THE EFFECT OF AN E-BASED EDUCATIONAL INTERVENTION ON EXPATRIATE PARENTS HUMAN PAPILLOMAVIRUS (HPV) KNOWLEDGE, PERCEPTION, VACCINATION INTENTION AND UPTAKE IN BANGKOK, THAILAND

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ผลของการให้ความรู้โดยใช้เทคโนโลยีสารสนเทศเพื่อการรับรู้เรื่องไวรัสที่ก่อให้เกิดมะเร็งปากมดลูก ความตั้งใจ และการพาบุตรธิดาไปรับวัคซีนของผู้ปกครองชาวต่างชาติที่พำนักอยู่ในกรุงเทพมหานคร ประเทศไทย

นางเมลิซาร์ มาเรีย เบเกอร์

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรดุษฎีบัณฑิต
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นางเมลิซาร์ มาเรีย เบเกอร์ : ผลของการให้ความรู้โดยใช้เทคโนโลยีสารสนเทศเพื่อการรับรู้เรื่องไวรัสที่ก่อให้เกิดมะเร็งปากมดลูก ความตั้งใจ และการพาบุตรธิดาไปรับวัคซีนของผู้ปกครองชาวต่างชาติที่พำนักอยู่ในกรุงเทพมหานคร ประเทศไทย. (THE EFFECT OF AN IT-BASED EDUCATIONAL INTERVENTION ON EXPATRIATE PARENTS' HUMAN PAPILLOMAVIRUS KNOWLEDGE PERCEPTION VACCINATION INTENTION AND UPTAKE IN BANGKOK THAILAND) อ.ที่ปรึกษาวิทยานิพนธ์หลัก : รศ.ดร.รัตนา สำโรงทอง, 192 หน้า.

ในโลกที่มนุษย์ papillomavirus มากที่สุดก็คือการติดเชื้อติดต่อทางเพศสัมพันธ์ที่แพร่หลาย (STI) หมู่คนหนุ่มสาวระหว่าง 15 และ 24 ปี (WHO, 2010) วัคซีนป้องกันโรคสองที่มีอยู่เพื่อป้องกันไม่ให้เชื้อ HPV ชนิดที่ 6, 11, 16 และ 18.

วัตถุประสงค์ของการทดลองควบคุมแบบสุ่มนี้นำโดยรูปแบบความเชื่อด้านสุขภาพคือการวัดผลกระทบของ ตามโปรแกรมการศึกษาการติดเชื้อ HPV เมื่อพ่อแม่ผู้ปกครองต่างชาติความตั้งใจที่จะฉีดวัคซีนป้องกันการติดเชื้อ HPV ความรู้การรับรู้และการติดเชื้อ HPV และการดูดซึมการใช้เทคนิคการสุ่มตัวอย่างที่ไม่น่าจะเป็น, 43 พ่อแม่ชาวต่างชาติที่อาศัยอยู่ในกรุงเทพฯได้รับคัดเลือกสำหรับการศึกษานี้.

การวิเคราะห์ข้อมูลที่ได้รับการคำนวณโดยใช้ IBM SPSS v.21 การทดสอบทางสถิติที่คำนวณรวมถึงความสัมพันธ์เพียร์สันทันทีผลิตภัณฑ์ร่วมที่มีประสิทธิภาพ (เพียร์สัน r), T-test การทดสอบไคสแควร์และความแตกต่างในความแตกต่าง (DID) ประมาณ การวิเคราะห์ทางสถิติได้ดำเนินการด้วยความเชื่อมั่น 95% และความสำคัญของ $p < 0.05$ แอลฟาจัดตั้งขึ้นเป็น 0.80 ความน่าเชื่อถือ

ผู้ปกครองที่รายงานความรู้มากขึ้นและการรับรู้บวกมากขึ้นจากการติดเชื้อ HPV และการฉีดวัคซีนป้องกันการติดเชื้อมีแนวโน้มที่จะมีความตั้งใจที่การฉีดวัคซีนในเชิงบวกและการดูดซึมการศึกษาครั้งนี้มีหลักฐานที่เชื่อถือได้ว่าการตรวจสอบยืนยันผลการศึกษาขนาดใหญ่ผลของการแทรกแซงการศึกษา สำหรับพ่อแม่ผู้ปกครองชาวต่างชาติ

สาขาวิชา สาธารณสุขศาสตร์ ลายมือชื่อนิสิต .....

ปีการศึกษา 2556 ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก. .....

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MELISSA M. BAKER: THE EFFECT OF AN E-BASED EDUCATIONAL INTERVENTION ON EXPATRIATE PARENTS' HUMAN PAPILLOMAVIRUS (HPV) KNOWLEDGE, PERCEPTION, VACCINATION INTENTION AND UPTAKE IN BANGKOK, THAILAND. ADVISOR: ASSOC. PROF. RATANA SOMRONGTHONG. Ph.D., 192 pp.

In the world, human papillomavirus (HPV) is most prevalent sexually transmitted infection (STI) among young people between 15 and 24 years of age (WHO, 2010). Two prophylactic vaccines are available to prevent the HPV types 6, 11, 16 and 18.

The objective of this randomized controlled trial, guided by the Health Belief Model, is to measure the effect of the E-based HPV educational program on expat parents' HPV knowledge, perception and HPV vaccination intention and uptake. Using non-probability sampling techniques, forty-three expat parents who live in Bangkok, Thailand, were recruited for this study.

Data analysis was computed using IBM SPSS v.21. Statistical tests computed include Pearson product-moment correlation co-efficient (*Pearson r*), *t-tests*, *chi-square* tests, and the Difference in Differences (DID) estimation. Statistical analyses were performed with a 95% confidence interval and significance of $p < 0.05$. Cronbach's alpha was established as 0.80 reliability.

Parents who reported greater knowledge and a more positive perception of HPV and the HPV vaccine were more likely to have a positive vaccination intention and uptake. This study provides reliable evidence that validate a larger confirmatory study on the effects of an E-based educational intervention for expat parents.

Field of Study: Public Health Student's Signature: .....

Academic Year: 2013 Advisor's Signature: .....

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"Educating the mind without educating the heart is no education at all." *Aristotle*

CONTENTS

Page

Page

Page

LIST OF TABLES

Page

Page

Page

Page

LIST OF FIGURES

Page

LIST OF ABBREVIATIONS

CDC	Centers for Disease Control and Prevention (USA)
HPV	Human Papillomavirus
IT	Information Technology
STI	Sexually Transmitted Infection
WHO	World Health Organization

CHAPTER I
INTRODUCTION

1.1 Background and Rationale

The human papillomavirus (HPV) is the most common sexually transmitted infection (STI) among adolescents and young people in the world (World Health Organization (WHO), 2010). An estimated 75% of sexually active people become infected with HPV at some point in their lives (SIECCAN, November 2010). HPV is the most common cause of cervical cancer and genital warts and has also been associated with other anogenital cancers such as vulvar, vaginal, penile, anal, and oropharyngeal cancers in males and females (Saslow, Castle, & Cox, 2007; Krawcyzk et al., 2012).

Cervical cancer is the second most common cancer among women in the world (WHO, 2010). Of the worlds' female population over the age of 15 years (over 2.3 million), over half a million young women were diagnosed with cervical cancer in 2010. Over one half of these women (275,128) died from this preventable disease – approximately 12% of the world's total population of women over the age of 15 years (WHO, 2010). The WHO projects that by the year 2025, there will be an estimated 720,060 cases of cervical cancer in women over the age of 15 years in the world. Should no remedial action be taken, an estimated 395,095 of those cases will result in death (WHO, 2010).

HPV infection does not only affect women. Men have been diagnosed with HPV and related cancers of the reproductive organs. In 2010, approximately 74% of the worlds' male population who were diagnosed with anal cancer also had a positive diagnosis of HPV (WHO, 2010). 68.9% of heterosexual men who were diagnosed with anal cancer were also infected with HPV (WHO, 2010). In addition to HPV infection in men who have anal cancer, 40 to 50% of cases of males who are diagnosed with penile cancer are also infected with HPV (WHO, 2010). Studies have found that the prevalence of penile cancer in heterosexual men in the world correlates with a high prevalence of cervical cancer among married couples (WHO, 2010). A high prevalence of anal, penile

and other ano-genital cancers have also been found in homosexual men and men who have sex with men (MSM). Approximately 98% of MSM who were diagnosed with anal cancer in 2010 were also infected with HPV (WHO, 2010).

To-date there is no known cure for HPV, but there are two prophylactic vaccines that can prevent up to 70% of cervical cancers, up to 90% of anogenital warts and other precancerous and persistent anogenital infections (Ilter et al, 2010). In 2006 the quadrivalent HPV vaccine, Gardasil, was licensed to protect females between the ages of 9 to 26 years against four HPV types (6, 11, 16, 18). These four types of HPV are known to cause genital warts and the majority of cases of cervical cancers (Kennedy, Sapsis, Stockley et al., 2011). In 2009, Gardasil was approved for use in males aged 9 to 26 years to protect against genital warts. The Centers for Disease Control and Prevention in the United States of America (USA) recommend vaccination for boys and girls between the ages of 11 and 12 years olds (CDC, 2013). Clinical trials have proven that the Gardasil vaccine is 100% effective in preventing HPV infection if all three doses are administered within the recommended time frame (within 6 months) and prior to sexual debut (Markowitz et al., 2007). In 2009, a bivalent HPV vaccine, Cervarix, was licensed for use only in females ages 10 to 25 years. Cervarix protects against HPV types 16 and 18, which are known to cause cervical cancer. The Cervarix vaccine does not protect against genital warts and has not been licensed for use in males.

There is public debate over parents' HPV vaccination intention and uptake, despite the rising prevalence of HPV in young people and the vaccines' proven potential to prevent HPV infection, cervical cancer and genital warts. A significant number of studies explore the factors that influence parents' vaccination intention and uptake (Brewer and Fazekas, 2007; Brewer et al., 2011; Allen et al., 2010; De Visser and McDonnell, 2008; Dempsey et al., 2009; Jaspers et al., 2011; Reiter et al., 2009). The most common factors found to influence parents' HPV vaccination intention and uptake include 1) perceived susceptibility of contracting HPV, an anogenital cancer or genital warts, 2) perceived severity and consequences of HPV, 3) perceived benefits of HPV vaccination, 4) the perceived barriers to getting the HPV vaccine, and 5) cues to action.

Despite the extensive literature, at the time of this study there was no prior research that measured expatriate (expat) knowledge, perception and HPV vaccination intention and uptake, and assessed the effect of educational interventions on these factors.

It is important to study the health of expats, as this population is rapidly growing with multinational corporations purposively recruiting and employing qualified professionals to fulfill international work assignments. In many cases, dependents (a spouse and/or children) accompany these qualified professionals in their move abroad. Expats and their families often face unique psychological, socio-cultural and environmental circumstances. These challenges cause disruptions to familiar routines, networks, and established lifestyles, and this can ultimately impact health and wellbeing. It is important to examine expats in Asia, as studies have found that expats living in Asia generally have a lower level of integration into the local community in comparison to expats who live in Western counties (HSBC, 2012).

This study assesses expat parents' knowledge, perception, vaccination intention and uptake, and measures whether an E-based HPV educational intervention affects these factors. The results from this trial intervention produced an association and effect, therefore in order to make clear conclusions it is recommended that a larger confirmatory study be conducted with a larger sample of expats.

1.2 Research Questions

- What is the level of parents' HPV knowledge, perception, vaccination intention and uptake pre- and post-exposure to an educational intervention?
- Do parents' knowledge and perception influence vaccination intention and uptake?
- Do parents' knowledge, perception and vaccination intention and uptake differ between those who receive the E-based educational intervention (test group) and those who do not receive the educational intervention (control group)?

1.3 Hypothesis

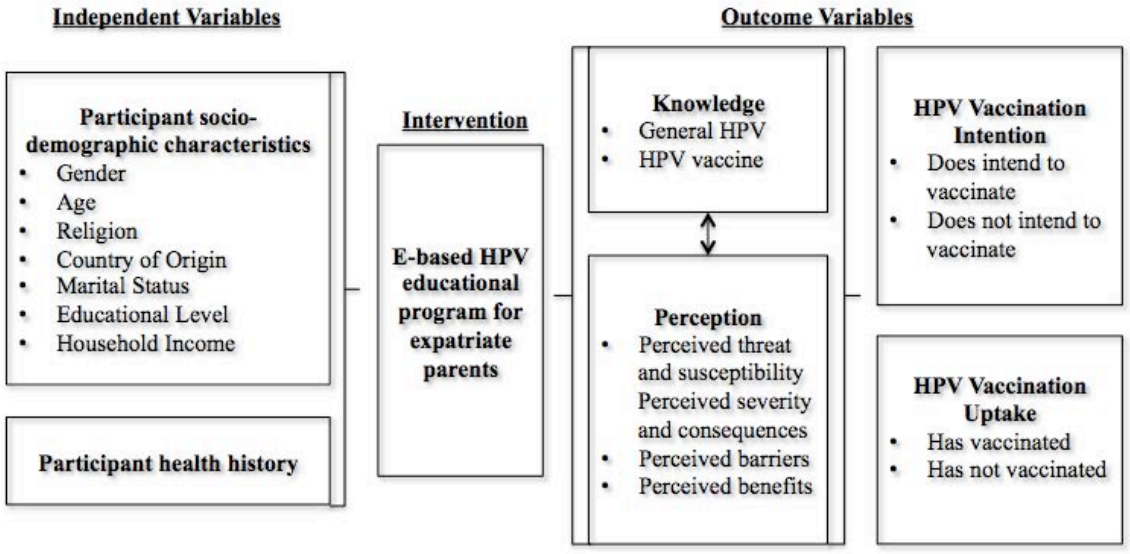
An E-based HPV educational program for expat parents will affect their level of knowledge, perception and vaccination intention and uptake.

1.4 Objectives

- To assess parents' knowledge and perception of HPV and the HPV vaccine before and after receiving an HPV educational intervention.
- To assess parents' HPV vaccination intention [across survey periods], and vaccination uptake [at first follow-up and second follow-up].
- To measure whether parents' knowledge and perception has an influence on HPV vaccination intention [across survey periods] and vaccination uptake [at first follow-up and second follow-up].
- To design and implement an E-based educational program for parents [first to be implemented with a test group, and at the end the program will be implemented for the control group].
- To measure whether the E-based educational program has an effect on parents' HPV knowledge, perception and vaccination intention and uptake.

1.5 Conceptual Framework

Figure 1: Conceptual Framework



1.6 Operational Definitions

* Age: Participants identifying which age group their age falls within (25-30 yrs; 31-35 yrs; 36-40 yrs; 41-45 yrs; 46-50 yrs; 51-55 yrs; 56-60 yrs; >60 yrs).
* Child: A person who is below the age of 18 years and has a parent(s) who has custody of, or is responsible for ensuring their overall wellbeing and development.
* Child's influence: Whether the child has any part in the decision-making process or decision to receive/not receive the HPV vaccine.
* Country of origin: The country which a person has lived the longest in the past 10 years of their life.
* E-based education: Using online tools such as the Internet, email, other sources of information technology (IT) to educate expat parents to increase their knowledge,

inform their perception of HPV and the HPV vaccine, and increase their HPV vaccination intention and uptake.

* Effect: Change from pre-and post-intervention, measuring expatriate parents' knowledge, perception, intention and HPV vaccination uptake.
* Expatriate: An educated, professional individual who has relocated to Bangkok for a career opportunity with an international organization or corporation, and whose country of origin is not Thailand.
* Family composition: The number of parents and children in a persons' immediate family.
* Gender: Identification as either male or female.
* Household composition: The number of individuals who dwell in the same household (children and adults).
* Household income: The combined annual income (in USD) of all income earners who are dwelling within the household.
* Intention: A persons' readiness to perform a certain behavior (Ajzen, 1991). Intention will be measured by whether the parent intends on vaccinating their child, if the parent is undecided about vaccinating their child, if the parent has decided against the HPV vaccination.
* Intervention: An HPV educational program that will be IT-based (using the Internet, email, and other sources of information technology).
* Marital status: A person's relationship status that can be either defined as single, married, separated, divorced or widowed.
* Parent: Includes biological parents and non-biological parental or guardian figures (mothers and fathers) who are over 18 years of age and have custody of and are responsible for ensuring the wellbeing and development of a person(s) (child) below the age of 18 years.
* Perceived Barriers: The obstacles or factors that a person believes hinders or prevents them from having a positive HPV vaccination intention and uptake.

* Perceived Benefits: A persons overall evaluation of the extent to which HPV vaccination uptake enhances a persons health by preventing HPV and its associated adverse health outcomes. Perceived benefits will be measured by expat parents' scores on the 'perceived benefits' section on the pre- and post-intervention surveys.
* Perceived Severity: A persons overall evaluation of the consequences or instance of severe adverse health outcomes that could result from not getting the HPV vaccine. Perceived severity will be measured by the expat parents' scores on the 'perceived severity' section of the pre- and post-intervention surveys.
* Perceived Susceptibility: A persons overall evaluation of whether they or another person is at risk of being exposed to, or susceptible of contracting HPV. Perceived susceptibility will be measured by the expat parents' scores on the 'perceived susceptibility' section of the pre- and post-intervention surveys.
* Standard health resources: Health information and services that are available in Bangkok, Thailand and on the Internet such as websites offering health advices. Expat parents must seek out these standard health resources on their own.
* Vaccination Uptake: Whether a parent has vaccinated their child with the HPV vaccine.

1.7 Expected Benefits and Applications

It is hoped that the data derived from this study, being unique to expat parents, will provide reliable evidence on a new educational intervention and inform the design and implementation of larger confirmatory studies.

CHAPTER II
REVIEW OF LITERATURE

There are a number of limitations to the growing body of literature on parents' knowledge and perception of HPV, and vaccination intention and uptake. First, many studies were conducted prior to, or shortly after the HPV vaccine was licensed for use in females only (studies prior to October 2009). This is problematic in that many of studies report that parental knowledge, perceptions, vaccination intention and uptake are largely influenced by a lack of knowledge of the vaccine due to its' unavailability or recent debut on the medical market at that time. Furthermore, these studies only capture parents' HPV vaccination intention and uptake for female children. Very few studies have examined parental HPV vaccination intention and uptake for both male and female children.

There are no studies that assess the climate for HPV knowledge, perceptions and vaccination intention and uptake of transient populations like expats. This study will focus on the HPV vaccination intention and uptake of expat parents who live in Bangkok, Thailand, who have male and female children who are below the age of 18 years.

2.1 Factors that Influence Parental HPV Vaccination Intention & Uptake

2.1.1 Perceived threat and susceptibility of being exposed to HPV

In a study conducted by the Hong Kong and Shanghai Banking Corporation (HSBC), researchers found that expats living in Asia generally have a more difficult experience integrating into the local community (HSBC, 2012). A lack of integration into a new environment is detrimental to an expat parents' experience abroad. A lack of familiarity or connection with the local community hinders the development of support systems with school administrators, local pastors or religious figures, parents of a child's friends, or neighbors. These support systems are a resource for parents – a form of social control to assist parents in monitoring their children's behaviors and activities within the community. Without this system parents can struggle in knowing what their child's activities and behaviors consist of.

Friends and social environment play an important part in a child's life and upbringing. Removing a child from his/her traditional support system magnifies parents' already challenging task of raising happy and well-adjusted children (Van Bochaute, 2012). Moving abroad disrupts the friendships that children establish based on sharing a common life. Friendships from a home country can be strained or dissolve when an expatriate child becomes immersed in their new environment and their childhood friends in their home country carry on life 'as usual' without them. Childhood friendships may also dissolve due to a lack of common ground and shared experiences, as expatriate children gain experiences that are completely foreign to their childhood friends. Friendships abroad may differ significantly from those in a child's home country, as friends may be transient and relationships more short-term. Making friends abroad can be difficult, as a number of factors set children apart, including nationality, diverse backgrounds with different traditions, living in different areas of the city, and having different household income levels. This lack of a social network is not only challenging for children, but also for their parents as many parents know one another in their child's circle of friends, and therefore this also serves as a social control to monitor their child's behavior and activities.

In addition to a lack of support systems, like many large cities around the world, Bangkok is host to a number of entertainment areas that promote high-risk activities. Expats often live in, or within a short commuting distance to the city center or central business district (CBD) in Bangkok, where there are a number of entertainment alternatives, including many bars and nightclubs. In their 2011 fourth quarter report, Colliers International Thailand reported that expats in Bangkok who rented serviced apartments tended to live in the early Sukhumvit area (40%), the outer central business district area (29%), the central Lumpini area (18%), and the central business district area (13%) (Colliers International Thailand, 2011). These environments are host to three famous red-light districts of Bangkok, including Pad Phong, soi Cowboy and Nana plaza. Alcohol, drug use and paying for prostitution are common in these areas of Bangkok.

In addition to being exposed to a plethora of entertainment alternatives, children of expats are often faced with adjusting to a new academic environment as they enter new schools. Several studies have found that international students often have difficulty accessing sexual and reproductive health service or information while living abroad. In a study at Umeå University in Sweden, Kolac (2009) found that 52% of international students did not know where to go should they experience a sexual health problem or require sexual or reproductive health information. In a similar study from Adelaide University in Australia, Laurence and Stocks (2011) found that female international students had poor sexual health knowledge and complex attitudes about premarital sex when compared to local students. Furthermore, these students had difficulty accessing sexual health information, and had a poor understanding of the role of general practitioners in their new environment.

With a combination of a lack of support systems, potential exposure to high-risk environments and behaviors, and a lack of sexual health-related information and services, this can increase a young person's susceptibility of being exposed to HPV.

2.1.2 Perceived vaccine safety and efficacy

Vaccine efficacy and safety are commonly reported as an influence in parents' HPV vaccination intention and uptake (Brewer & Fazekas, 2007; Sturm, Mays, & Zimit, 2005; Kennedy, Sapsis, Stockley et al., 2011). A Thomson Reuters/NPR Health Poll conducted in 2011 found that one in four Americans believed that there were safety problems with the HPV vaccines. In addition, a comprehensive review of several studies by Reynolds and O'Connell (2011) revealed that parents are often concerned with potential negative side effects or adverse health outcomes that could result from the HPV vaccine. For the most part, researchers have found that parents who are unclear and uncertain or lack knowledge about the HPV vaccine often have serious misconceptions that generate fear of vaccine safety and efficacy which in turn lowers vaccination intention and uptake. On the other hand, studies have found that parents who trust the

safety and efficacy of the HPV vaccine often have higher HPV vaccination intention and uptake (Reynolds and O'Connell, 2011).

Vaccine safety and efficacy has not only been a hot topic among parents, but has also become a hot topic in political debates worldwide, and in many cases this has been the root of many misconceptions about HPV and the HPV vaccines. In some cases, politicians are putting forward false information about the HPV vaccines to promote their conservative stance on adolescent or pre-marital sexuality and sexual behavior. This often generates fear and apprehension about the vaccine and clouds the reality that the HPV vaccine can prevent life altering and debilitating illness and even death. In addition to politicians putting forth misinformation are the major stakeholders in the pharmaceutical industry, especially among competing drug manufacturers and distributors as they engage in the competition to gain higher sales than their competitor. In order to overcome these misconceptions, parents need to look beyond these channels and seek other resources, find factual scientific evidence, and ask questions and engage in discussions about the HPV vaccine with friends, colleagues and healthcare practitioners so that they can make informed decisions of whether to vaccinate their child.

Many scientists and national Advisory Committees on Immunization Practices are working together to resolve the misinformation that has been generated about and the HPV vaccines' efficacy and safety. For example, the Centers for Disease Control and Prevention (CDC) in the United States aims to be transparent in allowing the general public access to information about the mechanisms that are in place to ensure vaccine safety and efficacy prior to and after all vaccines go on the market for use by the general population. Safety mechanisms include systems to monitor adverse health outcomes that are already known to be caused by the vaccine, and to detect new adverse health outcomes that were not identified in pre-licensure trials. In 2009, the CDC and the Food and Drug Administration (FDA) in the US reported that the most common adverse outcomes experienced after HPV vaccination were similar to what is seen in the safety reviews of other vaccines recommended for 9 to 26 year olds (CDC, 2009), including tiredness and soreness around the injection site.

Not only does scientific evidence help to influence parents' vaccination intention and uptake, but studies have shown that healthcare providers and pediatricians play an important role in influencing parents' HPV vaccination intention and uptake, as well (Sturm, Mays, & Zimit, 2005; Allen et al., 2010; Brewer & Fazekas, 2007; Kennedy et al., 2011). Physicians are often parents' preferred source of information regarding vaccines (Gellin, Maibach and Marcuse, 2000). Furthermore, parents' decision to vaccinate is often motivated by referent groups such as family, friends, or physician and healthcare provider recommendations that are supportive of the HPV vaccine (Reynolds & O'Connell, 2011; Zimet, 2005). Positive relationships, support and recommendations from physicians and healthcare providers helps parents to decrease anxiety and apprehension about vaccinating their child, and therefore increase HPV vaccination intention and uptake (Reiter et al., 2009). On the other hand, should there be challenges in regards to information and HPV vaccination access and availability, or should there be poor rapport with a physician or healthcare provider and parent, Shui et al. (2006) found this to heighten concerns over the HPV vaccination and decrease vaccination uptake (Shui et al., 2006).

In order to address this factor, many physicians are engaging in translating knowledge for parents and children. Some physicians identify eligible patients and increase dialogue with parents regarding the scientific evidence demonstrating HPV vaccine safety and efficacy, the benefits of getting the HPV vaccine, and the consequences and severity of adverse health outcomes that could result from not getting the vaccine. In addition to building physician-parent-child rapport increasing vaccination intention and uptake, this relationship also helps to ensure dosage completion, as this is an essential part of the HPV vaccination efficacy.

2.1.3 Perceived influence of HPV vaccination on sexual disinhibition

Several studies have reported a correlation between parental anxiety over HPV vaccination intention and uptake and adolescent sexual disinhibition and promiscuity (Brabin et al., 2006; Brewer & Fazekas, 2007; Sturm, Mays, & Zimit, 2005; Constantine

& Jerman, 2007; Woodhall et al., 2007). In a 2007 study, Woodhall et al. (2007) found that 42% of parents in the study sample believed that vaccinating their child against an STI would increase the likelihood of early sexual debut. Other studies revealed that parents believed that vaccinating their daughters with the HPV vaccine would communicate to their child that promiscuity is acceptable, and this would also increase the likelihood of their child having more sexual partners when they become sexually active (Waller et al., 2006; Reynolds and O'Connell, 2011). Brabin et al. (2006) also found that parents expressed concern that HPV vaccination would give their child(ren) a false sense of protection against other adverse health outcomes that could result from high-risk sexual activity, such as unplanned pregnancy and other STIs that are not covered by the HPV vaccine.

