The Efficacy of the Theory of Planned Behaviour and Individual Differences in
Predicting Human Papillomavirus and Influenza Vaccination Acceptance

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by

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Abstract

Available since 2006, the human papillomavirus (HPV) vaccine and its possible psychosocial predictors have not yet been extensively researched among young women. The present study investigated the roles of the Theory of Planned Behaviour (Ajzen, 1991) and several individual differences in acceptance of the HPV vaccine among undergraduate females ($N = 183$), and compared them to acceptance of a more established preventive health behaviour, flu vaccination. Because the vaccine is so new, it was expected that social norms regarding the vaccine would not yet be well known, and the normative beliefs component of the Theory of Planned Behaviour would not predict acceptance of the HPV vaccine. However, each component of the theory significantly predicted both HPV and flu vaccination acceptance. Extraversion, conscientiousness, weaker religious affiliation, knowledge of HPV, and a higher number of sexual partners were also associated with greater HPV vaccine acceptance. Potential implications, both theoretical and practical, are discussed.

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The Efficacy of the Theory of Planned Behaviour and Individual Differences in
Predicting Human Papillomavirus and Influenza Vaccination Acceptance

The beginning of college or university is a very exciting time for young adults. It is a time of self-discovery, new friendships, and independence. However, there can be serious health risks associated with these new beginnings. In addition to poor nutrition and insufficient quality of sleep, sexually transmitted infections (STIs) can be a major health risk for new undergraduates. In fact, it is estimated that, at any point in time, 1 in 4 college students will have an STI (Centers for Disease Control and Prevention, 2008a).

Human papillomavirus (HPV) is by far the most common STI in Canada. By the time they reach 50 years of age, 80% of women will have contracted HPV at some point in their lives (McAliser, 2006). The majority of women will never experience symptoms of the virus, which typically remedies on its own. However, HPV can also lead to genital warts and, rarely but more seriously, cervical cancer (Public Health Agency of Canada, 2007). Compared to other forms of cancer, cervical cancer has relatively low incidence and mortality rates in Canada. Worldwide, however, it is the second most common cancer affecting women, and has claimed more than 250 thousand lives (Public Health Agency of Canada, 2007).

HPV Vaccination

In July 2006, a vaccine for human papillomavirus was approved for distribution in Canada. Manufactured by Merck Frosst, the vaccine is commonly referred to as Gardasil. The vaccine is over 99% effective in preventing strains 6 and 11 of HPV, which cause

approximately 90% of genital warts, as well as strains 16 and 18, which are responsible for 70% of cervical cancers (Public Health Agency of Canada, 2007). Gardasil has been recommended for girls and women aged 9 to 26 and is believed to be most effective before the onset of sexual activity. The vaccine is administered in three separate 0.5 mL doses on a 0, 2, and 6 month schedule (Public Health Agency of Canada, 2007).

Similar to any other new preventive health development, concerns about safety and side effects are expected. As such, the chief public health officer of the Public Health Agency of Canada reviewed the recommendations of the National Advisory Committee on Immunization and voiced strong support for the vaccine. Furthermore, in June 2007, the World Health Organization's advisory committee on vaccine safety reviewed the existing data on the HPV vaccine and found no problems regarding its safety. In addition, the reported side effects of Gardasil are minor, such as pain or swelling at the injection site or, more rarely, fainting, weakness, or headaches. The rate of reported adverse reactions to Gardasil is approximately 36.6 per 100 thousand doses, comparable to 16-40 per 100 thousand doses, the reported rates of adverse reactions to all vaccines in Canada (Public Health Agency of Canada, 2007).

Despite this promising evidence, however, the acceptance of Gardasil has been low. The Ontario health insurance plan (OHIP) completely covers the cost of vaccination for Grade 8 girls. Less than 50% of parents, however, have allowed their daughters to receive the vaccine. Other Canadian provinces do not fare much better; in British Columbia and the Yukon territory, only 63% of parents expressed intentions to vaccinate their young daughters against HPV (National Review of Medicine, 2007). Furthermore,

among young women forming their own vaccination intentions, only about 10% of women aged 18 to 26 have received the vaccine (Boyles, 2008).

These low rates of acceptance of a vaccine preventing cancer might appear, at first, confusing. They are likely due, however, to controversy surrounding the HPV vaccine. Prominent health researchers have pointed out that abnormal cervical cells can be detected early with regular Pap tests, and that most cases of HPV are fought off with good nutrition and immune functioning. Furthermore, cervical cancer accounts for approximately 400 deaths in Canada per year, a figure which continues to decline. As such, many believe that cervical cancer is not a pressing health concern. Many parents are also concerned about the lack of research on the long-term effects of the vaccine. Furthermore, there is a growing belief that the HPV vaccine will give girls and young women a false sense of sexual security, and will encourage risky, premature sexual activity (Lippman, Melnychuk, Shimmin, & Boscoe, 2007). The ongoing debate surrounding Gardasil may account for the low vaccination acceptance rates. It is important, however, to investigate young women's personal attitudes and decisions concerning the HPV vaccine. The goal of the present study was to explore predictors of acceptance of the new HPV vaccine in young women, and compare them to a known and more commonly accepted vaccine, the influenza vaccine.

Parental Acceptance

The majority of published psychological research on the HPV vaccine has focused on parental intentions to vaccinate their young daughters. Insufficient knowledge appears to be one prominent reason for opposition to vaccination. For instance, Chan,

Cheung, Lo, and Chung (2007) asked mothers in Hong Kong about their acceptance of the HPV vaccine for their 8-18 year-old daughters. Next, they were given an information pamphlet detailing the effectiveness of the HPV vaccine, and then asked again about their attitudes toward HPV vaccination. The results showed that, once information about the vaccine was provided, approval increased from 32% to 52% (Chan et al., 2007). This study demonstrates that limited knowledge of the HPV vaccine may prevent parents from vaccinating their daughters.

A lack of knowledge of the benefits of the HPV vaccine is not the only barrier to vaccination. In a series of focus group discussions, Friedman and Shepeard (2007) found that misguided information, in addition to limited knowledge of HPV, is common in the general public. Many participants believed that genital warts were: a form of herpes, contagious only when they've burst, treatable, and not a great health concern. Furthermore, very few knew of the commonality of HPV, or the causal link between HPV and cervical cancer. The participants agreed that, before stating acceptance or rejection of the vaccine, they would need to be informed of the safety, side effects, and efficacy of the vaccine (Friedman & Shepeard, 2007). Clearly, it is important to provide extensive and accurate knowledge regarding HPV and HPV vaccination to parents in order for them to make informed decisions about vaccinating their daughters.

Not only does little or inaccurate information about HPV contribute to low vaccine acceptance, but parents' attitudes toward the transmission of the virus also play a large role in decisions to vaccinate. Human papillomavirus is transmitted sexually and, as such, many parents are hesitant to administer the vaccine to a daughter as young as the

age of nine. Many parents believe the vaccine will encourage premature sexual behaviour, as well as risky, unsafe sex. (Constantine & Jerman, 2007). Some parents opposed to the vaccine also believe that receiving the vaccine will label their daughters as “promiscuous,” in a similar manner to purchasing condoms or birth control pills (Friedman & Sheppard, 2007). A smaller percentage of parents voiced “trust” that their daughters would not engage in sexual behaviour. These arguments are often based in culture and religion, as Asian-Americans, African-Americans, and Christians expressed low vaccination intentions for their daughters (Constantine & Jerman, 2007). Indeed, many cultures discourage even discussing sexual activity before marriage (Sussman et al., 2007). A belief founded in religion that the HPV vaccine promotes risky, sexual behaviour is difficult to modify and is a major force in rejecting the vaccine.

In addition to parental religious beliefs concerning sexual behaviour, other parental attitudes play a role in acceptance or rejection of the HPV vaccine. For example, Dinh, et al. (2007) assessed mothers’ attitudes toward HPV in Vietnam, where cervical cancer is the leading cause of cancer-related death among women. They found that, although most women viewed girls and young women who engage in premarital sex as unworthy of respect, they still strongly supported the HPV vaccine for their daughters. In fact, attitudes toward sex did not influence vaccination intentions at all. Instead, mothers in this high-risk country cited their daughters’ perceived risk of HPV and the efficacy of the vaccine as the most important factors contributing to vaccine acceptance or rejection (Dinh et al., 2007). Thus, when the consequence of HPV, cervical cancer, is a serious health concern, health promotion is a higher priority than sexual implications.

Developmental differences and parental experience can also increase a parent's likelihood of vaccinating his or her daughter against HPV. Parents of 8 to 12-year-old children agreed that they would be more likely to vaccinate their daughters as older adolescents than at their current age (Dempsey, Zimet, Davis, & Koutsky, 2006). Furthermore, among these parents, those who had personally experienced HPV not only perceived their child to be at greater risk for HPV, but also perceived greater benefits to the vaccine. As a result, these parents were more likely to support HPV vaccination for their daughters. Individual differences among children and parents contribute greatly to decisions to vaccinate young girls.

Parental attitudes and beliefs, whether due to religion or personal experience, are not the only influences in determining the rate of HPV vaccination in young girls. In addition, the interactions between physicians and these girls may directly prevent HPV vaccination. Sussman et al. (2007) interviewed primary care clinicians of adolescent patients. Since the HPV vaccine is most effective before the onset of sexual activity (Public Health Agency of Canada, 2007), it is crucial that young girls receive information on safe sex, including HPV vaccination, before they become sexually active. The physicians, however, admitted they rarely discuss risky sexual behaviour with their patients, unless the patient gives a clear indication that she is sexually active. Furthermore, the clinicians rarely educated their young patients on HPV, given the complexity of the virus, time constraints in their appointments, and their personal discomfort. Additionally, many of the physicians interviewed worried that vaccinating against HPV would give teenage girls a false sense of protection against all STIs, thereby

increasing the rates of unprotected sexual behaviour (Sussman et al., 2007). Physicians were also apprehensive about discussing HPV vaccination with families of a religion that discouraged premarital sex. Health care providers are often the main source of information of preventive health developments for parents and adolescents. The lack of discussion of safe sex practices, including the HPV vaccine, among primary care clinicians, adolescent patients, and their families, will certainly lower HPV vaccination rates.

Women's Acceptance

In addition to the literature on parental decisions to vaccinate daughters, there have been several studies investigating the HPV vaccination intentions of young adult women. Similar to the main obstacle among parents, insufficient and mistaken information about HPV was a significant barrier to HPV vaccination. In a recent study, Gerend and Magloire (2008) asked female university students about their sexual history and HPV awareness. They found that, while most of the students had some knowledge of HPV, there were many inaccuracies in this knowledge. For example, only 29% of participants knew that most cases of HPV clear up on their own. Also, 31% did not know that HPV can result in genital warts. A large proportion of the sample, however, expressed a desire to learn more about HPV and its vaccine. (Gerend & Magloire, 2008). Accurate and extensive information about HPV is as necessary for young adult women as it is for parents of young girls.

The study also demonstrated that sexual history is a significant motivating factor in HPV vaccination (Gerend & Magloire, 2008). Women in a committed relationship or

who were casually dating expressed a greater interest in the vaccine than single women. Also, a greater number of lifetime sexual partners, as well as simply being sexually active, were predictive of not only greater perceived risk of HPV, but also greater vaccination intentions. Although these results seem intuitive, they are also troubling, as women who had not yet become sexually active were the least likely to express an interest in the HPV vaccine (Gerend & Magloire, 2008). These women, however, are most likely to benefit from the vaccine (Public Health Agency of Canada, 2007). Young women need to be educated on the effectiveness of the vaccine before sexual activity, in order for the benefits to be maximized.

A study by Gerend and Shepherd (2007) also demonstrated that sexual activity increases perceived risk of developing HPV, and thus intentions to vaccinate among female university students. In addition, the tone in which a message promoting HPV vaccination is delivered influences vaccination intentions. Participants received a booklet detailing either the benefits of the HPV vaccine (“gain-framed message”), or the costs of not vaccinating (“loss-framed message”). The results showed that a loss-framed message was more effective in convincing the sexually active, higher-risk women to vaccinate. Individual differences were also evident in vaccination acceptance. The researchers found that approach-oriented women were more likely to be persuaded by a gain-framed message, while avoidance-oriented women were more responsive to a loss-framed message (Gerend & Shepherd, 2007). Clearly, there are many factors to consider in improving vaccination rates among young adult women. Sexual behaviour and the tone of information delivered will likely play a role in vaccination acceptance. However,

investigating beliefs and attitudes toward the vaccine using an established theory of health behaviour may provide greater insight into the factors that primarily guide a young woman to accept or reject the HPV vaccine.

The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB; Ajzen, 1991) has helped to explain decisions to engage in health behaviours, including vaccination. The TPB posits that, in order for a behaviour to occur, several cognitive beliefs are essential. First, behavioural belief, the belief that performing a given behaviour will result in a particular outcome, must be present. A positive attitude toward the behavior is required. Also, normative belief, the belief that significant others such as family and friends will approve of the behaviour, is necessary. Similarly, positive subjective norms refer to the perception that it is normal for others to engage in this behaviour. Perceived behavioural control, meanwhile, refers to the belief that an individual is capable of overcoming any obstacles and performing the behaviour with relative ease. Finally, once all of these criteria are met, an intention to perform the behaviour will form. From this intention, the behaviour is likely to occur (Ajzen, 1991).

Many studies have investigated the reliability of the Theory of Planned Behaviour, in particular normative beliefs and subjective norms, in explaining preventive health behaviours. For instance, Deskins et al. (2006) examined the intentions of adults and children to participate in cholesterol screening. They found that positive attitudes toward the behaviour were predictive of intentions to engage in cholesterol screening. However, for children, normative beliefs and negative subjective norms were significant

barriers to acceptance. In other words, since it is rare for children to participate in cholesterol screening, there is little social pressure from friends and parents to do so. In fact, many parents indicated they would not approve of their child participating in cholesterol screening (Deskins et al., 2006). Normative beliefs and negative subjective norms were crucial barriers to a lack of intention to perform this preventive health behaviour.

In addition to cholesterol screening, the Theory of Planned Behaviour has been useful in explaining other preventive health behaviours such as condom use. One study (Bryan, Aiken, & West, 2004) found that, among adolescents, positive affective attitudes toward condoms were significantly predictive of intentions to use condoms. Also, the belief that condom use was widespread among other adolescents was associated with greater intentions to use condoms. Not only did positive attitudes concerning safe sex predict condom use, but subjective norms for the behaviour also contributed to safer sex intentions, thus validating multiple aspects of the TPB in explaining condom use.

