

CERVICAL CANCER SCREENING BARRIERS AND
PROSPECTIVE METHOD CHOICES:
THE INFLUENCE OF ATTACHMENT, PERSONALITY AND HEALTH BELIEFS

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by

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Abstract

A female undergraduate sample ($N = 259$) was used to investigate the influence of attachment, personality, and health beliefs on prospective cervical cancer screening choices and screening barriers. Two choices of cervical cancer screening were investigated: the Pap test, and a novel screening method, HPV-DNA self-sampling, a method under development in Ontario which would allow women to collect their own samples. Conscientiousness and perceived barriers to self-sampling were found to be predictive of Pap test choice, and perceived Pap test barriers were predictive of self-sampling choice. Conscientiousness emerged as the strongest predictor of screening barriers; it was inversely predictive of both Pap test and self-sampling barriers. Attachment anxiety was found to be predictive of both Pap test barriers and self-sampling barriers. Perceived susceptibility and perceived benefits were inversely predictive of Pap test barriers. Extraversion and openness were inversely predictive of self-sampling barriers. Implications of understanding psychological factors involved in cervical screening are discussed.

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Cervical Cancer Screening Preferences and Barriers:

The Influence of Health Beliefs, Attachment, and Personality

Cervical Cancer

One of the most successful public health initiatives in Canada has been the promotion of population-wide cervical cancer screening. The implementation of the current standard of cervical cancer screening, the Pap test, over 50 years ago, was followed by a dramatic decrease in the incidence of invasive cervical cancer (Kowalski & Brown, 1994). With the Pap test, 90% of invasive cervical cancer cases can be prevented through the identification and treatment of precancerous lesions on the cervix (Grunfeld, 1997).

Incidence of Cervical Cancer in Canada. Despite the overwhelming success of screening initiatives, cervical cancer cases are still reported across Canada, specifically among women who have low levels of education, are impoverished, new to Canada, over the age of 60 and are aboriginal (Fung-Kee-Fung, 2007). The high incidence of cervical cancer in these at-risk populations is largely due to the lack of screening. Failing to undergo regular screening is the single greatest risk factor for the development of cervical cancer and mortality from the disease (Health Canada, 2002). In Canada, cervical cancer is the third most common cancer in women aged 20-49 years (Fung-Kee-Fung, 2007). Worldwide, cervical cancer is the second leading cause of death among women largely due to the lack of screening measures in place in developing countries (Schoell, Janicek, & Mirhashemi, 1999). A high death rate from cervical cancer around the world further emphasizes the impact of the Pap test on decreasing cervical cancer incidence and mortality.

Cervical Cancer Etiology. One of the reasons for the success of cervical cancer screening programs is that, unlike many other cancers, the development and progression of cervical cancer is well-known (Mays, et al., 2000). The human papillomavirus (HPV), a common sexually transmitted infection, is present in almost all (99.7%) cases of cervical cancer (Clifford, et al., 2003). The human papillomavirus seems to be necessary but not sufficient for the development of cervical cancer; only a small proportion of women who have contracted the human papillomavirus will develop cervical cancer (Waller, McCaffery, & Wardle, 2004). In this small percentage of women, the human papillomavirus will cause precancerous lesions to develop on the cervix, which, in turn, could be identified through screening. Related to the transmission of the human papillomavirus, a high number of sexual partners, an early age at onset of intercourse, and a high number of partners of the male partner are all risk factors for the development of cervical cancer (Fung-Kee-Fung, 2007). Additionally, the past sexual behaviour of the male partner is as much of a risk factor for the development of cervical cancer as the woman's past sexual behaviour (Brinton et al., 1989).

Cervical Cancer Screening Challenges. There are still a number of challenges associated with cervical cancer prevention and screening despite knowledge of cervical cancer risk factors and the screening programs in place. For instance, married women, who are generally at the lowest risk for cervical cancer have the highest rates of screening (Sutton & Rutherford, 2005), while the at-risk populations such as immigrant, elderly, and aboriginal women remain underscreened (Health Canada, 2002). Insufficient screening, due to factors such as lack of awareness, lack of opportunities, and

inconvenience and pain, is responsible for upwards of 60% of cases of cervical cancer (Dannecker, et al., 2004).

HPV-DNA Testing

While the Pap test identifies cell changes on the cervix, a new testing method, HPV-DNA testing, has been developed to identify the presence of the human papillomavirus in the vagina and near the cervix (Dannecker, et al., 2004). HPV-DNA testing can be completed as a part of reflex testing, in which the residual from the Pap test is used to assess whether the human papillomavirus types are present (Stewart et al., 2006). Currently, in Ontario, HPV-DNA testing is recommended for women aged 30 or older with Pap results that identified atypical squamous cells of undetermined origin (ASCUS), cell changes that are potentially precancerous. HPV-DNA testing allows physicians to determine whether oncogenic types of HPV are factors in the abnormal cell changes (Stewart et al., 2006).

Self-Sampling for HPV-DNA. Patient-collected HPV-DNA testing has been developed as a result of both the simplicity of HPV-DNA sample collection and the overall success of HPV-DNA testing. This screening method, also known as self-sampling, allows women to collect their own samples, thereby removing many of the barriers of Pap testing such as discomfort, pain, and embarrassment (Barata et al., 2008). While self-sampling has not yet been implemented as an alternative to Pap testing, it has been suggested that self-sampling could be incorporated into screening or even supersede the Pap test as the primary screening measure (Barata et al., 2008; Crum & Berkowitz, 2002). Self-sampling, a method that has been cited as both less costly and less invasive than Pap testing (Petignat, et al., 2007), may therefore be a viable alternative for targeting

women who would otherwise not be regular participants in cervical cancer screening programs.

The Ontario Cervical Screening Program of Cancer Care Ontario has run a one-year pilot both for the use of HPV-DNA testing in reflex testing and for the feasibility of HPV self-sampling (McLachlin, Mai, Murphy, Fung-Kee-Fung, & Chambers, 2005). One of the main goals in assessing HPV self-sampling was to help determine whether this method of screening would be feasible among women who would not otherwise be screened (McLachlin et al., 2005). In Ontario, however, self-sampling kits are not yet widely available (Fung-Kee-Fung, 2007). Though self-sampling would appear to be a potential alternative to Pap testing as a form of primary screening of cervical cancer, there are also barriers acknowledged for this type of screening. Women have reported concerns about vaginal dryness and doing the test properly as deterrents in choosing self-sampling over the Pap test. Other self-sampling barriers include concerns about toxic shock and lack of understanding why testing was important (Stewart et al., 2007).

Efficacy and Acceptability of Self-Sampling. The development of HPV-DNA testing methods and self-sampling for HPV have stimulated discussions and studies investigating the efficacy and acceptability of these new screening methods (e.g., Barata, 2008; Danneck et al., 2004; Petignant, et al., 2007). In assessing the effectiveness of the Pap test compared to self-sampling of HPV, there is currently no consensus about which screening method is superior (Petignat et al., 2007). Dannecker and colleagues (2004) investigated the acceptability of self-sampling compared to the Pap test among women who had completed both types of tests. Acceptability was determined by composite ratings of the practicability, the patient's willingness to do the test at home and their

willingness to pay for the test. Self-sampling was found to be more acceptable than the Pap test in 65.6% of the women. Of the rest of the sample, 23% found both Pap tests and self-sampling equally acceptable and 11.3% rated the Pap test as more acceptable.

Demographic-related variables have been found to be associated with the acceptability of self-sampling as well. Women with a higher level of education and in a higher income bracket have been found to prefer self-sampling to Pap testing (Dzuba et al., 2002; Stewart et al., 2007; Tisci et al., 2003). For those women who preferred the Pap test to self-sampling, confidence in the procedure was the most common reason for doing so (Dannecker et al., 2004). Stewart and colleagues (2007) emphasized, in their systematic review on self-collected samples of HPV-DNA, that the demographic variables associated with self-sampling acceptability are relatively well-known, but other characteristics of this group of women remain an area of research that has yet to be fully explored.

Psychological Theories Applied to Health Behaviours

The present study aims to identify psychological factors associated with prospective cervical cancer screening method choices and related psychosocial barriers to cervical cancer screening. Three psychological theories are of interest in the present study: the health belief model, attachment theory and the five-factor model of personality. The health belief model has been widely used to assess both health behaviours and screening behaviours (Bish, Sutton & Golombok, 2000; Hill, Gardner & Rassaby, 1985; Janz & Becker, 1984; Wiebe & Christensen, 1997). Both attachment theory and the five-factor model of personality describe deep-seated traits in individuals that impact one's emotional reactions to situations, and interpersonal relations, which in turn have the

potential to impact health perceptions and behaviours. Each of the theories will be discussed with specific regard to their relationships, both established and proposed, with cervical cancer screening behaviours.

The Health Belief Model

In the 1950s, the health belief model (HBM) was developed by the United States Public Health Service in an attempt to understand disparities in preventive health behaviours. The health belief model posits that performing a health behaviour is dependent upon four psychosocial dimensions: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers (Janz & Becker, 1984). Perceived susceptibility refers to the individual's appraisal of the personal risk for the specific disease or condition. Perceived severity refers to the negative implications of the disease, including pain, deformity and mortality. Perceived benefits refers to the perceived effectiveness of performing the behaviour or getting the screening test, and perceived barriers, the most powerful component of the health belief model, refers to the costs of performing the behaviour (Janz & Becker, 1984). These costs can be psychological, social or physical, such as pain, inconvenience, discomfort, and embarrassment, as in the case of Pap testing (Barata et al., 2008). These four dimensions are believed to be related to a person's decision as to whether they will partake in the health behaviour or to what degree they will partake in the behaviour.

The health belief model has been used to study various forms of health behaviours such as getting the flu vaccine, testing for high blood pressure, breast self-examinations, and getting screened for the gene involved in Tay-Sachs disease (Janz & Becker, 1984), in addition to being used to study cervical cancer screening behaviours (e.g., Hennig &

Knowles, 1990; Hill, Gardner, & Rassaby, 1985). In their investigation of barriers of Pap testing in relation to the health belief model, Hennig and Knowles (1990) identified six out of nine barriers that were significantly correlated with Pap testing. The indignity of the examination, discomfort, embarrassment, the sex of the doctor, the doctor's not believing in the need for the Pap test, and the fear of the results were all significantly associated with intentions for Pap testing.

Hill and colleagues (1985) investigated three theoretical models that have been developed to understand behaviour choices: the theory of reasoned action, the health belief model, and the subjective probability model in relation to breast self-exams and Pap tests. The multiple regression analyses that included the health belief model factors revealed that perceived susceptibility and perceived barriers were the two significant predictors of intentions to get a Pap test. Specifically, embarrassment, the indignity of the exam and discomfort were most highly and negatively correlated with both intentions to get a Pap test and past Pap test behaviours.

Most recently, the health belief model has been used as a framework for understanding women's perceptions and feelings towards self-sampling and the possible inclusion of self-sampling into screening (Barata et al., 2008). Some of the benefits of self-sampling identified in this qualitative study included the convenience, comfort and the opportunity to take control of one's own health. In the focus groups of the study, women also discussed some possible barriers of self-sampling as well. Losing the benefit of the yearly appointment and the limited awareness of self-sampling among low-literacy women emerged as potential barriers to this new screening method (Barata et al., 2008).

Barriers to Pap Tests

Perceived barriers is a prominent theme among studies that have investigated reasons for lack of screening behaviours in women (Glasgow et al., 2000; Hennig & Knowles, 1990; Hill et al., 1985; Kowalski & Brown, 1994; Price et al., 1996; Sutton & Rutherford, 2005). Glasgow and colleagues (2000) suggested that barriers to Pap testing can be divided into three broad factors: embarrassment and mistrust barriers, pessimism and misinformation barriers, and logistics barriers (such as finding the time to get the test done). As discussed previously, discomfort with the Pap test has been cited for a lack of screening across various studies (Stewart et al., 2006). In their study of cervical cancer screening in a national sample of the British population, Sutton and Rutherford (2005) found that 22% of their sample of 1,307 found the Pap test “quite embarrassing ” or “very embarrassing”. Of those women who said the test was very embarrassing, 79% would get the Pap test, whereas 95.4% of the women who identified the test as not embarrassing at all would get the test done. Though 79% is a relatively high percentage of women who manage to cope with their embarrassment and get the test done, it would appear that embarrassment still prevents a number of women from getting regular Pap tests.

Hennig and Knowles (1990) studied a sample of women 40 years of age and older, and their barriers to cervical cancer screening. The indignity of the exam and the discomfort of the exam were identified as the most notable barriers in the sample. Forgetting to get a Pap test did not yield a significant result in this particular study, but has been found to be a barrier in cervical cancer screening (Price et al., 1996). Other idiosyncratic factors influence screening behaviours, such as physique anxiety (the concern about one’s body and appearance), which has been found to be related to a

decreased likelihood of screening (Kowalski & Brown, 1994). Due to the intimate nature of a Pap test and the pelvic exam, the relationship between the physician and patient is an important consideration. A qualitative study, involving focus groups of older women aged 45-70 years, found that a common thread across discussion groups was the importance of trust in the physician. Trust is thought to be integral to get over the embarrassment and discomfort of the Pap test (Van Til, MacQuarrie, & Herbert, 2003).

The Patient-Provider Relationship

The nature and quality of the relationship between the patient and the health care provider can impact patient adherence to treatment as well as the individual's decision to undergo disease screening such as Pap testing. Trust within the relationship and the overall satisfaction with the relationship are important factors in the patient-provider relationship. To develop trust and a good relationship, an important factor in a patient-provider relationship is the regularity and dependability of the physician. Ettner (1999) conducted a study with over 300 mid-life patients and found that those patients with a usual physician were three times more likely to have had a preventive health check than those without a physician. It should be emphasized that this finding may not necessarily establish a causal link between a usual physician and screening, but rather this relationship could be due to the notion that the types of individuals who are likely to keep a regular physician are also likely to be screened regularly. Similarly, greater satisfaction and trust in the patient-provider relationship has been linked to greater adherence in screening (O'Malley, Forrest, & Mandelblatt, 2002) and medication adherence (Piette, Heisler, Krein, & Kerr, 2005). The patient-provider relationship therefore is an important consideration in assessing individual differences in screening behaviours.

Attachment Theory

Related to the patient-provider relationship is attachment theory, a theory of interest in the present study, which posits that later-life relationships, including romantic relationships and patient-provider relationships, are greatly impacted by the relationship established in the first few years of life between the individual and caregiver (Bowlby, 1973). Attachment theory was developed by John Bowlby (1973) to describe the emotional bond that develops between an infant and caregiver. This bond is thought to develop in part as a result of evolutionary processes. When children feel threatened or upset, they instinctively seek out their primary caregiver for safety and relief from the distress. The interaction between caregiver and child becomes a part of what Bowlby defined as one's "internal working model", a schema that the individual will use throughout life for expectations in intimate relationships (Bowlby, 1973).

Internal working models are greatly affected by the interaction between child and caregiver, a subject that was of interest to famous developmental psychologist Mary Ainsworth who studied individual differences in attachment. She identified three attachment patterns in children: secure, avoidant and anxious-ambivalent, the latter two being two insecure attachment patterns (Ainsworth, Blehar, Waters, & Wall, 1978). These behaviour patterns were observed in her well-known study, the Strange Situation, which involved the observation of the toddler's reactions to separation from the mother, an introduction of a stranger, and finally the reunion of mother and child. Children were classified based on their responses to these conditions. Securely attached children, an attachment pattern found in the majority of individuals (55%) (Hunter & Maunder, 2001), were characterized by distress at separation, and relief at reunion with the mother.

Insecure avoidant children were generally unresponsive to the mother's departure as well as the mother's return. Children with the insecure anxious-ambivalent attachment style showed a great deal of distress when the mother was separated from them, and exhibited approach and avoidance behaviours at the return of the mother (Ainsworth et al., 1978).

Developed from the foundations of Bowlby and Ainsworth's work on attachment theory, Bartholomew and Horowitz (1991) developed a model of attachment to explain four types of attachment patterns, one secure and three insecure types, which have been applied to adult populations. These four attachment styles can be characterized by combinations of two attachment dimensions – anxiety and avoidance – that comprise the dominant framework of attachment in current use (Brennan, Shaver, & Clark, 1998). Attachment anxiety is characterized by a fear of rejection and need for dependence on one's partner, and attachment avoidance is characterized by chronic self-reliance and discomfort with closeness to others (Brennan et al., 1998).

Individuals range from high to low on attachment anxiety and attachment avoidance, and the unique combination of the attachment dimensions in turn corresponds to the individual's attachment styles (see Figure 1). For example, a secure attachment style is characterized by an individual with low attachment anxiety and low attachment avoidance. Fearful attachment is characterized by both high attachment anxiety and high attachment avoidance, preoccupied attachment is characterized by low avoidance and high anxiety, and dismissive attachment is characterized by high avoidance and low anxiety.