Quite to the contrary of parents' concerns and beliefs over HPV vaccination leading to adolescents' promiscuity and disinhibition, many adolescent females' surveyed pre-vaccination for knowledge, attitudes and sexual practices reported that they would not modify their sexual behaviors after receiving the HPV vaccine (United Press International, 2011; Schuler et al., 2011). Bednarczyk et al. (2012) substantiate these self-reported results in their study that focuses on sexual activity-related outcomes after the HPV vaccination of 11- to 12-year olds. Bednarczyk et al. (2012) found that the clinical markers of sexual activity of adolescent females after receiving the HPV vaccination, such as pregnancy/STI testing or diagnosis, and contraceptive counseling, were not significantly elevated in comparison to adolescent females who did not receive the HPV vaccinations. Forster et al. (2012) found similar results in their study on adolescent females aged 16 to 18 years in England, as there was no significant difference of adolescent females reporting initiation of sexual activity after HPV vaccination in comparison to adolescent females who had not been vaccinated (Forster et al., 2012).

Parental concerns over HPV vaccination leading to unsafe sexual behaviors such as decreased contraceptive use to protect against other STIs and unplanned pregnancy have also proven to be contradictory to what adolescents and young people are saying. In Australia, Mather et al. (2012) found that young females aged 18 to 30 years held

stronger attitudes toward safe sexual practices in comparison to unvaccinated females. Similar results were found in a study by Liddon et al. (2012), where young females who had been received the HPV vaccine reported an increased likelihood of using condoms in comparison to non-vaccinated young women. It is possible that these results are indicative that young females who receive the HPV vaccination have a greater understanding of the reproductive and sexual health, including safe sexual practices (Bednarczyk et al., 2012).

2.1.4 Perceived vaccine accessibility

There are a number of barriers that can inhibit a person from accessing reproductive and sexual health services, including socio-cultural, environmental, and economic factors. Access to reproductive and sexual health information and services can be influenced by many socio-cultural factors. In some cultures, class and social values can influence sexual expression, expectations and behaviors. Studies have shown that spirituality, religion and cultural traditions specific to ethnic background can influence parents' HPV vaccination intention and uptake (Moutsiakis & Chin, 2007; Peters, Aroian, & Flack, 2006; Gullatte, 2006; Brabin et al., 2006). In a 2004 study on young people's sexual risk-taking behaviors, Thianthai found that socio-economic backgrounds in Bangkok influenced different social expectations of male and female sexuality and sexual behavior (Thianthai, 2004). In many Asian counties, these beliefs and behaviors are rooted in traditional social and cultural norms, and often discourage public discussion of sex topics. Furthermore, premarital sex is considered unacceptable, thus preventing young people from accessing reproductive and sexual health information and services (Sridawruang et al, 2010). On the other hand, adolescent religious affiliation can be associated with delayed age of first intercourse and greater and more consistent contraceptive use (Brewster, 1994; Brewster et al., 1998; Cooksey et al., 1996; Meschke et al., 2002).

Communities and countries around the world are striving to overcome the environmental obstacles in HPV vaccine availability and accessibility. For example, in

the United States, researchers found when parents are provided with HPV education and information, if vaccinations are provided free and in a convenient location, and if they are provided with regular and diligent follow-up and medical support, they are more knowledgeable to make informed decisions regarding vaccination intention and uptake (Brabin et al., 2006).

Financing of the HPV vaccine is a big dilemma for many parents as they decide whether to vaccinate their child. In countries where HPV vaccination is not included in the national immunization program individuals must have private insurance or pay out-of-pocket to cover the vaccine costs. In moving abroad to work for a multinational company, some expatriate families are provided with international health coverage that includes a percentage of prescription drugs and healthcare provider and service fees. All international insurance coverage varies in coverage and claims; therefore, some companies may not cover the HPV vaccine, as it may not be a part of the type of insurance plan or deemed a non-mandatory vaccine. Other expatriates are not provided with international health coverage by their company. In these cases, some expatriates choose to purchase their own personal or family health insurance, or they pay out-of-pocket for healthcare services and prescription drugs while living abroad. In general, data suggests that expatriates worldwide tend to have a higher than average worldwide income therefore it is possible that they belong to a socio-economic range that is more likely to be able to afford the HPV vaccine (www.oecd.org, 2012).

Other socio-economic factors such as parents' level of education can also influence access to reproductive and sexual health information and services. Some studies report that a higher level of parental education is associated with greater access and initiative to use contraception, and lower risk of pregnancy and STIs (Meschke, 2002). Brabin et al. (2004) also found that parents with a higher education were more prone to ask questions about vaccine safety and efficacy.

Some studies have demonstrated a correlation between household and family composition, or in other words, how many parents and children live within the home, including biological and step-parents, and how these persons can influence sexual

preventative measures such as HPV vaccination (Miller, 2002; Ruangkanchanasetr et al., 2005; Mueller et al., 2008).

There are few studies that focus on other factors that affect access to reproductive and sexual health services and information. For example, some studies have explored children's role in deciding whether their parents seek out health services and information on their behalf. In regards to HPV vaccination uptake, there are a number of reasons why a child may or may not want to get the HPV vaccine, including fear of the vaccine or vaccinations in general, peer or parental pressure, judgment or disappointment, lack of awareness, and confusion and misconceptions about HPV and the HPV vaccine. Like many other vaccines, people do not like getting vaccines and children are no exception. Being the HPV vaccine is a series of 3 doses over the course of 6 months, the fear of vaccines can dissuade children from asking their parents about getting the HPV vaccine.

Another factor that can inhibit people from getting the HPV vaccine is the fear that the vaccine will actually cause HPV. This is not only true for the HPV vaccine, as this is often the case for the seasonal influenza vaccine where the days following vaccination many people report that they have come down with the flu. This leads to the misconception that the influenza vaccine caused them to get the flu; however, many people do not realize that the vaccine does not contain an active virus that causes the flu. This fear often influences opinions of other vaccines, and in regards to the HPV vaccine, this general misinformed fear results in children and parents not wanting the HPV vaccine.

Lastly, misinformation about HPV can hinder a person from seeking out reproductive and sexual health services and information. For example, some individuals believe that it is too late to receive the vaccine when they or their child is already sexually active, or they assume that their child does not need to vaccine to prevent an STI when they are not sexually active.

2.2 Cues to Action: Parental HPV Educational Interventions

There is a shared belief in most societies that adolescents and young people can benefit from parental support in educating about sex topics, preventative measures and risk reduction (Schuster et al., 2008). To address these often-controversial issues, parental sexual education programs have emerged in countries all over the world. Many of these programs aim to position parents as primary sources of support and information about sexuality and sex topics for their children. These programs often contain behavioral change elements to increase parents' knowledge, improve their attitudes and perspective, motivate actions which facilitate comfortable parent-child communication about sex topics, and increase parents' role in taking preventative measures and risk reduction for their child (Meschke et al., 2002).

2.2.1 Behavioral change interventions

Many studies have found that parents can significantly influence their child's sexual health by teaching about preventative measures and risk reduction (Schuster et al., 2008). More specifically, adolescents are more prone to delay sexual initiation, use contraceptives and have fewer partners when their parents are involved in supporting and educating them about their sexual health (Schuster et al., 2008).

A number of programs have been created to support parents so that they are equipped with the knowledge and proper attitudes to take active roles in teaching their child about preventative measures against high-risk sexual behaviors and adverse health outcomes. Many studies have tested the efficacy of these programs in instilling knowledge and positive attitudes, and sometimes inducing behavioral change so that parents can take an active part in their child's sexual development and wellbeing. Kennedy et al. (2011) found an increase in parent's knowledge, and attitudes were much more positive towards adolescent sexuality and sex topics after receiving a simple educational flyer which contained information about preventative measures in sexual engagement. In their randomized controlled-trial, Krawczyk et al. also found that parental exposure to an educational information pamphlet in combination with a video

intervention increased parents' knowledge and HPV vaccination intention and uptake. Davis et al. (2004), de Visser & McDonnell (2008) and Spleen et al. (2012) also found that parent's knowledge, attitudes and preventative initiative improved and increased after exposure to brief information interventions.

In their HIV prevention intervention, *REAL* Men, DiIorio et al. (2007) found that father-son communication about sex topics increased after fathers were exposed to an education program that taught them about "…general topics such as parental monitoring and relationships with peers, general sexual topics important in adolescence, and specific information about transmission and prevention of HIV and AIDS" (DiIorio et al., 2007). The *REAL* Men program found that this increase in father-son communication was accompanied by a statistically significant number of son's delaying sexual initiation and an increase in condom use during each sexual intercourse for son's who were already sexually active (DiIorio et al., 2007). O'Donnell et al. (2005) found similar results in their parental education program, *Saving Sex for Later*, that promoted positive parenting practices and parent-adolescent communication. More specifically, O'Donnell et al. (2007) found that parent's who were exercised greater parental monitoring, increased parent-child communication and expressed disapproval of risk behaviors influenced the delay of sexual initiation and reduced sexual risk-taking.

Many studies have aimed to find innovative mediums for the delivery of behavioral change interventions that are non-disruptive and integrative into parent's daily lives and routines. *Saving Sex for Later* consisted of an innovative independent learning method, a three 25-minute audio CDs (O'Donnell et al., 2005). This method of delivery provided parents with the opportunity to participate in the intervention at their own convenience, which resulted in a positive behavioral change increasing parent-child communication about sex topics and most importantly, sexual abstinence. In another study, Schuster et al. (2008) facilitated a workplace-based parent sex education program, *Talking Parents, Healthy Teens*. This study found that parents were able to overcome the factors that inhibit them from communicating with their adolescent about sex topics when they were taught how to communicate with, supervise and interact with their children,

and shown how to teach their adolescent decision-making and assertiveness skills (Schuster et al., 2008).

Villarruel et al. (2010) used a computer-based approach to increase parent-adolescent communication about sex topics. Parents in the intervention group were found to have "greater general communication, sexual communication, and comfort with communication" after exposure to the intervention in comparison to parents who were assigned to the control groups (Villarruel et al., 2010). Furthermore, the study found that computer-based interventions are an effective method of delivering public health information and support to populations that are hard to reach or underserved (Villarruel et al., 2010). Although these parental educational interventions have proven to be successful in seeing positive behavioral change, sex education specific to children is often considered controversial in nature (Sridawruang, 2010).

2.2.2 IT-based interventions

This study looks beyond conventional ways of delivering parental education programs, encouraging individual learning by using information technology (IT)-based learning resources, including email correspondence, frequenting online websites and regular use and access to the Internet.

Today, IT-based resources are increasingly pervading our work and everyday lives. As Hiltz describes in her book, *The Virtual Classroom*, computers and IT have moved from the work environment into homes, appliances and can even be found in the human body. Children play and learn with computerized toys, games, and some even have their own personal computers. Adults stay connected by using blue tooth telephone technology to speak on wireless headsets while driving, check emails on portable handheld devices, and have voice-automated commands for their household appliances and automobiles. Computerized devices are also implanted in the human body, including pace makers, hearing aids, and prosthetic limbs (Hiltz, 1995).

Computers and IT are increasingly being used as educational tool for populations that do not have the time or means to partake in traditional classroom learning. In his

study on visual learning technologies, Johnson (2006) found that traditional or conventional educational ways of learning often seclude a significant portion of the general population from accessing information, including those who have learning disabilities or low literacy levels, those who do not have the financial means, lack motivation, or have other commitments such as income generating tasks or responsibilities within the home such as child rearing (Johnson, 2006).

Online and IT learning have proven to be a successful medium of disseminating information in an efficient and widespread manner. For example, in the wake of major flooding and a national crisis in Thailand in 2011 a local animator, the Thai PBS and flood experts created the "Flood Whales" video that was posted on www.youtube.com. The information provided in this animated video educated Thai people on flooding prevention and response, including behavioral change components which focused on how to change individual actions in order to alleviate the flooding and prevent any personal injuries or illness. Over one million people viewed this link on the Internet and the video has been praised for being an effective educational tool for a mass audience.

The success of online and IT learning can be attributed to the fact that these resources facilitate a convenient, individualized and widespread learning environment. Using online and IT-learning resources allows people to access interventions when, where and how they wish, preventing conflicts with other daily tasks. As Lau et al. (2011) found in their review on information and communication technology (ICT)-based interventions, online and IT-learning resources and interventions can be compatible to many people's existing practice and lifestyle and therefore induce behavioral change (Lau et al., 2011). Cugelman, Thelwall and Dawes (2011) found similar results in their analysis of online intervention design features, in that online interventions have the capacity to influence voluntary behavior.

A number of factors must be addressed when developing an online or IT-based learning environment, most importantly, how to motivate people to visit and revisit the intervention, and also determining whether the intervention is personally relevant to the viewers to resonate and create positive behavioral changes. Studies have found that

online and IT intervention loyalty over an extended period of time, premature attrition rates, limited amount of time spent on accessing intervention content can cause an online or IT-learning intervention to be ineffective (Brouwer et al., 2008). In order to increase dissemination of and exposure to online interventions, Brouwer et al. (2008) found that potential users need to be motivated to access the intervention and content needs to be personally relevant. The probability of a person revisiting an intervention largely relies on their experience with the intervention in a prior visit, personal inclination to change the behavior that is targeted in the intervention, the provision of new content, and being reminded to visit the intervention (Brouwser et al., 2008).

This study hopes to build on the proven success of online and IT-learning resources to create and distribute an intervention that will influence positive behavioral change. In considering lessons learned from previous studies and to increase dissemination and exposure to this studies' content, the study measurement tools such as questionnaires, surveys and the intervention will be structured in an easy-to-use, comprehensive format. Furthermore, parents will be provided with an appropriate amount of detail and elaboration of educational information so that the length of time spent on the online and IT-learning resources will be brief; however sufficient to process the intervention content.

CHAPTER III
RESEARCH METHODOLOGY

3.1 Research Design

This study is a randomized-controlled trial, which is an appropriate design for this study, as it is a powerful tool to measure the influence of the educational intervention on parents' knowledge and perception of HPV and the HPV vaccine, and HPV vaccination intention and uptake.

Expat parents were randomized to either a test group who received the educational intervention, or a control group that did not receive the intervention until after the study was finished. Any statistically significant differences between the intervention group and the control group were predominantly attributed to having received the test intervention or not.

3.2 Study Area

This study was carried out in Bangkok, Thailand, an area that was purposively selected due to its' growing and diverse expat population. From January 2010 to December 2011, Bangkok's expat population increased almost 10%, from approximately 52,500 to 57,000 people. Many expat living in Bangkok are businessmen and women and other professionals who are working on an intra-country transfer, or are working for a Thai branch of Multinational Corporation. While relocating their careers, many expats find themselves relocating their families as well, some temporarily on a short-term basis and others more permanently. There is no research available on HPV educational interventions or studies on expat parents. With a large expat community in Bangkok, this study area allows for an in-depth exploration of expat parents' HPV knowledge, perception, and HPV vaccination intention and uptake.

3.3 Study Population

Expats living in Bangkok, Thailand, were purposively selected as this studies' population. This population was specifically chosen as a test population of expat parents to measure whether an E-based educational intervention has any effect on HPV knowledge, perception, vaccination intention and uptake. Should this intervention prove to be effective in this expat population it is possible that it could be implemented in a larger and more diverse population of expat parents around the world at another time or in a subsequent study.

The principal investigator is an expat living in Bangkok and has affiliations with many local expat community organizations and other expats who can connect the research team more broadly with other expat networks in Bangkok. This creates a broad network of expat communities from which the study population can be recruited. Very little information was collected from the expat networks, as they did not allow the research team access to their membership information, due to network and organizational privacy policies.

Expat parents were also purposively selected for this study population. The Thailand Migration Report from 2011 indicated that more than 100,000 foreigners held work permits in Thailand to fill professional, managerial and highly skilled employment for many international corporations (www.un.or.th, 2011). In addition to these expats who have work permits, other expats in Thailand include diplomats and foreign officials who work in international organizations, and their dependents, and do not require work permits. The International Organization for Migration, Thailand, reported that in March 2010, the skilled foreign nationals who held work permits in Thailand were lead by Japanese, China, India, the Philippines, the United Kingdom (UK) and Great Britain and Ireland, and the United States of America (www.un.or.th, 2011). It was also was more financially feasible to access the expat population in Bangkok. In trying to resolve any issues that emerged throughout the course of the study, the principal investigator was accessible in Bangkok and was able to provide support to the study population.

3.4 Sampling Technique

From November 2012 to January 2013, expat parents were recruited to participate in the study. A study advertisement was distributed by email to expat support and resource organizations and various international Chambers of Commerce in Bangkok, who subsequently emailed the advertisement to their respective members (see Appendix B for example of study advertisement). Due to organizational security and privacy policies, the principal investigator did not have direct access to the members' of each respective expat support and resource organization, which caused delays and difficulties in the recruitment of study participants as we relied on the expat networks to distribute the advertisements. It is possible that had we had direct access we could have sent more frequent and regular advertisements to the expats in each network, which could have generated a larger number of participants. Study advertisements were also posted on billboards throughout Bangkok. All forms of participant recruitment indicated that the study would investigate expat parents' knowledge of HPV. The study email address was included in the advertisement, which parents were encouraged to contact with any questions or if they were interested in participating in the study.

As shown in Figure 4, sixty-six parents contacted the private research email address with either questions regarding the study, or expressing their interest to participate in the study. Expat parents who expressed an interest in participating in the study were provided a participant information sheet (see Appendix C). After receiving the information sheet and/or having their questions answered by the principal investigator, nine parents declined to further participate in the study.

For the parents who provided acknowledgement of receipt and having read the participant information sheet, and provided written informed consent by email, they were asked to complete a brief screening questionnaire (see Appendix D). The brief screening questionnaire had questions which would generate answers that ensured the principal investigator to be sure the parents eligibility to participate in the study (see Figure 2 for sampling technique, Figure 3 for study eligibility criteria). Inclusion criteria included biological and non-biological parental or guardian figures (mothers and fathers) who

were over 18 years of age and have child(ren) 18 years of age or younger. The expat parents could be any nationality and must be living in Thailand and be proficient in reading and writing in English, and must have access to an email address and regular use of a computer and the Internet.

After completing the screening questionnaire, nine parents were deemed ineligible to participate in the study, three parents were ineligible, as they had already vaccinated their child(ren) prior to becoming enrolled in the study, and two parents opted out prior to receiving the baseline survey. In total, forty-three parents were eligible, willing and provided consent to participate in the study. These parents received the baseline survey in January 2013. The baseline survey had a 100% response rate. After collecting the baseline data, the forty-three parents were allocated a number and put in an automated computerized random number generator. Twenty-three parents were randomly assigned to the test group, and received the study intervention. Twenty parents were randomly assigned to the control group and did not receive the study intervention; however, will receive the intervention at the end of the study. The first follow-up survey was distributed within 24 hours after the study intervention ended. There was a 100% response rate for the first follow-up survey. The second follow-up survey was distributed three months after the study intervention ended, and there was also a 100% response rate from both control group and test group. In total, 100% of the test group (n=23) and 100% of the control group (n=20) responses for the baseline, first and second surveys were analyzed.

Parents did not receive any compensation for participating in the study.

Figure 2: Sampling Technique

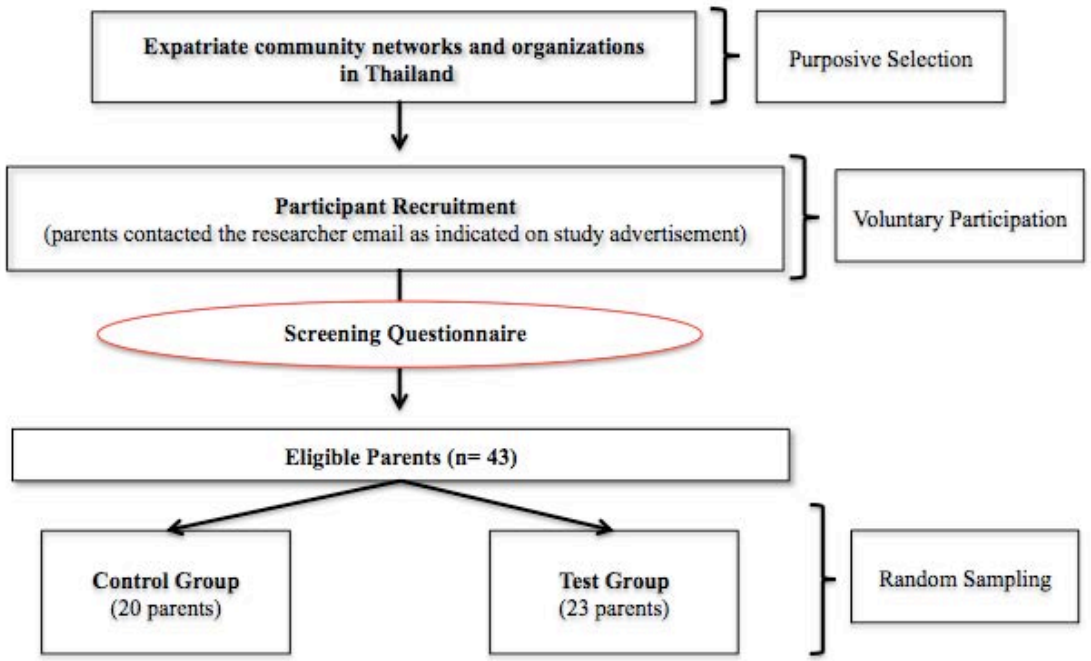
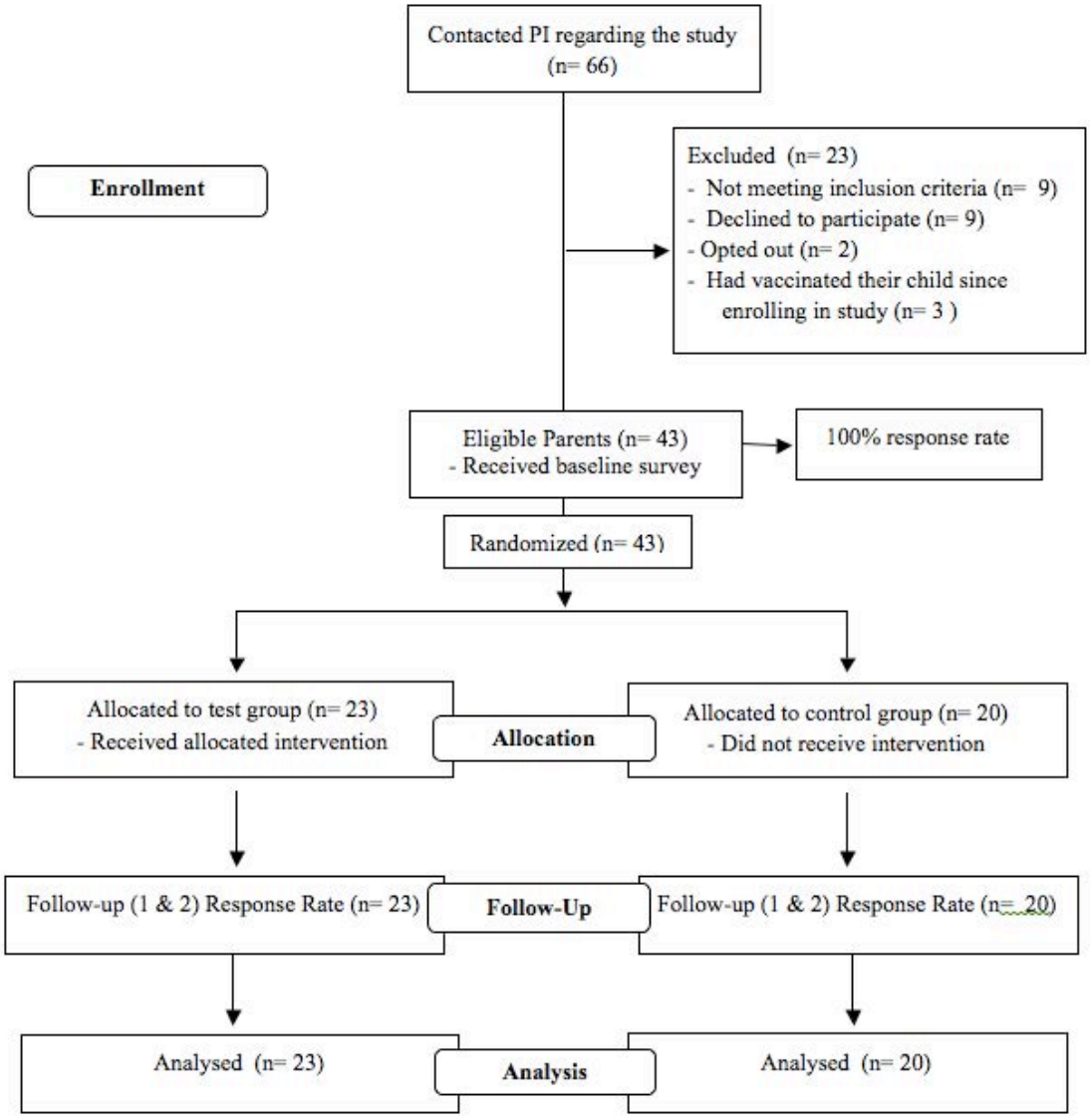


Figure 3: Study eligibility criteria

Exclusion Criteria	
Inclusion	Exclusion
Must provide written consent and be willing to participate in the study.	Knowingly cannot participate throughout the whole study.
Must be proficient in English (reading and writing).	Have already vaccinated their child(ren) with the HPV vaccine.
Must have daily access to email and the Internet.	Moving away from Bangkok during the study time frame.
Must have children below the age of 18 yrs.	The parents' child has had HPV prior to becoming enrolled in the study.

Figure 4: Flow chart of Participant Recruitment (Schulz et al., 2010; Moher et al., 2010)



3.5 Sample Size

The following is a sample calculation for this randomized-controlled trial study (Noordzij et al., 2010). *n* is the sample size in each group (control group and intervention group), *p*1 is the percentage of subjects in the control group who will have correct knowledge, a positive perception and HPV vaccination intention or uptake (40%), *q*1 is the percentage of subjects in the control group who will not have correct knowledge, a

positive perception and HPV vaccination intention or uptake ($1 - p1$). $p2$ is the percentage of subjects in the intervention group who will have correct knowledge, a positive perception and HPV vaccination intention or uptake (80%). $q2$ is the percentage of subjects in the control group who will not have correct knowledge, a positive perception and HPV vaccination intention or uptake ($1 - p2$). x is the percentage difference that I hope to detect in my study between the control group and the intervention group, a is the multiplier for alpha (0.05), and b is the multiplier for the power (80%). The prevalence rate for the control group knowledge level, perception and vaccination intention and uptake was determined based on the focus group discussions that were held at the onset of this study (see Appendix E). Two focus groups were held (one in December 2012 and one in January 2013): the first focus groups discussion had eleven parents and the second had nine parents. The expat parents were from diverse countries of origin (Europe, Asia, North America and one parent from Africa). The majority of the parents were female, with only one male parent.