Previous studies have found similar results investigating condom use and safe sex practices. For example, Catania, Coates, and Kegeles (1994) found that perceptions of friends' condom use, as well as positive evaluations of both the benefits of condoms, and the physical experience of using condoms, predicted intentions to use condoms. They also discovered that perceptions of the efficacy of condoms in preventing STIs were associated with greater condom use. Behavioural beliefs, positive attitudes, and subjective norms, are components of the TPB that aid in predicting preventive sexual health behaviour.

Additionally, both positive and negative sun protection behaviours have been explained in part by the TPB. For instance, Jackson & Aiken (2000) examined the role of subjective norms of sunscreen use and sunbathing in young women's intentions to either protect or harm their skin. The results showed that, for both sunscreen use and sunbathing, subjective norms of close friends for these behaviours were more predictive than image norms from movies and magazines portraying tans as glamorous and attractive. Clearly, the behaviour of significant others, such as friends, is influential in performing healthy or unhealthy preventive behaviours. Furthermore, this study demonstrated a clear, causal link between intentions to sun protect or sunbathe, and the respective behaviours (Jackson & Aiken, 2000). In providing evidence not only for subjective norms in predicting intentions, but also for intentions leading to behaviour for both sun protection and sunbathing, this study demonstrates that elements of the TPB are useful in explaining positive as well as negative preventive health behaviours.

Many studies have directly measured multiple aspects of the TPB in predicting health behaviours. Other studies, however, have found evidence of normative beliefs and subjective norms in adolescents' and young adults' engagement in preventive healthy or unhealthy behaviours, while investigating other theories and hypotheses. For example, adolescents perceiving that both close friends and parents would approve of them choosing to smoke cigarettes were more likely to express intentions to smoke (Van De Ven, Engels, Otten, & Van Den Eijnden, 2007). Explicit parental approval of physical exercise, meanwhile, results in increased outdoor physical activity in children (Beets, Chapman, Pitetti, & Cardinal, 2007). Parental encouragement and subjective peer norms

are also paramount in promoting healthy oral hygiene practices (Stokes, Ashcroft, & Platt, 2006). Moreover, not only do the norms of parents' and peers' drinking behaviour influence adolescents' alcohol consumption, but their actual expressed approval or disapproval of drinking also plays a large role in whether or not a teenager chooses to drink (Ouellette, Gerrard, Gibbons, & Reis-Bergan, 1999). This influence appears to endure, as new college students report alcohol consumption consistent with perceptions of peer, as well as parental norms, even after leaving physical parental care (Lau, Quadrel, & Hartman, 1990). There is little doubt that the preventive health behaviours of adolescents and young adults are guided by the beliefs and norms of significant others, particularly parents and friends.

Influenza Vaccination

The TPB has also been useful in explaining vaccination behaviour, in particular, norms, beliefs and intentions concerning influenza (flu) vaccination. In one study, all of the elements of the TPB accounted for 48% of the variance in vaccination intentions. Moreover, subjective norms, on their own, accounted for 8% of flu vaccination intentions (Gallagher & Povey, 2006). The TPB and, in particular, subjective norms, are highly predictive of established, common preventive health behaviours, such as the flu vaccine.

In a similar study, Daley et al. (2007) examined parents' decisions to vaccinate their children against the flu. They found that behavioural beliefs regarding flu vaccine efficacy were highly predictive of intentions to vaccinate. In addition, there appeared to be common, negative attitudes concerning the flu vaccine. For example, 70% of the sample believed the vaccine caused the flu, and 21% of the sample thought it was unsafe

for children. Perceived social norms of the flu vaccine, that is, the perception that flu vaccination of children is common, were also associated with greater intentions of parents to vaccinate their children (Daley et al., 2007). In this study, multiple aspects of the TPB helped explain parents' decisions to vaccinate their children from the flu.

The flu vaccination perceptions among older African-Americans, a race with traditionally low vaccination rates, have also been investigated (Wray et al., 2007). Poor acceptance of the flu vaccine was partially explained by widespread doubt in the vaccine's efficacy. Also, many of the participants held the false perception that they might contract the flu from the vaccine (Wray et al., 2007). Behavioural beliefs, negative attitudes, and misperceptions undoubtedly prevent universal acceptance of the flu vaccine, particularly among certain cultures and groups.

The Theory of Planned Behaviour often explains a significant proportion of the variance in performance of preventive health behaviours, such as flu vaccination. People of all ages have established beliefs and attitudes regarding the efficacy and safety of older vaccines, such as the flu vaccine. There are also clear social norms regarding flu vaccination across age and ethnic groups, which have proven to be strong influences in decisions to vaccinate (Daley et al., 2007; Gallagher et al., 2006). The HPV vaccine, however, has been available to females for just two years and, as such, the norms of vaccination for young women may be less clear. Indeed, when asked whether parents, boyfriends, or friends would approve of their decision to receive the HPV vaccine, the majority of women responded "Neither approve nor disapprove," rather than "Approve" or "Disapprove" (Hoover, Carfioli, & Moench, 2000). It appears that subjective norms

and normative beliefs of HPV vaccination may not yet exist and thus may not be as predictive of vaccine acceptance when compared with an older, more common area of preventive health, the flu vaccine. In order to evaluate the TPB's validity in predicting HPV vaccination decisions, individual differences and vaccine characteristics should also be assessed, to compare the components of the theory to other factors that might also be associated with acceptance of the HPV vaccine.

Individual Differences

Personality Traits

According to Costa and McCrae (1992), human personality is composed of five traits. Neuroticism is characterized primarily by excessive worry, anxiety and stress. Neurotic individuals are highly emotionally reactive and often perceive situations in a negative light. Extraversion consists primarily of positive emotions such as enthusiasm and gregariousness, and the desire to be around other people. Conscientious individuals, meanwhile, are self-disciplined and aim for personal achievement. Agreeableness consists of the ability and desire to live in harmony with others. Agreeable individuals are helpful, friendly, and rarely cause social disputes. Finally, openness is characterized by an interest in new ideas and experiences, and vivid imagination (Costa & McCrae, 1992). These five traits compose the Big Five Factor model of personality.

The Big Five have been useful in explaining many health behaviours. For instance, highly neurotic individuals are more likely than emotionally stable people to engage in negative health behaviours, such as poor nutrition, alcohol and tobacco consumption, excessive or insufficient sleep, and risky driving (e.g., Booth-Kewley &

Vickers, 1994; Ingledew & Brunning, 1999; Williams, O'Brien, & Colder, 2004). People high on neuroticism would therefore be less likely to perform a preventive health behaviour, that is, receive the flu vaccine. In addition, neurotic individuals typically experience high levels of worry and anxiety (Costa & McCrae, 1992). Since the HPV vaccine has raised concerns about lack of knowledge of long-term effects (Lippman et al., 2007), neurotic females might be less likely to receive the HPV vaccine due to a potential fear of a new vaccine.

In addition to neuroticism, openness is also useful in explaining and predicting healthy and unhealthy behaviours. Early research (e.g., Booth-Kewley & Vickers, 1994) has linked openness to risky health behaviours, such as substance abuse. However, newer studies indicate more promising health behaviours among open individuals. For example, McCann (2005) found that individuals open to experience were less likely to engage in unhealthy behaviours such as smoking and drinking, and more likely to exercise. Another study replicated these results, associating high openness with greater consumption of fruits and vegetables (deBrujin, Kremers, van Mechulen, & Brug, 2005). Openness is also associated with frequent condom use (Miller, Lynam, Zimmerman, Logan, Leukefeld, & Clayton, 2004). Highly open individuals tend to make healthier lifestyle choices than others less open to experience. Furthermore, by definition, people high on this trait gravitate toward new ideas and innovations. Thus, women who are more open to experience might be more likely than their less open peers to accept a new development in preventive health, the HPV vaccine.

Conscientiousness is also a major driving force in healthy lifestyle choices. In a meta-analysis, Bogg and Roberts (2004) found that highly conscientious individuals were less likely to consume alcohol, use recreational drugs, engage in risky driving or sexual practices, eat unhealthy foods, or smoke, than individuals scoring lower on the trait. Other studies (e.g. Booth-Kewley & Vickers, 1994; Ingledew & Brunning, 1999; McCann, 2005) produced similar results, consistently linking high conscientiousness to a tendency to avoid unhealthy behaviours such as smoking and drinking. Conscientious individuals tend to make healthier lifestyle choices, including engaging in a greater number of preventive health behaviours, such as proper nutrition and safer sex practices. Therefore, they might be more likely to receive an established method of preventive health, the flu vaccine. Despite the lack of research concerning the long-term effects of the HPV vaccine, it is possible that conscientious women with a greater knowledge of the benefits of the HPV vaccine, or more positive attitudes toward it, might be more likely to accept the vaccine.

In addition, extraversion and agreeableness have also been linked to healthy and unhealthy behaviours. Agreeable individuals tend to engage in positive health behaviours, such as proper nutrition, and avoid poor health behaviours, such as risky driving behavior (Booth-Kewley & Vickers, 1994). High extraversion, meanwhile, has been associated with positive health behaviours, including exercise. However, extraverted people are also more likely to engage in substance abuse (Booth-Kewley & Vickers, 1994). People scoring high on extraversion and low on agreeableness are also more likely to have many lifetime sexual partners, use alcohol or drugs before or during sex, and have an early age

of onset of sexual activity. Low agreeableness is also associated with sex outside of a committed relationship (Miller et al., 2004). Risky sexual behaviour may be related to HPV vaccination (Gerend & Magloire, 2008; Gerend & Shepherd, 2007). Therefore, extraversion and agreeableness may influence HPV vaccine acceptance.

Religious Beliefs

Religion has been a major factor in HPV vaccine acceptance for parents of young daughters (Constantine & Jerman, 2007; Sussman et al., 2007), due to the sexual connotations associated with the virus. Even for young women making their own health decisions, any new development related to premarital sex is often out of the question, as a result of religious instruction. Women with a strong religious affiliation might therefore be less likely to accept the HPV vaccine than women not primarily guided by religious beliefs. Also, parents belonging to certain cultures and religions, for example African-Americans, Asian-Americans, and non-Catholic Christians, have been less likely to accept the HPV vaccine than Hispanics, Catholics and non-religious parents (Constantine & Jerman, 2007). Thus, religion type may also influence HPV vaccination decisions.

Sexual History

Human papillomavirus is transmitted through sexual contact (Public Health Agency of Canada, 2007). It follows then, that sexually active young women tend to perceive themselves at greater risk for contracting HPV than women who do not engage in sexual behaviour (Friedman & Sheppard, 2007; Gerend & Magloire, 2008; Gerend & Shepherd, 2007). Thus, women who engage in sexual activity might be more likely to vaccinate than women who report no sexual history. There is also an ongoing debate

about whether HPV vaccination is associated with risky sexual practices (Lippman et al., 2007). However, it is not yet clear whether young women who engage in risky sexual behaviour are more likely to receive the HPV vaccine.

Vaccine Characteristics

HPV Knowledge

Lack of information concerning HPV and the HPV vaccine has shown to be a significant barrier to HPV vaccine acceptance for both parents of young daughters and young adult women (Chan et al., 2007; Friedman & Sheppard, 2007; Gerend & Magloire, 2008; Sussman et al., 2007). Therefore, young women with a greater knowledge of HPV and the HPV vaccine might be more likely to accept the vaccine than women with limited information. The flu vaccine, meanwhile, is a common, established method of preventive health that is well-known to many people (Daley et al., 2007; Wray et al., 2007). Thus, it is unlikely that flu vaccination knowledge would differentiate acceptance of the flu vaccine.

Vaccine Cost

Cost is often cited as a barrier to vaccination (Deskins et al., 2006; Friedman & Sheppard, 2007; Hoover et al., 2000). In Ontario, Gardasil is not covered by the provincial health insurance plan (OHIP), and the three doses of the vaccine cost a pricey \$404.00 (Comeau, 2007). The participants in this study, however, are insured under the Carleton University prescription drug plan, which covers 80% of the cost of the vaccine. Nevertheless, undergraduate students might prefer to spend their limited money elsewhere and cost might therefore result in lower levels of HPV vaccine acceptance. The

flu vaccine, however, is available at no cost to Carleton University students. Thus, it would not influence flu vaccine acceptance.

Mode of Administration

Gardasil consists of three separate injections. There are two forms available for purchase: a vial of the vaccine, or a pre-loaded syringe. According to Carleton University's health educator, the withdrawal of the pre-loaded syringe is often described as quite painful. Also, on rare occasion, side effects, such as pain at the injection site and faintness, have been reported (Public Health Agency of Canada, 2007). Many people fear the pain of needles and injections, as well as potential painful side effects (Constantine & Jerman, 2007; Dempsey et al., 2006; Deskins et al., 2006). An apprehension of injections might therefore predict lower reception of both the HPV vaccine and the flu vaccine.

The Present Study

Available to girls and women since 2006, the human papillomavirus vaccine has been shown to be safe and effective at preventing 70% of cervical cancers and 90% of genital warts (Public Health Agency of Canada, 2007). Among young women, however, vaccination rates have been low (Boyles, 2008). The purpose of the present study was to contribute to the body of research on the Theory of Planned Behaviour by providing evidence that subjective norms do not always reliably predict new preventive health behaviours. Other aspects of the TPB (e.g., attitudes), however, would predict both HPV vaccine acceptance beyond another factor shown in previous research to influence vaccination, knowledge of HPV. The TPB's predictive efficacy was also evaluated for a more established preventive health behaviour, flu vaccination. The present study also

sought to better understand the other factors, such as individual differences and vaccine characteristics, involved in acceptance of the HPV vaccine. Most of the studies on parents' and women's attitudes toward the HPV vaccine took place before the vaccine's availability to the public, simply describing it as a "hypothetical" vaccine for human papillomavirus (e.g., Constantine & Jerman, 2007; Dempsey et al., 2006; Hoover et al., 2000). The present study aimed to provide insight into the women who have actually accepted the HPV vaccine; that is, who have already received or intend to receive the vaccine, as Gardasil is now readily available to all young women. In addition, a goal of the present study was to generate findings that might provide important practical implications for private health services, as well as governmental health organizations, in implementing HPV vaccination programs and policies. Beliefs such as perceived risk and perceived severity have been shown to influence performance in a variety of preventive health behaviours (e.g., Greene & Brinn, 2003; Katz, Meyers, & Walls, 1995; Smith & Stasson, 2000). To maximize the scope of insight into possible predictors of HPV vaccination, and improve the potential recommendations to institutes of public health, items measuring perceived susceptibility and perceived severity of HPV were also included.

Hypothesis I: While greater knowledge of HPV would be associated with greater vaccine acceptance, the behavioural beliefs, attitudes, and perceived control components of the TPB would be more predictive of HPV vaccination. However, normative beliefs would not be associated with acceptance of the HPV vaccine. Each component of the TPB would predict flu vaccination.

Hypothesis II: Consistent with past research, women with no sexual history would be less likely than sexually active women to vaccinate against HPV. Sexual history would not influence flu vaccine acceptance.

