaccinations
- 3- To determine the main barriers that prevent vaccination (including the influence of cost)
- 4- To determine the factors that promote vaccine uptake
- 5- To determine the influence of HPV vaccination on a woman's decision for future cervical cancer screening
- 6- To evaluate the association between ethnicity and immigration history and the perceptions about HPV vaccination

## **CHAPTER 2** **METHODS**

### **2.1 Study Design**

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This was a cross-sectional study, based mainly on a one-time response to a web-based survey. The target population was undergraduate women aged 18 to 25 who attend the University of Ottawa. The sampling frame was based on email contact lists that individual faculties and departments already had assembled for administrative purposes. Potentially eligible women were identified from the sampling frame of the faculties and departments who agreed to participate in the study.

To supplement the quantitative results obtained from the survey, qualitative results were procured through the use of two focus groups. The purpose of including qualitative methods was to complement or extend the survey results. Specifically, the focus group with survey respondents served as a form of member checking and more in-depth analysis of the results; while a second focus group was used to explore the relevance and meaning of the findings in a sample drawn from a different population.

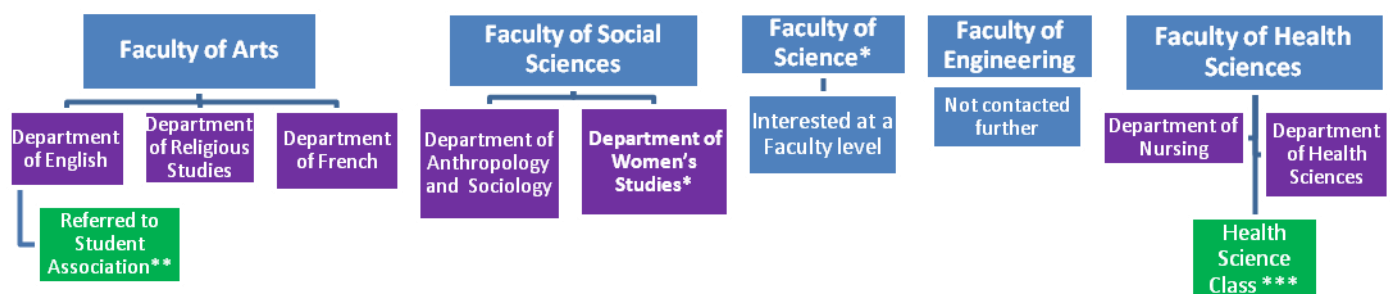
### **2.2 Identification and Recruitment of Survey Participants**

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The research team initially contacted administrative staff from five faculties of the University of Ottawa, the Faculty of Arts, the Faculty of Social Sciences, the Faculty of Science, the Faculty of Health Sciences and the Faculty of Engineering, of whom the Faculty of Science expressed interest in helping to contact students. The Faculty of Science alone includes students in both biological and physical sciences, particularly the Departments of: Biochemistry, Biology, Biomedical Sciences, Biopharmaceutical Science, Biotechnology, Chemistry, Earth Sciences, Environmental Sciences, Mathematics and Statistics, Ophthalmic Medical Technology, Physical

Geography and Physics. Since this faculty includes such a wide variety of departments, the students in them could themselves be quite diverse. In order to get a more representative sample of women, the researchers then contacted individual departments in the Faculties of Arts, Social Sciences and Health Sciences. Individual departments in the Faculty of Engineering were not approached as the other university faculties had a larger female to male ratio and we believed they would be more likely to express interest in the study. In the Faculty of Social Sciences, the Departments of Sociology and Anthropology, as well as the Department of Women’s Studies were approached. The latter agreed to participate in the study. In the Faculty of Arts, three departments were approached, the departments of English, Religious Studies and French, of which the Department of English expressed in interest. The administrative assistant for this department referred the researchers to the student association for the English department, who agreed to help contact students. In the Faculty of Health Sciences, the Departments of Nursing and Health Sciences were contacted, of which neither expressed interest in the study. As interest was lower than anticipated at the Faculty and Departmental levels, the research team also approached a professor of a required Health Science course, for the Department of Health Sciences.

**Figure 1: Faculties and departments approached for the study**



\*Administrative staff forwarded three survey invitations to the students

\*\*Student association forwarded one survey invitation to the students.

\*\*\* Professor forwarded one survey invitation to the students.

Figure 1 illustrates how potential participants were contacted through a faculty, department, student association or professor. Those contacted belonged to either the Faculty of Science, the Department of Women's Studies (Faculty of Social Sciences), the Department of English (Faculty of Arts, through the Student Association) or the Department of Health Sciences (contacted Professor of Health Sciences). Administrative staff from all the divisions of the University who participated in this study were contacted by the research team- these staff members were then responsible for making direct contact with the students who were potential survey participants. All students, male or female, enrolled in the particular faculty or department were contacted by their individual faculty or departmental administration, for the Faculty of Science and Department of Women's Studies; their student association, for the Department of English; or their professor, for the Department of Health Sciences. The sampling frame used for this study, i.e. lists already compiled and inclusive of all the students registered in the given faculty or department, therefore did not exclude any currently registered students in those academic units (although it excluded all University of Ottawa students not registered in participating units).

Contact was made with all the students from the contact list of the Faculty of Science and the Department of Arts three times via email through the administration of the faculty or department. The students in the Department of English and the Department of Health Sciences were contacted once via email by their student association or professor, respectively. The three contacts consisted of an initial email which introduced the study, briefly described the survey and provided a link to complete it, then two additional emails were sent as a reminder/thank you

for filling out the survey (See Appendix E). The single contact with the students of the Departments of English and Health Sciences consisted of the initial email. All the emails contained links to the survey and were bilingual (English/French). The emails were distributed approximately one week apart from each other, in the morning, to increase the chance of more students seeing the email during the day. This in turn could increase the likelihood of response to the survey. The emails also contained information about a focus group we planned for students who completed the survey; participants were asked to contact the researchers directly regarding interest in the group. All three email contacts were sent to all individuals on the respective contact lists of the Faculty of Science and Department of Women's Studies, regardless of responses status (i.e., whether or not the student had already responded to the survey). All survey invitations were distributed between March 2013 and April 2013.

### **2.3 Method of Data Collection**

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The data for this study were collected using a web-based questionnaire that was developed specifically for use in this survey. We chose a web-based questionnaire because of the nature of the target population (university students tend to be frequent internet users) and available sampling frame, as well as cost and convenience.

The survey application used for this study was one provided by Fluid Surveys. This particular survey application was chosen above others for several reasons. Firstly, Fluid Surveys is Canadian-based, developed by a Canadian company and stores its data in Canada. As such, the data are subject to Canadian privacy laws, unlike companies that are based in the United States and are thus subject to access by the United States government because of the United States Patriot Act. The second reason for choosing this application is that it has several features that were important for this particular survey. These features include that the application allowed for

skip logic, which allows the survey programmer to setup the online survey according to a pattern, given a participant's response to a particular question. Furthermore, Fluid Surveys permits multi-lingual programming, which allows for the overlaying of the survey in multiple languages and the export of the survey in all languages into a single database. Other advantages include ability to customize the survey URL, which is useful if the URL needs to be retyped. To prevent multiple responses from the same respondent, a feature on Fluid Surveys was enabled to prevent multiple survey submissions from the same computer. Although this may not have been 100% effective, it could prevent multiple responses from the same individual.

## **2.4 Sample Size**

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### **2.4.1 Primary Calculation of Sample Size**

For this study, the sample size was based on the need to estimate a population proportion. Specifically, although the survey has several objectives, a primary one was to estimate the proportion of female undergraduate students aged 18 to 25 at the University of Ottawa who have been vaccinated against the Human papillomavirus. For this study, being vaccinated has been defined as receiving a minimum of one dose of the HPV vaccine.

The sample size was calculated to be 385, given the parameters used to estimate a sample size based on proportions. The formula used to calculate this sample size was:

$$n = p(1 - p) \left( \frac{Z_{1-\frac{\alpha}{2}}}{E} \right)^2$$

This equation represents the minimum number of participants needed to ensure a margin of error no greater than the one specified (E), given the desired level of confidence at the

specified proportion  $p$ . The equation requires a prior estimate of the proportion of students in this age range who have been vaccinated against HPV.

This prior estimate can be obtained from the findings of a previous study in the literature or a pilot test. There has not been a study of a similar nature conducted in a Canadian context and there have not been reported rates of HPV vaccination for women in this particular age range. According to the data available, the uptake rate of the HPV vaccine in Ontario for the 2007/2008 and 2008/2009 cycles was 56.6% (43). However, women who were eligible for the vaccine in 2007 would now be approximately 19 years old. Women older than 19 years of age were not offered the vaccine for free and are therefore less likely to have been vaccinated. Thus, a conservative estimate of 0.5 was used for the proportion estimate in a sample size calculation for a proportion; an estimate of 0.5 maximizes the possible sample size. It is very unlikely that the proportion of those vaccinated exceeds 50%, given that the vaccine was only available in Canada as of 2007 and was introduced free of charge in Ontario to girls only in grade 8.

This sample size was calculated in order to obtain a power of 80%, for a 2-tailed test at a 5% level of significance.

#### **2.4.2 Effect of Response Rate on Sample Size**

Once the sample size has been established, the survey response rate, defined as the percentage of potential respondents who partake in the survey and provide measurable answers, must be considered. The response rate affects the number of people who need to be contacted to attain the desired sample size. Based on the literature, response rates to surveys, particularly surveys given to students in university, are quite variable (60). Survey response rates depend on several factors, namely the subject matter, the mode of the survey, the time involvement required, the survey burden, the individual's social environment and their own personal

characteristics (61). For web surveys in particular, the sender of the survey could influence whether or not a potential respondent even opens the email.

According to the existing literature, the response rate for university students given a mailed or web survey varies between 14% and 70% (60). The probability of response to a survey increases as the survey burden decreases (60). Given this information, an estimated response rate of 40% was chosen, which signified that at least 963 female students would have to be contacted to achieve a sample size of 385 respondents (56).

## **2.5 Questionnaire Development**

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### **2.5.1 Instrument Design**

In this study, the instrument used was newly developed, as no gold standard questionnaire currently exists on the topic of HPV vaccination among university women. The questionnaire that was developed for this study was produced using both published measures and original questions. One or more constructs were used to pursue each of the study objectives:

- 1- The proportion of women in this age group that have been vaccinated with an HPV vaccine (as well as the number of doses they have received)
- 2- The proportion of women who would be interested in receiving the vaccine, among those who have not been vaccinated, or completing their vaccine program, among those who have not completed their HPV vaccinations (Constructs: Attitude toward receiving the HPV vaccine, intentions to receive/complete the vaccine series)
- 3- The main barriers that prevent vaccination (Constructs: Barriers, knowledge)
- 4- The factors that promote vaccine uptake (Constructs: Motivations, knowledge)

- 5- The influence of HPV vaccination on a woman's decision for future cervical cancer screening (Constructs: Beliefs about HPV vaccination, intentions toward cervical cancer screening)
- 6- The association between ethnicity and immigration history and the perceptions about HPV vaccination (Constructs: Attitudes about receiving the HPV vaccine)

The constructs above were chosen based on the study objectives and on the literature available on the topic. The literature was also essential in the design of the questionnaire, the flow and phrasing of the particular questions and the potential categories for the responses.

The first draft of the questionnaire was comprised of a total of 25 questions over six sections. There was a section describing each of the following: demographics, knowledge of HPV and cervical cancer, knowledge of HPV vaccines, attitudes about HPV vaccination, motivations and barriers toward HPV vaccination and vaccine acceptability. This first draft concentrated mostly on the knowledge construct, as it involved two sections addressing this construct. This initial format for the survey was partially guided by Bednarzcyk et al, who had done a similar study using a convenience sample of New York University female undergraduate students (56).

The initial draft questionnaire was further modified with eight additional drafts, incorporating both minor and major changes (Appendix D, Table 1). In some cases, entire sections were added or removed, as the measures for assessing the constructs became more developed. Minor modifications reflected comments or concerns regarding the questions themselves, acceptable responses or response categories or missing concepts. The questions and potential responses were ordered in such a way as to minimize the potential for respondent satisficing, defined as respondents simply selecting answers in a predictable manner, without

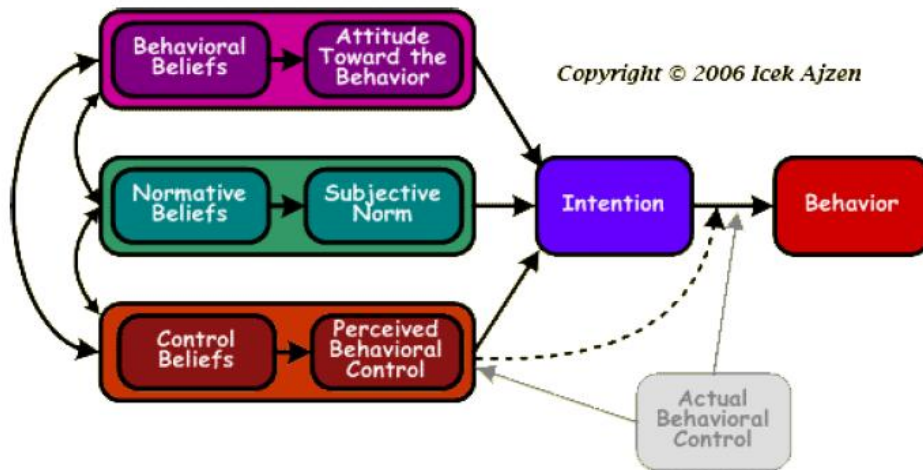
regards for the question. Certain questions and responses were therefore developed to be reverse coded to make it easier to identify respondents who were satisficing, though this was difficult to detect. Additionally, the different drafts of the questionnaire went through multiple rounds of peer and colleague review with the purpose of assessing both its readability and its content. Such input was required to ensure that the questionnaire was properly structured and asked questions which properly reflected the survey objectives and constructs being measured.

As the constructs and questions became better developed, the team recognized that the questionnaire would benefit from being guided by an overarching theory of vaccination behaviour. The Theory of Planned Behaviour (ToPB) was therefore used as the building block for the reconstruction of the attitude section of this survey. The theory suggests that intention towards a given behaviour, a central factor of the ToPB, is the best predictor of that same behaviour (See figure 2 below) (62). Intention indicates the extent to which an individual is willing to exert themselves, in order to perform the behaviour. This theory suggests that this intention is the result of three determinants: attitude toward the specific behaviour, subjective norms and perceived behavioural control. Attitude toward the specific behaviour is defined as the extent to which a person positively or negatively views a given behaviour (63). Attitude itself is a composite of various beliefs people have about the object of the attitude. In general, beliefs are formed through associations with other objects or characteristics and assume a value on a negative to positive scale (bad-good, harmful-beneficial) (63). Through this association with a positive or negative value, an attitude to the behaviour is attained. As such, people favor (have more positive attitudes toward) behaviours which are associated with more desirable consequences (62). Behavioural beliefs strongly influence the attitude toward performing a certain behaviour (in this case, getting the HPV vaccine). Subjective norm is the second

antecedent of intention and reflects the perceived social pressure or social norms associated with the behavior. Normative beliefs, the beliefs one has about the expectations of others toward the behaviour, influence subjective norms. The particular behavioural expectations of others in a person's social circle (family, friends, peers and in the case of HPV vaccination, doctors) can be as influential as attitudes in the prediction of intention or behaviour (62). The final predictor of intention in the ToPB is perceived behavioural control, which reflects an individual's perceptions about the perceived control, ease or difficulty an individual ascribes to performing a particular behaviour (62). This is established through control beliefs, which are beliefs about the factors that could facilitate or prevent performing the behaviour (63). While attitude toward the behaviour, subjective norm and perceived behavioural control together form intention, generally more favorable attitudes and subjective norms and greater perceived control lead to stronger intentions toward performing the behaviour (62). Lastly, with enough actual control over performing the behaviour, it is anticipated that individuals perform the behaviour when given the opportunity (63).

The Theory of Planned Behaviour has been used for many years for questionnaire development concerning the prediction of health behaviours in various populations, including university-aged populations (64-66). Since we were interested in behaviour (receiving the HPV vaccine), intentions (to receive or complete the course of vaccination, to be screened for cervical cancer) and predictors of those intentions, the model was a good fit for our study.

**Figure 2: Theory of Planned Behaviour (62)**



Specifically, we used the theory not only to guide questions about intentions toward vaccination (study objective 2) but also to fulfill our objectives to identify barriers that prevent vaccination and factors that promote vaccination against HPV. The theory was also used to incorporate beliefs about consequences, particularly with regards to the perceived efficacy of the vaccine. The normative beliefs part of the ToPB is highly relevant to considering barriers and facilitators (study objectives 3 and 4), as the opinions or actions of others regarding a given behaviour can greatly influence an individual's decision about the behaviour. In this case, we revised our questionnaire to expand the barriers and motivators section, ensuring that it encompassed a mix of social influences such as the influence of parents, friends and health care professionals, as well as more personal influences, such as having a family history of cervical cancer or abnormalities. This section also included potential influences, such as the vaccine coverage by private health insurance and the vaccine being offered through a school system. These influences, as well as the barriers, relate to perceived behavioral control beliefs of the

ToPB. The use of this theory thus made several sections of the questionnaire stronger and more comparable to other studies.

### 2.5.2 Cognitive Interviews

Cognitive interviewing is an important step in the development of a questionnaire for distribution in a large population. Its purpose is to uncover the process through which people understand and come to an answer to a particular question. According to Groves et al, 2009 (61), all survey questions should include 3 standards: content standards, cognitive standards and usability standards. The first addresses whether the questions included are asking the right things, in order to properly assess the constructs of study. This standard was felt to be met through the careful development process described above. The second assesses if respondents are consistently capable of understanding and willingly responding to the questions, given the information they already possess. The last standard is based on how easily the respondents can complete the questionnaire and if they can complete it in the manner it was intended to be completed. These last two standards are assessed through the cognitive interviewing process, to ensure that the final survey is appropriate and usable, before it is distributed.

While there are several methods that have been studied for properly conducting a cognitive interview, the methods used for this study were retrospective think-alouds, along with the use of probes. The former method refers to the process by which a respondent describes to an interviewer how they arrived at their answer to a given question after providing one on the questionnaire, while the latter required the respondent to answer follow up questions issued by the interviewer, designed to help elucidate the response strategies of the respondent.

Advantages to using a combination of both verbal probing and a form of think-aloud include (1) controlling the interview by preventing the interviewee from going on tangents that

could detract from the original purpose of the interview; (2) allowing the interviewer to focus on areas that could be future sources of response error; (3) the burden of the interview not falling on the respondent, as they do not to be trained to respond in much detail of the own accord, but rather can be prompted as required (67). A combination of both scripted and unscripted probes were used in the interviews. Specific scripted probes were written for each question (see Appendix F). If during the interview, something was said that required clarification or follow-up questions were in order, unscripted probes were used.

A total of three cognitive interviews were conducted for this study, using a convenience sample of individuals in the target age group who were acquaintances of the researcher (RF). The interviews consisted of the respondents going through the version of the questionnaire that was submitted to ethics. The questionnaire consisted of a total of 49 questions. The interviewees, however, answered the questionnaire according to its skip patterns, thereby answering 35 questions. As this was designed as a self-administered web-based survey in which respondents are expected to read and answer the questions themselves, during the interviews the respondents read the questions themselves. The information from the interviews was informally recorded in written form, with the interviewer taking notes as the respondent thought aloud.

### **2.5.3 Pilot Test**

A pilot test was the final process involved in the development of the questionnaire. The purpose of this pilot test was to assess all aspects of the survey. This process helped ensure that the survey application (Fluid Surveys) was usable from a variety of computers and internet browsers and that the instructions were clear and being followed. The pilot test also provided an opportunity to recognize if any questions were being missed consistently and that all the questions had a variety of responses. Lastly, this process ensured that it was possible to collect

the data and that it could be exported and stored in a database separate from the survey server, for analysis purposes.

The pilot test included 20 people: 18 women and 2 men. The two men were included to test the function of the survey to redirect potential male respondents to the end of the survey, as they were not part of the target population. The women involved were drawn from a population outside the target population and were primarily acquaintances of the researcher (RF). Results from the pilot study were collected from respondents using different computer systems and internet browsers, as well as in both English and French. The pilot test resulted in a variety of responses to all the questions, indicating that the questions were collecting useful information. Additionally, the results of the pilot test were helpful in estimating more accurately the time required to respond to the entire survey. Comments from the participants of the pilot test informed the final physical design of the questionnaire on Fluid Surveys, particularly with regards to the colour scheme and spacing issues for some of the response categories. The questionnaire itself did not change.

#### **2.5.4 Final Instrument**

The final survey comprised of 5 sections with a total of 49 questions (see Appendix B).

The first question of the survey was a screening question: it simply asked about the sex of the respondent to separate males who were responding to the survey and redirect them to the survey's thank you page, as the targeted population for this study was female. The second question of the survey was used to separate the female survey participants into 2 groups; the first included those respondents who had received at least one dose of an HPV vaccine and the second included the participants who had not been vaccinated. Respondents who indicated that they had been vaccinated were then asked the number of doses they had received to date.

The content sections were:

- (1) Questions about overall attitudes and intentions towards HPV vaccination and cervical cancer screening.
- (2) Potential motivations for HPV vaccination, as well as barriers that prevent such immunization (beliefs).
- (3) Vaccine acceptability and safe sex practices
- (4) Knowledge about HPV and cervical cancer
- (5) Demographics

More specifically, the first two content sections of the questionnaire had slight differences that depended on the vaccination status of the respondent, as ascertained in the introductory section. The first content section included 11 questions for each group, nine questions regarding the respondent's attitudes to issues surrounding HPV vaccination and two questions about intentions. The attitudes component of the section was basically identical between the two groups and covered: (i) an overall attitude toward the vaccine; and (ii) the main outcomes that the HPV vaccines were developed to prevent (behavioural beliefs about consequences and importance of those consequences, which in turn influence attitude, as per the ToPB). Thus, the questions were centered on genital warts, cervical cancer and cervical cancer screening. There were also additional questions about the people who should be given the vaccine. This part of the survey was guided by the ToPB, with each separate idea being captured by multiple Likert scales that were worded in a specific way (Appendix B, questions 4-12, 17-25). While certain questions directly asked for opinions about the nature of the potential benefits of HPV vaccination, other questions drew out views about the vaccine's efficacy with respect to those benefits (e.g. it's ability to actually prevent certain health risks). Response categories for

many of these questions included categories that were reverse coded in order to more easily detect respondents who were “satisficing” (i.e. not reading the questions carefully). Satisficing was not detected.

The intentions questions varied slightly between the two groups; while the vaccinated group was asked if they intended to complete the vaccine series, the non-vaccinated group was asked if they intended to start the vaccine series. It was important to ask the question to the vaccinated group because it clarified the proportion of women who had already completed the vaccination series, those who intended to complete the series but outside of the scheduled time frame (receive the third dose by 6 months after the first dose) and the proportion of women who did not intend to complete the vaccines series.

The second section of the survey differed considerably between the two groups. This section incorporated questions about motives to receive the vaccine and barriers which prevent receiving the HPV vaccine (i.e., the normative beliefs and perceived behavioural control beliefs in the ToPB). The group of respondents who were vaccinated answered two multi-part questions, while the other group answered three. Only the non-vaccinated group was asked about potential barriers that prevent HPV vaccination. This same group was also asked an additional question about cost, as it is an underlying theme in the literature. This section of the questionnaire involved various statements, both novel and from previously published studies, with Likert scales as the response categories.

From the third section onwards, all the questions were common for both groups. The third section concerned vaccine acceptability and its influence on safe sex practices. This part was included as it is important to know if HPV vaccination, which is supposed to lower the risk of cervical cancer, negatively impacts people’s attitudes towards their sexual health or their

practices of safe sex. By understanding the role HPV vaccination plays in future sexual practices, it is possible to then target education and information programs accordingly, to clarify the advantages and limitations of the vaccine. Questions in this section of the survey addressed the influence of HPV vaccination on future decisions regarding Pap smears and safe sex practices, particularly condom use. One of the questions in this section was taken from a previously validated measure (68), which globally concerned safe sex.

The fourth section of the survey involved a series of true or false statements, designed to test the respondent's level of knowledge about the virus, the HPV vaccine and cervical cancer screening. The questions in this section were developed with the benefit of the current literature, as well as with information that is readily available on the Public Health Agency of Canada's website and the respective websites for Gardasil and Cervarix. The purpose of this section was to comprehend whether lack of knowledge or high knowledge contributed to the results of the study, particularly with regards to HPV vaccine attitudes.

The fifth and final section of the questionnaire involved a series of demographic questions. Questions concerning faculty, age, ethnicity and province or country of origin were included to have a general idea of the population involved in the study. Other questions regarding health insurance, sexual activity and sexual health were included to compare the participants in the two groups involved in the study.

The final survey was translated from English to French by the researchers and then verified by a Francophone, to ensure the translation and expressions used were appropriate. The survey was available in both languages.

## **2.6 Focus Groups**

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### **2.6.1 Rationale for Including Focus Groups**

When using a questionnaire as the basis of data collection, qualitative methods can be essential in uncovering more significant meanings to certain responses or behaviours, as well as in providing potential explanations for surprising or unexpected responses (69).

Two models have been developed to explain the relationship between epidemiology and qualitative research. These models, “The enhancement model” and “The epistemological model”, both describe how the use of qualitative research can contribute to epidemiological studies and understanding (69). While the first illustrates how qualitative research can enhance quantitative work in various aspects, the latter model suggests that qualitative research not only enhances epidemiological research, but contributes to it in a material way by delving further into understanding concepts.

For this study, qualitative research was used primarily for enhancement purposes, in order to reflect on the responses obtained through the survey. The data collection method used for the qualitative component of this thesis was focus groups. Focus groups were used to discuss and elaborate on unexpected or potentially controversial issues that were raised in the questionnaire.

### **2.6.2 Purpose of Focus Groups**

Focus groups are used to gather information and as a way to understand how people think and feel about an issue (70). We conducted two focus groups. The first focus group included students who had participated in the survey distributed to the undergraduate students at the

University of Ottawa. The second focus group included a group of immigrant women who did not participate in the original study.

Two focus groups of characteristically different women were used for several reasons. These include understanding the range of ideas and views people have about the topic of study, as well as the difference in opinions between the two groups of women. Groups were used as opposed to individual interviews because of the effect group discussion can have on an idea. Ideas and opinions can evolve in a synergistic manner, as people delve deeper into topics together.

### **2.6.3 Focus Group for Students**

Participants of the main survey were given the opportunity to take part in a focus group to further discuss HPV vaccination and cervical cancer screening. Potential participants were asked to email the researchers after completing the questionnaire if they were interested in participating in the focus group. Nine women volunteered to take part in this focus group and they were all invited to attend the discussion, which took place in a conference room of a University of Ottawa library, on a weekday afternoon in early April, 2013. It was not possible to purposively sample women with different opinions on the HPV vaccine, as the survey responses were not linked to individuals. Six women attended this focus group, in addition to the group facilitator (RF) and a note-taker (a study team member, MK). The responses were audio-recorded and notes were taken by the note-taker.

The question route developed for this first focus group (Appendix C) was based on some of the more unexpected results of the pilot study, as well as preliminary results of the main survey. The question route followed a common design suggested for qualitative research (70), beginning with a relaxed opening question and moving on to introductory questions to introduce

the topic of discussion, transition questions to move into the main reason for the discussion group, key questions and ending questions. The main questions asked of this focus group surrounded the issues of vaccination prevalence, reasons for not being vaccinated, the target population for HPV vaccination, the effect of HPV vaccination on safe sex practices and the effect on future cervical cancer screening decision making.

#### **2.6.4 Focus Group for Immigrant Women**

The group of immigrant women was assembled to take part in a discussion about their perceptions toward HPV vaccination and cervical cancer screening. Women were approached at the Community Cup tournament, an annual soccer tournament in the city of Ottawa which was established in 2005. For the past nine years, this tournament has been an opportunity for new Canadians to meet other newcomers and learn more about the city and the programs it has to offer. Only women who could understand and speak English were invited to participate in the focus group. Eight women expressed an interest in the group and four attended the discussion, in addition to the focus group facilitator (RF). This focus group took place early in July, in the same conference room of a University of Ottawa library, which is located in downtown Ottawa and easily accessible by both car and public transit. The focus group was audio-recorded and notes were taken by the facilitator.

Akin to the focus group of students, this second focus group was given the opportunity to discuss the results of the survey completed by the university students. This was done with the intention of verifying whether the opinions of the focus group members were similar to those of the larger student group. At the same time, the focus group participants were given the opportunity to express their opinions as to what they believed would be the best methods for reaching out to, and surveying, other immigrant women. The information collected from this

focus group could serve to inform instrument development and sampling strategies for further research on this topic, in an immigrant population.