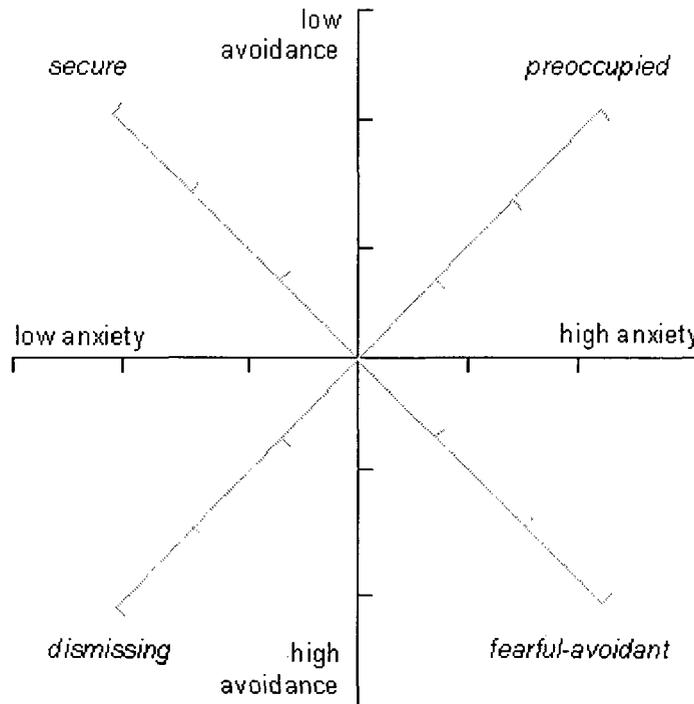


Figure 1. Attachment Style as an Interaction between Anxiety and Avoidance. Adapted from Fraley (2004).

Attachment is not only assessed using the attachment dimensions of anxiety and avoidance; it can be measured by both categorical and continuous measures. The Relationship Questionnaire (RQ), developed by Bartholomew and Horowitz (1991), provides a categorical measurement of attachment, and the Experience in Close Relationships Questionnaire (ECR), developed by Brennan and colleagues (1998), is a commonly used continuous measure of attachment. Though the ECR has been reported as a more psychometrically sound instrument than other categorical measures (Fraley, Waller & Brennan, 2000), both categorical and continuous measures of attachment are reported in the literature (e.g., Ciechanowski, et al., 2002; Feeney & Ryan, 1994; Scharfe & Eldredge, 2001).

Developmental Stability of Attachment. Attachment theory has been accepted as a developmentally stable construct (Zimmerman & Becker-Stoll, 2002; Waters, Merrick, Treboux, Crowell, & Albersheim, 2000), and in turn, applicable to research in adult populations. A longitudinal study conducted by Waters and colleagues (2000) found that 72% of children in their longitudinal study maintained their attachment style into adulthood. Further, those individuals with unstable attachment styles had dealt with some severe conditions throughout their childhood such as abuse, mental illness, parental illness and divorce.

Attachment Theory Applied to Health. Attachment theory has been of particular interest in relation to health behaviours, health care seeking and symptom reporting (Noyes et al., 2003; Scharfe & Eldredge, 2001). Attachment behaviours are manifested when individuals feel vulnerable or threatened, and therefore situations dealing with health and illness, which would evoke such feelings, are of interest in terms of their relationship with attachment patterns. Attachment theory has been investigated with regards to its relationship with hypochondriasis, health care seeking, and sexuality (Ciechanowski, et al., 2002; Hunter & Maunder, 2001; Noyes et al., 2003; Scharfe & Eldredge, 2001), which are health care behaviours that could also be related to cervical cancer beliefs and screening.

Noyes and colleagues (2003) studied the relationship between personality, attachment and hypochondriasis and found that hypochondriasis was positively correlated with all insecure attachment styles — preoccupied, fearful and dismissive. Hypochondriasis had a particularly strong correlation with the fearful attachment style. Of the personality variables in the study, neuroticism was found to be the only significant

predictor of hypochondriasis, and remained the strongest among all predictors investigated in the study.

Based on the distinct nature and opportunity for both defiance and dependence in the patient-provider relationship, the link between health care behaviours and attachment theory has been of interest in this line of research (Ciechanowski, et al., 2002). Those individuals with an insecure preoccupied attachment style have been found to overuse the health care system and “doctor-shop”, a behaviour in which the patient continues to change and visit new physicians (Ciechanowski et al., 2002). Contrary to these types of behaviours, those individuals high on fearful insecure attachment style have been found to underuse the health care system, despite the high symptom reporting among this group (Ciechanowski et al., 2002).

Scharfe and Eldredge (2001) investigated the relationship between sexual behaviours, general health behaviours, and attachment among university students. Attachment styles were related to different sexual behaviours, depending on the student’s relationship status. Of those who were involved in a romantic relationship, security was related to fewer casual partners, whereas high scores on fearful insecurity was associated with more lifetime partners and more casual partners. Of those participants who were not in a relationship, security was found to be related to greater sexual activity and greater condom use. Security was also associated with good quality sleep, therefore further supporting the notion that individuals with a secure attachment style may have more positive health behaviours than individuals with an insecure attachment style.

The Five-Factor Model of Personality

In addition to the valuable information provided by both the nature and stability of attachment theory, the five-factor model of personality provides another opportunity to investigate stable characteristics which have been found to impact health behaviours (Booth-Kewley & Vickers, 1994, Christensen & Smith, 1995; de Bruijn, 2005, Ferguson, 2000; Honda & Jacobson, 2005; Wiebe & Christensen, 1996). The five-factor model of personality is a widely-accepted theory of personality that dominates the field of personality research (Ferguson, 2000). Eysenck's theory of personality, which posited that extraversion and neuroticism were two of the major components of personality, was a theory that greatly influenced the development of the five-factor model (McCrae & John, 1992). Extraversion and neuroticism were kept in the five-factor model, and then openness to experience, conscientiousness and agreeableness were the three factors added later (de Bruijn, Kremers, van Mechelen & Brug, 2005).

Individuals can range from being high to low on each of the five factors, which are also referred to as the "big five" (Booth-Kewley & Vickers, 1994). Individuals high on extraversion tend to be affectionate, gregarious, active and warm. Neuroticism is generally characterized by negative emotions, worrying, vulnerability and self-consciousness. Agreeableness is characterized by altruism, modesty, generosity and being good-natured. Individuals high on openness to experience tend to be imaginative, creative, curious, and prefer variety. Finally, conscientiousness is defined by characteristics such as being hard-working, well-organized, punctual and ambitious (McCrae & Costa, 2003).

Personality, Health, & Illness. The personality traits of the big five model have been studied in relation to various aspects of health and illness. Over twenty years ago, Costa and McCrae (1987) investigated the relationship between neuroticism, disease and somatic complaints. Though there was no difference in mortality rates, significant correlations between neuroticism and reporting of physical symptoms were found. Modest associations between neuroticism and objective health outcomes have been found (Wiebe & Christensen, 1996), which are possibly associated with the link between neuroticism and the psychophysiology of stress, and its consequences (Marshall, Wortman, Vickers, Kusulas, & Hervig, 1994).

Personality and Health Behaviours. In recent years, research conducted on the relationship between health and personality variables has highlighted the unique associations among health and the other factors – openness, conscientiousness, and agreeableness – in addition to neuroticism and extraversion. In their study of health behaviours, Booth-Kewley and Vickers (1994) found that extraversion was associated with wellness behaviours such as exercising and eating healthily, but was also associated with substance use. High agreeableness and conscientiousness scores were associated with low rates of substance use, whereas openness to experience was found to be related to substance use. Conscientiousness, agreeableness and openness to experience have been found to be related to healthy diets. Specifically, agreeableness was found to be related to vegetable consumption and openness has been found to be related to both fruit and vegetable consumption (de Bruijn et al., 2005).

Personality and Medical-Care Seeking Variables. The five-factor personality variables have also been investigated in relation to medical care-seeking and symptom

reporting behaviours, topics relevant to the present study. Ferguson (2000) investigated the relationship between the five-factor model, hypochondriacal concerns and related medical-care seeking behaviours. Perceived inadequacy of the physician's explanation of the medical condition was related to lower scores on agreeableness. In the same study, conscientiousness was found to be negatively related to hypochondriacal concerns. In a study of renal dialysis patients, conscientiousness was the only personality factor that was found to be associated with adherence to the medical regimen for dialysis (Christensen & Smith, 1995). A recent study investigating the relationship between personality and complementary and alternative medicine (CAM) found that openness to experience was positively correlated with the use of all types of CAM except manipulative body-based methods including massage and chiropractic treatments (Honda & Jacobson, 2005). This finding is not surprising given that individuals high on openness to experience prefer variety and in turn, this preference for variety likely translates to medical settings as well.

Personality and the Health Belief Model. An important consideration in the present study is the relationship between the health belief model and the personality variables. Wiebe and Christensen (1997) investigated the interaction between conscientiousness, the health belief model, and regimen adherence among haemodialysis patients. The authors hypothesized that there would be an interaction between conscientiousness and perceived susceptibility in that individuals would need to feel susceptible to an illness for conscientiousness to positively impact health behaviours. The results did not yield the expected findings. Instead, it was found that those patients high on conscientiousness and high on perceived severity were more likely to have

poorer patient adherence. This surprising finding was attributed to the possibility of defective coping strategies among such individuals.

In their study of the perceived risks of radon and smoking, Hampson and colleagues (2006) found a three-way interaction between gender, perceived risk (susceptibility) of smoking and conscientiousness on quitting smoking. Women who were high on conscientiousness were more likely to quit smoking when their levels of perceived risk were high. A previous preliminary study conducted on perceived risk of smoking and radon by Hampson and colleagues (2000) did not produce similar findings. Though an interaction between conscientiousness and perceived susceptibility has strong theoretical grounds, research in this field remains relatively exploratory.

The Present Study

The present study aims to investigate psychological factors associated with women's prospective cervical cancer screening method choices and screening barriers. The likelihood of choosing either the Pap test or self-sampling as a primary screening option in cervical cancer prevention is of particular interest. Although self-sampling is not yet widely available to women in Ontario, in 2004, Cancer Care Ontario ran a one year pilot on the feasibility of HPV self-sampling (McLachlin et al., 2005). While the main goal of this program was to determine the feasibility of self-sampling particularly among underserved women (immigrant, native and low literacy women), it has been suggested that self-sampling has the potential to supersede Pap testing as the primary cervical cancer screening measure (Barata et al., 2008). Therefore, self-sampling perceptions and opinions among both serviced and underserved women in Canada is an important research avenue.

Higher income and higher education are factors that have been found to be related to the acceptability of self-sampling (Dzuba et al., 2002; Stewart et al., 2007; Tisci et al., 2003). Beyond these demographic-related variables, not much is known about the characteristics, such as personality and psychological correlates, of women that would be likely to accept self-sampling as an option in cervical cancer screening (Stewart et al., 2007). To develop a better understanding of the factors influencing women's choices and opinions of cervical cancer screening measures, attachment, personality and health belief model variables were of principal interest in the present study.

The interest in attachment theory in relation to cervical cancer screening tests stems from the literature citing the relationship between health care seeking behaviours and attachment (Ciechanowski et al., 2002; Feeney & Ryan, 1994). Preoccupied attachment has been found to be related to health care overuse whereas individuals with fearful attachment pattern have been empirically associated with underuse, and the dismissive attachment style has been theoretically implicated as being likely associated with underuse of the medical system among adult female primary care health maintenance organization (HMO) patients (Ciechanowski, et al., 2002). Additionally, Feeney and Ryan (1994) used a university student sample to investigate health care seeking and attachment. Avoidant attachment, as measured by both a categorical and dimensional measures, was inversely related to visits to health care professionals.

Attachment anxiety and attachment avoidance were therefore of particular interest in the present study due to the intimate nature of Pap tests in comparison to the independently-completed self-sampling of HPV- DNA. Among the personality factors, conscientiousness and openness were of particular interest due to past literature citing

these factors as being associated to medical care usage (Christenesen & Smith, 1995; Honda & Jacobson, 2005). The relationship between screening choices, screening barriers and the health belief model components — perceived susceptibility, perceived severity, perceived benefits and perceived costs — were also investigated.

In the present study, three dependent variables were measured. The first dependent variable was screening choice: whether the participant would choose the Pap test, self-sampling, or neither test. The other two dependent variables were Pap test barriers and self-sampling barriers.

Hypothesis I: Preoccupied attachment, characterized by high attachment anxiety and low attachment avoidance, will be predictive of Pap test choice. Individuals with this attachment style will be more likely to want to maintain the patient-provider relationship, which would otherwise be diminished with self-sampling. Dismissive attachment, characterized by high attachment avoidance and low attachment anxiety, will be predictive of self-sampling choice due to the independent nature of the screening method. The continuous attachment dimensions, anxiety and avoidance, will also be of particular interest due to the high reliability and sensitivity associated with the ECR (Fraley, et al., 2000). Both the ECR and the RQ were used to investigate the influence of attachment in the present study.

Hypothesis II: Pap barriers will be positively predictive of self-sampling choice, and self-sampling barriers will be positively predictive of Pap test choice. This is based on the past research that has revealed the barrier component of the health belief model as the most predictive of screening behaviours (Janz & Becker, 1984).

Hypothesis III: Openness will be predictive of both self-sampling choice and lowered self-sampling barriers. This is hypothesized based on characteristics of openness, notably preference for variety and curiosity, and past research supporting the relationship between openness to experience and alternative forms of medicine (Honda & Jacobson, 2005).

Hypothesis IV: The perceived susceptibility and perceived severity components of the health belief model will be negatively predictive of screening barriers (both Pap test and self-sampling). This hypothesis is based on the notion that high perceived susceptibility and high perceived severity would likely motivate individuals to perform preventive health behaviours, thereby corresponding to lower screening barriers.

Hypothesis V: For self-sampling and Pap test barriers, an interaction between conscientiousness and perceived susceptibility will be explored. High conscientiousness may only lead to lowered screening barriers when perceived susceptibility is high due to the notion that individuals must feel susceptible to a disease in order for conscientiousness to positively impact their attitudes. Research investigating this interaction has been mixed (Hampson et al., 2000; Hampson et al., 2006; Weibe & Christensen, 1997), and therefore the present study aims to further examine this topic.

Method

Materials

Attachment. In the present study, information on attachment was collected using two questionnaires, one to collect information on the continuous dimensions – anxiety and avoidance – and another to collect information on the four attachment styles – secure,

preoccupied, fearful and dismissive. Each measure is described below, and the relationship between the two instruments is discussed as well.

To assess the attachment dimensions (anxiety and avoidance) of this sample of emerging adults, the Experience in Close Relationships scale (ECR) was used (Appendix E). Brennan, Clark and Shaver (1998) developed the ECR from a factor-analytic study investigating adult attachment behaviours. It was developed as a two dimensional continuous measure, assessing both attachment anxiety and attachment avoidance. The scale is 36 items, with 18 items measuring each of the attachment dimensions. The odd numbered questions make up the attachment avoidance subscale and the even numbered questions make up the attachment anxiety scale. The following items are reverse scored prior to calculating the mean score for the subscale: 3, 15, 19, 22, 25, 27, 29, 31, 33, and 35. Participants responded to each item with a 7-point Likert scale, which ranged from “strongly disagree” to “strongly agree”. An example of an attachment anxiety question would be “I’m afraid that I will lose my partner’s love” and an example of an attachment avoidance question would be “I find it difficult to allow myself to depend on romantic partners”. Both the attachment anxiety dimension and the attachment avoidance dimension have been found to have high internal consistency, .92 and .93 respectively (Nofle & Shaver, 2006). In the present study, both the avoidance scale ($\alpha = .87$) and the anxiety scale ($\alpha = .91$) had good internal consistency.

Developed by Bartholomew and Horowitz (1991), the Relationship Questionnaire (RQ) is another measure of adult attachment (Appendix G). The RQ consists of four paragraphs, each describing an attachment style – secure, preoccupied, fearful and dismissive. For each paragraph, participants were asked to select the paragraph that best

suit them (forced-choice response format). Participants also responded on 7-point Likert scales, which ranged from ‘not at all like me’ to ‘very much like me’ for each of the four paragraphs describing the attachment styles. The RQ has been shown to have high stability across an 8-month period (Scharfe & Bartholomew, 1994), and has had internal consistencies ranging from .72 to .96 (Mauricio & Gormley, 2001).

Correlations of the attachment dimensions (avoidance and anxiety) and the attachment styles (secure, preoccupied, fearful and dismissive) support the theoretical link between the two sets of constructs. As would be expected, the secure attachment style was negatively correlated with both the avoidance ($r = -.608, p < .001$) and anxiety attachment dimensions ($r = -.422, p < .001$). Fearful attachment style ratings were positively correlated with both avoidance ($r = .504, p < .001$) and anxiety ($r = .314, p < .001$). The preoccupied attachment style was correlated with only attachment anxiety ($r = .555, p < .001$). The dismissive attachment style was positively correlated with avoidance ($r = .302, p < .001$) and negatively correlated with attachment anxiety ($r = -.162, p < .001$). A further exploration of the relationship between the two scales using a multivariate analysis of variance (MANOVA) is included in Appendix O.