Noticeable trends from both focus group discussions included a general lack of knowledge of what HPV is (many had not heard of HPV and admitted to attending the focus group with the hopes of learning more about the disease). For those who had heard of HPV prior to the focus group, many did not know of the health effects or the preventative measures against HPV (ie. vaccination). Those who did know of the HPV vaccine expressed that they felt that they were not equipped with sufficient information to make an informed decision of whether to vaccinate their child. The majority of discussion centering on the HPV vaccine were regarding concerns over vaccine safety, efficacy and the risks (short term and long term health effects) that could result from vaccination.

All parents indicated their interest and willingness to learn more about HPV, a disease they felt they needed to know more about in order to make an informed-decision regarding their child's health. The parents expressed that if they received enough information about the vaccine they would feel confident in making a decision regarding vaccination. The parents discussed how they learned of other preventative measures to

protect their child's health and took health-related action. When the discussions broached on the best methods of educating on HPV, many parents expressed that Internet served as their first source of information, and if they thought their child was at risk of illness or disease they would then take health-related action and seek out health services and information from a doctor or medical facility.

As there were no prior studies that assessed expat parents' HPV-related knowledge, perception, vaccination intention or uptake from which to base the prevalence rates, these data collected from the focus group discussions informed an estimated prevalence rate for the control group (see Appendix E). After considering the willingness and interest of the parents, and also noting their initiative in health-related action, the principal investigator was able to generate an estimated prevalence rate for the test group.

$$n = \frac{[(a + b)^2 (p1q1 + p2q2)]}{x^2}$$

$$n = \frac{[(1.96 + 0.842)^2 (0.40 \times 0.60 + 0.80 \times 0.20)]}{0.40^2}$$

$$n = \frac{[(2.802)^2 (0.24 + 0.16)]}{0.16}$$

$$n = \frac{[(7.851) (0.4)]}{0.16}$$

$$n = \frac{3.1404}{0.16}$$

$$n = 20$$

In an effort to minimize the potential effect of drop out or continuity correction, 10% was to the sample calculation for each group ($n = 20 + 2 = 22$ per group).

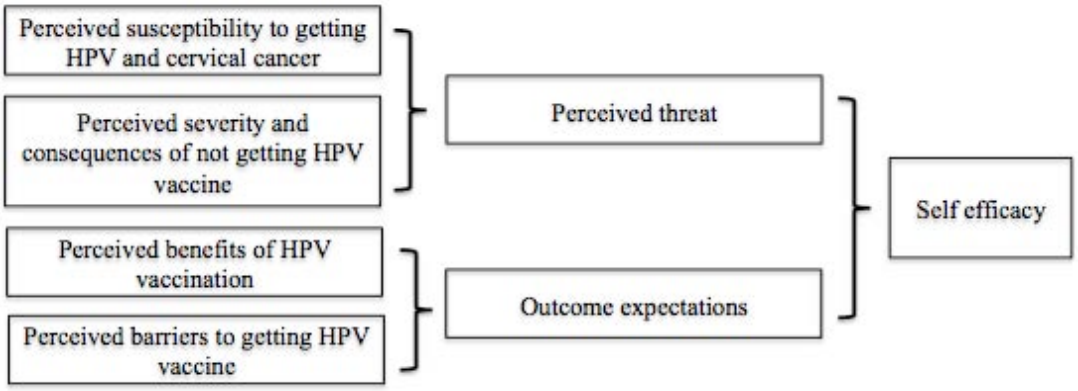
3.6 Data Collection

The research team was composed of the principal investigator, Ms. Melissa Baker and Advisor, Assistant Professor Ratana Somrongthong from the College of Public Health Sciences at Chulalongkorn University. A graphic designer was hired to design the poster series. A consultant was hired to advise the data analysis.

3.7 Measurement Tools

The study measurement tools were designed in considering the Health Belief Model (HBM) (Rosenstock 1966, Figure 5) and a Behavioral Change Model (Panza, 1996) (Figure 6).

Figure 5: Major constructs of the Health Belief Model



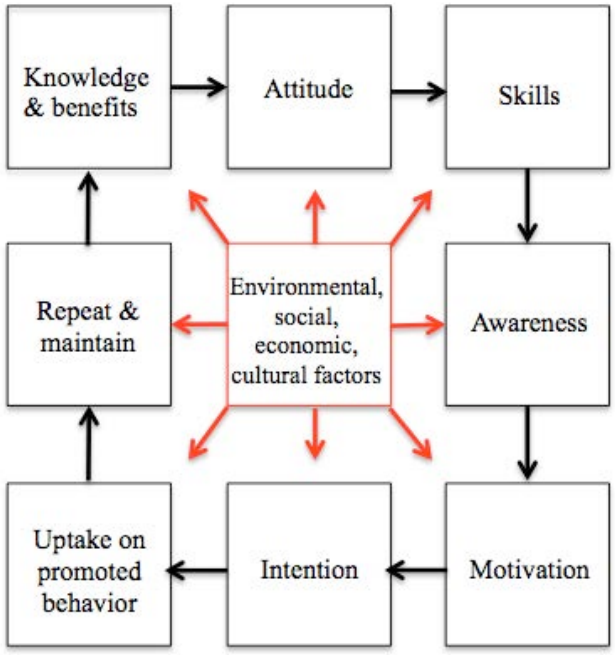
The HBM is an appropriate theoretical framework for the design of the study surveys, as the principal investigator set out to examine the predictors to expat parents' health-related action, which included the perceived threat, benefits to, perceived barriers and cues to vaccination (Reynolds and O'Connell, 2011). The outcome variables measured in this study are knowledge, perception, HPV vaccination intention and uptake.

It may seem incomprehensible for parents to vaccinate their child for an STI when they are not sexually active, let alone when the child has yet to reach puberty. In this regard, parents need to take action and preventative measures in the absence of illness. Foresight is needed to initiate preventative measure to protect children against a prevalent infection that may result in life changing or sometimes fatal circumstances in the future.

If parents do not believe there is any benefit for their child to be vaccinated with the HPV vaccine they are more likely to have a lower HPV vaccination intention and uptake (Gellin, Maibach, & Marcuse, 2000). If parents believe there is a positive outcome associated with vaccinating their children then they are more likely to have a greater vaccination intention and uptake (Constantine and Jerman, 2007; Zimet, Blythe and Fortenberry, 2000). Furthermore, when parents believe their child(ren) are more susceptible to being exposed to, or may be at risk of becoming infected with HPV, they are more likely to have positive vaccination intention and uptake (Reynolds & O'Connell, 2011). These and other studies demonstrate how knowledge, attitudes and beliefs can influence behavioral change, including HPV vaccination uptake (Spleen et al.,

2012; Krawczyk, 2012). A behavioral change model complemented the HBM in guiding the design of the study educational intervention.

Figure 6: Behavioral Change Model



The key aspects of the Behavioral Change Model include knowledge acquisition, instilling of positive attitudes, creation of skills, increased awareness, motivation and intention, and ultimately the uptake of a promoted behavioral outcome. This model ties in nicely with the HBM, as the intervention was designed with the aim to increase expat parents knowledge, instill positive perceptions while dispelling negative perceptions, and develop decision-making skills and motivation to make informed vaccination-related decisions.

3.7.1 Qualitative data Measurement Tools

Due to the lack of information and research on expats health, in particular a gap in the area of HPV research on expat parents, this inhibited the principal investigator from

developing a hypothesis, defining independent and dependent variables, and determining the appropriate estimated prevalence rate for the study sample at the onset of this study. In order to generate a hypothesis, a conceptual framework, and calculate the study sample size, the principal investigator conducted focus group discussions with expat parents who live in Bangkok, Thailand (see Appendix E). Two focus group discussions were held in December 2012 and January 2013 (one per month), with eleven expat parents attending the first discussion and nine other parents attending the second discussion. Recruitment to the study was ongoing at this time. Eligible expat parents were invited (via email and in person) to attend the focus group discussions which were held in a neutral coffee shop in Bangkok during a week day(s). If parents were unable but expressed their interest in contributing to the focus group discussions, they were invited to send their comments and questions to the principal investigator. The principal investigator hired a research assistant to attend the focus group discussions as a note taker. This method of collecting qualitative data to inform elements of the study design incorporated aspects of the Grounded Theory Method of a hypothesis-generating study (Heath and Cowley, 2004). As per the Grounded Theory Method, theoretical coding was used to develop the trial intervention study hypothesis based on the data that was collected during focus group discussions – essentially, grounding the hypothesis in what the expat parents reported. The focus group discussions captured aspects of expat parents' HPV knowledge, perception and vaccination intention, and provided the principal investigator with sufficient information to generate a hypothesis, set a general prevalence rate for the control group and test group, and identify independent and dependent variables for the conceptual framework.

3.7.2 Quantitative data measurement tools

Quantitative data measurement tools included a screening questionnaire (see Appendix D), one baseline survey (see Appendix F), and two follow-up surveys (see Appendix H): the first follow-up was conducted immediately after the intervention

completion, and a second follow-up was conducted three months after the intervention completion. The pre- and post-intervention surveys were adapted from the Carolina HPV Immunization Measurement and Evaluation (CHIME) Project (Reiter et al., 2009). The Dissertation Proposal Examination Committee from the College of Public Health Sciences at Chulalongkorn University approved the study in November 2012, as did the Ethics Review Committee for Research Involving Human Research Subjects, Health Sciences Group in December 2012. Consultations were conducted with health professionals, health scientists and researchers from around the world to collect advice on the design of all measurement tools and the study intervention.

The surveys were administered online using a website that was private and controlled by the principal investigator. The website tracked the parents who had completed the survey, and automatic notices were programmed and sent to the parents who have not yet completed the questionnaire or survey(s).

The baseline and follow-up surveys were used to measure the impact of the intervention. The baseline survey took approximately 20 minutes to access and complete. The follow-up surveys took approximately 10 minutes to complete. As with the screening questionnaire, parents received an email requesting that they access the survey website and complete the survey. The baseline survey consisted of 5 sections:

I. Socio-Demographic Information

II. Your Health History

III. HPV – Knowledge

IV. Perception of HPV

V. HPV Vaccination Intention

The follow-up surveys were administered immediately after the intervention was completed, and 3 months later. The purpose of the first follow-up survey was to measure parents HPV vaccination intention and uptake immediately after receiving an HPV educational program. The purpose of the second follow-up survey was to measure whether the parents had sustained HPV vaccination intention and uptake after a sufficient period of time when they have gone without the educational intervention. By having

only a short period of 3 months between the first follow-up and second follow-up survey, this reduced the amount of time that parents had to access other sources of information, which we hoped would reduce any extraneous variables that could potentially contaminate the study results. It is hoped that this shorter amount of time for study follow-up would also reduce parent drop out or discontinuation from the study, as parents had less time to loose interest or find the study burdensome or too demanding.

The follow-up surveys consisted of 5 sections:

I. HPV – Knowledge
II. Perception of HPV and the HPV vaccine
III. HPV Vaccination Intention
IV. HPV Vaccination Uptake
V. Comments & Feedback

3.7.3 Study Intervention

The study intervention consisted of an E-based poster series that was emailed to the personal email addresses of each parent in the intervention group (see Appendix G). Each poster contained new information about HPV and the HPV vaccine. The series consisted of 12 posters that were emailed individually to the intervention group three times a week every Monday, Wednesday and Friday morning for a duration of one month. Parents were asked to send an email reply to the research team indicating they had viewed the poster (see Appendix).

The posters were designed in HTML and PDF formats so that parents could access the poster in their email from any mobile phone device, personal computer, laptop, tablet, etc. It was hoped that by having a program that was carried out over the period of one month, the parents would receive sufficient information as part of the educational program and not actively seek out additional HPV information from other sources. It was hoped that this providing an endless stream of information three times a week over a one-month period would prevent extraneous variables from influencing parents HPV knowledge, perception, vaccination intention and uptake. By creating a program that was

only one month in length we hoped that this would reduce parents' discontinuation and drop out from the study.

A graphic designer designed the posters. All poster content is included in Appendix F. The intervention content was guided by information from the World Health Organization (WHO), the Public Health Agency of Canada, the Centers for Disease Control and Prevention (CDC) and other reputable health-based websites, and from input of experts from Canada and in Thailand. It should also be noted that there was no mention of the two HPV vaccine brands or manufacturers, and there was a disclaimer at the bottom of each poster stating that this study was in no way affiliated with or linked to either drug manufacturer or HPV vaccine.

The control group of parents received the poster series after the study ended.

3.8 Data Analysis

Analysis of the data was done using the Statistical Package for the Social Sciences version 21.0 (SPSS, Chicago, Illinois). Statistical tests were performed with a 95% confidence interval (CI) and a p-value <0.05 was considered statistically significant.

The survey contained questions regarding parents' socio-demographic characteristics and health history. Socio-demographic data included age, gender, religious affiliation, country of origin (the country from which the parent holds a passport(s)), marital status, household information (income level, family/household composition), and information on who decides whether their child receives the HPV vaccine. Questions on health history included how many times the parent visited a doctor, if the parent knows of someone (who they care about) who has ever had genital warts or an anogenital cancer, and whether the parent has received any doses of the HPV vaccine.

Knowledge-related questions included, "have you heard of HPV or the human papillomavirus before this study?" and "have you ever heard of the HPV vaccine before this study (Gardasil or Cervarix)?" Knowledge questions included, "HPV is a sexually transmitted infection", "HPV can cause cervical cancer", and "HPV can cause genital

warts". Prevention-related questions included, "getting regular Pap tests reduce a woman's chances of getting cervical cancer". The survey also included questions about how HPV can be prevented, for example, "getting a regular Pap smear test reduces a woman's chances of getting cervical cancer" and asking parents whether they had heard of the HPV vaccine. Parents responded with 'yes', 'no' or 'do not know' to twelve questions. 'Yes' responses were scored with 1-point and all 'no', 'do not know' or missing values were scored with zero points.

Perception of HPV and the HPV vaccine was measured by the degree to which parents agreed with twenty negative and positive statement questions regarding susceptibility, threat and consequences of HPV, vaccine efficacy, safety and accessibility. Responses to perception statements fell on either a 7-point or 5-point Likert scale. Due to a small sample size, in the data analysis parents' responses were collapsed. Agreement to positive statements and disagreement with negative statements was considered to be a positive perception of HPV or the HPV vaccine and scored with one point. All other responses or missing values were scored as zero. Responses were summed to derive a mean perception score.

Examples of perception statements included in the surveys include those regarding concerns over vaccine efficacy and safety such as, "The HPV vaccine is unsafe", "The HPV vaccine may cause short term problems", "The HPV vaccine may cause lasting long term side effects", and "I am concerned about giving my child too many vaccines." Parental concern over vaccination increasing sexual behavior or initiating sexual debut at an earlier age was captured in statements such as, "If a teenage boy/teenage girl get the HPV vaccine, he may be more likely to have sex" and "My child is too young to get a vaccine for an STI." Perceived susceptibility of contracting HPV was measured in statement questions regarding the likelihood of each parents' child contracting HPV, genital warts or an anogenital cancer in the future.

Vaccine efficacy was measured in statement questions including, "How effective is the HPV vaccine in preventing HPV infection", "How effective is the HPV vaccine in preventing genital warts", and "How effective is the HPV vaccine in preventing cervical

cancer?" Access and availability of the vaccine was measured in statement questions regarding the level of difficulty in accessing a healthcare provider who has the vaccine available, where the vaccine is affordable, and where there is not a long wait time to receive the vaccine.

Two scales were created for the purposes of the study. A knowledge scale composed of 6 questions) and an overall perception scale (20 statement questions) sought to capture expat parents' level of knowledge and perception of HPV and the HPV vaccine. The overall perception scale was subsequently divided into 5 subscales measuring more precise constructs: perceived vaccine safety, concerns over vaccination influencing sexual behavior or earlier sexual debut, perceived susceptibility of child contracting HPV in the future, perceived vaccine efficacy, and perceived vaccine accessibility. The make-up of the subscales was left unchanged across surveys to facilitate comparisons across time.

In each survey, parents were asked whether they had sufficient information about the HPV vaccine to make a decision of whether to administer it to their child. The proportion of parents who agreed or disagreed with this statement was measured within groups over time relative to the baseline survey (McNemar Test) and between groups at each survey period.

HPV vaccination intention was measured by whether the parent does or does not intend to vaccinate their child within the next year or when he/she is eligible. If a parent responded with an intention to vaccinate they were scored with 1 point. If the parent responded that they did not intend to vaccinate their child they were scored 0. HPV vaccination uptake was measured by whether parents had or had not vaccinated their child at the measurement period. If a parent had a child who was eligible to be vaccinated (9 to 18 years of age) and they responded that they had vaccinated their child at the measurement period (either first or second follow-up) they were scored with 1 point. If the parent responded that their eligible child had not been vaccinated at the measurement period they were scored a zero.

The sample was normally distributed and met all assumptions to run the following data analyses, as mentioned herewithin. All variables were analyzed for frequencies. *Pearson r* test was conducted to analyze correlations. *Chi-square* and *t-test* were conducted to test whether there were any differences in the knowledge, perception, vaccination intention and uptake mean scores of the test group and control group at each survey period.

A difference-in-differences (DID) estimate was computed to determine the effect of the study's educational intervention program effects (Abadie, 2005). The procedure involved measuring the interaction between two dummy variables: one representing the baseline and follow-up (pre- and post-test), and another representing the test group and control group. The DID estimate is obtained by first measuring the change within each group between the baseline and the follow-up and then measuring the difference of this change between groups (Abadie, 2005). A positive DID estimate implies that the difference between the pre and post surveys is greater for the test group, which could be explained by a treatment effect of the study educational intervention.

After consulting with a data analyst consultant, it was determined that due to the small sample size, that a logistic regression analysis was not suitable for these study data. Furthermore, our confidence was low in using the results from the logistic regression to determine any relationships between the knowledge and vaccination intention and uptake variables, and the perception and vaccination intention and uptake variables, as there were too few respondents with a positive vaccination intention and uptake variables to detect a relationship that would be reflective of the study population. Rather than use the results from the regression analysis, a series of *t-tests* were computed for all the scales (knowledge and perception) with the grouping variable being vaccination intention and vaccination uptake. This analysis was a comparison of respondents who did intend to vaccinate their child versus those who do not intend to vaccinate their child on all scales. The same analysis was computed comparing those who did vaccinate their child versus those who did not vaccinate their child on all scales. These comparisons demonstrate the significant differences in knowledge or perception between the groups of parents who

responded positively and negatively for vaccination intention, and between the parents who responded positively and negatively for vaccination uptake. It should be noted that conclusions from these analyses are made with caution, as they cannot be generalized to all expats who live in Thailand.

3.9 Pre-test and Validation

The Dissertation Proposal Examination Committee of the principal investigator approved the research proposal, which included measurement tools on November 1, 2012 at the College of Public Health Sciences, Chulalongkorn University. Consultations were conducted with health professionals, health scientists and researchers from around the world to collect advice on the design of all measurement tools and the study intervention, including health professionals and researchers from the Canadian Institutes of Health Research and experts from the College of Public Health Sciences at Chulalongkorn University.

The questionnaire, surveys and educational intervention were piloted among a diverse community of over twenty parents of children who are below the age of 18 years. All feedback was compiled and revisions were made accordingly.

3.10 Ethical Consideration

Ethical approval was obtained from the Ethics Research Committee on Research Involving Human Research Subjects, Health Sciences Group from Chulalongkorn University in Bangkok, Thailand (see Appendix J).

CHAPTER IV
RESULTS

In total, data from forty-three parents were analyzed at baseline. The first follow-up survey (see Appendix H) was sent to twenty parents who were randomly assigned to the study control group and twenty-three parents who were randomly assigned to the test group. A 100% response rate was achieved for all surveys.

4.1 Socio-demographic characteristics

The socio-demographic profile of the study population are summarized in Table 1.

Of the study population, one parent was within the age category 25-30 years, nine parents were within the age category: 31-35 years, eleven of the parents were within the age category: 36-40 years (25.6%), ten parents were within the category: 41-45 years (23.3%), and twelve parents were older than 46 years of age. Thirty-seven parents are female and six are male. The expat parents come from fifteen different countries of origin within Asia, North America, Europe, Oceania and Africa. Almost all parents involved in the study are married or living with a spouse or partner (97.7%; n = 42). Twenty-seven parents (63%) reported a religious affiliation and sixteen (37.2%) are unaffiliated.

The SES of the study population is high. Forty parents (93%) completed post-secondary education. The median annual household income is within the range of $125,000 - $149,999 USD/year. Eighteen parents (42%) reported an average household income of <125,000 USD/year, and nineteen parents (58.7%) reported a household income >149,999 USD/year. Ten parents (23%) reported an annual household income of $200,000 USD or greater/year.

A *Pearson's r* test was computed to assess whether any correlations exist between the socio-demographic variables and vaccination intention – no correlations existed.

Table 1
Study participants' socio-demographic characteristics (*n* = 43)

Characteristic	Group	n (%)
Age (years)	25-30	1 (2.3)
	31-40	20 (46.5)
	41-50	18 (41.9)
	51 or older	4 (9.3)
Gender	Female	37 (86)
	Male	6 (14)
Country of Origin	Asia	3 (6.9)
	Europe	13 (30.3)
	North America	20 (46.5)
	Oceania	5 (11.6)
	Central America	1 (2.3)
	Africa	1 (2.3)
Religious Affiliation	Affiliated	27 (62.8)
	Not Affiliated	16 (37.2)
Married/Spouse	Yes	42 (97.7)
	No	1 (2.3)
Post-secondary Education	Yes	40 (93)
	No	3 (7)
Average household income (USD/yr)		
	<$50,000	3 (7)
	$50,000-99,999	8 (18.6)
	$100,000-150,000	14 (32.6)
	$150,000-199,999	9 (20.9)
	$200,000 and up	10 (23.3)
In household who decided if your child gets a vaccine?*		
	Me	8 (18.6)
	Joint decision	34 (79.1)

*One person did not answer this question
** There were no statistically significant differences between the socio-demographic characteristics of the control group and the test group.

4.2 Health History Profile

The study populations' health history profile is captured in Table 2. Health history was only collected at baseline.

Of the females in the study population (n = 37) thirty-one (82%) reported that they have annual Pap smear examinations, and almost half (33%; n = 14) had ever had an irregular Pap smear result. Of all the study participants, five parents (12%) had a doctor inform them of abnormal colposcopy or biopsy results. Less than one quarter of the study population knew of someone who they care about who has had genital warts or an anogenital cancer, 23% (n = 10) and 21% (n = 9), respectively. Two mothers (5%) in the study sample had received the HPV vaccine.

Pearson r was computed to determine whether the health history variables had any correlations among one another, or between the health history variables and vaccination intention and uptake. No correlations were found between the health history variables and vaccination intention.

Table 2
Study participants' health history (*n* = 43)

Characteristic	Group	*n* (%)
How many times/year do you visit a healthcare provider for yourself?		
	Never	1 (2)
	1-5 times	36 (84)
	6-10	4 (9)
	11-15	1 (2)
	>20	1 (2)
Has a healthcare provider told you that the results of a colposcopy or biopsy were abnormal? *		
	Yes	5 (12)
	No	37 (88)
Has someone you care about ever had genital warts? *		
	Yes	10 (23)
	No	32 (76)
Has someone you care about ever had an anogenital cancer? (ie. cervical, vaginal, vulvar, penile, anal)		
	Yes	9 (21)
	No	34 (79)
Have you received any doses of the HPV vaccine?		
	Yes	2 (5)
	No	41 (95)
Do you go for an annual Pap smear examination?**		
	Yes	31 (82)
	No	7 (18)
Have you ever had irregular Pap smear results?**		
	Yes	14 (37)
	No	24 (63)

*One respondent did not respond to this question.
**Only female respondents answered the questions listed in this section (*n* = 38).
***There were no significant differences of the health history between the control group and test group.

4.3 Knowledge of HPV and the HPV vaccine

4.3.1 Baseline Data

At baseline, data for the study population was analyzed together in one group prior to examining the data per control group and test group. Table 3 summarizes correlations between the study populations' baseline knowledge level and vaccination intention.

Table 3
Correct knowledge variables and vaccination intention for all study participants' at baseline (*Pearson correlation co-efficient (r))* (n= 43)

Question	Correct answers ***n* (%)**	Intention **Pearson *r***
General Knowledge		
Have you ever heard of HPV before this study?	32 (74)	-0.28
Have you heard of the HPV vaccine before this study?	32 (67)	-0.33**
My child is in the age group that health officials recommend get the HPV vaccine.	18 (42)	-0.28
Does your child have any form of health insurance?	34 (79)	-0.30
Does your child's health insurance cover the HPV vaccine?	23 (54)	-0.13
From what I have heard of the HPV vaccine it has been positive.	16 (37)	-0.29
Knowledge Scale		
HPV can cause cervical cancer.	28 (65)	-0.35**
HPV can cause genital warts.	18 (42)	-0.2
HPV is a sexually transmitted infection.	27 (63)	-0.37**
HPV infection can go away without treatment.	8 (19)	0.08
Getting regular Pap tests reduces a woman's chances of getting cervical cancer.	25 (58)	-0.29
HPV can cause abnormal Pap smear results.	20 (47)	-0.27

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

Of the study population, 74% (n = 32) had heard of HPV prior to the study and 26% (n = 11) had no prior knowledge of HPV. 70% (n = 32) had heard of the HPV vaccine (Gardasil or Cervarix), and 37% of the parents (n = 16) had heard a positive information about the HPV vaccine. Only 42% (n = 18) of the study population knew whether their child was in an age group eligible for HPV vaccination.

The study populations' knowledge scale mean was low (*m* = 0.49; SD 0.06). Only 63% of the study population (*n* = 27) knew that HPV is a sexually transmitted infection, 65% (*n* = 28) knew that HPV can cause cervical cancer and 42% (*n* = 18) knew that HPV could cause genital warts. Knowledge about HPV prevention and treatment was low with only 19% of the study population (*n* = 8) who knew that HPV can go away without treatment. 58% (*n* = 25) of study population knew that getting a regular Pap smear examination can reduce a woman's chances of contracting an HPV infection, and only 47% (*n* = 20) of the study population knew that HPV could cause abnormal Pap smear results.