The question route for this focus group (Appendix C) was similar to the one used for the focus group for students and followed the same skeleton. The second focus group was primarily used to assess if there were any differences in opinions of new Canadians.

## **2.7 Statistical Analysis**

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### ***2.7.1 Questionnaire Analysis***

The data were analyzed first using descriptive statistics. These statistics include means and standard deviations for continuous variables, and proportions with confidence intervals for categorical variables. Behavioural beliefs and attitudes were evaluated through a series of questions based on the Theory of Planned Behaviour. These beliefs and attitudes were assessed using multiple characteristics on a 7-point scale. On the scale, a one indicated a positive behavioural belief (i.e. good, desirable, beneficial), while a seven was indicative of a negative view (i.e. bad, undesirable, harmful). A mean of the behavioural beliefs was then calculated to evaluate an overall attitude (i.e. attitude to receiving the HPV vaccine) on a 7-point scale and used as the approach to compare the groups of vaccinated and non-vaccinated women. The lower the overall mean the more positive the attitude is toward the construct. A score between three and five was considered as neutral, while a score greater than five was considered unfavourable. A method similar to this has previously been used, in which the total overall score of multiple Likert scales was used to compare study subpopulations, as opposed to the overall mean (65).

A logistic regression model was also included to investigate the associations between the predictors and the primary outcome of interest, accepting HPV vaccination. Regression analysis

was used to compare (1) respondents who intend to be vaccinated against HPV at some point in the future with those who do not intend to be vaccinated in the future; and (2) those who were vaccinated with those who intend to be vaccinated against HPV at some point. Both univariate and multivariate models were used to assess which factors are influential in HPV vaccination. The ToPB indicates that intention is best predicted by a combination of overall attitude toward the behaviour, social norms and perceived behavioural control. Thus, variables in the questionnaire which represented these predictors of behavioural intention were included in these models, which is similar to the analyses conducted in other studies (65, 66). Several candidate participant characteristics were considered for inclusion in these models; those which were statistically significant were included in the final models. The inclusion of demographic characteristics in the final model was done to control for possible confounding by these variables (65).

According to the ToPB (Figure 2), behavioural beliefs should influence overall attitude, which in turn influences intention towards behaviour. To evaluate if overall attitude mediates the association between beliefs and intentions, the logistic regression analyses involved two multivariate models for each of the two study sub-populations, mentioned above. The first multivariate logistical model directly assessed the influence of only beliefs (behavioural, normative and control) on vaccine uptake intention, while the second model also included overall attitude. Univariate linear regression was then conducted, using the individual beliefs as predictors of overall attitude to receiving the HPV vaccine, in order to assess whether this attitude can be predicted by beliefs. In a similar study conducted by Ratanasiripong et al, the researchers explored the individual correlations between behavioural beliefs, subjective norms and perceived behavioural control to the overall attitude to receiving the HPV vaccine (65).

Although these researchers did not use univariate linear regression, they too explored the relationship between beliefs and overall attitude.

As a survey was the tool used for primary data collection in this study, response rates were calculated on a faculty basis. Missingness in the data, incomplete questionnaires, were included in the analysis if the respondents had at the very least completed the first section of the questionnaire, indicating if they had been vaccinated, their attitudes towards the vaccine and intentions for future vaccination and screening. Information concerning survey completion in English or French, as well as time required to complete the survey, was also included. SAS 9.3 was used to do all the statistical analyses.

### **2.7.2 Focus Group Analysis**

Notes and audio-recordings were taken at each focus group. The audio-recordings were transcribed by a study researcher; transcription was focused on the main points brought forth by each participating member for each question, as well as quotes that particularly stood out. The field notes were used as an initial template for the transcription of the audio-recordings, as they captured many of the themes that were reiterated over the course of the discussion.

There are five main steps in qualitative research: (1) establishing general research question(s); (2) selecting relevant site(s) and subjects; (3) collection of relevant data; (4) interpretation of data; (5) conceptual and theoretical work. Step 5 can lead to the collection of more data and repeating the last steps (71).

Analysis of the groups was guided by the idea of concepts established in qualitative research, particularly in qualitative description (72). The principles of qualitative research were used to define and identify emerging concepts which were then broken down into specific

categories, which can potentially group different concepts together (71). The discussion of each concept was continued until no new information arose. Interpretation of the data was based on these concepts, how often they arose and how they relate to each other.

The two focus groups were conducted in the hope of achieving data saturation within and between each focus group. This saturation is attained when no new or applicable information is provided for a given category, the category has been substantially developed or the relationship between categories has been validated (71, 73). The first definition was used to determine saturation of each concept for each of the focus groups in this study. Each question reflected on a different theme which was compared between the two different groups.

Common themes were grouped for each question and overarching themes which were represented over the entire discussion were assessed within and between the focus groups to evaluate if the different groups had similar views or ideas. The concepts raised in the focus groups were discussed with another study researcher (JL) as well as the note-taker of the first focus group.

## **2.8 Ethics**

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Both the web survey and the focus group components of this study were approved by the Ottawa Hospital Research Ethics Board (Appendix F).

## **CHAPTER 3**

### **RESULTS**

A total of 401 women were included in the final analysis of this study. Of these, 378 completed the entire questionnaire, while 23 completed at least the first section about attitudes and intentions. Approximately 15% of the respondents completed the questionnaire in French.

This survey was distributed to the entire Faculty of Science, as well as individual departments in the Faculties of Arts, Social Sciences and Health Sciences. With the exception of the Department of Women's Studies, it was not possible for the survey invitations to only be sent to women. Any males who attempted to complete the survey were redirected to the thank you page, after indicating that they were male. The overall response rate for this survey was 16.72% (see Appendix D for number of students approached in each faculty and the response rate by Faculty). The response rate was calculated using estimates for the proportion of females in each of the faculties involved in this study, based on statistics available for the University of Ottawa, as well as from the people who facilitated the distribution of the survey invitations.

#### **3.1 Participant Characteristics**

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Of the 401 women in the study, 196 (48.88%) had received at least 1 of the 3 doses of the vaccine series. Of these 196 women, nearly 60% had received the entire 3 doses required to complete the vaccine program. Nearly a fifth of the vaccinated sample was unsure of the amount of vaccine doses received (Table 1).

The rates of HPV vaccination by age, though unsurprising, indicate that the younger women in this cohort, 19 years of age or under, were 1.49 times more likely to be vaccinated against HPV than women 20 years of age or older (Chi square 14.29,  $p=0.0002$ , RR=1.49, 95%

CI [1.22, 1.81]). This is likely because the younger women in this study were offered the vaccine in school.

**Table 1: Prevalence of HPV vaccination**

<b>Characteristic</b>	<b>N</b>	<b>(%)</b>
<b>Ever been vaccinated against HPV</b>		
Yes	196	48.88
No	205	51.12
<b>Doses of HPV Vaccine Received</b>		
1	13	6.63
2	31	15.81
3	113	57.65
Not sure	38	19.39
<i>Missing</i>	1	0.51

Overall 23 women, 9 in the vaccinated sample and 14 in the non-vaccinated sample did not complete the demographics section at the end of the questionnaire and so were excluded from this part of the analysis.

Table 2 describes the general demographics of the study cohort. The average age of the women who participated in this study was 20.4 (this average excludes 11 people whose ages were not specified, as women under the age of 18 and older than 25 were grouped into categories of either younger than 18 or older than 25). The largest age category was women 21 years of age. The vaccinated sample included 2 women under the age of 18 (age not specified) and 1 woman over the age of 25, while the non-vaccinated group included no women under the age of 18 and 8 women over the age of 25. The median age group of was 20 and 21 for the vaccinated and non-vaccinated samples, respectively.

All participants in this study belonged to one of 4 faculties: Arts, Health Sciences, Science or Social Sciences. The largest number of students belonged to the Faculty of Science, as the whole faculty was offered the opportunity to participate in the study. Akin to the age

characteristic, there were similar numbers of participants from vaccinated and non-vaccinated women within faculties.

The largest ethnic population in the study was white; however the non-vaccinated group had greater ethnic diversity. The next largest ethnic groups included women who were Black, Chinese or South Asian. With the exception of white and Aboriginal women, there was a discernible trend for women of other ethnicities to be less likely to be vaccinated against HPV. While the sample drew participants who had lived in 8 different provinces and several other countries before coming to Ottawa, the vast majority of the participants were from Ontario. There were similar rates of vaccination among women from the same province or country. The majority of the study participants were either covered by their parent's health insurance or that of the university.

Several characteristics were explored further to establish if there was an association between the variable and HPV vaccine uptake. There were larger differences between the vaccinated and non-vaccinated groups when it came to questions regarding sex and sexual health. While women in the vaccinated group were more likely to have had a sexual encounter, a sexually transmitted infection other than HPV and be Canadian-born, the only significant differences, at this bivariate level, were that vaccinated women were significantly more likely to: have had at least one Pap smear, be using some form of birth control or contraception and identify as being ethnically white. Women in the non-vaccinated group were slightly more likely to have had an abnormal Pap smear and diagnosed HPV infection at the time of the survey, though these results were not significant (Figure 3). These findings are not adjusted for age.

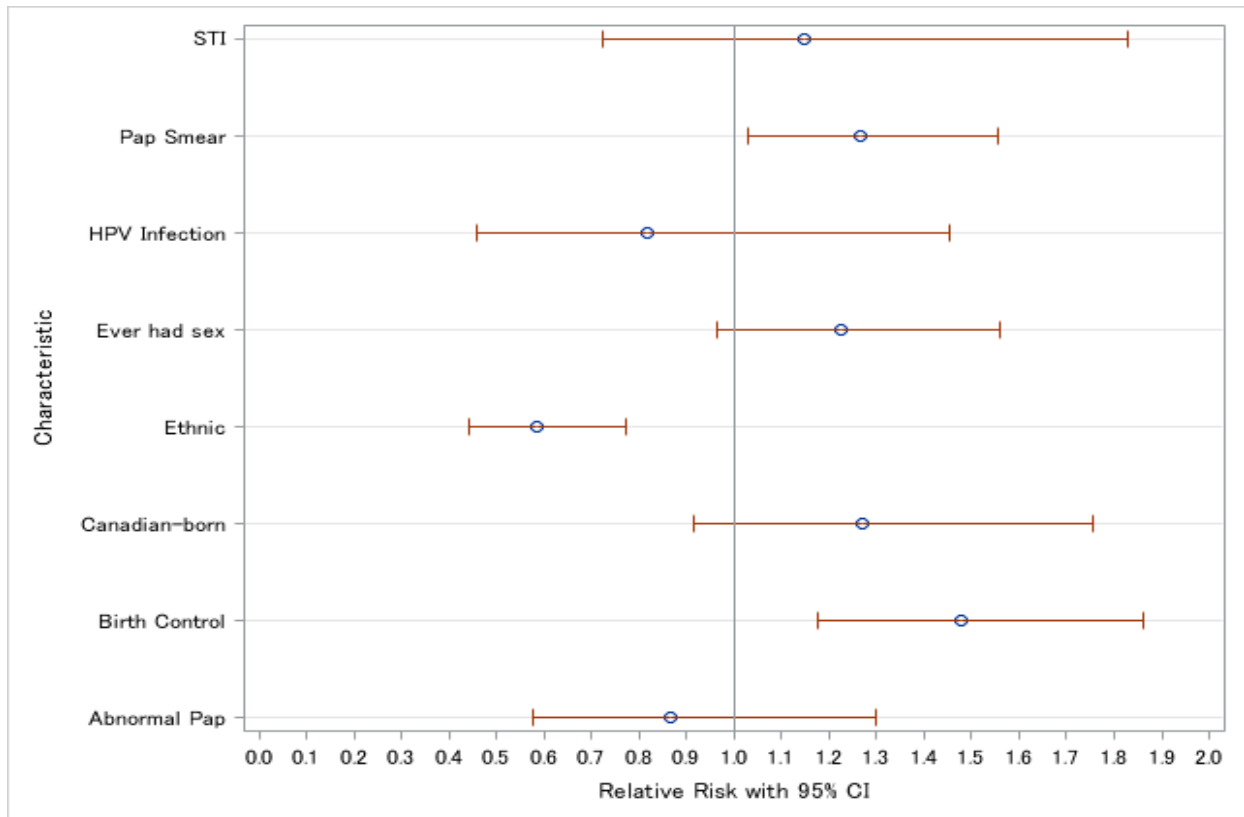
**Table 2: Participant characteristics by vaccination status**

Characteristic	Vaccinated (n = 196)		Not vaccinated (n = 205)	
	N	%	N	%
<b>Age</b>				
<18	2	1.02	0	0.00
18	34	17.35	17	8.29
19	41	20.92	27	13.17
20	28	14.29	47	22.93
21	45	22.96	46	22.44
22	23	11.73	23	11.22
23	11	5.61	13	6.34
24	2	1.02	7	3.41
25	0	0.00	3	1.46
>25	1	0.51	8	3.90
<i>Missing</i>	9	4.59	14	6.83
<b>Faculty</b>				
Arts	9	4.59	10	4.88
Health Sciences	17	8.67	13	6.34
Science	145	73.98	147	71.71
Social Sciences	16	8.16	20	9.76
<i>Missing</i>	9	4.59	15	7.32
<b>Ethnicity</b>				
White	144	73.47	115	56.10
South Asian	4	2.04	14	6.83
Chinese	6	3.06	12	5.85
Black	8	4.08	15	7.32
Latin American	3	1.53	4	1.95
Arab	3	1.53	9	4.39
South-East Asian	7	3.57	8	3.90
West Asian	2	1.02	4	1.95
Korean	0	0.00	1	0.49
Aboriginal	3	1.53	0	0.00
Other:	6	3.06	6	2.93
<i>Missing</i>	10	5.10	17	8.29
<b>Province or Country of Residence before University of Ottawa</b>				
Atlantic Provinces	6	0.51	9	4.41
Quebec	22	11.22	15	7.32
Ontario	152	77.55	156	76.10
Western Provinces	1	0.51	3	1.47
<i>Other (not specified)</i>	1	0.51	0	0.00
Africa	2	1.02	2	0.98
USA	0	0.00	2	0.98
Europe	1	0.51	1	0.49
Central America	0	0.00	1	0.49
Asia	0	0.00	1	0.49
More than 1 country	2	1.02	0	0.00
<i>Missing</i>	9	4.59	14	6.83

**Table 2: Participant characteristics by vaccination status (Continued)**

Characteristic	Vaccinated		Not Vaccinated	
	N	%	N	%
<b>Canadian Born</b>				
Yes	164	83.67	154	75.12
No	24	12.24	35	17.07
Missing	8	4.08	16	7.80
<b>Insurance Coverage, in addition to Provincial coverage</b>				
Parents	124	63.27	105	51.22
University	58	29.59	70	34.15
Own private insurance	3	1.53	4	1.95
Spouse	0	0.00	2	0.98
None	3	1.53	7	3.41
Missing	8	4.08	17	8.29
<b>Ever had Sex</b>				
Yes	140	71.43	124	60.49
No	48	24.49	63	30.73
Missing	8	4.08	18	8.78
<b>Pap Smear</b>				
More than 1	68	34.69	57	27.80
Once	35	17.86	25	12.20
No	81	41.33	103	50.24
Don't know	3	1.53	4	1.95
Missing	9	4.59	16	7.80
<b>Abnormal Pap Smear</b>				
Yes	14	7.14	18	8.78
No	159	81.12	155	75.61
Don't know	13	6.63	15	7.32
Missing	10	5.10	17	8.29
<b>Up to date on Vaccines</b>				
Yes	154	78.57	127	61.95
No	9	4.59	22	10.73
Don't know	24	12.24	38	18.54
Missing	9	4.59	18	8.78
<b>Birth Control/Contraception</b>				
Yes	128	65.31	95	46.34
No	59	30.10	93	45.37
Missing	9	4.59	17	8.29
<b>HPV infection</b>				
Yes	7	3.57	10	4.88
No	181	92.35	178	86.83
Missing	8	4.08	17	8.29
<b>Other STI infection</b>				
Yes	8	4.08	6	2.93
No	180	91.84	182	88.78
Don't know	0	0.00	1	0.49
Missing	8	4.08	16	7.80

**Figure 3: Relative risk of reporting having been vaccinated against HPV for women with particular characteristics**



### 3.2 Intention toward HPV Vaccination

#### 3.2.1 Intention to complete vaccination program

Of the 196 women who indicated that they were vaccinated against HPV, almost three-quarters indicated that they had already completed the full dose schedule (Table 3), although only 58% had indicated with certainty that they had received 3 doses of the vaccine (Table 1). Almost all the remainder of the vaccinated group intended to finish completing the 3 vaccinations as scheduled, albeit a little more than 8% specified that they would take longer than the recommended 6 months to complete the vaccination process (Table 3). Only 2 of the 196 vaccinated women (1.02%) indicated that they would not be receiving the full vaccine program. One woman felt it would be better for her health not to complete the vaccine series, while the

other woman thought she would have to restart the entire vaccine program if she were to ask for the next dose. Another 2 women did not respond to the question.

**Table 3: Intentions to complete the vaccination program**

Intentions	Vaccinated Group	
	N	(%)
Finish vaccine doses as per schedule	34	17.53
Finish, but take longer than scheduled time frame	16	8.25
Has already received all the doses	142	73.20
Will not finish getting the vaccine	2	1.03

**3.2.2 Intention to receive the vaccine program**

The responses were more diverse in the non-vaccinated group towards the HPV vaccine program. Although nearly 40% of the non-vaccinated sample stated that they did not intend to receive the immunization, nearly 50% indicated that they planned on getting vaccinated against HPV at some point in the future. However, when specifically asked if they intended to be vaccinated within the next 12 months, only 18% indicated that they did have this intention. The results of the three questions that addressed the respondents' intentions to be vaccinated in the future are indicated in Table 4.

Of the 57 participants who were neutral to the idea of intending to be vaccinated in the next 12 months, 43% intend on getting vaccinated at some point, while another 54% were neutral to the idea of HPV vaccination at some point. Of the 80 women who indicated that they do not intend on being vaccinated at all, 32 were neutral or planned to get vaccinated at some point in the future.

Although 99 women in the non-vaccinated cohort specified that they planned on being vaccinated against HPV at some point, only 37 indicated that they intended to be vaccinated within the next 12 months.

**Table 4: Intentions to be vaccinated**

Intentions	Non-vaccinated group	
	N (204)	(%)
Get vaccinated in the next 12 months		
Agree	37	18.14
Neutral	57	27.94
Disagree	110	53.92
Do <b>not</b> intend to get vaccinated		
Agree	80	39.22
Neutral	46	22.55
Disagree	78	38.24
Get vaccinated at some point		
Agree	99	48.53
Neutral	51	25.00
Disagree	54	26.47

### **3.3 Perceptions about HPV Vaccination: Beliefs about consequences of the vaccine and attitudes toward the vaccine**

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In general, study participants had relatively positive perceptions about HPV vaccination. When analyzed as separate groups, vaccinated women consistently had more positive views towards HPV vaccination than non-vaccinated women. The greatest differences in opinions between the two groups related to the concept of HPV vaccination being beneficial, desirable and good. Table 5 indicates the overall mean, median and range of attitudes (and beliefs) to the behavior (HPV vaccination) of the women in both cohorts. These statistics were based on a 1 to 7 Likert scale, in which a 1 indicated a more favourable attitude to a given characteristic.

Compared to the vaccinated group, the study participants in the non-vaccinated group had more diversity in their responses, though the largest proportion of women had favorable opinions towards HPV vaccination in general.

**Table 5: To me, getting vaccinated against HPV was (would be...)**

Concept	Vaccinated Group (n=196)			Non-vaccinated Group (n= 205)			p-value
	Mean	Median	Range	Mean	Median	Range	
<b>Beneficial</b> <sup>1</sup>	1.66	1.00	[1.00, 7.00]	2.70	2.50	[1.00, 7.00]	<0.0001
<b>Desirable</b> <sup>2</sup>	2.11	1.00	[1.00, 7.00]	3.26	3.00	[1.00, 7.00]	<0.0001
<b>Good</b> <sup>3</sup>	1.70	1.00	[1.00, 5.00]	2.70	3.00	[1.00, 7.00]	<0.0001
<b>Useful</b> <sup>4</sup>	1.99	1.00	[1.00, 7.00]	2.94	2.50	[1.00, 7.00]	<0.0001
<b>Effective</b> <sup>5</sup>	2.41	2.00	[1.00, 7.00]	3.00	3.00	[1.00, 7.00]	0.0002

Responses are based on a 1 to 7 Likert scale, where a 1 indicates a positive attitude.

The scales were rated as <sup>1</sup> Beneficial to Harmful; <sup>2</sup> Desirable to Undesirable; <sup>3</sup> Good to Bad; <sup>4</sup> Useful to Worthless;

<sup>5</sup> Effective to Ineffective

P-value based on the differences in means.

In addition to both groups of women having very positive beliefs about decreasing their personal risk of getting genital warts (Table 6) or cervical cancer (Table 7), both groups mostly shared similar notions about the perceived efficacy of HPV vaccines with regards to the aforementioned risks (Table 8). The vaccinated group consistently had even more favourable views towards decreasing their risk of genital warts or cervical cancer, when compared to the non-vaccinated group. With regards to perceived vaccine efficacy, though both groups believed that the vaccine would decrease their risk of cervical cancer, their beliefs tended to be neutral towards the vaccine's ability to decrease the risk of genital warts. The perceptions of the women in the vaccinated group were again more positive toward the vaccine than the non-vaccinated cohort, which is particularly evident in the respondents' views of the vaccine's perceived efficacy to decrease the risk of cervical cancer, shown in Table 8.

**Table 6: Decreasing my risk of getting genital warts is...**

Concept	Vaccinated Group (n=196)			Non-vaccinated Group (n= 205)			p-value
	Mean	Median	Range	Mean	Median	Range	
<b>Beneficial</b> <sup>1</sup>	1.14	1.00	[1.00, 4.00]	1.40	1.00	[1.00, 5.00]	0.0002
<b>Desirable</b> <sup>2</sup>	1.25	1.00	[1.00, 7.00]	1.47	1.00	[1.00, 7.00]	0.03
<b>Good</b> <sup>3</sup>	1.12	1.00	[1.00, 3.00]	1.35	1.00	[1.00, 6.00]	0.0003

Responses are based on a 1 to 7 Likert scale, where a 1 indicates a positive attitude.

The scales were rated as <sup>1</sup> Beneficial to Harmful; <sup>2</sup> Desirable to Undesirable; <sup>3</sup> Good to Bad

P-value based on the differences in means.

**Table 7: Decreasing my risk of getting cervical cancer is...**

Concept	Vaccinated Group (n=196)			Non-vaccinated Group (n= 205)			p-value
	Mean	Median	Range	Mean	Median	Range	
<b>Beneficial</b> <sup>1</sup>	1.08	1.00	[1.00, 4.00]	1.29	1.00	[1.00, 7.00]	0.001
<b>Desirable</b> <sup>2</sup>	1.22	1.00	[1.00, 7.00]	1.40	1.00	[1.00, 7.00]	0.07
<b>Good</b> <sup>3</sup>	1.09	1.00	[1.00, 4.00]	1.24	1.00	[1.00, 5.00]	0.005

Responses are based on a 1 to 7 Likert scale, where a 1 indicates a positive attitude.

The scales were rated as <sup>1</sup> Beneficial to Harmful; <sup>2</sup> Desirable to Undesirable; <sup>3</sup> Good to Bad

P-value based on the differences in means.

**Table 8: Efficacy of HPV vaccination**

Concept	Vaccinated Group (n=196)			Non-vaccinated Group (n= 205)			p-value
	Mean	Median	Range	Mean	Median	Range	
<b>Decreased Risk of Genital Warts</b>	3.01	3.00	[1.00, 7.00]	3.33	3.00	[1.00, 7.00]	0.07
<b>Decreased Risk of Cervical Cancer</b>	2.14	2.00	[1.00, 7.00]	2.76	2.00	[1.00, 7.00]	0.0002
<b>Decreased need of future cervical cancer screening</b> <sup>**</sup>	5.01	5.00	[1.00, 7.00]	5.04	5.00	[1.00, 7.00]	0.87

Scales based on an Extremely likely to Extremely Unlikely 1 to 7 Likert Scale.

\*\*This scale measures the *decreased* need for cervical cancer screening.

P-value based on the differences in means.

Analysis of the overall attitudes particular ethnicities had towards the HPV vaccine demonstrated that within vaccinated and non-vaccinated groups, the overall attitudes tended to be similar, regardless of ethnicity (Table 9). With the exception of the Aboriginal group, which only had 3 respondents who were all vaccinated, all the other cells had a minimum of 5 respondents in them. Some categories had to be collapsed together to make this possible. Arab, West Asian and South Asian respondents were collapsed into an Asian category, while Chinese, South-east Asian and Korean respondents were grouped into an East Asian category and black and Latin American respondents were grouped together. Most respondents thought the vaccine was likely to be more effective at reducing the risk of cervical cancer, compared to genital warts. No group of women, vaccinated or not, considered the vaccine as harmful or useless and generally had a positive view of the vaccine. The vaccinated women in the East Asian group had

slightly less positive views towards the vaccine’s efficacy of decreasing genital warts or cervical cancer, compared to the non-vaccinated women of the same ethnicities, though this result was not statistically significant. Both white and Canadian-born vaccinated respondents had significantly more positive views across all three categories compared to the non-vaccinated respondents of these same characteristics. The overall attitude about the vaccine’s efficacy against development of cervical cancer was significantly more positive for the vaccinated Asian respondents compared to the non-vaccinated Asian respondents. Canadian-born and immigrant women had comparable views of the vaccine and its perceived efficacy at decreasing the risk of genital warts and cervical cancer. While non-vaccinated immigrant women had a slightly more positive perception of the vaccine than non-vaccinated Canadian-born women, vaccinated immigrant and Canadian-born women had a statistically significant more positive overall attitude to receiving the HPV vaccine than the non-vaccinated women of the same groups.

**Table 9: Attitudes to HPV vaccination and beliefs about vaccine efficacy by ethnicity and immigrant status**

Ethnicity and Immigration Status	Overall Attitude†			Genital Warts*			Cervical Cancer**		
	Vaccinated Group	Non-Vaccinated Group	p-value	Vaccinated Group	Non-Vaccinated Group	p-value	Vaccinated Group	Non-Vaccinated Group	p-value
White	1.93	3.01	<0.0001	2.92	3.44	0.019	2.06	2.82	<0.0001
Asian	1.68	2.70	0.06	3.00	3.46	0.53	1.63	2.70	0.04
East Asian	2.00	2.33	0.44	3.91	3.22	0.25	2.64	2.12	0.27
Black/ Latin American	2.38	3.29	0.15	2.55	3.28	0.29	2.36	3.33	0.11
Aboriginal	2.0	-	-	4.00	-	-	3.00	-	-
Canadian-Born	1.99	2.97	<0.0001	3.01	3.41	0.044	2.12	2.84	<0.0001
Immigrant	1.97	2.59	0.04	2.87	3.00	0.77	2.17	2.37	0.56

All values based on a 1-7 Likert scales.

† Based on the means of 5 Likert scales rated from Beneficial to Harmful; Desirable to Undesirable; Good to Bad; Useful to Worthless; Effective to Ineffective

\*Perceived efficacy of the vaccine to decrease the risk of genital warts

\*\*Perceived efficacy of the vaccine to decrease the risk of cervical cancer

With respect to the more controversial question of which women should be vaccinated, those who are sexually active or those who are not, the difference was visible. Although both the

non-vaccinated and vaccinated groups had positive attitudes towards the vaccination of sexually active women against HPV, the vaccinated group's views were statistically significantly more favorable (Table 10). The group of non-vaccinated women, however, had a more neutral standpoint with regards to the vaccination of all eligible females who are not sexually active. The women who were part of the vaccinated cohort all shared a distinctly positive view towards the vaccination of eligible girls who are not sexually active, but comparatively, the non-vaccinated cohort thought that this vaccination would be less beneficial, desirable, good or important (Table 11).

**Table 10: Vaccinating all eligible girls who are sexually active**

Concept	Mean			Median		Range	
	Vaccinated Group	Non-Vaccinated Group	p-value	Vaccinated Group	Non-Vaccinated Group	Vaccinated Group	Non-Vaccinated Group
<b>Beneficial</b>	1.50	2.01	<0.0001	1.00	2.00	[1.00, 5.00]	[1.00, 6.00]
<b>Desirable</b>	1.93	2.27	0.01	2.00	2.00	[1.00, 7.00]	[1.00, 7.00]
<b>Good</b>	1.52	2.00	<0.0001	1.00	2.00	[1.00, 7.00]	[1.00, 7.00]
<b>Important</b>	1.60	2.18	<0.0001	1.00	2.00	[1.00, 7.00]	[1.00, 7.00]
<b>Overall Mean</b>	1.63	2.13	<0.0001	-	-	-	-

All values based on 1-7 Likert scales.