Also, individual differences, such as personality and religious beliefs, would be predictive of HPV vaccine acceptance. Specifically, women scoring high on neuroticism would be less likely to receive both the HPV and the flu vaccine. Women scoring high on openness would be more likely to accept the HPV vaccine. Conscientious participants would be more likely to vaccinate against the flu.

Furthermore, women with strong religious affiliation would be less likely to accept the HPV vaccine than participants with few or no religious beliefs. There would be no relation between religion and flu vaccination.

Hypothesis III: Women who perceive the HPV vaccine to be costly would be less likely to receive the HPV vaccine. Women who fear the pain or side effects of the injection would be less likely to accept both the HPV and the flu vaccine.

Hypothesis IV: Consistent with past research of preventive health behaviors (e.g., Jackson & Aiken, 2000), both HPV and flu vaccination intentions would be associated with their respective vaccination behaviours at a 2 month follow-up.

In addition to the above hypotheses, the present study explored several potential associations with HPV vaccination. It was of interest whether women who participate in risky sexual behaviour are more or less likely to receive the HPV vaccine than women who do not engage in risky sexual behaviour. Also, the roles of conscientiousness, extraversion, and agreeableness as predictors of HPV vaccination intentions would be

explored. The present study also explored the hypothesis that conscientiousness might interact with knowledge or positive attitudes toward the HPV vaccine. Because conscientiousness has been shown to predict healthy behaviours, women with high conscientiousness who know about the HPV vaccine or who have a positive attitude toward it might be more likely to accept the vaccine. It was also of interest whether participants' type of religious affiliation influenced their acceptance of the HPV vaccine. Finally, the present study also explored whether other beliefs, such as perceived risk and perceived severity, would be associated with HPV vaccine acceptance.

Method

Participants

One hundred eighty-three females participated in the present study. They ranged in age from 17 to 27 ($M = 18.84$, $SD = 1.64$). The majority of participants (62.8%) were White, with the remaining participants self-identifying as Black (6.6%), Chinese (6%), South Asian (6%), Arab (2.7%), Latin American (2.7%), West Asian (1.6%) Aboriginal (1.1%), or another ethnicity (10.5%). The most dominant religion was Catholicism (36.1%), followed by Protestantism (16.9%), Islam (9.8%), and another religion (9.8%), while 27.3% had no religious affiliation. Sixty-three percent of the women had participated in sexual intercourse, and 69.6% had participated in oral sex. The participants were introductory psychology students, recruited through the online SONA system. The students received grade-raising credit for their participation in the study.

Materials

Personality Traits

The Big Five Factor Inventory (BFFI, John & Srivastava, 1999) was used to assess personality traits. The BFFI is a 44 item questionnaire that contains items for neuroticism, such as “I see myself as someone who worries a lot;” items for openness, such as “I see myself as someone who is curious about many different things;” items for conscientiousness, such as “I see myself as someone who does things efficiently;” items for extraversion, such as “I see myself as someone who is outgoing and social;” and items for agreeableness, such as “I see myself as someone who likes to cooperate with others.” Responses are made on a 5 point Likert scale ranging from 1 = “Disagree strongly” to 5 =

“Agree strongly.” Higher scores indicate that an individual is high on each of the traits. In the present study, the inter-item reliability was strong for extraversion ($\alpha = .82$), conscientiousness ($\alpha = .80$), and neuroticism ($\alpha = .81$), and acceptable for agreeableness ($\alpha = .76$) and openness ($\alpha = .75$).

Religiosity

In order to determine participants' degree of religious affiliation, the Spiritual Involvement and Beliefs Scale (Hatch, Burg, Naberhaus, & Helmmich, 1998) was administered. This measure consists of 19 items, including “A spiritual force influences the events in my life,” and “I have felt pressured to accept spiritual beliefs that I do not agree with.” Responses are made on a 5-point Likert scale with options ranging from 1 = “Strongly disagree” to 5 = “Strongly agree.” The scale also contains 4 items, including “When I wrong someone, I make an effort to apologize,” and “I solve my problems without using spiritual resources.” Responses are made on a 5-point Likert scale with options ranging from 1 = “Never” to 5 = “Always.” Additionally, there are 3 items, including “During the last week, I prayed...” and “During the last week, I meditated....” Responses are made on a 5-point Likert scale with options ranging from 1 = “0 times” to 5 = “10 or more times.” Higher scores indicate stronger religious affiliation. The inter-item consistency was excellent ($\alpha = .91$). Demographical information also asked participants their particular religious affiliation.

Sexual History

To determine participants' sexual activity, they were asked “Have you ever participated in sexual intercourse?” and “Have you ever participated in oral sex?”

Responses were “yes” or “no.” Also, participants were provided with three questions created to assess behaviour. The first asks, “How often do you use condoms during sex?” Responses are made on a 5-point Likert scale with options ranging from 1 = “Never” to 5 = “Always.” Participants were also asked, “How many sexual intercourse partners have you had in the past year?” and “How many oral sex partners have you had in the past year?” Responses are made on a 5-point Likert scale with options ranging from 1 = “0” to 5 = “4 or more.” Higher scores indicate riskier sexual behaviour.

HPV Knowledge

To assess participants’ preexisting knowledge of HPV, ten items of true and false statements about the disease and its vaccine were created from the Public Health Agency of Canada’s review of the vaccine (Public Health Agency of Canada, 2007). Examples of questions include “Most cases of HPV are asymptomatic,” and “Side effects of the HPV vaccine are common.” The response options are “True” and “False.” Scores were based on number of correct responses, with more correct responses indicating greater HPV knowledge.

Vaccine Cost

In order to determine whether or not the cost of the HPV vaccine influences HPV vaccine acceptance, the present study included the statement “I would be more likely to receive the HPV vaccine if it were free.” Responses are made on a 7-point Likert scale with responses ranging from 1 = “Disagree” to 7 = “Agree.” Higher scores indicate a greater influence of vaccine cost on acceptance.

Pain and Side Effects

To assess the degree to which the pain of injection influences HPV vaccination reception, participants were asked to rate the degree to which they agree or disagree with the statement, “I would be more likely to receive the HPV vaccine if it were not by injection.” Also, to determine the role of potential side effects in HPV vaccine acceptance, they received the statement, “I would be more likely to receive the HPV vaccine if I knew there were no side effects.” Responses are made on a 7-point Likert scale with responses ranging from 1 = “Disagree” to 7 = “Agree.” Higher scores indicate a greater influence of pain and side effects on vaccine acceptance.

Theory of Planned Behaviour (HPV)

The following items were adapted from a manual for Theory of Planned Behaviour measures (Francis et al., 2004) and modified to assess HPV and flu vaccination.

Subjective norms and normative beliefs. To determine the influence of subjective norms on HPV vaccination, the present study included the statement, “Most girls my age have received the HPV vaccine.” Also, to assess normative beliefs regarding the HPV vaccine, this study included several statements, including “My gynecologist/family doctor thinks I should receive the HPV vaccine,” and “My family would approve of my receiving the HPV vaccine.” Responses are made on a 7-point Likert scale with responses ranging from 1 = “Disagree” to 7 = “Agree.” Higher scores indicate greater influence of subjective norms and normative beliefs. The inter-item reliability was good ($\alpha = .83$).

Behavioural beliefs. In order to assess participants' behavioural beliefs regarding HPV vaccination, they were asked to rate the degree to which they agree with the following statements: "If I receive the HPV vaccine, I will feel that I am doing something positive for my health," and "If I receive the HPV vaccine, it will help prevent me from developing genital warts/cervical cancer." Responses are made on a 7-point Likert scale with responses ranging from 1 = "Disagree" to 7 = "Agree." Higher scores indicate greater belief in the vaccine's efficacy. The internal reliability was less than ideal ($\alpha = .62$).

Attitudes. To measure participants' attitudes toward the HPV vaccine, they were provided with the statement, "Overall, I think that receiving the HPV vaccine is..." Responses are made on a 7-point Likert scale with options ranging from 1 = "Harmful" to 7 = "Beneficial," 1 = "Unpleasant" to 7 = "Pleasant," 1 = "The wrong thing to do," to 7 = "The right thing to do," and 1 = "Unimportant" to 7 = "Important." Higher scores indicate more positive attitudes. The internal consistency was good ($\alpha = .80$).

Perceived control. To assess participants' perceived behavioural control over HPV vaccination, the present study included the statements "I feel confident that I could receive the HPV vaccine if I wanted to," and "Whether or not I choose to receive the HPV vaccine is entirely up to me." Responses are made on a 7-point Likert scale with responses ranging from 1 = "Disagree" to 7 = "Agree." Higher scores indicate greater perceived behavioural control. The inter-item reliability was low ($\alpha = .59$).

Vaccine acceptance. To measure intentions to receive the HPV vaccine, participants were provided with the statement "I will receive the HPV vaccine in the next

2 months.” Responses are made on a 7-point Likert scale with responses ranging from 1 = “Disagree” to 7 = “Agree.” Higher scores indicate a greater intention to vaccinate.

Participants were also asked, “Have you already received the HPV vaccine?” Response options were “Yes” or “No.” Participants who had already received the vaccine were given a score of “7” on intention, and this item was used to assess acceptance of the HPV vaccine.

Behaviour follow-up. In order to determine whether intention to receive the HPV vaccine was associated with actual vaccination, participants received an e-mail two months after initial testing containing the question, “Have you received the HPV vaccine since November 2008?” Responses were “Yes” or “No.” There was also an open-ended response question: “If so, why? If not, why not?”

Perceived Susceptibility and Severity

To determine whether perceived risk affected reception of the HPV vaccine, two items, “I feel I might be at risk for developing cervical cancer,” and “I feel I might be at risk for developing genital warts,” were included. To assess the influence of perceived severity on HPV vaccination, the present study also included the items “Cervical cancer is a serious illness,” and “Genital warts are a serious illness.” Responses are made on a 7-point Likert scale with responses ranging from 1 = “Disagree” to 7 = “Agree.” These measures were adapted from a scale of the Health Belief Model (Maiman, Becker, Kirscht, Haefner, & Drachman, 1977). Higher scores indicate greater perceived risk or perceived susceptibility.

Flu Vaccination

Theory of Planned Behaviour. In order to assess the role of the Theory of Planned Behaviour in flu vaccination acceptance, the TPB questions and response options for HPV vaccination at initial testing were also administered for flu vaccination. For example, for behavioural beliefs, rather than “If I receive the HPV vaccine, it will help prevent me from developing genital warts/cervical cancer,” participants were provided with the statement, “If I receive the flu vaccine, it will help prevent me from developing the flu.” The internal consistency was strong for normative beliefs ($\alpha = .81$), behavioural beliefs ($\alpha = .83$), and attitudes ($\alpha = .84$), but low for perceived control ($\alpha = .62$).

Pain and side effects. To assess the influence of the perceived pain of injection on flu vaccination, participants were asked to rate the degree to which they agree or disagree with the statement, “I would be more likely to receive the flu vaccine if it were not by injection.” Also, to determine the role of potential side effects in flu vaccine acceptance, the statement, “I would be more likely to receive the flu vaccine if I knew there were no side effects” was included. Responses are made on a 7-point Likert scale with responses ranging from 1 = “Disagree” to 7 = “Agree.”

Vaccine acceptance. To measure intentions to receive the flu vaccine, participants were provided with the statement “I will receive the flu vaccine in the next 2 months.” Responses were made on a 7-point Likert scale with responses ranging from 1 = “Disagree” to 7 = “Agree.” Higher scores indicate a greater intention to vaccinate. Participants were also asked, “Have you already received the flu vaccine in the fall of

2008?” Responses options were “Yes” or “No.” Participants who had already received the vaccine were given a score of “7” on intention, and this item was used to assess acceptance of the flu vaccine.

Behaviour follow-up. The two month follow-up e-mail also included the question, “Did you receive the flu vaccine?” Responses were “Yes” or “No.” There was also an open-ended response question: “If so, why? If not, why not?”

Perceived susceptibility and severity. The items used to measure perceived susceptibility and perceived severity for HPV vaccination were also applied to flu vaccination. For perceived susceptibility, participants received the statement, “I feel I might be at risk for developing the flu.” For perceived severity, the item, “The flu is a serious illness” was administered. Responses are made on a 7-point Likert scale with responses ranging from 1 = “Disagree” to 7 = “Agree.” Higher scores indicate greater perceived risk or perceived susceptibility.

Demographics

Participants were also asked demographical information, including age, first language, race or ethnic background, religious affiliation, marital status, employment status, student status (full-time, part time, or not working towards a degree or diploma) family income, and highest level of education completed.

Procedure

Participants registered for the study through the online SONA system. When they arrived at the research laboratory, they were greeted by the researcher, then read and signed an informed consent form, which notified them of potentially sensitive content,

such as questions about sexual history. Participants who consented to be contacted again were then asked to provide their e-mail address for the follow-up e-mail. The participants then completed the questionnaires, which took approximately half an hour. They received a debriefing sheet detailing the purpose of the study, potential implications, and sources of help for distress caused by the potentially uncomfortable nature of the study. Two months later, the participants who consented received the brief e-mail asking whether or not they had received the HPV vaccine and/or the influenza vaccine. After returning the e-mail, they received a final debriefing form by e-mail.

Results

Preliminary Analyses

The data were screened for missing values. Little's missing completely at random test was not significant ($\chi^2 = 1854.69, p = .07$), so it was concluded that the data were missing completely at random. Furthermore, the missing value analysis indicated that less than five percent of the data were missing, so listwise or pairwise deletion was appropriate (Tabachnick & Fidell, 2007). For subscale computations, mean substitution was used. When running analyses, listwise deletion was selected.

Univariate outliers were assessed by examining the standardized scores. HPV attitudes, HPV perceived control, and flu perceived control each had cases outside the 3.29 standard deviation cutoff (Tabachnik & Fidell, 2007). These outliers were changed to bring their standardized scores below the 3.29 value. The standardized scores were generated a second time, and indicated that two cases on flu perceived control were still outliers. These cases were adjusted again, bringing all univariate outliers within range.

The skewness and kurtosis values, statistical tests of normality, and histograms and boxplots for each variable were examined to test the assumption of normality. The Big Five factors, religiosity, and HPV knowledge were normally distributed. HPV normative beliefs, HPV behavioural beliefs, HPV perceived severity, flu normative beliefs, flu attitudes, and flu perceived risk were all slightly negatively skewed, but the histograms and boxplots were acceptable. HPV perceived risk had a slight positive skew, but its histogram was acceptable. HPV fear of pain, HPV intent, flu perceived severity,

flu fear of pain, and flu intent were all slightly kurtotic, but the histograms and boxplots showed only slight deviations from normality.