The Big Five Inventory. The Big Five Inventory (BFI) was developed by John, Donahue, and Kentle (1991) as a way to measure personality factors using short phrases (Appendix F). Scores for each of the five dimensions are generated from the 44-item questionnaire. The extraversion subscale includes 8 items (1, 6R¹, 11, 16, 21R, 26, 31R, 36), the agreeable subscale includes 9 items (2R, 7, 12R, 17, 22, 27R, 32, 37R, 42), the

¹ R denotes a reverse scored item

conscientiousness scale includes 9 items (3, 8R, 13, 18R, 23R, 28, 33, 38, 43R), the neuroticism scale includes 8 items (4, 9R, 14, 19, 24R, 29, 34R, 39), and the openness scale includes 10 items (5, 10, 15, 20, 25, 30, 35R, 40, 41, 44). For extraversion, items include statements like “I see myself as someone who is talkative”; for agreeableness, “I see myself as someone who likes to cooperate with others”; for openness, “I see myself as someone who is curious about many different things”; for neuroticism, “I see myself as someone who gets nervous easily” and for conscientiousness, “I see myself as someone who makes plans and follows through with them”. Participants responded to each of the questions using 5-point Likert scale ranging from “disagree strongly” to “agree strongly”. Across U.S. and Canadian samples, the BFI has had alpha reliabilities ranging from .75 to .90. In the present study, extraversion ($\alpha = .83$), agreeableness ($\alpha = .71$), neuroticism ($\alpha = .85$) and openness ($\alpha = .76$) and conscientiousness ($\alpha = .79$) all had acceptable internal reliabilities. Test-retest reliabilities and validity evidence through comparisons to other five-factor model measures have been found (Pervin & John, 2001).

Cervical Cancer and Cervical Cancer Screening Information. To ensure that participants had sufficient knowledge of cervical cancer, the Pap test and self-sampling, participants were introduced to these topics with a few paragraphs. Basic information about cervical cancer, cervical cancer risk factors, preventing cervical cancer, the Pap test, and self-sampling were provided to students (Appendix H).

Cervical Cancer and Cervical Cancer Knowledge-Check. To assess whether participants read and understood the information provided to them, they completed eight multiple choice questions on cervical cancer and cervical cancer screening (Appendix I).

Cervical Cancer Beliefs Questionnaire. The Cervical Cancer Beliefs Questionnaire (Appendix J) is the name applied to the questionnaire which assessed three components of the health belief model applied to cervical cancer – perceived susceptibility, perceived severity, perceived benefits of the Pap test. The items of the questions were derived from the questionnaire used to assess health beliefs by Bish, Sutton and Golombok (2000). The questionnaire consisted of 23 items, with 9 items assessing perceived susceptibility to cervical cancer (1, 4, 5, 9, 10, 12R, 16R, 18R, 19R), 5 items assessing perceived severity of cervical cancer (2, 6R, 13, 21R 23), and 9 items assessing the perceived benefits of getting a Pap test (3R, 7R, 8, 11R, 14R, 15, 17, 20R, 22). Participants were asked to respond to each statement using a 7-point Likert scale ranging from “strongly disagree” to “strongly agree”. For perceived susceptibility, an example of an item would be “My lifestyle makes it likely that I will get cervical cancer”, for perceived severity, “If I got cervical cancer my whole life would change”, and for perceived benefits, “If I have regular smear tests cervical cancer will be found before it is advanced”. The alpha coefficients for internal reliability for the perceived susceptibility, perceived severity, perceived benefits and perceived costs were found to be .79, .61, and .71 respectively (Bish et al., 2000). Alpha coefficients for the present study were .70, .51 and .79 for perceived susceptibility, perceived severity and perceived benefits respectively.

Pap Test and Self-Sampling Opinions Questionnaire. The Pap Test and Self-Sampling Opinions Questionnaire assessed perceived barriers of the two screening measures. Barriers associated with both Pap tests and self-sampling was assessed using 7-point Likert scales. For the items, participants were asked to indicate whether they

“strongly disagree” or “strongly agree” with the statement in reference to both Pap tests and self-sampling. Participants therefore produced one response for Pap testing and one response for self-sampling for 11 items out of the 14 items included in the scale. The other three items pertained only to self-sampling.

The questions only applicable to self-sampling asked participants whether they would be fearful that they would do self-sampling properly, whether they would be concerned about losing the benefit of seeing a physician if they participated in only self-sampling, and a positively worded item asking participants to indicate whether self-sampling would allow them to feel as though they would have more control over their health. These questions were developed based on barriers to self-sampling acknowledged in the literature (Barata et al., 2008; Dannecker et al., 2007; Stewart et al., 2007).

Hennig and Knowles (1990) identified time, embarrassment, forgetting, fear of the results, discomfort of the exam and indignity of the exam as possible barriers to Pap testing. Additionally, Grunfeld (1997) also suggested that both physical and psychological discomfort as likely barriers to underscreened women in Canada. The 11 items assessing barriers of both Pap tests and self-sampling were therefore derived from these studies. An example barrier question would be “this type of screening would be embarrassing for me”, and participants would indicate how much they agreed or disagreed with the statement for both Pap tests and self-sampling for these 11 items (see Appendix J). Internal reliabilities for the Pap test barriers ($\alpha = .86$) and the self-sampling barriers ($\alpha = .80$) were found to be acceptable in the present study.

Past Screening Behaviours and Screening Choices Questionnaire. Participants were asked whether they have participated in self-sampling as well as whether they have

ever had a Pap test (both with Yes or No response options) (Appendix L). If participants had had a Pap test, they were asked when their last Pap test was, how often they get a Pap test, and the total number of Pap tests they have had. Information from this questionnaire was used in the present study to describe the sample being used. For the assessment of screening choice, participants were asked whether they would choose a Pap test, self-sampling or neither as a screening option for cervical cancer. Following the screening choice question, participants were asked to rate the certainty of their response on a 7-point Likert scale from “very uncertain” to “very certain”.

Lifestyle and Health Behaviours Questionnaire. In this questionnaire (Appendix M), participants were asked a number of questions including questions about their age, their relationship status, sexual behaviour history, HPV vaccine opinions, birth control choices and smoking behaviours. Information from this questionnaire was primarily used in the present study to describe the sample being used.

Procedure

Two hundred and seventy undergraduate female students were recruited in January and February 2009 through the online Carleton University participant pool (SONA). Participants were tested in classrooms on the university campus and were given grade-raising credit (1%) for participation in the study. Of the 270 participants, 6 cases were spoiled due to the participants skipping integral sections of the study (e.g., pages of questionnaires, not responding to the dependent variable question). When participants entered the classroom or office they were asked to fill out the consent form (Appendix B) before receiving the questionnaire booklet.

The questionnaires and information presented in the study, discussed in the materials section, were presented in questionnaire booklets. The study consisted of three parts: part A, part B and part C. Part A included the Experience in Close Relationships Questionnaire, the Big Five Inventory, the Relationship Questionnaire and the information about Cervical Cancer and Cervical Cancer Screening. The presentation of information for Pap test and self-sampling was counterbalanced to prevent an order effect as much as possible. Half of the participants read information about the Pap test first, and the other half of the participants read information about self-sampling first. Following the completion of this section, participants returned the booklet to the researcher, and received Part B, the Cervical Cancer and Cervical Cancer Knowledge-Check. Following the completion of Part B, participants received Part C, the last questionnaire booklet which included the Cervical Cancer Beliefs Questionnaire, the Pap test and Self-Sampling Opinions Questionnaire, the Past Screening and Screening Choice Questionnaire, and the Lifestyle and Health Behaviours Questionnaire. The format of the study was explained to participants on the booklet title page for Part A (Appendix D).

Following the completion of the questionnaire booklet, participants were debriefed. The debriefing form (see Appendix C) explained the purpose of the study and provided sources for further information about cervical cancer, the human papillomavirus, Pap testing and self-sampling, as well as resources in case participants had concerns about their sexual health. Participants were also provided with an answer sheet that provided them with the correct answers from the eight-question knowledge-check (Appendix N).

Results

Preliminary Analyses

Prior to conducting the main analyses, the data were screened for missing data, normality and outliers. The variables included in this assessment were the attachment dimensions (avoidance and anxiety), the big five personality factors (openness, conscientiousness, neuroticism, agreeableness, extraversion), and the health belief model components (perceived susceptibility, perceived severity, perceived Pap benefits, perceived Pap barriers, perceived self-sampling barriers). A Little's MCAR test was used as a part of the Missing Value Analysis. The statistic for this test, $\chi^2(44) = 44.11, p = .467$, indicated that the data met the statistical criteria for missing completely at random. It was also a consideration that much of the missing data was *missing by design*, a term used to describe missing data due to the design of the study (questionnaires were reprinted due to participants skipping questions because of tightly-spaced text). This issue was alleviated when questionnaires were spaced properly and reprinted. The lack of responses for these cases was believed to be unrelated to the scale items. This form of missing data is considered to fall under the umbrella of missing completely at random (Acock, 2005).

The form of substitution for the missing data was *valid mean substitution*, a method recommended specifically for items on scale scores (Raaijmakers, 1999), which was the source of all the missing values in the dataset. For each case that was missing a scale score, the intraindividual mean of all non-missing items of the scale was calculated and replaced the missing values of the items on the scale. New scores were then calculated for each of the cases with missing total scale scores. Normality was assessed using box plots, skew ratios and Q-Q plots. The calculation of skew ratios for the

variables revealed that the personality variable agreeableness had a negative skew (skew ratio = -3.32). This could have been the result of individuals being likely to identify themselves as highly agreeable. Agreeableness was further assessed for outliers before a transformation was considered. One outlier (z score > 3) was identified for agreeableness. The value of this outlier was changed and maintained relative rank in the dataset, a method recommended by Tabachnick and Fidell (2007). A reassessment of this variable using skew ratios revealed that following the bringing of the outlier within range, the variable remained negatively skewed. Following a reflection and square root transformation of this variable, the skewness of the agreeableness variable was greatly improved (skew ratio = .86).

No other variables revealed considerable skew or notable deviations from normality. Outliers were identified for the variables extraversion and perceived susceptibility (z scores >3). These outliers were brought within range and maintained relative rank in the dataset. Following these changes, no further outliers for the variables were identified. Mahalanobis distance was used to determine whether multivariate outliers were present. The largest Mahalanobis distance among all cases was 30.19, which did not exceed the critical value of $\chi^2(12) = 32.91$, $p = .001$, and therefore no multivariate outliers were identified in the dataset.

Examining Possible Order Effects in Presentation of Screening Methods

In the first part of the study, participants were to read information about both Pap tests and self-sampling. The presentation of the two topics was counterbalanced to prevent an order effect in the study. The effect of the order of presentation was investigated prior to conducting the main analyses. Independent t-tests were used to

determine whether the group that received information about the Pap test first differed significantly from the group which received information about self-sampling first. A Bonferroni correction was used due to the large number of tests being conducted (12). The new critical alpha level was determined to be .004. The t-tests revealed that the groups did not differ across the attachment dimensions, the big five personality factors or the health belief model components ($p > .05$). Further, a chi-square goodness of fit test was used to determine whether a relationship between the order of screening method presentation and participants' screening choice (one of the dependent variables) was present. There was no relationship found between screening choice and the order of screening method presentation, $\chi^2(2) = .203, p = .903$.

Participants' Knowledge of Cervical Cancer and Cervical Screening

After the participants read information about cervical cancer and cervical cancer screening, their knowledge of these topics was tested with 8 multiple choice questions. The knowledge quiz was given to ensure that participants read and understood the material presented. The scores on the knowledge quiz ranged from 1 to 8 with a mean of 4.96 ($SD = 1.54$). The knowledge variable did not significantly correlate with the attachment dimensions, personality factors or health belief components. Only 14 participants (5.4%) scored 2 or less on the quiz; the majority of subjects (94.6%) had a score of 3 or more. Differences between the two groups on the primary variables (attachment, personality and health beliefs) were tested with the Mann-Whitney U-test, a nonparametric method recommended when group sizes are small and distributions are not normally distributed (Ruxton, 2006). No differences between the groups were found ($p > .05$).

Screening Choice: Investigating Participants who chose "Neither"

In the third part of the study, participants were to indicate whether they would choose the Pap test, self-sampling or neither option for their primary cervical cancer screening method. In the study, 204 of the participants (77.3% of the total sample) indicated they would choose the Pap test, 55 of the participants indicated that they would choose self-sampling (20.8% of the total sample), and 5 participants (1.9% of the total sample) indicated they would not participate in either screening method. Differences between these 5 women and the remainder of the sample (women who indicated a cervical cancer screening method choice) were investigated using a Mann-Whitney U-test. Due to the large number of comparisons being made (12), a Bonferroni correction was again applied to help avoid the occurrence of alpha error. The new critical alpha level was determined to be .004. Women who would choose a screening method were found to have significantly lower self-sampling barriers than those women who did not choose a screening method, $U = 121.5, p = .002, M = 3.38, SD = 1.02$ vs. $M = 4.90, SD = .53$. Though not significant following the application of the Bonferroni correction, the women who would not choose a screening method had higher scores than women who would choose a screening method on avoidance ($M = 4.16, SD = .44$ vs. $M = 3.29, SD = .89, U = 246.5, p = .018$), anxiety ($M = 4.91, SD = .69$ vs. $M = 3.86, SD = .105, U = 252, p = .019$) and Pap test barriers ($M = 4.91, SD = .69$ vs. $M = 3.86, SD = .105, U = 223, p = .012$).

These statistical tests reveal that the women who would not choose the Pap test or self-sampling as potential cervical cancer screening methods may in fact be a unique group of women. These women appear to have higher barriers to cervical cancer

screening and they also may have higher attachment avoidance and higher attachment anxiety. Further, none of the 5 women in this group had undergone a Pap test prior to completing the study. The purpose of the present study was to investigate psychological factors associated with Pap test and self-sampling choice, and therefore the small group of women ($n = 5$) who would not choose either screening method were excluded from subsequent analyses.

In further understanding participants' attitudes toward cervical screening choice, a Mann-Whitney U-test was used to examine differences in screening choice certainty among those participants who chose the Pap test compared to those who chose self-sampling, as measured with a 7-point Likert scale ranging from (1) very uncertain to (7) very certain. A significant mean difference between the groups was found ($U = 3870.5$, $p = .001$) indicating that participants who chose the Pap test were more certain of their choice compared to participants who chose self-sampling ($M = 5.97$, $SD = 1.25$ vs. $M = 5.43$, $SD = 1.25$).

The Sample

The sample used for the main analyses included 259 participants who ranged in age from 17 to 45 years ($M = 20.31$, $SD = 3.82$). Approximately half of the sample of women (51.7%) reported having had a Pap test and 2 participants (.8%) reported having participated in self-sampling prior to completing the study. Pap test compliance reported in the present study was similar to the rates reported for this age group according to Statistics Canada data (Lee et al., 1998). Sixteen participants (6.2%) reported having had an abnormal Pap test. All of these women indicated they would choose the Pap test given the option between the Pap test and self-sampling. The majority (70.3%) of the

participants had engaged in sexual intercourse and 54.8% reported being sexually active. Sexual behaviours of the sample in present study are also in line with figures from Statistics Canada reports (Roterman, 2008)².

Descriptive Statistics and Correlations

Descriptive statistics are reported in Table 1 for the main variables of interest: the attachment dimensions, the big five personality factors, and the health belief model components for the 259 participants included in the analyses. Correlations were also calculated for the variables (see Table 2). A moderate positive correlation was found between neuroticism and attachment anxiety. This correlation has been found in past literature regarding personality and the attachment dimensions (e.g. Nofhle & Shaver, 2006; Shaver & Brennan, 1992). Though this relationship was moderate ($r = .595, p < .001$), it did not approach multicollinearity ($r = .8 - .9$), and therefore is not of major concern. Pap test barriers and self-sampling barriers were also highly correlated ($r = .660, p < .001$). Women who score high on Pap test barriers also have high self-sampling barriers. A weak-moderate correlation was also found between attachment anxiety and attachment avoidance ($r = .317, p < .001$), thereby indicating that the two attachment dimensions are related.

² A separate analysis of the sexual behaviour questions and past Pap test information was presented in March 2009 at the Annual Convention for la Société Québécoise pour la Recherche en Psychologie in Ottawa. A hierarchical logistic regression was used to analyze the influence of health beliefs on screening choice above and beyond that of sexual behaviour variables (sexual intercourse and currently sexual active) and past Pap test participation. Results of the analysis revealed that before health belief components were included in the model, past Pap test participation predicted Pap test choice. When the health beliefs were included in the model, self-sampling barriers predicted Pap test choice and Pap test barriers predicted self-sampling choice. Past Pap test participation was no longer a significant predictor in the model.