**Table 11: Vaccinating all eligible girls who are not sexually active**

Concept	Mean			Median		Range	
	Vaccinated Group	Non-Vaccinated Group	p-value	Vaccinated Group	Non-Vaccinated Group	Vaccinated Group	Non-Vaccinated Group
<b>Beneficial</b>	1.71	3.02	<0.0001	1.00	3.00	[1.00, 7.00]	[1.00, 7.00]
<b>Desirable</b>	2.35	3.39	<0.0001	2.00	4.00	[1.00, 7.00]	[1.00, 7.00]
<b>Good</b>	1.76	2.98	<0.0001	1.00	3.00	[1.00, 6.00]	[1.00, 7.00]
<b>Important</b>	1.87	3.2	<0.0001	1.00	3.00	[1.00, 7.00]	[1.00, 7.00]
<b>Overall Mean</b>	1.92	3.15	<0.0001	-	-	-	-

All values based on 1-7 Likert scales.

### **3.4 Barriers to HPV Vaccination**

The cohort of women who were not vaccinated was asked a series of questions regarding what barriers they may have faced regarding receiving an HPV vaccine. Of the 12 possible

barriers that were presented to the women, the most influential obstacles seemed to focus on a lack of knowledge about the vaccine itself, as well as cost (Table 12). Given that more than 50% of the women in this cohort reported that not knowing enough about the vaccine was influential in not receiving it, it is unsurprising that other influential barriers included a lack of familiarity with the vaccine's potential side effects and a need for further understanding of how the vaccine works.

The cost of the vaccine series was also an important influence reported by women who were not vaccinated. A question in the survey directly addressed the maximum amount participants would be willing to pay for the entire HPV vaccine series. Though the majority of the unvaccinated group was willing to pay something for the vaccine, only a very small proportion (3.9 %) was willing to pay the actual cost of the vaccine, which can vary from \$100 per dose at its cheapest to \$175 per dose, depending on the pharmacy where the vaccine is obtained. Slightly more than half the women in the non-vaccinated group (55.12%) were willing to pay up to \$100 for the vaccine series, while 10.7% of this group was not willing to pay anything and another 14.14% would not get the vaccine at all.

Although not influential for the majority of the cohort of participants who were not vaccinated, the ideas of not requiring the vaccine because the respondent was either in a monogamous relationship or was not currently sexually active were reported as influential for 24.24% and 29.44%, respectively

**Table 12: Barriers to vaccination**

<b>Intentions</b>	<b>N non-vaccinated group (n=205)</b>	<b>%</b>
I have not heard of the Vaccine		
Influential	24	12.12
Neutral	19	9.60
Not Influential	101	51.01
N/A	54	27.27
I don't know where the vaccine is offered		
Influential	51	25.76
Neutral	19	9.60
Not Influential	96	48.48
N/A	32	16.16
The vaccine costs too much		
Influential	90	45.69
Neutral	24	12.18
Not Influential	60	30.46
N/A	23	11.68
The vaccine is not covered by my health insurance		
Influential	78	39.59
Neutral	25	12.69
Not Influential	60	30.46
N/A	34	17.26
I'm in a monogamous relationship and therefore don't need the vaccine		
Influential	48	24.24
Neutral	15	7.58
Not Influential	97	48.99
N/A	38	19.19
I'm not currently having sex and therefore don't need the vaccine		
Influential	58	29.44
Neutral	16	8.12
Not Influential	91	46.19
N/A	32	16.24
My parents don't want me to get the vaccine		
Influential	41	20.71
Neutral	28	14.14
Not Influential	87	43.94
N/A	42	21.21
I don't know enough about the vaccine		
Influential	107	54.31
Neutral	20	10.15
Not Influential	49	24.87
N/A	21	10.66
I don't know enough about the vaccine's potential side effects		
Influential	126	66.64
Neutral	18	9.09
Not Influential	37	18.69
N/A	17	8.59

**Table 12: Barriers to vaccination (continued)**

Intentions	N non-vaccinated group (n=205)	%
I don't know if the vaccine works		
Influential	95	47.98
Neutral	35	17.68
Not Influential	53	26.77
N/A	15	7.58
I am concerned the vaccine will hurt		
Influential	33	16.67
Neutral	22	11.11
Not Influential	125	63.13
N/A	18	9.09
I already have HPV		
Influential	12	6.09
Neutral	4	2.03
Not Influential	49	24.87
N/A	132	67.01

### **3.5 Factors that Promote the Uptake of the HPV Vaccines**

All participants of the study were presented with a list of 12 motivations that potentially have or could influence their decision to get the HPV vaccine (Table 13). There was a significant difference for how influential three-quarters of these factors were for the vaccinated and non-vaccinated groups.

The most common influence for the vaccinated group was parental recommendation of the vaccine, compared to the non-vaccinated group, whose primary influence was the recommendation from a doctor. Although both groups in the study were influenced by the vaccine being offered free or covered by health insurance (thereby not at the individual's expense), vaccine cost was much less influential for the vaccinated group when compared to the non-vaccinated women.

Only 66 women in the vaccinated group (33.67%) stated that having the vaccine offered in school was an influential factor. For the non-vaccinated group, being offered the vaccine in a school setting would positively influence the decision of nearly half (45.37%) of the respondents.

**Table 13: Motives for HPV vaccination uptake**

Intentions	Vaccinated Group (n=196)		Non-vaccinated Group (n=205)		p-value
	N	%	N	%	
My doctor recommended it					0.185
Influential	127	66.84	114	58.46	
Neutral	21	11.05	32	16.41	
Not Influential	10	5.26	32	16.41	
N/A	32	16.84	17	8.72	
I saw advertisements for it					0.010
Influential	61	32.11	46	23.59	
Neutral	46	24.21	37	18.97	
Not Influential	51	26.84	105	53.85	
N/A	32	16.84	7	3.59	
My friend(s) got it/were going to get it					0.862
Influential	45	23.68	50	25.51	
Neutral	39	20.53	36	18.37	
Not Influential	49	25.79	97	49.49	
N/A	57	30.00	13	6.63	
I think I am susceptible to HPV infection					<0.0001
Influential	53	27.89	94	47.96	
Neutral	24	12.63	27	13.78	
Not Influential	60	31.58	44	22.45	
N/A	53	27.89	31	15.82	
There's a history of cervical abnormalities in my family					<0.0001
Influential	30	15.79	92	46.94	
Neutral	10	5.26	14	7.14	
Not Influential	61	32.11	30	15.31	
N/A	89	46.84	60	30.61	
I know someone who has/had cervical cancer					<0.0001
Influential	36	19.05	77	3.49	
Neutral	13	6.88	24	12.31	
Not Influential	47	24.87	39	20.00	
N/A	93	49.21	55	28.21	
My parent(s) recommended it					<0.0001
Influential	143	75.26	91	46.43	
Neutral	11	5.79	31	15.82	
Not Influential	14	7.37	36	18.37	
N/A	22	11.58	38	19.39	
My friend(s) recommended it					0.004
Influential	49	26.06	66	33.85	
Neutral	22	11.70	43	22.05	
Not Influential	44	23.40	59	30.26	
N/A	73	38.83	27	13.85	
It was free/covered by my health insurance					0.572
Influential	98	51.31	103	52.55	
Neutral	26	13.61	32	16.33	
Not Influential	32	16.75	39	19.90	
N/A	35	18.32	22	11.22	

**Table 13: Motives for HPV Vaccination Uptake (continued)**

Intentions	Vaccinated Group (n=196)		Non-vaccinated Group (n=205)		p-value
	N	%	N	%	
It was offered to me through my school					0.009
Influential	66	34.55	93	47.45	
Neutral	6	3.14	19	9.69	
Not Influential	26	13.61	46	23.47	
N/A	93	48.69	38	19.39	
Vaccine cost					<0.0001
Influential	41	21.69	101	51.53	
Neutral	31	16.40	32	16.33	
Not Influential	55	29.10	45	22.96	
N/A	62	32.80	18	9.18	
Most girls/women my age were getting the vaccine					0.759
Influential	54	33.13	66	33.85	
Neutral	37	22.70	47	24.10	
Not Influential	41	25.15	72	36.92	
N/A	31	19.02	10	5.13	

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### 3.6 Multivariate Models

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Two comparative multivariate models were used to assess the differences between different subpopulations of this study. The first compared only subpopulations in the unvaccinated cohort: those who intended to be vaccinated at some point in the future (survey question: “I plan on getting the HPV vaccine at some point”) and those who did not (which included those who were neutral to the idea of HPV vaccination in the future), while the second model evaluated the factors associated with those who were already vaccinated against HPV, compared to those who intended to be vaccinated at some point.

According to the ToPB, it is expected that beliefs influence overall attitude, which in turn influences intention towards behaviour. To assess if overall attitude mediates the association between beliefs and intentions, two logistic regression models were run for each of the two study sub-populations. The first model directly assessed the influence of beliefs on vaccine uptake intention, while the second included overall attitude. Univariate linear regression was also

conducted with the separate beliefs as predictors and the overall attitude variable as the outcome, in order to assess whether attitude is predicted by beliefs.

### **3.6.1 Comparison of respondents who do and do not intend to be vaccinated**

The univariate logistic regressions used for the comparison of these two study sub-populations included as independent variables those characteristics that were to be included in the final multivariate models. These variables represent the three antecedents of intention in the ToPB: attitude toward the behavior, subjective norms and perceived behavioural control, in addition to demographics characteristics that have been associated with HPV vaccination in previous studies (65) as well as this one. The independent variables included in the univariate and multivariate analyses were: overall attitude to getting the HPV vaccine; participant reporting that the cost of the vaccine, not knowing enough about the vaccine, doctor recommendation, friend(s) who were getting the vaccine, HPV susceptibility, parental recommendation and vaccine benefit (protection against developing cervical cancer) would influence their decision to be vaccinated; age and ethnicity. The former variables represent behavioural, normative and control beliefs, while the latter two represent demographic characteristics which were significantly associated with HPV vaccination. Table 14 illustrates these comparisons. The second column of the table represents a model consisting of all the variables above, without overall attitude, while the third column includes the latter, in order to see if overall attitude mediates the association between beliefs and vaccine intention.

Participants who intended to be vaccinated at some point had a more positive attitude overall towards HPV vaccination (lower overall mean score). The univariate models suggested that the women who intended to be vaccinated were influenced by the cost of the vaccine and its potential to protect against cervical cancer. Social norms were particularly influential for the

women who intended to be vaccinated, including a belief that doctor and parental recommendations would be influential or that friends who were getting or who had received the vaccine would be an important influence. Sufficient knowledge of the vaccine and susceptibility to HPV were not significant.

The final multivariate logistic regression model included the characteristics above. Of these included factors, only a more positive overall attitude to HPV vaccination, doctor recommendation and having a friend who was going to get the vaccine were significant in this final model. Without overall attitude in the model, doctor recommendation and friends getting the vaccine were still significant, though model fit was slightly inferior without the overall attitude variable.

Table 15 illustrates the linear relationship each of the above variables has with the overall attitude toward HPV vaccination. While there were differences in how much the variance in overall attitude was accounted for by each variable for different study sub-populations, all of the variables were significantly associated with overall attitude, with respect to the entire non-vaccinated study population. Although it was not significant in the final multivariate models, the perceived benefit of the vaccine in protecting against cervical cancer development accounted for the most variance in overall attitude (24%). Parental recommendation and doctor recommendation were each associated with 14% of the variance, while cost accounted for slightly less than 10% of the variance in overall attitude to HPV vaccination.

### **3.6.2 Comparison of respondents who are vaccinated and those who intend to be vaccinated**

Table 16 illustrates the results of the univariate and multivariate logistic regressions comparing the women who were vaccinated and the women who intend to be vaccinated at some point. The characteristics included in these analyses were: overall attitude to getting the HPV

vaccine; participant reporting that the cost of the vaccine (motive), doctor recommendation of the vaccine, friend(s) who were getting the vaccine, HPV susceptibility, parental recommendation of the vaccine and vaccine benefit (protection against developing cervical cancer) would be influential in the decision to receive the vaccine; age and ethnicity. The former variables represent behavioural, normative and control beliefs, while the latter two represent demographic characteristics which were significantly associated with HPV vaccination. These demographic characteristics, though not directly related to the ToPB, could also be influential in the decision to ultimately perform a behaviour. The second and third columns of the table represent a model consisting of all the variables above, without or with overall attitude respectively. These separate models were arranged to see if overall attitude mediates the association between beliefs and vaccine intention.

Significant univariate analysis results included a more positive attitude to HPV vaccination in general and a belief that a parental recommendation of the vaccine was influential for the women who were already vaccinated. Conversely, women who intend to be vaccinated, but have not been vaccinated yet, are influenced more by peer's actions, vaccine cost and perceived susceptibility to HPV infection. There was no significant difference between the two subgroups concerning doctor recommendation and the vaccine's benefit of protecting against cervical cancer.

**Table 14: Comparison of respondents who intend and do not intend to be vaccinated**

Variable	Do not intend to be vaccinated (n=105)	Intend to be vaccinated (n=99)					
		Univariate Analysis		Multivariate Analysis <sup>¥</sup>		Multivariate Analysis <sup>£</sup>	
		OR	95% CI	OR	95% CI	OR	95% CI
Overall Attitude to HPV vaccination	Referent	0.49***	[0.39, 0.63]	-	-	0.50**	[0.35, 0.71]
Cost (barrier)	Referent	1.86*	[1.01, 3.40]	1.30	[0.61, 2.81]	1.10	[0.47, 2.58]
Don't know enough about the vaccine	Referent	0.75	[0.41, 1.37]	0.73	[0.34, 1.56]	1.20	[0.49, 2.92]
Doctor recommendation	Referent	5.21***	[2.45, 11.09]	5.24**	[1.83, 15.01]	4.48**	[1.42, 14.13]
Friends got it/were going to get the vaccine	Referent	6.05***	[2.78, 13.13]	3.59**	[1.50, 8.60]	2.41	[0.94, 6.19]
Susceptibility to HPV	Referent	1.50	[0.81, 2.76]	0.69	[0.28, 1.66]	0.73	[0.28, 1.91]
Parent recommendation	Referent	2.31*	[1.23, 4.35]	0.79	[0.33, 1.87]	0.70	[0.26, 1.86]
Protect me from developing cervical cancer	Referent	17.35***	[2.23, 135.09]	4.76	[0.50, 45.61]	1.08	[0.09, 12.45]
Age	Referent	0.94	[0.81, 1.09]	0.88	[0.71, 1.06]	0.81	[0.65, 1.00]
Ethnicity (White vs not white)	Referent	0.51*	[0.29, 0.90]	0.48	[0.22, 1.05]	0.50	[0.22, 1.15]

Note: Those who did not intend to be vaccinated were used as the reference category.

\* p <0.05 \*\* p <0.01 \*\*\*p <0.0001

<sup>¥</sup> Model fit: Hosmer and Lemeshow Goodness-of-fit Test, p= 0.73; this model does not include overall attitude.

<sup>£</sup> Model fit: Hosmer and Lemeshow Goodness-of-fit Test, p= 0.75.

**Table 15: Univariate linear regression predicting overall attitude to HPV vaccination**

Variable	Intend to be Vaccinated		Do not Intend to be Vaccinated		Total Non-Vaccinated Study Population	
	Adjusted R <sup>2</sup>	F-statistic p-value	Adjusted R <sup>2</sup>	F-statistic p-value	Adjusted R <sup>2</sup>	F-statistic p-value
Cost (barrier)	0.06	0.01*	0.06	0.008	0.09	<0.0001
Don't know enough about the vaccine	0.06	0.009	0.01	0.12	0.04	0.003
Doctor recommendation	0.005	0.24	0.12	0.0002	0.14	<0.0001
Friends got it/were going to get the vaccine	0.01	0.154	0.14	<0.0001	0.14	<0.0001
Susceptibility to HPV	0.001	0.70	0.05	0.013	0.02	0.04
Parent recommendation	0.005	0.83	0.15	<0.0001	0.08	<0.0001
Protect me from developing cervical cancer	0.04	0.04	0.26	<0.0001	0.24	<0.0001

The final multivariate logistic regression model included the aforementioned variables. Significant predictors of being vaccinated (versus intend to be vaccinated) in the final model included having a more positive attitude toward receiving the vaccine and being influenced by a positive parental recommendation. Women who intended to be vaccinated at some point in the future reported being motivated by lower vaccine cost and were more influenced by perceptions of HPV susceptibility than the women who were already vaccinated. Comparatively, the multivariate model which did not include overall attitude had the same significant variables, but the model fit without overall attitude was improved.

Table 17 illustrates the linear relationship each of the above variables has with the overall attitude toward HPV vaccination. None of these beliefs significantly accounted for the variance in overall attitude toward HPV vaccination in the vaccinated group. However, in the overall vaccinated and intend to be vaccinated study population, only protection against developing cervical cancer significantly predicted overall attitude.

The linear regression results indicate that overall attitude is partially predicted by the majority of the variables included in the multivariate logistic models for the non-vaccinated study population. For the vaccinated and intend to be vaccinated sub-population, however, only the possibility of the vaccine protecting against the development of cervical cancer significantly accounted for a minor portion of the variance in overall attitude. These models indicate that these beliefs alone do not entirely predict attitudes toward behaviour. Thus, overall attitude to the behaviour does in fact mediate the association between beliefs and intention. Attitude is required as an intermediate variable in the theoretical causal pathway between belief and intention, as described by the ToPB.

**Table 16: Comparison of respondents who are vaccinated and who intend to be vaccinated**

Variable	Intend to be vaccinated (n=99)	Vaccinated (n=196)					
		Univariate Analysis		Multivariate Analysis <sup>¥</sup>		Multivariate Analysis <sup>£</sup>	
		OR	95% CI	OR	95% CI	OR	95% CI
Overall Attitude to HPV vaccination	Referent	0.78*	[0.62, 0.98]	-	-	0.72*	[0.52, 0.99]
Cost (Motive)	Referent	0.18***	[0.10, 0.33]	0.18***	[0.09, 0.38]	0.16***	[0.08, 0.36]
Doctor recommendation	Referent	0.51	[0.25, 1.03]	0.88	[0.35, 2.22]	0.87	[0.34, 2.24]
Friends got it/were going to get the vaccine	Referent	0.45**	[0.25, 0.79]	0.59	[0.28, 1.23]	0.58	[0.27, 1.24]
Susceptibility to HPV	Referent	0.31***	[0.18, 0.53]	0.31*	[0.15, 0.62]	0.29*	[0.14, 0.60]
Parent recommendation	Referent	2.07**	[1.14, 3.76]	2.78**	[1.30, 5.92]	2.74**	[1.24, 6.02]
Protect me from developing cervical cancer	Referent	0.51	[0.06, 4.62]	0.58	[0.04, 9.63]	0.50	[0.03, 7.37]
Age	Referent	0.81**	[0.70, 0.94]	0.84	[0.69, 1.02]	0.84	[0.68, 1.03]
Ethnicity (White or not white)	Referent	3.61***	[2.12, 6.13]	5.24***	[2.5, 10.72]	6.06***	[2.89, 12.73]

Note: Those who did not intend to be vaccinated were used as the reference category

\* p <0.05 \*\* p <0.01 \*\*\*p <0.0001

<sup>¥</sup> Model fit: Hosmer and Lemeshow Goodness-of-fit Test, p= 0.27; this model does not include overall attitude.

<sup>£</sup> Model fit: Hosmer and Lemeshow Goodness-of-fit Test, p= 0.02 (If age and ethnicity are excluded, Hosmer and Lemeshow Goodness-of-fit Test, p=0.44)

**Table 17: Univariate linear regression predicting overall attitude to HPV vaccination**

Variable	Vaccinated		Intend to be Vaccinated		Vaccinated and Intend to be Vaccinated Study Population	
	Adjusted R <sup>2</sup>	F-statistic p-value	Adjusted R <sup>2</sup>	F-statistic p-value	Adjusted R <sup>2</sup>	F-statistic p-value
Cost (Motive)	0.0002	0.84	0.12	0.0007	0.002	0.21
Doctor recommendation	0.005	0.35	0.005	0.24	0.002	0.23
Friends got it/were going to get the vaccine	0.0005	0.76	0.01	0.154	0.003	0.39
Susceptibility to HPV	0.0003	0.83	0.001	0.70	0.0001	0.54
Parent recommendation	0.001	0.28	0.005	0.83	0.0003	0.33
Protect me from developing cervical cancer	0.02	0.05	0.04	0.04	0.03	0.005

### **3.7 Influence of HPV Vaccination on Future Cervical Cancer Screening Decisions**

Most of the women in this study had favourable attitudes to future cervical cancer screening or Pap smears. The majority of the women in the vaccinated cohort (82.47%) intended to get cervical cancer screening in the future, while 69.27% of the non-vaccinated group intended to be screened in the future for cervical abnormalities. Almost 12% and 17% of the vaccinated and non-vaccinated cohorts, respectively, indicated that HPV vaccination had or would affect their decision about cervical cancer screening. Of the women who indicated that HPV vaccination would change their attitudes towards cervical cancer screening, 50% of the vaccinated group and 55% of the non-vaccinated group would be more prone to go through screening if they were vaccinated. Of the entire study sample, 4.3% of the vaccinated sample and nearly a tenth (9.84%) of the non-vaccinated group specified that they would be less likely to get Pap smears, if they were vaccinated against HPV.

### 3.8 The Effect of HPV Vaccination on Safe Sex Practices

A series of 5 statements regarding the effect of HPV vaccination on safe sex practices, such as condom use and unprotected sex (adapted from Mullins et al (68)), were asked of both groups in the study. While the vast majority of the study population disagreed with the idea of HPV vaccination negatively impacting safe sex practices, a minority of the group agreed that condom use is less necessary following HPV vaccination. Although this was the case, few women in the study would be less worried about having unprotected sex if they were vaccinated against HPV (Table 18).

**Table 18: Effect of vaccination of future safe sex practices**

Concept	Vaccinated group		Non-vaccinated group		p-value
	N	(%)	N	(%)	
Condom use is <i>less</i> necessary					0.53
Agree	14	7.14	18	8.78	
Neutral	13	6.63	7	3.41	
Disagree	160	81.63	167	81.46	
Missing	9	4.59	13	6.34	
It is just as important to have as few sex partners as possible					0.027
Agree	131	66.85	151	73.66	
Neutral	28	14.29	26	12.68	
Disagree	28	14.29	15	7.32	
Missing	9	4.59	13	6.34	
It is not as important to talk to my partners about safe sex					0.19
Agree	13	6.63	20	9.76	
Neutral	3	1.53	9	4.39	
Disagree	168	85.71	162	79.02	
Missing	12	6.12	14	6.83	
It is still as important to use a condom everytime I have sex					0.45
Agree	153	78.06	156	76.10	
Neutral	22	11.22	18	8.78	
Disagree	11	5.6	18	8.78	
Missing	10	5.10	13	6.34	
I am less worried about having unprotected sex					0.06
Agree	8	4.08	16	7.80	
Neutral	16	8.16	20	9.76	
Disagree	163	83.16	156	76.10	
Missing	9	4.59	13	6.34	

### 3.9 Knowledge and Effect of that Knowledge

The knowledge section of the survey included 16 true or false statements, the results of which are shown in Table 19. The population in this study had a high knowledge of HPV

vaccination and cervical cancer screening. There were certain items that both groups were uncertain of, primarily with regards to how severe and widespread the virus itself can be.

**Table 19: Knowledge by vaccine status**

Statement	Answer	N correct Vaccinated		N correct not vaccinated		p-value
		N	(%)	N	(%)	
HPV is primarily sexually transmitted	True	174	92.55	167	87.89	0.128
HPV is the most common STI (sexually transmitted infection)	True	84	44.68	84	44.68	1.00
HPV only affects women	False	151	80.75	148	77.49	0.437
Most people infected with HPV do not show any signs or symptoms of infections	True	172	91.98	173	90.58	0.630
HPV vaccination is only effective if you are not sexually active	False	173	92.02	173	90.58	0.620
The highest rate of HPV infection is in adults <25 years of age	True	148	79.57	141	74.21	0.219
HPV infection can lead to cervical cancer	True	187	99.47	190	99.48	0.991
3 HPV vaccine doses are required to have the fullest protection	True	177	94.15	147	76.96	<0.001
At least 1 in 2 women is diagnosed with HPV in her lifetime	True	92	50.27	95	50.00	0.958
HPV vaccination protects you from all HPV-related infections	False	148	79.57	158	82.72	0.435
The most common sign of HPV infection is genital warts	True	134	71.66	146	76.44	0.290
HPV vaccination is only effective for women	False	114	61.29	113	59.47	0.720
HPV infection has been associated with several types of cancer	True	147	78.61	147	77.37	0.772
There are 2 HPV strains that account for 70% of cervical cancers	True	163	88.11	169	88.95	0.799
HPV is the only established cause of cervical cancer	True	31	16.76	31	16.40	0.920
Pap tests are unnecessary if women are vaccinated against HPV	False	184	98.40	184	93.43	0.213

The only significant difference between the 2 groups with regards to knowledge as a construct concerned the number of vaccine doses required to have the best protection against HPV.

### **3.10 Focus Group for Students**

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This focus group included six female university students and lasted two hours. The question route used for this discussion group can be found in Appendix C. The women who took part in this group were quite diverse, including women from different faculties (Science, Arts and Social Science) and a variety of cultural backgrounds. This sample of students included a mixture of women who were or were not vaccinated against HPV and one woman who had previously been diagnosed with cervical cancer. The women had different perspectives toward the topic, both positive and negative. Negative aspects included the idea that the pharmaceutical companies have too much say on who the vaccine should be marketed for and misinformation about the vaccine itself.

The discussion about HPV vaccination repeatedly returned to the ideas of information, education and cost. The focus group participants agreed that the main differences between the women who received the vaccine and those who did not, were information about the virus and the vaccine, as well as socioeconomic status. These participants felt that information about HPV was not readily available to them and that people in general do not realize how prevalent and severe the viral infection can be. Socioeconomic status was given particular importance, since many health insurance companies do not pay for the vaccine and many students do not have the capacity to pay for the entire vaccine series in the span of six months.

Although women in both the vaccinated and unvaccinated groups had similar views about the efficacy of the vaccine, the focus group participants discussed a number of factors that could prevent the women in the latter group from receiving the vaccine. Education, misinformation convenience, time and cost were aspects that were repeatedly discussed. The group considered the fact that their own different educations contributed to their difference of opinions on the topic

of HPV vaccination, as certain university programs do not provide education about health. Time and convenience, particularly for university students, was considered a major concern since, even though some women want to get the vaccine, they may not have the time or may not be able to make the time for it. Cost was, again, a major barrier that was brought up by the focus group. One point brought up on this subject was the idea that women will not go out of their way to seek out the vaccine if it is not covered by all health insurance plans. A fear of side effects was another obstacle that was mentioned and agreed upon by most of the group, along with the perceived effectiveness of the vaccine. These two ideas focus again on the importance of education and the dissemination of correct information.

Another barrier that some of the women in the focus group had faced was that their doctor had specifically told them not to get the vaccine, soon after the vaccine was first available. This may have been the opinion of some doctors and members of the health community at the time because they may not have had all the information about the vaccine. However, it's possible that women who were told this will not be interested in the vaccine series anymore, if they are under the impression that the vaccine is not suitable for them.

*"I know when I approached my doctor about it, I was told that no, they wouldn't give it to me, if I had slept with anyone or if I had been sexually active.[...] I remember being- I felt bad for myself that my doctor told me no, we don't recommend it for you, just because I had been sexually active. And it makes you feel bad as a girl, about yourself."*

The group discussed which, if any, of the barriers could be eliminated or minimized. The group was unanimous about the idea that cost could be the easiest barrier to be broken down. The barrier could be reduced by complete or even partial subsidy of the vaccine series through health

insurance plans, particularly the one offered by the university. Removing the obstacle of cost could be one way to make the vaccine more accessible to a large proportion of women.

The major influences for HPV vaccination in women aged 18 to 25 were different for the members of the group. While some women discussed the weight of community health centers and health care practitioners in making the decision, others maintained that peer influence for women in this age group was probably the strongest motivating factor. The idea of sexual activity was also raised, with people in monogamous relationships being less likely to think about the vaccine compared to a person who has multiple partners. The participants of this group did not consider the idea of parental recommendation as a strong influence for university women, since they may be less knowledgeable about the vaccine and will generally have less of an input on the health related issues of their daughters compared with parents of younger girls.