HPV attitudes and flu behavioural beliefs were significantly negatively skewed. Square root transformations were applied to these variables to reduce skewness. The analyses were run with both the transformed and untransformed data. Since the results did not differ substantially, the untransformed results were retained. For several variables, the square root and logarithmic transformations were applied, but did not help to reduce skewness.

To help remedy variables with extreme positive or negative skewness, they were dichotomized or trichotomized (Tabachnik & Fidell, 2007). Condom use had a significant negative skew even after log transforms were used and so it was dichotomized from 1 = “Never,” 2 = “Rarely,” 3 = “Sometimes,” 4 = “Often,” 5 = “Always,” to 1 - 4 = “Not always” ($n = 71$) and 5 = “Always” ($n = 110$). Both intercourse and oral sex partners were very positively skewed. These variables were trichotomized from 1 = “0,” 2 = “1,” 3 = “2,” 4 = “3,” 5 = “4 or more,” to 1 = “0” ($n = 68$ for intercourse, $n = 59$ for oral sex), 2 = “1” ($n = 65$ for intercourse, $n = 81$ for oral sex), 3 = “2 or more” ($n = 49$ for intercourse, $n = 41$ for oral sex). Both HPV and flu perceived control were extremely negatively skewed. These variables were dichotomized to 1-6 = “Low control” ($n = 96$ for HPV, $n = 65$ for flu), 7 = “High control” ($n = 87$ for HPV, $n = 118$ for flu). Both HPV and flu fear of side effects were negatively skewed. HPV side effects was dichotomized to 1-5 = “Low concern” ($n = 79$), 6-7 = “High concern” ($n = 104$). Flu fear of side effects was dichotomized to 1-4 = “Low concern” ($n = 88$), 5-7 = “High concern” ($n = 95$). HPV

cost was also negatively skewed. It was dichotomized to 1-5 = “Low importance” ($n = 84$), 6-7 = “High importance” ($n = 98$).

Mahalanobis distance values for all variables were generated to assess multivariate outliers. Case 25 exceeded the cutoff of 58.30 for 29 variables at the .001 significance level. Further investigation showed the case was an outlier on HPV behavioural beliefs, HPV attitudes, HPV perceived risk, openness, flu attitudes, flu pain, HPV pain, and flu perceived risk. This case was deleted from further analyses.

The inter-item correlations were examined to detect multicollinearity. None of the correlations exceeded .78. A linear regression was run using all variables and the tolerance values were generated. Values below .20 are considered problematic (Tabachnik & Fidell, 2007). Since none of the values were lower than .25, it was concluded that multicollinearity was not a problem.

Descriptive statistics were generated. The inter-item correlations are depicted in Table 1. Extraversion ($M = 3.47$, $SD = .68$), conscientiousness ($M = 3.44$, $SD = .65$), neuroticism ($M = 3.05$, $SD = .74$), and openness ($M = 3.47$, $SD = .57$) were all in the moderate range, while self-reported agreeableness ($M = 3.98$, $SD = .56$) was, overall, quite high. Religious beliefs were also moderate overall ($M = 79.14$, $SD = 16.16$). Knowledge of HPV was generally low ($M = 5.74$, $SD = 1.64$). Eighteen percent of participants had already received the HPV vaccine, while 15.2% had received the flu vaccine by the initial study. Of the 82 women who responded to the follow-up e-mail, three had received the HPV vaccine and five had received the flu vaccine since the initial

Table 1.

Correlations Among Personality, Religiosity, and TPB items

Scale	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Extra	.08	.19**	-.37***	.22**	.15*	.12	.03	.12	.17*	.13	.17*	.29***	.14
2. Agree		.24**	-.34***	-.04	.10	-.01	.02	-.01	.01	.10	-.01	.003	.02
3. Conscien			-.25**	.02	.03	.12	.08	.12	.03	.02	.03	.18*	.03
4. Neuro				.04	-.17*	.11	.11	.02	.02	-.09	-.13	-.05	.03
5. Open					.02	-.04	-.02	-.07	-.03	-.03	.04	.01	.05
6. Religion						-.24**	-.24**	-.12	-.04	-.004	.11	-.14	.06
7. HPVnorms							.67***	.61***	.37***	.22**	.13	.64***	.26***
8. HPVbehav								.64***	.31***	.30***	.18*	.52***	.25**
9. HPVvatt									.38***	.35***	.38***	.55***	.32***
10. Flunorms										.66***	.59***	.24**	.65***
11. Flubehav											.78***	.22**	.66***
12. Fluatt												.19*	.60***
13. HPVvintent													.30***
14. Fluintent													

Note. Extra = Extraversion, Agree = Agreeableness, Conscien = Conscientiousness, Neuro = Neuroticism, Open = Openness (Big Five Factor Inventory; John & Srivastava, 1999),

Religion = Religiosity (Spiritual Involvement and Beliefs Scale; Hatch et al., 1998), HPVnorms = HPV normative beliefs, HPV behav = HPV behavioural beliefs, HPVvatt = HPV

attitudes, Flunorms = Flu normative beliefs, Flubehav = Flu behavioural beliefs, Fluatt = Flu attitudes, HPVvintent = HPV vaccination intention, Fluintent = Flu vaccination

intention (Theory of Planned Behaviour; Francis et al., 2004).

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

study two months previously. Younger women were more likely to accept the HPV vaccine, $r = .17, p < .05$.

In general, the elements of the Theory of Planned Behaviour were associated with greater acceptance of both the HPV and the flu vaccine. Women with greater HPV perceived risk, greater flu perceived risk, and greater flu perceived severity had greater vaccine acceptance for the respective vaccines. Of the Big Five Factors, only extraversion and conscientiousness were associated with HPV vaccination. None of the Big Five Factors were related to flu vaccination. Women with greater knowledge of HPV and greater sexual history were more likely to accept the HPV vaccine. Religiosity was not, on its own, significantly associated with either HPV or flu vaccination. Women who accepted the HPV vaccine were also more likely to accept the flu vaccine.

Predictors of HPV Vaccination Acceptance

For the purpose of the present study, HPV vaccine acceptance was operationalized as women who had already received the vaccine, or had high intentions to vaccinate.¹ Therefore, participants who indicated that they had already received the vaccine were coded as high vaccination intentions. To determine significant predictors of HPV vaccination acceptance, three hierarchical multiple linear regression analyses were conducted with HPV vaccination acceptance as the dependent variable. Control variables were entered in the first steps, and predictor variables were entered in the second steps. It was hypothesized that greater HPV knowledge would be associated with greater acceptance of the HPV vaccine. However, the Theory of Planned Behaviour would be more predictive of HPV vaccination. Normative beliefs, however, would not be

associated with vaccine acceptance. In the first regression, HPV knowledge was entered in the first step and the items of the Theory of Planned Behaviour (HPV normative beliefs, HPV behavioural beliefs, HPV attitudes, and HPV perceived control) were entered in the second step. The significance values for each step and the individual predictors are depicted in Table 2. In the first step, HPV knowledge was significant, indicating that greater HPV knowledge was associated with greater HPV vaccination acceptance. On its own, HPV knowledge accounted for six percent of the variance in acceptance of the HPV vaccine. Table 2 indicates that adding TPB variables in step 2 was significant overall in predicting HPV vaccine acceptance, and HPV knowledge did not remain significant. Consistent with hypothesis I, HPV attitudes was a significant predictor of HPV vaccine acceptance, but HPV norms also significantly predicted acceptance, contrary to predictions, $R^2 = .46$, $F(5,174) = 29.38$, $p < .001$.

Table 2.

Knowledge and the TPB as Predictors of HPV Vaccination Acceptance

Variable	Model 1			Model 2		
	<i>B</i>	95% CI <i>B</i>	β	<i>B</i>	95% CI <i>B</i>	β
HPV Knowledge	.34	.14, .55	.24**	.07	-.10, .25	.05
HPV Normative Beliefs				.70	.46, .93	.46***
HPV Behavioural Beliefs				.06	-.24, .35	.03
HPV Attitudes				.45	.16, .74	.24**
HPV Perceived Control				.05	-.52, .61	.01
ΔR^2		.06			.40	
<i>F</i> for change in R^2		10.65**			32.19***	

Note. CI = confidence intervals.

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

Greater sexual history was also expected to predict greater HPV acceptance. In addition, the Big Five factors of personality, particularly low neuroticism and high openness, were expected to be associated with high HPV vaccine acceptance. Stronger

religious affiliation was hypothesized to lower acceptance of the HPV vaccine. In the second regression, the three elements of sexual behaviour (frequency of condom use, number of intercourse partners, number of oral sex partners) were entered in the first step and the Big Five factors and religiosity were entered in the second step. The significance values for each step and the individual predictors are depicted in Table 3. Although the first step of sexual history variables was significant, accounting for six percent of the variance in HPV vaccination acceptance, none of the individual predictors were significant. The second step was significant, and extraversion, conscientiousness, and religiosity were all significant predictors, $R^2 = .16$, $F(9,168) = 3.65$, $p < .01$, indicating that adding individual differences, such as personality traits and religious beliefs, was significant in contributing to a greater proportion of variance in HPV vaccination. The regression was run a second time using only participants who had participated in sexual intercourse. The first step, containing only sexual history, was no longer significant, $R^2 = .02$, $F(3, 111) = .86$, $p = .46$. Since the first step containing all participants was significant, it was concluded that greater sexual history was associated with greater HPV vaccine acceptance, and hypothesis II was met. Also in accordance with hypothesis II, greater religious affiliation was associated with lower reception of the HPV vaccine. However, contrary to hypothesis II, neuroticism and openness did not predict HPV vaccination. Also, participants higher on extraversion and conscientiousness were more likely to accept the HPV vaccine.

Table 3.

Sexual History, Big Five factors, and Religiosity as Predictors of HPV Vaccination Acceptance

Variable	Model 1			Model 2		
	<i>B</i>	95% CI <i>B</i>	β	<i>B</i>	95% CI <i>B</i>	β
Condom use	.01	-.75, .77	.001	.15	-.58, .88	.03
Intercourse partners	.13	-.51, .77	.04	-.18	-.81, .46	-.06
Oral partners	.64	-.04, 1.32	.20	.61	-.06, 1.27	.19
Extraversion				1.01	.45, 1.56	.30***
Agreeableness				-.03	-.67, .61	-.01
Conscientiousness				.56	.03, 1.09	.16*
Neuroticism				.27	-.26, .79	.08
Openness				-.20	-.79, .39	-.05
Religiosity				-.02	-.05, -.002	-.16*
ΔR^2		.06			.11	
<i>F</i> for change in R^2		3.39*			3.63**	

Note. CI = confidence intervals.

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

Vaccine characteristics, such as concerns about the cost, pain, and potential side effects of vaccination were expected to lower HPV vaccine acceptance. It was also of interest whether perceived risk and perceived severity might also contribute to acceptance of the HPV vaccine. In the third regression, HPV fear of side effects, fear of pain, and importance of cost were entered in the first step and HPV perceived risk and perceived severity were entered in the second step. The significance values for each step and the individual predictors are displayed in Table 4. The first step was not significant, indicating that, contrary to hypothesis III, HPV fear of pain, side effects, and importance of cost were not associated with HPV vaccination. The second step was significant, and HPV perceived risk was significant, indicating that women with greater perceived risk of HPV were more likely to accept the HPV vaccine.

Table 4.

Vaccine Characteristics, Perceived Risk, and Severity as Predictors of HPV Vaccination Acceptance

Variable	Model 1			Model 2		
	<i>B</i>	95% CI <i>B</i>	β	<i>B</i>	95% CI <i>B</i>	β
HPV cost	.58	-.16, 1.31	.12	.38	-.36, 1.11	.08
HPV side effects	-.20	-.95, .55	-.04	-.19	-.93, .56	-.04
HPV pain	.03	-.12, .18	.03	.03	-.11, .18	.03
HPV perceived risk				.32	.09, .54	.21**
HPV perceived severity				.07	-.30, .44	.03
ΔR^2		.01			.04	
<i>F</i> for change in R^2		.86			3.88*	

Note. CI = confidence intervals.

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

Predictors of Influenza Vaccination Acceptance

For the purpose of the present study, flu vaccine acceptance was defined as participants who expressed high intentions to receive the vaccine, or who had already vaccinated against the flu. Therefore, participants who indicated that they had already received the vaccine were coded as high vaccination intention. To determine the significant predictors of flu vaccination, three hierarchical multiple linear regressions were conducted with flu vaccine acceptance as the dependent variable. Control variables were entered in the first steps, and predictor variables were entered in the second steps. Each component of the Theory of Planned Behaviour was expected to predict flu vaccination acceptance. In the first regression, the elements of the Theory of Planned Behaviour (flu normative beliefs, flu behavioural beliefs, flu attitudes, and flu perceived control) were entered as predictors. The significance values for the individual predictors are displayed in Table 5. Both flu normative beliefs and flu behavioural beliefs were significant, indicating that, in accordance with hypothesis I, participants with greater flu normative beliefs and greater flu behavioural beliefs were more likely to accept the flu

vaccine. In total, the four elements of the Theory of Planned Behaviour accounted for 53% of the variance in flu vaccination, $R^2 = .53$, $F(4,177) = 49.09$, $p < .001$.

Table 5.

The TPB as a Predictor of Flu Vaccination Acceptance

Variable	<i>B</i>	95% CI <i>B</i>	β
Flu normative beliefs	.64	.40, .88	.37***
Flu behavioural beliefs	.41	.18, .64	.31**
Flu attitudes	.25	-.04, .54	.14
Flu perceived control	-.32	-.86, .22	-.06
R^2		.53	
F for R^2		49.09***	

Note. CI = confidence intervals.

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

Sexual history and religiosity were not expected to be related to flu vaccination.

Low neuroticism and high conscientiousness, however, were hypothesized to predict greater flu vaccine acceptance. In the second regression, sexual history (frequency of condom use, number of intercourse partners, number of oral sex partners) was entered in the first step and the Big Five factors and religiosity were entered in the second step. The significance values for each step and the individual predictors are depicted in Table 6. Neither step, nor the final model, was significant, $R^2 = .04$, $F(9,167) = .70$, $p = .71$. Thus, sexual activity and religiosity did not predict flu vaccination, and this aspect of hypothesis II was supported. However, contrary to hypothesis II, conscientiousness and neuroticism were not related to reception of the flu vaccine.

Concerns about the pain and possible side effects of vaccination were expected to lower acceptance of the flu vaccine. It was also of interest whether perceived risk and perceived severity of the flu would affect flu vaccine acceptance. In the third regression,

Table 6.

