

How our behaviors now affect our fertility later: *Examining sexual health behaviors and STI prevalence at Quest University Canada*

1.0 Introduction

My question is: *how does one's health, culture and environment influence their ability to reproduce?* This question is meant to capture my three principal academic interests: health sciences, environmental health sciences, and medical anthropology. Within the field of health sciences, I am particularly interested in reproductive health, and obstetrics and gynecology. Obstetrics and gynecology is the medical subfield that focuses on birth and female health. According to the WHO, environmental health is concerned with the physical, chemical and biological environment surrounding a person, and the related factors that impact health and behavior ("WHO | Environmental health," n.d.). Finally, Medical anthropology is the study of "human health and disease, health care systems, and bio-cultural adaptation" ("Medical Anthropologie.pdf," n.d.). In other words, medical anthropologists study the social and cultural constructions of health and disease.

When given the opportunity to participate in the Summer Fellows Program at Quest University, I wanted to come up with a project that allowed me to explore the aspects of my question outlined above. In order to apply reproductive health to the non-reproducing student body at Quest, I decided to focus my research on preconceptive health. Preconceptive health is "the health of women and men during their reproductive years with a focus on taking steps now to protect the health of a baby they might have sometime in the future" ("CDC - Preconception Care, Overview," n.d.-a). I then narrowed my research further to focus on the importance of sexual health in preconception care. The purpose of my summer fellows project is to characterize the sexual health behaviors of Quest University students and determine the prevalence of sexually transmitted infections (STIs) on campus. Data collection is proposed through an anonymous online survey to be hosted on the Quest Portal. Survey questions are designed to assess sexual history, decision-making and risk taking of the Quest student body.

2.0 Definitions

The World Health Organization (WHO) defines reproductive health as a sense of physiological, mental and social wellbeing that gives people the "capacity to reproduce and the freedom to choose if, when and how often they do so" ("WHO | Reproductive health," n.d.). As defined by the CDC, preconceptive health is "the health of women and men during their reproductive years" (puberty to age 35 for women, and puberty to age 45 for men) with a focus on "taking steps now to protect the health of a baby they might have sometime in the future" ("CDC - Preconception Care, Overview," n.d.-b). Preconceptive health care is important for every sexually active man and woman of reproductive age regardless of his or her intentions to conceive. It is focused primarily on achieving and maintaining overall health, and therefore provides a good opportunity for general health improvement ("CDC - Preconception Care, Overview," n.d.-b). Sexual

health is “a state of physical, emotional, mental, and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction, or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination and violence” (“WHO | Sexually transmitted infections,” n.d.). According to the WHO, “sexually transmitted infections (STIs) are infections that spread primarily through person-to-person sexual contact. There are more than 30 different sexually transmitted bacteria, viruses and parasites” (“WHO | Sexually transmitted infections,” n.d.). The concepts and definitions above will be reconsidered and further developed throughout this report.

3.0 Potential benefits of this Research

This project will benefit the Quest community because information derived from this research may be useful when creating programs aimed at improving the sexual health knowledge and behaviors of Quest University students. Provided with this information, Quest University staff can develop initiatives within already existing programs to address risky sexual habits and behaviors practiced by Quest’s student body. This study will benefit survey participants because they will be asked to think carefully about their sexual experiences. In this way, participants will be provided an opportunity to reflect on their risk exposure, and consider ways to improve their sexual wellbeing. After completion of the survey, participants will be provided with debriefing materials that include both on and off-campus resources in the case that they wish to learn more about sexual health and how to protect themselves from STIs. If participants wish to be screened for STIs, they will be encouraged to visit the Sea To Sky Walk In Clinic, the Safe clinic, or one of the on-campus physicians. The hope is that participation in this survey will prompt students to reconsider their STI risk and take measures to protect both their own sexual health and the sexual health of other Quest students.