The discussion about who should be vaccinated raised different opinions. While all the respondents agreed that both boys and girls should be vaccinated, there was less consensus as to the age at which they should be vaccinated. Ultimately, the debate focused on the point of who the target is for the vaccine. When considering the vaccine purely as prevention before the onset of sexual activity for everyone, a younger age is preferable. If, however, the objective is for the individual to make the decision for themselves, the end of high school was suggested as a suitable age, as the recipients of the vaccine would be older and able to seek out the information for themselves.

Akin to the main study, the women in the focus group agreed that HPV vaccination in general would not change a woman's views on safe sex practices, though a small minority of people may think it is safe for them to have unprotected sex after getting the vaccine. Part of this can be attributed to the misinformation in circulation about HPV and what such an infection can

cause. The main result of this part of the discussion was that better or increased sexual health education is needed, so that people are aware that there are different STIs which can cause very different health outcomes.

Many of the women in the focus group agreed that HPV vaccination would likely not affect the decisions of the majority of women towards cervical cancer screening. One approach to ensure that women continue to be screened following vaccination is continued education about the benefit of screening and why it continues to be important, even after HPV vaccination. Suggestions from the group for ensuring that women continued to be screened include information in the university health centre about the services available through the university, as well as the Canadian guidelines for such screening.

The topic of immigrants and HPV vaccination was discussed at length in the focus group. The results of this discussion involved offering information about a variety of health topic to newcomers to the country, as health is not at the forefront of people's minds when they move to a new country. For university students in particular, the group thought it would be helpful to provide a package about the university, including an information sheet on health topics. As cervical cancer rates are the highest in developing countries, it would be important to include this information, particularly as different countries have different views on HPV vaccination. It would, however, be important to be aware of the fact that religion and culture could play a sizeable role in the decision making process for certain groups of people. Peer education was suggested as a means of increasing vaccine acceptability.

### **3.11 Focus Group for Immigrant Women**

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This focus group included four women not born in Canada and lasted an hour and three-quarters. Two of the women had moved to Canada in high school, while two others had very

recently arrived. This group included women from Romania, the United States, Algeria and the United Arab Emirates. The question route used for this focus group can be found in Appendix C. Saturation within this group was reached as well, since no novel applicable information was discussed about the categories, after sufficient discussion. Although only one of the women had been vaccinated against HPV, all of the women were aware of and had favorable attitudes towards the vaccine. The primary association the women in this group had with HPV vaccination was cancer prevention.

Akin to the focus group for students, the women in this focus group considered several possibilities for the non-vaccination of approximately half the study population. The women in this discussion group reasoned that the differences between the vaccinated and unvaccinated cohorts could include a better knowledge of the vaccine, parental attitude to the vaccine and vaccine sentiment in general. This group of women, unlike the other focus group, placed more emphasis on parental attitudes and cultural influence on vaccine receipt. The group considered that women who were not vaccinated might be the result of a conflict with personal or cultural beliefs, as well as a lack of awareness about the vaccine's benefits. The perception of susceptibility to HPV was also proposed and it was suggested that women in the non-vaccinated group could consider themselves as not susceptible to this STI, for a variety of reasons, including being in a monogamous relationship.

The main barriers to vaccination discussed for women in general were very similar to those raised in the previous focus group. These obstacles included cost, perceived risk of infection, fear of side effects and lack of awareness of both the severity of the virus and the potential benefits of the vaccine. One point that was raised was the idea that some of the women

were not refusing the vaccine per se, but rather assuming that the vaccine was not particularly useful for them.

With regards to the question of barriers specific to newcomers to Canada, the responses varied. The consensus of the group was that barriers would be different depending on the country of origin of the woman entering the country. While the HPV vaccines are publicly funded in certain countries, in others, the vaccine is not and there is less or almost no knowledge of either the virus or the vaccine. Thus, a newcomer who has never heard about the vaccine would likely be less receptive to the immunization. For other groups of people, cultural beliefs may be very influential in the decision to receive the vaccine or not, as talking about sexual health can be taboo in some cultures. Another barrier which is less problematic for Canadian-born people is language, as not all newcomers are fluent enough in either English or French to understand available information, which in itself may not be easily accessible by new immigrants, as a lot of the information is online and not in paper format. As this is the case, some newcomers do not even know where they can go to access health care facilities, which was the case for two of the women in the focus group, who had recently immigrated to Canada. These women were not given any particular information about accessing health facilities or contacting physicians, other than conducting their own internet search. A final barrier that is more specific to new immigrants is the reality of their having more pressing issues to consider than HPV vaccination, such as housing and employment, particularly since HPV infection is generally associated with being a chronic problem that may not manifest for several years.

With respect to the controversy of the target population for the vaccine, the response was unanimous. All the group members agreed that everyone should be vaccinated, with particular emphasis on boys, who are both susceptible to HPV and major source of the viral propagation. It

was also suggested that the vaccine should be publicly funded for a larger age range of people, so that those who either missed the vaccine or were too old to receive the free vaccine when it was first introduced, could now receive it. The focus group was also in agreement that both sexually active and non-sexually active women should be offered the vaccine. They thought that the earlier the vaccine is offered, however, the better it would be at capturing the largest group of women prior to sexual debut, when the vaccine would be most effective. The women in this group did not think the idea that early vaccination promotes earlier onset of sexual activity held any credence, primarily if the vaccine is marketed as a preventative measure against cervical cancer.

For immigrants, the group felt it would be important to ensure they were aware of the facts surrounding HPV infection and cervical cancer rates for developing countries. While the group did not think that certain ethnicities should be targeted, they did think extra resources should be invested for some groups that might be more susceptible, by translating materials into the languages common to that group, for example. It was suggested that information about HPV vaccinations and cervical cancer screening be made available for all new immigrants, as health is a universal concern for people, although it may not be the first thing that they think about when they arrive in Canada.

Similar to the women in the first focus group and the main study, the group did not think that HPV vaccination would change women's ideas of safe sex practices. The main reason for this that was discussed was that a person is not primarily concerned with the transmission of HPV, but rather with other STIs that are perceived as more harmful, such as HIV and hepatitis. For the women who indicated that HPV vaccination would make them less likely to practice safe

sex, the group thought that this could be the result of misinformation about the vaccine and people thought that the vaccine was more broadly effective against other STIs in general.

One concern that was raised during the discussion was that new female immigrants were potentially unaware of the Canadian guidelines for cervical cancer screening or even what cervical cancer screening entailed. This can be problematic, as a proportion of people do not have a family physician and only go see a doctor at a walk-in clinic or the emergency room if there is a specific problem. If this is the case, these women may not be screened for cervical abnormalities, unless a physician at an urgent care or walk-in clinic specifically asks if the woman had been recently screened. With regards to the idea that HPV vaccination may change women's ideas about cervical cancer screening, the group thought this would be very minimal and analogous to the idea that the vaccination may change women's views to safe sex practices. The idea was raised, however, that the vaccination could give women a potentially false sense of security and women may be less concerned about missing a screening, as they feel more protected.

Overall, the group felt that information was the most powerful way to increase HPV vaccination in immigrant women. Systematic problems that were raised during this discussion group included that health information was not readily available to new immigrants, as well as people not knowing where to find health care services.

## **CHAPTER 4** **DISCUSSION**

### **4.1 Overview of Study Results**

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The prevalence of HPV vaccination in this study of undergraduate university women was 48.88%. Of the 196 vaccinated women in this study, 60% had already received all three doses of the vaccine, however almost 75% indicated that they had completed the vaccine series. The overall attitudes of both the vaccinated and non-vaccinated groups were positive towards the HPV vaccine and they generally perceived that the vaccine is efficacious in reducing the risk of genital warts and cervical cancer, though the vaccinated group's attitudes and beliefs were slightly more positive. The biggest barriers to HPV vaccination found in this study revolved around the issue of lack of knowledge about the vaccine and its potential side effects. Cost was an additional important barrier raised by the survey and the expense associated with the vaccine was a primary concern among all women in the two focus groups.

### **4.2 Prevalence of HPV Vaccination**

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Women 19 years of age or younger in this cohort were significantly more likely to be vaccinated against HPV than older women. This was expected in view of the timing of the introduction of the school based HPV immunization program in 2007. The initial uptake of the vaccine in Ontario schools was fairly low compared to other studies which indicated a larger discrepancy in the vaccination rates between 18 year old females compared to 19 to 26 year olds (74). While it is probable that the proportion of women vaccinated against HPV will increase slightly over the next few years, as schools continue to vaccinate girls and the vaccine becomes more accepted, the proportion of vaccinated women in this age group is probably slightly lower than the proportion found by this study, as it focused on university women rather than the

general population. Although the prevalence of HPV vaccination in this thesis was higher than anticipated, it is still lower than the 80% required to achieve herd immunity.

The prevalence of vaccination in this study is comparable to other studies done in similar populations (56, 66). For instance, a study conducted in New York had a prevalence of vaccine series initiation of 56% (56), while a study at a Midwestern university in the United States reported a vaccine series initiation prevalence of 49% (75). Internationally, a study completed in Marseilles high school and university students reported a prevalence of 35.4% (76). Vaccination series completion rates and overall prevalence were assessed by some of these studies. The study in New York had a vaccine series completion prevalence of 44%, which was nearly 80% of those who had received the first vaccine (56), while the Midwestern university study had approximately 70% of its vaccine initiators complete the series, resulting in a complete HPV vaccination series prevalence of 34% (75). Nearly three-quarters of the vaccine initiators in Marseilles completed the vaccine series (76), while a study conducted in Malaysia reported a vaccination rate of 51.5% (77). A study recently conducted at McGill University, however, indicated an HPV vaccination prevalence of only 27.3% (66).

The difference in prevalence and completion rates could be the result of differences in HPV vaccine policies in different provinces of Canada, or the country as a whole compared to others. Across Canada alone, HPV vaccine programs vary from initiation in the fourth grade to initiation in grade 8. In other countries, the vaccine may be offered through a school or health centre based program, but is not always fully or even partially subsidized by the government (78). Furthermore, catch-up vaccination programs have been organized by individual provinces and countries, primarily based on cost effectiveness. As such, catch-up programs vary greatly by province and country and can contribute to large differences in vaccination uptake rates. These

differences may also be because the populations sampled in each study were different. Most of the above studies which involved university students were based on sampling strategies in which only classes from one department were included in the study, whereas the present study included women from a variety of educational programs.

Unlike other studies that were conducted on this topic, this study not only assessed how many doses of the vaccine series the respondents had, but also explored the intentions of partially vaccinated women to complete the vaccine series.

The proportion of women who indicated that they were going to take longer than guidelines suggest to complete the vaccine program was fairly low (8.25%). People who delay completion can forget to finish the vaccine series, regardless of their initial intention. Stopping the vaccine series after one or even two doses can also make it more difficult for people to return and complete it, as there is the misunderstanding that they may have to restart the whole vaccine process. This last sentiment was initially raised in the questionnaire and further discussed in the focus groups. Individuals who do not complete the vaccine series in turn are not fully protected against the strains of virus in the vaccine.

There may be a variety of reasons why women do not complete the vaccine series within the recommended 6 month period, some of which were raised in the focus group. These reasons include forgetfulness and inconvenience, as each of the three doses require separate visits to the doctor, if not the pharmacy as well, to pick up the prescription. A third possibility is that people in this age group may not have enough money to pay for all three doses. As asked by one woman in one of the cognitive interviews “How many university students have several hundred dollars lying around?” a thought that was echoed by the women in both the focus groups and reflected by the survey results. Lastly, as this study concerned students in university, there is the potential

for people to move away from their home to continue their schooling. In the process, many students may choose not to change their family physician to one in their new city, province or country. Subsequently, these women would only be able to schedule appointments with their respective physicians when they returned home, which would not necessarily coincide with the recommended vaccination schedule. For other women who change provinces, it may be difficult to complete the vaccine series, particularly if it is part of a catch up program which can vary by province. However, a randomized control trial of undergraduate women from a Pittsburgh university was conducted to assess the noninferiority of an alternate vaccine administration schedule of the quadrivalent HPV vaccine (79), which could address the issue of women not completing the series within the recommended timeline. This study demonstrated that administration of the vaccine at months 0, 2 and 12 was non inferior to vaccine delivery at 0, 2 and 6 months. These results indicate that women who delay completing the last dose of the vaccine by up to 6 months will have an immune response comparable to those who received the third dose at the 6 month mark.

This study reveals that a sizeable proportion of women who have not yet been vaccinated would be interested in receiving the vaccine at some point, which is comparable to other studies (66, 80). Although 99 women in the non-vaccinated cohort specified that they planned on being vaccinated against HPV at some point, only a third of them indicated that they intended to be vaccinated within the next 12 months. The reasons for delaying the initiation of the vaccine process could be similar to those women who will take a longer time than scheduled to complete the vaccine series. These include, but are not limited to, time and convenience, cost, not having a physician and misinformation about when the vaccine series should be initiated. The idea of time and convenience, though not specifically asked in our questionnaire, has been assessed in other

studies and was discussed by both focus groups. A study conducted in New Jersey found that, even under conditions where young women were offered a free voucher for the whole vaccine series, after completing a questionnaire, uptake of the vaccine was low in a population of women aged 18-24. This study found that women who pre-specified that they would make the time to receive the second and third doses of the vaccine were much more likely to complete the vaccine series (81).

### **4.3 Characteristics Associated with HPV Vaccination**

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This study identified several characteristics, both demographic and related to sexual health, that were associated with receipt of the HPV vaccine. The significant characteristics included being white, having had at least one Pap smear and currently using some form of birth control, while reporting ever having had sex approached significance. An American study based on female university students in New York found that doctor recommendation, identifying as white and having a history of sexual intercourse were associated with vaccine series initiation (56). Another study found yet other exposures to be associated with vaccine acceptance of university women, primarily sexual activity, having an STI or abnormal Pap smear (82). A third study from the UK also identified that girls of different ethnic minorities had significantly lower rates of HPV vaccination uptake, which parallels this study (83), whereas another study conducted in the United States found that being white decreased the likelihood of vaccine series initiation in women aged 19 to 26 (84).

Another Canadian study (66) which explored the relationship of HPV vaccination intention between subgroups of a survey cohort found that negative health consequences, doctor recommendation, attitudes and subjective norms were significant in multivariate analysis

comparing unvaccinated women who did not intend to be vaccinated with those who did. This thesis found quite similar results, with overall attitude towards the vaccine, doctor recommendation and peer influence all being significant in the final model. The study by Krawczyk et al (66) also investigated the difference between vaccinated and intending to be vaccinated study participants. The model developed in that study greatly differed than the one used in this thesis. While doctor recommendation, susceptibility to HPV and subjective norms were significantly associated with being vaccinated in that study, this thesis found that a more positive overall attitude toward getting the vaccine and being more influenced by a parental recommendation were significantly associated with being vaccinated. This in fact may simply be because many of the vaccinated women in this study were vaccinated against HPV in grade 8, when parental influences were greater compared to when women are adults. The vaccinated group was also significantly less influenced by their perceived susceptibility to HPV, as well as the vaccine cost.

The differences between the multivariate models of these two studies could be the result of differences in survey development, as two different questionnaires and populations were used. Further, the questionnaire used for this thesis included specific questions about a multitude of barriers and motivators for vaccination, as well as differentiated between potential subjective norms. This separation of subjective norms is particularly important for this age group as peer influence can be much stronger than parental influence. As seen in these models, parental influence was much stronger for women who were already vaccinated, probably as a result of the majority of the women being vaccinated when they were younger. The study by Krawczyk et al (66), which drew its sample population primarily from the university's Psychology Department, was advertised as a study about factors which affects decision-making with regards to health and

sexuality, without mentioning HPV. It involved completing the questionnaire at a designated computer lab only for the study, which could potentially bias the sample towards people who have fewer social inhibitions, though it could capture women who are less interested in HPV. As this study was conducted at McGill University, it is likely that the sample included women who were more culturally diverse, since this university is in a larger city and attracts more people from across the country, as well as internationally when compared to the University of Ottawa.

In the model used in this study, knowledge was not included as a factor because it was equally high in both the vaccinated and unvaccinated groups. It was surprising that knowledge was so high in both cohorts, considering much of the literature indicates that there is only a low to moderate understanding of HPV in the female population (85-91). The differences between these studies and ours may perhaps be mostly the result of increased exposure about the virus and HPV vaccination over time, since many of these studies were conducted soon after the vaccine was released, as well as in other countries, where sexual health education could be quite different. One surprising result in the knowledge section was that only 94% of the vaccinated group was aware of the required dosage. This indicates that not all women who are vaccinated know that they need to get three doses to complete the vaccine series.

Most of the women in the study were unaware that there was more than one vaccine available against HPV (40.11% and 30.73% respectively for the vaccinated and non-vaccinated groups). This lack of knowledge, though it may not dissuade someone from receiving the vaccine they are aware of, can prevent someone from clearly understanding the choices available to them, as well as the pros and cons of each vaccine.

#### **4.4 Attitudes toward HPV, HPV Vaccination and Cervical Cancer Screening**

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The attitudes of the respondents in this study were generally positive, which is similar to the results of other studies in similar populations (56, 66, 92-94). It was unsurprising that the majority of women who were vaccinated at the time of the study were optimistic since they would mostly be aware of the benefits of HPV vaccination. There was, however, a small percentage of women in the vaccinated group who had lower overall opinions of receiving the vaccine, which has been largely unexplored in the literature. There are several possible explanations for this phenomenon. Firstly, some women may feel that the vaccine has not been beneficial or useful yet as they have not seen any change in their health between the time prior to vaccination and the present. Like other vaccines, it is difficult for an individual to ascertain if their good health is a result of the vaccine's efficacy or not being infected with the virus in question. Secondly, some women may have had an adverse reaction to the vaccine, which may have overshadowed perceptions of its potential benefits. Thirdly, as the vaccines only directly cover two to four HPV types, it is possible to have been infected with other subtypes that cause an infection or problem, which can persuade vaccinated individuals that the vaccines are not effective. This outcome would be more likely with Cervarix, as it does not directly offer immunoprotection against HPV types that cause genital warts. The overall attitudes of the non-vaccinated women were also generally positive, though slightly less favourable than the women in the vaccinated cohort. This difference in attitude could perhaps be part of the reason why these women have not chosen to receive the vaccine.

This study also assessed the respondents' particular perceptions of the efficacy of the vaccine in prevention of both genital warts and cervical cancer. Almost all the women in this study considered genital warts and cervical cancer as severe and had very positive attitudes to

reducing their risk of these outcomes, which is comparable to other studies that looked at perceptions of the HPV infection (95-98). Both groups of respondents had a more positive opinion of the vaccine's ability to reduce the risk of cervical cancer, compared to genital warts. This difference in opinions may lie in the fact that genital warts can become apparent after a short period of time, whereas cervical lesions or cervical cancer can take years to develop. Thus, a vaccinated woman may discover that she has genital warts and therefore have a less favorable view of the vaccine's efficacy towards risk reduction of the warts, but not towards cervical cancer. It is also possible that women are confusing genital warts with genital herpes or are unaware that different viruses are the cause of the given afflictions. Furthermore, Cervarix only directly offers protection against the main cancer-causing HPV strains, not those which cause genital warts. Therefore those vaccinated with this HPV vaccine would not be protected from developing genital warts.

The questionnaire and focus groups in this study also explored the controversial question of the target population for the vaccine: those who are sexually active or not. While the vaccinated group had similar beliefs about vaccinating both groups of women, the non-vaccinated cohort was more hesitant to vaccinate non-sexually active girls. This could be related to the idea that vaccinated women are less worried about the vaccine, particularly if they had received the vaccine prior to their own onset of sexual activity. The women in the non-vaccinated group could be more hesitant to vaccinate non-sexually active females because of the misconception that vaccinating too early can be harmful. The problem some people have with vaccinating girls as young as nine is that they will not understand the reason for the vaccination and that they are too young to be exposed to information about sexually transmitted infections. Another argument that has been put forward for not vaccinating women early is that vaccinated

women might be less likely to practice safe sexual behaviours (85, 99). The results of this study, however, indicate that only a small proportion of women believe that HPV vaccination would change their current safe sex practices. Furthermore, discussion in both focus groups indicated that they felt it unlikely that HPV vaccination would increase the likelihood of earlier sexual onset for young girls, though the focus group participants agreed that this theoretical possibility could lead to some parents deciding not to have their daughters vaccinated against HPV.

#### **4.5 Barriers to HPV vaccination**

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Discussion amongst the focus groups' participants served to elaborate on many of the topics in the main study. The main barriers brought forth by the survey and focus group of students surrounded the topic of lack of knowledge pertaining to the vaccine. As the vaccine is still fairly new and its long term effects have yet to be determined, it is expected that people are not aware of all the facts surrounding the HPV vaccines. Unlike other more established vaccines, the side effects of the HPV vaccines may not be widely known. As this study concerned university students, it is not unreasonable to expect them to be more inquisitive about their health options and disposed to learn more about a vaccine before opting to receive it. These results are not unique to this study, as others have also indicated that the vaccine being too new, not knowing enough about it or its side effects, are among the chief reasons for women of university age not to receive the vaccine (87, 91, 100). Other factors brought up by these studies include being in a monogamous relationship, uncertainty about health insurance coverage of the vaccine and cost (87, 100), which were all noted issues in our study as well.

One way for all the barriers specifically about HPV vaccine knowledge to be tackled at the same time is through a discussion with a family physician or gynaecologist, either of whom

would be capable of addressing most questions or concerns about the vaccine. A health care professional would be able to alleviate the concerns these women have and if not directly provide them with the information they are looking for, at least point them towards a credible source where they could learn more about the issues for themselves. This potential solution, however, brings up another problem of people not having their own physicians. This could be a genuine issue for a student population who may be transitioning from pediatric to adult care or be moving to a new city and be unaware of how to find a new physician. Thus, it is essential for students to realize that their health should be a priority and to be aware of which health services are available to them. If more awareness was made about the health services that students may already be paying for or automatically qualify for, then they would have more opportunities and perhaps more incentive to find a physician and discuss possible health choices for themselves, including receiving an HPV vaccine.

Although many of the women who were not vaccinated at the time of the study intend to get the vaccine in the future, only a small subset of these women are willing to pay the required amount for the vaccine series. This in itself may be enough to prevent intention from becoming behaviour. Clearly cost is not a barrier that can be resolved through education. Unless it is covered by a woman's health insurance, this vaccine can be quite expensive for women who did not receive it in school. This barrier has been a concern for women in many other studies (87, 98, 100-103). One of the problems brought up in the focus groups is that people are not aware of how expensive the vaccine actually is and that the cost is per dose, not for the entire series. Knowing that this is the reality, it is likely that vaccine cost could be a barrier for a larger proportion of women in this age range. The focus group of students indicated that though it was not the most common barrier, cost could be the first and easiest barrier to be removed. One

suggestion made was that health insurance policies, particularly the ones students pay for as part of their university fees, should partially cover the HPV vaccines, which would lower the financial burden for students. This approach would make the vaccine a more viable option for students and could lower health costs in the future, by decreasing the incidence of cervical lesions and cervical cancer among HPV vaccinated women. An incentive for the health insurance companies would be potential cost savings in the long run, particularly as the proportion of vaccinated women increase, presumably lowering the prevalence of abnormal Paps and decreasing the incidence of cervical cancer (42). A subset of the non-vaccinated women entering university will be those who missed it when they were younger or those who may be entering Canada from another country which does not vaccinate against HPV. By partially subsidizing the vaccine series, there would be a sharing of cost between the insurance companies and the vaccine users and there would likely be an increase in uptake of the vaccine by older women.

#### **4.6 Factors that Promote Vaccine Uptake**

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Although certain influences on HPV vaccination were shared between the two vaccinated and unvaccinated groups in this study, it was surprising how different some of the motives were. The focus groups indicated that non-vaccinated women, particularly if they lived at home or were financially dependent on their parents, were still influenced by parental approval, which correlated to the survey data. Women in the vaccinated group may have been dependent on their parents at the time of vaccination, to provide them with information about the vaccine and financial support, either through directly paying for the vaccine or through their own health insurance. A parent could also logistically be the link between the girl and the physician. Furthermore, whether living at home or abroad, students may still be under their parents' health insurance or rely on their parents for financial aid with larger expenses. Thus, it is important for

parents to be fully informed about issues related to sexual health and the health options and information available to them and their children. It is, however, important to consider that peer influence is also a strong motive for HPV vaccination, particularly in this population, as parental weight for health matters can decrease as women get older.

It was unsurprising that both groups are strongly influenced by a doctor, as this is a health matter and the vaccine is relatively new. The recommendation from a doctor would be particularly important for slightly older women who had not been offered the vaccine in school, since they may not know as much about the vaccine or virus and would potentially need more information. This factor has been recognized in several other studies (66, 89) and tends to be the one of the most influential aspects in the decision to receive the HPV vaccine, for women over the age of 18.

Although both groups in the study were influenced by the vaccine being offered free or covered by health insurance (thus not at the individual's expense), vaccine cost was much less influential for the vaccinated group when compared to the non-vaccinated women. This is partially because some women were offered the vaccine through school clinics, while for others the vaccine was covered by their health insurance. For those who were not offered it in school or whose insurance does not cover the vaccine, the cost of the vaccine can be the deciding factor on whether or not to receive the vaccine, a fact which has been noted in other studies (87, 98, 100-103).

#### **4.7 Effect of HPV Vaccination on Safe Sex Practices and Cervical Cancer Screening**

Although there have been studies which suggest that HPV vaccination could negatively impact women's attitudes to safe sex practices and cervical cancer screening (85, 99), this study found that women perceived HPV vaccination would have negligible effects on either of these

behaviours, though a small proportion of the study population (4.3% of the vaccinated group and 9.8% of the non-vaccinated group) indicated that they would be less likely to receive Pap smears after HPV vaccination. These results are comparable to other studies (92, 104) that were conducted among female university students in the United States and female adults in Turkey, which demonstrated that HPV vaccination does not negatively affect sexual behaviour or screening practices. In fact, a study conducted in Scotland found that unvaccinated women were significantly less likely to indicate intentions to be screened for cervical abnormalities in the future (105). For a small sub-population of our study, however, there could potentially be negative repercussions towards safe sex practices, particularly for other sexually transmitted infections.

#### **4.8 Other Issues Discussed in the Focus Groups**

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The focus group discussions contributed supplemental qualitative information for this study. Similar to the study by Teitelman et al, this thesis found that attitudes and social norms were strongly associated with HPV vaccine intention (106). While that study did not differentiate between potential social influences, the most common themes of social norms included parents and peers, similar to both focus groups in our study. Other similarities these studies shared include the generally positive attitude to HPV vaccination and that health insurance coverage of the vaccine could greatly increase the vaccination rates in this population.

Both focus groups discussed the issues of the vaccine's target population at length. The consensus of both groups was that universal vaccination of all eligible people, female or male, sexually active or not, should be available and most advocated for some form of subsidized vaccination program for all the eligible people who were not grade 8 girls. This sentiment has

been echoed in other studies, which proposed universal access by adult women for the vaccine (93).

The focus group for immigrant women discussed issues concerning parental attitudes and cultural influence on women's views toward the HPV vaccination as well as potential methods to make the vaccine more acceptable for other cultures. These suggestions included providing educational materials in different languages or promoting the vaccine primarily as cancer prevention instead of emphasizing its use for preventing sexually transmitted infections. Another study, however, looked at whether ethnicity really influenced parental decision-making with regards to HPV vaccination of their daughters (107). This study included parents who identified as being white, African-American, African-Caribbean, African or Latino and results indicated that immigrant parents and non-white parents were actually more supportive of HPV vaccination mandates. The differences between these two studies could be due to the fact that different ethnicities were involved, with different cultural beliefs. More in-depth study could be done in particular cultures, with a larger sample size, to see if a difference truly exists between cultures.

These discussions helped to further explain the findings of the survey and provided extra insight into the thought processes of university students and immigrants. The experiences and knowledge the respondents in these focus groups shared brought up other barriers and considerations that were not discussed in the survey. A striking example of this was the reality that two women in the focus group for immigrant brought forth. Upon arriving in Canada, they were not given any information or guidance about health information. As newcomers to the country, they may not be aware of which health services they have a right to use to or how to access health care providers, other than the emergency room or walk-in clinics. This situation

speaks to a larger issue than HPV vaccination, the Canadian health care system in general. This is especially important for people who immigrate to Canada at an older age. Women in particular, in addition to not having annual physicals, would also potentially miss the opportunity for screening against both breast and cervical cancer without access to adequate primary care. This experience of not having or not knowing how to access health services is not unique to this study. F.S. Hodges et al found in their study that female American Indian college students were unaware of where they could find such information and where they could actually access the vaccine itself (108).