Pearson r was computed to determine whether any knowledge variables or the knowledge scale had any correlations with the vaccination intention outcome variable. Only one correlation was found between the knowledge scale and parents' vaccination intention ($r = -0.31$, $n = 43$, $p = 0.05$). This weak negative correlation means that when parents were less knowledgeable of the health effects and preventative measures against HPV they were 31% more likely to have a positive vaccination intention.

After exploring the baseline data for the study population, we separated the data per control group and the test group data to explore whether there were any significant differences between the knowledge levels of the two groups. A *chi-square test* was computed to analyze categorical knowledge variables. An independent *t-test* was computed to explore the knowledge scale. For the categorical knowledge variables, there were two questions that had statistically significant differences between the control and test groups at baseline: whether the parents knew if their child is currently eligible for vaccination (χ^2 (1) = 6.51, p =0.05), and what kind of information the parent had received (positive or negative) (χ^2 (1) = 10.03, p =0.01).

The test group (*n* = 23) mean score on the knowledge scale was low with only *m* = 0.57 (SD 0.39) and the control group mean score was *m* = 0.39 (SD 0.35) (see Tables 4 and 5). The independent *t-test* did not reveal any significant differences between the mean knowledge scale scores of the two groups.

Table 4
Correct knowledge variables and vaccination intention for the control group at baseline (*Pearson correlation co-efficient (r))* (n= 20)

Question	Correct answers *n* (%)	Intention Pearson *r*
General Knowledge		
Have you ever heard of HPV before this study?	13 (65)	-0.37
Have you heard of the HPV vaccine before this study?	11 (55)	-0.45**
My child is in the age group that health officials recommend get the HPV vaccine.	3 (15)	-0.49**
Does your child have any form of health insurance?	13 (65)	-0.37
Does your child's health insurance cover the HPV vaccine?	11 (55)	-0.41
From what I have heard of the HPV vaccine it has been positive.	5 (25)	-0.42
Knowledge Scale		
HPV can cause cervical cancer.	12 (60)	-0.41
HPV can cause genital warts.	4 (20)	-0.38
HPV is a sexually transmitted infection.	10 (50)	-0.50**
HPV infection can go away without treatment.	2 (10)	0.17
Getting regular Pap tests reduces a woman's chances of getting cervical cancer.	10 (50)	-0.50**
HPV can cause abnormal Pap smear results.	9 (45)	-0.30

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

Table 5
Correct knowledge variables and vaccination intention for the test group at baseline (*Pearson correlation co-efficient (r))* (n= 23)

Question	Correct answers *n* (%)	Intention Pearson *r*
General Knowledge		
Have you ever heard of HPV before this study?	19 (83)	-0.21
Have you heard of the HPV vaccine before this study?	18 (78)	-0.24
My child is in the age group that health officials recommend get the HPV vaccine.	12 (52)	-0.21
Does your child have any form of health insurance?	18 (78)	-0.24
Does your child's health insurance cover the HPV vaccine?	18 (78)	0.17
From what I have heard of the HPV vaccine it has been positive.	6 (26)	-0.22
Knowledge Scale		
HPV can cause cervical cancer.	16 (70)	-0.30
HPV can cause genital warts.	14 (61)	-0.13
HPV is a sexually transmitted infection.	17 (74)	-0.27
HPV infection can go away without treatment.	6 (26)	0.01
Getting regular Pap tests reduces a woman's chances of getting cervical cancer.	16 (65)	-0.09
HPV can cause abnormal Pap smear results.	11 (48)	-0.25

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

4.3.2 First Follow-up Data

Table 6 summarizes correlations between knowledge level and vaccination intention at the first follow-up for the study population as one group, and Tables 7 and 8 summarize per test and control group, respectively.

Table 6
Correct knowledge variables and vaccination intention for all study participants' at first follow-up (*Pearson correlation co-efficient (r)*) (n = 23)

Question	Correct answers ***n* (%)**	Intention **Pearson *r***
Knowledge Scale		
HPV can cause cervical cancer.	42 (98)	0.15
HPV can cause genital warts.	38 (88)	0.30**
HPV is a sexually transmitted infection.	38 (88)	0.30**
HPV infection can go away without treatment.	14 (33)	-0.30
Getting regular Pap tests reduces a woman's chances of getting cervical cancer.	40 (93)	-0.02
HPV can cause abnormal Pap smear results.	31 (71)	0.17

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

Table 7
Correct knowledge variables and vaccination intention for the control group at first follow-up (*Pearson correlation co-efficient (r)*) (n = 20)

Question	Correct answers *n* (%)	Intention Pearson *r*
Knowledge Scale		
HPV can cause cervical cancer.	20 (100)	-
HPV can cause genital warts.	16 (80)	0.29
HPV is a sexually transmitted infection.	16 (80)	0.29
HPV infection can go away without treatment.	5 (25)	0.15
Getting regular Pap tests reduces a woman's chances of getting cervical cancer.	18 (90)	0.16
HPV can cause abnormal Pap smear results.	12 (60)	0.21

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

Table 8
Correct knowledge variables and vaccination intention for the test group at first follow-up (*Pearson correlation co-efficient (r)*) (n = 23)

Question	Correct answers *n* (%)	Intention Pearson *r*
Knowledge Scale		
HPV can cause cervical cancer.	22 (96)	0.24
HPV can cause genital warts.	22 (96)	0.24
HPV is a sexually transmitted infection.	22 (96)	0.24
HPV infection can go away without treatment.	9 (39)	-0.19
Getting regular Pap tests reduces a woman's chances of getting cervical cancer.	22 (96)	-0.19
HPV can cause abnormal Pap smear results.	19 (83)	0.06

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

For the study population, the mean knowledge scale score was $m = 0.85$ at first follow-up (SD 0.19). The mean knowledge scale score for the test group was high at $m = 0.84$ (SD 0.17), and the control group moderate at $m = 0.73$ (SD 0.23). The test groups' knowledge of the health effects of HPV was high with 95.7% knowing that HPV is a sexually transmitted infection that can cause cervical cancer and genital warts, and can be

prevented by getting regular Pap smear examinations (*n* = 22), and 83% of the test group know that HPV can cause abnormal Pap smear results (*n* = 19). The test group had a low level of knowledge that HPV can go away without treatment (*n* = 9, 39%). The control group had a high level of knowledge of the health effects of HPV, with 100% who know that HPV can cause cervical cancer (*n* = 100), 80% know that HPV is an STI that can cause genital warts (*n* = 16). 90% of the control group knows that getting regular Pap test reduces a woman's chances of getting cervical cancer (*n* = 18). Knowledge that HPV can cause abnormal Pap smear results was moderate (*n* = 12, 60%) and knowledge that HPV can go away without treatment was low (*n* = 5, 25%).

A *T-test* was computed to determine whether there were any differences between the control groups' mean knowledge scale score and test groups' mean knowledge scale score (see data summarized in Table 9). The Levene's test for equality of variances indicated no difference between the control group and test group variances, therefore a pooled *t-test* was computed. A statistically significant difference was found between the control group and test groups' knowledge scale scores ($t(41) = 2.91$, $p < 0.0.1$). This statistic implies that there is evidence that being in the test group has a significant effect on level of knowledge. *Cohen's d* and r^2 were computed to measures the effect size. The *Cohen's d* effect size is 88.76 and r^2 is 0.17, which means a large effect (almost 89%) with 17% of the variance of knowledge level is accounted for from being in the test group or control group.

Table 9
Mean knowledge scores for all study participants, and separated and compared between test and control group at first follow-up

	Mean (S.D.)			*t-test (df)*
	Overall (*n* = 43)	**Test** (*n* = 23)	**Control** (*n* = 20)	
Knowledge Scale	0.79 (0.21)	0.84 (0.16)	0.73 (0.24)	2.91(41)***
HPV can cause cervical cancer.	0.98 (0.15)	0.96 (0.21)	1.0	
HPV can cause genital warts.	0.88 (0.32)	0.96 (0.21)	0.80 (0.41)	
HPV is a sexually transmitted infection.	0.88 (0.32)	0.96 (0.21)	0.80 (0.41)	
HPV infection can go away without treatment.	0.33 (0.47)	0.39 (0.5)	0.25 (0.44)	
Getting regular Pap tests reduces a woman's chances of getting cervical cancer.	0.93 (0.26)	0.96 (0.21)	0.90 (0.31)	
HPV can cause abnormal Pap smear results.	0.72 (0.45)	0.83 (0.39)	0.60 (0.5)	

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

Pearson r was computed to assess the relationship between each knowledge variables and vaccination intention or uptake - no correlations were found.

4.3.3 Second Follow-up Data

Knowledge of the study population, the test group and the control group are summarized in their own respective tables, 10, 11 and 12.

Table 10
Correct knowledge variables and vaccination intention for all study participants at second follow-up (*Pearson correlation co-efficient (r)*) (n = 43)

Question	Correct answers ***n* (%)**	Intention **Pearson *r***
Knowledge Scale		
HPV can cause cervical cancer.	40 (93)	0.27
HPV can cause genital warts.	38 (88)	0.21
HPV is a sexually transmitted infection.	41 (95)	0.22
HPV infection can go away without treatment.	10 (23)	0.01
Getting regular Pap tests reduces a woman's chances of getting cervical cancer.	40 (93)	0.9
HPV can cause abnormal Pap smear results.	36 (84)	0.18

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

Table 11
Correct knowledge variables and vaccination intention for the control group at second follow-up (*Pearson correlation co-efficient (r)*) (n = 20)

Question	Correct answers *n* (%)	Intention Pearson *r*
Knowledge Scale		
HPV can cause cervical cancer.	18 (90)	0.25
HPV can cause genital warts.	15 (75)	0.18
HPV is a sexually transmitted infection.	18 (90)	0.25
HPV infection can go away without treatment.	2 (10)	0.11
Getting regular Pap tests reduces a woman's chances of getting cervical cancer.	18 (90)	0.25
HPV can cause abnormal Pap smear results.	14 (70)	0.02

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

Table 12
Correct knowledge variables and vaccination intention for the test group at second follow-up *Pearson correlation co-efficient (r)*) (n = 23)

Question	Correct answers *n* (%)	Intention Pearson *r*
Knowledge Scale		
HPV can cause cervical cancer.	22 (96)	0.27
HPV can cause genital warts.	23 (100)	-
HPV is a sexually transmitted infection.	23 (100)	-
HPV infection can go away without treatment.	8 (35)	-0.16
Getting regular Pap tests reduces a woman's chances of getting cervical cancer.	22 (96)	-0.17
HPV can cause abnormal Pap smear results.	22 (96)	0.27

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

The mean knowledge scale score for the study population at second follow-up was *m* = 0.81 (SD 0.16). The mean knowledge scale score for the test group was high at *m* = 0.83 (SD 0.12), and the control group moderate at *m* = 0.64 (SD 0.22). The test groups' knowledge of the health effects of HPV was high with 100% knowing that HPV is a sexually transmitted infection that can cause genital warts, and *m* = 0.96 (SD 0.21) knowing that HPV can cause cervical cancer. Of the test group, *m* = 0.96 (SD 0.21) knew that HPV can cause abnormal Pap smear results, and by getting regular Pap smears this can reduce a woman's chances of getting cervical cancer. The test group had a low level of knowledge that HPV can go away without treatment (*m* = 0.35, SD 0.49).

The control group had a high level of knowledge of the health effects of HPV, with *m* = 0.75 (SD 0.44) who know that HPV is an STI, and *m* = 0.90 knowing that HPV can cause cervical cancer and genital warts (SD 0.31). Of the control group, *m* = 0.90 (SD 0.31) knew that getting regular Pap test reduces a woman's chances of getting cervical cancer, and *m* = 0.70 knew that HPV can cause abnormal Pap smears (SD 0.47). Knowledge that HPV can go away without treatment was low (*m* = 0.10, SD 0.31). An independent *t-test* was computed to determine whether there were any differences between the control groups' mean knowledge scale score and test groups' mean knowledge scale level. The Levene's test for equality of variances indicated that the variances were not to be assumed as equal (F = 4.4; *p* = 0.04), therefore we used the statistical outputs from the Welch *t test* results. A statistically significant difference (t(41) = 3.44, *p* <0.01; see Table 13). The measurements for effect size were high with *Cohen's d* = 107.43 and r^2 = 22.4. These data indicate that 22.4% of the variance in the knowledge level can be accounted for by being in the test group or control group.

Pearson r was computed at second follow-up to determine whether any correlations exist between the knowledge variables and vaccination intention or uptake – no correlations were found.

Table 13

Mean knowledge scores for all study participants, and separated and compared between test and control group at second follow-up

	Mean (S.D.)			*t-test (df)*
	Overall (n = 43)	**Test** (n = 23)	**Control** (n = 20)	
Knowledge Scale	0.74 (0.2)	0.83 (0.12)	0.64 (0.22)	3.41 (41)***
HPV can cause cervical cancer.	0.93 (0.26)	0.96 (0.21)	0.90 (0.31)	
HPV can cause genital warts.	0.88 (0.32)	1.0 (-)	0.90 (0.31)	
HPV is a sexually transmitted infection.	0.95 (0.21)	1.0 (-)	0.75 (0.44)	
HPV infection can go away without treatment.	0.23 (0.43)	0.35 (0.49)	0.10 (0.31)	
Getting regular Pap tests reduces a woman's chances of getting cervical cancer.	0.93 (0.26)	0.96 (0.21)	0.90 (0.31)	
HPV can cause abnormal Pap smear results.	0.84 (0.37)	0.96 (0.21)	0.70 (0.47)	

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

4.3.4 Summary

Table 14 presents descriptive statistics for the study population for the knowledge scale at each survey period, including the mean and standard deviation (SD), the observed minimum and maximum values, and an index of reliability (Cronbach's alpha) (Cronbach, 1951).

Table 14
Descriptive statistics of knowledge scale by survey period for all study participants (n = 43)

Knowledge Scale	Descriptive	Baseline	Follow-up 1	Follow-up 2
	Mean	0.49	0.81	0.81
	St. Dev.	0.38	0.19	0.16
	Min.	0.00	0.33	0.17
	Max.	1.00	1.00	1.00
	Cronbach's Alpha	0.88		

From baseline to the first follow-up the study populations' mean rose from *m* = 0.49 (SD 0.38) to *m* = 0.81 (SD 0.19), and remained the same at second follow-up (*m* = 0.81, SD 0.16)). To understand this large increase in the mean knowledge level, it is important to examine the test group and control group to determine whether there was an even increase in knowledge means in both groups. A series of comparisons were conducted to establish any differences between the control group and test group across survey periods. The control group and test group mean knowledge scores were not significantly different at baseline; however, the test group scored higher than the control group at follow-up. Table 15 presents the results of the analysis with the mean and standard deviation (SD) per control group and test group for each survey, and the result of a mean comparison (*t-test*).

Table 15
Comparison of knowledge scale means between the control group and test group at each survey period

Survey Period	Mean (S.D.)		***t-test (df)***
	Test Group (n = 23)	**Control Group** (n = 20)	
Baseline	0.57 (0.39)	0.39 (0.35)	1.60 (41)
Follow-up 1	0.84 (0.16)	0.73 (0.24)	1.88 (41)
Follow-up 2	0.87 (0.11)	0.71 (0.23)	2.87 (26.74)***

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

There were statistically significant differences found between the control group and test group mean knowledge score at first follow-up and second follow-up. At first follow-up, the control group mean knowledge score increased substantially even though they did not receive the educational intervention (from $m = 0.39$ at baseline (SD 0.35) to $m = 0.73$ at the first follow-up (SD 0.24)), and the test groups' mean knowledge score increased substantially from $m = 0.57$ at baseline (SD 0.39) to $m = 0.84$ at first follow-up (0.16). For the control group there was a 34% increase in knowledge, and for the test group there was a 27% increase in knowledge from baseline to first follow-up. From the first follow-up to second follow-up there was a 2% decrease in the control groups' knowledge level ($m = 0.71$, SD 0.23), and there was a 3% increase in the test groups' knowledge level (SD 0.11).

As summarized in Table 16 – Mean comparisons of the knowledge scale by vaccination intention; there was one statistically significant difference between the knowledge level of the parents who reported that they intend to vaccinate their child, and the parents who do not intend to vaccinate their child. This statistically significant difference was found at baseline ($t(30) = 3.46$, $p < 0.01$). No statistically significant differences were found at first or second follow-up.

Table 16
Mean comparisons of knowledge scale by vaccination intention for all study participants (n = 43)

Group		Survey Period		
		Baseline	**Follow-up 1**	**Follow-up 2**
Do not intend	*Mean (SD)*	0.43 (0.39)	0.75 (0.25)	0.75 (0.25)
Intend	*Mean (SD)*	0.73 (0.15)	0.83 (0.14)	0.84 (0.1)
	t-test (df)	3.46 (30)***	1.22 (33.81)	1.61 (27.83)
Sample size (*n*)				
	Do not intend	**35**	**22**	**22**
	Intend	**8**	**21**	**21**

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

No statistically significant differences were found between the mean knowledge scores for parents who did vaccinate their child versus those who did not vaccinate their child (Table 17).

Table 17
Mean comparisons of knowledge scale by vaccination uptake for all study participants (n = 43)

Group		Survey Period	
		Follow-up 1	**Follow-up 2**
No	*Mean (SD)*	0.77 (0.21)	0.79 (0.2)
Yes	*Mean (SD)*	0.89 (0.14)	0.81 (0.12)
	t-test (df)	1.31 (41)	0.22 (41)
Sample size (*n*)			
	No (Did not vaccinate their child(ren))	**37**	**36**
	Yes (Vaccinated their child(ren))	**36**	**7**

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

4.4 Perception of HPV and the HPV Vaccine

4.4.1 Baseline Data

The study populations' baseline responses to perception statement questions were aggregated into scales (Table 18) to explore correlations with the outcome variables (Table 19). Table 20 presents the perception variables per scale or subscale as they relate to the study population (overall), control group and test groups' vaccination intention.

Table 18
Aggregate perception variables and their components for all study participants at baseline (*n* = 43)

Statements per Subscale	Positive Perception *n* (%)
Perceived Vaccine Safety	
The HPV vaccine is unsafe.	18 (42)
I am concerned the vaccine will cost more than I can afford.	22 (51)
The vaccine is still so new that I want to wait a while before deciding if my child should get it.	14 (33)
I am concerned about giving my child too many vaccines.	14 (33)
The HPV vaccine is being pushed to make money for drug companies.	15 (35)
The HPV vaccine may cause short-term problems.	5 (12)
The HPV vaccine may cause lasting health problems.	16 (37)
Sexual Disinhibition	
If a teenage boy gets the vaccine he may be more likely to have sex.	26 (61)
If a teenage girl gets the vaccine she may be more likely to have sex.	26 (61)
My child is too young to get a vaccine for a sexually transmitted infection like HPV.	15 (35)
Perceived Susceptibility	
Likelihood of your child getting HPV in the future.	16 (37)
Likelihood of your child getting an anogenital cancer in the future.	10 (23)
Likelihood of your child getting genital warts in the future	9 (21)
Perceived Vaccine Efficacy	
How effective is the HPV vaccine in preventing HPV infection?	13 (30)
How effective is the HPV vaccine in preventing genital warts?	6 (14)
How effective is the HPV vaccine in preventing cervical cancer?	12 (28)
Perceived Vaccine Accessibility	
How hard would it be to find a healthcare provider with the vaccine is available?	20 (47)
How hard would it be to find a healthcare provider where you could afford the vaccine?	20 (47)
How hard would it be to find a healthcare provider who is easy to get to?	23 (54)
How hard would it be to find a healthcare provider where there is not a long wait time for an appointment?	25 (58)

Table 19
Mean perception scores for all study participants, and separated and compared between test and control group at baseline

Perception Subscale	Mean (S.D.)			***t-test (df)***
	Overall (n = 43)	**Test** (n = 23)	**Control** (n = 20)	
Perceived Vaccine Safety	0.35 (0.34)	0.38 (0.35)	0.31 (0.34)	0.68 (41)
Sexual Disinhibition	0.52 (0.43)	0.58 (0.39)	0.45 (0.47)	0.98 (41)
Perceived Susceptibility	0.27 (0.38)	0.36 (0.4)	0.17 (0.33)	1.72 (41)
Perceived Vaccine Efficacy	0.24 (0.37)	0.29 (0.41)	0.18 (0.31)	0.95 (41)
Perceived Vaccine Accessibilit	0.51 (0.46)	0.63 (0.45)	0.38 (0.43)	1.89 (41)

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

Table 20
Pooled perception variables as they relate to the vaccination intention for all study participants at baseline (*Pearson correlation co-efficient (r)*) (n = 43)

Perception Subscale	Vaccination Intention **Pearson *r***	**Cronbach's alpha**
Perceived Vaccine Safety	-0.52***	0.85
Sexual disinhibition	-0.30**	0.86
Perceived Susceptibility	-0.45***	0.82
Perceived Vaccine Efficacy	-0.29	0.82
Perceived Vaccine accessibility	-0.15	0.93

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

The study populations' mean perception scale score was low at baseline (m = 0.38, SD 0.29). Responses to seven statement questions were calculated to derive a total mean score of the study populations' perceived safety of the HPV vaccine. m = 0.35 (SD 0.34, Cronbach's alpha for perceived safety scale. 0.85) of the study population did not perceive the HPV vaccine to be unsafe. Perceived vaccine safety at baseline for the study population had a statistically significant correlation with parents' vaccination intention (r = -0.52, n = 43, p = 0.01).

Three questions were combined into a scale to assess whether the study population perceived the HPV vaccine would influence sexual disinhibition or earlier sexual debut. Overall mean of perceived sexual disinhibition scale for the study population was $m = 0.52$ (SD 0.43, Cronbach's alpha 0.86). 60.5% ($n = 26$) of the study population perceived that a teenage boy and a teenage girl, respectively, are more susceptible to engage in sexual intercourse if they receive the HPV vaccine. Like many of the other perception scales, this scale had a statistically significant correlation to parents' vaccination intention ($r = -0.30$, $n = 43$, $p = 0.05$, respectively).

Scores from three statements on perceived susceptibility were combined to derive a mean score of $m = 0.27$ (SD 0.38) for the study population. The perceived susceptibility scale had statistically significant negative correlations with all outcome variables with *p-values* < 0.05, Cronbach's alpha 0.82). This indicates that when the perception scale variable increased then the outcome variable would decrease, and vice versa.

Responses from three statements for the study population were calculated to derive a total mean perception score for vaccine efficacy in preventing HPV infection, genital warts and cervical cancer ($m = 0.24$, SD 0.37, Cronbach's alpha 0.82).

The study population was also introduced to a scale comprised of four statement questions regarding vaccine accessibility, which was found to have no correlates with the outcome variables (Cronbach's alpha 0.93). Responses to accessibility statements were calculated to find a total mean perception score of $m = 0.51$ (SD 0.46) for the study population. When analyzing the data per control group and test group, we found statistically significant correlations (*Pearson r*) between the perception scales and outcome variables (see Table 19 and Table 20, respectively). For the control group, a weak negative correlation was found between perceived safety concerns with the HPV vaccine and vaccination intention ($r = -0.46$, $n = 20$, $p < 0.05$), between perceived susceptibility and vaccination intention ($r = -0.51$, $n = 20$, $p = 0.05$), and between perceived vaccine efficacy and vaccination intention ($r = -0.52$, $n = 20$, $p = 0.05$). These results indicate that when the control group perceives there to be less safety concerns,

susceptibility of contracting HPV, and lower perceived issues regarding vaccine efficacy, there is an increase in the control groups' overall positive vaccination intention.

Table 21
Pooled perception variables as they relate to the vaccination intention of the control group at baseline (*Pearson correlation co-efficient (r)*) (*n* = 20)

Perception Subscale	Vaccination Intention	
	Pearson *r*	
Perceived Vaccine Safety	-0.46**	0.87
Sexual disinhibition	-0.25	1.0
Perceived Susceptibility	-0.51**	0.86
Perceived Vaccine Efficacy	-0.52**	0.75
Perceived Vaccine Accessibility	-0.29	0.91

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

After computing the *Pearson r* on the test group data, results revealed weak negative correlations between the test groups' perceived level of susceptibility and vaccination intention ($r = -0.45$, $n = 23$, $p < 0.05$).

4.4.2 First Follow-up Data

Table 22
Pooled perception variables as they relate to the vaccination intention of the test group at baseline (*Pearson correlation co-efficient (r)*) (*n* = 20)

Perception Subscale	Vaccination Intention **Pearson *r***
Perceived Vaccine Safety	-0.21
Sexual disinhibition	-0.25
Perceived Susceptibility	-0.45**
Perceived Vaccine Efficacy	-0.15
Perceived Vaccine Accessibility	-0.13

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

An independent *T-test* revealed a statistically significant difference in the perception scale score for the test group and the control group for susceptibility ($t(41) = 1.72$, $p < 0.10$) and accessibility and availability of the vaccine ($t(41) = 1.89$, $p < 0.10$). The control group

Table 23 summarizes the number and percent of the study population who responded positively to the perception statement questions.

Table 23
Aggregate perception variables and their components for all study participants at first follow-up (*n* = 43)

Statements per Subscale	Positive Perception *n* (%)
Perceived Vaccine Safety	
The HPV vaccine is unsafe.	24 (56)
I am concerned the vaccine will cost more than I can afford.	32 (74)
The vaccine is still so new that I want to wait a while before deciding if my child should get it.	20 (47)
I am concerned about giving my child too many vaccines.	17 (40)
The HPV vaccine is being pushed to make money for drug companies.	22 (51)
The HPV vaccine may cause short-term problems.	5 (12)
The HPV vaccine may cause lasting health problems.	22 (51)
Sexual Disinhibition	
If a teenage boy gets the vaccine he may be more likely to have sex.	31 (72)
If a teenage girl gets the vaccine she may be more likely to have sex.	32 (74)
My child is too young to get a vaccine for a sexually transmitted infection like HPV.	17 (40)
Perceived Susceptibility	
Likelihood of your child getting HPV in the future.	19 (44)
Likelihood of your child getting an anogenital cancer in the future.	15 (35)
Likelihood of your child getting genital warts in the future	14 (33)
Perceived Vaccine Efficacy	
How effective is the HPV vaccine in preventing HPV infection?	21 (49)
How effective is the HPV vaccine in preventing genital warts?	19 (44)
How effective is the HPV vaccine in preventing cervical cancer?	18 (42)
Perceived Vaccine Accessibility	
How hard would it be to find a healthcare provider with the vaccine is available?	22 (51)
How hard would it be to find a healthcare provider where you could afford the vaccine?	23 (54)
How hard would it be to find a healthcare provider who is easy to get to?	31 (72)
How hard would it be to find a healthcare provider where there is not a long wait time for an appointment?	31 (72)

Table 24 summarizes the mean perception scores per aggregated scales as per the study population, by test group, and control group.