4.0 Sexually Transmitted Infections

According to Weinstock, Berman and Willard (2004), approximately 18.9 million new cases of sexually transmitted infections (STIs) were reported in the year 2000, of which 48% occurred among young people aged 15-24 (Weinstock, Berman, & Cates, 2004). STI infection is most common among emerging young adults, and its risk increases with alcohol use (Neinstein, 2013). When left untreated, sexually transmitted infections (STIs) may lead to adverse reproductive health outcomes such as infertility, still births, and early infant death (World Health Organization, 2009). This section of the report reviews the four most common STIs among young people in North America, and the risk factors that contribute to the transmission of STIs. My survey will assess the factors that contribute to unsafe sexual behaviors at Quest University, as well as the current prevalence and risk for transmission of STIs on campus.

4.1 Human Papillomavirus

Human Papillomavirus (HPV) is the most common STI in Canada and Worldwide. Multiple strains of HPV have been identified. Some lead to genital warts and lesions while others lead to cervical cancer (Government of Canada, 2012d). All strains of HPV are transmitted through oral, vaginal or anal sex, or during intimate skin-to-skin contact

with an infected individual (Government of Canada, 2012d). It is estimated that as many as 75% of sexually active Canadian men and women will contract at least one HPV infection in their lifetime. However, most healthy immune systems are able to fight off the infection without medication (Government of Canada, 2012d).

For women, possible symptoms of HPV include warts on the inner thighs, vulva, on the cervix, or in the vagina (Government of Canada, 2012d). For men, symptoms generally include warts on the penis, scrotum, thighs, or in the urethra (Government of Canada, 2012d).

HPV testing is widely available in Canada. Pap tests are the current method for detecting if a woman is at risk of developing pre-cancerous changes on the cervix, thereby allowing these changes to be closely monitored to reduce the risk of cervical cancer (Government of Canada, 2012d). HPV testing in men is still under development.

Health Canada has authorized two vaccines to prevent infection from the most common types of HPV. These include the Gardasil vaccine (for both men and women) and the Cervarix vaccine (for women only). Both vaccines appear to be safe and effective in preventing HPV infections. Health Canada recommends that all girls between the ages of 11 and 12 be vaccinated against HPV. Finally, women vaccinated with Gardasil or Cervarix should none-the-less receive regular pap tests, and practice safer sex methods (Government of Canada, 2012d).

4.2 Chlamydia

According to Health Canada, Chlamydia is the most commonly reported bacterial STI in Canada (Government of Canada, 2012c). It disproportionately affects young people between the ages of 15 and 24, which is the age category that best represents Quest's student body (Government of Canada, 2012c). This STI is recognized as a silent disease because more than 50 % of infected men and 70 % of infected women experience no symptoms (Government of Canada, 2012c). This is particularly dangerous because when left untreated, Chlamydia can lead to chronic health conditions and infertility in both men and women (Government of Canada, 2012c).

In cases where symptoms do arise, women tend to experience vaginal discharge, painful urination, cramps in the lower abdomen, fever, chills, pain during intercourse, and unexpected bleeding (Government of Canada, 2012c). Men experience symptoms such as swollen testicles, a burning sensation during urination, discharge from the penis, and itching at the opening of the urethra (Government of Canada, 2012c).

The health risks associated with Chlamydia vary between men and women. For up to 40 % of infected women, untreated Chlamydia leads to pelvic inflammatory disease (PID), which causes scarring in the fallopian tubes, and an increased risk of infertility and ectopic pregnancy (Government of Canada, 2012c). Furthermore, infants of women infected with Chlamydia are more likely to be born premature, suffer from eye, ear and throat infections, and develop post natal pneumonia (Government of Canada, 2012c).

Untreated men may experience scarring of the urethra, which causes chronic pain and increases the risk of infertility (Government of Canada, 2012c).

4.3 Gonorrhoea

Gonorrhoea is a common bacterial STI that is known to cause infertility when left untreated (Government of Canada, 2012b). The rates of reported cases of Gonorrhoea infection have increased in Canada by more than 53 % over the past ten years, and the infection is becoming increasingly more resistant to antibiotic treatments (Government of Canada, 2012b). Like most STIs, Gonorrhoea is transmitted from person to person through oral, vaginal or anal sex, as well as from mother to child during vaginal birth (Government of Canada, 2012b). Similar to Chlamydia, Gonorrhoea disproportionately affects young people under the age of 24; particularly young men (Government of Canada, 2012b). Most people infected with Gonorrhoea do not experience symptoms; women commonly mistake the symptoms of Gonorrhoea for a bladder infection (Government of Canada, 2012b). However, even when symptoms are absent, serious health risks and potential complications remain (Government of Canada, 2012b).