## **4.9 Strengths and Limitations of the Study**

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### **4.9.1 Strengths of the Study**

The survey portion of this study involved 401 female undergraduate students from 4 of the largest faculties at the University of Ottawa. These women represent a fairly diverse sample of the university's population, corresponding to more than 10 ethnicities and different provinces, as well as countries, of origin. Strong points of the questionnaire include that it was broad in scope, covering many areas related to beliefs, attitudes, and behaviours around HPV vaccination, and that it included questions specifically designed for women who either had or had not been vaccinated against HPV.

Another asset of the study is that the questionnaire went through several drafts, which ensured that the questions included in the final version were accurate, clear and provided information for all the study objectives. The process of creating and editing a new instrument permitted a lot of flexibility in the type of data collected and how specific or broad the data could be. Furthermore, through the use of cognitive interviews and a pilot test in a comparable

population, it was ensured that the final set of questions were appropriate for the population in question, were necessary and measured the constructs intended to be measured. As a result, a great deal of data has been collected about the attitudes university women have regarding HPV vaccination, as well as several other topics surround these perceptions.

A further strength of the survey is that it was bilingual English/French. This was particularly important since the University of Ottawa is a bilingual university which caters to both Anglophone and Francophone students. In this study, nearly 15% of the survey sample responded to the questionnaire in French. By offering the survey in both languages, this eliminated bias that could be introduced into the study from neglecting a sizeable portion of the student population.

Finally, this survey included an interesting sample of women taking advantage of an opportunity to survey who were offered the vaccine in schools after it had been introduced in 2007, while also including women who, due to age requirements, would not have been offered the vaccine.

Strengths of the focus groups include that they involved a variety of women with different views about HPV vaccinations and diverse backgrounds, both educational and cultural.

#### **4.9.2 Limitations of the Study**

There were several limitations to this study. The first is that the sampling strategy used to obtain this study's sample was not random. In this case, it was not possible to include a random sample because the lists of students in each faculty or department are confidential and therefore could not be obtained to select a random number of students. As a result, all students on the given list were contacted, regardless of sex. Another limitation of the study is that there was not equal representation from all the faculties that participated in this study. Since only the Faculty

of Science participated at the level of a faculty, students in the sciences were overrepresented among survey participants. However, as this faculty incorporates all sciences, pure and applied and biologically based, it does represent a broad group of women. The other faculties are each represented by a given department, which does not necessarily reflect the opinions of the whole faculty.

Though this study did include 401 women, as the sample was not chosen randomly, its generalizability is a matter of question. As it pertains to university students, it should provide a fairly accurate picture since the sample included a broad range of women. The inclusion of the focus groups in this study, though one included only 4 women, is a method of improving the generalizability of the results.

As this study was cross-sectional in design, there was no chance for follow up with the participants. Consequently, there is no way of knowing if the participants' views will change over time, particularly those in the non-vaccinated cohort. It is also unfeasible to find out if the intentions indicated by the participants were turned into behaviour or not, for both vaccination and cervical cancer screening intention.

Another limitation of this study is the use of self-reported information. As it was a survey, all the information obtained was solely based on information the participant provided and was therefore subject to all the bias associated with this type of study, as well as biases associated with surveys in general. These biases include, response bias, recall error, sampling bias (with respect to the faculties other than science), coverage bias and nonresponse bias. With regards to recall error, HPV vaccination is an event that should be fairly easy to remember, particularly since it would have been within the last 5 years and involves up to 3 repetitions. It is possible for errors to have been reported for the question regarding vaccination influences, as

someone may not remember how much a given factor may have impacted a decision a few years after the fact (109). As this survey assessed safe sex practices, it may have been subject to social desirability bias. However, since this was not a phone or in-person interview, the anonymity may have allowed respondents to answer the questions freely. Although the target population for this study was University of Ottawa women aged 18 to 25 and the sampling frame theoretically encompasses all the students attending the university, bias was introduced as a consequence of the survey only being administered to a subset of the student population. This study involved overcoverage of the target population by the sampling frame due to the fact that the email lists did not differentiate between male and female students. Undercoverage arose as not all faculties were included in the survey.

Non-response bias is another limitation to the study. Although the response rate for the survey was slightly more than 15%, it is difficult to compare it with other studies, as many of them do not indicate their response rates. Although respondents had opinions that ranged across the spectrum, there was probably a tendency for respondents to be more interested in the topic and potentially have a more favorable opinion about the vaccine, since the attitudes seemed to be positive overall. There is potential concern about the generalizability of the survey results as the response rate was only just under 17%. While the results of the survey suggest that the prevalence of HPV vaccination is approximately 50% for this age group, this is probably an over-estimation. The data may not be fully representative of the attitudes of the general population (given the response rate), which should be taken into consideration when reviewing the results of this study. The low response rate could be the result of the time of the year when the questionnaire was distributed, which approached the end of the winter semester and final examinations. One explanation for the difference in response rates by department or faculty

could be the sender of the email containing the survey link. Students do not always open emails from their administration, particularly if they receive many emails a day. Students could be more apt, however, to open an email from their professor, which can be noted in Appendix D (Table 2). The Faculty of Health Sciences (survey link distributed once by a professor) was among the highest response rates, while the Faculty of Arts (survey link distributed once by student association) had the lowest response rate. It is also evident that interest in the survey topic is very influential in survey response rates, as the highest response rate resulted from the Department of Women's Studies (nearly 100% response rate). The students from this department would be very interested in female issues and thus be more likely to complete a survey about the female perspective regarding HPV vaccination. Other possible explanations for the lack of responses include lack of interest by the student population in the topic or completing a survey and the burden of completing the questionnaire.

Nonresponse rates are heavily influenced by the following: failure to deliver the survey request, refusal to participate and inability to participate. In this case, the first point was of minor concern, as the contact was made through persons in administrative positions, who would have the correct contact information required for survey distribution. The last point was also minimized by having a bilingual survey, which would theoretically enable all potential respondents to respond, as they would have a working knowledge of either English or French.

Lastly, a general limitation of this topic is that it is difficult to compare different studies, particularly with regards to attitudes as different research groups used different theoretical frameworks to guide the development of their individual questionnaires. The framework chosen for this study, however, has been used in several other studies and has been previously validated in other questionnaires.

#### **4.10 Significance of the Thesis**

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This thesis makes a meaningful contribution in the field of epidemiology. The Human papillomavirus is one of the most common sexually transmitted infections in Canada and other parts of the world. It is capable of causing a range of symptoms and diseases, from asymptomatic infection to cervical cancer. Currently, half of sexually active women between the ages of 18 and 22 are infected with some strain of this virus (14). Since the HPV vaccines have been recommended for use in women up to the age of 25 or 45, depending on whether the vaccine they are receiving is Cervarix or Gardasil, it is logical for this age group to be targeted for vaccination.

The women who are now between the ages of 18 and 25 may not have been offered the HPV vaccine, when the vaccines were first introduced into school immunization programs approximately 5 years ago. As the vaccine was very new and free only for a certain subset of the population, namely girls in the eighth grade, many parents did not have their daughters vaccinated. Thus, there is now a gap in which many young women are not vaccinated or have not completed all 3 of their vaccine doses. Furthermore, there are still many girls today who are offered the vaccine as part of the school based immunization programs who have not received it. Thus, targeting women over the age of 18 to be offered an HPV vaccine, regardless of whether or not the women are sexually active, may be considered in the future. Since the vaccines include immunoprotection against multiple strains that are both high and low risk, in addition to providing cross-protection to several other oncogenic viral strains, the vaccines can provide benefit for women who are sexually active. It is also unlikely that a woman is infected with all the strains included in the vaccines.

This thesis has shed some light on the main issues involved in acceptance or rejection of the HPV vaccines, as well as the attitudes of women aged 18 to 25 towards these vaccines. This can inform the development and implementation of catch-up programs for this age group, as well as accompanying education strategies. This study differs from others that have already been conducted in that it concentrates on the perspective of Canadian women, whereas most of the literature is focused on women from the United States.

In Europe, 19 of the 29 countries in the European Union (EU) and the European Union Association Agreement (EAA) have established HPV vaccination programs, 10 of which have also implemented HPV catch up programs (78). Each of these countries has developed its own program independent of the others, thereby having different target groups, methods of vaccine delivery and financing options. While some countries fully finance both the initial immunization initiative as well as the catch up program, the vaccine recipients in other countries bear the full financial burden. Vaccination coverage in these countries ranges from 17 to 84%, which overall is much lower than anticipated (78). These rates of vaccination indicate that it is important to recognize the role of HPV vaccination and cervical cancer screening in female immigrants. Although some of these countries offer catch up programs, there are still many women who will not have benefitted from these programs. It is therefore important to consider that women from these countries may not be vaccinated against HPV, though they may be willing to receive the vaccine, given that European studies indicate an overall positive view towards the vaccine (51, 76, 88).

In November 2011, the Global Alliance for Vaccines and Immunization (GAVI Alliance) stated that they would support HPV vaccinations in the poorest countries (110). Currently, there are 56 countries that are eligible for the support of this alliance, based on having a gross national

income (GNI) per capita that does not exceed US\$ 1550 (111). While nearly 3 billion people live in GAVI-eligible countries, 70% of who are under the age of 35, 48% of new cervical cancer cases are from these countries. In GAVI-eligible countries, cervical cancer is not the third leading cause of female cancer mortality, but the first. Given this information, between 2006 and 2010, PATH (a nongovernmental collaborator of GAVI) worked with the governments of India, Uganda and Vietnam to assess the feasibility of introducing an HPV vaccination program. Three delivery strategies were attempted, including school-based strategies in Uganda and Vietnam, which achieved 83-96% coverage, a combination of school and health-centre based delivery in India attained 77-88% coverage, while a health-centre based program in Vietnam observed 99% coverage (110). Coverage was defined as the percentage of household of eligible girls who had been vaccinated with all three doses of the vaccine series. Rwanda, the first African country to introduce HPV vaccination, partnered with Merck Frosst to deliver the vaccine series to girls in grade 6 in 2011, achieving 93.23% coverage of their target population (112). These levels of coverage are astounding when compared to the levels achieved to date in Ontario are far lower. However, again it must be taken into consideration that the population being targeted in these countries is young girls, while older women were not offered the vaccine free of charge. Therefore, there are many women in these countries who are still at a higher risk for cervical cancer.

#### **4.11 Future Directions**

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This study found that the overall attitude to HPV vaccination in university women is positive. Like other studies assessing attitudes to HPV vaccination (66, 113), this study's results suggest that increasing education about the vaccine's benefits and targeting personal or cultural beliefs about HPV vaccination could increase vaccination rates in women of university age.

Though a substantial proportion of the non-vaccinated group intends to be vaccinated at some point, it is evident that barriers other than knowledge, primarily cost and health insurance, need to be addressed to significantly increase the rates of HPV vaccination (114).

As immigration plays a vital role in the growth of the Canadian population, it is important to consider the immunization of newcomers to the country against HPV. This is particularly important since the greatest proportion of cervical cancer cases are in developing countries. Therefore, more effort should be made to ensure that people entering the country are aware of the guidelines for cervical cancer screening and are conscious of all the options available to protect themselves and others against HPV infection. Since cervical cancer screening regulations can greatly vary between countries, it is essential that women have this information available to them when they initially come into the country, particularly since many newcomers do not know where to access health care programs.

Future studies will need to assess the issue of HPV vaccination in men, in order to truly attain the rates of vaccination required to achieve herd immunity. It will also be important to consider the role of time and convenience of receiving the HPV vaccine in future studies looking at this particular population. Suggestions for improving rates of vaccination among university women include partial or total subsidy of the vaccine for women who are under the university's health coverage or extended provincial coverage for women past the eighth grade.

#### **4.12 Conclusion**

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Overall, this study suggests that close to half of unvaccinated women surveyed would be interested in obtaining the vaccine at some point in the future, supporting the feasibility of a catch-up HPV vaccination program targeting a similar population. While cost is not the main

barrier that prevents HPV vaccination in this population, it is amongst the foremost barriers. The most common facilitators of vaccination were doctor recommendation, as well as recommendation from parents or peers.

## REFERENCES

1. Watts LA, Joseph N, Wallace M, Rauh-Hain JA, Muzikansky A, Growdon WB, et al. HPV vaccine: A comparison of attitudes and behavioural perspectives between Latino and non-Latino women. *Gynecologic Oncology*. 2009;112:577-82.
2. World Health Organization. WHO Guidance Note: Comprehensive cervical cancer prevention and control- a healthier future for girls and women. Geneva: World Health Organization 2013 2013 Contract No.: 9789241505147.
3. Cutts F, Franceschi S, Goldie S, Castellsague X, de Sanjose S, Garnett G, et al. Human papillomavirus and HPV vaccines: a review. *Bulletin of the World Health Organization*. 2007 September 2007;85(9):649-732.
4. Pakin D, Bray F, Ferlay K, Pisani P. Global Cancer Statistics. *CA Cancer J Clin*. 2002;55(2):74-108.
5. D'Andrilli G, Bovicelli A, Giordano A. HPV vaccines: State of the art. *Journal of Cellular Physiology*. 2010;224(3):601-4.
6. Trottier H, Franco EL. The epidemiology of genital human papillomavirus infection. *Vaccine*. 2006;24, Supplement 1(0):S4-S15.
7. Baseman JG, Koutsky LA. The epidemiology of human papillomavirus infections. *J Clin Virol*. 2005;32(Suppl. 1):S16-24.
8. Koutsky LA, Galloway D, Holmes K. Epidemiology of genital human papillomavirus infection. *Epidemiologic Reviews*. 1988 1988;10:122-63.
9. Johnson AM, Mercer CH, Beddows S, de Silva N, Desai S, Howell-Jones R, et al. Epidemiology of, and behavioural risk factors for, sexually transmitted human papillomavirus infection in men and women in Britain. *Sexually Transmitted Infections*. 2012 April 1, 2012;88(3):212-7.
10. Kreimer AR, Clifford GM, Boyle P, Franceschi S. Human Papillomavirus Types in Head and Neck Squamous Cell Carcinomas Worldwide: A Systematic Review. *Cancer Epidemiology Biomarkers & Prevention*. 2005 February 1, 2005;14(2):467-75.
11. Schiller JT, Day PM, Kines RC. Current understanding of the mechanism of HPV infection. *Gynecologic Oncology*. 2010;118(1, Supplement 1):S12-S7.

12. Ault KA. Human papillomavirus vaccines and the potential for cross-protection between related HPV types. *Gynecologic Oncology*. 2007;107(2, Supplement):S31-S3.
13. de Sanjosé S, Diaz M, Castellsagué X, Clifford G, Bruni L, Muñoz N, et al. Worldwide prevalence and genotype distribution of cervical human papillomavirus DNA in women with normal cytology: a meta-analysis. *The Lancet Infectious Diseases*. 2007;7(7):453-9.
14. Torgerson R, MacAdam R. HPV Vaccine Funded in Canada. In: Networks CPR, editor. Ottawa: Health Policy Monitor; 2007.
15. Sellors JW, Mahony JB, Kaczorowski J, Lytwyn A, Bangura H, Chong S, et al. Prevalence and predictors of human papillomavirus infection in women in Ontario, Canada. *Canadian Medical Association Journal*. 2000 September 5, 2000;163(5):503-8.
16. The Society of Obstetricians and Gynaecologists of Canada. Incidence and Prevalence of HPV in Canada. Ottawa: SOGC; 2007 [cited 2013 June 18, 2013]; Available from: <http://www.hpvinfos.ca/health-care-professionals/what-is-hpv/incidence-and-prevalence-of-hpv-in-canada/>.
17. Ratanasiripong NT. A review of human papillomavirus (HPV) infection and HPV vaccine-related attitudes and sexual behaviors among college-aged women in the United States. *J Am Coll Health*. 2012;2012;60(6):461-70.
18. Clifford GM, Gallus S, Herrero R, Muñoz N, Snijders PJF, Vaccarella S, et al. Worldwide distribution of human papillomavirus types in cytologically normal women in the International Agency for Research on Cancer HPV prevalence surveys: a pooled analysis. *The Lancet*. 2005;366(9490):991-8.
19. Walboomers JMM, Jacobs MV, Manos MM, Bosch FX, Kummer JA, Shah KV, et al. Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. *The Journal of Pathology*. 1999;189(1):12-9.
20. Bosch FX, Manos MM, Muñoz N, Sherman M, Jansen AM, Peto J, et al. Prevalence of Human Papillomavirus in Cervical Cancer: a Worldwide Perspective. *Journal of the National Cancer Institute*. 1995 June 7, 1995;87(11):796-802.
21. Bosch FX, Burchell AN, Schiffman M, Giuliano AR, de Sanjose S, Bruni L, et al. Epidemiology and Natural History of Human Papillomavirus Infections and Type-Specific Implications in Cervical Neoplasia. *Vaccine*. 2008;26(Supplement 10):K1-K16.

22. Patel H, Wagner M, Singhal P, Kothari S. Systematic review of the incidence and prevalence of genital warts. *BMC Infectious Diseases*. 2013;13(1):39.
23. Gross G, Pfister H. Role of human papillomavirus in penile cancer, penile intraepithelial squamous cell neoplasias and in genital warts. *Med Microbiol Immunol*. 2004 2004/02/01;193(1):35-44.
24. Moscicki A-B, Shiboski S, Broering J, Powell K, Clayton L, Jay N, et al. The natural history of human papillomavirus infection as measured by repeated DNA testing in adolescent and young women. *The Journal of Pediatrics*. 1998;132(2):277-84.
25. Marra F, Ogilvie G, Colley L, Kliewer E, Marra CA. Epidemiology and costs associated with genital warts in Canada. *Sexually Transmitted Infections*. 2009 April 1, 2009;85(2):111-5.
26. Kliewer EV, Demers AA, Elliott L, Lotocki R, Butler JRG, Brisson M. Twenty-Year Trends in the Incidence and Prevalence of Diagnosed Anogenital Warts in Canada. *Sexually Transmitted Diseases*. 2009;36(6):380-6 10.1097/OLQ.0b013e318198de8c.
27. Center for Disease Control. Genital HPV Infection - Fact Sheet. Atlanta: Centers for Disease Control and Prevention; August 25, 2011 [updated February 15, 2012; cited 2012 April 28, 2012]; Available from: <http://www.cdc.gov/std/hpv/stdfact-hpv.htm>.
28. Schiffman MH, Castle P. Epidemiologic Studies of a Necessary Causal Risk Factor: Human Papillomavirus Infection and Cervical Neoplasia. *Journal of the National Cancer Institute*. 2003 March 19, 2003;95(6):E2.
29. Waggoner SE. Cervical cancer. *The Lancet*. 2003;361(9376):2217-25.
30. American Cancer Society. Cervical Cancer. American Cancer Society; 2013 [updated April 11, 2013; cited 2013 July 5, 2013]; Available from: <http://www.cancer.org/cancer/cervicalcancer/detailedguide/cervical-cancer-treating-by-stage>.
31. Mammas I, Sourvinos G, Vakonaki E, Giamarelou P, Michael C, Spandidos D. Novel human papilloma virus (HPV) genotypes in children with recurrent respiratory papillomatosis. *European Journal of Pediatrics*. 2010;169(8):1017-21.
32. Rothera MP, Albert DM, Hughes OR. UK needs vaccine to protect against HPV types causing recurrent respiratory papillomatosis. *BMJ*. 2011 2011-10-18 00:00:00;343.
33. Adams M, Jasani B, Fiander A. Prophylactic HPV vaccination for women over 18 years of age. *Vaccine*. 2009;27(25-26):3391-4.

34. Gouvernement du Québec. Human Papillomavirus Viruses (HPV). Santé et Services sociaux Québec; 2012 [cited 2012 June 10, 2012]; Available from: <http://www.msss.gouv.qc.ca/sujets/santepub/vaccination/index.php?aid=193#q10>.
35. Public Health Agency of Canada. Human Papillomavirus (HPV). In: Public Health Agency of Canada, editor. Ottawa: Health Canada; 2010.
36. Medeiros LR, Rosa DD, Rosa MI, Bozzetti MC, Zanini RR. Efficacy of Human Papillomavirus Vaccines: A systematic quantitative review. *Int J Gynecol Cancer*. 2009;19:1166-76.
37. Garland SM, Hernandez-Avila M, Wheeler CM, Perez G, Harper DM, Leodolter S, et al. Quadrivalent Vaccine against Human Papillomavirus to Prevent Anogenital Diseases. *New England Journal of Medicine*. 2007;356(19):1928-43.
38. Muñoz N, Kjaer SK, Sigurdsson K, Iversen O-E, Hernandez-Avila M, Wheeler CM, et al. Impact of Human Papillomavirus (HPV)-6/11/16/18 Vaccine on All HPV-Associated Genital Diseases in Young Women. *Journal of the National Cancer Institute*. 2010 March 3, 2010;102(5):325-39.
39. Lippman A, Melnychuk R, Shimmin C, Boscoe M. Human papillomavirus, vaccines and women's health: questions and cautions. *CMAJ: Canadian Medical Association Journal*. 2007;Sect. 484-7.
40. NBC News. Some girls fainting after receiving HPV vaccine. Atlanta: MSNBC; 2008 [cited 2012 June 10, 2012]; Available from: [http://www.msnbc.msn.com/id/22492557/ns/health-childrens\\_health/t/some-girls-fainting-after-receiving-hpv-vaccine/#.T84KPI6ZNBw](http://www.msnbc.msn.com/id/22492557/ns/health-childrens_health/t/some-girls-fainting-after-receiving-hpv-vaccine/#.T84KPI6ZNBw).
41. de Freitas AC, Almeida Diniz Gurgel AP, Simas Chagas B, Campos Coimbra E, Medeiros do Amaral CM. Susceptibility to cervical cancer: An overview. *Gynecologic Oncology*. 2012.
42. Public Health Agency of Canada. Recommendations on a Human Papillomavirus Immunization Program. Public Health Agency Of Canada- Canadian Immunization Committee; 2007 [updated 2007-12-01; cited 2013 June 20, 2013]; Available from: <http://www.phac-aspc.gc.ca/publicat/2008/papillomavirus-papillome/papillomavirus-papillome-12-eng.php#tphp>.

43. Smith L, Brassard P, Kwong J, Deeks S, Ellis A, Levesque L. Factors associated with initiation and completion of the quadrivalent human papillomavirus vaccine series in an ontario cohort of grade 8 girls. *BMC Public Health*. 2011;11(1):645.
44. GlaxoSmithKline. Health Canada Approves Cervarix™, new GSK cervical cancer vaccine2010: Available from: [http://www.gsk.ca/english/docs-pdf/FINAL\\_Press\\_Release\\_Cervarix\\_EN.pdf](http://www.gsk.ca/english/docs-pdf/FINAL_Press_Release_Cervarix_EN.pdf).
45. Public Health Agency of Canada. Update On Human Papillomavirus (HPV) Vaccines. In: *Immunization NACI*, editor.: Public Health Agency of Canada; 2012.
46. Human Papillomavirus Vaccination. Toronto: Cancer Care Ontario; 2009 [cited 2012 June 24, 2012]; Available from: <https://www.cancercare.on.ca/pcs/prevention/hpvvaccination/>.
47. Brisson M, Edmunds W. Economic evaluation of vaccination programs: the impact of herd-immunity. *Medical Decision Making*. 2003;23(1):76-82.
48. Ontario Ministry of Health and Long-term care. Ontario's HPV vaccination program. Toronto: Ontario Ministry of Health and Long-term care; 2012 [updated 2012-06-10; cited 2013 February 26, 2013]; Available from: <http://www.health.gov.on.ca/en/ms/hpv/eligible.aspx>.
49. Zimet GD, Liddon N, Rosenthal SL, Lazcano-Ponce E, Allen B. Chapter 24: Psychosocial aspects of vaccine acceptability. *Vaccine*. 2006;24, Supplement 3(0):S201-S9.
50. Brotherton J, Gertig D, Cahappell G, Rowlands L, Saville M. Catching up with the catch-up: HPV vaccination coverage data for Australian women aged 18-26 years from the National HPV Vaccination Program Register. *Commun Dis Intell*. 2011;35(2):197-201.
51. Kumar V, Whynes D. Explaining variation in the uptake of HPV vaccination in England. *BMC Public Health*. 2011;11(1):172.
52. de Visser R, Waites L, Parikh C, Lawrie A. The importance of social norms for uptake of catch-up human papillomavirus vaccination in young women. *Sexual Health*. 2011;8(3):330-7.
53. Arbyn M, Simoens C, Van Damme P, Scharpantgen A, Meijer CJLM, Beutels P. Introduction of Human Papillomavirus Vaccination in Belgium, Luxembourg and the Netherlands. *Gynecologic and Obstetric Investigation*. 2010;70(4):224-32.
54. Cancer Care Ontario. Cervical Screening. Cancer Care Ontario; 2013 [updated April 24, 2013; cited 2013 2013-06-28]; Available from: <https://www.cancercare.on.ca/pcs/screening/cervscreening>.

55. Guidelines Advisory Committee. Summary of Recommended Guidelines Cervical Cancer Screening. Toronto: Guidelines Advisory Committee; 2007 [updated February 2007; cited 2013 July 5, 2013]; Available from:  
[http://www.gacguidelines.ca/site/GAC\\_Guidelines/assets/pdf/CERV\\_SCRN05\\_Screening\\_Summary.pdf](http://www.gacguidelines.ca/site/GAC_Guidelines/assets/pdf/CERV_SCRN05_Screening_Summary.pdf).
56. Bednarczyk RA, Birkhead GS, Morse DL, Doleyres H, McNutt L-A. Human papillomavirus vaccine uptake and barriers: Association with perceived risk, actual risk and race/ethnicity among female students at a New York State university, 2010. *Vaccine*. 2011;29(17):3138-43.
57. Ford JL. Racial and Ethnic Disparities in Human Papillomavirus Awareness and Vaccination among Young Adult Women. *Public Health Nursing*. 2011;28(6):485-93.
58. Keenan K. Race and Sexual Behaviour Predict uptake of the Human Papillomavirus Vaccine. *Health Psychology*. 2012;31(1):31-4.
59. Brewer NT, Fazekas KI. Predictors of HPV vaccine acceptability: A theory-informed, systematic review. *Preventive Medicine*. 2007;45(2-3):107-14.
60. Porter S, Umbach P. Student Survey Response Rates across Institutions: Why Do they Vary? *Res High Educ*. 2006 2006/03/01;47(2):229-47.
61. Groves RM, Fowler FF, Couper MP, Lepkowski JM, Singer E, Tourangeau R. *Survey Methodology*. 2nd ed. Hoboken, NJ: John Wiley & Sons; 2009.
62. Ajzen I. Constructing a theory of planned behavior questionnaire. Unpublished manuscript Retrieved. 2011;1.
63. Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. 1991;50(2):179-211.
64. Costar H. Creative persuasive health message: Consideration of future consequences and intention to pursue vaccination against Human Papillomavirus [Dissertation]: University of Maryland; 2007.
65. Ratanasiripong N. What College Women Know, Think, and Do About Human Papillomavirus (HPV) and HPV Vaccine [Dissertation]. Kansas City: University of Missouri-Kansas City; 2012.

66. Krawczyk ALP, Samara; Lau, Elsa; Holcroft, Christina A.; Amsel, Rhonda; Knäuper, Bärbel; Rosberger, Zeev. Human papillomavirus vaccination intentions and uptake in college women. *Health Psychology*. 2012 Sep 2012;31(5):685-93.
67. Willis G. *Cognitive Interviewing "A How to Guide"*: Research Triangle Institute 1999 1999.
68. Mullins TL, Zimet GD, Rosenthal SL, Morrow C, Ding L, Shew M, et al. Adolescent Perceptions of Risk and Need for Safer Sexual Behaviors After First Human Papillomavirus Vaccination. *Archives of Pediatrics & adolescent Medicine*. 2012;166(1):82-8.
69. Popay J. Qualitative research and the epidemiological imagination: a vital relationship. *Gac Sanit*. 2003;17(Suppl 3):58-63.
70. Krueger RA, Casey MA. *Focus Groups: A Practical Guide for Applied Research*. 3rd ed. Thousand Oaks, California: Sage Publications, Inc; 2000.
71. Bryman A. *Social Research Methods*. 2nd ed. Oxford: Oxford University Press; 2004.
72. Sandelowski M. Whatever Happened to Qualitative Description? *Research in Nursing & Health*. 2000;23:334-49.
73. Francis JJ, Johnston M, Robertson C, Glidewell L, Entwistle V, Eccles MP, et al. What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *Psychology & Health*. 2010;25(10):1229-45.
74. Licht AS, Murphy JM, Hyland AJ, Fix BV, Hawk LW, Mahoney MC. Is use of the human papillomavirus vaccine among female college students related to human papillomavirus knowledge and risk perception? *Sexually Transmitted Infections*. 2010 February 1, 2010;86(1):74-8.
75. Roberts ME, Gerrard M, Reimer R, Gibbons FX. Mother-Daughter Communication and Human Papillomavirus Vaccine Uptake by College Students. *Pediatrics*. 2010 May 1, 2010;125(5):982-9.
76. Sabiani L, Bremond A, Mortier I, Lecuyer M, Boubli L, Carcopino X. Évaluation de la couverture vaccinale du vaccin anti-hpv : résultats d'une enquête auprès des lycéennes et étudiantes de la région PACA. *Journal de Gynécologie Obstétrique et Biologie de la Reproduction*. 2012;41(2):136-44.