Sexual History, Big Five Factors, and Religiosity as Predictors of Flu Vaccination Acceptance

Variable	Model 1			Model 2		
	<i>B</i>	95% CI <i>B</i>	β	<i>B</i>	95% CI <i>B</i>	β
Condom use	.01	-.27, .29	.01	.07	-.21, .35	.04
Intercourse partners	.12	-.58, .82	.04	.09	-.63, .81	.03
Oral partners	-.19	-.92, .53	-.06	-.26	-1.00, .49	-.08
Extraversion				.65	.03, 1.28	.18*
Agreeableness				.18	-.53, .89	.04
Conscientiousness				-.01	-.61, .59	-.003
Neuroticism				.42	-.17, 1.01	.13
Openness				.15	-.52, .81	.03
Religiosity				.003	-.02, .03	.02
ΔR^2		.002			.04	
<i>F</i> for change in R^2		.09			1.00	

Note. CI = confidence intervals.

* $p < .05$

fear of flu injection pain and fear of flu injection side effects were entered in the first step and flu perceived risk and flu perceived severity were entered in the second step. The significance values for each step and the individual predictors can be seen in Table 7. The first step was not significant, indicating that, contrary to Hypothesis III, concerns about the possible pain and side effects associated with the flu vaccine were not related to acceptance of the flu vaccine. In the second step, perceived risk and perceived severity were both significant, indicating that women with a greater perceived risk of the flu and a greater perceived severity of the flu were more likely to accept the flu vaccine. Combined, all of these variables accounted for 26% of the variance in flu vaccination acceptance, $R^2 = .26$, $F(4,176) = 15.08$, $p < .001$.

Table 7.

Vaccine Characteristics, Perceived Risk, and Severity as Predictors of Flu Vaccination Intentions

Variable	Model 1			Model 2		
	<i>B</i>	95% CI <i>B</i>	β	<i>B</i>	95% CI <i>B</i>	β
Flu pain	-.11	-.26, .05	-.10	-.08	-.21, .06	-.07
Flu side effects	.86	.12, 1.59	.18*	.62	-.04, 1.27	.13
Flu perceived risk				.35	.18, .52	.28***
Flu perceived severity				.54	.33, .75	.34***
ΔR^2		.03			.22	
<i>F</i> for change in R^2		2.89			26.44***	

Note. CI = confidence intervals.

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

Conscientiousness and HPV Vaccination

It was hypothesized that conscientiousness would predict greater HPV vaccine acceptance, but only for women with more positive attitudes toward HPV or greater HPV knowledge. Higher conscientiousness was indeed associated with greater HPV vaccination acceptance, $r = .18$, $p < .05$, so to explore a possible moderating relationship, two hierarchical regression analyses were conducted. The variables were centered, and the interaction terms were created. In the first regression, HPV attitudes and conscientiousness were entered in the first step and the interaction term was entered in the second step. The interaction was not significant, $\beta = .08$, $t(177) = 1.33$, $p = .18$. In the second regression, HPV knowledge and conscientiousness were entered in the first step and the interaction term was entered in the second step. The interaction was not significant, $\beta = .12$, $t(176) = 1.68$, $p = .10$. Thus, neither HPV attitudes nor HPV knowledge moderated the association between conscientiousness and HPV vaccination.

Extraversion and HPV Vaccination

Past research (Markey & Markey, 2007; Miller et al., 2004) has shown that high extraversion is associated with a greater number of sexual partners, which was hypothesized to predict greater HPV vaccination acceptance. In order to explore the possibility of sexual history mediating the association between extraversion and HPV vaccination, several linear regressions were conducted, using the causal steps approach (Baron & Kenny, 1986). The results are depicted in Table 8. First, HPV vaccine acceptance, the outcome variable, was regressed on extraversion, the predictor. The relation was significant ($B = 1.00, p < .001$), so this condition was met. Next, sexual history, the mediator, was regressed on extraversion, the predictor. The relation was significant ($B = .16, p < .01$), so it was concluded that this condition was met. Next, HPV vaccine acceptance, the outcome variable, was regressed on both extraversion, the predictor, and sexual history, the mediator. The relation between sexual history and HPV vaccine acceptance while controlling for extraversion, was significant ($B = .84, p < .05$) so it was concluded that the third condition was met. The results of the third regression were then compared to the results of the first regression. The relation between extraversion and HPV vaccine acceptance from the first regression ($B = 1.00, p < .001$) decreased in the third regression, when sexual history was added ($B = .86, p < .01$). Thus, it was concluded that the last condition was met. Since the relation in condition 4 remained significant, it appears that sexual history may partially mediate the relation between extraversion and HPV vaccination.

Table 8.

Sexual History as a Mediator of the Extraversion-HPV Vaccination Relationship

Testing steps in mediation model	<i>B</i>	<i>SE B</i>	95% CI <i>B</i>	β
Testing Step 1				
Outcome: HPV vaccination acceptance				
Predictor: Extraversion	1.00	.26	.49, 1.51	.28***
Testing Step 2				
Mediator: Sexual history				
Predictor: Extraversion	.16	.05	.06, .26	.24**
Testing Step 3 and 4				
Outcome: HPV vaccination acceptance				
Mediator: Sexual history	.84	.38	.09, 1.59	.16*
Predictor: Extraversion	.86	.26	.35, 1.38	.24**

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

The causal steps approach has, however, been criticized for its low statistical power in sample sizes of less than 500, and its inability to directly assess mediation effects (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Therefore, the analysis was followed up with a nonparametric bootstrapping procedure, which can detect mediator effects in small sample sizes (Shrout & Bolger, 2002). The bootstrapping procedure's 95% confidence intervals did not contain zero (.0021, .3152), so the test was significant. The results of this test further support a mediation effect of sexual history on the relation between extraversion and acceptance of the HPV vaccine.

Sexual Activity and HPV Vaccination

To determine whether sexually active women were more likely than women with no sexual history to receive the HPV vaccine, a one-way ANOVA was performed with participation in sexual intercourse as the independent variable and HPV vaccination acceptance as the dependent variable. The ANOVA was significant, $F(1,178) = 4.19$, $p < .05$. Women who had participated in sexual intercourse ($M = 4.22$, $SD = 2.36$) were

more likely to accept the HPV vaccine than women who had never participated in sexual intercourse ($M = 3.48$, $SD = 2.29$).

In order to determine whether women who participate in risky sexual behaviour were more likely to accept the HPV vaccine, three one-way ANOVAs were conducted. In the first, oral sex partners was the independent variable and HPV vaccine acceptance was the dependent variable. The test was significant, $F(2,176) = 4.99$, $p < .01$. A Tukey's HSD test revealed that women with two or more partners in the past year ($M = 4.80$, $SD = 2.10$) were more likely to accept the HPV vaccine than women with no oral sex partners in the past year ($M = 3.32$, $SD = 2.27$). In the second ANOVA, intercourse partners was the independent variable and HPV vaccine acceptance was the dependent variable. The test was significant, $F(2,177) = 3.05$, $p < .05$. A Tukey's HSD test revealed that women with two or more partners in the past year ($M = 4.55$, $SD = 2.36$) were more likely to accept the HPV vaccine than women with no intercourse partners in the past year ($M = 3.47$, $SD = 2.27$). In the third ANOVA, condom use among sexually active participants was the independent variable and HPV vaccine acceptance was the dependent variable. The test was not significant, $F(1,112) = .003$, $p = .96$, indicating that women who always used condoms ($M = 4.26$, $SD = 2.35$) did not differ from participants who did not always use condoms ($M = 4.24$, $SD = 2.36$) on HPV vaccination acceptance. These results suggest that women with greater sexual history are more likely to accept the HPV vaccine, and hypothesis IV was supported. Since condom use was not associated with vaccine acceptance, it appears that some forms of risky sexual behaviour do not influence HPV vaccination.

Religious Affiliation and HPV Vaccination

To determine whether religion was associated with HPV vaccine acceptance, a one-way ANOVA was conducted with type of religious affiliation (Protestant, Catholic, Muslim, Other, No affiliation) as the independent variable and HPV vaccination acceptance as the dependent variable. The test was significant, $F(4,176) = 4.21, p < .01$. Since the assumption of homogeneity of variance was violated, $F(4,176) = 3.71, p < .01$, a Dunnett's T3 post-hoc test was conducted (Tabachnick & Fidell, 2006). The test revealed that Muslims ($M = 2.06, SD = 1.39$) were less likely than Protestants ($M = 3.74, SD = 2.28$), Catholics ($M = 4.59, SD = 2.31$), other religions ($M = 4.00, SD = 2.22$), and participants with no affiliation ($M = 3.76, SD = 2.46$) to accept the HPV vaccine. Type of religion does appear to have an effect on HPV vaccination.

Intention and Follow-up Behaviour

It was hypothesized that, in accordance with the TPB, intentions to receive both the HPV and the flu vaccine would be associated with their respective behaviours at the two month follow-up. To investigate this potential relation, two binary logistic regressions were conducted using only the participants who had not received the vaccines prior to the study. In the first regression, HPV follow-up behaviour was regressed on HPV vaccination intentions. The regression was not significant, $B = .56, p = .11$, indicating that, contrary to hypothesis VI, women who intended to receive the HPV vaccine were not more likely to have received it at the two month follow-up. In the second regression, flu follow-up behaviour was regressed on flu vaccination intentions. The regression was significant, $B = .52, p < .05$, indicating that, consistent with hypothesis

IV, participants who intended to receive the flu vaccine were more likely to have received it at the two month follow-up.

Discussion

Summary of Results

To summarize, although normative beliefs were not expected to be associated with acceptance of the HPV vaccine, each component of the Theory of Planned Behaviour predicted, by itself, HPV vaccination. When entered into a multiple linear regression, normative beliefs and attitudes emerged as significant predictors of HPV vaccination. In addition, women scoring higher on extraversion and conscientiousness were more likely to accept the HPV vaccine. Participants with a greater number of sexual partners in the past year, knowledge of HPV, and perceived risk of contracting the virus were more likely to accept the HPV vaccine. Women with stronger religious beliefs, particularly Muslims, had lower HPV vaccination acceptance. Contrary to hypotheses, neuroticism, openness, and concerns about cost, pain, and side effects were not related to HPV vaccination. The TPB, as a whole, also predicted flu vaccination, with normative beliefs and behavioural beliefs contributing the greatest amount of unique variance. Greater perceived susceptibility and severity of the flu predicted greater acceptance of the vaccine, but none of the individual differences or vaccine characteristics were associated with flu vaccination.

Theory of Planned Behaviour

The main purpose of the present study was to evaluate the validity of the Theory of Planned Behaviour in predicting HPV vaccination acceptance. Because the vaccine has only been available since 2006, it was predicted that subjective norms regarding vaccination trends and expectancies from significant others would not yet be well

established. As such, the normative beliefs component of the TPB would not predict HPV vaccination. However, the results did not support this hypothesis, as greater HPV normative beliefs were associated with greater HPV vaccine acceptance. On its own, each element of the TPB was associated with HPV vaccination. However, once the shared variance was removed, only normative beliefs and attitudes remained statistically significant predictors.

Although the HPV vaccine is relatively new, it appears that the social norms of vaccination must already be well known. This rapid spread of public health knowledge and beliefs is probably due, at least in part, to the vigorous marketing of the vaccine by its manufacturer, Merck Frosst. Its campaigns, including “Tell someone,” “One less,” and “Everything I can,” focusing mainly on the link between HPV and cervical cancer, have been widely circulated in television, radio, and print (Siers-Poisson, 2007). In the past, media advertising has influenced the public’s perceptions and opinions on health behaviours such as colorectal cancer screening, smoking cessation, and diabetes treatment adherence (e.g., Campo et al., 2008; Gallivan, Lising, Ammary, & Greenberg, 2007; Niederdeppe, Farrelly, Thomas, Wenter, & Weiztenkamp, 2007). In addition, the HPV vaccine has generated controversy concerning the lack of research of its long term effects, which has been well-publicized (Lippman et al., 2007). The media devotion to the HPV vaccine has likely helped people form opinions of the vaccine, whether positive or negative, and thus contributed to the early establishment of its social norms.

In addition to the marketing of the HPV vaccine, parental attitudes toward the vaccine are likely also an influence on young women’s subjective norms. As previously

mentioned, many parents are hesitant to vaccinate their young daughters due to the sexual transmission and connotations of the virus (Constantine & Jerman, 2007; Friedman & Shepeard, 2007). Although the participants in this study were adult women capable of making their own health-related decisions, the age range was 17 to 27, with a mean age of just 18.84 ($SD = 1.64$). Even after young adults have left the home for college, their parents' attitudes remain an important influence on their health behaviour choices (Abar & Turrisi, 2008; Mims & Sarris, 1992). It is possible that parents have voiced their opinions regarding the HPV vaccine to their daughters, resulting in clear subjective norms and vaccination acceptance that fit accordingly.

The unsupported hypothesis that normative beliefs would not be associated with HPV vaccination also holds important implications for the Theory of Planned Behaviour. The TPB has been useful in predicting engagement in many well-known preventive health behaviours, including cholesterol screening, condom use, and sun protection (Bryan et al., 2004; Deskins et al., 2006; Jackson & Aiken, 2000). However, all of the components of the TPB, including normative beliefs, predicted acceptance of the HPV vaccine, available for just two years at the time of the present study. These results provide evidence that the TPB can help explain even recently developed areas of preventive health.

The TPB as a whole accounted for 40% of the variance in HPV vaccination acceptance, which falls in the typical 25%-55% range of past studies of various health behaviours (e.g., Andrykowski, Beacham, Schmidt, & Harper, 2006; Armitage, Norman, & Conner, 2002; Gallagher & Povey, 2006; Godin & Kok, 1996; Keats, Culos-Reed,

Courneya, & McBride, 2007; Pawlak & Malinauskas, 2008). Despite significant correlations of each element of the TPB with HPV vaccination, only normative beliefs and attitudes remained in the final model, indicating a large proportion of shared variance between the various components of the theory (inter-item $r_s = .33 - .67$, $p_s < .001$). The present study adds to the body of research on the TPB by demonstrating that all of its components, particularly normative beliefs and attitudes, can predict a significant proportion of the variance in acceptance of a behaviour not previously explored by the TPB, HPV vaccination.

In addition, the present study went beyond many of the others conducted on the TPB (e.g., Arvola et al., 2008; Caperchione, Duncan, Mummery, Steele, & Schofield, 2008; Cha, Kim, & Patrick, 2008; Chatzisarantis, Hagger, & Smith, 2007; Myklestad & Rise, 2007; Pawlak & Malinauskas, 2008; Williams, Povey, & White, 2008), by exploring an important tenet of the theory, that is, the association between intentions and behaviour. According to the TPB, the main components, normative beliefs, behavioural beliefs, attitudes, and perceived control are necessary to form an intention to perform a health behaviour. However, also central to the theory is the notion that this intention will actually lead to the performance of the behaviour (Ajzen, 1991). In the present study, intention predicted behaviour, but only for flu vaccination. The data were collected in November, when the flu vaccine is typically first made available to the public (Centers for Disease Control and Prevention, 2008b), which likely contributed to the significant relation. The lack of association between intentions and behaviour for the HPV vaccine, however, may indicate that young women may still be uncertain in their intentions to

vaccinate. Thus, although normative beliefs were predictive of HPV vaccine acceptance, the HPV vaccine might not yet be an established or accepted area of preventive health. Nonetheless, although there was no association for HPV vaccination, the present study supported past research on the TPB by satisfying its final condition, a predictive relation between intention and behaviour, for the flu vaccine.