Table 1

*Descriptive Statistics of Attachment Dimensions, Personality Factors and Health Belief**Model Components*

Variable	Mean (SD)	Minimum	Maximum
Attachment			
Attachment Avoidance	3.29 (.89)	1.33	5.72
Attachment Anxiety	3.86 (1.05)	1.00	6.56
Big Five Personality			
Extraversion	3.55 (.74)	1.60	5.00
Agreeableness	3.85 (.59)	2.20	5.00
Conscientiousness	3.63 (.66)	1.78	5.00
Neuroticism	3.05 (.83)	1.00	4.88
Openness	3.61 (.61)	1.90	5.00
Health Belief Model			
Perceived Susceptibility	3.06 (.94)	1.00	5.82
Perceived Severity	5.00 (1.07)	2.40	7.00
Perceived Pap Test Benefits	5.09 (1.18)	2.33	7.00
Pap Test Barriers	3.38 (1.02)	1.29	6.21
Self-Sampling Barriers	3.46 (1.35)	1.00	6.55

Table 2
Intercorrelations among Attachment Dimensions, Personality Factors and Health Belief Model Components

Variable	1	2	3	4	5	6	7	8	9	10	11
1. avoid											
2. anxiety	.317**										
3. extra	-.336**	-.202**									
4. agree	-.388**	-.248**	.210**								
5. consci	-.318**	-.238**	.217**	.288**							
6. neurot	.281**	.595**	-.200**	-.390**	-.163						
7. open	-.006	-.072	.126*	-.002	.113	.000					
8. psuscept	-.109	.037	.133*	-.168**	-.080	.063	-.044				
9. pseverity	.026	.279**	.000	-.072	-.110	.279**	-.076	-.146*			
10. pbenefits	-.157*	.00	.032	.237**	.055	.010	-.036	-.174**	.518**		
11. ssbarriers	.096	.259**	-.207**	-.085	-.272**	.134*	-.195**	.008	.120	-.064	
12. papbarriers	.256**	.269**	-.252**	-.207**	-.331**	.175**	-.134*	-.113	.119	-.128	.660**

Note. avoid = Attachment Avoidance, anxiety = Attachment Anxiety (Experience in Close Relationships; Brennan, Clark, & Shaver, 1998), extra = Extraversion, agree = Agreeableness, consci = Conscientiousness, neurot = Neuroticism, Open = Openness (Big Five Factor Inventory; John, Donahue, & Kentle, 1991), psuscept = Perceived Susceptibility, pseverity = Perceived Severity, pbenefits = Perceived Benefits (Bish et al., 2000), ssbarriers = Self-Sampling barriers, papbarriers = Pap test barriers

** $p < .01$. * $p < .05$.

Screening Choice: The Influence of Attachment, Personality and Health Beliefs

A hierarchical logistic regression was performed to investigate the influence of attachment, personality and health beliefs on screening method choice. A hierarchical method was used in order to determine the influence of health beliefs above and beyond the more stable traits such as personality (Costa & McCrae, 1992) and attachment (Zimmerman & Becker-Stoll, 2002; Waters et al., 2000). For the purpose of the present investigation, the attachment dimensions (as measured by the ECR) were entered into the first block of the model due to the strong theoretical link between attachment and health care seeking (e.g. Ciechanowski, et al., 2002; Hunter & Maunder, 2001; Noyes et al., 2003; Scharfe & Eldredge, 2001), which is of primary interest in the present study. Block two and block three, which will be discussed later on, then included the addition of the personality variables and health belief model components respectively. Therefore, what will be described as the final model in subsequent sections refers to block three of the regression, which includes all variables under investigation.

The screening choice of self-sampling was used as the reference category. Predictors with a significant odds ratio greater than one were therefore positively predictive of self-sampling choice. That is, high scores on these variables would indicate an association between the variable and self-sampling choice. Predictors with a significant odds ratio less than one would indicate the variable was negatively predictive of self-sampling choice; lower scores on the variable would be associated with self-sampling choice (and in turn, higher scores on the variable would be associated with Pap test choice).

Block One: Attachment and Screening Choice. The first block of the regression, which included attachment anxiety and attachment avoidance, was found to be significant, $\chi^2(2) = 6.70, p = .035$. The Nagelkerke R^2 value of .04 indicates that attachment dimensions explain approximately 4% of the variance in prospective screening choice. Further examination of the predictor variables in the logistic regression indicated that avoidance ($p = .019$) was the only significant predictor among the two attachment dimensions (see Table 3). Those individuals who would choose self-sampling as their primary form of cervical cancer screening were more likely to have high attachment avoidance scores than individuals who would choose the Pap test (OR = 1.52; 95% C.I. = 1.07, 2.15).

Table 3

Logistic Regression of Attachment Dimensions on Screening Method Choice

Predictor	B	S.E.	Wald's χ^2	df	p	OR (95% C.I.)
Avoidance	.417	.178	5.464	1	.019	1.52 (1.07 – 2.15)
Anxiety	.053	.157	.112	1	.738	1.054 (.775 – 1.434)
Constant	-2.93	.757	14.97	1	.000	.053

Block Two: Attachment, Personality and Screening Choice. The big five personality factors were entered into the model in block two. It should be noted that logistic regression does not make any assumptions about the distribution of the variables in the equation (Peng, Lee, & Ingersoll, 2002). Therefore, for this analysis, the untransformed agreeableness variable was used. Block two of the regression, which included only the big five personality factors, was also found to be significant, $\chi^2(5) =$

11.73, $p = .039$. Personality factors therefore explained variance in screening choice above and beyond the attachment dimensions. The model, which included both the attachment dimensions and the big five personality factors, was also found to be significant, $\chi^2(7) = 18.43$, $p = .010$. The Nagelkerke R^2 value of .107 indicates that when the attachment dimensions and the personality factors were included as predictors in the logistic regression, the model had a better fit than when only the attachment dimensions were included. A Nagelkerke R^2 value of .20 would indicate a model with a good fit (Nagelkerke, 1991), and therefore, the present model's R^2 value of .107 is considered relatively low and reflects that much of the group membership is not predicted by only the attachment dimensions and the personality factors.

It was hypothesized that openness to experience would be positively predictive of self-sampling choice. This hypothesis was not supported; openness to experience was a nonsignificant predictor in the model, Wald's $\chi^2(1) = 1.024$, $p = .312$.

Conscientiousness was found to be the only significant predictor in the model, indicating that individuals who would choose self-sampling were more likely to have lower scores on conscientiousness than individuals who would choose the Pap test (OR = .55; 95% C.I. = .33,.92). This indicates that once the personality variables were included in the logistic regression model, attachment avoidance was no longer a significant predictor of screening method choice, Wald's $\chi^2(1) = .937$, $p = .333$. Results of the logistic regression for block one and block two are presented in Table 4.

Final Model: Attachment, Personality, Health Beliefs and Screening Choice. The third hypothesis of the present study was that Pap test barriers would be positively predictive of self-sampling choice and self-sampling barriers would be positively

predictive of Pap test choice. In order to test this hypothesis, the health belief model components including Pap barriers, self-sampling barriers, perceived susceptibility to cervical cancer, perceived severity of cervical cancer and perceived Pap benefits were added to the hierarchical logistic regression described above. It should be noted that logistic regression requires an observation-to-predictor ratio of 10 to 1 (Peng et al., 2002), a requirement which is far exceeded in the present study ($N = 259$). As noted previously, results of the final hierarchical regression correspond to the model when all three sets of variables are included in the model.

Table 4

Hierarchical Logistic Regression of Attachment and Personality on Screening Method Choice

	B	SE	Wald	df	p	Odds Ratio (95% C.I.)
Block 1						
Attachment Avoidance	.417	.178	5.464	1	.019	1.52 (1.07 – 2.15)
Attachment Anxiety	.053	.157	.112	1	.738	1.054 (.775 – 1.434)
Constant	-2.93	.757	14.97	1	.000	.053
Block 2						
Attachment Avoidance	.200	.207	.937	1	.333	1.22 (.815 – 1.832)
Attachment Anxiety	.135	.200	.454	1	.500	1.144 (.773 – 1.693)
Extraversion	-.333	.225	2.19	1	.139	.717 (.461 – 1.11)
Agreeableness	-.233	.304	.586	1	.444	.792 (.436 – 1.44)
Conscientiousness	-.594	.259	5.277	1	.022	.552 (.333 – .92)
Neuroticism	-.360	.258	1.95	1	.163	.698 (.421 – 1.16)
Openness	.273	.27	1.024	1	.312	1.314 (.77 – 2.23)
Constant	1.74	2.31	.566	1	.452	5.698

Results of the final hierarchical regression indicate that the health belief model components contributed significantly to the already existing model, which included the attachment dimensions and personality factors, $\chi^2(5) = 95.15, p < .001$. The significant value associated with block three indicates that the health belief model components explain variance in screening method choice above and beyond that of the attachment dimensions and personality factors. Overall, the final model was also significant, $\chi^2(12) = 113.58, p < .001$, indicating that when all three sets of variables — attachment, personality and health beliefs — are included in a model, screening method choice could be predicted. The Nagelkerke R^2 of .551 indicated that the final model was much stronger than the previous models in predicting classification of screening method choice. This figure also indicates that when the health belief model components were added, the model had a good fit (Nagelkerke, 1991), and therefore predictors of the model were able to predict group membership for screening method choice well.

The predictors of the final model and corresponding statistics are presented in Table 5. Similar to the previous model produced (attachment and personality variable included only), individuals who would choose self-sampling as their primary form of cervical cancer screening were more likely to be low on conscientiousness than individuals who would choose the Pap test (OR = .456; 95% CI = .22, .94). In terms of the health belief model components, the only significant predictors were Pap test barriers and self-sampling barriers. As hypothesized, individuals who would choose self-sampling as their primary method of cervical cancer screening were more likely to have scored highly on Pap test barriers (OR = 7.93; 95% CI = 4.38, 14.35). Also supporting hypothesis two, high self-sampling barriers were negatively associated with self-sampling

choice, which, in turn indicated Pap test choice (OR = .162; 95% CI = .08, .32). No other predictors were found to be significant in the model.

Interestingly, the personality variable neuroticism began to approach significance in the final model, Wald's $\chi^2(1) = 3.28, p = .070$. Individuals who were more likely to choose self-sampling were more likely to have lower neuroticism scores, (OR = .542; 95% CI = .28; 1.05). This odds ratio should be interpreted with caution due to the fact that this finding was only approaching significance ($p = .070$). Further, neuroticism was not significant in block two of the model. Instead, it only approached significance when the health belief model components were added to the model, thereby indicating that suppression of the variable may be a factor in the previous block. It should also be noted that neuroticism was not found to be a significant predictor in the preceding model or in the previous block, and therefore, it remains unclear whether neuroticism contributes to the prediction of group membership for screening choice.

Table 5

Final Hierarchical Logistic Regression Model of Attachment, Personality and Health Beliefs on Screening Method Choice

	B	SE	Wald's χ^2	df	p	Odds Ratio (95% C.I.)
Attachment Avoidance	-.051	.282	.033	1	.856	.960 (.55-1.65)
Attachment Anxiety	.091	.274	.109	1	.741	1.095 (.64 – 1.87)
Extraversion	-.282	.298	.890	1	.345	.755 (.42 – 1.354)
Agreeableness	.024	.421	.003	1	.954	1.024 (.449 – 2.336)
Conscientiousness	-.784	.366	4.59	1	.032	.456 (.223 - .935)
Neuroticism	-.613	.339	3.28	1	.070	.542 (.279 – 1.052)
Openness	.433	.374	1.34	1	.246	1.542 (.741 – 3.206)
Perceived Susceptibility	-.173	.271	.410	1	.522	.841 (.495 – 1.43)
Perceived Severity	.131	.268	.240	1	.624	1.14 (.675 – 1.927)
Perceived Pap Benefits	.232	.247	.878	1	.349	1.261 (.776 – 2.047)
Perceived Pap Barriers	2.07	.303	46.692	1	<.001	7.925 (4.377 – 14.35)
Perceived Self-Sampling Barriers	-1.822	.348	27.406	1	<.001	.162 (.082 - .32)
Constant	-.610	3.982	.023	1	.878	

Attachment Style and Screening Choice. In addition to the Experience in Close Relationships Scale, another attachment questionnaire, the Relationship Questionnaire, was administered to the participants. This scale provides a categorical measure of attachment among the four attachment styles described by Bartholomew and Horowitz (1991) – secure, preoccupied, fearful and dismissive. Casewise deletion for the following analyses excluded five participants who did not respond to the RQ. Among the 254 participants included in the analysis, 106 (41.7%) were securely attached, 73 (28.7%) had a fearful attachment style, 37 (14.6%) had preoccupied attachment style, and 38 (15%) had a dismissive attachment style. A chi-square goodness-of-fit test, conducted to investigate whether there was a relationship between attachment style and screening choice, indicated the two variables were not related, $\chi^2(3) = 3.95, p = .267$.

Pap Test Barriers: Attachment, Personality and Health Beliefs

In order to investigate the influence of attachment, personality, and health beliefs on perceived Pap test barriers, a hierarchical multiple linear regression was conducted. Predictor variables were centered prior to conducting the analysis, as recommended for multiple linear regression (Aiken & West, 2001). Centering also alleviates the issue of multicollinearity among predictors (Aiken & West, 2001), which was not of concern in present analysis; variance inflation factor and tolerance values were acceptable. Regression assumptions of homogeneity of variance, independence, and linearity were assessed using studentized residuals and predicted values. All assumptions were met and no outliers or influential cases for the analysis were identified. The transformed agreeableness variable (reflect and square root) was used for the analysis in order to

satisfy the assumption of normality for the predictor variables. The assumption of normality was met for the other predictor variables.

Block One: Attachment and Pap Test Barriers. In the first block of the hierarchical multiple linear regression, the attachment dimensions (avoidance and anxiety) were entered into the model. The relationship between attachment and cervical cancer screening was of particular interest in the present study, and therefore these variables were entered into the equation first. This block was found to be significant, $F(2, 256) = 14.98, p < .001$. The attachment variables explained 9.8% of the variance in Pap test barriers ($adjusted R^2 = .098, R^2 = .105, R = .324$). Both attachment avoidance and attachment anxiety were found to be significant predictors of Pap test barriers in this block of the model. Attachment avoidance was found to be positively predictive of Pap test barriers, ($\beta = .189, t(257) = 3.04, p = .003$). Attachment anxiety was also found to be positively predictive of Pap test barriers in the first block, ($\beta = .209, t(257) = 3.36, p = .001$). High scores on both attachment anxiety and avoidance were predictive of higher Pap test barriers.

Block Two: Attachment, Personality and Pap Test Barriers. In the second block of the regression, the big five personality factors were introduced to the model. Similar to attachment, personality is a relatively stable trait throughout one's life (Costa & McCrae, 1992), and therefore the five factors were considered before assessing the health belief model. The regression with both the attachment dimensions and the personality factors was also found to be predictive of Pap test barriers, $F(7, 251) = 8.22, p < .001$. The addition of the big five personality factors contributed to a significant increase in the amount of variance explained in Pap test barriers, $F_{ch}(2, 251) = 5.04, p < .001$. The

attachment variables and the big five personality factors explained 16.4% of the variance in Pap test barriers (*adjusted R*² = .164, *R*² = .186, *R* = .432), with the personality factors improving explained variance by 8.2% (*R*²_{ch} = .082).

Attachment avoidance was no longer significant in this model, $\beta = .076$, $t(257) = 1.13$, $p = .258$. Neuroticism ($\beta = -.028$, $t(257) = -.374$, $p = .166$), openness ($\beta = -.080$, $t(257) = -1.388$, $p = .166$), and agreeableness ($\beta = .056$, $t(257) = .848$, $p = .397$) were also non-significant predictors in the model. Attachment anxiety did remain a significant predictor of Pap test barriers in this model ($\beta = .164$, $t(257) = 2.234$, $p = .026$), with increases in attachment anxiety being predictive of increases in Pap test barriers. Additionally, personality factors extraversion ($\beta = -.130$, $t(257) = -2.108$, $p = .036$) and conscientiousness ($\beta = -.219$, $t(257) = -3.502$, $p = .001$) were found to be negatively predictive of Pap test barriers. Therefore, higher scores on these personality factors were found to be predictive of lower Pap test barriers.

Final Model: Attachment, Personality and Health Beliefs. Finally, in the third block, the health belief model components were added to the regression analysis. The final regression, which included the attachment dimensions, the personality factors, and the health belief model components, was found to be significant, $F(10, 248) = 7.29$, $p < .001$. The addition of the health belief model components contributed to a significant increase in amount of variance explained in Pap test barriers, $F_{ch}(3, 248) = 4.36$, $p = .005$. The model with all variables included explained 19.6% of the variance in barriers (*adjusted R*² = .196, *R*² = .227, *R* = .477), with the health belief model components improving explained variance by 4.1% (*R*²_{ch} = .041).

Attachment anxiety, conscientiousness, perceived susceptibility and perceived Pap test benefits were found to be the only significant predictors in the model when all 10 predictors were included in the analysis (refer to Table 6 for corresponding statistics). Among the four significant predictors, conscientiousness had the largest influence on Pap test barriers ($\beta = -.459, t(257) = -3.63, p < .001$) followed by perceived Pap test benefits ($\beta = -.215, t(257) = -2.676, p = .008$), perceived susceptibility to cervical cancer ($\beta = -.204, t(257) = -2.406, p = .017$), and attachment anxiety ($\beta = .186, t(257) = 1.981, p = .049$). As per the trend in the previous blocks, attachment anxiety was positively predictive of Pap test barriers. The other three variables – conscientiousness, perceived susceptibility to cervical cancer, and perceived Pap test benefits – were negatively predictive of Pap test barriers; respective increases in the three variables were found to be associated with lower Pap test barriers.

Table 6

*Final Hierarchical Multiple Linear Regression of Attachment, Personality and Health**Beliefs on Pap Test Barriers*

	B	SE	β	<i>t</i>	df	<i>p</i>
Attachment Avoidance	-.084	.101	.055	.834	257	.405
Attachment Anxiety	.186	.094	.144	1.981	257	.049
Extraversion	-.214	.113	-.117	-1.896	257	.059
Conscientiousness	-.459	.127	-.224	-3.63	257	<.001
Neuroticism	-.046	.122	-.028	-.375	257	.708
Openness	-.192	.127	-.086	1.511	257	.132
Agreeableness (rflctSQRT)	.279	.460	.041	.605	257	.545
Perceived Susceptibility	-.204	.085	-.142	-2.406	257	.017
Perceived Severity	.161	.091	.128	1.778	257	.077
Perceived Pap Benefits	-.215	.080	-.187	-2.676	257	.008
Constant	-.610	3.982	.023	45.87		.000

Self-Sampling Barriers: Attachment, Personality and Health Beliefs

A hierarchical multiple linear regression was used to assess the influence of attachment, personality and health beliefs on self-sampling barriers. The centered predictor variables were used in the analysis, and the square root transformation of the agreeableness personality factor was also used to meet the assumption of normality for predictors. The assumption of normality was met for all other untransformed predictors. Regression assumptions of homogeneity of variance, independence and linearity were met as assessed with studentized residuals and predicted values. No outliers or influential cases were identified in the model.