When symptoms do arise, women tend to experience burning urination, pain in the lower abdomen, painful intercourse, and irregular vaginal bleeding (Government of Canada, 2012b). Gonorrhoea infected men may experience a burning sensation during urination, yellowish or white discharge from the opening of the urethra, painful or swollen testis, and a burning or itching sensation all over the penis (Government of Canada, 2012b). Like with Chlamydia, when left untreated in women, Gonorrhoea may lead to PID (Government of Canada, 2012b). Men may develop epididymitis, a painful inflammation in the tubes attached to the testis, which can lead to scarring and infertility (Government of Canada, 2012b). Infection with Gonorrhoea increases the risk of infection with other STDs including Human Immunodeficiency Virus (Government of Canada, 2012b). Gonorrhoea can be detected through urine samples and swabs, and treated with antibiotics (Government of Canada, 2012b).

4.4 Genital Herpes

Genital Herpes is common STI that causes painful sores on the genital area. Genital Herpes is transmitted through unprotected vaginal, anal, and oral sex, as well as from mother to child during childbirth (Government of Canada, 2012a). Symptoms for women include sores inside or near the vagina, as well as on the cervix, thighs and buttocks (Government of Canada, 2012a). Men's symptoms typically include sores on the penis, around the testis, near the anus, or on the thighs or buttocks (Government of Canada, 2012a). During the first attack of the virus, the infected individual may experience a fever, headache, and muscle pains. Within days of contracting the virus, they may begin to notice a tingling sensation or irritation in the genital area. A cluster of blisters may appear and burst, leaving open sores that often last up between two and three weeks (Government of Canada, 2012a). After the sores heal, the virus goes into a dormant state, but recurrent outbreaks may occur (Government of Canada, 2012a). Stress, menstruation, illness, pregnancy, and the use of some medications may play a role in the frequency and severity of recurrences.

Though it is important to recognize the common symptoms of Genital Herpes, many people who have Herpes are unaware of their infection because they do not experience symptoms or mistake mild symptoms for something else (Government of Canada, 2012a). Importantly, Herpes continues to be transmitted to others, even when symptoms are unapparent (Government of Canada, 2012a). The major health risks associated with Genital Herpes are pain and discomfort. However, it can also cause emotional and social distress for those living with the infection (Government of Canada, 2012a). Genital Herpes is diagnosed by taking a swab from the open sores, or through a blood test (Government of Canada, 2012a). Although Genital Herpes cannot be cured, it can be well managed with antiviral medications to control recurrences (Government of Canada, 2012a).

5.0 Risk factors

According to Santelli et al. the probability of one individual contracting an STI is the product of several interrelated risk factors. Important considerations include age at initiation of sexual activity, number of current or consecutive sex partners, prevalence of infection in the community, partner choice, use of barrier methods of contraception, frequency of STI screening, and access to health services for the treatment of STIs (Santelli, Brener, Lowry, Bhatt, & Zabin, 1998). This section of the report will consider the relevant risk factors for STI transmission at Quest University, and explain the interconnected nature of these risks.

5.1 multiple, simultaneous or consecutive sex partners

Research has clearly shown that the number of sexual partners an individual has strongly influences their likelihood of contracting an STI. According to Santelli et al., many young adults do not use condoms consistently, making the number of individuals with which they come into contact an important risk factor for the transmission of HIV and other STIs (Santelli et al., 1998). In their research focused on determining the prevalence of Chlamydia and evaluating its sexual and behavioral risk factors, Jonsson et al. found that infection with Chlamydia increases dramatically with an increasing number of lifetime sexual partners (M Jonsson, Karlsson, Rylander, Gustavsson, & Wadell, 1997). Furthermore, they found that Chlamydia infection is 6 times more likely among women who have had more than one sex partner when compared to less experienced women (Monica Jonsson et al., 1995). Because sexual contact with multiple partners means more potential for exposure to infections, those who have sex with multiple individuals are at higher risk for infection. Importantly, other factors such as young age at first sexual encounter are correlated with having multiple sex partners. According to Santelli's study, young women who first had sex before the age of 14 are twice as likely to have multiple sex partners than are those who became sexually active later in life (Santelli et al., 1998).