Personality Traits

It was hypothesized that neurotic individuals, who typically engage in poor health behaviours and might experience anxiety about an only recently developed vaccine, would express lower HPV vaccination acceptance. Neuroticism was not, however, significantly associated with HPV vaccination. There are several reasons for this lack of relation. First, the poor health behaviours typically associated with neuroticism tend to be forms of coping with stress, such as consumption of junk foods, a lack of or an excess of sleep, and alcohol and tobacco consumption (e.g., Booth-Kewley & Vickers, 1994; Ingledew & Brunning, 1999; Williams, O'Brien, & Colder, 2004). These coping behaviours may not, however, generalize to an active choice of preventive health, such as a vaccine. Indeed, neuroticism was also not related to engagement in a similar behaviour, flu vaccination, in the present study. Furthermore, while neurotic individuals tend to report a higher number and greater perceived severity of physical symptoms, they often do not seek treatment for illness (Watson & Pennebaker, 1989). The relationship between neuroticism and vaccination behaviour remains unclear.

It is also possible that the women scoring higher on neuroticism had not yet actively formed concrete vaccination intentions. This study was conducted in November,

a month when final course assignments are typically due, and just weeks before final examinations. Because neurotic individuals tend to experience a great deal of worry and anxiety, the more neurotic participants in the present study were likely too preoccupied with their academic burden to consider their actual personal acceptance of the HPV vaccine. Without clearly thought out intentions, it would be difficult to find a relationship between neuroticism and HPV vaccination acceptance.

Women who score higher on openness, however, tend to accept new ideas and developments. They were therefore expected to have greater reception of the HPV vaccine. Like neuroticism, however, there was no relation between openness and HPV vaccination. The absence of relationship may be due, in part, to the mixed results concerning openness and health behaviours. Earlier personality research (e.g., Booth-Kewley & Vickers, 1994) has associated openness with poor health behaviours, including substance abuse. More recent studies, however, have found evidence that open individuals tend to practice safe sex and have a healthy diet (deBruijn et al., 2005; Miller et al., 2004). It is possible that no relation was found between openness and HPV vaccination because women who are open to experience tend to engage in a variety of health behaviours, both positive and negative. Thus, there is no clear trend in acceptance of a particular area of preventive health, the HPV vaccine.

Furthermore, the strong positive association between subjective norms and HPV vaccination may provide an indication as to why openness was not predictive of intentions. As previously mentioned, although the HPV vaccine has only been available to the public since 2006, it has been widely advertised and debated in the media. It

appears that, perhaps due to the marketing and controversy surrounding the vaccine, clear social norms have already been established. Therefore, the HPV vaccine may not be viewed as a new innovation in preventive health and, as such, would not be related to a personality trait such as openness.

There were no specific hypotheses regarding the relationship between conscientiousness and HPV vaccination. Conscientiousness is consistently associated with healthy behaviours such as proper nutrition (e.g., Bogg & Roberts, 2004; Booth-Kewley & Vickers, 1994; Ingeldew & Brunning, 1999; McCann, 2005). However, due to the lack of knowledge of long term effects, it was not known whether conscientious women would perceive the HPV vaccine as a safe area of preventive health. Therefore, knowledge of HPV and attitudes toward the vaccine were explored as potential moderators of the relation between conscientiousness and HPV vaccination. The results did not indicate that a moderated relationship was present. However, conscientiousness remained in the final model of HPV vaccination predictors, indicating that conscientious women are more likely to accept the HPV vaccine. This relationship supports past research linking conscientiousness to beneficial health behaviours. Because conscientious individuals tend to engage in healthy behaviours, the results indicate that the HPV vaccine is likely considered a positive area of preventive health.

There were also no specific predictions for the relation between extraversion and HPV vaccination. Extraversion has, in the past, been associated with healthy behaviours, such as exercise (e.g., Booth-Kewley & Vickers, 1994), but also unhealthy behaviours, including a greater number of sexual partners (Gute & Eshbaugh, 2008; Markey &

Markey, 2007; Miller et al., 2004). Because of this association with sexual history, and the hypothesized relationship of sexual behaviour and HPV vaccination, a mediated relation was explored. The results indicated that sexual history did, in part, mediate the relationship between extraversion and HPV vaccination acceptance. This mediated relationship seems to suggest that extraverted women are more likely to accept the HPV vaccine due to a greater perceived risk of contracting HPV. Thus, although extraverted women engage in risky sexual behaviour by reporting a greater number of sexual partners, they are also behaving in a healthy manner by vaccinating themselves against a sexually transmitted infection, HPV. High perceived risk has been a motivating factor for extraverted individuals to perform a proactive health behaviour, cessation of smoking. (Hampson, Andrews, Barckley, Lichtenstein, & Lee, 2006). In order to increase HPV vaccination acceptance among extraverted women, their perceived risk due to sexual activity should be made clear.

Religious Beliefs

In past research investigating the psychosocial influences on parents' acceptance of the HPV vaccine for their young daughters, strong religious affiliation emerged as a significant barrier to vaccination, primarily due to the sexual transmission of the virus (Constantine & Jerman, 2007; Sussman et al., 2007). It was therefore expected that in the present study of young undergraduate women, participants with stronger religious beliefs would be less likely to receive the HPV vaccine. Because religiosity remained in the final multiple linear regression model of individual differences, this hypothesis was met. In the past, religion has served as a protective factor for illness, and individuals with strong

spiritual beliefs tend to engage in healthy behaviours, including exercise and good nutrition, and avoid risky behaviours such as drug, alcohol, and tobacco consumption (e.g., George, Ellison, & Larson, 2002; Mahoney et al., 2005; Strawbridge, Shema, Cohen, & Kaplan, 2001). One study, in fact, found that a strong sense of religious affiliation was predictive of cholesterol screening, mammograms, and flu vaccination, all preventive health behaviours similar to HPV vaccination (Benjamins & Brown, 2004). None of the illnesses associated with these behaviours, however, are transmitted sexually. Religiosity appears to promote participation in preventive health behaviours, except when the behaviour has sexual connotations.

This association between religious and sexual beliefs was further emphasized when the type of religious affiliation in relation to HPV vaccination was investigated. One study (Constantine & Jerman, 2007) found that parents of African-American, Asian-American, and Protestant backgrounds were less likely than Hispanics, Catholics, and parents with no religious affiliation to vaccinate their young daughters against HPV. In the present study, however, only women who identified themselves as Muslims had significantly lower vaccine acceptance than each of the other religions. Although Muslims tend to strictly avoid risky health behaviours, particularly drug and alcohol consumption (Michalak & Trocki, 2006), it is the abstention from sex that is most important for young unmarried women (Coleman & Testa, 2008; Khoei, Whelan, & Cohen, 2008). For Muslim women living in Canada and the United States, language, a shortage of local, female, extended family members as companions to appointments, and the perception of the self as a “stranger” in the health care system have been cited as

barriers to preventive health behaviours (Bottorff et al., 1998; Simpson & Carter, 2008). However, in the case of vaccination against a virus such as HPV, the sexual connotations of the disease are likely the greatest obstacle in acceptance. Muslim women tend to avoid preventive health behaviours that publicly display their sexual activity, such as purchase of contraception (Coleman & Testa, 2008), and might choose to avoid receiving the HPV vaccine for fear of being labeled “promiscuous,” whether they are sexually active or not. Among women with strong religious beliefs, particularly those of the Muslim faith, the sexual transmission of HPV is likely the cause of low vaccination acceptance.

Sexual History

Aside from its close relation to religious beliefs, sexual activity may play a role in determining young women’s acceptance of the HPV vaccine. Past research (e.g., Gerend & Magloire, 2008) has found that women with a greater number of sexual partners, in addition to simply being sexually active, were more likely to express interest in receiving the HPV vaccine. It was therefore predicted that women with greater sexual history would be more likely to accept the HPV vaccine than women with little or no sexual history. This hypothesis was supported, as participants with at least two sexual intercourse or oral sex partners had greater vaccination acceptance than women who had not participated in intercourse or oral sex in the past year. In addition, women who had never participated in sexual activity had significantly lower HPV vaccination acceptance than women who indicated they were sexually active. These results seem to support the idea that sexual activity increases perceived risk of contracting HPV, resulting in greater acceptance of the vaccine (Gerend & Magloire, 2008; Gerend & Shepherd, 2007). Still,

these results are troubling, as the benefits of the HPV vaccine are maximized before the onset of sexual activity (Public Health Agency of Canada, 2007). Women who have never participated in sex, however, are not eager to vaccinate themselves.

In past studies, parents have voiced concern that vaccinating their daughters against HPV will give them a false sense of sexual security and result in risky sexual behaviour (Constantine & Jerman, 2007; Dinh et al., 2007; Friedman & Sheppard, 2007; Sussman et al., 2007). As such, the association between HPV vaccination and risky sexual behaviour, specifically number of intercourse partners, number of oral sex partners, and frequency of condom use, was explored. Although, as previously mentioned, a higher number of sexual partners in the past year was associated with acceptance of the HPV vaccine, the relationship between vaccination and condom use was not significant. These results should help ease parents' apprehensions because, although HPV vaccination is associated with a greater number of sexual partners, it is not related to infrequent condom use, and will likely not put young women at greater risk for many serious sexually transmitted infections.

HPV Knowledge

Insufficient or inaccurate knowledge about HPV and its vaccine has been a significant barrier to vaccine acceptance among both parents and young women (Chan et. al, 2007; Friedman & Sheppard, 2007; Gerend & Magloire, 2008). It was therefore expected that, in the present study, women with greater knowledge of HPV and the benefits of its vaccine would be more likely to accept the vaccine. Because greater HPV knowledge was associated with greater HPV vaccination acceptance on its own, this

hypothesis was supported. Overall, the present study's sample of undergraduate women had low knowledge of HPV. Out of ten true or false response questions, the mean number of correct responses was just 5.74 ($SD = 1.64$), with only 13.1% of participants obtaining at least 8 correct responses. Indeed, several participants informed the researcher that they had never heard of HPV. Although Merck Frosst's current marketing campaign emphasizes the link between HPV and cervical cancer, young women should be better educated on the other consequences and transmission of the virus, as well as the benefits and potential side effects of the vaccine, in order to help them make a well-informed decision about vaccination.

Although knowledge of HPV predicted HPV vaccination acceptance on its own, once included in a multiple linear regression with the elements of the Theory of Planned Behaviour, it became insignificant. This adds further support to the predictive value of the TPB, since it accounted for a significantly larger proportion of variance in HPV vaccination than HPV knowledge, shown by past research to be one of the most important factors in decision to vaccinate. Although extensive, accurate knowledge of HPV and its vaccine is important, elements of the TPB, such as normative beliefs and attitudes, are more influential in choosing to receive the HPV vaccine.

Concerns About Cost, Pain, and Side Effects

Although the Carleton University student drug plan covers approximately 80% of the cost of the three injections of the HPV vaccine, students must pay for the remaining 80 dollars of the vaccine. Because the price of the HPV vaccine is sometimes cited as a barrier to vaccination (Friedman & Sheppard, 2007; Hoover et al., 2000), it was expected

that women who perceive the vaccine as costly would be less likely to vaccinate. In addition, the pain of injection, as well as the potential associated side effects, have made girls and women apprehensive about receiving the vaccine in the past (Constantine & Jerman, 2007; Dempsey et al., 2006). It was therefore hypothesized that women who fear the pain and potential side effects of the HPV vaccine would be less likely to accept the vaccine. None of these hypotheses, however, were supported. Both the variables of importance of cost and fear of side effects were very negatively skewed, indicating that most of the participants, whether they accepted the vaccine or not, placed a high importance on both. It appears that, although the cost and potential side effects of the HPV vaccine are a significant concern for young women, they do not influence acceptance of the vaccine.

Predictors of Influenza Vaccination Acceptance

In the past, the TPB has reliably predicted engagement in many preventive health behaviours, including flu vaccination (e.g., Daley et al., 2007; Gallagher & Povey, 2006; Wray et al., 2007). As expected, in the present study, each component of the TPB was, on its own, significantly associated with flu vaccination. When controlling for the shared variance in a multiple linear regression model, normative beliefs and behavioural beliefs remained significant predictors. In total, the TPB accounted for 53% of the variance in flu vaccination acceptance. In addition, as previously mentioned, intentions to receive the flu vaccine predicted self-reported vaccination two months later, supporting another important component of the TPB, the association between intentions and behaviour. For

both HPV and the flu, the TPB was a strong predictor of vaccination, as it has been for preventive health behaviours in the past.

In addition to the elements of the TPB, other potential predictors of the flu vaccine help to gain insight to the possible motivators and barriers to HPV vaccine acceptance. While HPV is transmitted sexually, the flu has no sexual associations. As expected, strong religious beliefs and low sexual history were predictive of lower HPV vaccine acceptance. However, these constructs were not related to reception of the vaccine for a non-sexually transmitted virus, the flu. This lack of association between religiosity, sexual history, and flu vaccination intentions further indicates that it may be the sexual connotations associated with HPV that prevent young women with a strong religious affiliation from fully accepting the HPV vaccine.

Neuroticism has, in the past, been associated with risky health behaviours, including alcohol and tobacco consumption (e.g., Booth-Kewley & Vickers, 1994; Ingledew & Brunning, 1999; Williams et al., 2004). It was therefore expected that women scoring higher on neuroticism would be less likely to receive the flu vaccine. Conscientious individuals, meanwhile, tend to engage in healthier behaviours, such as proper nutrition and condom use (e.g. Booth-Kewley & Vickers, 1994; Ingledew & Brunning, 1999; McCann, 2005). Therefore, high conscientiousness was expected to be associated with greater flu vaccination acceptance. Neither of these hypotheses, however, was supported. Much of the research conducted on the psychosocial predictors of the flu vaccine has focused on middle aged to older adults (e.g., Chapman & Coups, 1999; Gallagher & Povey, 2006; Wray et al., 2007), who are at greater risk for developing the

flu (Centers for Disease Control and Prevention, 2008b). The participants in this study, however, ranged in age from 17-27 years, with a mean age of just 18.84 ($SD = 1.64$). When perceived risk is low, neurotic individuals might not experience worry and anxiety about contracting the virus. In addition, although conscientious individuals tend to engage in preventive health behaviours, with low perceived risk of developing an illness, vaccination will likely be a low priority. Personality traits, such as neuroticism and conscientiousness, have been associated with a variety of healthy and unhealthy behaviours. However, for a behaviour not as important for an individual's stage of life, the predictive validity of these traits diminishes.