Table 24
Mean perception scores for all study participants, and separated and compared between test and control group at first follow-up

Perception Subscale	Mean (S.D.)			*t-test (df)*
	Overall (n = 43)	**Test** (n = 23)	**Control** (n = 20)	
Perceived Vaccine Safety	0.47 (0.31)	60 (0.27)	0.33 (0.3)	3.11 (41)***
Sexual Disinhibition	0.63 (0.37)	0.74 (0.32)	0.48 (0.37)	2.46 (41)**
Perceived Susceptibility	0.37 (0.45)	0.46 (0.46)	0.27 (0.43)	1.45 (41)
Perceived Vaccine Efficacy	0.45 (0.46)	0.71 (0.39)	0.15 (0.33)	5.0 (41)***
Perceived Vaccine Accessibility	0.63 (0.37)	0.82 (0.30)	0.40 (0.34)	4.24 (41)***

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

The study populations' overall perception scale mean was low at m = 0.51 (SD 0.28). The study population has low aggregated perception scale means. The mean score for the study populations' perceived safety of the HPV vaccine was low with m = 0.47 (SD 0.31). At a closer look, there was a significant difference between the control group and test group means for perceived safety concerns with the HPV vaccine (m = 0.60, SD 0.27, and m = 0.33, SD 0.3, respectively). An pooled independent *t-test* revealed that this difference was statistically significant, t(41) = 3.11, p <0.1. The measures for effect size produced results of a *Cohen's d* = 94.65, and am r^2 of 0.1909; meaning that 19.1% of the variance in the number of perceived safety of the HPV vaccine can be accounted for from designation to either the control group or test group.

Overall, of study population, m = 0.63 (SD 0.37) did not perceive the HPV vaccination would influence sexual disinhibition or earlier sexual debut. The pooled independent *t test* revealed that there were significant differences found between the test group mean and control group mean for perceived influence of the HPV vaccine on sexual disinhibition and earlier sexual debut (m = 0.74, SD 0.32, and m = 0.48, SD 0.37, respectively; t(41) = 2.46, p <0.05). The measures for effect size produced results of a *Cohen's d* = 74.66, and am r^2 of 0.1286; meaning that 12.9% of the variance in the number of perceived influence of the HPV vaccine on child(ren)'s

sexual disinhibition can be accounted for from designation to either the control group or test group.

The study populations' perceived susceptibility of their child(ren) getting HPV, genital warts or a anogenital cancer was low, with only m = 0.37 (SD 0.45) who perceived their child to be susceptible to infection. Only m = 0.46 (SD 0.46) of the test group, and m = 0.27 (SD 0.43) of the control group perceiving their child(ren) to be at risk of becoming infected with HPV, genital warts or an anogenital cancer in the future. The pooled independent *t-test* revealed no significant differences between the two groups.

The vaccine efficacy scale also had a low overall mean score for the study population (m = 0.45, SD 0.46). At a closer look, the mean perceived vaccine efficacy score for the test group was considerably higher than the mean of the study population and the control group (m = 0.71, SD 0.39). The mean score for the control group was considerably lower than the mean score of the test group with only m = 0.15 (SD 0.33) of the control group perceiving the vaccine to be effective in preventing HPV infection, genital warts and cervical cancer. The pooled independent *t-test* revealed a significant difference between the means of the control group and test group ($t(41) = 5.0$, $p < 0.01$). The *Cohen's d* effect size was low with < 0.000, and r^2 of 0.543, meaning that 54% of the variance in the perceived vaccine efficacy scale can be accounted for by designation to either the control group or test group.

A significant difference was found between the overall study population, control group and test groups' perception of vaccine accessibility and availability. The study populations mean for perceived vaccine accessibility and availability was low with m = 0.62 (SD 0.38). The test group mean score was significantly higher with a mean of m = 0.82 (SD 0.30) and the control group mean is considerably less at m = 0.40 (SD 0.34). Therefore, a statistically significant difference was found between the control group and test group ($t(41) = 4.24$, $p < 0.0.1$).

The measures for effect size produced results of a *Cohen's d* = 1.29, and am r^2 of 0.305; meaning that almost 31% of the variance in the number of perceived vaccine

accessibility can be accounted for from designation to either the control group or test group.

Next, we explored whether the study populations' perception scale mean scores had any correlations with vaccination intention or uptake.

Table 25
Pooled perception variables as they relate to the vaccination intention of all study participants at first follow-up (*Pearson correlation co-efficient (r)*) (n = 43)

Perception Subscale	Vaccination Intention **Pearson *r***
Perceived Vaccine Safety	0.78***
Sexual disinhibition	0.43***
Perceived Susceptibility	0.33**
Perceived Vaccine Efficacy	0.47***
Perceived Vaccine Accessibility	0.24

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

As seen in Table 25, for the study population, the perceived vaccine safety had a statistically significant correlation with parents' vaccination intention ($r = 0.78$, $n = 43$, $p < 0.01$). These are strong positive correlations between parents' perceived safety of the HPV vaccine and vaccination intention. This means that when the study population perceives the vaccine to be safe, they are more likely to have a positive vaccination intention (78% more likely).

The scales regarding sexual disinhibition and vaccine efficacy had statistically significant weak correlation to the study populations' vaccination intention. When the study population did not perceive the vaccine would influence their child's sexual disinhibition they were 43% more likely to have positive vaccination intention ($r = 0.43$, $n = 43$, $p < 0.01$). Positive weak correlations were also found between the study populations perceived vaccine efficacy scale and vaccination intention ($r = 0.47$, $n = 43$, $p < 0.01$). This means that when the study population perceived the HPV vaccine to be effective, they are 47% more likely to have a positive vaccination intention.

The results of the *Pearson r* test also found positive correlations between the study populations perceived susceptibility of their child contracting HPV, genital warts or cervical cancer in the future and vaccination intention ($r = 0.33$, $n = 43$, $p = 0.03$). This means that when the study population perceived their children to be more susceptible to contracting HPV, genital warts or cervical cancer in the future, they were 33% more likely to have a positive vaccination intention.

When we analyzed the first follow-up data per control group and test group, we found a number of significant correlations per perception scale and the outcome variables (see Table 26 for test group, and Table 27 for control group).

Table 26
Pooled perception variables as they relate to the vaccination intention of the test group at first follow-up (*Pearson correlation co-efficient (r)*) (*n* = 23)

Perception Subscale	Vaccination Intention **Pearson *r***
Perceived Safety	0.77***
Sexual disinhibition	0.37
Perceived Susceptibility	0.28
Perceived Vaccine Efficacy	0.16
Perceived Vaccine Accessibility	-0.07

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

Table 27
Pooled perception variables as they relate to the vaccination intention of the control group at first follow-up (*Pearson correlation co-efficient (r)*) (*n* = 20)

Perception Subscale	Vaccination Intention **Pearson *r***
Perceived Safety	0.71***
Sexual disinhibition	0.34
Perceived Susceptibility	0.28
Perceived Vaccine Efficacy	0.59***
Perceived Vaccine Accessibility	0.2

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

Statistically significant correlations were found between the test group perceived safety of the HPV vaccine and vaccination intention ($r = 0.77$, $n = 23$, $p < 0.01$). The test group was 77% more likely to have a positive vaccination intention when they perceived the vaccine to be safe.

For the control group, positive correlations were found between the control group perceived vaccine safety scale and vaccination intention ($r = 0.71$, $n = 20$, $p < 0.01$). Perceived vaccine efficacy had a positive weak correlation with vaccination intention ($r = 0.59$, $n = 20$, $p < 0.01$).

Pearson r test was also computed to determine whether there were any correlations between the perception scales and the study population, control group and test groups' vaccination uptake (respectively) (summarized in Table 28).

Table 28
Pooled perception variables as they relate to the vaccination uptake of all study participants, control group and test group at first follow-up (*Pearson correlation co-efficient (r)*) (*n* = 20)

Perception Subscale	**Positive Vaccination Uptake**		
	Study population	Control group	Test group
	Pearson *r*	**Pearson *r***	**Pearson *r***
Perceived Vaccine Safety	0.33**	-	-
Sexual disinhibition	0.34**	-	-
Perceived Vaccine Efficacy	0.33**	0.60***	-

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

A statistically significant weak, positive correlations were found between the study populations' vaccination uptake and perceived level of safety of the HPV vaccine ($r = 0.33$, $n = 43$, $p = 0.03$). This weak positive correlation demonstrates that when the study population had a more positive perception of the safety of the HPV vaccine, they were 33% more likely to have a positive vaccination uptake. Similar correlations were found between the study populations' perceived likelihood that the HPV vaccine would influence sexual disinhibition and vaccination uptake ($r = 0.34$, $n = 43$, $p = 0.03$), and perceived vaccine efficacy ($r = 0.33$, $n = 43$, $p = 0.03$). A moderate, positive correlation was found between perceived vaccine efficacy and the control groups' vaccination uptake ($r = 0.60$, $n = 20$, $p < 0.01$).

4.4.3 Second Follow-up Data

As with the baseline and the first follow-up data, the perception-related data collected at the second follow-up was also aggregated into scales, with Table 29 summarizing the number and percent of the study population who responded positively to the perception statement questions.

Table 29
Aggregate perception variables and their components for all study participants at second follow-up (*n* = 43)

Statement per Subscale	Positive Perception *n* (%)
Perceived Vaccine Safety	
The HPV vaccine is unsafe.	24 (56)
I am concerned the vaccine will cost more than I can afford.	34 (79)
The vaccine is still so new that I want to wait a while before deciding if my child should get it.	18 (42)
I am concerned about giving my child too many vaccines.	19 (44)
The HPV vaccine is being pushed to make money for drug companies.	23 (54)
The HPV vaccine may cause short-term problems.	5 (12)
The HPV vaccine may cause lasting health problems.	26 (61)
Sexual Disinhibition	
If a teenage boy gets the vaccine he may be more likely to have sex.	31 (72)
If a teenage girl gets the vaccine she may be more likely to have sex.	31 (72)
My child is too young to get a vaccine for a sexually transmitted infection like HPV.	18 (42)
Perceived Susceptibility	
Likelihood of your child getting HPV in the future.	21 (49)
Likelihood of your child getting an anogenital cancer in the future.	16 (37)
Likelihood of your child getting genital warts in the future	13 (30)
Perceived Vaccine Efficacy	
How effective is the HPV vaccine in preventing HPV infection?	24 (56)
How effective is the HPV vaccine in preventing genital warts?	19 (44)
How effective is the HPV vaccine in preventing cervical cancer?	19 (44)
Perceived Vaccine Accessibility	
How hard would it be to find a healthcare provider with the vaccine is available?	31 (71)
How hard would it be to find a healthcare provider where you could afford the vaccine?	29 (67)
How hard would it be to find a healthcare provider who is easy to get to?	37 (86)
How hard would it be to find a healthcare provider where there is not a long wait time for an appointment?	34 (79)

Table 30 summarizes the mean perception scores per aggregated scales as per the study population, by test group and control group.

Table 30
Mean perception scores for all study participants, and separated and compared between test and control group at second follow-up

Perception Subscale	Mean (S.D.)			***t-test (df)***
	Overall (*n* = 43)	**Test** (*n* = 23)	**Control** (*n* = 20)	
Perceived Vaccine Safety	0.50 (0.30)	0.60 (0.28)	0.38 (0.29)	2.49 (41)**
Sexual Disinhibition	0.62 (0.37)	0.70 (0.30)	0.53 (0.42)	1.46 (41)
Perceived Susceptibility	0.40 (0.43)	0.42 (0.44)	0.35 (0.44)	0.52 (41)
Perceived Vaccine Efficacy	0.50 (0.44)	0.67 (0.35)	0.27 (0.44)	3.32 (41)***
Perceived Vaccine Accessibility	0.76 (0.33)	0.85 (0.26)	0.66 (0.38)	1.88 (41)

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

At second follow-up, the study populations' overall perception scale mean remained low at *m* = 0.55 (SD 0.24). The study population has low-to-moderate aggregated perception scale mean scores. The mean score for the study populations' perceived safety of the HPV vaccine was low with *m* = 0.50 (SD 0.30), perceived susceptibility of their child(ren) contracting HPV, genital warts or cervical cancer in the future (*m* = 0.40, SD 0.43), and perceived vaccine efficacy (*m* = 0.50, SD 0.44). At a closer look, there were significant differences between the control group and test group means for perceived safety concerns (*m* = 0.38, SD 0.29, and *m* = 0.60, SD 0.28, respectively) and concerns over vaccine efficacy (*m* = 0.27, SD 0.44, and *m* = 0.68, SD 0.35, respectively). The independent *t-test* revealed significant differences between the two groups for the perception scales on vaccine safety and vaccine efficacy ($t(41) = 2.49$, $p < 0.05$ and $t(41) = 3.32$, $p < 0.01$, respectively). For the scale on perceived vaccine safety, the measures for effect produced a high effect with a *Cohen's d* = 76.89, and am r^2 of 0.131, and for the scale on perceived vaccine efficacy, a *Cohen's d* = 100.69, and am r^2 of 0.212. These results produced by the *Cohen's d* statistics indicate that there is a high standardized difference between the means of the test group and the control group for the

perceived vaccine safety and perceived vaccine efficacy scales. Furthermore, the r^2 reveal that 13% of the variance in the perceived vaccine safety scales, and 21% of the variance in the perceived vaccine efficacy scales can be accounted for from either being designated to the control group or test group.

Next, we explored whether the study populations' perception scale mean scores had any correlations with vaccination intention or uptake (Table 31). For the study population, significant correlations were found between perceived level of vaccine safety and vaccination intention ($r = 0.80$, $n = 43$, $p < 0.01$). This strong, positive correlation indicates that the study population had a significantly greater likelihood of having a positive vaccination intention when they perceived the vaccine to be safe. Perceived vaccine efficacy, accessibility and susceptibility of their child(ren) contracting HPV, genital warts or cervical cancer in the future had a weak positive correlation with vaccination intention.

Table 31
Pooled perception variables as they relate to the vaccination intention of all study participants at second follow-up (*Pearson correlation co-efficient (r)*) (n = 43)

Perception Subscale	Vaccination Intention **Pearson *r***
Perceived Vaccine Safety	0.80***
Sexual disinhibition	0.27
Perceived Susceptibility	0.37**
PerceivedVaccine Efficacy	0.34
Perceoved Vaccine Accessibility	0.40**

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

When the second follow-up data were analyzed per control group and test group, a number of significant correlations were found between perception scales and vaccination intention (see Table 32 for Test Group, and Table 33 for Control Group). For the test group, perceived safety of the HPV vaccine had a moderate correlation with vaccination intention ($r = 0.74$, $n = 23$, $p < 0.01$). These moderate positive correlations

demonstrate that when the test group had a more positive perceived level of the HPV vaccines' safety, they were significantly more likely to have a positive vaccination intention.

Table 32
Pooled perception variables as they relate to the vaccination intention of the test group at second follow-up (*Pearson correlation co-efficient (r)*) (*n* = 23)

Perception Subscale	Vaccination Intention **Pearson *r***
Perceived Vaccine Safety	0.71***
Sexual disinhibition	0.06
Perceived Susceptibility	0.16
Perceived Vaccine Efficacy	0.04
Perceived Vaccine Accessibility	-0.09

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

Similar to the test group correlations, perceived level of vaccine safety also positively correlated with the control groups' vaccination intention ($r = 0.83$, $n = 20$, $p < 0.01$).This strong positive correlation means that when the control group has a positive perception of the HPV vaccines' level of safety they are 83% more likely to have a positive vaccination intention. Weak positive correlations were also found between the control groups' perceived level of susceptibility of their child contracting HPV, genital warts or cervical cancer in the future and vaccination intention ($r = 0.58$, $n = 20$, $p = 0.03$). This means that when the control group perceives their child more at risk of contracting HPV, genital warts or cervical cancer in the future they are 58% more likely to have a positive vaccination intention.

The control groups' perceived level of vaccine efficacy and accessibility were also found to positively correlate with vaccination intention. When the control group perceived the vaccine to be accessible they were 67% more likely to have a positive vaccination intention ($r = 0.67$, $n = 20$, $p < 0.01$).

Table 33
Pooled perception variables as they relate to the vaccination intention of the control group at second follow-up (*Pearson correlation co-efficient (r)*) (*n* = 20)

Perception Subscale	Vaccination Intention **Pearson *r***
Perceived Safety	0.83***
Sexual disinhibition	0.31
Perceived Susceptibility	0.58**
Perceived Vaccine Efficacy	0.48
Perceived Vaccine Accessibility	0.67***

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

For vaccination uptake, we found weak, positive correlations between the study populations' perceived vaccine safety ($r = 0.47$, $n = 43$, $p < 0.01$), and perceived susceptibility of their child contracting HPV, genital warts or cervical cancer in the future ($r = 0.35$, $n = 43$, $p = 0.02$). This means that when the study population perceives the vaccine to be safe, they are 47% more likely to vaccinate their child with the HPV vaccine. Furthermore, when the study population perceives their child to be at risk, they are 35% more likely to have a positive vaccination uptake.

Correlations were also found between perceived vaccine safety and the control groups' vaccination uptake ($r = 0.47$, $n = 20$, $p = 0.02$), and perceived vaccine safety and the test groups' vaccination uptake ($r = 0.51$, $n = 23$, $p = 0.01$) (Table 34). This means that when the control group and the test group perceive the vaccine to be safe, they are 47% and 51%, respectively, more likely to vaccinate their child with the HPV vaccine.

Table 34
Pooled perception variables as they relate to the vaccination uptake for all study participants, the control group and the test group at second follow-up (*Pearson correlation co-efficient (r)*) (*n* = 20)

Perception Subscale	**Positive Vaccination Uptake**		
	Overall **Pearson *r***	Control group **Pearson *r***	Test group **Pearson *r***
Perceived Vaccine Safety	0.47***	0.47**	0.51***
Perceived Susceptibility	0.35**	-	-

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

4.4.4 Summary

Table 35 below presents selected descriptive statistics of perception scale and subscales by survey periods for the study population, including the mean and standard deviation (SD), the observed minimum and maximum values, and an index of reliability (Cronbach's alpha) (Cronbach, 1951).

Table 35
Descriptive statistics of perception scale and subscales by survey period for all study participants (n = 43)

Scales	Descriptive	Baseline	Follow-up 1	Follow-up 2
Overall Perception				
	Mean	0.38	0.51	0.55
	SD	0.29	0.28	0.24
	Min.	0.00	0.00	0.00
	Max.	0.85	1.00	0.95
	Cronbach's Alpha	0.91		
Perceived Vaccine Safety				
	Mean	0.35	0.47	0.50
	SD	0.34	0.31	0.30
	Min.	0.00	0.00	0.00
	Max.	1.00	1.00	1.00
	Cronbach's Alpha	0.85		
Sexual Disinhibition				
	Mean	0.52	0.60	0.62
	SD	0.43	0.36	0.37
	Min.	0.00	0.00	0.00
	Max.	1.00	1.00	1.00
	Cronbach's Alpha	0.86		
Perceived Susceptibility				
	Mean	0.27	0.37	0.40
	SD	0.38	0.45	0.43
	Min.	0.00	0.00	0.00
	Max.	1.00	1.00	1.00
	Cronbach's Alpha	0.82		
Perceived Vaccine Efficacy				
	Mean	0.24	0.45	0.50
	SD	0.37	0.46	0.44
	Min.	0.00	0.00	0.00
	Max.	1.00	1.00	1.00
	Cronbach's Alpha	0.82		
Perceived Accessibility				
	Mean	0.51	0.63	0.76
	SD	0.46	0.37	0.33
	Min.	0.00	0.00	0.00
	Max.	1.00	1.00	1.00
	Cronbach's Alpha	0.93		

A series of comparisons were conducted to determine any differences between the mean scores for the control group and test group on the overall perception scale and subscales. In every case, the test group scored higher than the control group on the baseline measurement. However, in only two cases were these differences significant: perceived vaccine accessibility and perceived susceptibility of contracting HPV, genital warts or an anogenital cancer in the future. These results indicate that the control group and test groups' mean overall perception scale and subscale scores were not significantly different at the baseline, which may imply that subsequent positive differences between the groups could be the result of the study's educational intervention. Table 36 below summarizes the results of these analyses with the mean and standard deviation (SD) by control group and test group at first follow-up and second follow-up, and the result of a mean comparison (independent *t-test*).

Table 36
Comparison of perception scale and subscale means between the control group and test group at each survey period

Perception Scales	Survey Period	Mean (SD)		*t-test (df)*
		Test Group (n = 23)	Control Group (n = 20)	
Overall Perception Scale	Baseline	0.44 (0.28)	0.3 (0.29)	1.62 (41)
	Follow-up 1	0.66 (0.21)	0.33 (0.23)	4.83 (41)***
	Follow-up 2	0.65 (0.18)	0.44 (0.26)	3.04 (33.14)***
Perceived Safety	Baseline	0.38 (0.35)	0.31 (0.34)	0.68 (41)
	Follow-up 1	0.6 (0.27)	0.33 (0.3)	3.11 (41) ***
	Follow-up 2	0.6 (0.28)	0.38 (0.29)	2.49 (41) **
Sexual Disinhibition	Baseline	0.58 (0.39)	0.45 (0)	0.97 (36.98)
	Follow-up 1	0.74 (0.32)	0.48 (0.37)	2.45 (41) **
	Follow-up 2	0.7 (0.3)	0.53 (0.42)	1.43 (33.62)
Perceived Susceptibility	Baseline	0.36 (0.4)	0.17 (0.33)	1.72 (41)
	Follow-up 1	0.46 (0.46)	0.27 (0.43)	1.45 (41)
	Follow-up 2	0.42 (0.44)	0.35 (0.44)	0.52 (41)
Perceived Vaccine Efficacy	Baseline	0.29 (0.41)	0.18 (0.31)	0.95 (41)
	Follow-up 1	0.71 (0.39)	0.15 (0.33)	5.00 (41) ***
	Follow-up 2	0.67 (0.35)	0.27 (0.44)	3.32 (41) ***
Perceived Vaccine Accessibility	Baseline	0.63 (0.45)	0.38 (0.43)	1.89 (41)
	Follow-up 1	0.82 (0.3)	0.4 (0.34)	4.24 (41) ***
	Follow-up 2	0.85 (0.26)	0.66 (0.38)	1.83 (32.6)

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

Among the study population there was a trend in increasingly positive perception scores. At baseline, there were no statistically significant differences found between the test group and control groups' mean [overall] perception scale or subscale scores. For the study population, perceived vaccine safety became increasingly positive from baseline to first follow-up (from m = 0.35, SD 0.34 to m = 0.47, SD 0.31, respectively), and ever so slightly from first follow-up to second follow-up (from m = 0.47, SD 0.31 to m = 0.50, SD 0.30, respectively). A 12% increase was found between baseline and first follow-up. To find explanations for these data, the mean perception scores per control group and test group were explored. There were statistically significant differences detected between

the control group and test group mean [overall] perception scores at first follow-up ($t(41) = 3.11$, $p < 0.01$) and second follow-up ($t(41) = 2.49$, $p < 0.05$).

At baseline, the study populations' perceived influence of the HPV vaccine on their child's sexual disinhibition was $m = 0.52$ for the study population. At baseline, no statistically significant differences were found between the control group and test groups' mean perceived sexual disinhibition scores ($m = 0.45$, SD = 0; and $m = 0.58$, SD 0.39, respectively). At first follow-up, the study populations' mean perceived sexual disinhibition score rose 8% and a statistically significant difference was detected between the control group and test group means ($m = 0.48$, SD 0.37; $m = 0.74$, SD 0.32; $t(41) = 2.45$, $p < 0.05$). At second follow-up, the control group and test group mean perceived sexual disinhibition scores rose to $m = 0.53$ (SD 0.53) and $m = 0.70$ (SD0.3), respectively; however, no statistically significant differences were detected between the groups.

For the perceived susceptibility scale whereby parents reported on the perceived likelihood of their child contracting HPV, genital warts, or an anogenital cancer in the future, the study population had a low mean perceived susceptibility score at baseline ($m = 27\%$, SD 0.38), as did the control group ($m = 0.17$, SD 0.33) and test group ($m = 0.36$, SD 0.4). The mean perceived susceptibility scores increased slightly at first follow-up and second follow-up, but not significantly. At no measurement was there a statistically significant difference between the control group and test groups' mean perceived susceptibility scores. At second follow-up the mean perceived susceptibility scores remained low.

In regards to perceived vaccine efficacy, there was a significant increase in the test groups' mean scores from baseline to second follow-up. At baseline, the test group had $m = 0.29$ (SD 0.41) positive perception of the vaccines' efficacy. At first follow-up this score increased to $m = 0.71$ (SD 0.39) (a 42% increase). At second follow-up, the test groups' mean perceived vaccine efficacy score decreased slightly to $m = 0.67$ (SD 0.35). At first follow-up and second follow-up there were statistically significant

differences ($t(41) = 5.0$, $p < 0.01$, and $t(41) = 3.32$, $p < 0.01$, respectively) between the control group and test groups' mean scores for perceived vaccine efficacy.

At baseline, the study population had a low mean for perceived vaccine accessibility ($m = 0.51$, SD (0.46)). At first follow-up, the control group mean score had a minimal change from baseline, increasing by 2% to $m = 0.40$ (SD 0.34). The test group had a 19% increase in mean perceived vaccine accessibility score ($m = 0.82$ (SD 0.3)). These data generated a statistically significant difference between the groups at first follow-up ($t(41) = 4.24$, $p < 0.01$). At second follow-up, the study populations' mean perceived vaccine accessibility score rose ($m = 0.76$ (SD 0.33), and the control group reported a mean score of $m = 0.66$ (SD 0.38) and test group reported a mean score of $m = 0.85$ (SD 0.26).

Of the study population, the most notable increases in perception scores were perceived vaccine safety which increased 60% from baseline to second follow-up, vaccine efficacy which increased 24%, and vaccine accessibility which increased by 25%. For the control group, the most notable increases from baseline to second follow-up were perceived susceptibility (an increase of 18%) and perceived vaccine accessibility (an increase of 28%). For the test group, the most notable increases in perception scale mean scores from baseline to second follow-up were for perceived vaccine safety (an increase of 22%), perceived vaccine efficacy (an increase of 38%), and perceived vaccine accessibility (an increase of 22%).

At baseline, statistically significant correlations ($p < 0.05$) were found between the each of the following perception scales and the study populations' vaccination intention: perceived vaccine safety, perceived influence of the vaccine on child's sexual disinhibition, perceived susceptibility of child contracting/developing HPV, genital warts or an anogenital cancer in the future.