5.2 Early age at first sexual intercourse

Many studies have shown that the earlier a person starts having sex, the more likely they are to contract an STI, however the exact mechanisms of this association are not clear. With an interest in the causes of HPV infection in young women, Kahn et al. set out to determine the factors linking young age at sexual initiation and subsequent HPV infection. They conducted a longitudinal study on 504 sexually active university aged

women to identify a set of partner traits and sexual risk behaviors that facilitate the strong association between young age at first sexual encounter and ensuing HPV infection.

The female college students recruited for this study underwent HPV testing and completed a self-administered survey every six months for three consecutive years (Kahn, Rosenthal, Succop, Ho, & Burk, 2002). The researchers matched and compared the HPV positive women with the HPV negative woman in order to determine the variables that affect one's likelihood of contracting HPV. The factors that were considered include number of sexual partners, partner's number of sexual partners, drug and alcohol use in conjunction with sexual behaviors, and use of barrier methods of protection (Kahn et al., 2002). Kahn et al. confirmed that young age at first sexual intercourse is positively associated with HPV infection (Kahn et al., 2002). Ultimately, they determined that this strong association is mediated by the following variables: multiple sex partners in the previous 6 months, inconsistent use of condoms, history of previous pregnancy, current smoking, use of drugs and alcohol, and partners' number of sex partners (Kahn et al., 2002). Biological variables such as cervical immaturity also contributed to the risk for HPV infection (Kahn et al., 2002).

Kaestle et al also conducted a study on age at first sexual intercourse. The focus of their research was to determine the long term consequences of having sex at a young age (Kaestle, Halpern, Miller, & Ford, 2005). Though they did not uncover specific long-term health consequences of early initiation of sexual intercourse, their results further confirmed the strong association between having sex at a young age and contracting an STI (Kaestle et al., 2005). They explained that women who begin engaging in sexual intercourse at a young age are susceptible to STIs in part due to a biological predisposition of the immature cervix and an underdeveloped immune system. They also proposed that those who initiate sex at a younger age are inherently more likely to engage in risky sexual behaviors than are those who postpone intercourse (Kaestle et al., 2005). They pointed out that most research on STIs is focused on women. They maintain that while this female focus is largely driven by data availability, it can lead to the misconception that early initiation of sexual intercourse has no negative effects on the reproductive health of boys and young men (Kaestle et al., 2005). They assert that this is not the case. Their research shows that the association between timing of first intercourse and risk for STI contraction does not differ between women and men (Kaestle et al., 2005).

5.3 Alcohol and drug use in conjunction with sex

It is well understood by public health specialists that the use of drugs and alcohol has a huge effect on sexual risk behaviours, and thus the prevalence of STIs in young people. People who use drugs and alcohol in conjunction with sexual activities tend to have more partners, engage in casual sex, and use condoms less frequently.

Casual sex is popular among university-aged students. In a random sample of undergraduate students, 48% had had sexual interactions with a stranger at university (Bersamin, Paschall, Saltz, & Zamboanga, 2012). According to the keystone research of Quest University graduate Heather Harden, casual sex is also common at Quest (Heather

Harden, 2013). Heather's research demonstrates that it will be important to consider the relationship between alcohol consumption and casual sex at Quest.

Bersamin et al. conducted a study to determine the relationship between college drinking and intercourse with strangers. They surveyed 14,280 undergraduate students from 4 different public universities in California. Students were asked how often they drink alcohol, how often they get drunk and how many times they have had intercourse with a stranger. Their results showed that 33% of college males surveyed and 16% of college females surveyed had had intercourse with a stranger (Bersamin et al., 2012).

Importantly, students clearly indicated that their casual sex behaviors were often a result of intoxication, and that they were less likely to use a condom when under the influence of alcohol (Bersamin et al., 2012). The association between drinking and casual sex among college-aged students is important because those who report having engaged in intercourse with a stranger are significantly more likely to report infection with an STI than those who have not (Bersamin et al., 2012).