77. Al-Naggar RA, Bobryshev YV. Practice Towards Human Papillomavirus Vaccine Among Malaysian Women: a Survey of the General Population. *Asian Pacific Journal of Cancer Prevention*. 2011;12:2045-9.
78. European Centre for Disease Prevention and Control. Introduction of HPV vaccines in EU countries- an update. Stockholm: ECDC2012.
79. Zimmerman RK, Nowalk MP, Lin CJ, Fox DE, Ko FS, Wettick E, et al. Randomized trial of an alternate human papillomavirus vaccine administration schedule in college-aged women. *J Women's Health*. 2010;19(8):1441-7.
80. Mehu-Parant F, Rouzier R, Soulat J-M, Parant O. Eligibility and willingness of first-year students entering university to participate in a HPV vaccination catch-up program. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 2010;148(2):186-90.
81. Moore GR, Crosby RA, Young A, Charnigo R. Low rates of free human papillomavirus vaccine uptake among young women. *Sexual Health*. 2010;7(3):287-90.
82. Crosby R, Schoenberg N, Hopenhayn C, Moore G, Melhan W. Correlates of intent to be vaccinated against human papillomavirus: an exploratory study of college-aged women. *Sexual Health*. 2007;4(1):71-3.
83. Roberts S, Brabin L, Stretch R, Baxter D, Elton P, Kitchener H, et al. Human papillomavirus vaccination and social inequality: results from a prospective cohort study. *Epidemiology and Infection*. 2011;139(3):400.
84. Dempsey A, Cohn L, Dalton V, Ruffin M. Worsening disparities in HPV vaccine utilization among 19–26 year old women. *Vaccine*. 2011;29(3):528-34.
85. Juraskova I, Bari RA, O'Brien MT, McCaffery KJ. HPV vaccine promotion: does referring to both cervical cancer and genital warts affect intended and actual vaccination behavior? *Womens Health Issues*. 2010;2011 Jan-Feb;21(1):71-9.
86. Gerend MA, Shepherd JE. Correlates of HPV knowledge in the era of HPV vaccination: a study of unvaccinated young adult women. *Women & Health*. 2011;51(1):25-40.
87. Giede C, McFadden LL, Komonoski P, Agrawal A, Stauffer A, Pierson R. The acceptability of HPV vaccination among women attending the University of Saskatchewan Student Health Services. *J Obstet Gynaecol Can*. 2010;32(7):679-86.

88. Durusoy R, Yamazhan M, Tasbakan MI, Ergin I, Aysin M, Pullukcu H, et al. HPV vaccine awareness and willingness of first-year students entering university in Western Turkey. *Asian Pac J Cancer Prev*. 2010;11(6):1695-701.
89. Dillard JP, Spear ME. Knowledge of human papillomavirus and perceived barriers to vaccination in a sample of US female college students. *J Am Coll Health*. 2010;2011;59(3):186-90.
90. Medeiros R, Ramada D. Knowledge differences between male and female university students about human papillomavirus (HPV) and cervical cancer: Implications for health strategies and vaccination. *Vaccine*. 2011;2010 Dec 16;29(2):153-60.
91. Wong LP, Sam IC. Ethnically diverse female university students' knowledge and attitudes toward human papillomavirus (HPV), HPV vaccination and cervical cancer. *Eur J Obstet Gynecol Reprod Biol*. 2010;2010 Jan;148(1):90-5.
92. Marek E, Dergez T, Kricskovics A, Kovacs K, Rebek-Nagy G, Gocze K, et al. Difficulties in the prevention of cervical cancer: adults' attitudes towards HPV vaccination 3 years after introducing the vaccine in Hungary. *Vaccine*. 2010;2011 Jul 18;29(32):5122-9.
93. Short MB, Rosenthal SL, Sturm L, Black L, Loza M, Breitkopf D, et al. Adult women's attitudes toward the HPV vaccine. *J Womens Health (Larchmt)*. 2010;2010 Jul;19(7):1305-11.
94. Lenselink CH, Schmeink CE, Melchers WJ, Massuger LF, Hendriks JC, van Hamont D, et al. Young adults and acceptance of the human papillomavirus vaccine. *Public Health*. 2008;2008 Dec;122(12):1295-301.
95. Lopez R, McMahan S. College women's perception and knowledge of human papillomavirus (HPV) and cervical cancer. *Californian J Health Promot*. 2007;5(3):12-25.
96. Conroy K, Rosenthal SL, Zimet GD, Jin Y, Bernstein DI, Glynn S, et al. Human papillomavirus vaccine uptake, predictors of vaccination, and self-reported barriers to vaccination. *Journal of Women's Health*. 2009;18(10):1679-86.
97. Rosenthal S, Weiss T, Zimet G, Ma L, Good M, Vichnin M. Predictors of HPV vaccine uptake among women aged 19–26: Importance of a physician's recommendation. *Vaccine*. 2011;29(5):890-5.

98. Holguin AC. Determining the Knowledge & Attitudes of 18-to 26-Year Old Women Regarding Cervical Cancer, Human Papillomavirus, and The Human Papillomavirus Vaccine. *Graduate Theses and Dissertations*. 2009:464.
99. Cooper Robbins SC, Bernard D, McCaffery K, Brotherton J, Garland S, Skinner SR. "Is cancer contagious?": Australian adolescent girls and their parents: Making the most of limited information about HPV and HPV vaccination. *Vaccine*. 2010;28(19):3398-408.
100. Zimet GD, Weiss TW, Rosenthal SL, Good MB, Vichnin MD. Reasons for non-vaccination against HPV and future vaccination intentions among 19-26 year-old women. *BMC women's health*. 2010;10(1):27.
101. Bynum SA, Wright MS, Brandt HM, Burgis JT, Bacon JL, Bynum S. Knowledge, beliefs, and attitudes related to human papillomavirus infection and vaccination, pap tests, and cervical intraepithelial neoplasia among adolescent girls and young women. *Journal of the South Carolina Medical Association*. 2009;35:267.
102. Burke SC, Vail-Smith K, White DM, Baker E, Mitchell T. Getting Vaccinated against HPV: Attitudes, Intentions and Perceived Barriers of Female Undergraduates. *College Student Journal*. 2010;44(1):55-63.
103. Caskey R, Lindau ST, Alexander GC. Knowledge and early adoption of the HPV vaccine among girls and young women: results of a national survey. *Journal of Adolescent Health*. 2009;45(5):453-62.
104. Mather T, McCaffery K, Juraskova I. Does HPV vaccination affect women's attitudes to cervical cancer screening and safe sexual behaviour? *Vaccine*. 2012;30(21):3196-201.
105. Paul-Ebhohimhen V, Huc S, Tissington H, Oates K, Stark C. HPV vaccination: vaccine acceptance, side effects and screening intentions. *Community Practitioner*. 2010;83(6):30-3.
106. Teitelman AM, Stringer M, Nguyen GT, Hanlon AL, Averbuch T, Stimpfel AW. Social cognitive and clinical factors associated with HPV vaccine initiation among urban, economically disadvantaged women. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*. 2011;40(6):691-701.
107. Perkins RB, Pierre-Joseph N, Marquez C, Iloka S, Clark JA. Why do low-income minority parents choose human papillomavirus vaccination for their daughters? *The Journal of Pediatrics*. 2010;157(4):617-22.

108. Hodge FS, Itty T, Cardoza B, Samuel-Nakamura C. HPV vaccine readiness among American Indian college students. *Ethnicity and Disease*. 2011;21(4):415.
109. Chouinard E, Walter S. Recall bias in case-control studies: an empirical analysis and theoretical framework. *Journal of clinical epidemiology*. 1995;48(2):245-54.
110. de Sanjosé S, Serrano B, Castellsagué X, Brotons M, Muñoz J, Bruni L, et al. Human Papillomavirus (HPV) and Related Cancers in the Global Alliance for Vaccines and Immunization (GAVI) Countries. A WHO/ICO HPV Information Centre Report. *Vaccine*. 2012;30(Suppl 4).
111. GAVI Alliance. Countries eligible for support. 2013 [updated 2013; cited 2013 July 20, 2013]; Available from: <http://www.gavialliance.org/support/apply/countries-eligible-for-support/>.
112. Binagwaho A, Wagner CM, Gatera M, Karema C, Nutt CT, Ngabo F. Achieving high coverage in Rwanda's national human papillomavirus vaccination programme. *Bulletin of the World Health Organization*. 2012;90(8):623-8.
113. Bendik M, Mayo R, Parker V. Knowledge, Perceptions, and Motivations Related to HPV Vaccination Among College Women. *Journal of Cancer Education*. 2011:1-6.
114. Patel DA, Zochowski M, Peterman S, Dempsey AF, Ernst S, Dalton VK. Human papillomavirus vaccine intent and uptake among female college students. *Journal of American College Health*. 2012;60(2):151-61.
115. O'Connor AM. Validation of a Decisional Conflict Scale. *Medical Decision Making*. 1995 February 1, 1995;15(1):25-30.

## APPENDIX A

### Canadian Provincial and Territorial Publicly Funded HPV Vaccination Programs (September 2010)

Adapted from the Public Health Agency of Canada (45)

Province/Territory	Routine Schedule (0, 2 and 6 months)	Date of Implementation of Routine Program	Catch-up Programs (Date of Implementation)
British Columbia	Grade 6	September 2008	Grade 9 (2008-2011)
Alberta	Grade 5	September 2008	Grade 9 (2009-2012)
Saskatchewan	Grade 6	September 2008	Grade 7 (2008-2009)
Manitoba	Grade 6	September 2008	
Ontario	Grade 8	September 2007	
Quebec	Grade 4 (doses 1 and 2), in 3 <sup>rd</sup> year of secondary school (dose 3)	September 2008	9 to 13 years of age (High Risk of HPV Infections) 14-17 years of age 9 to 17 years of age in First Nations communities 3 <sup>rd</sup> year of secondary school (2008-2013)
New Brunswick	Grade 7	September 2008	Grade 8 (2008-2009)
Nova Scotia	Grade 7	September 2007	Grade 10 (2009-2010 only) Grade 8 (2010-2011 only)
Prince Edward Island	Grade 6	September 2007	Grade 9 (2009-2010 only)
Newfoundland and Labrador	Grade 6	September 2007	Grade 9 (2008-2010)
Northwest Territories	Grade 4	September 2009	Grades 11 and 12 (2009-2010) Grades 10 and 11 (2010-2011) Grades 9 and 10 (2011-2012) Grade 9 (2012-2014)
Yukon	Grade 6	September 2009	Grades 7 and 8
Nunavut	Grade 6	March 2010	

## APPENDIX B

### Final English Questionnaire

The survey you are about to do is about your attitudes about the Human Papillomavirus (HPV) vaccine. This survey can be completed regardless of whether or not you have ever received the vaccine. Please respond as honestly as possible.

The Human Papillomavirus (HPV) is a virus that is responsible for a variety of genital infections. It is also the primary cause of cervical cancer, which is one of the most common types of cancer in women worldwide. The Papanicolaou test, more commonly known as a Pap test or a Pap smear, is used to detect cervical abnormalities and pre-cancerous or cancerous lesions.

1) Are you female or male?

- Female
- Male (Will be redirected to the thank you page of the survey)

2) Have you been vaccinated with at least 1 dose of an HPV vaccine?

- Yes (Will be directed to the next question)
- No (Will be directed to Question 16)

3) How many doses of the HPV vaccine have you had?

- 1
- 2
- 3
- 4 or more
- I'm not sure

#### Section 1a: Attitude about HPV vaccines and getting the HPV vaccine

*In this section, you will be asked about your opinions of the HPV vaccine. Though some of the questions may seem similar, please answer each of them. The questions in this section are mostly based on a 1 to 7 rating scale. For each statement, indicate the number on the scale that you think best reflects your opinion or belief.*

4) To me, getting vaccinated against HPV was...

Beneficial	1	2	3	4	5	6	7	Harmful
Undesirable	1	2	3	4	5	6	7	Desirable
Good	1	2	3	4	5	6	7	Bad
Worthless	1	2	3	4	5	6	7	Useful
Effective	1	2	3	4	5	6	7	Ineffective

5) Getting the HPV vaccine has decreased my risk of getting genital warts.

Extremely likely    1    2    3    4    5    6    7    Extremely unlikely

6) Decreasing my risk of getting genital warts is...

Beneficial	1	2	3	4	5	6	7	Harmful
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Undesirable	1	2	3	4	5	6	7	Desirable
Good	1	2	3	4	5	6	7	Bad

7) Getting the HPV vaccine has decreased my risk of getting cervical cancer.

Extremely likely 1 2 3 4 5 6 7 Extremely unlikely

8) Decreasing my risk of getting cervical cancer is...

Beneficial	1	2	3	4	5	6	7	Harmful
Undesirable	1	2	3	4	5	6	7	Desirable
Good	1	2	3	4	5	6	7	Bad

9) Getting the HPV vaccine has decreased my need for cervical cancer screening in the future.

Extremely likely 1 2 3 4 5 6 7 Extremely unlikely

10) Cervical cancer screening is...

Beneficial	1	2	3	4	5	6	7	Harmful
Undesirable	1	2	3	4	5	6	7	Desirable
Good	1	2	3	4	5	6	7	Bad

11) Vaccinating all eligible girls/women against HPV, if they are not sexually active is...

Beneficial	1	2	3	4	5	6	7	Harmful
Undesirable	1	2	3	4	5	6	7	Desirable
Good	1	2	3	4	5	6	7	Bad
Important	1	2	3	4	5	6	7	Unimportant

12) Vaccinating all eligible girls/women against HPV, if they are sexually active is...

Beneficial	1	2	3	4	5	6	7	Harmful
Undesirable	1	2	3	4	5	6	7	Desirable
Good	1	2	3	4	5	6	7	Bad
Important	1	2	3	4	5	6	7	Unimportant

13) I intend to finish my HPV vaccine series

- Yes, as per the vaccine schedule
- Yes, but it will take longer than the scheduled time frame
- I have already gotten all my vaccine doses
- No (Reason:\_\_\_\_\_)

14) Please indicate the extent to which you agree or disagree with the following statements.

a) Getting the HPV vaccine has changed my intentions to get cervical cancer screening

Strongly Agree 1 2 3 4 5 Strongly Disagree

b) I intend to get cervical cancer screening in the future

Strongly Agree 1 2 3 4 5 Strongly Disagree

c) HPV vaccination has not affected my decision about cervical cancer screening

Strongly Agree 1 2 3 4 5 Strongly Disagree

**Section 2a: Motivations and Barriers**

*In this section we would like to ask you about what influenced your decision to get the HPV vaccine.*

15) If you HAVE had at least one dose of the HPV vaccine, how influential each of the following factors was in making your decision:

My doctor recommended it	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
I saw advertisement(s) for it	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
My friend(s) got the vaccine or were going to get it	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
I think I am susceptible to HPV infection	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
There is a history of cervical abnormalities in my family	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
I know someone who has/had cervical cancer	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
My parents recommended it	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
My friend(s) recommended it	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
It was covered by my health insurance	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
It was offered to me through my school (elementary, middle or high school)	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
Most girls/women my age were getting the vaccine	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A

16) If you HAVE had a least one dose of the HPV vaccine, indicate the extent to which the following potential benefits to HPV vaccination influenced your decision to get the vaccine.

It may protect me against HPV infection	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
It may protect me from getting genital warts	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
It may protect me from developing cervical cancer	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A

[Will be directed to section 3]

**Section 1b: Attitude about HPV vaccines and getting the HPV vaccine**

*In this section, you will be asked about your opinions of the HPV vaccine. Though some of the questions may seem similar, please answer each of them. The questions in this section are mostly based on a 1 to 7 rating scale. For each statement, indicate the number on the scale that you think best reflects your opinion or belief.*

17) To me, getting vaccinated against HPV would be...

Beneficial	1	2	3	4	5	6	7	Harmful
Undesirable	1	2	3	4	5	6	7	Desirable
Good	1	2	3	4	5	6	7	Bad
Worthless	1	2	3	4	5	6	7	Useful
Effective	1	2	3	4	5	6	7	Ineffective

18) Getting the HPV vaccine will decrease my risk of getting genital warts.

Extremely likely	1	2	3	4	5	6	7	Extremely unlikely
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19) Decreasing my risk of getting genital warts is...

Beneficial	1	2	3	4	5	6	7	Harmful
Undesirable	1	2	3	4	5	6	7	Desirable
Good	1	2	3	4	5	6	7	Bad

20) Getting the HPV vaccine will decrease my risk of getting cervical cancer.

Extremely likely	1	2	3	4	5	6	7	Extremely unlikely
------------------	---	---	---	---	---	---	---	--------------------

21) Decreasing my risk of getting cervical cancer is...

Beneficial	1	2	3	4	5	6	7	Harmful
Undesirable	1	2	3	4	5	6	7	Desirable
Good	1	2	3	4	5	6	7	Bad

22) Getting the HPV vaccine will decrease my need for cervical cancer screening in the future.

Extremely likely	1	2	3	4	5	6	7	Extremely unlikely
------------------	---	---	---	---	---	---	---	--------------------

23) Cervical cancer screening is...

Beneficial	1	2	3	4	5	6	7	Harmful
Undesirable	1	2	3	4	5	6	7	Desirable
Good	1	2	3	4	5	6	7	Bad

24) Vaccinating all eligible girls/women against HPV, if they are not sexually active is...

Beneficial	1	2	3	4	5	6	7	Harmful
Undesirable	1	2	3	4	5	6	7	Desirable
Good	1	2	3	4	5	6	7	Bad
Important	1	2	3	4	5	6	7	Unimportant

25) Vaccinating all eligible girls/women against HPV, if they are sexually active is...

Beneficial	1	2	3	4	5	6	7	Harmful
Undesirable	1	2	3	4	5	6	7	Desirable
Good	1	2	3	4	5	6	7	Bad
Important	1	2	3	4	5	6	7	Unimportant

26) Please indicate the extent to which you agree or disagree with the following statements.

- a) I intend to get the HPV vaccine in the next 12 months
- |                |   |   |   |   |   |                   |
|----------------|---|---|---|---|---|-------------------|
| Strongly Agree | 1 | 2 | 3 | 4 | 5 | Strongly Disagree |
|----------------|---|---|---|---|---|-------------------|
- b) I do not intend to get the HPV vaccine
- |                |   |   |   |   |   |                   |
|----------------|---|---|---|---|---|-------------------|
| Strongly Agree | 1 | 2 | 3 | 4 | 5 | Strongly Disagree |
|----------------|---|---|---|---|---|-------------------|
- c) I plan on getting the HPV vaccine at some point
- |                |   |   |   |   |   |                   |
|----------------|---|---|---|---|---|-------------------|
| Strongly Agree | 1 | 2 | 3 | 4 | 5 | Strongly Disagree |
|----------------|---|---|---|---|---|-------------------|

27) Please indicate the extent to which you agree or disagree with the following statements.

- a) Getting the HPV vaccine would change my intentions to get cervical cancer screening
- |                |   |   |   |   |   |                   |
|----------------|---|---|---|---|---|-------------------|
| Strongly Agree | 1 | 2 | 3 | 4 | 5 | Strongly Disagree |
|----------------|---|---|---|---|---|-------------------|
- b) I intend to get cervical cancer screening in the future
- |                |   |   |   |   |   |                   |
|----------------|---|---|---|---|---|-------------------|
| Strongly Agree | 1 | 2 | 3 | 4 | 5 | Strongly Disagree |
|----------------|---|---|---|---|---|-------------------|
- c) HPV vaccination would not affect my decision about cervical cancer screening
- |                |   |   |   |   |   |                   |
|----------------|---|---|---|---|---|-------------------|
| Strongly Agree | 1 | 2 | 3 | 4 | 5 | Strongly Disagree |
|----------------|---|---|---|---|---|-------------------|

## **Section 2b: Motivations and Barriers**

*In this section we would like to ask you about what has influenced your decision to not get the HPV vaccine.*

28) If you have NOT had at least one dose of the HPV vaccine, indicate how influential each of the following factors was in making your decision:

I have not heard of the vaccine	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
I don't know where the vaccine is offered	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
The vaccine costs too much	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
The vaccine is not covered by my health insurance	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
I'm in a monogamous relationship and therefore don't need the vaccine	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
I'm not currently having sex and therefore don't need the vaccine	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
My parents don't want me to get the vaccine	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
I don't know enough about the vaccine	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
I don't know enough about the vaccine's potential side effects	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
I don't know if the vaccine works	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
I am concerned that the vaccine will hurt	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
I already have HPV	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A

29) If you have NOT yet had at least one dose of the HPV vaccine, indicate how influential each of the following factors would be in making your decision to receive the HPV vaccine.

My doctor recommended it	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
I saw advertisement(s) for it	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
My friend(s) got the vaccine or were going to get it	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
I think I am susceptible to HPV infection	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
There is a history of cervical abnormalities in my family	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
I know someone who has/had cervical cancer	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
My parents recommended it	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
My friend(s) recommended it	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
It was free or covered by my health insurance	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
It was offered to me through my school (elementary, middle or high school)	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
Vaccine cost	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
Most girls/women my age were getting the vaccine	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
It may protect me against HPV infection	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
It may protect me from getting genital warts	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A
It may protect me from developing cervical cancer	Very Influential	Somewhat Influential	Neutral	Not Very Influential	Not At All Influential	N/A

30) If your health insurance did not cover it, what is the most you would be willing to pay for the HPV vaccine series?

- \$0
- More than \$0, but less than or equal to \$100
- \$200
- \$300
- \$400
- Greater than or equal to \$500
- I would not get the vaccine

**Section 3: Vaccine Acceptability and Safe Sex practices**

*In this section we would like to know how this vaccine could alter your future health and safe sex practices.*

31) Getting the HPV vaccine has/would make me less likely to get regular Pap smears.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

32) Assuming that you have had or were going to get the HPV vaccine, please indicate the extent to which you agree or disagree with the following statements about safe sex behaviours.

Complete the statement:

*“After getting vaccinated against HPV \_\_\_\_\_”*

I think that condom use during sex is less necessary	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I feel it is still just as important to have as few sexual partners as possible	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I feel that it is not as important to talk to my sex partners about safe sex	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I think it is still as important to use a condom everytime I have sex	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I will be less worried about having unprotected sex	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

33) Has/would receiving the HPV vaccine affect how often you would use a form of birth control or contraception during sex, compared to before you received the vaccine?

- Yes, I would use it more frequently
- Yes, I would use it less frequently
- No, I would not change the frequency with which I used birth control/contraception methods
- Don't know
- N/A

**Section 4: Knowledge of HPV and Cervical Cancer**

There are 2 different HPV vaccines available to women. These vaccines, Gardasil® and Cervarix® both provide protection against the most common strains of HPV that cause cervical cancer. Gardasil® also provides protection against some additional types of HPV that cause genital warts but not cancer.

*In this section, we would like to know how familiar you are with HPV and cervical cancer facts.*

34) Indicate whether you think each of the following statements about HPV is true or false.

<b>HPV is primarily sexually transmitted</b>	True	False
<b>HPV is the most common STI (sexually transmitted infection)</b>	True	False
<b>HPV only affects women</b>	True	False
<b>Most people infected with HPV do not show any signs or symptoms of infections</b>	True	False
<b>HPV vaccination is only effective if you are not sexually active</b>	True	False
<b>The highest rate of HPV infection is in adults &lt;25 years of age</b>	True	False
<b>HPV infection can lead to cervical cancer</b>	True	False
<b>3 HPV vaccine doses are required to have the fullest protection</b>	True	False
<b>At least 1 in 2 women is diagnosed with HPV in her lifetime</b>	True	False
<b>HPV vaccination protects you from all HPV-related infections</b>	True	False
<b>The most common sign of HPV infection is genital warts</b>	True	False
<b>HPV vaccination is only effective for women</b>	True	False
<b>HPV infection has been associated with several types of cancer</b>	True	False
<b>There are 2 HPV strains that account for 70% of cervical cancers</b>	True	False
<b>HPV is the only proven cause of cervical cancer</b>	True	False
<b>Pap tests are unnecessary if women are vaccinated against HPV</b>	True	False

35) Before today, were you aware that there are vaccines available that can help prevent cervical cancer and other HPV-related infections?

- Yes
- No

36) Before today, were you aware that there were 2 different vaccines available against HPV?

- Yes
- No

### **Section 5: Demographics**

*In this final section, we would like to know some background information.*

37) Which Faculty are you in?

- Arts
- Science
- Engineering
- Health Sciences
- Other (please specify)\_\_\_\_\_

38) How old are you?

- Less than 18 years
- 18 years
- 19 years
- 20 years
- 21 years
- 22 years
- 23 years
- 24 years
- 25 years
- More than 25 years

39) You may belong to one or more racial or cultural groups on the following list.

What are your ethnic or cultural origins? (*Check all that apply*):

- White
- South Asian (e.g. East Indian, Pakistani, Sri Lankan etc)
- Chinese
- Black
- Filipino
- Latin American
- Arab
- South-east Asian (e.g. Vietnamese, Cambodian, Malaysian, Laotian, etc)
- West Asian (e.g. Iranian, Afghani, etc)
- Korean
- Japanese
- Aboriginal (includes First Nation/Inuit/Métis)
- Other (please specify)\_\_\_\_\_

40) Prior to starting at the University of Ottawa, where did you live?

- Alberta
- British Columbia
- Manitoba
- New Brunswick
- Newfoundland and Labrador

- Nova Scotia
- Ontario
- Prince Edward Island
- Quebec
- Saskatchewan
- Northwest Territory
- Nunavut
- Yukon
- Other country (please specify) \_\_\_\_\_

41) Please select the answer that best corresponds to your current health insurance plan, in addition to provincial healthcare (OHIP, RAMQ).

- I am covered by my parent(s) or guardian's health insurance plan
- I am covered by the university's health insurance plan
- I have my own private health insurance plan
- I am covered by my spouse's health insurance plan
- I do not have a health insurance plan

42) Have you ever had sex (oral, vaginal, or anal) with a male partner?

- Yes
- No

43) Have you ever had a Pap smear?

- Yes, more than once
- Yes, once
- No
- Don't know

44) Have you ever had an abnormal Pap smear?

- Yes
- No
- Don't know

45) Are you up to date on your regular vaccines (i.e. have you had your booster shots)?

- Yes
- No
- Don't know

46) Are you currently using some form of birth control/contraception?

- Yes
- No

47) Have you ever been told by a healthcare professional that you had an HPV infection?

- Yes
- No
- Don't know

48) Have you ever been told by a healthcare professional that you had an STI (sexually transmitted infection) other than HPV?

- Yes
- No
- Don't know

49) Were you born in Canada?

- Yes
- No

## Final French Questionnaire

Ce sondage vise à récolter vos opinions et vos perceptions sur la vaccination contre le virus du papillome humain (VPH). Vous pouvez remplir ce sondage que vous ayez reçu ou non le vaccin contre le VPH. S'il vous, veuillez répondre le plus honnêtement possible.

Le VPH est un virus qui cause une variété de maladies génitales. De plus, ce virus est la cause principale du cancer du col de l'utérus, l'un des cancers les plus répandus chez les femmes dans le monde entier. Le test de Papanicolaou, généralement connu comme un test de Pap, est utilisé pour détecter les anomalies du col de l'utérus et des lésions associées avec le cancer.

1) Êtes-vous une femme ou un homme?

- Femme
- Homme

2) Êtes-vous vaccinée avec au moins une dose du vaccin contre le VPH?

- Oui
- Non

3) Combien doses du vaccin contre le VPH avez-vous reçu?

- 1
- 2
- 3
- 4 ou plus
- Je ne suis pas certaine

### Section 1a : Attitudes au sujet des vaccins contre le VPH et recevoir ce vaccin

*Cette section porte sur vos opinions par rapport à la vaccination contre le VPH. Même si les questions ont l'air d'être similaires, veuillez répondre à chacune d'entre elles. La plupart des questions ci-dessous ont été développées sur une échelle de 7 points. Pour chaque question, indiquer le numéro dont qui correspond le plus à vos opinions ou vos croyances.*

4) D'après moi, recevoir la vaccination contre le VPH était...