Block One: Attachment and Self-Sampling Barriers. In the first block of the regression, the attachment variables were entered into the model. As noted previously, these variables were of paramount interest in the present investigation and therefore were considered in the model before the other predictors. The block with only the attachment variables was found to be significantly predictive of self-sampling barriers, $F(2, 256) = 9.23, p < .001$. The variables explained 6.0% of the variance in self-sampling barriers (*adjusted* $R^2 = .060, R^2 = .067, R = .259$), suggesting that this model, with only two predictor variables, had a relatively poor fit. In assessing the individual attachment variables, only attachment anxiety was found to be a significant predictor of self-sampling barriers ($\beta = .254, t(257) = 4.00, p < .001$). Attachment anxiety was found to be positively predictive of self-sampling barriers meaning that high attachment anxiety scores were associated with high self-sampling barrier scores. Attachment avoidance was a non-significant predictor in this model ($\beta = .015, t(257) = .234, p = .815$).

Block Two: Attachment Style, Personality and Self-Sampling Barriers. In the second block of the model, the big five personality factors were added to the model. The model with both the attachment dimensions and the personality factors was found to be predictive of self-sampling barriers, $F(2, 256) = 6.59, p < .001$. The addition of the big five personality factors significantly improved the explained variance of the model, $F_{ch}(2, 251) = 5.22, p < .001$. These variables explained an additional 8.8% of the variance in self-sampling barriers ($R^2_{ch} = .088$), and the overall model, including the attachment and personality variables, explained 13.2% of the variance in self-sampling barriers (*adjusted* $R^2 = .132, R^2 = .155, R = .394$).

The strongest predictor of the model was attachment anxiety ($\beta = .217, t(257) = 2.905, p = .004$) followed by conscientiousness ($\beta = -.206, t(257) = -3.241, p = .001$), openness ($\beta = -.140, t(257) = -2.378, p = .018$), and extraversion ($\beta = -.133, t(257) = -2.11, p = .036$). Attachment anxiety remained positively predictive of self-sampling barriers in this block of the model. The three significant personality factors (conscientiousness, openness and extraversion) were all negatively predictive of self-sampling; increases in these factors are therefore associated with decreases in self-sampling barriers. Non-significant predictors in the model were attachment avoidance ($\beta = -.071, t(257) = -1.046, p = .296$), neuroticism ($\beta = -.031, t(257) = -.403, p = .688$), and agreeableness ($\beta = -.011, t(257) = -.157, p = .876$).

Final Model: Attachment, Personality, Health Beliefs and Self-Sampling Barriers. The health belief model components were added to the model in the third and final block. This final model was found to be significantly predictive of self-sampling barriers, $F(10, 248) = 5.04, p < .001$. However, the addition of the health belief model components did

not help explain additional variance in self-sampling barriers ($F_{ch}(3, 248) = 1.36, p = .254, R^2_{ch} = .014$). Though the model was not improved significantly by the health belief model components, the final model explained 13.5% of variance in self-sampling barriers (*adjusted* $R^2 = .135, R^2 = .169, R = .411$). Conscientiousness was found to be the strongest predictor of self-sampling barriers in the final model ($\beta = -.201, t(257) = -3.144, p = .002$), followed by attachment anxiety ($\beta = .197, t(257) = 2.602, p = .010$), extraversion ($\beta = -.144, t(257) = -2.243, p = .026$), and openness ($\beta = -.137, t(257) = -2.315, p = .021$). Similar to the previous block of the model, attachment anxiety was found to be positively predictive of self-sampling barriers, and the three personality factors were found to be negatively predictive of self-sampling barriers. The other predictors were not significant in the final model (refer to Table 7 for corresponding statistics).

Table 7

Final Hierarchical Multiple Linear Regression of Attachment, Personality and Health Beliefs on Self-Sampling Barriers

	B	SE	β	t	df	p
Attachment Avoidance	-.088	.078	-.077	-1.125	257	.262
Attachment Anxiety	.191	.073	.197	2.602	257	.010
Extraversion	-.197	.088	-.144	-2.243	257	.026
Conscientiousness	-.310	.099	-.201	-3.144	257	.002
Neuroticism	-.047	.095	-.038	-.375	257	.624
Openness	-.229	.099	-.137	-2.315	257	.021
Agreeableness (rflctSQRT)	-.217	.359	-.043	-.604	257	.546
Perceived Susceptibility	.000	.066	.000	.002	257	.999
Perceived Severity	.114	.071	.120	1.608	257	.109
Perceived Pap Benefits	-.119	.063	-.138	-1.898	257	.059
Constant	3.381	.059		57.489		.000

Attachment Style and Barriers. To further investigate the impact of attachment style on cervical cancer screening barriers, a MANOVA was conducted with Pap test barriers and self-sampling barriers as the dependent variables and attachment style as the independent variable. Four categories of attachment style were used – secure, preoccupied, fearful and dismissive. The assumption of homogeneity of covariance was met, *Box's M* = 14.93, $p = .101$. Attachment style was found to have an impact on cervical cancer screening barriers, Wilk's $\lambda = .915$, $F(6,498) = 3.77$, $p = .001$, partial $\eta^2 = .043$. A Tukey's post-hoc test on each dependent variable indicated that for Pap test barriers, participants with a secure attachment style had lower barriers than participants with a fearful attachment style ($p = .011$) and participants with a preoccupied attachment style ($p = .030$). For self-sampling barriers, a significant mean difference was found between the secure attachment and preoccupied attachment styles ($p = .004$). Means for Pap test barriers and self-sampling barriers for each attachment style are reported in Table 8.

Table 8

Pap Test Barrier and Self-Sampling Barrier Scores across Attachment Style

	Attachment Style	Mean (SD)
Pap Barriers	Secure	3.10 (1.37) ^{a,b}
	Fearful (Insecure)	3.73 (1.25) ^a
	Preoccupied (Insecure)	3.80 (1.41) ^b
	Dismissive (Insecure)	3.73 (1.25)
Self-Sampling Barriers	Secure	3.20 (1.01) ^c
	Fearful (Insecure)	3.46 (.87)
	Preoccupied (Insecure)	3.86 (1.16) ^c
	Dismissive (Insecure)	3.36 (1.01)

Note. Symbols ^a, ^b and ^c denote significant mean differences.

The Relationship Questionnaire also includes a component in which participants rate themselves on 7-point Likert scales according to how similar they feel they are to the respective attachment style. To assess the relationship between attachment style ratings and Pap test barriers, correlations were conducted. Self-sampling barriers were negatively correlated with the secure attachment style ($r = -.150, p = .016$) and positively correlated with the fearful attachment style ($r = .124, p = .047$) and the preoccupied attachment style ($r = .168, p = .007$). Pap test barriers were negatively correlated with the secure attachment style ($r = -.274, p < .001$) and positively correlated with the fearful attachment style ($r = .165, p = .008$). The correlations between barriers and attachment style ratings are presented in Table 9.

Table 9

Intercorrelations among Barriers and Attachment Style Ratings

Variable	1	2	3	4	5	6
1. papbarriers						
2. ssbarriers	.660**					
3. secure	-.274**	-.251**				
4. preoccupied	-.102	-.205**	-.243**			
5. fearful	.165**	.124*	-.475**	.056		
6. dismissive	.050	-.050	-.111	-.223**	.037	

Note. ssbarriers = Self-sampling barriers, papbarriers = Pap test barriers, secure = secure attachment style rating, preoccupied = preoccupied attachment style rating, fearful = fearful attachment style rating, dismissive attachment style rating

** $p < .01$. * $p < .05$.

Investigating Conscientiousness as a Potential Moderator of the Relationship between Perceived Susceptibility and Barriers

To test the potential interaction of perceived susceptibility and conscientiousness in the prediction of screening barriers, two moderated linear regressions were performed (one for Pap test barriers and another for self-sampling barriers). In each regression, conscientiousness and perceived susceptibility were centered and entered into the first block of the model. A moderator effect variable was then created by multiplying the two variables together. This variable was then entered in the second block of the model. Assumptions of independence, normality, linearity and homogeneity were met, and no outliers or influential cases were found for both regression analyses. Multicollinearity was not suspected for either regression.

The final regression for Pap test barriers was found to be significant ($F(3, 255) = 12.74, p < .001$), and the model explained 12% of the variance in Pap test barriers (*adjusted* $R^2 = .120, R^2 = .130, R = .361$). However, the moderator effect did not contribute significantly to the model, $F_{ch}(1, 255) = .335, p = .563, R^2_{ch} = .001$. Corroborating the results of the previous multiple linear regression, both perceived susceptibility and conscientiousness were significant predictors of Pap test barriers. Conscientiousness was a stronger predictor ($\beta = -.342, t(257) = -5.845, p < .001$) than perceived susceptibility ($\beta = -.142, t(257) = -2.421, p = .016$). Both predictors were negatively predictive of Pap test barriers; higher conscientiousness and higher perceived susceptibility were each associated with lower Pap test barriers. As noted, the moderator effect was not significant in the model ($\beta = -.034, t(257) = -.579, p = .563$).

The final regression for self-sampling barriers was also found to be significant, ($F(3, 255) = 6.926, p < .001$), and the model explained 6.4% of the variance in self-sampling barriers (*adjusted* $R^2 = .064, R^2 = .075, R = .274$). The moderator effect did not, however, add to the explained variance in the model ($F_{ch}(1, 255) = .367, p = .545, R^2_{ch} = .001$). In the final model, conscientiousness was the only significant predictor ($\beta = -.273, t(257) = -4.517, p < .001$), and as with all previous analyses, conscientiousness was negatively predictive of self-sampling barriers. Perceived susceptibility ($\beta = -.011, t(257) = -.187, p = .852$) and the moderator effect ($\beta = .037, t(257) = .606, p = .545$) were found to be nonsignificant predictors in the model. Perceived susceptibility was unrelated to self-sampling barriers and it did not interact with conscientiousness.

Investigating Conscientiousness as a Potential Moderator of the Relationship between Perceived Severity and Barriers

The influence of an interaction between perceived severity and conscientiousness was tested using a moderated linear regression. An interaction between the two variables was of interest based on Wiebe and Christensen's (1997) finding that the high scores on both variables predicting lowered medical regimen adherence among dialysis patients. Perceived severity and conscientiousness were centered, and the values of the two variables were multiplied together in creating the moderator effect. Two regressions were conducted – one for Pap test barriers and another for self-sampling barriers. Perceived severity and conscientiousness were entered into block one of the model followed by the moderator effect, which was entered into block two of the model. Assumptions of independence, normality, linearity and homogeneity were met, and no outliers or influential cases were found for both regression analyses. Multicollinearity was not suspected for either regression.

The final regression for Pap test barriers was found to be significant ($F(3, 255) = 11.90, p < .001$), and the model explained 11.2% of the variance in Pap barriers (*adjusted* $R^2 = .112, R^2 = .123, R = .274$). The moderator effect did not explain a significant amount of variance in the final model, $F_{ch}(1, 255) = 1.75, p = .187, R^2_{ch} = .006$). In the final model, conscientiousness was the only significant predictor ($\beta = -.327, t(257) = -5.529, p < .001$). As with previous results, conscientiousness was predictive of lowered Pap test barriers. Perceived severity ($\beta = .086, t(257) = 1.462, p = .145$) and the moderator effect ($\beta = .078, t(257) = 1.324, p = .187$) were not significant predictors in

the final model. Perceived severity was not predictive of Pap test barriers and severity and conscientiousness did not interact in predicting Pap test barriers.

The influences of perceived severity, conscientiousness and a moderator effect of the two variables on self-sampling barriers were also tested in a linear regression. The final model was found to be significant ($F(3, 255) = 9.132, p < .001$), and the model explained 8.6% of variance in self-sampling barriers ($adjusted R^2 = .086, R^2 = .097, R = .311$). As with the previous models discussed, conscientiousness was found to be significantly negatively predictive of self-sampling barriers ($\beta = -.269, t(257) = -4.487, p < .001$). While perceived severity was not a significant predictor in the final model ($\beta = .095, t(257) = 1.59, p = .113$), the moderator effect was significant in the final model ($\beta = .122, t(257) = 2.051, p = .041$). The moderator effect explained a significant amount of variance in self-sampling barriers in the final model, $F_{ch}(1, 255) = 4.208, p = .041, R^2_{ch} = .015$.

For the follow-up simple slopes analysis, three categories of conscientiousness were used (low, medium, high). The values of these levels correspond to one standard deviation below (-.66), zero, and one standard deviation above the mean (.66) of the centered conscientiousness variable. The three levels of conscientiousness were plotted against perceived severity (see Figure 2). Low perceived severity corresponds to one standard deviation below the mean (-1.07) and high perceived severity corresponds to one standard deviation above the mean (1.07). The simple slopes analysis revealed that the slopes for low conscientiousness ($B = -.028, t = -0.38, p = .701$) and medium conscientiousness ($B = .09, t = 1.58, p = .116$) did not differ significantly from zero. The slope for high conscientiousness was found to differ significantly from zero ($b = .208, t =$

2.34, $p = .020$). For the high conscientiousness group of women, as perceived severity increased, self-sampling barriers also increased.

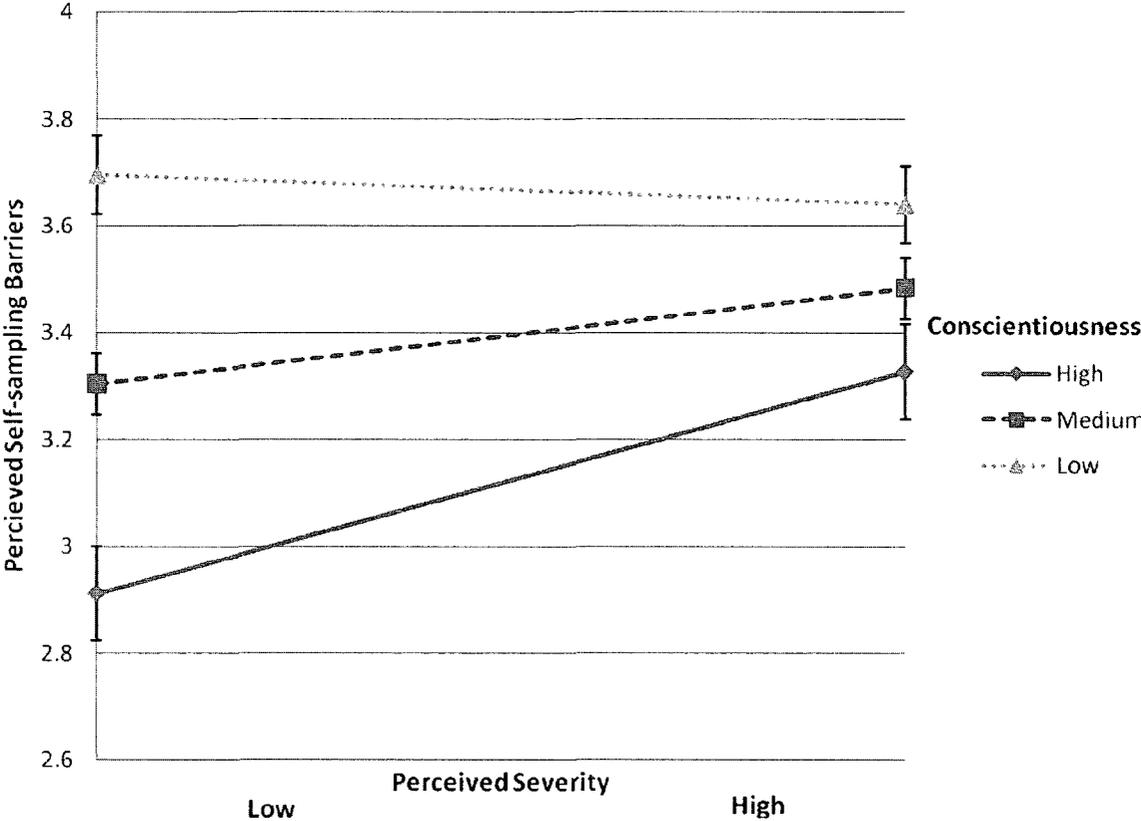


Figure 2. Moderator Effect of Conscientiousness in Perceived Severity Predicting Self-Sampling Barriers

Discussion

The present study provides insight into psychological factors associated with women's prospective cervical cancer screening method choices, specifically between the Pap test and the more novel screening method, self-sampling of HPV-DNA. Interestingly, the personality factor conscientiousness emerged as a strong predictor of Pap test choice, Pap test barriers and self-sampling barriers. Conscientiousness and perceived barriers were found to be strong predictors of screening method choice. Though attachment did not appear to strongly influence screening choice, attachment anxiety was positively predictive of both Pap test and self-sampling barriers. Further, screening barriers were found to be higher in individuals with the preoccupied and fearful attachment styles compared to individuals with the secure attachment style. This study provides evidence for the importance of health beliefs, attachment, and personality factors – most notably conscientiousness – in understanding women's cervical cancer screening choices and barriers.