Rehm et al. from Toronto's Center for Addiction and Mental Health conducted a systematic review and meta-analysis that examined alcohol use and sexual risk taking behaviors. The goal of their study was to determine the association between blood alcohol content (BAC) and the self-perceived likelihood of using a condom during sexual intercourse. They experimentally varied the BAC of North-American, university-aged people to measure its effect on their intentions to engage in unsafe sex (Rehm, Shield, Joharchi, & Shuper, 2012). Unsurprisingly, what they discovered is that when BAC increases from 0 to 0.10 mg/ml, it results in an increased perceived likelihood of engaging in unprotected sex by 5.0 % compared to the perceived likelihood at a BAC of zero (Rehm et al., 2012). Because the use of a male condom is the most readily available and effective safe sex method, failure to use a condom is a serious risk factor for contraction of HIV and other STIs. As Rehm et al's study pointed out, alcohol consumption greatly decreases one's likelihood of using a condom (Rehm et al., 2012). Therefore, the use of brain altering drugs and alcohol in conjunction with sexual behaviors is a serious risk factor for the transmission of STIs. My survey addresses these risks in the Quest community.

5.4 Inconsistent or non-use of condoms

It is well understood that correct and consistent condom use is the most effective method of protection against STIs. However, studies have shown that condom use among young adults is low, with less than 36% of couples using condoms at their first act of intercourse (Goldstein, Upadhyay, & Raine, 2013). Roberts and Kennedy conducted a study to determine the factors that lead to risky sexual behaviors among college-aged women with a specific focus on the reasons why women fail to use condoms consistently. They surveyed 100 women from a southern California University about their perceived risk of contracting an STI, perceived control over sexual encounters, actual sexual risk behaviors, actual condom use, substance use, and partner resistance to condom use. What they found is that women who are more assertive in their relationships, who intend to use condoms, and who refrain from drugs and alcohol are more likely to use condoms consistently.

Among women from all age categories, partner resistance was identified as the primary reason for inconsistent condom use (Roberts & Kennedy, 2006a). Most women (91 %) said that they requested their partner use a condom. However, despite women's communication about their wish to use a condom, consistent (100 % of the time) condom use was reported by only 36% of women (Roberts & Kennedy, 2006a). The difference between these two statistics points to a prevalent issue in both men's and women's knowledge and attitudes surrounding the use of condoms (Roberts & Kennedy, 2006a). Eighty nine percent of participants reported using drugs and alcohol in conjunction with sexual behaviors, further leading to sexual risk behaviors (Roberts & Kennedy, 2006a). As expected, substance use was inversely correlated with condom use among young university-aged women (Roberts & Kennedy, 2006a). Moreover, although 67% of women agreed that substance use increased their sexual risk taking behaviors, as many as 52% of women reported using drugs or alcohol in conjunction with one of their most recent sexual encounters (Roberts & Kennedy, 2006a). This demonstrates that even with an awareness of the negative effects of drugs and alcohol, women are willing to take sexual health risks. Importantly, 16% of women rated themselves at high risk for contracting an STD, 35% rated themselves at moderate risk, and 49% rated themselves at low risk (Roberts & Kennedy, 2006a). Young women enormously underrated their level of sexual risk. The results of this study indicated that 38% of women scored high risk, 43% of women scored moderate risk, and 19% of women scored low risk level sexual behaviors (Roberts & Kennedy, 2006b). This study points out the many complicated factors that contribute to a couple's decision to use a condom, and thus their level of protection against contraction or transmission of potentially harmful STIs.

5.5 Use of non-barrier methods of contraception

In the 1970's and 80's, a variety of highly effective hormonal contraceptive methods became widely available on the public market. In conjunction with this rapid increase in oral contraceptive use, the prevalence of STIs, particularly Chlamydia increased dramatically (Cottingham & Hunter, 1992). In the 1990's in North America and Western Europe, the prevalence for Chlamydia infection was between 5 % and 35 % for women and 3 % and 20 % for men respectively (Cottingham & Hunter, 1992). These shifts in contraceptive and sexual health patterns garnered interest from public health specialists. A number of studies carried out at that time highlighted oral contraceptive use as a co-factor for Chlamydia infection. Interested in this relationship, Researchers Cottingham and Hunter set out to assess the strength of the association between oral contraceptive use and infection with Chlamydia. They conducted a quantitative review of studies published between 1972 and 1990. They discovered an almost two fold increase in the risk of Chlamydia infection for oral contraceptive users when compared to non-users (Cottingham & Hunter, 1992).