Limitations and Future Research

There are several areas of the present study that could be improved upon in future research of the HPV vaccine. First, the flu vaccine was used as a comparison health behaviour because it was an older, more accepted method of preventive health, with subjective norms likely already well-known. The HPV vaccine, meanwhile, has only recently been made available to the public and, prior to the study, the role of subjective norms in accounting for vaccination acceptance was not clear. Because normative beliefs were found to significantly predict both HPV and flu vaccination, the Theory of Planned Behaviour's predictive efficacy did not differ on either behaviour. However, in this sample of young undergraduate women, acceptance of the flu vaccine was not associated with any of the Big Five factors of personality, which have been known to predict many types of health behaviours, possibly due to low perceived risk of developing the flu. Perhaps, instead of the flu vaccine, a form of preventive health targeted toward the age

group of the study could be used as a contrast to the HPV vaccine. For instance, adolescents and young adults between the ages of 15 to 19 years, particularly those living in residence, are at risk for contracting meningococcal meningitis, a bacterial disease with potentially fatal consequences (Health Canada, 2006). The vaccine, available to the public since 2002, is older than the HPV vaccine. It has not, however, received nearly as much media attention and marketing as Gardasil in Ontario. Future research on the TPB might compare the two vaccines to determine whether, due to media attention and controversy, normative beliefs might predict HPV vaccination better than a slightly older method of preventive health benefiting the same age group, meningococcal vaccination.

Although flu vaccination acceptance did not differ from acceptance of the HPV vaccine through the TPB, it did provide insight into other possible predictors of HPV vaccination. Because a greater number of sexual partners and low religiosity were predictive of acceptance of the HPV, but not the flu vaccine, it appears that it may be the sexual transmission of HPV that serves as a barrier to vaccination for women with strong religious beliefs. It would be interesting to further explore this relation between sexual health, HPV vaccination, and religiosity. Although the present study included an item on condom use, which was not related to HPV vaccination, it did not measure other areas of prevention, such as Pap testing and STI history, which have been associated with HPV perceived risk in the past (Gerend & Magloire, 2008). Future research should incorporate STI prevention behaviours and history, as well as contraceptive use, as comparisons to the HPV vaccine, to determine whether other areas of sexual health are more or less associated with religious beliefs.

In addition, the measurement of intentions and follow-up behaviour might be considered a limitation to the present study. In the few published studies on women's acceptance of the HPV vaccine, intentions have been operationalized as both dichotomous (Gerend & Magloire, 2008) and continuous Likert items (Gerend & Shepherd, 2007). In the present study, intentions were assessed with the statement "I will receive the HPV/flu vaccine in the next two months," with responses made on a 7-point Likert scale, ranging from 1 = "Disagree," to 7 = "Agree." This response format was ideal for the present study, as it is able to capture uncertainties in HPV vaccination intentions, particularly for women who had not previously heard of or thought about HPV. At the same time, however, it also does not force participants to choose from two options, intention or no intention to vaccinate, which would not allow for an "on the fence" response, and thereby fail to capture the true relation between intentions and the predictors.

Furthermore, due to the present study's time constraints, the behaviour follow-up e-mail was sent just two months after the initial assessment. For the flu vaccine, a significant relation was found between intentions and behaviour, likely due to the November timing of the present study. However, only three women had received the HPV vaccine by the follow-up measurement. As a result, there was no significant relation between HPV vaccination intentions and behaviour. Many studies have found that the intention-behaviour relationship is most valid for intentions that remain stable over time (e.g., Conner & Godin, 2007; Conner, Norman, & Bell, 2002; Conner, Sheeran, Norman, & Armitage, 2000). In order to determine whether intentions to receive the HPV vaccine

do indeed predict vaccination, as well as the temporal strength of this relationship, future research should measure the association between intentions and behaviour over a longer period of time.

The Theory of Planned Behaviour's efficacy in predicting acceptance of the recently developed HPV vaccine was the central focus of the present study. However, two items measuring perceived risk and perceived severity of HPV were also included. These items are derived from the Health Belief Model (HBM), a theory of action which holds that, along with perceived susceptibility and perceived severity, a health behaviour depends on perceived benefits, similar to the TPB's behavioural beliefs; perceived barriers; cues to action; and self-efficacy, which is virtually the same as the TPB's perceived behavioural control (Rosenstock, Strecher, & Becker, 1988). In the present study, the TPB was chosen as the theory to evaluate due to its normative beliefs component. The TPB and the HBM have been compared in predictive validity on a number of health behaviours, including seat belt use, colorectal cancer screening, and condom use (Ozakinci & Weinman, 2006; Palmer et al., 2007; Simsekoglu & Lajunen, 2008). Although the present study did include single item measures of perceived susceptibility and perceived risk, as well as indirect measures of a few of the potential barriers to HPV vaccination, such as cost, pain, and side effects, it was not sufficient to make inferences about the HBM's strength in predicting HPV vaccination. Future studies should incorporate both the TPB and the HBM in full to compare their respective predictive validity in reception of the HPV vaccine.

Potential Implications

The implications of the present study are twofold. First, the results contribute to those of past research on two supported psychological theories, the Theory of Planned Behaviour and the Big Five Factor model of personality. Each component of the TPB was associated with HPV vaccination, with normative beliefs and attitudes contributing the most unique variance. As a whole, the TPB accounted for 40% of the variance in acceptance of the HPV vaccine. The results of the present study contribute to the body of research on the TPB by adding a new preventive health behaviour to the wealth of others the theory has predicted. The TPB was an effective predictor for even a newly developed area of preventive health, HPV vaccination.

The results also hold important implications for the Big Five traits of personality in relation to preventive health behaviours. Extraversion was associated with greater HPV vaccination acceptance but this relation was mainly due to increased perceived risk of developing HPV, through a greater number of sexual partners, which replicates research on extraversion and increased sexual activity. Also, conscientious women were more likely to accept the HPV vaccine, which builds upon past research by demonstrating that, even when the long term effects are not known, conscientiousness will reliably predict engagement in preventive health behaviours. Furthermore, neuroticism was not associated with HPV vaccination, indicating that, although neuroticism has been linked to risky health behaviours in the past, it may not always be related to preventive health. There was no association, meanwhile, between flu vaccination and any of the Big Five factors. It is possible that, particularly for conscientiousness, the validity of the Big Five

factors in predicting preventive health behaviours tends to decrease when the person does not perceive herself as at serious risk for the particular illness. While the Big Five factors of personality undoubtedly play a role in engagement in health behaviours, the results of the present study suggest that for certain behaviours, other potentially moderating effects must be taken into account.

It is important to note that the potential long term side effects of the HPV vaccine are not yet known. If, however, long term safety and efficacy of the vaccine are proven then, in addition to the theoretical findings, the present study may have generated some important practical implications. Since the introduction of the HPV vaccine, health education centers such as Carleton University's Health and Counselling Services have sought to increase vaccine acceptance among female university students, and are supported by Merck Frosst in their efforts. These health care providers could interpret the results in implementing programs to raise vaccination rates. For instance, because of the strong association between normative beliefs and HPV vaccination, the university could employ student volunteers as "peer mentors," to inform other young women of the current trends in vaccine acceptance. Also, in order to increase vaccination rates among less conscientious women, Health and Counselling Services might set up HPV vaccine clinics around campus, as they currently do with the flu vaccine, so that women would not have to set up an appointment at the main health centre.

The implications of the present study extend beyond the university's health program. Governmental organizations such as Health Canada and the Public Health Agency of Canada would likely be interested in results that provide insight into reasons

for the generally low vaccination rates in many provinces, including Ontario, and ways to improve them. For this purpose, the present study contained an item measuring perceived susceptibility to HPV. Greater perceived risk was associated with greater acceptance of the vaccine. Also, women with a greater number of sexual partners were more likely to accept the HPV vaccine than women with no sexual history, which provides further evidence for the role of perceived risk in vaccination. Health Canada should build upon this relation, and emphasize not only the transmission of HPV through any sexual contact, but also the high commonality of the virus among sexually active women.

This association between high perceived susceptibility and greater vaccine acceptance also provides insight to one reason for low vaccination rates. Women who have not participated in sexual activity do not perceive themselves as at risk for contracting HPV, and thus do not express great interest in receiving the vaccine. These women, however, stand to receive the greatest benefits from the vaccine. As a result, the potential for maximal prevention of HPV and its possible consequences, cervical cancer and genital warts, decrease. Governmental HPV campaigns should stress the importance of vaccinating before the onset of sexual activity, in order to increase acceptance of the HPV vaccine.

Conclusion

The present study provided some indications to the psychosocial factors that contribute to acceptance of the HPV vaccine. The Theory of Planned Behaviour, in particular, reinforced its predictive validity in preventive health behaviours by contributing to a significant proportion of variance in HPV vaccination. Extraverted and

conscientious women were also more likely to accept the HPV vaccine. Furthermore, women with a greater knowledge of HPV, more sexual partners in the past year, and few religious beliefs had greater HPV vaccine acceptance. The results of the present study built upon past research of psychological theories by applying them to a preventive health behaviour not yet extensively researched, HPV vaccination. In addition, the present study's findings provide important implications and suggestions for both small scale health services and national governmental health agencies to increase awareness of HPV and, ultimately, acceptance of the vaccine. In the forthcoming years, as the research on the HPV vaccine amasses, the predictors of and barriers to vaccination should become clear and, as a result, policies should be implemented to decrease the incidence of this virus and its serious potential consequences.

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Footnotes

¹ To assess the influence of predictor variables on just intentions to receive the HPV vaccine, analyses were run a second time using only participants who had not yet been vaccinated ($n = 148$). Knowledge, TPB items, sexual history, extraversion, and perceived risk remained significant predictors. Conscientiousness and religiosity, however, did not predict intentions to vaccinate. Muslim women ($M = 2.06$, $SD = 1.39$) remained significantly less likely than Catholic participants ($M = 3.69$, $SD = 2.08$) to intend to receive the HPV vaccine.

Appendix A

Online Recruitment Notice

Study Name: Health behaviours and experiences of female students

Description:

This is a one-time questionnaire on the health behaviours and experiences of female undergraduate students. We are interested in what motivates people to engage in specific preventive health behaviors. There will also be an optional follow-up e-mail containing two questions.

Duration: Session 1 = 1 hour; Follow-up e-mail = 5 minutes

Percentage: Session 1 = 1%; Follow-up e-mail = .5%

Researchers:

Dr. Mary Gick: mgick@connect.carleton.ca

Kim Watkins: kwatkins@connect.carleton.ca

(613) 520-2600 ext 3781

A500C Loeb Building

Appendix B

Informed Consent

The purpose of an informed consent is to ensure that you understand the purpose of the study and the nature of your involvement. The informed consent must provide sufficient information such that you have the opportunity to determine whether you wish to participate in the study.

Present study: Health behaviours and experiences of female students

Research personnel. The following people are involved in this research project and may be contacted at any time: Dr. M. Gick (Faculty researcher, 520-2600, ext. 1727, mgick@connect.carleton.ca) and Kim Watkins (MA thesis student, 520-2600, ext. 3781; kwatkins@connect.carleton.ca). Should you have any ethical or other concerns about this study then please contact Dr. Avi Parush, Carleton University Ethics Committee for Psychological Research, 520-2600, ext. 6026) or Dr. J. Mantler (Chair, Dept. of Psychology, 520-2600, ext. 2648).

Purpose. The purpose of this study is to explore and better understand health behaviours and experiences in female students at Carleton, particularly behaviors that prevent medical problems (e.g., obtaining vaccines).

Task requirements. You will be asked to complete several questionnaires about yourself. Some of these contain personal information about your religious affiliation and questions about sexual activity and safe sex. You will also be given questionnaires about your typical ways of doing things or thinking about people, and intentions to do things in the future, such as obtaining a vaccine.

Duration and locale. The questionnaire session will last about 1 hour and will take place in Room A500C of the Loeb Building, Carleton University. Testing may occur in small groups.

Potential risk/discomfort. There is no known risk to participation in the current study. It is possible that some people might experience temporary distress when completing some of the questionnaires that ask about sexual background.

Anonymity/confidentiality. The data collected in this experiment are confidential and made available only to researchers associated with this project. All data are coded numerically such that your name is not associated with the data.

Right to withdraw. You have the right to withdraw from the experiment at any time, and to not answer any questions, without academic penalty.

ACKNOWLEDGMENT

I ACKNOWLEDGE THAT I HAVE READ AND UNDERSTOOD THIS AGREEMENT, that I have executed this agreement voluntarily. **SIGNED THIS** _____ day of _____, 20____, at Ottawa Ontario.

Signature _____ Date _____

In addition, because we may want to follow up with a brief email in the winter, please indicate here if you give us permission to contact you by email in the winter of 2009:

I consent to being contacted with a brief email in winter term 2009:

Signature: _____

Email: _____

I do not consent to being contacted with a brief email in winter 2009:

Signature: _____

- 6 **Current living arrangements:**
1. ☐ Alone
 2. ☐ With parents or relatives
 3. ☐ Dorm or shared apartment with a friend
 4. ☐ Conjugal (intimate relationship with one other person, including spouse, boyfriend or girlfriend, etc.)
 5. ☐ Other (please specify): _____
- 7 **Please indicate your present employment status:**
1. ☐ Unemployed
 2. ☐ Employed full-time
 3. ☐ Employed part-time
- 8 **Are you currently working toward a degree or diploma?**
1. ☐ No
 2. ☐ Yes, I am a *full-time* student
 3. ☐ Yes, I am a *part-time* student
- 9 **What is your family income?**
1. ☐ \$10,000 to 19,000	2. ☐ \$20,000 to 29,000
3. ☐ \$30,000 to 39,000	4. ☐ \$40,000 to 49,000
5. ☐ \$50,000 to 59,000	6. ☐ \$60,000 to 69,000
7. ☐ \$70,000 to 79,000	8. ☐ \$80,000 and above
- 10 **Highest level of education completed:**
1. ☐ Completed graduate training (M.A., Ph.D.)
 2. ☐ Some graduate school (M.A., Ph.D.)
 3. ☐ Completed university/college
 4. ☐ Some university/college
 5. ☐ Completed CEGEP
 6. ☐ Some CEGEP

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

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 _____
27. Can be cold and aloof _____
28. Perseveres until the task is finished _____
29. Can be moody _____
30. Values artistic, aesthetic experiences _____
31. I 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 _____

|

Spiritual Involvement and Beliefs Scale

Please answer the following questions by checking your response.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. In the future, science will be able to explain everything.	_____	_____	_____	_____	_____
2. I can find meaning in times of hardship.	_____	_____	_____	_____	_____
3. A person can be fulfilled without pursuing an active spiritual life.	_____	_____	_____	_____	_____
4. I am thankful for all that has happened to me.	_____	_____	_____	_____	_____
5. Spiritual activities have not helped me become closer to other people.	_____	_____	_____	_____	_____
6. Some experiences can be understood only through one's spiritual beliefs.	_____	_____	_____	_____	_____
7. A spiritual force influences the events in my life.	_____	_____	_____	_____	_____

8. My life has a purpose.	_____	_____	_____	_____	_____
9. Prayers do not really change what happens.	_____	_____	_____	_____	_____
10. Participating in spiritual activities helps me forgive other people.	_____	_____	_____	_____	_____
11. My spiritual beliefs continue to evolve.	_____	_____	_____	_____	_____
12. I believe there is a power greater than myself.	_____	_____	_____	_____	_____
13. I probably will not reexamine my spiritual beliefs.	_____	_____	_____	_____	_____
14. My spiritual life fulfills me in ways that material possessions do not.	_____	_____	_____	_____	_____
15. Spiritual activities have not helped me develop my identity.	_____	_____	_____	_____	_____

16. Meditation does not help me feel more in touch with my inner spirit.	_____	_____	_____	_____	_____
17. I have a personal relationship with a power greater than myself.	_____	_____	_____	_____	_____
18. I have felt pressured to accept spiritual beliefs that I do not agree with.	_____	_____	_____	_____	_____
19. Spiritual activities help me draw closer to a power greater than myself.	_____	_____	_____	_____	_____

Please indicate how often you do the following:

	Never	Rarely	Sometimes	Usually	Always
20. When I wrong someone, I make an effort to apologize.	_____	_____	_____	_____	_____
21. When I am ashamed of something I have done, I tell someone	_____	_____	_____	_____	_____
22. I solve my problems without					

using spiritual
resources.