Bénéfique	1	2	3	4	5	6	7	Nuisible
Indésirable	1	2	3	4	5	6	7	Désirable
Bonne	1	2	3	4	5	6	7	Mauvaise
Inutile	1	2	3	4	5	6	7	Utile
Efficace	1	2	3	4	5	6	7	Inefficace

5) Recevoir le vaccin contre le VPH a réduit mon risque de développer des verrues génitales....

Très probable	1	2	3	4	5	6	7	Peu probable
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6) Réduire mon risque de développer les verrues génitales est....

Bénéfique	1	2	3	4	5	6	7	Nuisible
Indésirable	1	2	3	4	5	6	7	Désirable
Bon	1	2	3	4	5	6	7	Mauvais

7) Recevoir le vaccin contre le VPH a réduit mon risque de développer le cancer du col de l'utérus...

Très probable      1      2      3      4      5      6      7      Peu probable

8) Réduire mon risque de développer le cancer du col de l'utérus est...

Bénéfique	1	2	3	4	5	6	7	Nuisible
Indésirable	1	2	3	4	5	6	7	Désirable
Bon	1	2	3	4	5	6	7	Mauvais

9) Recevoir le vaccin contre le VPH a réduit la nécessité d'avoir un test de dépistage pour le cancer du col de l'utérus...

Très probable      1      2      3      4      5      6      7      Peu probable

10) Le dépistage du cancer du col de l'utérus est...

Bénéfique	1	2	3	4	5	6	7	Nuisible
Indésirable	1	2	3	4	5	6	7	Désirable
Bon	1	2	3	4	5	6	7	Mauvais

11) La vaccination de toutes les filles/femmes contre le VPH, si elles ne sont pas sexuellement actives, est...

Bénéfique	1	2	3	4	5	6	7	Nuisible
Indésirable	1	2	3	4	5	6	7	Désirable
Bonne	1	2	3	4	5	6	7	Mauvaise
Importante	1	2	3	4	5	6	7	Non importante

12) La vaccination de toutes les filles/femmes contre le VPH, si elles sont sexuellement actives, est...

Bénéfique	1	2	3	4	5	6	7	Nuisible
Indésirable	1	2	3	4	5	6	7	Désirable
Bonne	1	2	3	4	5	6	7	Mauvaise
Importante	1	2	3	4	5	6	7	Non importante

13) J'ai l'intention de finir la série des vaccins contre le VPH

- Oui, conformément à l'horaire indiqué pour la série.
- Oui, mais je le ferai en plus de temps qu'indiqué pour la série de vaccins.
- J'ai déjà reçu toutes les doses de vaccin.
- Non (Raison(s): \_\_\_\_\_ )

14) SVP indiquez à quel point vous êtes d'accord avec les déclarations suivantes.

a) Recevoir le vaccin contre le VPH a changé mes intentions de recevoir ou non un test de dépistage du cancer du col de l'utérus.

Fermement en accord      1      2      3      4      5      Fermement en désaccord

b) J'ai l'intention de recevoir un test de dépistage du cancer du col de l'utérus.

Fermement en accord      1      2      3      4      5      Fermement en désaccord

c) Le vaccin contre le VPH n'a pas affecté ma décision concernant le dépistage du cancer du col de l'utérus.

Fermement en accord      1      2      3      4      5      Fermement en désaccord

## Section 2a : Motivations et obstacles

Dans cette section, nous vous demandons ce qui a influencé votre décision de recevoir le vaccin contre le VPH.

15) Si vous AVEZ reçu au moins une dose du vaccin contre le VPH, indiquez à quel point chacun de ces facteurs suivants a influencé votre décision.

Mon médecin me l'a recommandé.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
J'ai vu une (plusieurs) publicité(s) pour le vaccin.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Une (des) amie(s) a (ont) reçu le vaccin ou avait(ent) l'intention de le recevoir.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Je pense que je suis sujette à une infection de VPH	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Il y a des antécédents d'anomalies du col de l'utérus dans ma famille.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Je connais quelqu'un qui a/avait le cancer du col de l'utérus.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Mes parents me l'ont recommandé.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Mon (mes) amie(s) me l'a (ont) recommandé.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Le vaccin était couvert par mon assurance maladie.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Le vaccin m'était offert à l'école (primaire, secondaire).	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
La plupart des filles/femmes mon âge recevait le vaccin.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A

16) Si vous AVEZ reçu au moins une dose du vaccin contre le VPH, veuillez indiquer à quel point les avantages potentiels suivants à la vaccination contre le VPH ont influencé votre décision de recevoir ce vaccin.

Le vaccin pourrait me protéger contre une infection de VPH.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Le vaccin pourrait me protéger contre le développement des verrues génitales.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Le vaccin pourrait me protéger contre le développement du cancer du col de l'utérus.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A

### Section 1b : Attitudes au sujet des vaccins contre le VPH et l'administration du vaccin

Cette section vous demande vos opinions par rapport à la vaccination contre le VPH. Même si les questions ont l'air d'être similaire, veuillez répondre à chacune d'entre elles. La plupart des questions ci-dessous ont été développées sur une échelle de 7 points. Pour chaque question, indiquer le numéro dont qui correspond le plus à vos opinions ou vos croyances.

17) D'après moi, recevoir la vaccination contre le VPH serait...

Bénéfique	1	2	3	4	5	6	7	Nuisible
Indésirable	1	2	3	4	5	6	7	Désirable
Bonne	1	2	3	4	5	6	7	Mauvaise
Inutile	1	2	3	4	5	6	7	Utile
Efficace	1	2	3	4	5	6	7	Inefficace

18) Recevoir le vaccin contre le VPH réduira mon risque de développer des verrues génitales...

Très probable	1	2	3	4	5	6	7	Peu probable
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19) Réduire mon risque de développer les verrues génitales est....

Bénéfique	1	2	3	4	5	6	7	Nuisible
Indésirable	1	2	3	4	5	6	7	Désirable
Bon	1	2	3	4	5	6	7	Mauvais

20) Recevoir le vaccin contre le VPH réduira mon risque de développer le cancer du col de l'utérus...

Très probable	1	2	3	4	5	6	7	Peu probable
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21) Réduire mon risque de développer le cancer du col de l'utérus est...

Bénéfique	1	2	3	4	5	6	7	Nuisible
Indésirable	1	2	3	4	5	6	7	Désirable
Bon	1	2	3	4	5	6	7	Mauvais

22) Recevoir le vaccin contre le VPH réduira la nécessité d'avoir un test de dépistage pour le cancer du col de l'utérus...

Très probable	1	2	3	4	5	6	7	Peu probable
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23) Le dépistage du cancer du col de l'utérus est...

Bénéfique	1	2	3	4	5	6	7	Nuisible
Indésirable	1	2	3	4	5	6	7	Désirable
Bon	1	2	3	4	5	6	7	Mauvais

24) La vaccination de toutes les filles/femmes contre le VPH, si elles ne sont pas sexuellement actives, est...

Bénéfique	1	2	3	4	5	6	7	Nuisible
Indésirable	1	2	3	4	5	6	7	Désirable
Bonne	1	2	3	4	5	6	7	Mauvaise
Importante	1	2	3	4	5	6	7	Non importante

25) La vaccination de toutes les filles/femmes contre le VPH, si elles sont sexuellement actives, est...

Bénéfique	1	2	3	4	5	6	7	Nuisible
Indésirable	1	2	3	4	5	6	7	Désirable
Bonne	1	2	3	4	5	6	7	Mauvaise
Importante	1	2	3	4	5	6	7	Non importante

26) SVP indiquez à quel point vous êtes d'accord avec les déclarations suivantes.

a) J'ai l'intention de recevoir le vaccin contre le VPH durant les prochains 12 mois.

Fermement en accord      1      2      3      4      5      Fermement en désaccord

b) Je n'ai pas l'intention de recevoir le vaccin contre le VPH.

Fermement en accord      1      2      3      4      5      Fermement en désaccord

c) J'envisage de recevoir le vaccin contre le VPH à un moment.

Fermement en accord      1      2      3      4      5      Fermement en désaccord

27) SVP indiquez à quel point vous êtes d'accord avec les déclarations suivantes.

a) Recevoir le vaccin contre le VPH changera mes intentions envers le dépistage du cancer du col de l'utérus.

Fermement en accord      1      2      3      4      5      Fermement en désaccord

b) J'ai l'intention de recevoir un test de dépistage du cancer du col de l'utérus.

Fermement en accord      1      2      3      4      5      Fermement en désaccord

c) Le vaccin contre le VPH n'affectera pas ma décision envers le dépistage du cancer du col de l'utérus.

Fermement en accord      1      2      3      4      5      Fermement en désaccord

## Section 2b : Motivations et obstacles

Dans cette section, nous vous demandons ce qui a influencé votre décision de recevoir le vaccin contre le VPH.

28) Si vous N'AVEZ PAS reçu au moins une dose du vaccin contre le VPH, indiquez à quel point chacun des facteurs suivants a influencé votre décision.

Je n'ai jamais entendu parler du vaccin.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Je ne sais pas où ce vaccin est offert.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Le vaccin est trop cher.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Le vaccin n'est pas couvert par mon assurance de maladie.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Je suis dans une relation monogame alors je n'ai pas besoin ce vaccin.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
En ce moment je ne suis pas sexuellement active alors je n'ai pas besoin ce vaccin.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Mes parents ne veulent pas que je reçois ce vaccin.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Je n'en connais pas assez sur ce vaccin.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Je n'en connais pas assez sure les effets secondaires potentiels de ce vaccin.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Je ne sais pas si ce vaccin fonctionne.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
J'ai peur que le vaccin me fasse mal.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
J'ai déjà le VPH.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A

29) Si vous N'AVEZ PAS reçu au moins une dose du vaccin contre le VPH, indiquez à quel point chacun des facteurs suivants influencera votre décision.

Mon médecin me l'a recommandé.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
J'ai vu une (plusieurs) publicité(s) pour le vaccin.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Une (des) amie(s) a (ont) reçu le vaccin ou avait(ent) l'intention de le recevoir.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Je pense que je suis sujette à une infection de VPH.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Il y a des antécédents d'anomalies du col de l'utérus dans ma famille.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Je connais quelqu'un qui a/avait le cancer du col de l'utérus.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Mes parents me l'ont recommandé.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Mon (mes) amie(s) me l'a(ont) recommandé.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Le vaccin était couvert par mon assurance maladie.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Le vaccin m'était offert à l'école (primaire, secondaire).	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Le coût du vaccin.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
La plupart des filles/femmes mon âge recevait le vaccin.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Le vaccin pourrait me protéger contre une infection par le VPH	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Le vaccin pourrait me protéger contre le développement des verrues génitales.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A
Le vaccin pourrait me protéger contre le développement du cancer du col de l'utérus.	Très influent	Un peu influent	Neutre	Pas très influent	Pas du tout influent	N/A

30) Si votre assurance maladie ne le couvrait pas, quel serait le coût maximal que vous pourriez à payer pour la série de vaccins contre le VPH?

- 0\$
- Plus que 0\$ mais moins ou égalé à 100\$
- 200\$
- 300\$
- 400\$
- Plus que ou égalé à 500\$
- Je ne recevrai pas le vaccin.

### Section 3 : L'acceptabilité du vaccin et la pratique des rapports sexuels sans risque

Dans cette section, nous voulons savoir comment ce vaccin pourra changer votre future santé et vos rapports sexuels sans risque.

31) Recevoir le vaccin contre le VPH me porte/ me portera moins à recevoir des tests de Papanicolaou.

- Fermement en accord
- En accord
- Neutre
- En désaccord
- Fermement en désaccord

32) En supposant que vous avez reçu ou que vous étiez prête à recevoir le vaccin contre le VPH, SVP indiquez à quel point vous êtes en accord ou en désaccord avec les affirmations suivantes, au sujet des rapports sexuels sans risque. Complétez la déclaration :

“Après avoir reçu le vaccin contre le VPH \_\_\_\_\_”

Je pense que l'utilisation d'un condom durant les relations sexuelles est moins nécessaire.	Fermement en accord	En accord	Neutre	En désaccord	Fermement en désaccord
Je pense que c'est tout aussi important d'avoir le moins de partenaires sexuels possible.	Fermement en accord	En accord	Neutre	En désaccord	Fermement en désaccord
Je pense que c'est moins important de parler avec mes partenaires sexuels au sujet des rapports sexuels sans risque.	Fermement en accord	En accord	Neutre	En désaccord	Fermement en désaccord
Je pense que c'est tout aussi important d'utiliser un condom à chaque rapport sexuel.	Fermement en accord	En accord	Neutre	En désaccord	Fermement en désaccord
Je m'inquiéterai moins des rapports sexuels non-protégés.	Fermement en accord	En accord	Neutre	En désaccord	Fermement en désaccord

33) Est-ce que recevoir le vaccin contre le VPH a affecté/affectera combien de fois vous utiliserez une sorte de contrôle des naissances ou de la contraception durant les rapports sexuels, comparé à avant de recevoir le vaccin?

- Oui, je l'utiliserai plus souvent.
- Oui, je l'utiliserai moins souvent.
- Non, je ne changerai pas la fréquence avec laquelle j'utilise le contrôle des naissances/contraception.
- Je ne sais pas.
- N/A

#### Section 4 : Connaissance du VPH et du cancer du col de l'utérus

Il y a 2 vaccins différents contre le VPH qui sont disponible pour les femmes. Ces deux vaccins, Gardasil® et Cervarix®, fournissent une protection contre les souches les plus communes du VPH causant le cancer du col de l'utérus. De plus, Gardasil® protège contre deux autres souches du VPH qui causent seulement des verrues génitales.

*Dans cette section, nous voulons savoir si vous êtes au courant de certains faits concernant VPH et du cancer du col de l'utérus.*

34) Indiquez si vous pensez que les déclarations suivantes sont vraies ou fausses.

Le VPH est principalement transmis de manière sexuelle.	Vrai	Faux
Le VPH est la plus commune des IST (infections sexuellement transmissibles).	Vrai	Faux
Le VPH affecte seulement les femmes.	Vrai	Faux
La plupart des personnes infectées avec le VPH ne démontre pas de signes ou de symptômes d'une infection .	Vrai	Faux
La vaccination contre le VPH est seulement efficace si vous n'êtes pas sexuellement active.	Vrai	Faux
Le taux le plus élevé des infections au VPH est chez les adultes de <25 ans.	Vrai	Faux
Une infection avec le VPH peut causer le cancer du col de l'utérus.	Vrai	Faux
3 doses du vaccin contre le VPH sont requises pour vous assurer de la protection complète.	Vrai	Faux
Au moins 1 femme sur 2 est diagnostiquée avec le VPH durant sa vie.	Vrai	Faux
La vaccination contre le VPH vous protège contre toutes les infections reliées au VPH.	Vrai	Faux
Le signe le plus commun d'une infection de VPH est la présence de verrues génitales.	Vrai	Faux
La vaccination contre le VPH est efficace seulement pour les femmes.	Vrai	Faux
L'infection avec le VPH est associée avec plusieurs types de cancers.	Vrai	Faux
2 souches du VPH expliquent 70% des cancers du col de l'utérus.	Vrai	Faux
Le VPH est la seule cause établie du cancer du col de l'utérus.	Vrai	Faux
Les tests de Pap ne sont pas nécessaires si les femmes sont vaccinées contre le VPH.	Vrai	Faux

35) Avant aujourd'hui, étiez-vous au courant qu'il avait des vaccins disponibles qui pouvaient prévenir le cancer du col de l'utérus et d'autres infections associées avec le VPH?

- Oui
- Non

36) Avant aujourd'hui, étiez-vous au courant qu'il avait 2 vaccins différents disponibles contre le VPH?

- Oui
- Non

## Section 5 : Données démographiques

*Dans cette dernière section, nous voulons savoir un peu plus sur vous.*

37) Dans quelle faculté étudiez-vous?

- Arts
- Sciences
- Génie
- Sciences de la santé
- Autre (SVP spécifiez : \_\_\_\_\_ )

38) Quel âge avez-vous?

- Moins que 18 ans
- 18 ans
- 19 ans
- 20 ans
- 21 ans
- 22 ans
- 23 ans
- 24 ans
- 25 ans
- Plus que 25 ans

39) Vous pouvez être un membre d'un ou plusieurs groupes ethniques ou culturels de la liste suivante. Quels sont vos origines culturelles ou ethniques?

- Blanc
- Asiatique-sud (ex. est-Indienne, Pakistanaise, Sri Lankan etc.)
- Chinoise
- Noire
- Philippine
- Latino-Américaine
- Arabe
- Asiatique sud-est (ex : Vietnamienne, Cambodgienne, Malaysienne, Laotienne etc.)
- Asiatique-ouest (ex : Iranienne, Afghane etc.)
- Coréenne
- Japonaise
- Aborigène (inclut Première Nation/Inuit/Métis)
- Autre (SVP spécifiez : \_\_\_\_\_ )

40) Avant de commencer vos études à l'Université d'Ottawa, où viviez-vous?

- Alberta
- Colombie-Britannique
- Manitoba
- Nouveau Brunswick
- Terre Neuve et Labrador
- Nouvelle-Écosse

- Ontario
- Ile-du-Prince Édouard
- Québec
- Saskatchewan
- Territoires du Nord-Ouest
- Nunavut
- Yukon
- Autre pays (SVP spécifiez : \_\_\_\_\_ )

41) SVP indiquez la réponse qui correspond le mieux à votre assurance maladie, autre que celle fourni par la province (OHIP, RAMQ).

- Je suis couverte par le régime d'assurance maladie de mon(mes) parent(s) ou mon tuteur.
- Je suis couverte par le régime d'assurance maladie de l'université.
- J'ai mon propre régime d'assurance maladie privée.
- Je suis couverte par le régime d'assurance maladie de mon époux.
- Je n'ai pas de régime d'assurance maladie.

42) Avez-vous déjà eu des rapports sexuels (oraux, vaginaux ou anaux) avec un homme?

- Oui
- Non

43) Avez-vous déjà eu un test de Papanicolaou?

- Oui, plus d'une fois.
- Oui, une fois.
- Non
- Je ne sais pas.

44) Avez-vous déjà eu un test de Papanicolaou anormal?

- Oui
- Non
- Je ne sais pas.

45) Êtes-vous à jour dans vos vaccins réguliers (ex. avez-vous reçu vos vaccins de rappel)?

- Oui
- Non
- Je ne sais pas.

46) Est-ce que vous utilisez une sorte de contrôle des naissances/contraception?

- Oui
- Non

47) Est-ce qu'un professionnel de la santé vous avez déjà dit que vous aviez une infection par le VPH?

- Oui
- Non

48) Est-ce qu'un professionnel de la santé vous avez déjà dit que vous aviez une IST (infection sexuellement transmissible) autre que le VPH?

- Oui
- Non
- Je ne sais pas.

49) Êtes-vous nées au Canada?

- Oui
- Non

## APPENDIX C

### Question Route for Focus Group of Students

#### Opening Questions

- 1) Go around the table and tell us your name and what faculty/department you're in.

#### Introductory Question-Introduce the topic of discussion

- 2) Have any of you had the HPV vaccine? [maybe]
- 3) What made you all interested in participating in this focus group?

#### Transition Question-Move the conversation into the key questions that drive the study

- 4) Can you share what you have heard about HPV vaccination?
- 5) What is the first thing that comes to mind when you think of HPV vaccination? [Try to get a basic understanding of everyone's attitude toward the vaccine]

#### Key Questions

- 6) In the pilot study, approximately a quarter of the participants had received at least 1 dose of the vaccine. What do you think are the differences between women who get the vaccine and those who don't?
  - ⇒ Pilot showed that people who were and weren't vaccinated had similar opinions about the vaccine's efficacy, but those who had been vaccinated had a more favorable opinion toward the vaccine. What do you think about that?
- 7) Of the people who were not vaccinated, only about 1/3 said they would want to get the vaccine. What do you think are the reasons for this?
  - ⇒ What do you think is preventing the other 2/3's from getting the vaccine?
  - ⇒ What do you think are the biggest barriers to vaccination? What made you choose that(those) one(s)? [Cost?]
- 8) A big controversy that has surrounded HPV vaccination is the target population of the vaccine.
  - ⇒ Who do you think should be vaccinated?
  - ⇒ Sexually active women only? Only non-sexually active women? Both?
  - ⇒ Are there specific groups of people who should be targeted? (i.e. certain ethnic groups; immigrants?)
- 9) One thing that came up in the pilot study was the effect of HPV vaccination on safe sex practices. How do you think university women feel about safe sex practices in general? (*Examples?*) What effect do you think HPV vaccination will have/has had on safe sex practices amongst university students?
  - ⇒ Almost 1/4 of the participants said that condom use would be less necessary. What do you think about this?
  - ⇒ Almost 1/4 of the participants would be less worried about having unprotected sex after HPV vaccination. What do you think about this?

10) What effect do you think HPV vaccination will have on cervical cancer screening in the future? (This question will be used if time permits)

Ending Questions-Bring closure to the discussion, allow participants to reflect on previous comments (Total of 10-15 minutes)

11) All things considered, what do you think is the greatest issue concerning HPV vaccination and university students? (asked to each person)

12) [Give a summary of the discussion. Ask if the summary was good?]

13) Does anyone think that there's something we should have talked about that we didn't? Is there something that anyone wanted to say but didn't get the chance to say?

## Question Route for Focus Group of Immigrant Women

### Opening Question

- 1) Go around the table and tell us your name and where you are from.

### Introductory Question-Introduce the topic of discussion

- 2) Have any of you had the HPV vaccine? [maybe]
- 3) What made you all interested in participating in this focus group?

### Transition Question-Move the conversation into the key questions that drive the study

- 4) Can you share what you have heard about HPV vaccination?
- 5) What is the first thing that comes to mind when you think of HPV vaccination? [Try to get a basic understanding of everyone's attitude toward the vaccine]

### Key Questions

- 6) In the main study, approximately half of the participants had received at least 1 dose of the vaccine. What do you think are the differences between women who get the vaccine and those who don't?
  - ⇒ The study showed that people who were and weren't vaccinated had similar opinions about the vaccine's efficacy, but those who had been vaccinated had a more favorable opinion toward the vaccine. What do you think about this difference?
- 7) Of the people who were not vaccinated, about 1/2 said they would want to get the vaccine. What do you think are the reasons for this?
  - ⇒ What do you think is preventing the others from getting the vaccine?
  - ⇒ Do you think the barriers are different for immigrants compared to women who were born in Canada?
  - ⇒ What do you think are the biggest barriers for new Canadians to vaccination? What made you choose that(those) one(s)? [Cost?]
- 8) A big controversy that has surrounded HPV vaccination is the target population of the vaccine.
  - ⇒ Who do you think should be vaccinated?
  - ⇒ Sexually active women only? Only non-sexually active women? Both?
  - ⇒ Are there specific groups of people who should be targeted? (i.e. certain ethnic groups; immigrants?)
- 9) What role do you think HPV vaccination plays for women new to Canada?
  - ⇒ Do you think it is at all a concern?
  - ⇒ Do you think it should be promoted more for newcomers?
- 10) One thing that came up in the study was the effect of HPV vaccination on safe sex practices. How do you think women feel about safe sex practices in general? (*Examples?*)

What effect do you think HPV vaccination will have/has had on safe sex practices amongst university students? Amongst immigrants?

- ⇒ Some of the participants said that condom use would be less necessary. What do you think about this?
- ⇒ A small proportion of the participants would be less worried about having unprotected sex after HPV vaccination. What do you think about this?

11) What effect do you think HPV vaccination will have on cervical cancer screening in the future? (This question will be used if time permits)

- ⇒ Do you know what the Canadian guidelines are for cervical screening?
- ⇒ Is this a concern among immigrants?

Ending Questions-Bring closure to the discussion, allow participants to reflect on previous comments (Total of 10-15 minutes)

12) All things considered, what do you think is the greatest issue concerning HPV vaccination and university students? (asked to each person)

13) [Give a summary of the discussion. Ask if the summary was good?]

14) Does anyone think that there's something we should have talked about that we didn't? Is there something that anyone wanted to say but didn't get the chance to say?

## APPENDIX D

### Supplementary Tables

**Table 1: Questionnaire development and draft changes**

<b>Draft</b>	<b>Sections</b>	<b>Changes</b>
1	6 sections 25 questions	1-Demographics (5 questions) 2-Knowledge of HPV and Cervical Cancer (1 question) 3-Knowledge of HPV vaccines (8 questions) 4-Attitudes about HPV Vaccination (2 questions) 5-Motivations and Barriers for HPV vaccination (6 questions) 6-Vaccine Acceptability and Safe Sex Practices (2 questions) (68)
2	6 sections 30 questions	Demographics section: 5 questions were added concerning health insurance coverage, previous STI diagnoses, previous cervical screening encounters and use of birth control. Knowledge of HPV section: The first question had 3 additional statements about HPV infection. One extra question specifically about cervical cancer knowledge was added to the section, including 8 statements, primarily about Pap smears facts. Knowledge of HPV vaccination section: One statement was added about vaccine dosage efficacy Motivations and Barriers section: changed the question about cost to ascertain the maximum the respondent would be willing to pay for the vaccine series
3	6 sections 35 questions	Demographics section: Question stems and/or response categories to 5 of the questions, to make them more inclusive. Knowledge sections: Certain statements altered to clarify or simplify the language. Attitudes section: Introduced a skip-logic question to divide the respondents into either the vaccinated or non-vaccinated group. Motivations and Barriers section: Altered the question stems so it would be appropriate for both groups of respondents.
4	6 sections 37 questions	Demographics section: Reworded question about ethnicity to parallel the question used in the Canadian Community Health Survey. Knowledge sections: Removed superfluous statements/questions. Attitudes section: Reworded questions so that they could apply to both groups. Motivations and Barriers section: the questions to follow skip logic so it would be appropriate for both groups of respondent.
5	6 sections 37 questions	Rearrange the questionnaire so that the demographics section was last, as it did not contain the most important information. Knowledge section: Both knowledge sections were combined and the final section included 14 true or false statements, primarily focused on HPV and HPV vaccination, not cervical cancer screening. Decisional Conflict Scale was added as the third section, to clarify the decision making process using a validated scale (115)
6	6 sections 47 questions	Entire questionnaire was rearranged so it was ordered from most important and necessary data for informative and analytical purposes to less important questions. Order of sections: Attitudes, Motivations and Barriers, Decisional Conflict, Vaccine Acceptability and Safe Sex Practices, Knowledge and Demographics. Attitudes section: Reconstructed the entire section based on the Theory of Planned Behaviour (ToPB). Questions in this section were guided by the vaccine itself, risk of genital warts and cervical cancer, cervical cancer screening and vaccine eligibility. Motivations and Barriers sections split between the two groups. Barrier section only included for the non-vaccinated group.
7	6 sections 47questions	Changes addressed questionnaire design and including information to orient the respondent around each section.

<b>Draft</b>	<b>Sections</b>	<b>Changes</b>
8	5 sections 48 questions	Section 2 for non-vaccinated group: two statements in barrier portion of the section altered to clarify their meanings. Decisional conflict section was removed, as the ToPB, motivations and barriers sections made the questions redundant.
9	5 sections 49 questions	Demographics section: one question added about sexual activity (113) Final survey in Appendix B

**Table 2: Response rate by faculty**

<b>Faculty</b>	<b>N<sub>Students</sub></b>	<b>Proportion Female</b>	<b>N<sub>Female Students</sub></b>	<b>N<sub>Respondents</sub></b>	<b>Response rate (%)</b>
Science	3879	0.50	1940	292	15.05
Social Sciences	38	1.00	38	36	94.74
Arts	500	0.60	300	19	6.33
Health Sciences	150	0.80	120	30	25.00
Missing	-	-	-	23	-
<b>Total</b>			2398	401	<b>16.72</b>

N<sub>Students</sub>: Number of students approached in the faculty

Proportion female: based on information from the faculty or department administration. A proportion of 0.60 was applied for the students in the Faculty of Arts because this is the overall female to male ratio of undergraduate students at the University of Ottawa.

## **APPENDIX E**

### **Cognitive Interview Questions**

Scripted probes

#### Question 1

As this question clear?

#### Question 2

How sure are you that you have (or have not) been vaccinated against HPV?

What does the term “dose” mean to you?

#### Question 3

How sure are you that you’ve received (X) dose(s) of the vaccine?

Do you know how many doses are required for the vaccine series?

#### Questions 4/17

Can you sum up what you think this question is asking you?

Was this question easy or difficult to answer?

Do you think the format of the question is clear? Did you realize there are 5 parts to the question?