Oral contraceptives are known to induce cervical ectopy, a condition where the cells of the cervix are made more vulnerable to infection. Cottingham & Hunter note in their study that both estrogen and progesterone, the active hormones in oral contraceptives, enhance the survival and proliferation of the Chlamydia virus. They confirm that the use of oral contraceptives is known to increase the risk for contracting Chlamydia.

Importantly infection with STIs such as Chlamydia increases the one's likelihood of contracting more life threatening STDs such as HIV (Cottingham & Hunter, 1992). For this reasons, the relationship between oral contraceptives, Chlamydia and other STIs is an important public health interest. It is important to consider both the benefits and risks of oral contraceptive use among women who are likely to be exposed to STIs. The dual-protective effect of barrier methods such as the condom should be emphasized and promoted.

6.0 Minimizing the risk

Individuals can minimize their risk of contracting and transmitting STIs by practicing safer sex, communicating with sexual partners and getting regular STI screening (Government of Canada, 2012e). Sexually active men and women should make an effort to educate themselves and their partners about methods of protection against STIs, and practice them consistently (Government of Canada, 2012e). People should make informed decisions about their sexual health, and talk to their partners about their STI status and use of barrier methods (Government of Canada, 2012e). If someone has had unprotected sex, especially with multiple partners, they should be tested for STIs; keeping in mind that many STIs do not exhibit evident symptoms (Government of Canada, 2012e). If diagnosed with an STI, be sure to follow your health care practitioners treatment and follow up recommendations, and avoid unprotected sex until you and your partner(s) are cured (Government of Canada, 2012e). Most importantly, if someone is diagnosed with an STI, they or their local public health department should notify all of their previous sex partners who may also be at risk of infection (Government of Canada, 2012e). These individuals should undergo testing and treatment (Government of Canada, 2012e).

7.0 Survey Design

My summer fellows project is a cross-sectional survey design. Cross-sectional studies focus on one specific group of people or population of interest, and provide a snapshot of a population at one moment in time. In this case, my population of interest is Quest University's student body and the goal is to take a snap shot of the current prevalence of STIs on campus. Each of my survey questions is associated with one of the risk factors or protective measures for sexual health discussed above. Questions are designed to assess sexual health behaviors, history and knowledge. The following questions serve as examples of the topics covered in my survey questions:

- How many sex partners have you had in the previous 6 months?
- How many sex partners have you had in your lifetime?
- Have you ever had unprotected sex?
- How frequently do you drink alcohol?
- How often are drugs or alcohol involved in your sexual encounters?
- Have you ever had sex with a stranger?
- How often do you get screened for STIs?
- Have you ever had an STI?

I am looking forward to presenting my survey to the student body.

8.0 Sampling and Data Collection

The sample size for this project is 196 students (see table 1. For detail). All Quest students over the age of 18 are eligible to complete the survey. This population was selected for a number of reasons. First of all, Quest students are interesting because they belong to a very close-knit community, and live together on campus. I am curious how the requirement for every student to live on campus affects the sexual health of the student population. Secondly, students from all years of study are welcome to participate. I chose to look at the students across all years because I think it will be interesting to see the differences between sexual health among lowerclassmen versus upperclassmen. Does sexual health improve or worsen as students move through the institution? This comparison may yield interesting details about the distribution of STI infections on campus. Both men and women were included in the survey population as comparisons between sexual behaviors of men versus women at Quest are an area of interest.

My survey will be hosted online on the Quest University portal. I selected an online survey format as opposed to a printed or interview style survey for a number of reasons. Firstly, in order to meet the ethical requirements for research on humans at Quest, my survey must be entirely anonymous. Having a system where the data is anonymously collected and stored in an online format will help meet this requirement. Secondly, online data collection is faster, more organized, and less expensive than data collection through printed surveys.