Screening Choice

Results of the study indicated that among the undergraduate female population used, the majority of participants (77.3%) indicated that they would choose the Pap test for their cervical cancer screening method. Among the rest of the participants, 20.8% indicated they would choose self-sampling and 1.9% indicated they would not choose either method of screening. The low percentage of women that would choose self-sampling was a surprising figure given past research that has found the majority of women in their sample (65.6%) indicated that self-sampling was more acceptable than the Pap test (Dannecker et al., 2004). However, the study used primarily middle-aged

women ($M = 45$, $SD = 12.2$), and the participants also took their own HPV self-samples, which are likely factors involved in the difference between their results and the findings of the present study.

Other research has found a positive association among women's self-sampling acceptability and a high level of education and a higher income bracket (Dzuba et al., 2002; Stewart et al., 2007; Tisci et al., 2003). Given that the sample used was taken from an undergraduate university population, a higher percentage of women who would choose self-sampling was expected. Results also indicated that women who would choose the Pap test reported more certainty about their decision. Though the groups differed significantly on screening choice certainty, mean scores were high across both self-sampling ($M = 5.43$) and the Pap test ($M = 5.97$). Therefore, overall, it would appear that when women make a choice about their prospective cervical screening method, they are fairly certain about their decision.

An interesting and unexpected result was that five women in the study indicated they would not choose either method of cervical screening. These five women were found to have higher self-sampling barriers than women who would choose a screening method. Future research should attempt to understand psychosocial factors involved among women who have very high barriers to cervical cancer screening or do not choose to participate in cervical cancer screening. Exploration of their psychological characteristics and reasons for not undergoing cervical cancer screening will provide researchers with a greater understanding of more extreme psychosocial barriers.

The Role of Attachment in Screening Method Choice and Barriers

Contrary to hypothesis one, the present study found no association between attachment style (as measured by the RQ) and screening choice. However, when attachment avoidance and attachment anxiety (as measured by the ECR) were the only variables considered in predicting screening method choice, attachment avoidance was found to be associated with self-sampling. This finding, however, was not present in the final model (which included personality and health beliefs) and therefore the relationship between avoidance and self-sampling should be considered with caution. Conscientiousness and screening barriers were found to be the only significant predictors of screening method choice, findings which will be further discussed.

Attachment anxiety was found to be positively predictive of both self-sampling barriers and Pap test barriers, thereby suggesting that attachment anxiety is associated with cervical cancer screening barriers in general. Further supporting this finding, the insecure attachment styles theoretically linked to high attachment anxiety – fearful and preoccupied – were associated with higher Pap test barriers. The preoccupied attachment style had higher self-sampling barriers than the secure attachment style as well. Although the fearful attachment style did not have higher self-sampling barriers than the other attachment styles, the correlations among the barriers and the attachment style ratings (on 7-point Likert scales) revealed that fearful attachment ratings were positively correlated with both Pap test and self-sampling barriers. Therefore, although the categorical and Likert scale RQ results do not completely coincide, overall, the findings suggest attachment styles with high attachment anxiety (fearful and preoccupied) are associated with screening barriers.

Based on past research suggesting an association between the preoccupied attachment style and overuse of the health care system (Ciechanowski, et al., 2002), it would be expected that preoccupied individuals would have lower Pap test barriers in order to maintain a close relationship with the physicians. Results of the study suggest the contrary; the preoccupied and fearful attachment styles had higher Pap test barriers than the secure attachment style. While the reason for this relationship is not clear, it may again relate to the attachment anxiety – a characteristic of both the insecure attachment styles – which in turn was predictive of both Pap test barrier and self-sampling barriers.

A possible explanation for the finding may be related to the association between attachment anxiety and anxiety about sexual attractiveness and rejection (Hazan, Zeifman & Middleton, 1994), factors which may influence women's attitudes toward the Pap test. Attachment anxiety has also been positively linked to trait anxiety and low self-esteem (Feeney & Noller, 1990; Feeney & Ryan, 1994; Watson & Pennebaker, 1989), characteristics which could have the potential to influence general cervical cancer screening barriers. Specifically, individuals with high trait anxiety and low self-esteem may be less likely to want to participate in the Pap test because of the anxiety associated with a possible cancer diagnosis, a possibility with any type of cancer screening. Additionally, low self-esteem would act as a likely deterrent for self-sampling, a form of screening which requires a degree of self-competence. However, information about self-esteem and trait anxiety was not collected in the present study, so claims about these potential explanations for the association should be interpreted with caution. The potential influence of trait anxiety and self-esteem on cervical cancer screening barriers is a direction for future research in the field.

The fourth attachment style, dismissive, characterized by low attachment anxiety and high attachment avoidance, was not associated with screening choice, Pap test barriers or self-sampling barriers. To further support the finding of the RQ, attachment avoidance (as measured by the ECR) was not predictive of screening method choice, Pap test barriers or self-sampling barriers. The results pertaining to attachment of the present study therefore indicate that while attachment has been found to be associated with health care system use (Ciechanowski et al., 2002), differentiation between health care use for somatic symptoms compared to cancer screening should be considered. Attachment style may impact health care use one way when the concern is somatic symptoms, however, as the results suggest, a different relationship may exist when the reason for health care use is cancer screening.

It should also be noted that the study conducted by Ciechanowski and colleagues (2002) used an older population (ages 18 to 65) from a primary care health maintenance organization, and therefore attachment may impact the two samples differently. Ciechanowski and colleagues (2002) also computed participants' attachment styles using a composite of the Relationship Questionnaire and the Relationship Scales Questionnaires, which may be another factor in the differences in results between their study and the present study. The present study also used a healthy young population, which may be an additional factor involved in the difference in results found between this study and that of Ciechanowski and colleagues (2002). Further research in the field of health care use, specifically investigating health care use for somatic complaints as well as cancer screening, will help to further the understanding of the relationship between attachment and medical-care seeking.

The general finding that the secure attachment style was associated with lower screening barriers than some of the insecure attachment styles may also be due to the inclination of securely attached individuals to perform health behaviours (Scharfe & Eldredge, 2001). Secure attachment, characterized by low anxiety and avoidance, has been associated with health behaviours such as condom use and obtaining good quality sleep (Scharfe & Eldredge, 2001). Further, the present study's results suggest that anxiety, in particular, is linked with higher cervical cancer screening barriers. Therefore, low attachment anxiety may be especially beneficial for individuals to overcome barriers to screening.

The Role of Conscientiousness in Method Choice and Barriers

The strongest and most consistent predictor of screening choice and screening barriers in the present study was conscientiousness, a personality factor defined by characteristics such as competence, dutifulness, and self-discipline (Ingledeu & Brunning, 1999). In terms of screening choice, it was found that conscientiousness was associated with Pap test choice. This finding could be explained, at least in part, by the characteristics which define individuals high on conscientiousness. The current cervical screening program in Ontario recommends women received a Pap test once per year (Stewart et al., 2007), a regimen which may be especially ingrained in individuals high on conscientiousness. Due to the self-discipline and dutifulness associated with this personality trait, it could be that individuals high on conscientiousness would be likely to follow this recommendation without fail compared to individuals low on conscientiousness. This finding is similar to results found by Christensen and Smith (1995) in their study on personality and adherence to a medical regimen among dialysis

patients. In their study, conscientiousness was the only significant personality predictor of adherence to the medical regimen.

Past research has shown the positive impact of conscientiousness on health behaviours (Bogg & Roberts, 2004) and longevity (Friedman et al., 1995). Similar to the present study, in a study conducted by Booth-Kewley and Vickers (1994), conscientiousness emerged as the personality factor most strongly associated with health behaviours including wellness behaviours and fewer traffic risk-taking. Additionally, a longitudinal study conducted by Friedman and colleagues (1995) found that conscientiousness was positively linked to longevity, mainly because these individuals abstain from unhealthy behaviours such as substance abuse. In relation to the results of the present study, it would seem that individuals high on conscientiousness are focused on healthy behaviours, which in turns explains their low cervical cancer screening barriers.

An interaction between perceived susceptibility and conscientiousness on cervical cancer screening barriers was explored based on the notion that conscientiousness would have an especially positive influence on health behaviours when an individual feels susceptible to the illness. This hypothesis was derived from a study conducted by Wiebe and Christensen (1997) on regimen adherence in dialysis patients, as well as past research indicating an interaction between perceived risk and conscientiousness on health behaviours (Hampson et al., 2006). Similar to the results of Wiebe and Christensen's (1997) study, conscientiousness and perceived susceptibility did not interact to influence Pap test barriers or self-sampling barriers. For Pap test barriers, both perceived

susceptibility and conscientiousness were negatively predictive of Pap test barriers indicating that a high score on both of the variables was associated with lowered barriers.

Results of the moderation for self-sampling barriers, however, did not mirror the results of the Pap test barriers results. For self-sampling barriers, perceived susceptibility was not a significant predictor, but conscientiousness was significant again in the model. It is unclear why perceived susceptibility was revealed as a significant predictor of Pap test barriers and not for self-sampling barriers. As discussed previously, the majority of participants indicated they would choose the Pap test as their screening method choice and therefore the results may be a reflection of participants' attitudes towards current cervical screening regimens. Perhaps perceived susceptibility was associated with lower Pap test barriers rather than lower self-sampling barriers because of the overwhelming majority of the sample that felt that the Pap test was a more suitable screening method. Participants therefore may not have associated feeling susceptible to cervical cancer to performing self-sampling, but instead associated feelings of susceptibility with the Pap test.

Interestingly, similar to the results of Wiebe and Christensen's (1997) study, perceived severity and conscientiousness interacted in predicting self-sampling barriers. Results indicated that for participants high on conscientiousness, perceived severity was found to be positively predictive of self-sampling barriers. This interaction indicates that perceived severity has the potential to influence women's perceptions of self-sampling, specifically among those high on conscientiousness. The interaction between perceived severity and conscientiousness, however, was not replicated for the Pap test barriers – conscientiousness was the only predictor in the final model. The finding that high

conscientiousness and high severity predicted self-sampling barriers and not Pap test barriers could indicate that high conscientiousness individuals may not trust self-sampling as much as the Pap test, especially when they perceive cervical cancer as a severe disease. It should also be noted that perceived severity had a mediocre internal consistency ($\alpha = .512$), and therefore results should be interpreted with caution. The results of the interaction do provide direction for future research in investigating the influence of the interaction between personality and health beliefs on health behaviours.

The Role of Barriers in Predicting Cervical Cancer Screening Method Choice

As predicted in hypothesis two, screening method barriers were found to be predictive of screening method choice. Specifically, Pap test barriers were found to be predictive of self-sampling choice and self-sampling barriers were found to be predictive of Pap test choice. Among the four health belief model components assessed in the present study – perceived susceptibility to cervical cancer, perceived severity of cervical cancer, perceived benefits of the Pap test and perceived barriers – the only significant predictors of screening choice were the Pap test barriers and self-sampling barriers. Janz and Becker (1984) have acknowledged that perceived barriers has consistently emerged as the strongest component of the health belief model. Additionally, Fulton (1991), in a breast cancer screening study, found that perceived benefits and perceived barriers were stronger predictors of behaviour than perceived susceptibility and perceived severity. Studies investigating Pap testing have found that barriers strongly influence women's decisions to undergo the screening (Hennig & Knowles, 1990; Hill et al., 1985).

Results of the present study indicate that it may be beneficial to introduce self-sampling as a cervical cancer screening method. Women with high Pap test barriers

seem to prefer self-sampling, a screening measure that would overcome many of the barriers associated with the Pap test such as physical pain, inconvenience, discomfort and embarrassment (Barata et al., 2008; Hennig & Knowles, 1990; Hill et al., 1985).

Additionally, though the majority of the participants in the sample would prefer the Pap test, approximately 20% of women in the study indicated self-sampling was their screening method of choice. These findings emphasize the potential for self-sampling to improve women's cervical cancer screening.

Similar to the qualitative results of the study conducted by Barata and colleagues (2008), it would seem as though there are barriers associated with self-sampling as well. Women with high self-sampling barriers indicated that they would choose the Pap test over self-sampling. Past research has found that losing the benefit of the yearly appointment, limited awareness and trust of self-sampling, fears of hurting oneself and lack of confidence in doing the test properly are potential barriers to this screening method (Barata et al., 2008; Stewart et al., 2007). Individual items of the barrier questionnaire were not analyzed separately, thereby limiting specific conclusions about the barriers of the screening measures. Future research should attempt to identify specific barriers unique to Pap tests and self-sampling respectively in order for health promotion programs to appropriately address women's concerns about these screening methods.

Perceived Susceptibility, Severity and Benefits in Predicting Screening Barriers

Though perceived susceptibility, perceived severity and perceived Pap benefits were not significant predictors of cervical cancer screening choice, the health belief model components are an important consideration in understanding Pap barriers in particular. Specifically, high perceived susceptibility and high perceived benefits were

found to be associated with lower Pap test barriers. The finding that higher perceived Pap test benefits were associated with lower Pap test barriers may be, at least in part, a circular finding. Past research, however, has found that perceived benefits is an especially important component in predicting screening behaviour such as being screened for colon cancer and breast cancer (Hayden, 2008). Therefore, it could be that perceiving a screening test as beneficial is particularly important to overcoming barriers associated with the screening test. Future research investigating the perceived benefits of self-sampling would help to further understand women's perceptions of this novel screening method.

The finding that perceived susceptibility and Pap test barriers were linked partially supports hypothesis four. Hypothesis four specifically proposed that both perceived susceptibility and perceived severity would be associated with screening barriers. In essence, it was proposed that women who perceive themselves as susceptible to cervical cancer or perceive cervical cancer as a severe condition would be less likely to report barriers to screening. Contrary to the hypothesis, perceived severity was not predictive of Pap test barriers or self-sampling barriers. This may be, at least in part, due to its mediocre internal consistency ($\alpha = .512$). The perceived severity subscale only included 5 items, the smallest of the four health belief subscales. Future research should consider adding more items to the perceived severity subscale to potentially improve its reliability.

Hypothesis four was only partially supported in that perceived susceptibility was predictive of Pap test barriers, but not self-sampling barriers. Past research has shown that perceived susceptibility is a powerful component of the health belief model (Hayden,

2008), and this study further supports this notion. Perceived susceptibility was found to be a stronger predictor of Pap test barriers than perceived benefits and perceived severity. The lack of association between perceived susceptibility and self-sampling barriers may, again, be due to the limited number of individuals who would use this screening method, thereby emphasizing its lack of credibility as an appropriate screening method for detecting cervical cancer. The association between perceived susceptibility and Pap test barriers indicates that not only is high perceived susceptibility associated with lower Pap test barriers, it also suggests that individuals with low perceived susceptibility would be more likely to have high Pap test barriers. The relationship between perceived susceptibility and screening barriers is a point that should be addressed by both physicians and health promotion campaigns educating women about actual risk factors associated with cervical cancer and appropriate screening behaviours.

Openness and Extraversion in Screening Method Choice and Barriers

It was hypothesized that the personality trait openness to experience, defined by characteristics such as curiosity, preference for variety, intellect and being adventurous and creative, would be predictive of self-sampling choice as well as lower self-sampling barriers. Contrary to hypothesis three, openness was not found to be predictive of self-sampling choice, but it was predictive of self-sampling barriers. As hypothesized, high scores on openness to experience were associated with low self-sampling barriers. Individuals high on openness may be more likely to perceive fewer barriers in self-sampling because they are curious about the novel screening method and would be open to trying a new screening measure. Results of this study relate to the results of Honda and Jacobson's (2005) study on personality and complementary and alternative medicine

(CAM) in which they found openness was associated with a variety of CAM techniques. Therefore, although openness has been found to be associated with poor health behaviours including substance use (Booth-Kewley & Vickers, 1994; Lemos-Giraldez & Fidalgo-Aliste, 1997), it could be that openness has the potential to influence positive health behaviours, specifically in terms of trying new forms of medical treatment, including forms of cervical cancer screening.

A surprising link between extraversion and lower self-sampling barriers was found in the study. Similar to openness, the link between extraversion and health is not generalizable across health behaviours. Extraversion has been found to be associated with exercise (Booth-Kewley & Vickers, 1994), but it has also been found to be associated with substance use (Booth-Kewley & Vickers, 1994; Martsh & Miller, 1997). A recent study of personality and gastric cancer screening found that extraversion was positively related to compliance to the screening regimen (Arai et al., 2009), a finding that would support the association between extraversion and lower self-sampling barriers in the present study. It should be noted, however, that extraversion was not associated with lowered Pap test barriers, and therefore the association between extraversion and cervical cancer screening barriers in the present study is not clear. The results of the present study regarding extraversion and screening barriers should therefore be considered as preliminary and further follow-up would be advantageous.

Limitations and Future Directions

The present study contributes much to the literature on psychological factors associated with cervical cancer screening choices and barriers. However, there are a number of limitations that should be addressed in the present study. One major limitation

is that the research investigated prospective cervical cancer screening, which is somewhat artificial considering that self-sampling has only recently been piloted in Ontario (McLachlin et al., 2005). Participants were therefore asked about their decisions between the Pap test, a screening method that is currently promoted in the Canadian health care system, and self-sampling, one that has been piloted and is currently under review (McLachlin, et al., 2005). This may be a major factor in the limited number of participants who indicated they would choose self-sampling over the Pap test.