#### Questions 5/18

How sure are you of your answer?

Was it hard for you to answer this?

Why do you think this?

What does the term “genital warts” mean to you?

#### Questions 6/19

Was this easy for you to answer?

What do you think the difference is between beneficial, desirable and good is? Can you define each of these terms?

Do you think having a 1-7 scale is helpful? Or is it confusing?

Questions 7/20

How sure are you of your answer?

Was it hard for you to answer this?

Why do you think this?

What does the term “cervical cancer” mean to you?

Questions 8/21

Was this question difficult or easy to answer?

How sure are you of your answer?

Does it seem like you should answer the same rating for each part of the question?

Questions 9/22

Do you know what is meant by the term “cervical cancer screening”?

Is this easy for you to answer?

Questions 10/23

How sure are you of your answer?

What do you think of the order of the response/answer categories for all these questions? Do you think the responses should all be in the same order or switched up so they are less predictable?

Questions 11/24

What was your first thought after you read this question?

Was it easy for you to answer this question?

Questions 12/25

Was it easy or difficult for you to answer this question?

What was your first thought after reading this question?

Do you think there should be a difference in vaccination patterns between sexually active and non-sexually active girls/women?

Question 13

Was that question easy or difficult to answer?

(If the interviewee hesitates) I noticed that you hesitated before answering- tell me what you were thinking.

Questions 14/27

(If the interviewee hesitates) I noticed that you hesitated before answering- tell me what you were thinking.

Was it difficult or easy to answer this question?

How sure are you of your answer?

Questions 15/16/29

How easy or difficult was this for you to answer?

Which to you as the most influential? Why do you think this one is the most influential?

Do you think any of these were unnecessary?

Question 26

Was it easy for you to answer this question?

Why do you believe this?

Have you ever thought of getting the HPV vaccine before today? (If the interviewee hesitates) I noticed that you hesitated before answering- tell me what you were thinking.

Question 28

Did you find any of these factors unclear or confusing?

How sure are you that your health insurances covers (does not cover) the vaccine?

How sure are you of the vaccine's cost?

Do all these factors seem necessary? (Which would you remove and why?)

Would you reorder theses in any particular way?

Which one(s) do you think have been most influential to you, personally?

Question 30

Was this easy or difficult to answer?

Do you know how much the actual vaccine series costs?

How sure are you of your answer?

#### Question 31

What does the term “Pap smear” mean to you?

Was this question easy or hard to answer?

Do you think this question was straightforward?

#### Question 32

Can you reword this question?

What are your thoughts on this question?

Was it difficult to answer this question?

Why do you believe this?

#### Question 33

Was this easy or difficult to answer?

Was this question confusing to understand or to answer?

Can you define the term “birth control”? “Contraception”?

#### Question 34

Was it easy or difficult to answer?

Were there any that you felt you really didn’t know?

Did you feel sure of your answers (approximately how many)?

#### Question 35

How sure are you of your answer?

What comes to mind when you hear the term “HPV-related infections”?

Question 36

Was it hard to remember this?

Questions 37-41

Was the question clear? Was the question easy to answer?

Were any categories missing?

Question 42

Did you feel you could honestly answer this question?

Was it easy or difficult to answer?

Questions 43/44

Did you feel you could honestly answer this question?

Was it easy or difficult to answer?

How sure are you of your answer?

Question 45

Can you repeat this question in your own words?

Are you sure of your answer?

Question 46

Is this question clear?

Do you feel you could honestly answer this question?

Question 47/48

Do you think you can answer this question honestly?

Was it difficult or easy to answer this question?

Question 49

Is this question clear?

**APPENDIX F**  
**Ethics Documents**

**THE PERCEPTIONS OF UNIVERSITY WOMEN TOWARDS HUMAN  
PAPILLOMAVIRUS VACCINATION - WEB SURVEY  
PARTICIPANT CONSENT FORM**

We are asking you to complete a survey, intended for female students attending the University of Ottawa. We are interested to know what your perceptions are about the Human Papillomavirus (HPV) vaccines. The survey should take no more than 20 minutes to complete.

Completing this survey is voluntary and you may skip any question(s) you do not wish to answer. We will not be collecting any identifying information other than your email address, should you wish to participate in a focus group discussion; as a result your responses will remain anonymous.

Completing the survey implies that you have read this consent form and understand the following:

- Completing this survey is voluntary.
- You may skip any question that you do not wish to answer.
- You may withdraw from the study at any time.
- Your answers are anonymous (that is, we do not collect any information that would allow us to identify you personally).
- The information you provide may be used in reports and publications.
- All statistical information will be presented in summary form (e.g., group averages). No information will be presented that could identify individual respondents.
- There is no benefit to completing this survey.

Yes, I wish to complete the survey

No, I do not wish to participate at this time

**Survey Instructions**

**Please complete this survey.**

Answer the questions in this survey by clicking on the appropriate response for each question.

The survey should take about 20 minutes to complete

I would ask you complete the survey within two weeks of receiving this notice.

Thank you in advance for your feedback!

Rachel Fernandes

# LES PERCEPTIONS DES FEMMES FRÉQUENTANT L'UNIVERSITÉ ENVERS LA VACCINATION CONTRE LE VIRUS DU PAPILLOME HUMAIN- SONDAGE

## FORMULAIRE DE CONSENTEMENT DE LA PARTICIPANTE

Nous vous demandons de remplir un sondage qui est destiné aux étudiantes qui assistent aux cours à l'Université d'Ottawa. Notre but est de comprendre vos perceptions et opinions à propos des vaccins contre le virus du papillome humain (VPH). Le sondage ne prendra pas plus que 20 minutes de votre temps.

Votre participation à ce sondage est complètement volontaire et vous pouvez sauter les questions auxquelles vous ne voulez pas répondre. Nous ne collecterons aucune information qui peut vous identifier autre que votre courriel, si vous voulez participer dans le groupe de consultation; vos réponses seront donc anonymes.

En complétant ce sondage, vous confirmez que vous avez lu ce formulaire de consentement et que vous êtes d'accord avec les faits suivants:

- La participation à ce sondage est complètement volontaire.
- Vous pouvez sauter n'importe quelle question si vous ne voulez pas y répondre.
- Vous pouvez vous retirer de l'étude à n'importe quel moment.
- Vos réponses seront anonymes (nous ne collecterons pas d'informations qui pourraient être utilisées pour vous identifier).
- L'information que vous nous donnez pourrait être utilisée dans des rapports ou des publications.
- Toutes les informations et statistiques seront présentées sous une forme sommaire (ex. des moyennes de groupe). Aucune information qui pourrait identifier des participants ne sera présentée.
- Il n'y a aucun avantage de compléter ce sondage.

Oui, je veux compléter le sondage

Non, je ne veux pas participer en ce moment

### **Instructions du sondage**

**Veillez s'il vous plaît compléter ce sondage.**

Répondez à chaque question dans ce sondage en indiquant la réponse appropriée. Remplir le sondage ne vous prendra pas plus que 20 minutes.

Je vous demanderai de compléter le sondage dans les 2 prochaines semaines.

Merci en avance pour votre coopération.

Rachel Fernandes

## **E-mail invitation #1 (English)**

### E-mail header:

List of addressee's emails (will be hidden from email recipients)

### Subject line:

*Please share your insight for University of Ottawa research!*

### Email Body:

Dear Student,

You are being asked to participate in a Web Survey to further research about Human Papillomavirus (HPV) vaccination in young women. The overall purpose of this thesis project is to understand the perceptions young women have about the HPV vaccines and cervical cancer. HPV is a very common infection for young women and though it usually doesn't have any symptoms, in some women it can lead to more severe disease. It is therefore important to understand the attitudes women have to this vaccine. This survey is being used to collect data for my thesis.

This survey is intended for undergraduate women over the age of 18, who are currently attending the University of Ottawa. Please take a moment to complete the survey; it should take no more than 20 minutes. If you complete the survey and offer comments about it, you will be *eligible for a draw* for one of several \$5 gift certificates to Tim Horton's. Please click the link below to access the survey, which starts with an informed consent page.

<http://fluidsurveys.com/s/HPV-survey/langeng/>

The information you provide will be anonymous and confidential. The results of the survey will be used for research purposes and will only be presented as averages, so that no individual can be identified through the data. You are under no obligation to complete this survey. If you choose to fill out the online questionnaire, you are allowed to stop at any time. Please fill out the survey only once.

There will also be a **focus group session** to discuss what young women think about HPV vaccination in university aged women, as well as cervical cancer and cervical cancer screening. If you would like to participate in this session or are interested in learning more about it, please contact me at the email address below.

Your participation in completing this survey is greatly appreciated.

Thank you,

Rachel Fernandes

MSc Candidate

Epidemiology and Community Medicine

## L'invitation par courriel 1 (Français)

### Sujet du courriel:

SVP partagez vos idées pour la recherche de l'Université d'Ottawa!

### Courriel

Cher(e) étudiant(e),

Nous vous demandons à participer à un sondage sur le web pour un projet de recherche concernant la vaccination contre le virus du papillome humain (VPH) chez les jeunes femmes. L'objectif général de ce projet de recherche est de comprendre les perceptions des jeunes femmes au sujet du vaccin contre le VPH et le cancer du col de l'utérus. Le VPH est une infection assez commune pour les jeunes femmes et bien qu'elle soit généralement sans symptômes, il se peut qu'elle cause une maladie plus sérieuse. Donc, il est important de comprendre les attitudes des femmes envers ce vaccin. Ce sondage est l'outil que j'utilise pour collecter des données pour ma thèse.

Ce sondage est destiné aux étudiantes de premier cycle âgées de 18 ans ou plus et qui assistent à des cours à l'Université d'Ottawa présentement. S'il vous plaît, prenez un moment pour remplir ce sondage; il vous ne prendra pas plus de 20 minutes. Si vous remplissez le sondage et offrez des commentaires sur le sondage, *vous serez admissible pour un tirage* pour un de plusieurs bon d'achats de Tim Horton's de valeur de 5\$. S'il vous plaît cliquez sur le lien suivant pour accéder au sondage, qui commence avec un formulaire de consentement.

<http://fluidsurveys.com/s/HPV-survey/langfra/>

L'information que vous nous donnez sera anonyme et confidentielle. Les résultats du sondage seront utilisés à des fins de recherche et seront seulement présentés sous forme de moyennes et personne ne pourra être identifié. Vous n'êtes pas obligée de remplir ce sondage. Si vous choisissez de remplir le questionnaire, vous pouvez arrêter quand vous voulez. S'il vous plaît, ne remplissez le questionnaire qu'une seule fois.

Il y aura aussi une session de groupe de consultation dans laquelle les jeunes femmes pourront discuter ce qu'elles pensent de la vaccination contre le VPH dans une population de femmes d'un âge universitaire, ainsi que le cancer du col de l'utérus et du dépistage de ce dernier.

Votre participation à ce sondage est très appréciée.

Merci,  
Rachel Fernandes  
Candidate à la maîtrise,  
Épidémiologie et médecine communautaire

## **E-mail Reminder #1 (English)**

### E-mail header:

List of addressee's emails (will be hidden from email recipients)

### Subject line:

*Please take a moment for HPV research!*

### Email Body:

Dear Student, *[Don't use their names]*

This is a reminder that you still have the opportunity to participate in a Web Survey to further research of Human Papillomavirus (HPV) vaccination in young women. The overall purpose of this thesis is to understand the perceptions undergraduate women have about the HPV vaccines and cervical cancer. This survey is being used to collect data for my thesis.

If you have already filled out the survey, I would like to thank you for your participation. If you have not yet completed the survey, please take a few minutes to do so. Your views are an important contribution to research. This online survey should take no more than 20 minutes of your time. If you complete the survey and offer comments about it, you will be ***eligible for a draw*** for one of several \$5 gift certificates to Tim Horton's. Please click the link below to access the survey, which starts with an informed consent page.

<http://fluidsurveys.com/s/HPV-survey/langeng/>

There will also be a **focus group session** to discuss what young women think about HPV vaccination in university aged women, as well as cervical cancer and cervical cancer screening. If you would like to participate in this session or are interested in learning more about it, please contact me at the email address below.

Your participation in completing this survey is greatly appreciated.

Thank you,  
Rachel Fernandes  
MSc Candidate  
Epidemiology and Community Medicine

## Rappel 1 (Français)

### Sujet du courriel:

SVP prenez un moment pour la recherche du VPH!

### Courriel

Cher(e) étudiant(e),

Ce courriel est une invitation à participer à un sondage sur le web pour un projet de recherche concernant la vaccination contre le virus du papillome humain (VPH) chez les jeunes femmes. L'objectif général de ce projet de recherche est de comprendre les perceptions des jeunes femmes au sujet du vaccin contre le VPH et le cancer du col de l'utérus. Ce sondage est l'outil que j'utilise pour collecter des données pour ma thèse.

Si vous avez déjà rempli le sondage, je vous remercie pour votre participation. Si vous ne l'avez pas encore rempli, s'il vous plaît prenez quelques minutes pour le faire. Vos opinions constituent une contribution importante à la recherche. Ce sondage sur le web ne prendra pas plus que 20 minutes. Si vous remplissez le sondage et vous offrez des commentaires sur le sondage, ***vous serez admissible pour un tirage*** pour un de plusieurs bon d'achats de Tim Horton's de valeur de 5\$. S'il vous plaît cliquez sur le lien suivant pour accéder au sondage, qui commence avec un formulaire de consentement.

<http://fluidsurveys.com/s/HPV-survey/langfra/>

Il y aura aussi une session de groupe de consultation dans laquelle les jeunes femmes pourront discuter ce qu'elles pensent de la vaccination contre le VPH dans une population de femmes d'un âge universitaire, ainsi que le cancer du col de l'utérus et du dépistage de ce dernier.

Votre participation à ce sondage est très appréciée.

Merci,

Rachel Fernandes

Candidate à la maîtrise

Épidémiologie et médecine communautaire

## **E-mail Reminder #2 (English)**

### E-mail header:

List of addressee's emails (will be hidden from email recipients)

### Subject line:

*Last chance to share your insight about Human Papillomavirus Vaccination!*

### Email Body:

Dear Student, [*Don't use their names*]

This is a last reminder that you still have the opportunity to participate in a web survey to further research Human Papillomavirus (HPV) vaccination in young women. This survey is being used to collect data for my thesis. The overall purpose of this thesis is to understand the perceptions undergraduate women have about the HPV vaccines and cervical cancer.

If you have already filled out the survey, I would like to thank you for your participation. If you have not yet completed the survey, please take a few minutes to do so. *This survey is important to further understanding the perceptions women in Ottawa have about HPV vaccination. Your thoughts and opinions about this topic are essential for this research project.* This online survey should take no more than 20 minutes of your time. If you complete the survey and offer comments about it, you will be **eligible for a draw** for one of several \$5 gift certificates to Tim Horton's. Please click the link below to access the survey, which starts with an informed consent page.

<http://fluidsurveys.com/s/HPV-survey/langeng/>

There will also be a **focus group session** to discuss what young women think about HPV vaccination in university aged women, as well as cervical cancer and cervical cancer screening. If you would like to participate in this session or are interested in learning more about it, please contact me at the email address below.

Your participation in completing this survey is very much appreciated.

Thank you,  
Rachel Fernandes  
MSc Candidate  
Epidemiology and Community Medicine

## Rappel 2 (Français)

### Sujet du courriel:

Dernière chance à partager vos idées sur la vaccination contre le VPH!

### Corps du courriel

Cher(e) étudiant(e),

Ceci un dernier rappel: vous avez toujours l'opportunité de participer au sondage web pour un projet de recherche sur la vaccination contre le virus du papillome humain (VPH) chez les jeunes femmes. Ce sondage est l'outil que j'utilise pour collecter des données pour ma thèse.

L'objectif général de ce projet de recherche est de comprendre les perceptions des jeunes femmes au sujet du vaccin contre le VPH et le cancer du col de l'utérus.

Si vous avez déjà rempli le sondage, je vous remercie pour votre participation. Si vous ne l'avez pas encore rempli, s'il vous plaît prenez quelques minutes pour le faire. Vos opinions constituent une contribution importante à la recherche. *Ce sondage est important afin de faire avancer la recherche sur la compréhension et les opinions qu'ont les jeunes femmes d'Ottawa envers la vaccination contre le VPH. Vos opinions et vos idées à ce sujet sont essentielles pour ce projet de recherche.* Ce sondage sur le web ne prendra pas plus que 20 minutes. Si vous remplissez le sondage et vous offrez des commentaires sur le sondage, **vous serez admissible pour un tirage** pour un de plusieurs bon d'achats de Tim Horton's de valeur de 5\$. S'il vous plaît cliquez sur le lien suivant pour accéder au sondage, qui commence avec un formulaire de consentement.

(URL)

Il y aura aussi une session de groupe de consultation dans laquelle les jeunes femmes pourront discuter ce qu'elles pensent de la vaccination contre le VPH dans une population de femmes d'un âge universitaire, ainsi que le cancer du col de l'utérus et du dépistage de ce dernier.

Votre participation à ce sondage est très appréciée.

Merci,

Rachel Fernandes

Candidate à la maîtrise

Épidémiologie et médecine communautaire



uOttawa

L'Université canadienne  
Canada's university

Université d'Ottawa

Faculté de médecine

Épidémiologie et médecine  
sociale

University of Ottawa

Faculty of Medicine

Epidemiology and  
Community Medicine

## THE PERCEPTIONS OF UNIVERSITY WOMEN TOWARDS HUMAN PAPILLOMAVIRUS VACCINATION- FOCUS GROUP

### PARTICIPANT INFORMATION FORM

#### Purpose of Research

Cervical cancer is one of the most prominent cancers in women worldwide. It is the second most common cancer affecting women and the third leading cause of cancer mortality among women. Infection with one or more strains of Human Papillomavirus (HPV) is very common. There are about 100 strains of HPV and infection with the majority of strains does not result in any symptoms. However, persistent infection with HPV is the primary cause of cervical cancer.

Two different vaccines are available to be used to provide protection against the 2 most common cancer causing strains of HPV. Although these vaccines are offered to Ontarian girls in school in the 8<sup>th</sup> grade, the uptake rate is still quite low. Furthermore, women who are currently still eligible for vaccination may not have been previously offered the vaccine, although half of sexually active women between the ages of 18 and 22 are infected with at least one HPV strain.

Understanding the reasons women in university have or have not received the HPV vaccine can help health professionals adjust their health focus for this population.

#### Description of the Research

You are being asked to take part in a focus group because we are interested in your thoughts and ideas regarding HPV vaccination and cervical cancer screening.

We are conducting focus groups with different groups of young women who are currently attending University of Ottawa. We are looking for women who are Canadian born, as well as women who have recently immigrated to Canada or who are currently living in Canada but are not citizens. The latter groups are of particular importance for this study, as the Canadian population has a growing immigrant population, whose health concerns may be different than those born in Canada.

#### Procedures and Participants

Both focus groups will involve up to twelve students. After a short introduction with some information on Human Papillomavirus, HPV vaccines and cervical cancer, the group will be invited to begin a discussion, prompted by issues and questions raised in the presentation. You will be encouraged to talk about any aspect of HPV vaccination and cervical cancer screening that you think is important- whether or not we have asked a question on it. Two or three researchers will be present during the focus group. One will be there to facilitate the discussion along, if it needs any help. The other(s) will be there to take care of practical arrangements for the meeting and for note taking. We estimate that the focus group will last up to 2 hours.

We will be tape recording the focus groups so we can transcribe them (written records). This will allow us to review and analyze the information thoroughly. We will ask for your permission to do this.

**Risks and Benefits of Participating in the Research**

Your identity will be protected and all statements, quotations and comments will be recorded in anonymous form. You will not benefit directly from participating in this research. You will not be exposed to any additional risk by participating in this project.

**Voluntary Participation and Withdrawal from the Project**

Your participation in this focus group is voluntary and you may withdraw from the focus group at any time. The decision to participate or not or to withdraw will have no impact on your current or future academic standing with the University of Ottawa.

**Confidentiality**

Your information will be kept strictly confidential unless release is required by law. You will not be identified in any publications or presentations resulting from study. Any personal information will be coded so that you cannot be identified by name. Representatives of the Ottawa Hospital Research Ethics Board as well as the Ottawa Hospital Research Institute may review the study records, for audit purposes, under the supervision of Dr. Little or his staff. The audiotape of the focus group and the written transcript will be given a code to protect your identity. We will permanently delete any specific information in the transcript which might reveal your identity or that of someone close to you. The tapes will be destroyed once they have been transcribed and the transcripts will be stored securely for 10 years after the completion of the study. Paper records will be stored in a locked office accessible only to Dr. Little and/or his research staff and electronic records will be stored in a password protected file on the University of Ottawa server, again only accessible to Dr. Little and/or his research staff.

**Questions**

The main contact person organizing the focus group is Rachel Fernandes. If you would like to speak to one of the investigators, please contact Dr Julian Little or Rachel Fernandes.

If you have any questions regarding your rights as a research participant, you may contact the Chairperson of the Ottawa Hospital Research Ethics Board (613-798-5555).



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**THE PERCEPTIONS OF UNIVERSITY WOMEN TOWARDS HUMAN  
PAPILLOMAVIRUS VACCINATION- FOCUS GROUP**

**PARTICIPANT CONSENT FORM**

I have read the participant information form and this consent form and I have had the chance to ask Ms. Rachel Fernandes or Dr. Julian Little any questions that I could have regarding this study.

All the questions I asked were answered to my complete satisfaction and I voluntarily agree to participate in this study. If I later decide to withdraw from the study, I will be able to do so at any time.

A copy of the information sheet and the consent form will be provided to me.

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Faculté de médecine

Épidémiologie et médecine  
sociale

University of Ottawa  
Faculty of Medicine

Epidemiology and  
Community Medicine

I consent for this focus group session to be recorded.  Yes  No

Name of participant (in block letters) \_\_\_\_\_

Signature of participant \_\_\_\_\_

\_\_\_\_\_  
Date

Name of researcher/delegate (in block letters) \_\_\_\_\_

Signature of researcher/delegate \_\_\_\_\_

\_\_\_\_\_  
Date



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## LES PERCEPTIONS DES FEMMES FRÉQUENTANT L'UNIVERSITÉ ENVERS LA VACCINATION CONTRE LE VIRUS DU PAPILLOME HUMAIN- GROUPE DE CONSULTATION

### FORMULAIRE D'INFORMATION DE LA PARTICIPANTE

#### Objectif du projet de recherche

Le cancer du col de l'utérus est un des cancers les plus répandus chez femmes dans le monde entier. Il est le deuxième cancer le plus commun chez les femmes et la troisième plus importante cause de mortalité chez les femmes. La cause principale du cancer du col de l'utérus est l'infection persistante avec le virus du papillome humain (VPH).

Deux vaccins différents sont disponibles pour se protéger contre les 2 souches de VPH qui sont les causes les plus communes de ce cancer. Ce vaccin est offert à toutes les filles de 8ième année dans les écoles ontariennes, cependant le taux de vaccination est encore plutôt bas. De plus, il se peut que le vaccin n'ait pas été offert aux femmes qui sont encore éligibles à le recevoir, même si la moitié des femmes âgées entre 18 et 22 ans qui sont sexuellement actives sont infectées avec au moins une souche de VPH.

Comprendre les raisons pour lesquelles les femmes à l'université se sont ou se ne sont pas vaccinées contre le VPH peut aider les professionnels de la santé à conseiller cette population à l'avenir.

#### Description du projet de recherche

Nous vous demandons de bien vouloir participer à cette étude parce que nous sommes intéressés par vos pensées et vos idées concernant la vaccination contre le VPH et le dépistage du cancer de col de l'utérus.

Nous organisons des groupes de consultations avec différents groupes de jeunes femmes qui assistent en ce moment à des cours à l'Université d'Ottawa. Nous cherchons les femmes qui sont nées au Canada, ainsi que des femmes qui ont récemment émigré au Canada ou qui vivent au Canada sans avoir la citoyenneté. Ces derniers groupes sont particulièrement importants pour cette étude, car la population canadienne a une population d'immigrants grandissante et leurs soucis de santé sont peut-être différents comparés aux gens nés au Canada.

#### Interventions et participants

Les deux groupes de consultation regrouperont jusqu'à 12 étudiantes. La séance commencera avec une courte introduction sur des informations concernant le virus du papillome humain, les vaccins contre le VPH et le cancer du col de l'utérus. Le groupe sera alors invité à commencer une discussion en répondant aux questions posées lors de la présentation. On vous encouragera à parler de tous les aspects de la vaccination contre le VPH et du dépistage du cancer du col de l'utérus qui, selon vous, sont importants, que vous ayez ou non une question à poser à ce sujet. Deux ou trois chercheurs seront présents durant le groupe de consultation. L'un d'eux sera présent pour faciliter la discussion, si nécessaire. L'autre sera présent pour régler l'occupation de la logistique de la consultation et pour prendre des notes. Nous estimons que les discussions des groupes de consultation dureront jusqu'à 2 heures.

Nous enregistrerons les conversations lors des groupes de consultation pour ensuite les transcrire sur papier. Cela signifie que nous pourrions les relire aussi souvent que nous en aurons besoin et nous assurer que les délibérations sont pleinement analysées. Nous vous demanderons votre permission pour pouvoir faire ceci.

### **Risques et avantages reliés à la participation à ce projet de recherche**

Votre identité sera protégée et toutes les déclarations, citations et tous les commentaires seront conservés de façon anonyme. Il n'y a aucun avantage direct à participation à ce projet de recherche. Vous n'allez courir aucun risque supplémentaire en participant à ce projet.

### **Retrait du projet**

Votre participation dans ce groupe de consultation est volontaire et vous pouvez vous retirer du groupe de consultation à n'importe quel moment. La décision de participer ou non ou de retirer n'aura aucun impact sur vos présents ou futures études à l'université d'Ottawa.

### **Confidentialité**

Les informations vous concernant seront conservées de manière strictement confidentielle, sauf si la décharge est exigée ou permise par la législation. Vous ne serez pas identifiée dans les publications ou présentation découlant de cette étude. Toute information personnelle sera encodée pour que l'on ne puisse pas vous identifier par votre nom. Des représentants du Conseil d'éthique en recherches de l'Hôpital d'Ottawa ainsi que l'Institut de recherche de l'Hôpital d'Ottawa pourraient passer en revue les dossiers de l'étude, pour les besoins de la vérification, sous la supervision du Dr Little ou de son personnel.

L'enregistrement audio du groupe de consultation et la transcription écrite comprendront un numéro de code pour qu'on ne puisse pas vous identifier. Nous effacerons de façon permanente dans la transcription toute information qui pourrait révéler votre identité ou celle d'un de vos proches. Les enregistrements seront détruits lorsqu'elles sont transcrites et une fois l'étude est terminée, les transcriptions seront conservées en sécurité pendant les 10 années suivantes. Des enregistrements écrits seront gardés dans un bureau fermé à clé, accessible seulement par Dr. Little et son personnel et les enregistrements électroniques seront gardés dans un dossier protégé d'un mot de passe sur le serveur de l'Université d'Ottawa, encore seulement accessible par Dr Little et son personnel.

### **Questions**

La personne-ressource principale pour ce projet est Mme Rachel Fernandes. Si vous désirez parler à l'un des chercheurs, veuillez contacter le Dr Julian Little ou Rachel Fernandes.

Si vous avez des questions concernant vos droits en tant que participant de recherche, vous pouvez contacter le président du Conseil d'éthique en recherches de l'Hôpital d'Ottawa (613-798-5555).



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**LES PERCEPTIONS DES FEMMES FRÉQUENTANT L'UNIVERSITÉ  
ENVERS LA VACCINATION CONTRE LE VIRUS DU PAPILLOME HUMAIN-  
GROUPE DE CONSULTATION**

**FORMULAIRE DE CONSENTEMENT DE LA PARTICIPANTE**

J'ai lu la feuille d'information du participant et ce formulaire de consentement et j'ai eu l'occasion de poser à Mme Rachel Fernandes ou Dr. Julian Little toutes les questions que je pourrais avoir concernant cette étude.

On a répondu à mon entière satisfaction à toutes les questions que j'ai posées et j'accepte volontairement de participer à cette étude. Si je décide par la suite de me retirer de l'étude, je pourrais le faire à n'importe quel moment.

Une copie de cette feuille d'information de consentement me sera fournie.

Je consens à ce que les discussions du groupe de consultation soient enregistrées.  Oui  Non

Nom du participant (en lettres moulées) \_\_\_\_\_

Signature du participant \_\_\_\_\_

\_\_\_\_\_ Date

Nom du chercheur/délégué (en lettres moulées) \_\_\_\_\_

Signature du chercheur/délégué \_\_\_\_\_

\_\_\_\_\_ Date

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