For the study population, perceived safety and susceptibility also correlated with vaccination intention at first follow-up and second follow-up, in addition to perceived influence of vaccination on sexual disinhibition and perceived vaccine efficacy at first follow-up, and perceived vaccine efficacy and accessibility at second follow-up.

For the control group, at baseline the perception scales on safety, susceptibility and vaccine efficacy had independent correlations with vaccination intention (p <0.05). At first follow-up only perceived vaccine efficacy and safety correlated with vaccination intention. At second follow-up, perceived vaccine safety, susceptibility and vaccine accessibility independently correlated with vaccination intention.

At baseline, only perceived susceptibility correlated with the test groups' vaccination intention. At first follow-up and second follow-up, perceived susceptibility no longer correlated with vaccination intention. Rather, at these two measurement periods only perceived vaccine safety positively correlated with the test groups' vaccination intention.

There was a clear trend in the study data, regardless of parents' allocation to the test group or control group, parents who reported a more positive perception of HPV and the HPV vaccine were more likely to have a positive vaccination intention or more inclined to vaccinate their child. Table 37 – Mean comparisons of overall perception scale and subscales by vaccination intention, captures data on parents' perception scales in relation to their vaccination intention being positive or negative, and Table 36 – Mean comparisons of perception scale and subscales by vaccination uptake captures data on parents perception scales in relation to vaccination uptake.

Table 37
Mean comparisons of perception scale and subscales by vaccination intention for all study participants (n = 43)

Scale	Group		Survey Period		
			Baseline	**Follow-up 1**	**Follow-up 2**
Overall Perception					
	Do not intend	*Mean (SD)*	0.31 (0.28)	0.33 (0.21)	0.39 (0.21)
	Intend	*Mean (SD)*	0.66 (0.13)	0.69 (0.21)	0.71 (0.14)
		t-test (df)	5.27 (23.09)***	5.54 (41)***	5.82 (41)***
Perceived Vaccine Safety					
	Do not intend	*Mean (SD)*	0.26 (0.3)	0.24 (0.18)	0.26 (0.2)
	Intend	*Mean (SD)*	0.71 (0.24)	0.71 (0.21)	0.74 (0.16)
		t-test (df)	3.94 (41)***	7.85 (41)***	8.68 (41)***
Sexual Disinhibition					
	Do not intend	*Mean (SD)*	0.46 (0.42)	0.47 (0.37)	0.58 (0.39)
	Intend	*Mean (SD)*	0.79 (0.4)	0.78 (0.29)	0.67 (0.35)
		t-test (df)	2.05 (41)**	3.07 (41)***	0.81 (41)
Perceived Susceptibility					
	Do not intend	*Mean (SD)*	0.19 (0.32)	0.23 (0.4)	0.24 (0.4)
	Intend	*Mean (SD)*	0.63 (0.45)	0.52 (0.45)	0.54 (0.43)
		t-test (df)	3.23 (41)***	2.27 (41)**	2.35 (41)**
Perceived Vaccine Efficacy					
	Do not intend	*Mean (SD)*	0.19 (0.34)	0.24 (0.4)	0.32 (0.4)
	Intend	*Mean (SD)*	0.46 (0.43)	0.67 (0.42)	0.65 (0.41)
		t-test (df)	1.93 (41)	3.38 (41)***	2.66 (41)***
Perceived Accessibility					
	Do not intend	*Mean (SD)*	0.48 (0.46)	0.53 (0.36)	0.66 (0.37)
	Intend	*Mean (SD)*	0.66 (0.44)	0.71 (0.39)	0.87 (0.26)
		t-test (df)	0.99 (41)	1.58 (41)	2.18 (37.76)**

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

Table 38
Mean comparisons of perception scale and subscales by vaccination uptake for all study participants (n = 43)

Scale	Group		Survey Period	
			Follow-up 1	**Follow-up 2**
Overall Perception				
	No	*Mean (SD)*	0.46 (0.26)	0.51 (0.24)
	Yes	*Mean (SD)*	0.8 (0.14)	0.76 (0.09)
		t-test (df)	3.1 (41)***	4.83 (41)***
Perceived Vaccine Safety				
	No	*Mean (SD)*	0.41 (0.29)	0.45 (0.3)
	Yes	*Mean (SD)*	0.83 (0.11)	0.71 (0.18)
		t-test (df)	6.47 (20.03)***	3.04 (13.4)***
Sexual Disinhibition				
	No	*Mean (SD)*	0.56 (0.35)	0.59 (0.37)
	Yes	*Mean (SD)*	1 (0)	0.76 (0.32)
		t-test (df)	7.63 (36)***	1.12 (41)
Perceived Susceptibility				
	No	*Mean (SD)*	0.35 (0.44)	0.36 (0.42)
	Yes	*Mean (SD)*	0.5 (0.55)	0.52 (0.5)
		t-test (df)	0.75 (41)	0.9 (41)
Perceived Vaccine Efficacy				
	No	*Mean (SD)*	0.4 (0.45)	0.41 (0.41)
	Yes	*Mean (SD)*	0.78 (0.4)	0.86 (0.38)
		t-test (df)	1.95 (41)	2.66 (41)***
Perceived Accessibility				
	No	*Mean (SD)*	0.59 (0.37)	0.72 (0.35)
	Yes	*Mean (SD)*	0.83 (0.41)	0.96 (0.09)
		t-test (df)	1.49 (41)	3.56 (36.2)***
Sample size (*n*)				
	No (Did not vaccinate their child(ren))		**37**	**36**
	Yes (Vaccinated their child(ren))		**36**	**7**

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

In each survey, parents were asked whether they had sufficient information about the HPV vaccine to make a decision of whether to administer the vaccine to their child. The proportion of parents who agreed or disagreed with this statement was measured within groups over time relative to the baseline survey (McNemar Test) and between groups at each survey period.

The results of the comparisons within and between control group and test group across survey periods can be seen in Table 39 and Table 40.

Table 39
Sufficient Information: Comparisons within control group and test group across survey periods

	Baseline					
	Test Group (n = 23)			**Control Group (n = 20)**		
	Agree (%)	Disagree (%)	Total (%)	Agree (%)	Disagree (%)	Total (%)
Follow-up 1						
Agree (%)	22	9	**30**	75	-	**75**
Disagree (%)	30	39	**70**	10	15	**25**
Total (%)	**52**	**48**	**100**	**85**	**15**	**100**
Follow-up 2						
Agree (%)	17	13	**30**	50	5	**55**
Disagree (%)	35	35	**70**	35	10	**45**
Total (%)	**52**	**48**	**100**	**85**	**15**	**100**

The comparison between the control group and test group at each survey period highlighted some differences between the two groups. Two-thirds of parents agreed with the statement in the baseline survey, although a significantly larger proportion were from the control group (χ^2 (1) = 5.25, $p < 0.05$). The effect size for this difference is moderate (φ = 0.35), however. At first follow-up, the difference is much more pronounced with nearly half of the parents disagreeing with the statement, with over two-thirds of the parents from the test group compared to only a quarter from the control group. This result is statistically significant (χ^2 (1) = 8.50, $p < 0.05$) and has a larger effect size relative to the baseline (φ = 0.45). Finally, by second follow-up, the difference is no longer statistically significant (χ^2 (1) = 2.65, p = 0.103).

Table 40
Sufficient information: Comparisons between control group and test group at each survey period

	Baseline (%)		Follow-up 1 (%)		Follow-up 2 (%)	
	Agree	**Disagree**	**Agree**	**Disagree**	**Agree**	**Disagree**
Test (n = 23)	52	48	30	70	30	70
Control (n = 20)	85	15	75	25	55	45
Total (n = 43)	67	33	51	49	42	58

A significantly larger proportion of parents who intend to vaccinate their children state that they have enough information to make this decision relative to those who do not intend to vaccinate their children. When asked if they "do not have enough information," parents who said that they intended to vaccinate their children disagreed by a proportion of 63% in the baseline survey, 90% in first follow-up survey, and 81% in the second follow-up survey. These proportions were compared to parents who stated that they do not intend to vaccinate their children, who disagreed at a proportion of 26%, 9%, and 36% at each measurement (see *chi-square* results below in Table 41).

Table 41
Vaccination intention by sufficient information for all study participants (n = 43)

Vaccination Intention	Baseline (%)		Follow-up 1 (%)		Follow-up 2 (%)	
	Agree	**Disagree**	**Agree**	**Disagree**	**Agree**	**Disagree**
No	74	26	91	9	64	36
Yes	38	63	10	90	19	81
Total	67	33	51	49	42	58
	χ^2 (1) = 4.01, $p < 0.05$		χ^2 (1) = 28.48, $p < 0.01$		χ^2 (1) = 8.78, $p < 0.01$	

Similar analyses were conducted between parents whose children had been vaccinated with the HPV vaccine, and those whose children had not. The results indicate that at the first follow-up, all parents whose children were vaccinated for HPV disagreed that they did not have enough information to make this decision. This is compared to 41% of the parents whose children were not vaccinated. This difference is significant, χ^2 (1) = 7.31, $p < 0.01$. At the second follow-up survey, 86% of the parents whose children were vaccinated disagreed with the statement, compared to 53% of those whose children were not vaccinated. This difference is not significant, χ^2 (1) = 2.61, $p = 0.11$.

Table 42
Vaccination uptake by sufficient information for all study participants (n = 43)

Vaccination Uptake	Follow-up 1 (%)		Follow-up 2 (%)	
	Agree	**Disagree**	**Agree**	**Disagree**
No	59	41	47	53
Yes	0	100	14	86
Total	51	49	42	58
	χ^2 (1) = 7.31, $p < 0.01$		χ^2 (1) = 2.61, $p = 0.11$	

4.5 Vaccination Intention

4.5.1 Baseline

Vaccination intention at baseline is summarized in Table 43. In the test group, only four parents reported a positive vaccination intention (17%). From the control group, only four of the twenty parents in the control group had a positive vaccination intention (20%). When we compared the mean vaccination intention between the test and control group we found that there was no statistically significant difference at baseline.

Table 43
Positive vaccination intention for study population, control group and test group at baseline

	Test Group (n = 23) *n* (%)	**Control Group (n = 20)** *n* (%)	***Chi-square (df)***
Vaccination Intention	4 (17)	4 (20)	-

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

4.5.2 First Follow-up

Vaccination intention for the study population is summarized in Table 44.

Table 44
Positive vaccination intention for control group and test group at first follow-up

	Test Group (n = 23) *n* (%)	**Control Group (n = 20)** *n* (%)	***Chi-square (df)***
Vaccination Intention	15 (65)	6 (30)	5.3 (1)**

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

At first follow-up, in the test group, fifteen of the twenty-three parents in the test group had a positive vaccination intention (63%) at first follow-up. From the control group, six of the twenty parents in the control group had a positive vaccination intention at first follow-up (30%). When we compared the mean vaccination intention between the test group and control group (*chi*-square test) we found that there was a statistically significant difference between the test group and control group vaccination intention (χ^2 (1) = 5.3, p = 0.02).

4.5.3 Second Follow-up Data

As seen in Table 45, at second follow-up, from the test group, thirteen parents (56.5%) reported a positive vaccination intention. From the control group, seven of twenty parents reported a positive vaccination intention (35%). When comparing the mean vaccination intention between the test group and control group (*chi*-square test), we found that there were no statistically significant differences between the test group and control group.

Table 45
Positive vaccination intention for the control group and test group at second follow-up

	Test Group (n = 23) *n* (%)	**Control Group (n = 20)** *n* (%)	***Chi-square (df)***
Vaccination Intention	13 (61)	7 (35)	2.87 (1)

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

4.5.4 Summary

Table 46 compares how parents in the control group and test group responded to this question between survey periods.

Table 46
Vaccination Intention: Comparisons within control group and test group across survey periods

	Baseline					
	Test Group (n = 23)			**Control Group (n = 20)**		
	No Intention (%)	**Intention** (%)	**Total** (%)	**No Intention** (%)	**Intention** (%)	**Total** (%)
Follow-up 1						
No Intention	35	-	35	60	10	70
Intention	48	17	65	20	10	30
Total	83	17	100	80	20	100
Follow-up 2						
No Intention	39	-	39	60	5	65
Intention	43	17	61	20	15	35
Total	83	17	100	80	20	100

The comparison between groups shows some interesting results. At the baseline measurement, parents from both groups are not significantly different with regards to their vaccination intentions (χ^2 (1) = 0.05, p = 0.83), with roughly 20% in both groups reporting that they intend to vaccinate their children against HPV. However, as mentioned above, a significant number of parents from the test group changed their intentions at the first follow-up, with almost two thirds reporting that they intend to vaccinate their children - this is compared to a relatively small change in the control group. This change in vaccination intention is sustained at second follow-up, indicating a significant difference between groups at first follow-up (χ^2 (1) = 5.31, $p < 0.05$, φ = 0.35) and at second follow-up (χ^2 (1) = 2.87, $p < 0.1$, φ = 0.26).

Table 47
Vaccination Intention: Comparisons between control group and test group at each survey period

	Baseline			Follow-up 1			Follow-up 2		
	No Intention	**Intention**	**Total**	**No Intention**	**Intention**	**Total**	**No Intention**	**Intention**	**Total**
Test (n=23)	83%	17%	100%	35%	65%	100%	39%	61%	100%
Control (n=20)	80%	20%	100%	70%	30%	100%	65%	35%	100%
Total	81%	19%	100%	51%	49%	100%	51%	49%	100%

4.6 Vaccination Uptake

4.6.1 First Follow-up

Vaccination uptake at first follow-up is summarized in Table 48. At first follow-up, twenty parents in the study population had children who are eligible to receive the HPV vaccine (between the ages of 9 and 18 years). In the test group fourteen parents had children who are eligible for vaccination (61% of the test group), and six parents from the control group had children who were currently eligible for vaccination (30% of the control group).

Table 48
Positive vaccination uptake for all study participants (n = 43), test group (n = 23) and control group (n = 20) at first follow-up

	Study Population *n*(%)	**Test Group** *n* (%)	**Control Group** *n* (%)
Vaccination Uptake	6 (30)	4 (29)	-

4.6.2 Second Follow-up

Vaccination uptake at second follow-up is summarized in Table 49. At second follow-up, twenty-one parents in the study population had children who are eligible to receive the HPV vaccine (between the ages of 9 and 18 years). In the test group fifteen parents had children who are eligible for vaccination (63% of the test group), and six parents from the control group had children who were currently eligible for vaccination (30% of the control group).

In total, seven parents from the study population who have eligible children (between the ages of 9 and 18 years) had vaccinated at the time of the second follow-up (33%). In the test group, five of the fifteen parents who have children who are eligible for vaccination had vaccinated with the HPV vaccine (33%). Of the six parents in the control group who have children who are eligible for vaccination, only two had vaccinated their child at second follow-up.

Table 49
Positive vaccination uptake for all study participants (n = 43), test group (n = 23) and control group (n = 20) at second follow-up

	Study Population *n*(%)	**Test Group** *n* (%)	**Control Group** *n* (%)
Vaccination Uptake	7 (33)	5 (36)	2 (33)

4.6.3 Summary

Table 50 below presents the within-group analysis between the first and second follow-up surveys. In neither case are there any significant changes across time (p = 1.00 for both groups), with the control group remaining unchanged between survey periods. The test group saw a slight increase in the proportion of vaccinated children, from 17% at first follow-up to 22% at second follow-up, but this is not a statistically significant change.

Table 50
Vaccination Uptake: Comparisons within the control group and test group across survey periods

	Follow-up 1					
	Test Group (n = 23)			**Control Group (n = 20)**		
	No (%)	**Yes (%)**	**Total (%)**	**No (%)**	**Yes (%)**	**Total (%)**
Follow-up 2						
No	70	9	78	90	-	90
Yes	13	9	22	-	10	10
Total	83	17	100	90	10	100

A comparison between groups indicates that there are no significant differences between the control group and test group in the proportion of parents who reported having their children vaccinated. This result is consistent for both first follow-up (χ^2 (1) = 0.49, p = 0.49, and second follow-up (χ^2 (1) = 1.08, p = 0.30). Table 51 below presents the results of this comparison.

Table 51
Vaccination Uptake: Comparisons between the control group and test group at each survey period

	Follow-up 1 (%)			Follow-up 2 (%)		
	No Intention	**Intention**	**Total**	**No Intention**	**Intention**	**Total**
Test Group (n=23)	83	17	100	78	22	100
Control Group (n=20)	90	10	100	90	10	100
Total	86	14	100	84	16	100

4.7 Overview

In order to determine the effect of the study's educational intervention, we explored whether there were any positive DID estimates in the data, implying that the difference between the baseline and first follow-up, and baseline and second follow-up is greater for the test group, which could be explained by a treatment effect.

Table 52
Difference in differences (DID) estimates

Scales	**Comparison** (Test - Control)	**DID Estimate**	**S.E.**
Knowledge Scale	Follow-up 1 - Baseline	-0.07	0.11
	Follow-up 2 - Baseline	-0.02	0.11
Overall Perception Scale	Follow-up 1 - Baseline	0.19	0.10
	Follow-up 2 - Baseline	0.07	0.10
Perceived Vaccine Safety	Follow-up 1 - Baseline	0.20	0.13
	Follow-up 2 - Baseline	0.15	0.13
Sexual Disinhibition	Follow-up 1 - Baseline	0.13	0.16
	Follow-up 2 - Baseline	0.03	0.16
Perceived Susceptibility	Follow-up 1 - Baseline	0.00	0.18
	Follow-up 2 - Baseline	-0.13	0.18
Perceived Vaccine Efficacy	Follow-up 1 - Baseline	0.45***	0.16
	Follow-up 2 - Baseline	0.29	0.16
Perceived Vaccine Accessibility	Follow-up 1 - Baseline	0.16	0.15
	Follow-up 2 - Baseline	-0.07	0.15

Note: Significance levels are set at *** $p < 0.01$, ** $p < 0.05$.

4.8 Participant Feedback and Comments

At follow-up, study parents were asked to provide feedback on the study. The control group and test group were asked what information they would like to receive pertaining to HPV. The test population was also asked whether the E-based HPV educational program helped to improve their knowledge of HPV and the HPV vaccine, whether the program improved their perception of HPV and the HPV vaccine, and informed their decision to vaccinate their child(ren).

From the control group, many parents asked for information regarding the potential side effects and how the vaccine affects boys and girls. Many parents also asked for more information about the vaccine itself such as efficacy and prevention of infection, and what age should be vaccinated. Some parents wanted information about how long the vaccine has been on the market, what is the risk/benefit ratio for vaccination, why the vaccine is not recommended as a part of national immunization programs (and is this an indication of its' efficacy or safety concerns by health professionals?), and why should a parent start thinking about and STI vaccine for their young children when they are not sexually mature or have even reached puberty.

From the test group, 95.7% of parents (*n* = 22) reported that the E-based HPV educational program improved their knowledge of HPV and the HPV vaccine, 82.6% (*n* = 19) reported that the program improved their perception of HPV and the HPV vaccine, and 65.2% (*n* 15) indicated that the program did/will influence their decision to vaccinate their child with the HPV vaccine. When the test group was asked what they thought of the E-based HPV educational program, responses were positive with comments such as "excellent information", "concise and clear", "wish the program would go on longer so I could get even more information", "I liked the amount of information on each poster – easily digestible" and "very informative". Some feedback on the delivery and format of the posters included comments such as, "would prefer to receive all the information at once rather than over the course of one month" and "dislike receiving all the information in separate sessions".

When the test group was asked what information they would like to receive pertaining to HPV or the HPV vaccine their comments included, statistics on “death rates, seizures and other serious life threatening reactions, ingredients in the vaccines, the risks vs. benefits of the vaccine”, “how many countries are using the vaccine and are the rates of infection declining – are there any trends yet or is the virus still on the increase?”, and “what studies have shown with regards to side effects of the vaccines”, and “how long does the vaccine last for, do you have to get a booster injection after so many years”. Other comments about the study that the parents’ expressed were, “a very important study that needs to be made available to everyone”, “great and helpful study. Thanks for involving me”, and “I am very pleased to see this happening in Thailand”.

All comments and feedback will be considered in the design and implementation of future HPV educational programs that are targeted at expat parents.

CHAPTER V
DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion

This was a randomized control trial, intervention study that was carried out among expat parents living in Bangkok, Thailand. The aim of this study was to assess expat parents' level of knowledge, perception and HPV vaccination intention and uptake, and measure whether an E-based educational intervention had an effect on these factors.

This study also explored whether knowledge and perception had an influence on vaccination intention and uptake. The results of this trial intervention provide evidence to support the creation of a confirmatory study to test the E-based HPV educational program among a larger study sample.

In this study we define 'expat' as an individual who is not a citizen of the country in which he/she lives. Expat parents are an important population of interest for this type of study, as expatriates face unique psychological, socio-cultural and environmental circumstances (Tahir and Ismail, 2007). Studies have shown that expats often take between six to twelve months to feel comfortable in their new environment (Tung, 1998). In the meantime, expats navigate their way through unique challenges that often add to the already existing factors that influence HPV vaccination intention.

Many expats encounter cross-cultural challenges in their move abroad. In some cases, expats experience difficulties in comprehending the host countries' values, culture, or behaviors exhibited within their new environment (Elashmawi and Harris, 1993). This can impact an expat's daily life, let alone when they seek out health care or medical advice. Accessing a healthcare professional or services can be a challenge as expats deal with language barriers, unique inter-personal interactions, and new physical spaces. In many cases, expats move abroad to a new environment where they do not have a family physician or a familiar healthcare provider, which places them at an elevated risk of not being equipped with correct information about HPV and the HPV vaccine. In some cases expats also experience gender-related socio-cultural issues, when moving from a

country of origin that promotes male-female equality to a male-dominated country or society (Caliguiri and Cascio, 1998). This can influence the expats' adjustment to their new environment and also the services they may access, based on their gender. In some countries a female needs to be attended by a female physician and males by a male physician. Should there be no appointments or healthcare professionals available based on gender, this can influence a persons' access health services and information.

Another challenge faced by many expats is the often-daunting task of establishing a support system in their new environment. Support networks are one of the key factors to the successful adaptation and adjustment of expats in their new environment (Caliguiri and Cascio, 1998; Foster, 2000). Support systems and social environment play an important part in an expats' life abroad, as this often fosters confidence, instills positive attitudes and lends to the expats' self-orientation of their new environment. Support from peers and employer has been positively associated to an expats' adjustment to their new environment (Hutchings and Ratnasari, 2006). These are just some of the challenges faced by expats in their move and adjustment to life in a new country. These unique circumstances demonstrate the need for studies of this kind that explore the health of this unique study population.

5.1.1 Socio-demographic characteristics

This study population was categorized into six age groups, the majority of the expat parents' are between thirty-six and forty-five years of age. The age of this study population is consistent with other HPV educational and intervention studies which were aimed at measuring parents' knowledge, attitudes, perceptions and health-related behavior regarding HPV and their child. This study populations' demographic information was also familiar with other HPV-related studies, in that the study population was predominantly female parents (only 14% were male). Recent studies by Jaspers et al. (2011) and Reynolds and O'Connell (2011) also had low male participation (16.4% and 5.3%, respectively). However, these studies differ from another recent study that was carried out by Kennedy et al. (2012), where almost half (44%) of the study parents were

male. An explanation for a predominantly female population can be that the expat networks and organizations that distributed the advertisement of the study have predominantly female membership. Unfortunately, this study did not have access to the expat networks' members' personal information, so this is only a possible explanation.

Other notable socio-demographic information from this study was the high socio-economic status of the parents – both academic attainment and annual household income. The median household income from the study population was between $125,000 and $149,000 USD/year; however a great portion of the study population had an even greater annual household income with nineteen parents (58.7%) who reported a household income >149,999 USD/year, and ten parents (23%) reported an annual household income of $200,000 USD or greater/year. Forty parents (93%) completed a post-secondary education (minimum an undergraduate degree). At this time, being there are no other expat studies to compare these data to, it is difficult to assess whether this is an accurate representation of expats socio-economic status; however, it is highly unlikely that this is an accurate representation of all expats living in Thailand. Although these socio-demographic data did not have statistically significant relationships with parents' vaccination intention and uptake, it would be recommended to explore these factors further, as other studies report that a higher level of parental education is associated with preventative health-related behavior (Meschke, 2002; Brabin et al., 2004).

From this study population, self-reported religious affiliation was moderate (63%). No correlations were found between religious affiliation and parents' HPV vaccination intention and uptake, which is not consistent with other studies that have found that spirituality, religion and cultural traditions specific to ethnic background can influence parents' HPV vaccination intention and uptake (Moutsiakis & Chin, 2007; Peters, Aroian, & Flack, 2006; Gullatte, 2006; Brabin et al., 2006).

5.1.2 Health History

There were no significant relationships found between the parents' health history information and expat parents' HPV vaccination intention and uptake. These results are

similar to the study findings of Jaspers et al. (2011) and Rosenthal et al. (2008) where no significant associations were found between reported health history and vaccination intention and uptake. However, this is contradictory to a study by Marlow et al. (2007), which found that vaccine acceptance was higher in mothers who had experienced cancer in the family. Hechter et al. from Kaiser Permanente in Southern California found that there was a correlation between mothers' use of preventative services and vaccination uptake for male children (Akpan, 2013). For instance, mothers who had received the flu vaccine, who had Pap smear examinations, and had a history of genital warts were more likely to have a higher vaccination uptake for their sons. Although we found no correlations in this study, it is recommended that similar to these study surveys (which included questions on these aspects of health history) be included in a larger confirmatory study in order to determine whether there would be correlations among a larger, more diverse group of expat parents.

5.1.3 Knowledge of HPV and the HPV vaccine

The first objective of this study was to measure expat parents' knowledge of HPV and the HPV vaccine. Although most of study population reported that they had heard of HPV or the HPV vaccine, overall HPV knowledge was low at baseline (m = 49%, SD 0.38), which was consistent with the baseline findings from other HPV-related knowledge measurement studies (Krawczyk et al., 2012; D'Urso et al., 2007; Klug et al., 2008).

From baseline to the first follow-up the study populations' mean rose from m = 0.49 (SD 0.38) to m = 0.81 (SD 0.19), and remained the same at second follow-up (m = 0.81, SD 0.16)). To understand this large increase in the mean knowledge level, a series of comparisons were conducted to establish any differences between the control group and test group across survey periods. The control group and test group mean knowledge scores were not significantly different at baseline; however, the test group scored higher than the control group at follow-up. This implies that the positive differences between the groups could be the result of the educational intervention.