9.0 Conclusion

I am very excited that I was given the opportunity to work on a project of my choosing this summer. I am thrilled with the progress that I have made over the course of my fellowship and I look forward to collecting and analyzing my data this year. I hope that my results give an accurate representation of sexual health on campus, and that the information derived from my research can be used to improve the health and wellbeing of Quest students and alumni for years to come.

10.0 Tables

<u>Criteria</u>	<u>Sample: Cross-sectional</u>
Major study variable:	STI prevalence on campus (Student has or does not have STI).
Types of estimates of study variables:	Likert scale responses, binary variables, and categorical variables.
Population of interest:	All students at Quest University Canada.
Proportion Estimates:	One previous study indicates that 15% of American young adults between the ages of 18-26 (comparable to the age range of Quest students) have had an STI in the past 12 months.
Tolerable range of error in the estimate:	± 0.05
Standard error/Confidence interval (CI):	95 % confidence interval. Standard error = 1.96.
Formula:	$n = Z^2_{1-\alpha/2} [P_1 (1- P_1)]/d^2$ <p>Where $Z^2_{1-\alpha/2}$ = standard error associated with confidence interval; P_1 = estimated proportion; and d = tolerable range of error in the estimate.</p>
Sample size calculation:	$n = (1.96)^2 [(0.15)(1-0.15)] / 0.05^2$
Sample size:	$n = 196$

Table 1.

Illustrates the data and calculations used to derive the ideal sample size for my study.

~ Work Cited ~

Bersamin, M. M., Paschall, M. J., Saltz, R. F., & Zamboanga, B. L. (2012). Young adults and casual sex: the relevance of college drinking settings. *Journal Of Sex Research, 49*(2-3), 274–281. doi:10.1080/00224499.2010.548012

CDC - *Preconception Care, Overview*. (n.d.-a). Retrieved January 18, 2014, from <http://www.cdc.gov/preconception/overview.html>

CDC - *Preconception Care, Overview*. (n.d.-b). Retrieved June 6, 2014, from <http://www.cdc.gov/preconception/overview.html>

Cottingham, J., & Hunter, D. (1992). Chlamydia trachomatis and oral contraceptive use: a quantitative review. *Genitourinary Medicine, 68*(4), 209–216. doi:10.1136/sti.68.4.209

Goldstein, R. L., Upadhyay, U. D., & Raine, T. R. (2013). With Pills, Patches, Rings, and Shots: Who Still Uses Condoms? A Longitudinal Cohort Study. *The Journal of*

- Adolescent Health : Official Publication of the Society for Adolescent Medicine*, 52(1), 77–82. doi:10.1016/j.jadohealth.2012.08.001
- Government of Canada, H. C. (2001, September 25). *HIV and AIDS - Diseases and Conditions - Health Canada*. fact sheet. Retrieved June 3, 2014, from <http://www.hc-sc.gc.ca/hc-ps/dc-ma/aids-sida-eng.php>
- Government of Canada, H. C. (2012a, October 9). *Genital herpes*. Retrieved June 3, 2014, from <http://healthycanadians.gc.ca/health-sante/sexual-sexuelle/herpes-eng.php>
- Government of Canada, H. C. (2012b, October 9). *Gonorrhea*. Retrieved May 30, 2014, from <http://healthycanadians.gc.ca/health-sante/sexual-sexuelle/gonorrh-eng.php>
- Government of Canada, H. C. (2012c, October 11). *Chlamydia*. Retrieved May 30, 2014, from <http://healthycanadians.gc.ca/health-sante/sexual-sexuelle/chlamyd-eng.php>
- Government of Canada, H. C. (2012d, October 11). *Human papillomavirus (HPV)*. Retrieved June 2, 2014, from <http://healthycanadians.gc.ca/health-sante/sexual-sexuelle/hpv-vph-eng.php>
- Government of Canada, H. C. (2012e, October 11). *Lymphogranuloma venereum (LGV)*. Retrieved June 3, 2014, from <http://healthycanadians.gc.ca/health-sante/sexual-sexuelle/lymphogranulom-eng.php>
- Government of Canada, H. C. (2012f, October 11). *Syphilis*. Retrieved June 2, 2014, from <http://healthycanadians.gc.ca/health-sante/sexual-sexuelle/syphilis-eng.php>
- Jonsson, M., Karlsson, R., Persson, K., Juto, P., Edlund, K., Evander, M., ... Wadell, G. (1995). The Influence of Sexual and Social Factors on the Risk of Chlamydia trachomatis Infections: A Population-Based Serologic Study. *Sexually Transmitted Diseases*, 22(6), 355–363. doi:10.1097/00007435-199511000-00007
- Jonsson, M., Karlsson, R., Rylander, E., Gustavsson, A., & Wadell, G. (1997). The associations between risk behaviour and reported history of sexually transmitted diseases, among young women: a population-based study. *International Journal Of STD & AIDS*, 8(8), 501–505.
- Kaestle, C. E., Halpern, C. T., Miller, W. C., & Ford, C. A. (2005). Young Age at First Sexual Intercourse and Sexually Transmitted Infections in Adolescents and Young Adults. *American Journal of Epidemiology*, 161(8), 774–780. doi:10.1093/aje/kwi095
- Kahn, J. A., Rosenthal, S. L., Succop, P. A., Ho, G. Y. F., & Burk, R. D. (2002). Mediators of the association between age of first sexual intercourse and