The use of the undergraduate female population is another limitation of the present study. Barriers to cervical cancer screening have been found to be particularly high among women with low levels of education, women who are impoverished, are immigrants or aboriginal, or are over the age of 60 (Fung-Kee-Fung, 2007). The present study did not investigate these specific factors in understanding women's attitudes towards the Pap test and self-sampling. However, it should be noted that the use of a relatively homogeneous population allowed for the study to focus on the psychological factors associated with screening. All women in the study were students at Carleton University, and had access to health care at Carleton University's Health and Counselling Services, thereby limiting confounding variables such as limited access to health care and educational attainment. Future research should continue to investigate psychological factors associated with cervical cancer screening, specifically including the underserved populations mentioned above.

While the study provided some interesting information regarding the impact of psychological factors on screening barriers, limited information about specific barriers were provided. Items of the barrier scales were not analyzed separately, as this is not a

recommended statistical method for items of scales (Carifio & Perla, 2007). Whereas past research has identified specific barriers associated with the Pap test (Hennig & Knowles, 1990; Hill et al., 1985) and self-sampling (Barata et al., 2008; Dannecker et al., 2004; Stewart et al., 2007), the present study could only speak to Pap test and self-sampling barriers in general. Future research should further attempt to identify psychological characteristics associated with specific barriers associated with the Pap test and self-sampling.

Implications for Cervical Cancer Screening Promotion

The present study used attachment theory as a framework for understanding prospective cervical screening choices and screening barriers. Results suggest that attachment anxiety is related to screening barriers, indicating that individuals high on attachment anxiety may be particularly vulnerable to the development of cervical cancer. This finding, coupled with past research that has shown a positive relationship between anxious attachment and sexual experience (Tracy, Shaver, Albino, & Cooper, 2003), has implications for health promotion among this population. Sexual experience is a risk factor for the development of cervical cancer (Ho et al., 1998), and therefore, it is particularly troubling then that attachment anxiety is a characteristic associated with sexual experience as well as cervical cancer screening barriers. This would suggest that females high on attachment anxiety may be at risk for cervical cancer, especially because lack of screening is the number one risk factor for the development of the disease (Health Canada, 2002). These findings stress the importance of the patient-physician relationship and the consideration of patients' unique attachment styles in the promotion of screening behaviours.

Conscientiousness, openness and extraversion, as well as perceived susceptibility appear to have a positive impact on cervical cancer screening attitudes. Personality and health beliefs are therefore both important considerations in understanding women's cervical screening barriers and choices. Further research investigating the impact of personality and health beliefs on specific screening barriers would allow for further understanding of cervical cancer screening beliefs. Educating women about risk factors for cervical cancer may also help women understand their own susceptibility, and in turn motivate them to follow screening recommendations accordingly.

Conclusion

In conclusion, this study indicates that the influences of attachment, personality and health beliefs are important to consider in understanding women's cervical screening choices and barriers. Conscientiousness is a particularly beneficial personality trait in overcoming barriers to screening. Attachment anxiety appears to be a factor associated with barriers to cervical cancer screening. On a related thread, the fearful and preoccupied attachment styles had high barriers compared to the secure attachment style, a finding that provides a new perspective in understanding the impact of attachment on health care use. Finally, women with high self-sampling barriers preferred the Pap test and women with high Pap test barriers preferred self-sampling, an especially important finding in the present study. This would suggest that although the Pap test was chosen by the majority of participants, women with high Pap test barriers would benefit from having self-sampling as an option. Having two screening methods available would allow women with high Pap test barriers to partake in cervical cancer screening with a less-invasive procedure while allowing other women to continue to obtain Pap tests. Future research in

this field would allow for a greater understanding of psychological factors associated with both the Pap test and self-sampling.

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Appendix A

Participant Pool (SONA) Recruitment

Study Title: Personality, Health Beliefs and Health Behaviours among Female Undergraduates

Description: This study will explore personality, health beliefs, general health and sexual health among undergraduate female university students at Carleton University. Sensitive topics, related to sexual health, will be discussed in the study.

Participants in the study will be asked to fill out questionnaires about personality, health beliefs, general and sexual health. The study will take approximately one hour to complete. All responses will remain confidential and will only be used by the primary investigator and research team for research purposes.

Students enrolled in Introductory Psychology are eligible to receive 1% credit for participation in this study.

Please feel free to contact Erin Hill (principal investigator) or Dr. Mary Gick (faculty supervisor) if you have further questions about this study.

Thank you.

Erin Hill
Principal Investigator
ehill2@connect.carleton.ca

Mary Gick
Faculty Supervisor
613-520-2600 ext. 1727
mary_gick@carleton.ca

Appendix B

Consent Form

Title of the study: Personality, Health Beliefs and Health Behaviours among Female Undergraduates

The purpose of an informed consent form is to ensure that you understand the purpose of the study and the nature of your involvement. It must provide adequate information for you to decide whether or not you wish to participate.

Research personnel: The study is being conducted by Erin Hill, a Carleton University Master's Student in Psychology, and is being supervised by Dr. Mary Gick, Carleton University.

Purpose of the study: The purpose of this study is to investigate the relationship between personality, health beliefs and health behaviours among female undergraduate students.

Nature of your involvement: Once you have agreed to participate in the study you will be asked to complete several questionnaires examining your personality, relationship experience, health beliefs, health behaviours, and demographics.

Location and time involved: The study will take place in a classroom or office on Carleton University campus. The questionnaires will take approximately one hour to complete.

Potential risks and discomfort: This study contains sensitive subject matter pertaining to sexual health and sexual behaviours. If you do experience any emotional discomfort or have questions about your own sexual health as a result of participation in the study, the debriefing document contains contact information of the relevant Carleton University services.

Confidentiality: All responses of the questionnaires and your contact information will be kept confidential by the researcher. Your responses and measurements will be associated with a numeric code, not your name. The data collected will be used for research purposes only and will be viewed only by the research personnel involved in this study.

Right to withdraw: You have the right to withdraw at any time during the study without penalty. If you withdraw before the end of the study, we will give you a debriefing form at that time.

I have read the above description of the study entitled, Personality, Health Beliefs and Health Behaviours in Female Undergraduates and understand the conditions of my involvement and I agree to participate in the study.

Name (printed): _____

Signature: _____

Date: _____

Appendix C

Debriefing Form

Thank you for your participation in this study. The research questions we are investigating in this study are discussed below to provide you with an understanding of our research design and purposes.

What are we trying to learn in this research?

This study is investigating the impact of attachment style (related to personal relationship wants and needs), personality and health beliefs on women's attitudes and opinions of cervical cancer screening. Given the potential for there to be options (as opposed to the current standard of Pap testing) for women in cervical cancer screening, the purpose of this study was to investigate the impact of individual differences (attachment, personality and health beliefs) on cervical cancer screening opinions, choices and barriers to the screening methods.

Why is this research important?

It is important to public health officials, researchers and medical professionals to understand the impact of individual differences in cervical cancer screening choices and behaviours. Self-sampling may eventually be offered as an alternative to Pap testing across Ontario and Canada, and therefore it is important to understand characteristics of women who would be inclined to choose one type of screening test over the other. This will also help physicians to better understand patients' needs regarding preventive health behaviours.

Where can I learn more?

Various personality and health topics were discussed. Here are some resources for you to find out more information.

Attachment Theory and Health:

Scharfe, E., & Eldredge, D. (2001). Associations between attachment representations and health behaviors in late adolescence. *Journal of Health Psychology, 6*, 295-307.

Personality and Health:

Booth-Kewley, S., & Vickers, R.R. (1994). Associations between major domains of personality and health behavior. *Journal of Personality, 62*, 281-298.

Self-Sampling for HPV:

Stewart, D., Gagliardi, A., Johnston, M., Howlett, R., Barata, P., Lewis, N., Oliver, T., & Mai, V. (2007). Self-collected samples for testing of oncogenic human papillomavirus: A systematic review. *Journal of Obstetrics and Gynaecology, 29*, 817-828.

What if I have questions later?

If you have any questions about this study you can contact:

Erin Hill, principal investigator, Carleton University, ehill2@connect.carleton.ca or

Dr. Mary Gick, research supervisor, 613-520-2600 ext 1727 or mary_gick@carleton.ca

Should you have any ethical concerns about this study, please contact Dr. Avi Parush (Chair for the Carleton University Ethics Committee for Psychological Research) at 613-520-2600 ext. 6026 or avi_parush@carleton.ca or Dr. Janet Mantler (Psychology Department Chair) at 613-520-2600 ext. 2648 or psychchair@carleton.ca.

What resources are available to Carleton University Students?

If you have emotional or physical discomfort and need to seek professional help, or simply any questions or concerns about your general health, you may wish to contact Carleton's Health and Counselling Services. Health and Counselling Services is also a resource to you about your sexual health and cervical cancer screening.

Carleton University Health and Counselling Services, 613-520-6674

<http://www.carleton.ca/health/>

Health Canada provides detailed information about cervical cancer and cervical cancer screening recommendations at the following address:

<http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/diseases-maladies/cervical-uterus-eng.php>

The website below provides information about the review conducted by Cancer Care Ontario for the feasibility and acceptability of self-collected samples of HPV.

http://www.guideline.gov/summary/summary.aspx?ss=15&doc_id=9553&nbr=5098

We would like to thank you for your participation in this study. Your time and effort are greatly appreciated.

Appendix D

Questionnaire Cover Page

Personality, Health Beliefs and Health Behaviours among Female Undergraduates

This study has three parts: A, B and C.

You are to complete this set of questionnaires (Part A). Once you have completed Part A, give your questionnaire booklet to the researcher and she will give you Part B.

Once you have completed Part B, give it to the researcher and she will give you Part C.

After you complete Part C, you will be given a debriefing form about the study.

Thank you and please feel free to ask questions for clarification if needed.

Appendix E

Experiences in Close Relationships Scale (ECR)

The following statements concern how you generally feel in close relationships (e.g., with romantic partners, close friends, or family members). Respond to each statement by indicating how much you agree or disagree with it. Circle the number, using the following rating scale:

1 Disagree Strongly	2 Disagree	3 Disagree Slightly	4 Neutral/Mixed	5 Agree Slightly	6 Agree	7 Agree Strongly
---------------------------	---------------	---------------------------	--------------------	------------------------	------------	------------------------

1. I prefer not to show others how I feel deep down.
1 2 3 4 5 6 7
2. I worry about being rejected or abandoned.
1 2 3 4 5 6 7
3. I am very comfortable being close to other people.
1 2 3 4 5 6 7
4. I worry a lot about my relationships.
1 2 3 4 5 6 7
5. Just when someone starts to get close to me I find myself pulling away.
1 2 3 4 5 6 7
6. I worry that others won't care about me as much as I care about them.
1 2 3 4 5 6 7
7. I get uncomfortable when someone wants to be very close to me.
1 2 3 4 5 6 7
8. I worry a fair amount about losing my close relationship partners.
1 2 3 4 5 6 7
9. I don't feel comfortable opening up to others.
1 2 3 4 5 6 7
10. I often wish that close relationship partners' feelings for me were as strong as my feelings for them.
1 2 3 4 5 6 7
11. I want to get close to others, but I keep pulling back.
1 2 3 4 5 6 7
12. I want to get very close to others, and this sometimes scares them away.
1 2 3 4 5 6 7
13. I am nervous when another person gets too close to me.
1 2 3 4 5 6 7
14. I worry about being alone.
1 2 3 4 5 6 7
15. I feel comfortable sharing my private thoughts and feelings with others.
1 2 3 4 5 6 7
16. My desire to be very close sometimes scares people away.
1 2 3 4 5 6 7
17. I try to avoid getting too close to others.
1 2 3 4 5 6 7
18. I need a lot of reassurance that close relationship partners really care about me.
1 2 3 4 5 6 7
19. I find it relatively easy to get close to others.
1 2 3 4 5 6 7

20. Sometimes I feel that I try to force others to show more feeling, more commitment to our relationship than they otherwise would.
1 2 3 4 5 6 7
21. I find it difficult to allow myself to depend on close relationship partners.
1 2 3 4 5 6 7
22. I do not often worry about being abandoned.
1 2 3 4 5 6 7
23. I prefer not to be too close to others.
1 2 3 4 5 6 7
24. If I can't get a relationship partner to show interest in me, I get upset or angry.
1 2 3 4 5 6 7
25. I tell my close relationship partners just about everything.
1 2 3 4 5 6 7
26. I find that my partners don't want to get as close as I would like.
1 2 3 4 5 6 7
27. I usually discuss my problems and concerns with close others.
1 2 3 4 5 6 7
28. When I don't have close others around, I feel somewhat anxious and insecure.
1 2 3 4 5 6 7
29. I feel comfortable depending on others.
1 2 3 4 5 6 7
30. I get frustrated when my close relationship partners are not around as much as I would like.
1 2 3 4 5 6 7
31. I don't mind asking close others for comfort, advice, or help.
1 2 3 4 5 6 7
32. I get frustrated if relationship partners are not available when I need them.
1 2 3 4 5 6 7
33. It helps to turn to close others in times of need.
1 2 3 4 5 6 7
34. When other people disapprove of me, I feel really bad about myself.
1 2 3 4 5 6 7
35. I turn to close relationship partners for many things, including comfort and reassurance.
1 2 3 4 5 6 7
36. I resent it when my relationship partners spend time away from me.
1 2 3 4 5 6 7

Appendix F

Personality Inventory

I see myself as someone who . . .

Instructions: For each of the 44 characteristics listed below, rate how descriptive each characteristic is of you using the scale from 1 to 5 as shown below:

Disagree strongly	Disagree a little	Neither Agree or disagree	Agree a little	Agree strongly
1	2	3	4	5

I see myself as someone who . . .

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Is talkative _____ 2. Tends to find fault with others _____ 3. Does a thorough job _____ 4. Is depressed, blue _____ 5. Is original, comes up with new ideas _____ 6. Is reserved _____ 7. Is helpful and unselfish with others _____ 8. Can be somewhat careless _____ 9. Is relaxed, handles stress well _____ 10. Is curious about many different things _____ 11. Is full of energy _____ 12. Starts quarrels with others _____ 13. Is a reliable worker _____ 14. Can be tense _____ 15. Is ingenious, a deep thinker _____ 16. Generates a lot of enthusiasm _____ 17. Has a forgiving nature _____ 18. Tends to be disorganized _____ 19. Worries a lot _____ 20. Has an active imagination _____ 21. Tends to be quiet _____ 22. Is generally trusting _____ 23. Tends to be lazy _____ 24. Is emotionally stable, not easily upset _____ 25. Is inventive _____ 26. Has an assertive personality _____ | <ol style="list-style-type: none"> 27. Can be cold and aloof _____ 28. Perseveres until the task is finished _____ 29. Can be moody _____ 30. Values artistic, aesthetic experiences _____ 31. Is sometimes shy, inhibited _____ 32. Is considerate and kind to almost everyone _____ 33. Does things efficiently _____ 34. Remains calm in tense situations _____ 35. Prefers work that is routine _____ 36. Is outgoing, sociable _____ 37. Is sometimes rude to others _____ 38. Makes plans and follows through with them _____ 39. Gets nervous easily _____ 40. Likes to reflect, play with ideas _____ 41. Has few artistic interests _____ 42. Likes to cooperate with others _____ 43. Is easily distracted _____ 44. Is sophisticated in art, music, or literature _____ |
|---|--|

Appendix G

The Relationship Questionnaire

Bartholomew & Horowitz, 1991

1. Following are descriptions of four general relationship styles that people often report.

Please read each description and **CIRCLE** the letter corresponding to the style that *best* describes you or is *closest* to the way you generally are in your close relationships.

A. It is easy for me to become emotionally close to others. I am comfortable depending on them and having them depend on me. I don't worry about being alone or having others not accept me.

B. I am uncomfortable getting close to others. I want emotionally close relationships, but I find it difficult to trust others completely, or to depend on them. I worry that I will be hurt if I allow myself to become too close to others.

C. I want to be completely emotionally intimate with others, but I often find that others are reluctant to get as close as I would like. I am uncomfortable being without close relationships, but I sometimes worry that others don't value me as much as I value them.

D. I am comfortable without close emotional relationships. It is very important to me to feel independent and self-sufficient, and I prefer not to depend on others or have others depend on me.

2. Please rate each of the following relationship styles according to the *extent* to which you think each description corresponds to your general relationship style.

A. It is easy for me to become emotionally close to others. I am comfortable depending on them and having them depend on me. I don't worry about being alone or having others not accept me.

B. I am uncomfortable getting close to others. I want emotionally close relationships, but I find it difficult to trust others completely, or to depend on them. I worry that I will be hurt if I allow myself to become too close to others.

C. I want to be completely emotionally intimate with others, but I often find that others are reluctant to get as close as I would like. I am uncomfortable being without close relationships, but I sometimes worry that others don't value me as much as I value them.

D. I am comfortable without close emotional relationships, It is very important to me to feel independent and self-sufficient, and I prefer not to depend on others or have others depend on me.