There were no statistically significant differences found between the control group and test group mean knowledge score at first follow-up and second follow-up. These data reveal that both groups did not have an even increase in knowledge across survey periods. At first follow-up, the control group mean knowledge score increased substantially even though they did not receive the educational intervention (from *m* = 0.39 at baseline (SD 0.35) to *m* = 0.73 at the first follow-up (SD 0.24)), and the test groups' mean knowledge score increased substantially from *m* = 0.57 at baseline (SD 0.39) to *m* = 0.84 at first follow-up (0.16). For the control group there was a 34% increase in knowledge, and for the test group there was a 27% increase in knowledge from baseline to first follow-up. From the first follow-up to second follow-up there was a 2% decrease in the control groups' knowledge level (*m* = 0.71, SD 0.23), and there was a 3% increase in the test groups' knowledge level (SD 0.11).

Surprisingly, the control group knowledge increased substantially from baseline to follow-up, which could be a result of many possible explanations. For example, it is possible that when the expat parents became involved in the study and took the baseline survey, they realized that their low level of knowledge on HPV, therefore initiating health information-seeking behavior to become more informed. In order to stop the test group from seeking information from other sources, we randomized the study population into control group and test group immediately after the baseline survey was collected, and the test group started to receive the study educational intervention.

Another explanation for the control groups' substantial increase in knowledge could be explained by expat parents being acutely aware that they are more independent while living abroad, in that they do not have a familiar healthcare professional or family physician to send reminders or alert them to take health-related or preventative action (such as vaccines for their child), when needed. Therefore, it is possible that this study population is a group of self-starters who are motivated to stay on top of their child's health needs and overall wellbeing.

There was one statistically significant difference between the knowledge level of the parents who reported that they intend to vaccinate their child, and the parents who do

not intend to vaccinate their child; or the parents who did vaccinate their child versus those who did not vaccinate their child. This statistically significant difference was found at baseline ($t(30) = 3.46$, $p < 0.01$). No statistically significant differences were found at first or second follow-up. This indicates that there can be no conclusions made regarding the influence of knowledge level on vaccination intention. These results are not consistent with findings from other studies that have found that higher levels of HPV knowledge correspond to positive vaccination intention and uptake (Brabin et al., 2006; De Visser and McDonnell, 2008). Explanatory factors for this lack of consistency with other study findings may be a result of the high knowledge level of the entire study population, and the lack of any significant differences between the control group and test group.

5.1.4 Perception of HPV and the HPV vaccine

The second study objective is to measure expat parents' perception of HPV and the HPV vaccine.

A series of comparisons were conducted to determine any differences between the mean scores for the control group and test group on the overall perception scale and subscales. In every case, the test group scored higher than the control group on the baseline measurement. However, in only two cases were these differences significant: perceived vaccine accessibility and perceived susceptibility of contracting HPV, genital warts or an anogenital cancer in the future. These results indicate that the control group and test groups' mean overall perception scale and subscale scores were not significantly different at the baseline, which may imply that subsequent positive differences between the groups could be the result of the study's educational intervention.

There was a clear trend in the study data, regardless of parents' allocation to the test group or control group, parents who reported a more positive perception of HPV and the HPV vaccine were more likely to have a positive vaccination intention or more inclined to vaccinate their child.

As predicted by the studies' theoretical framework, parents' perceptions of HPV and the HPV vaccine were key correlates of a positive HPV vaccination intention. Consistent with other literature, the expat parents who intended to vaccinate their child had less concern of vaccine safety and efficacy (Allen et al., 2010; Reynolds and O'Connell, 2011). The survey results did not corroborate what some studies have found as a strong correlation between parental anxiety over sexual disinhibition, promiscuity and earlier age of sexual initiation and lower HPV vaccination intention and uptake (Brabin et al., 2006; Brewer and Fazekas, 2007; Sturm et al., 2005; Constantine and Jerman, 2007; Woodhall et al., 2007; Marlow et al., 2007). Rather, this study corroborates results from other studies that have found that parents who felt the HPV vaccine has a limited or no influence on their child's sexual disinhibiition or sexual behavior were more likely to have a positive vaccination intention (Ogilvie et al., 2007). These results are positive in that other studies, such as one conducted by Bednarczyk et al. (2012) found that the clinical markers of sexual activity of adolescent females after receiving the HPV vaccination, such as pregnancy/STI testing or diagnosis, and contraceptive counseling, were not significantly elevated in comparison to adolescent females who did not receive the HPV vaccinations. Forster et al. (2012) found similar results in their study on adolescent females aged 16 to 18 years in England, as there was no significant difference of adolescent females reporting initiation of sexual activity after HPV vaccination in comparison to adolescent females who had not been vaccinated. This study data corroborates these findings in that expat parents believe that the initiation of sexual activity and sexual behaviors would not be modified after vaccination.

There was a significant relationship between parents' perception of vaccine accessibility and positive HPV vaccination intention. Studies have found that parents who have access to HPV education and information, if vaccinations are provided free and in a convenient location, and if they are provided with regular and diligent follow-up and medical support, this reduces some of the barriers to HPV vaccination intention and uptake (Brabin et al., 2006). Expats in Bangkok often live in or within a short commuting distance to the city center or central business district where many of the internationally

renowned private hospitals are located. In their 2011 fourth quarter report, Colliers International Thailand reported that expats in Bangkok who rented serviced apartments tended to live in the early Sukhumvit area (40%), the outer central business district area (29%), the central Lumpini area (18%), and the central business district area (13%). Bangkok has a significant number of reputable private and public hospitals and health facilities within this area and this may be an explanation for parents reporting that accessibility was not perceived as a factor inhibiting their decision of vaccination intention or uptake (Colliers International Thailand, 2011).

As with findings from other studies, a positive perception of the vaccine efficacy and safety was reported as an influence in parents' positive HPV vaccination intention (Brewer and Fazekas, 2007; Sturm et al., 2005; Kennedy et al., 2011). This is explained by several studies that have found that parents who are unclear and uncertain or lack knowledge about the HPV vaccine often have serious misconceptions that generate fear of vaccine safety and efficacy which in turn lowers vaccination intention and uptake. On the other hand, studies have found that parents who trust the safety and efficacy of the HPV vaccine often have higher HPV vaccination intention and uptake (Reynolds and O'Connell, 2011).

In each survey, parents were asked whether they had sufficient information about the HPV vaccine to make a decision of whether to administer the vaccine to their child. The proportion of parents who agreed or disagreed with this statement was measured within groups over time relative to the baseline survey (McNemar Test) and between groups at each survey period.

For the test group, no significant change was observed between baseline and first follow-up ($p = 0.18$), nor were there any significant differences between baseline and second follow-up ($p = 0.23$). Nevertheless, there was a higher proportion of parents who disagreed with the statement in the follow-up surveys (70%) relative to the baseline survey (48%), which indicates that more parents felt they had sufficient information to make an informed decision in relation to vaccinating their child. For the control group, no significant differences were observed between the baseline and first follow-up ($p =$

0.50), although there was a slight increase in the proportion of parents who disagreed with the statement (15% at baseline and 25% at first follow-up). Significant differences were found between baseline and the second follow-up responses ($p < 0.10$), with a significant difference in the total proportion of parents who disagreed with the statement in the second follow-up survey (45%) relative to the baseline (15%).

The comparison between the control group and test group at each survey period highlighted some differences between the two groups. Two-thirds of parents agreed with the statement in the baseline survey, although a significantly larger proportion were from the control group (χ^2 (1) = 5.25, $p < 0.05$). The effect size for this difference is moderate ($\varphi = 0.35$), however. At first follow-up, the difference is much more pronounced with nearly half of the parents disagreeing with the statement, with over two-thirds of the parents from the test group compared to only a quarter from the control group. This result is statistically significant (χ^2 (1) = 8.50, $p < 0.05$) and has a larger effect size relative to the baseline ($\varphi = 0.45$). Finally, by second follow-up, the difference is no longer statistically significant (χ^2 (1) = 2.65, $p = 0.103$).

A significantly larger proportion of parents who intend to vaccinate their children state that they have enough information to make this decision relative to those who do not intend to vaccinate their children. When asked if they "do not have enough information," parents who said that they intended to vaccinate their children disagreed by a proportion of 63% in the baseline survey, 90% in first follow-up survey, and 81% in the second follow-up survey. These proportions were compared to parents who stated that they do not intend to vaccinate their children, who disagreed at a proportion of 26%, 9%, and 36% at each measurement.

Similar analyses were conducted between parents whose children had been vaccinated with the HPV vaccine, and those whose children had not. The results indicate that at the first follow-up, all parents whose children were vaccinated for HPV disagreed that they did not have enough information to make this decision. This is compared to 41% of the parents whose children were not vaccinated. This difference is significant, χ^2 (1) = 7.31, $p < 0.01$. At the second follow-up survey, 86% of the parents whose children

were vaccinated disagreed with the statement, compared to 53% of those whose children were not vaccinated. This difference is not significant, χ^2 (1) = 2.61, p = 0.11.

5.1.5 Vaccination intention

The third objective of this study was to measure HPV vaccination intention and assess whether knowledge or perception had an influence on intention. Parents were asked to declare their intentions to vaccinate their children at each survey period. For the test group, there was a significant change ($p < 0.01$) between the baseline and the first follow-up survey; whereas only 17% of parents intended to vaccinate their child at the baseline measurement, roughly two-thirds (65%) intended to vaccinate their child at the time of the first follow-up. This proportion remained relatively constant during the second follow-up survey.

The control group also witnessed a small increase in the proportion of parents who intend to vaccinate their children against HPV for both follow-up surveys relative to the baseline, however neither of these changes were statistically significant (p = 0.69 between baseline and first follow-up; p = 0.38 between baseline and second follow-up).

The comparison between groups shows some interesting results. At the baseline measurement, parents from both groups are not significantly different with regards to their vaccination intention (χ^2 (1) = 0.05, p = 0.83), with roughly 20% in both groups reporting that they intend to vaccinate their children against HPV. However, as mentioned above, a significant number of parents from the test group changed their intentions at the first follow-up, with almost two thirds reporting that they intend to vaccinate their children - this is compared to a relatively small change in the control group. This change in vaccination intention is sustained at second follow-up, indicating a significant difference between groups at first follow-up (χ^2 (1) = 5.31, $p < 0.05$, φ = 0.35) and at second follow-up (χ^2 (1) = 2.87, $p < 0.1$, φ = 0.26).

5.1.6 Vaccination Uptake

Lastly, the follow-up surveys sought to capture how many parents *actually* had their child vaccinated against HPV (vaccination uptake) whenever their child was eligible (between the ages of 9 and 18 years). In neither case are there any significant changes across time (p = 1.00 for both groups), with the control group remaining unchanged between survey periods. The test group saw a slight increase in the proportion of vaccinated children, from 17% at first follow-up to 22% at second follow-up, but this is not a statistically significant change.

A comparison between groups indicates that there are no significant differences between the control group and test group in the proportion of parents who reported having their children vaccinated. This result is consistent for both first follow-up (χ^2 (1) = 0.49, p = 0.49, and second follow-up (χ^2 (1) = 1.08, p = 0.30).

5.1.7 Study Effect

In order to determine the effect of the study's educational intervention, we explored whether there were any positive DID estimates in the data, implying that the difference between the baseline and first follow-up, and baseline and second follow-up is greater for the test group, which could be explained by a treatment effect.

The validity of the DID estimator relies on at least two assumption. The first implies that both groups compared across time remain constant for each survey period. With a 100% response rate for each survey, the current study has ensured that both the control group and test group are the same throughout the study. This provides some validity to the DID estimates. The second assumption posits that both groups would have followed the same trajectory in the absence of any intervention (Abadie, 2005). Although this study cannot provide a conclusive answer to this assumption, the randomized sampling strategy helps to ensure that both groups are balanced. Furthermore, preliminary comparisons of scale means demonstrated that on almost all baseline measures, there are no significant differences between the control group and test

group. This finding implies that parents in both groups may have been following similar trajectory prior to the intervention.

For the overall perception scale, a $p < 0.1$ was detected from baseline to the first follow-up. Perceived vaccine efficacy had a statistically significant DID estimate ($p < 0.1$) between baseline and second follow-up, and a $p < 0.01$ from the change at baseline to second follow-up. These data imply that the difference between measurements from baseline to follow-up is greater for the test group, which could be explained by a treatment effect as a result of being exposed to the study educational intervention.

5.2 Recommendations

There are several notable limitations in this study, of which recommendations are made to address in future studies. First, purposive selection of the study population limits the generalizability of the study to the entire expat community in Bangkok, Thailand. This is especially problematic as the sample may be representative of only expat parents who are interested in learning about sexual health. Furthermore, the sample may only be representative of a specific social class and parents that belong to the expat networks within which the study advertisement was circulated. It is recommended that future studies be expanded to include a wider sample of expat parents who live in different parts of the world.

The high socio-economic status of many of the parents reduces the generalizability of this study to other expats who live in Bangkok, those who a not professionals or those who are not in the same income bracket. Furthermore, the study sample is very small and this reduces the generalizability of the study findings; therefore this trial intervention study should be followed with a larger confirmatory study. The study parentss were also highly-educated, the majority of whom having a minimum college or university degree. This also reduces the generalizability of the findings to a wider population of expats who live and work away from their country of origin. Despite this potential limitation, the study sample was a diverse group of expat parents. A larger confirmatory study should aim to achieve a diverse sample of expats.

The sample size was small which makes it difficult for these study data to accurately describe the knowledge, perception, vaccination intention and uptake of expats living in Bangkok. The advantages of having a small sample were that it enabled a study that was quicker to conduct, recruiting parents, reviewing parent responses to surveys, performing analyses and ensuring a low drop out rate. Furthermore, conducting a study with a small sample size was appropriate to test a new hypothesis in a population that has not been explored in other studies, to date. The small sample size was feasible in that there was not an abundance of resources required (time and financial costs) to determine whether there was an effect between the educational intervention and expats' level of HPV knowledge, perception, vaccination intention and uptake. Being that we found an association and an effect of the educational intervention, it is now recommended that a larger confirmatory study is needed.

Self-selection could result in parental bias and therefore generate study results that are not representative of the target population. This sampling technique was chosen, as the expat community networks would not grant the research team access to their members' personal and contact information, therefore eliminating the use of other probability sampling techniques. In an effort to minimize parent bias the study parents were recruited through a number of mediums and in a variety of informal settings where they could gather more information at their own convenience. In recruiting study participants, the parents were encouraged to participate in the study, regardless of their knowledge or perception of HPV. The principal investigator did not disclose to the parents the desired study outcome, as this could affect parents' willingness to participate in the study and cause only parents with some characteristics (ie. those who are supportive of HPV vaccination) to participate, which would result in participant bias. In future studies, it is recommended that a broader form of recruitment be taken so that a larger expat population be accessed and recruited from. In addition, it is recommended that more information be collected from the expat networks and organizations to get a grasp on their membership characteristics (ie. socio-demographic, etc.)

There is a possibility that since the study results demonstrated a significant increase in the control groups' level of knowledge from baseline to follow-up measurement periods, it is possible that there could have been contamination of the study. Regardless, the test group did have higher knowledge levels at all measurement periods. It would be recommended that in future studies, that there be focus group discussions with the study populations (test group and control group, separately), so that it could be made clearer to the research team the influence of the intervention, as well as external factors. This would help to clarify whether there were/are any instances of contamination in the study.

Lastly, it is difficult to assess changes in HPV knowledge, perception, vaccination intention and uptake based on the impact of the intervention, as there are an abundance of information available pertaining to HPV and the HPV vaccines. Nonetheless, this is a study yielded results that can inform other community-based strategies and programs to increase HPV knowledge, perception, vaccination intention and uptake. It is recommended that the intervention be tested among other a larger sample of expats to assess its effectiveness and generalizability.

Additional recommendations that are suggested, as a result of this study are to conduct a larger confirmatory study to assess whether socio-demographic characteristics and health history of the expat population do indeed influence vaccination intention and uptake. This study found no relationships between these variables, which is contradictory to many other studies on parental HPV vaccination intention and uptake.

5.3 Conclusion

Overall, these study findings suggest that expat parents who have a higher level of knowledge and understanding of the perceived susceptibility, severity and consequences of HPV, and the benefits and barriers to getting the HPV vaccine have a higher vaccination intention. This intervention and others should aim to address some of the salient factors that influence knowledge, perception, vaccination intention and uptake,

which were revealed in this study will include information on HPV transmission, prevention and health effects, and HPV vaccine efficacy, safety and potential side effects.

These trial data provide useful information for further research and intervention studies. With growing evidence of the HPV vaccines efficacy and recommended use in boys and girls, it is critical that parents be informed of the susceptibility, severity and consequences of HPV, and the benefits and barriers to getting the HPV vaccine, so that they can make informed decisions of whether to vaccinate their child prior to sexual debut (Haupt and Sattler, 2010). Worldwide, researchers have worked to address the factors that influence parental vaccination intention and uptake by implementing interventions specifically aimed at educating parents about sexual health, HPV and the HPV vaccine (Kennedy et al., 2011; Krawczyk et al., 2012; Reynolds and O'Connell, 2011; Schuster et al., 2008; Spleen et al., 2012; Villarruel et al., 2010). This study contributes to existing literature and intervention research on HPV vaccination intention and uptake, as it is the first of its' kind to assess expat parents' knowledge, perception, vaccination intention and uptake. In considering other studies and preventative interventions, online access to vaccine information and services is ideal for populations who face unique social and environmental determinants of health, including expats who are transient and relocate their families and careers abroad.

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APPENDICES

APPENDIX A

STUDY TIMELINE

Research process	2012		2013								
	November	December	January	February	March	April	May	June	July	August	September
Approval of Research Proposal at College of Public Health Sciences, Chulalongkorn University											
Preparation and submission of research proposal to Research Ethics Board (REB), Chulalongkorn University											
Ethical Approval											
Study introduction & advertisement of research to the expatriate community network											
Participant recruitment (including distribution of screening questionnaire and written consent form to expat parents)											
Focus group discussion(s)											
Selection of study participants and distribution of pre-intervention survey											
Assignment of study participants to intervention group and control group											
Distribution of educational program to intervention group											
Follow-up to educational intervention											
Distribution of post-intervention surveys											
Analysis of pre- and post-intervention surveys											
Distribution of educational program to control group.											
Drafting of final report											
Sharing of final report with expatriate community networks.											
Reports submitted for publication in international journals.											
Presentation at international conferences.											
Defense of dissertation at CPHS, CU.											

APPENDIX B

STUDY ADVERTISEMENT

APPENDIX C
PARTICIPANT INFORMATION SHEET

Title of research project: THE EFFECT OF AN E-BASED EDUCATIONAL INTERVENTION ON EXPATRIATE PARENTS' HUMAN PAPILLOMAVIRUS (HPV) KNOWLEDGE, PERCEPTION, VACCINATION INTENTION AND UPTAKE IN BANGKOK THAILAND

Principal Investigator: Ms. Melissa M. Baker
Office Address: College of Public Health Sciences, Chulalongkorn University
Telephone: 66 (0) 81 831 2149
Email: melbaker13@hotmail.com

To Whom It May Concern,

You are invited to participate in a research project entitled, The Effect of an E-based Educational Intervention on Expatriate Parents' Human Papillomavirus (HPV) Knowledge, Perception, Vaccination Intention and Uptake in Bangkok, Thailand, by Ms. Melissa M. Baker, PhD Candidate at the College of Public Health Sciences at Chulalongkorn University, Bangkok, Thailand.

Prior to deciding whether you should participate in this research it is important that you understand why the research is being conducted and what it will entail. Please take time to familiarize yourself with the following information and do not hesitate to contact the Ms. Baker if anything is unclear or if you would like additional information.

The objectives of this research are to explore how an online parental education program can influence expatriate parents' knowledge and perceptions of the Human Papillomavirus (HPV) and parents' HPV vaccination intention and uptake – before and after participating in the educational program. This study will take place from January – September 2013.

If you are interested in participating in the study you may volunteer or express interest to Ms. Baker either by phone or email (please see contact information above). First, you will be asked to disclose your personal email address. Do not worry, your email address and contact information will remain confidential and will not be given to any other sources for any other purposes. If you consent to provide your email address, you will be emailed a weblink where you can access a brief screening questionnaire to make sure that you are eligible to participate in the study, and will also be asked to fill in a consent form to express your willingness to participate in the study. The screening questionnaire should take approximately one minute to complete.

This research uses a randomized controlled trial research design. If you are eligible to participate in the study, you may be randomly assigned to either a control group or intervention group. If you are randomly assigned to the control group you will be asked to complete pre- and post-intervention surveys, which will be emailed to your personal email addresses. Please note that you will not participate in the intervention until after the study is completed, approximately 10 months from study start date. If you are randomly assigned to the intervention group you will be asked to complete pre- and post-intervention surveys, and will also receive an educational program which consist of weekly information posters being sent to your personal email for viewing. You will be asked to acknowledge receipt of each survey and the intervention. Each survey should take approximately 20 to 30 minutes to complete.

Regardless of which group you may be assigned to, whether the intervention and control groups, the content of this study is confidential and you will be asked not to discuss the study or study content with anyone aside from their child's healthcare provider or physician.

You will have no risks in participating in this research. You will not receive any compensation for your time to participate in this study. Your participation in this research is voluntary and you have the right to refuse participation or withdraw at any given time with no adverse implications on you.

It is hoped that this study will generate data that can inform the creation of community-based strategies aimed to provide expatriate parents' like yourself with information regarding HPV and the HPV vaccines, and help you to make an informed decision of whether to vaccinate your child with the HPV vaccine.

If you have any questions or would like additional information you may contact Ms. Baker at any time.

Information and data collected that are directly related to you will be kept confidential. Results of the study will be reported as an overall statement with anonymity.

I, _____ (name printed) provide my informed consent and confirm my willingness to voluntarily participate in this study.

_____ (Signature)

_____ (Date)

N.B. If the researcher does not treat you as stated in the Participant Information Sheet, you can report the Principal Investigator to the Ethical Review Committee for Research Involving Human Subjects, Health Sciences Group, Chulalongkorn University, located at Institute Building 2, 4th Floor, Soi Chulalongkorn 62, Phyathai Rd., Bangkok, Thailand 10330. Telephone: 66 (0) 2218-8147; Fax: 66 (0) 2218 8147; Email: eccu@chula.ac.th.

APPENDIX D
SCREENING QUESTIONNAIRE

Instructions: Please mark a check mark in the parentheses ( ) next to your answer.

1) I can read English.

( ) Yes

( ) No

2) I can write in English.

( ) Yes

( ) No

3) I have access to a personal email address.

( ) Yes

( ) No

4) I am willing to disclose my email address to the research team for this study.

( ) Yes

( ) No

5) I have regular access to the Internet and a computer to access my email.

( ) Yes

( ) No

6) I live in Thailand fulltime.

( ) Yes

( ) No

7) I have son(s) or daughter(s) who are 18 years old or younger.

( ) Yes

( ) No

8) How did you hear of this study?

( ) Friend/Family

( ) I received the study advertisement from an expatriate support network.

( ) I saw the study advertisement on a website

( ) Other, please specify …

APPENDIX E
FOCUS GROUP GUIDELINES

1. Welcome to participants

   I introduced myself, and asked everyone to sign-in and answer a few quick demographic questions on a sign-in sheet (age, gender, country of origin).

2. Logistics
   - Focus group will last about one hour
   - Feel free to move around
   - Where is the bathroom? Exit?
   - Help yourself to refreshments

3. Review
   - Who I was
   - What I am doing and what are the objectives of the study I hoped to carry out
   - What would be done with the information collected during the focus group discussion

4. Explanation of the process

   I asked the group if anyone has participated in a focus group before and gave some background information about focus groups:
   - We learn from you (positive and negative)
   - Not trying to achieve consensus, I'm gathering information
   - In this project, I will be conducting surveys and focus group discussions. The reason for using both of these tools is that I can get more in-depth information from a smaller group of people in focus groups that will provide me with a reference point to design my study.

5. Ground rules
    - Everyone should participate.
    - Information provided in the focus group must be kept confidential
    - Stay with the group and please don't have side conversations
    - Turn off cell phones, if possible
    - Have fun

6. Recording began

7. Questions were posed to guide the discussion
    - The group was asked if they had any questions before getting started.
    - What do you know about HPV?
    - What do you know about the HPV vaccine?
    - How do you feel about getting your child vaccinated with the HPV vaccine?
    - What are the factors that shape or influence your decision to vaccinate your child with the HPV vaccine or any vaccine?
    - What/who are your primary influences that have shaped your HPV knowledge, perception, intention and vaccine uptake?
    - What would you like to know about HPV?
    - What would you like to know about the HPV vaccine?