- subsequent human papillomavirus infection. *Pediatrics*, 109(1), e5.
doi:10.1542/peds.109.1.e5
- Medical Anthropologie.pdf. (n.d.). Retrieved from
<http://www.univie.ac.at/ethnomedicine/PDF/Medical%20Anthropologie.pdf>
- Neinstein, L. (2013). The New Adolescents: An Analysis Of Health Conditions, Behaviors, Risks, And Access to Service Among Emerging Young Adults. Retrieved from http://www.usc.edu/student-affairs/Health_Center/thenewadolescents/doc/TheNewAdolescents_Final_Locked.pdf
- Rehm, J., Shield, K., D., Joharchi, N., & Shuper, P., A. (2012). Alcohol consumption and the intention to engage in unprotected sex: systematic review and meta-analysis of experimental studies. *Addiction*, 107(1), 51–59. doi:10.1111/j.1360-0443.2011.03621.x
- Roberts, S. T., & Kennedy, B. L. (2006a). Why Are Young College Women Not Using Condoms? Their Perceived Risk, Drug Use, and Developmental Vulnerability May Provide Important Clues to Sexual Risk. *Archives of Psychiatric Nursing*, 20(1), 32–40. doi:10.1016/j.apnu.2005.08.008
- Roberts, S. T., & Kennedy, B. L. (2006b). Why Are Young College Women Not Using Condoms? Their Perceived Risk, Drug Use, and Developmental Vulnerability May Provide Important Clues to Sexual Risk. *Archives of Psychiatric Nursing*, 20(1), 32–40. doi:10.1016/j.apnu.2005.08.008
- Santelli, J. S., Brener, N. D., Lowry, R., Bhatt, A., & Zabin, L. S. (1998). Multiple sexual partners among U.S. adolescents and young adults. *Family Planning Perspectives*, 30(6), 271–275.
- Weinstock, H., Berman, S., & Cates, W. (2004). Sexually Transmitted Diseases Among American Youth: Incidence and Prevalence Estimates, 2000. *Perspectives on Sexual and Reproductive Health*, 36(1), 6–10. doi:10.1363/3600604
- WHO | *Environmental health*. (n.d.). WHO. Retrieved August 26, 2014, from http://www.who.int/topics/environmental_health/en/
- WHO | *Reproductive health*. (n.d.). Retrieved January 16, 2014, from http://www.who.int/topics/reproductive_health/en/
- WHO | *Sexually transmitted infections*. (n.d.). WHO. Retrieved June 6, 2014, from http://www.who.int/topics/sexually_transmitted_infections/en/

World Health Organization. (2009). Women and Health: Today's Evidence Tomorrow's Agenda. Retrieved from http://whqlibdoc.who.int/publications/2009/9789241563857_eng.pdf