23. I examine my
actions to see if
they reflect my
values.

24. During the last WEEK, I prayed. . . (check one)

- 10 or more times.
- 7-9 times.
- 4-6 times.
- 1-3 times.
- 0 times.

25. During the last WEEK, I meditated... (check one)

- 10 or more times.
- 7-9 times.
- 4-6 times
- 1-3 times.
- 0 times.

26. Last MONTH, I participated in spiritual activities with at
least one other person... (check one)

- more than 15 times.
- 11-15 times.
- 6-10 times.
- 1-5 times.
- 0 times.

HPV Facts

Please indicate whether you believe the following statements about HPV are true or false.

Genital warts are a form of herpes	TRUE	FALSE
The HPV vaccine prevents 70 percent of cervical cancers	TRUE	FALSE
HPV can be transmitted through oral sex	TRUE	FALSE
Side effects of the HPV vaccine are common	TRUE	FALSE
The HPV vaccine consists of one injection	TRUE	FALSE
The HPV vaccine eliminates the need for pap tests	TRUE	FALSE
The HPV vaccine helps prevent genital warts	TRUE	FALSE
Most cases of HPV are asymptomatic	TRUE	FALSE
The Carleton drug plan does not cover the HPV vaccine	TRUE	FALSE
HPV is a concern for both women and men	TRUE	FALSE

HPV Vaccination

Please rate the degree to which you agree with the following statements about the HPV vaccine.

1. My gynecologist/family doctor thinks I should receive the HPV vaccine:

1	2	3	4	5	6	7
Disagree						Agree

2. Other girls my age would approve of my receiving the HPV vaccine:

1	2	3	4	5	6	7
Disagree						Agree

3. Most girls my age have received the HPV vaccine:

1	2	3	4	5	6	7
Disagree						Agree

4. My family would approve of my receiving the HPV vaccine:

1	2	3	4	5	6	7
Disagree						Agree

5. It is expected of me that I receive the HPV vaccine.

1	2	3	4	5	6	7
Disagree						Agree

6. If I receive the HPV vaccine, I will feel that I am doing something positive for my health.

1	2	3	4	5	6	7
Disagree						Agree

7. If I receive the HPV vaccine, it will help prevent me from developing genital warts.

1	2	3	4	5	6	7
Disagree						Agree

8. If I receive the HPV vaccine, it will help prevent me from developing cervical cancer.

1	2	3	4	5	6	7
Disagree						Agree

9. I would be more likely to receive the HPV vaccine if it were free.

1	2	3	4	5	6	7
Disagree						Agree

10. I would be more likely to receive the HPV vaccine if I knew there were no side effects.

1	2	3	4	5	6	7
Disagree						Agree

11. I would be more likely to receive the HPV vaccine if it were not by injection.

1	2	3	4	5	6	7
Disagree						Agree

12. I would be more likely to receive the HPV vaccine if my doctor discussed the benefits and risks with me in detail.

1	2	3	4	5	6	7
Disagree						Agree

13. Overall, I think that receiving the HPV vaccine is:

1	2	3	4	5	6	7
Harmful						Beneficial

1	2	3	4	5	6	7
Unpleasant						Pleasant

1	2	3	4	5	6	7
The wrong Thing to do						The right Thing to do

1	2	3	4	5	6	7
Unimportant						Important

14. I feel confident that I could receive the HPV vaccine if I wanted to.

[illegible]

15. Whether or not I choose to receive the HPV vaccine is entirely up to me.

1 2 3 4 5 6 7
Disagree Agree

16. I feel I might be at risk for developing genital warts.

1 2 3 4 5 6 7
Disagree Agree

17. I feel I might be at risk for developing cervical cancer.

1 2 3 4 5 6 7
Disagree Agree

18. Genital warts are a serious illness.

1 2 3 4 5 6 7
Disagree Agree

19. Cervical cancer is a serious illness.

1 2 3 4 5 6 7
Disagree Agree

20. I have already received the HPV vaccine.

1 2 3 4 5 6 7
Disagree Agree

21. I will receive the HPV vaccine in the next 2 months.

1 2 3 4 5 6 7
Disagree Agree

Influenza Vaccination Beliefs

Please rate the degree to which you agree with the following statements about the flu vaccine.

1. My family doctor thinks I should receive the flu vaccine:

1	2	3	4	5	6	7
Disagree						Agree

2. Other people my age would approve of my receiving the flu vaccine:

1	2	3	4	5	6	7
Disagree						Agree

3. Most people my age receive the flu vaccine:

1	2	3	4	5	6	7
Disagree						Agree

4. My family would approve of my receiving the flu vaccine:

1	2	3	4	5	6	7
Disagree						Agree

5. It is expected of me that I receive the flu vaccine.

1	2	3	4	5	6	7
Disagree						Agree

6. If I receive the flu vaccine, I will feel that I am doing something positive for my health.

1	2	3	4	5	6	7
Disagree						Agree

7. If I receive the flu vaccine, it will help prevent me from developing the flu

1	2	3	4	5	6	7
Disagree						Agree

8. I would be more likely to receive the flu vaccine if I knew there were no side effects.

1	2	3	4	5	6	7
Disagree						Agree

9. I would be more likely to receive the flu vaccine if it were not by injection.

1	2	3	4	5	6	7
Disagree						Agree

10. I would be more likely to receive the flu vaccine if my doctor discussed the benefits and risks with me in detail.

1	2	3	4	5	6	7
Disagree						Agree

11. Overall, I think that receiving the flu vaccine is:

1	2	3	4	5	6	7
Harmful						Beneficial

1	2	3	4	5	6	7
Unpleasant						Pleasant

1	2	3	4	5	6	7
The wrong Thing to do						The right Thing to do

1	2	3	4	5	6	7
Unimportant						Important

12. I feel confident that I could receive the flu vaccine if I wanted to.

1	2	3	4	5	6	7
Disagree						Agree

13. Whether or not I choose to receive the flu vaccine is entirely up to me.

1	2	3	4	5	6	7
Disagree						Agree

14. I feel I might be at risk for developing the flu.

1	2	3	4	5	6	7
Disagree						Agree

15. The flu is a serious illness.

1	2	3	4	5	6	7
Disagree						Agree

16. I have already received the influenza vaccine in the fall 2008.

1	2	3	4	5	6	7
Disagree						Agree

17. I will receive the flu vaccine in the next 2 months.

1	2	3	4	5	6	7
Disagree						Agree

Sexual Behaviour Questionnaire

Please rate the degree to which the following sexual behaviours describe you. Remember that you are not obligated to answer any questions that make you uncomfortable, and that this study is completely confidential.

1. Have you ever participated in sexual intercourse?

Yes No

2. Have you ever participated in oral sex?

Yes No

3. How often do you use condoms during sex?

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

4. How many sexual intercourse partners have you had in the past year?

0	1	2	3	4 or more
---	---	---	---	-----------

5. How many oral sex partners have you had in the past year?

0	1	2	3	4 or more
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Appendix D

Initial Debriefing

What are we trying to learn in this research? What are our predictions?

The purpose of this research is to examine why female university students choose to or choose not to receive the human papillomavirus vaccine, commonly known as Gardasil, and the flu vaccine.

In the past, research in health psychology has been guided by theories that try to explain why people choose to engage in preventive health behaviors. For instance, intentions to perform a behavior, such as using sunscreen or receiving regular Pap tests, are often guided by normative influences (Ajzen, 1991), or if they believe significant others, such as family and friends, would approve of them doing so. Adolescents and young adults in particular are more likely to accept a preventive behavior if they believe it is common among their peers (e.g. Bryan, Aiken, & West, 2004). The HPV vaccine, however, has only been available since 2006, and, thus there might not be established norms on the use of the vaccine among undergraduate girls. Since this vaccine is relatively new, it was hypothesized that individual differences that describe yourself, such as your personality traits and personal feelings toward injections, might be more predictive of acceptance of the HPV vaccine than normative influences. In order to have a comparison behavior, you were also asked about attitudes and intentions toward the influenza vaccine, which has established norms. Because the HPV virus is sexually transmitted, it was also hypothesized that sexual activity and religion may influence intentions to receive the vaccine.

Why is this research important to scientists or the general public?

Although the Public Health Agency of Canada has deemed the HPV vaccine safe and effective for girls and women aged 9-26, acceptance of the vaccine of parents for their young daughters has been very low, possibly due to parents' lack of knowledge and link to sexual behavior (Friedman & Sheppard, 2007; Constantine & Jerman, 2007). However, the intentions to receive the vaccine of women of an adult age have not been extensively researched. It is important to know why so few young women are choosing to receive a vaccine that prevents 70 percent of cases of cervical cancer.

Where can I learn more?

You may want to look at the following article:

Daley, M.F., Crane, L.A., Chandramouli, V., Beaty, B.L., Barrow, J., Allred, N.

Berman, S., & Kempe, A. (2007). Misperceptions about influenza vaccination among parents of healthy young children. *Clinical Pediatrics*, 46, 408-417.

If you would like to learn more about the HPV vaccine, please visit the Public Health Agency of Canada's website at <http://www.phac-aspc.gc.ca>.

What if have questions later?

If you have any questions or comments about this research, then please feel free to contact Dr. M. Gick (Faculty Researcher, 520-2600, ext. 2664). Should you have any ethical concerns about this study then please contact Dr. Avi Parush, Chair, Carleton University Ethics Committee for Psychological Research, 520-2600, ext. 6026) or Dr. J. Mantler (Chair, Dept. of Psychology, 520-2600, ext. 2648).

Is there anything I can do if I found this experiment to be emotionally draining?

If you have any personal concerns about your emotionality, or general physical or emotional well being that you would like to discuss with somebody, you might wish to contact the Carleton University Health and Counselling Services at 613-520-6674.

We would like to thank you for participating in this research. Your time and efforts are greatly appreciated!

Appendix E

Optional follow-up e-mail

This is a follow-up e-mail for the study “Health behaviours and experiences of female students” that took place in the fall of 2008. For your completion and return of the following questions, you will receive an increase of .5 in your introductory psychology grade.

Have you obtained the flu vaccine since November 2008?

If so, why? If not, why not?

Have you obtained the HPV vaccine since November 2008?

If so, why? If not, why not?

Please return this e-mail to the address from which it was sent. Thank you for your participation.

Appendix F

Final Debriefing

What are we trying to learn in this research? What are our predictions?

The purpose of this research is to examine why female university students choose to or choose not to receive the human papillomavirus vaccine, commonly known as Gardasil, and the flu vaccine.

In the past, research in health psychology has been guided by theories that try to explain why people choose to engage in preventive health behaviors. For instance, intentions to perform a behavior, such as using sunscreen or receiving regular Pap tests, are often guided by normative influences (Ajzen, 1991), or if they believe significant others, such as family and friends, would approve of them doing so. Adolescents and young adults in particular are more likely to accept a preventive behavior if they believe it is common among their peers (e.g. Bryan, Aiken, & West, 2004). The HPV vaccine, however, has only been available since 2006, and, thus there might not be established norms on the use of the vaccine among undergraduate girls. Since this vaccine is relatively new, it was hypothesized that individual differences that describe yourself, such as your personality traits and personal feelings toward injections, might be more predictive of acceptance of the HPV vaccine than normative influences. In order to have a comparison behavior, you were also asked about attitudes and intentions toward the influenza vaccine, which has established norms. Because the HPV virus is sexually transmitted, it was also hypothesized that sexual activity and religion may influence intentions to receive the vaccine.

In addition, psychological theories hold that intentions to perform a health behavior tend to be associated with actual performance of that behavior (Ajzen, 1991). You were therefore asked whether or not you received the HPV and influenza vaccines, in order to determine whether it corresponded with your expressed intentions at the initial study.

Why is this research important to scientists or the general public?

Although the Public Health Agency of Canada has deemed the HPV vaccine safe and effective for girls and women aged 9-26, acceptance of the vaccine of parents for their young daughters has been very low, possibly due to parents' lack of knowledge and link to sexual behavior (Friedman & Sheppard, 2007; Constantine & Jerman, 2007). However, the intentions to receive the vaccine of women of an adult age have not been extensively researched. It is important to know why so few young women are choosing to receive a vaccine that prevents 70 percent of cases of cervical cancer.

Where can I learn more?

You may want to look at the following article:

Daley, M.F., Crane, L.A., Chandramouli, V., Beaty, B.L., Barrow, J., Allred, N.

Berman, S., & Kempe, A. (2007). Misperceptions about influenza vaccination among parents of healthy young children. *Clinical Pediatrics*, 46, 408-417.

If you would like to learn more about the HPV vaccine, please visit the Public Health Agency of Canada's website at <http://www.phac-aspc.gc.ca>.

What if have questions later?

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Is there anything I can do if I found this experiment to be emotionally draining?

If you have any personal concerns about your emotionality, or general physical or emotional well being that you would like to discuss with somebody, you might wish to contact the Carleton University Health and Counselling Services at 613-520-6674.

We would like to thank you for participating in this research. Your time and efforts are greatly appreciated!