	Not at all like me			Somewhat like me			Very much like me
Style A.	1	2	3	4	5	6	7
Style B.	1	2	3	4	5	6	7
Style C.	1	2	3	4	5	6	7
Style D.	1	2	3	4	5	6	7

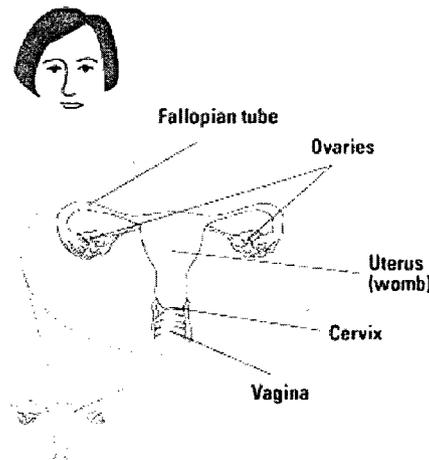
Appendix H

Cervical Cancer Screening Information

This study examines students' perceptions of cervical cancer risk as well as opinions on screening.

What is Cervical Cancer?

Cervical cancer refers to the development of cancerous cells on a woman's cervix (the tissue that connects the uterus and the vagina- see figure below). Cervical cancer affects women of all ages. It is the third most common cancer in women aged 20-49 and the highest incidence is in women aged 40-59. The five year survival rate is 72%, meaning that out of 100 women who get cervical cancer, 72 are expected to live for more than 5 years after the cancer diagnosis.

**Risk Factors:**

The presence of a sexually transmitted infection, the human papillomavirus (HPV), is present in 99.7% of cervical cancer cases. The human papillomavirus is responsible for the development of cervical cancer and genital warts. Not surprisingly, the risk factors for developing cervical cancer include having had a high number of sexual partners, early age at first intercourse (younger than 16), number of partners of the male partner and having had an HPV infection (including genital warts). Additionally, cervical cancer has been linked to cigarette smoking, using oral contraceptives for more than 5 years and having had other sexually transmitted infections.

Preventing Cervical Cancer:

The majority of cervical cancer deaths are avoidable, since the disease is treatable caught at earlier stages of cancer. This is why screening is extremely important in the prevention of cervical cancer.

The Pap Test:

The Pap test was developed in the 1930's by Dr. George Papanicalou and it has been used in Canada as the primary method of cervical cancer screening since the 1950's. The Pap test is often included as part of the pelvic exam of a yearly physical. It involves the patient lying on the exam table and the doctor then uses a tool called a speculum to open the vagina to gain access to the cervix. The doctor uses a special brush to take cells from the cervix for microscopic examination. The microscopic examination will identify whether the cells are normal or abnormal (pre-cancerous cell changes).

The Development of a New Cervical Cancer Screening Measure:

With the knowledge that we have now about the sexually transmitted human papillomavirus (HPV) being a necessary component for the development of cervical cancer (present in 99.7% of cervical cancer cases), new screening measures are in development to test for the presence of the HPV.

A new procedure that has been under review with Cancer Care Ontario would allow women to collect their own HPV samples. This new screening option is referred to as HPV DNA self-sampling.

How does it work?

A woman participating in self-sampling would be asked to insert a sterile cytobrush (a long Q-tip-like instrument used to collect cells) into her vagina, rotate the cytobrush, remove it, and put it into a specimen collection tube. The microscopic analysis of this test would identify whether the woman has any oncogenic (cancer-causing) human papillomavirus types in her vagina. This type of self-sampling could be completed at home or in the washroom of physician's office. The specimen collection tube could then be either returned directly to the physician's office or to the medical lab.

This form of cervical cancer screening has been found to have similar sensitivity to detecting women at risk for cervical cancer as the Pap test.

Appendix I

Cervical Cancer and Cervical Cancer Screening Questions

Please circle one response for each question.

1. The human papillomavirus is present in what percent of cervical cancer cases?
 - a. 92.8%
 - b. 50%
 - c. 95.4%
 - d. 99.7%
2. What is the cervical cancer five year survival rate?
 - a. 52%
 - b. 72%
 - c. 87%
 - d. 99.7%
3. Cervical cancer is the 3rd most common cancer in women in what age bracket?
 - a. Age 15-30
 - b. Aged 20-29
 - c. Aged 20-49
 - d. Aged 15-49
4. The human papillomavirus is responsible for:
 - a. Cervical cancer and herpes
 - b. Cervical cancer and genital warts
 - c. Cervical and vaginitis
 - d. Only cervical cancer
5. Self-sampling has been under review with which government organization?
 - a. Cancer Care Canada
 - b. Canadian Cancer Society
 - c. Ontario Cancer Society
 - d. Cancer Care Ontario
6. Pap tests have been the standard for cervical cancer screening in Canada since what decade?
 - a. 1940's
 - b. 1950's
 - c. 1960's
 - d. 1970's
7. Which of the following is *NOT* a risk factor in the development of cervical cancer?
 - a. Smoking
 - b. Use of the birth control pill
 - c. Use of condoms during intercourse
 - d. Early at age at first intercourse
8. What is the name of the tool women use to collect their HPV samples in self-sampling?
 - a. cytobrush
 - b. cytostick
 - c. cyto-speculum
 - d. speculum

Appendix J

Cervical Cancer Beliefs Questionnaire

The following 23 questions assess your opinions of cervical cancer and the Pap test. This questionnaire is to be filled out regardless of whether you have had a Pap test yet in your life. If you have never had a Pap test, please answer the Pap questions regarding whether the statement **would be/will be** applicable when you begin cervical cancer screening. Write the number in the space provided, using the following rating scale:

1	2	3	4	5	6	7
Strongly Disagree			Neutral/ Mixed			Strongly Agree

1	My physical health makes it likely that I will get cervical cancer.	1	2	3	4	5	6	7
2	Getting cervical cancer would interfere with my sex life.	1	2	3	4	5	6	7
3	I believe that a Pap test will only find evidence of cervical cancer when it is too late to treat it.	1	2	3	4	5	6	7
4	My lifestyle makes it likely that I will get cervical cancer.	1	2	3	4	5	6	7
5	There is a good possibility that I will get cervical cancer.	1	2	3	4	5	6	7
6	Getting cervical cancer would not be a problem for me.	1	2	3	4	5	6	7
7	Having regular Pap tests is not a good idea.	1	2	3	4	5	6	7
8	I have a lot to gain by having regular Pap tests.	1	2	3	4	5	6	7
9	I worry a lot about getting cervical cancer.	1	2	3	4	5	6	7
10	I believe that my chances of getting cervical cancer are high.	1	2	3	4	5	6	7
11	Cervical Pap tests are no good at detecting cervical cancer in its early stages.	1	2	3	4	5	6	7
12	I do not think that I am the sort of woman who would get cervical cancer.	1	2	3	4	5	6	7
13	If I got cervical cancer, my whole life would change.	1	2	3	4	5	6	7
14	Having a Pap test would not give me peace of mind.	1	2	3	4	5	6	7
15	I would be reassured about cervical cancer if I had Pap tests regularly.	1	2	3	4	5	6	7
16	With my family history, I am unlikely to get cervical cancer.	1	2	3	4	5	6	7
17	Cervical Pap tests can detect abnormal changes before I would notice any symptoms.	1	2	3	4	5	6	7
18	I do not see myself getting cervical cancer in the next year.	1	2	3	4	5	6	7
19	My chances of getting cervical cancer are small.	1	2	3	4	5	6	7
20	There is nothing I can do to detect cervical cancer.	1	2	3	4	5	6	7
21	My feelings about myself would not change if I got cervical cancer.	1	2	3	4	5	6	7
22	If I have regular Pap tests, cervical cancer will be found before it's advanced.	1	2	3	4	5	6	7
23	If I got cervical cancer I would have problems which would last a long time.	1	2	3	4	5	6	7

Appendix K

Pap Test and Self-Sampling Opinions Questionnaire

The following 13 questions assess your opinions of the Pap test and the self-sampling technique.

This questionnaire is to be filled out regardless of whether you have had a Pap test yet in your life. Circle the number (for Pap and self-sampling) in the space provided, using the following rating scale **for each screening method**.

1 2 3 4 5 6 7
 Strongly Neutral/ Strongly
 Disagree Mixed Agree

Statement	Pap Test	Self-Sampling
1. This type of screening is too time-consuming.	1 2 3 4 5 6 7	1 2 3 4 5 6 7
2. This type of screening would be embarrassing for me.	1 2 3 4 5 6 7	1 2 3 4 5 6 7
3. I would be likely to forget to get this type of screening done.	1 2 3 4 5 6 7	1 2 3 4 5 6 7
4. I would be fearful of the results from this type of screening.	1 2 3 4 5 6 7	1 2 3 4 5 6 7
5. Having to get/to do this screening would make me anxious.	1 2 3 4 5 6 7	1 2 3 4 5 6 7
6. Getting the results from this exam would make me anxious.	1 2 3 4 5 6 7	1 2 3 4 5 6 7
7. I would be fearful of the possible pain associated with this screening.	1 2 3 4 5 6 7	1 2 3 4 5 6 7
8. I would not feel confident that getting/doing this test would prevent cervical cancer.	1 2 3 4 5 6 7	1 2 3 4 5 6 7
9. This type of screening exam would make me physically uncomfortable.	1 2 3 4 5 6 7	1 2 3 4 5 6 7
10. This type of screening exam would make me psychologically uncomfortable.	1 2 3 4 5 6 7	1 2 3 4 5 6 7
11. I would feel undignified by participating in this type of screening.	1 2 3 4 5 6 7	1 2 3 4 5 6 7

Statement	Pap Test	Self-Sampling
12. I would be fearful that I wouldn't do self-sampling properly (e.g. not obtaining a proper sample).	not applicable	1 2 3 4 5 6 7
13. I would be concerned that I would lose the benefit of seeing my physician for check-ups if I participated in only self-sampling instead of the Pap test.	not applicable	1 2 3 4 5 6 7
14. Self-sampling is appealing because it would allow me to be more in control of my own health.	not applicable	1 2 3 4 5 6 7

If you wish, list below any other reasons you would not participate in the types of cervical cancer screening.

Pap testing

Self-sampling

Appendix L

Past Screening Behaviours and Screening Choice Questionnaire

PAST SCREENING BEHAVIOURS

- 1. Have you ever participated in self-sampling? Yes No
- 2. Have you ever had a Pap test? Yes No

If you answered *yes*, to question 2, please answer question 3, 4, and 5.
 If you answered *no*, to question 2, please go to question 6 in the “screening choice” section.

- 3. Have you ever had abnormal results from a Pap test? Yes No
- 4. Approximately how many months ago was your last Pap test? _____
- 5. Please indicate how often you get a Pap test.

Once every 5 years	Once every 2-3 years	Once per year	Once every six months
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- 6. If you have ever had a Pap test, how many Pap tests have you had? _____
 If you can't recall the exact number please indicate from the options below:

more than 1	more than 2	more than 3	more than 4	don't remember
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SCREENING CHOICE

- 7. Given the choice between a Pap test, self-sampling or neither, which would you choose as a primary cervical cancer screening option? (please circle only *one* response)

Pap test	Self-sampling	Neither
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Please rank the **certainty** of your response on the following rating scale:

1	2	3	4	5	6	7
Very Uncertain			Neutral			Very Certain

Appendix M

Lifestyle and Health Behaviours Questionnaire

Please answer all of the questions to the best of your ability.

Please fill in the following data.

1. Age: _____
2. Program: _____
3. Year: _____
4. Are you currently involved in a romantic relationship? Yes No

If you answered “yes” proceed to question 5.

If you answered “no” proceed to question 6.

5. How long have you and your partner been together? _____

The following questions refer to your present and past sexual behaviours.

6. Have you ever engaged in sexual intercourse? Yes No
7. Have you ever engaged in oral sex? Yes No
8. Are you currently sexually active? Yes No
9. How old were you when you first engaged in intercourse? _____ n/a
10. Have you received the Gardasil HPV vaccine?

1	2	3	4
Yes	No	No	Don't know/ Not applicable
	(and don't plan on it)	(but plan on getting it)	

The following question refers to your sexual orientation.

11. Please circle the number that best suits your sexual orientation:

1	2	3	4	5	6	7	8	9	10
Attracted to women									Attracted to men

12. From this list of birth control methods, please indicate (circle Yes or No) whether you have used the method.

Male condom	Yes	No	
Female condom	Yes	No	
Intrauterine device	Yes	No	If yes to the Birth Control Pill, how long have you been on it? _____
Birth Control Pill	Yes	No	
The Ring	Yes	No	
The Patch	Yes	No	
Depo-provera (The Needle)	Yes	No	
Diaphragm	Yes	No	
Cervical Cap	Yes	No	
Withdrawal	Yes	No	

Other - Please indicate: _____

Appendix N

Cervical Cancer and Cervical Cancer Screening Answer Sheet

Please circle one response for each question.

1. The human papillomavirus is present in what percent of cervical cancer cases?
 - a. 92.8%
 - b. 50%
 - c. 95.4%
 - d. 99.7% - correct answer
2. What is the cervical cancer five year survival rate?
 - a. 52%
 - b. 72% - correct answer
 - c. 87%
 - d. 99.7%
3. Cervical cancer is the 3rd most common cancer in women in what age bracket?
 - a. Age 15-30
 - b. Aged 20-29
 - c. Aged 20-49 - correct answer
 - d. Aged 15-49
4. The human papillomavirus is responsible for:
 - a. Cervical cancer and herpes
 - b. Cervical cancer and genital warts - correct answer
 - c. Cervical and vaginitis
 - d. Only cervical cancer
5. Self-sampling has been under review with which government organization?
 - a. Cancer Care Canada
 - b. Canadian Cancer Society
 - c. Ontario Cancer Society
 - d. Cancer Care Ontario - correct answer
6. Pap tests have been the standard for cervical cancer screening in Canada since what decade?
 - a. 1940's
 - b. 1950's - correct answer
 - c. 1960's
 - d. 1970's
7. Which of the following is *NOT* a risk factor in the development of cervical cancer?
 - a. Smoking
 - b. Use of the birth control pill
 - c. Use of condoms during intercourse - correct answer
 - d. Early at age at first intercourse
8. What is the name of the tool women use to collect their HPV samples in self-sampling?
 - a. cytobrush - correct answer
 - b. cytostick
 - c. cyto-speculum
 - d. speculum

Appendix O

Exploring the Convergence of the Attachment Dimensions and Attachment Styles

A MANOVA was conducted with attachment anxiety and attachment avoidance as the dependent variables and attachment style as the independent variable. Four categories of attachment style were used – secure, preoccupied, fearful and dismissive. The assumption of homogeneity of covariance was met (critical $\alpha = .001$), *Box's M* = 19.19, $p = .027$. Significant differences in attachment anxiety and avoidance were found among the attachment styles, Wilk's $\lambda = .523$, $F(6,498) = 31.82$, $p < .001$, partial $\eta^2 = .277$.

A Tukey's post-hoc test revealed that for avoidance, participants with a secure attachment style had lower avoidance scores than participants with a fearful attachment style ($p < .001$), participants with a preoccupied attachment style ($p = .008$) and participants with a dismissive attachment style ($p < .001$). The fearful attachment style had higher avoidance scores than the preoccupied attachment style ($p = .003$). The preoccupied attachment style had lower avoidance scores than the dismissive attachment style ($p = .037$). Refer to Table 9 for means and standard deviations.

The Tukey's post-hoc test for attachment anxiety revealed that participants with a secure attachment style had lower anxiety scores than participants with a fearful attachment style ($p < .001$) and participants with a preoccupied attachment style ($p < .001$). The fearful attachment style had higher anxiety scores than the dismissive attachment style ($p = .010$) and lower anxiety scores than the preoccupied attachment style ($p < .001$). The preoccupied attachment style also had higher anxiety scores than the

dismissive attachment style ($p < .001$). Means and standard deviations for the attachment dimensions for each attachment style are reported in Table O1.

Table O1

Attachment and Avoidance Scores across Attachment Styles

	Attachment Style	Mean (SD)
Avoidance	Secure	2.79 (.66) ^{a b c}
	Fearful (Insecure)	3.80 (.80) ^{a d}
	Preoccupied (Insecure)	3.26 (.76) ^{b d}
	Dismissive (Insecure)	3.74 (.98) ^c
Anxiety	Secure	3.35 (.94) ^{e f}
	Fearful (Insecure)	4.18 (.84) ^{e g h}
	Preoccupied (Insecure)	5.04 (.62) ^{f g i}
	Dismissive (Insecure)	3.64 (.89) ^{h i}

Note. Symbols ^{a b c d e f g h i} denote significant mean differences.

Results of the MANOVA support a strong relationship between the results of the RQ and the ECR. As would be expected, the secure attachment style had lower avoidance scores than the fearful and dismissive attachment style. Secure attachment also had lower avoidance scores than preoccupied, a finding that is not consistent with the theoretical relationship between the dimensions for preoccupied attachment (low avoidance, high anxiety). Preoccupied attachment did have lower avoidance scores than the fearful attachment style (characterized by high avoidance, high anxiety), consistent with the theory.

For attachment anxiety, as would be expected, the secure attachment style had lower anxiety scores than the preoccupied and fearful attachment styles. Also consistent with the theoretical link between the dimensions and styles, the fearful attachment style

and preoccupied attachment styles had higher anxiety than the dismissive attachment style. Interestingly, the preoccupied attachment style had higher attachment anxiety than the fearful attachment style. Both styles are associated with high attachment anxiety, however, higher anxiety scores among either style would not be expected. Though minor inconsistencies were found between the attachment dimensions and styles using the MANOVA, results suggest that both the RQ and ECR scales support the current theory of attachment (e.g., Brennan et al., 1998).