8. Conclusion of focus group discussion.
    - Participants were thanked for participating

APPENDIX F

PRE-INTERVENTION SURVEY

The pre-intervention survey has 5 categories:

I. Socio-Demographic Information

II. Your Health History

III. HPV – Knowledge

IV. Perception of HPV

V. HPV Vaccination Intention

Section/Category	Question	Response Scale
I. Socio-demographic Information	Age	19-24 yrs. 25-30 yrs. 31-35 yrs. 36-40 yrs. 41-45 yrs. 46-50 yrs. 51-55 yrs. 56-60 yrs. >60 yrs.
	Gender	1 – Female 0 – Male
	What is your religion?	1 – Christian 2 – Buddhist 3 – Muslim 4 –Other, please specify 0 – Unaffiliated

	What is your country of origin?	Please specify
	What is your marital status?	1 – Single 2 – Marries 3 – Separated 4 – Divorced 5 – Common-law 6 – Widower 7 - Other, please specify
	What is your highest level of education?	1 - Did not attend school 2 – Primary 3 - Secondary 4 – College 5 – University 6 – Graduate Degree 7 – Other, please specify
	What your household income (SD/year)?	1 - $0 - 25,000 2 - $25,000 - $49,999 3 - $50,000 - $74,999 4 - $75,000 - $99,999 5 - $100,000 - $124,999 6 - $125,000 - $ 149,999 7 - $150,000 - $ 174,999 8 - $175,000 - $199,999

		9 - $200,000 and up
	How many children do you have and what are their age and gender?	1, 2, 3, 4, 5, 6 … 1 – Female 2 - Male
	In your household, who decides if your child gets vaccines?	1 - Me 2 - Spouse/partner (only) 3 – Myself & my spouse/partner (together) 4 – Child (only) 5 – Joint decision - Myself, my spouse/partner and my child 6 - Other, _____
	Which expatriate community network are you a member of, or which support groups, website, or other forums do you frequent/attend for information?	(Check all that apply) 1 - Bangkok Mothers and Babies International (BAMBI) 2 - Parent Vine 3 - Coconuts Bangkok 4 - American Women's Club of Thailand 5 - Australians in Thailand 6 - Australian-New

		Zealand Women's Group 7 - Bangkok Network of Women 10 - International Women's Club of Thailand 11 - Other, please specify 12 - None
II. Your Health History	How many times have you visited a doctor, health care provider, or clinic in the past 3 months (for your own health)?	Range from 0 - 100
	Has someone you care about ever had genital warts?	1 - Yes 0 - No
	Has a doctor or healthcare provider ever told that the results of a colposcopy or biopsy were abnormal?	1- Yes 0 - No
	Has someone you care about ever had an anogenital cancer (ie. cervical, vaginal, vulvar, penile, anal)?	1 - Yes 0 - No
	Have you received any doses of the HPV vaccine? If yes, how many doses did you receive (the completed series has 3 doses).	1 - Yes 0 - No 1, 2, 3
	[For female participants only] Do you	1 – Yes

	go for annual Pap smear examinations?	0 – No
	[For female participants only] have you ever had an irregular Pap smear result?	1 – Yes 0 - No
III. HPV Knowledge	Instructions: The following questions will test what your knowledge and what you think of HPV and the HPV vaccine…	
	Have you heard of HPV or human papillomavirus before this study? [PAP PILL O MA VIRUS]	1 - Yes 0 – No (If no, skip to section IV)
	The HPV can cause cervical cancer.	1 – Yes 2 – No 3 – Do not know
	HPV is a sexually transmitted infection.	1 – Yes 2 – No 3 – Do not know
	HPV infection can go away without treatment.	1 – Yes 2 – No 3 – Do not know
	Getting regular Pap tests reduces a woman's chances of getting cervical cancer.	1 – Yes 2 – No 3 – Do not know
	HPV can cause abnormal Pap smears.	1 – Yes 2 – No 3 – Do not know
	HPV can cause genital warts.	1 – Yes 2 – No 3 – Do not know
	Have you ever heard of the HPV	1 – Yes

	vaccine before this study (Gardasil or Cervarix)?	2 – No 3 – Do not know
	My child is in the age group that health officials recommend get the HPV vaccine.	1 – Yes 2 – No 3 – Do not know
IV. Perception of HPV and the HPV Vaccine	The HPV vaccine is unsafe.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	The HPV vaccine might cause short term problems, like fever or discomfort.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	The HPV vaccine might cause lasting health problems.	1 – Completely disagree

		2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	The HPV vaccine is being pushed to make money for drug companies.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	The HPV vaccine is still so new that I want to wait awhile before deciding if my child should get it.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree

		7 – Completely agree 8 – Do not know
	I am concerned about giving my child too many vaccines.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	I am concerned that the HPV vaccine costs more than I can pay.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	I do not have enough information about the HPV vaccine to decide whether to give it to my child.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree

		4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	If a teenage boy gets the HPV vaccine, he may be more likely to have sex.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	If a teenage girl gets the HPV vaccine, she may be more likely to have sex.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	My child is too young to get the HPV	1 – Completely

	vaccine.	disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	It is unlikely that my child will get HPV in the future.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	It is unlikely that my child will get an anogenital cancer (ie. cervical, penile, vulvar, vaginal, anal cancer) in the future.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree

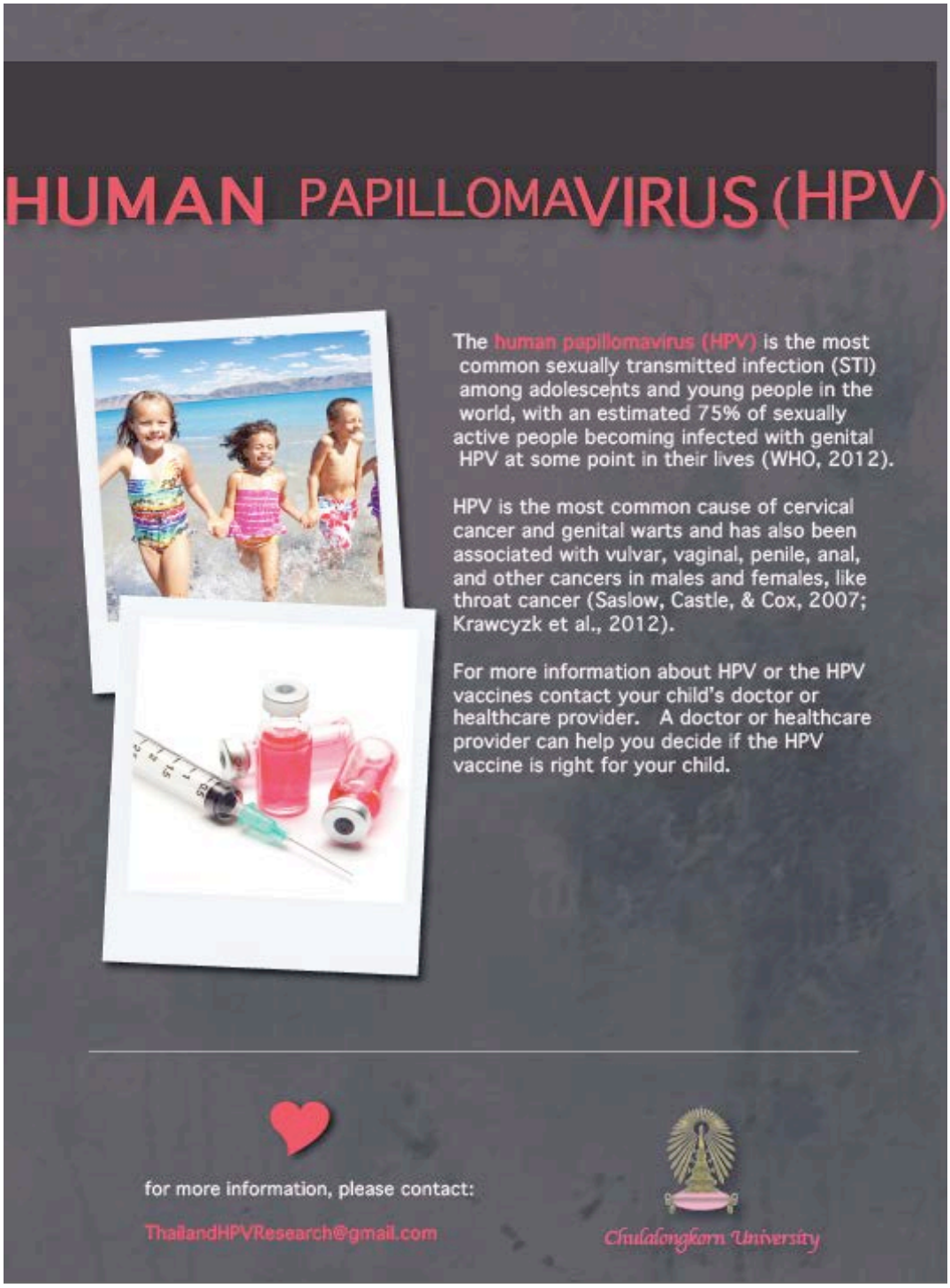
		6 – Mostly agree 7 – Completely agree 8 – Do not know
	It is unlikely that my child will get genital warts in the future.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	How effective is the HPV vaccine is in preventing HPV infection?	1 - Not effective at all 2 – Slightly 3 – Moderately 4 – Very 5 – Extremely 6 – Do not know
	How effective is the HPV vaccine is in preventing genital warts?	1 - Not effective at all 2 – Slightly 3 – Moderately 4 – Very 5 – Extremely 6 – Do not know
	How effective is the HPV vaccine is in preventing cervical cancer?	1 - Not effective at all 2 – Slightly 3 – Moderately

		4 – Very 5 – Extremely 6 – Do not know
	How hard would it be to find a provider or clinic that has the vaccine available?	1 - Not hard at all 2 – Slightly 3 – Moderately 4 – Very 5 – Extremely hard 6 – Do not know
	How hard would it be to find a provider or clinic where you can afford the vaccine?	1 - Not hard at all 2 – Slightly 3 – Moderately 4 – Very 5 – Extremely 6 – Do not know
	How hard would it be to find a provider or clinic that is easy to get to?	1 - Not hard at all 2 – Slightly 3 – Moderately 4 – Very 5 – Extremely 6 – Do not know
	How hard would it be to find a provider or clinic where you do not have to wait long to get an appointment?	1 - Not hard at all 2 – Slightly 3 – Moderately 4 – Very 5 – Extremely 6 – Do not know
V. HPV Vaccination	**Please answer one section for each child that you have who is 18 years of age or younger who <u>HAS NOT</u> received the HPV**	

Intention	**vaccine.**	
CHILD 'A'	What is the age and gender of your child?	Range of number to select age. 1 – Female 2 - Male
	Before this study, had you thought about getting your child the HPV vaccine?	1 – Yes 2- No
	In the past year, have you talked to a doctor or other healthcare provider about the HPV vaccine for your child?	1 – Yes 2- No
	In the past year, has a doctor or health care provider recommended that your child get the HPV vaccine?	1 – Yes 2- No
	Which of the following best described how you feel about getting your child the HPV vaccine in the next year?	1 - I DO NOT want my child to get the vaccine 2 - I DO want my child to get the vaccine 3 – I am UNDECIDED

APPENDIX G

INTERVENTION CONTENT



HUMAN PAPILLOMAVIRUS (HPV)

The human papillomavirus (HPV) is a group of more than 120 viruses, of which, approximately 40 HPV types are sexually transmitted from person to person, genital-to-genital contact, oral-genital contact, and sexual intercourse.

Types 16 and 18 and other HPV viruses are considered 'high risk' and may cause abnormal Pap smear test results and are believed to cause up to 70% of the cases of cervical cancer in women. In both men and women, 'high risk' HPV infections are believed to cause 85% of anal cancers, 50% of other anogenital cancers, 20% of cancers of the throat and mouth and 10% of cancers of the larynx and esophagus

HPV types 6 and 11 may cause genital warts which are responsible for more than 90% of genital warts.

For more information about HPV or the HPV vaccines contact your child's doctor or healthcare provider. A doctor or healthcare provider can help you decide if the HPV vaccine is right for your child.

for more information, please contact:

ThailandHPVResearch@gmail.com

Chulalongkorn University

HUMAN PAPILLOMAVIRUS (HPV)

Cervical cancer is the second most common cancer among women in the world (WHO, 2012). Cervical cancer is not hereditary; rather it is caused by certain types of the Human Papillomavirus (HPV). Most HPV infections have no symptoms (asymptomatic) and are cleared by the immune system within a few weeks or months. If not found early, abnormal cells can develop in the lining of the cervix, which can become precancers and then cervical cancer can develop. The World Health Organizaion estimates that by 2025, there will be approximately 720,000 cases of cervical cancer in women over the age of 15 years in the world and 395,005 of those cases will result in death (WHO, 2010).

For more information about HPV or the HPV vaccines contact your child's doctor or healthcare provider. A doctor or healthcare provider can help you decide if the HPV vaccine is right for your child.

for more information, please contact:

ThailandHPVResearch@gmail.com

Chulalongkorn University

HUMAN PAPILLOMAVIRUS (HPV)

There are more than 30 types of HPV genital types. Of these 30-40 different types of HPV genital types, many will go away on their own without you even knowing you had them.

HPV types 16 and 18 cause 70% of cases of cervical cancer. HPV types 6 and 11 have been known to cause 90% of cases of genital warts. Genital warts are usually soft, flesh-colored growths that can be raised or flat, small or large, alone or in clusters. While genital warts are not life threatening, they can be life altering. There are a number of ways to treat genital warts, including creams, removal by burning, freezing, or laser, and surgery. However, even after treatment, genital warts can return. In fact, 25% of cases return within 3 months.

For more information about HPV or the HPV vaccines contact your child's doctor or healthcare provider. A doctor or healthcare provider can help you decide if the HPV vaccine is right for your child.

for more information, please contact:

ThailandHPVResearch@gmail.com

Chulalongkorn University

HUMAN PAPILLOMAVIRUS (HPV)

Both men and women can have HPV and it is easily spread. The prevalence of penile cancer in heterosexual men correlates with the prevalence of cervical cancers among married couples (WHO, 2010). Any type of genital contact with someone who has HPV can put you at risk. In other words, HPV can be spread even if you don't have penetrative sexual intercourse with a person infected with HPV.

HPV can also be spread through oral and anal sex. HPV types 6 and 11 which may cause genital warts may also be spread from mother to infant during pregnancy and delivery and can cause upper respiratory tract infection of the child.HPV often does not have signs or symptoms, so many people don't even realize that they have HPV or that they are passing it on to their partner. In women, HPV can be detected in regular Pap smears.

For more information about HPV or the HPV vaccines contact your child's doctor or healthcare provider. A doctor or healthcare provider can help you decide if the HPV vaccine is right for your child.

for more information, please contact:

ThailandHPVResearch@gmail.com

Chulalongkorn University

HUMAN PAPILLOMAVIRUS (HPV)

To-date there is no known cure for HPV, but there are two HPV vaccines. One vaccine protects against HPV types 6, 11, 16, and 18) and was licensed by the US Food and Drug Administration (FDA) in 2006 for use in females. These HPV types are known to cause genital warts and up to 70% of cases of cervical cancer. In 2009, the FDA also licensed this vaccine for use in males to prevent genital warts and anal cancers.

There is also another HPV vaccine that protects against HPV types 16 and 18. Both vaccines are effective in preventing HPV infections from HPV types 16 and 18, therefore, can prevent precancers and cancers (including cervical cancer).

For more information about HPV or the HPV vaccines contact your child's doctor or healthcare provider. A doctor or healthcare provider can help you decide if the HPV vaccine is right for your child.

for more information, please contact:

ThailandHPVResearch@gmail.com

Chulalongkorn University

HUMAN PAPILLOMAVIRUS (HPV)

The HPV vaccines are given intramuscularly. The HPV vaccines should be given in a 3-dose series over a period of 6 months. It is recommended that the second dose be administered 1-2 months after the first dose, and the third dose should be administered 6 months after the first dose.

In order to get the full benefit of the HPV vaccine it is important that your child receive all 3 doses. If your child misses a dose, talk to his/her healthcare provider about how to complete the series. Men who have sex with men may be immunized with the HPV vaccine up to 26 years of age. Males 22-26 years of age, and women ages 27-45 may also be vaccinated with the HPV vaccine.

For more information about HPV or the HPV vaccines contact your child's doctor or healthcare provider. A doctor or healthcare provider can help you decide if the HPV vaccine is right for your child.

for more information, please contact:

ThailandHPVResearch@gmail.com

Chulalongkorn University

HUMAN PAPILLOMAVIRUS (HPV)

The HPV vaccines work to prevent illness. It is recommended that children between the ages of 11 and 12 years of age (and as young as 9) get the HPV vaccine, because the vaccine is most effective when all 3 doses are administered prior to sexual debut.

The vaccines can be administered to males and females between the ages of 9 and 26 years old. In the United States, the Centers for Disease Control and Prevention (CDC) recommends the HPV vaccination be a part of a child's vaccination schedule.

For more information about HPV or the HPV vaccines contact your child's doctor or healthcare provider. A doctor or healthcare provider can help you decide if the HPV vaccine is right for your child.

for more information, please contact:

ThailandHPVResearch@gmail.com

Chulalongkorn University

HUMAN PAPILLOMAVIRUS (HPV)

There is limited data on getting the effect of the HPV vaccine during pregnancy, but there is no evidence that a fetus would be affected if a pregnant woman were vaccinated.

People who suffer from hypersensitivity to any of the vaccine components should not receive the vaccine.People who suffer severe or acute illness should not get the vaccine until after illness is improved.

For more information about HPV or the HPV vaccines contact your child's doctor or healthcare provider. A doctor or healthcare provider can help you decide if the HPV vaccine is right for your child.

for more information, please contact:

ThailandHPVResearch@gmail.com

Chulalongkorn University

HUMAN PAPILLOMAVIRUS (HPV)

Research has shown that the HPV vaccines are efficacious and effective in preventing persistent infection, cervical precancer, cervical cancer, and vulvar and vaginal precancers. The HPV vaccine that prevents HPV types 6, 11, 16 and 18 has also proven to be highly effective in preventing genital warts and other types of precancerous lesions in both males and females.

For more information about HPV or the HPV vaccines contact your child's doctor or healthcare provider. A doctor or healthcare provider can help you decide if the HPV vaccine is right for your child.

for more information, please contact:

ThailandHPVResearch@gmail.com

Chulalongkorn University

HUMAN PAPILLOMAVIRUS (HPV)

The HPV vaccines do not prevent chronic HPV infection or the development of disease caused by HPV infection in people who are already infected with HPV, nor do the HPV vaccines treat cervical cancer or genital warts.

The HPV vaccine does not replace routine cervical cancer screenings, does not prevent pregnancy or other sexually transmitted diseases caused by other HPV types or not caused by HPV. Even if your child gets the HPV vaccine, it is important that they are aware of these risks and exercise caution.

For more information about HPV or the HPV vaccines contact your child's doctor or healthcare provider. A doctor or healthcare provider can help you decide if the HPV vaccine is right for your child.

for more information, please contact:

ThailandHPVResearch@gmail.com

Chulalongkorn University

HUMAN PAPILLOMAVIRUS (HPV)

The HPV vaccines efficacy and safety have been tested in many studies around the world. The vaccines have proven to be safe and cause no serious side effects.

Possible side effects of the HPV vaccine can include pain, swelling, itching, bruising, and redness at the injection site, headache, fever, nausea, dizziness, vomiting, and fainting.

For more information about HPV or the HPV vaccines contact your child's doctor or healthcare provider. A doctor or healthcare provider can help you decide if the HPV vaccine is right for your child.

for more information, please contact:

ThailandHPVResearch@gmail.com

Chulalongkorn University

APPENDIX H

POST-INTERVENTION SURVEY

The pre-intervention survey has 5 categories:

I. HPV – Knowledge

II. Perception of HPV and the HPV vaccine

III. HPV Vaccination Intention

IV. HPV Vaccination Uptake

V. Comments & Feedback

Section/Category	Question	Response Scale
I. HPV Knowledge	Instructions: The following questions will test what your knowledge and what you think of HPV and the HPV vaccine…	
	The HPV can cause cervical cancer.	1 – Yes 2 – No 3 – Do not know
	HPV is a sexually transmitted infection.	1 – Yes 2 – No 3 – Do not know
	HPV infection can go away without treatment.	1 – Yes 2 – No 3 – Do not know
	Getting regular Pap tests reduces a woman's chances of getting cervical cancer.	1 – Yes 2 – No 3 – Do not know
	HPV can cause abnormal Pap smears.	1 – Yes 2 – No 3 – Do not know

	HPV can cause genital warts.	1 – Yes 2 – No 3 – Do not know
	Have you ever heard of the HPV vaccine before this study (Gardasil or Cervarix)?	1 – Yes 2 – No 3 – Do not know
	My child is in the age group that health officials recommend get the HPV vaccine.	1 – Yes 2 – No 3 – Do not know
II. Perception of HPV and the HPV Vaccine	The HPV vaccine is unsafe.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	The HPV vaccine might cause short term problems, like fever or discomfort.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree

		5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	The HPV vaccine might cause lasting health problems.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	The HPV vaccine is being pushed to make money for drug companies.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree

		7 – Completely agree 8 – Do not know
	The HPV vaccine is still so new that I want to wait awhile before deciding if my child should get it.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	I am concerned about giving my child too many vaccines.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know

	I am concerned that the HPV vaccine costs more than I can pay.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	I do not have enough information about the HPV vaccine to decide whether to give it to my child.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	If a teenage boy gets the HPV vaccine, he may be more likely to have sex.	1 – Completely disagree 2 – Mostly disagree

		3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	If a teenage girl gets the HPV vaccine, she may be more likely to have sex.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	My child is too young to get the HPV vaccine.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither

		disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	It is unlikely that my child will get HPV in the future.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	It is unlikely that my child will get an anogenital cancer (ie. cervical, penile, vulvar, vaginal, anal cancer) in the future.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree

		6 – Mostly agree 7 – Completely agree 8 – Do not know
	It is unlikely that my child will get genital warts in the future.	1 – Completely disagree 2 – Mostly disagree 3 – Somewhat disagree 4 – Neither disagree or agree 5 – Somewhat agree 6 – Mostly agree 7 – Completely agree 8 – Do not know
	How effective is the HPV vaccine is in preventing HPV infection?	1 - Not effective at all 2 – Slightly 3 – Moderately 4 – Very 5 – Extremely 6 – Do not know
	How effective is the HPV vaccine is in preventing genital warts?	1 - Not effective at all 2 – Slightly 3 – Moderately 4 – Very

		5 – Extremely 6 – Do not know
	How effective is the HPV vaccine is in preventing cervical cancer?	1 - Not effective at all 2 – Slightly 3 – Moderately 4 – Very 5 – Extremely 6 – Do not know
	How hard would it be to find a provider or clinic that has the vaccine available?	1 - Not hard at all 2 – Slightly 3 – Moderately 4 – Very 5 – Extremely hard 6 – Do not know
	How hard would it be to find a provider or clinic where you can afford the vaccine?	1 - Not hard at all 2 – Slightly 3 – Moderately 4 – Very 5 – Extremely 6 – Do not know
	How hard would it be to find a provider or clinic that is easy to get to?	1 - Not hard at all 2 – Slightly 3 – Moderately 4 – Very 5 – Extremely 6 – Do not know
	How hard would it be to find a provider or clinic where you do not have to wait long to	1 - Not hard at all 2 – Slightly

	get an appointment?	3 – Moderately 4 – Very 5 – Extremely 6 – Do not know
III. HPV Vaccination Intention	**Please answer one section for each child that you have who is 18 years of age or younger who <u>HAS NOT</u> received the HPV vaccine.**	
CHILD 'A'	What is the age and gender of your child?	Range of number to select age. 1 – Female 2 - Male
	Which of the following best described how you feel about getting your child the HPV vaccine in the next year?	1 - I DO NOT want my child to get the vaccine 2 - I DO want my child to get the vaccine 3 – I am UNDECIDED 4 – I have ALREADY vaccinated my child
IV. HPV Vaccination Uptake	**Please answer one section for each child that you have who is 18 years of age or younger who <u>HAS NOT</u> received the HPV vaccine.**	
CHILD 'A'	Has your child received…	1 – Yes 0 - No

	Vaccine Dose 1 Vaccine Dose 2 Vaccine Dose 3	

V. Comments and Feedback

Instructions: Please write your responses in the space provided below each question.

[For control group]

1) What information would you like to have in relation to HPV and the HPV vaccine?

2) Do you have any other comments about this study that you wish to share?

[For test group]

1) This poster series has improved my knowledge of HPV and the HPV vaccine.

( ) Yes

( ) No

Comments…

2) This poster series improved my perception of HPV and the HPV vaccine.

( ) Yes

( ) No

Comments…

3) The poster series did/will influence my decision to vaccinate my child with the HPV vaccine.

( ) Yes

( ) No

Comments…

4) What did you think of the poster series? What did you like and what did you dislike?

Comments…

5) What information would you like to have in relation to HPV and the HPV vaccine?

6) Do you have any other comments about this study that you wish to share?

Thank you!!!

That is my last question. Everyone's answers will be combined to give us information about parents' knowledge, perception, vaccination and vaccination intentions.

Thank you very much for helping in this important study. What we learn from you and other parents may affect policies and programs about HPV vaccination for expatriate parents.

APPENDIX I

EXAMPLE OF PARTICIPANT VIEWING EMAIL

From:
Date: Fri, Feb 15, 2013 at 12:46 PM
Subject: Viewed Posters
To: "thailandhpvresearch@gmail.com" <thailandhpvresearch@gmail.com>

Dear Melissa,

This weeks posters were very informative. I look forward to receiving more next week.

Have a great weekend,
Julie

APPENDIX J

BUDGET

Items	Unit	Cost/unit (USD)	Total (USD)	%
1. Personnel				
- Principal Investigator (full time 12 months)	1	1000	1000	12.9
- Research Assistant & data analyst (consultant)	1	500	500	6.5
- Graphic designer (contract for 75 hours)	1	1500	1500	19.4
2. Operating Costs				
- Study advertising				
• Membership costs to access expatriate community networks	1	100	100	1.3
• Printing posters.	1	100	100	1.3
• Promoting the study on expatriate network websites, in newsletters and magazines (space rental)	1	400	400	5.2
• Promoting the study through poster distribution (poster printing and posting fees)	1	100	100	1.3
- Surveys				
• Purchase of survey license from www.surveymonkey.com	1	350	350	4.5
- Intervention				
• Printing posters and business cards	1	100	100	1.3
- Final report				
• Data analysis (purchase of SPSS v. 21)	1	250	250	3.2
3. Dissemination of the results				
• Sharing of results at national conferences (including poster	1	800	800	10.3

production fees, abstract submission and conference registrations and travel) • Sharing of results at national conferences (including poster production fees, abstract submission and conference registrations and travel) • Printing of final report for dissemination • Publication in international journals	1 1 3	1500 50 250	1500 50 750	19.4 0.6 9.7
4. Miscellaneous	1	250	250	3.2
TOTAL			**7750**	100

N.B. 1 Thai Baht = 31 USD

APPENDIX K

ETHICAL CERTIFICATE OF APPROVAL

AF 02-12

The Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University
Institute Building 2, 4 Floor, Soi Chulalongkorn 62, Phyathai Rd., Bangkok 10330, Thailand,
Tel: 0-2218-8147 Fax: 0-2218-8147 E-mail: eccu@chula.ac.th

COA No. 010/2013

Certificate of Approval

Study Title No.175.1/55 : **THE EFFECT OF AN IT-BASED EDUCATIONAL INTERVENTION ON EXPATRIATE PARENTS' HUMAN PAPILLOMAVIRUS (HPV) KNOWLEDGE, PERCEPTION, VACCINATION INTENTION AND UPTAKE IN BANGKOK, THAILAND**

Principal Investigator : MS.MELISSA MARIE BAKER

Place of Proposed Study/Institution : College of Public Health Sciences, Chulalongkorn University

The Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University, Thailand, has approved constituted in accordance with the International Conference on Harmonization – Good Clinical Practice (ICH-GCP) and/or Code of Conduct in Animal Use of NRCT version 2000.

Signature: Prida Tasanapradit ..... Signature: Nuntaree Chaichanawongsaroj .....

(Associate Professor Prida Tasanapradit, M.D.) Chairman

(Assistant Professor Dr. Nuntaree Chaichanawongsaroj) Secretary

Date of Approval : 11 January 2013 Approval Expire date : 10 January 2014

The approval documents including

1) Research proposal
2) Patient/Participant Information Sheet and Informed Consent Form
3) Researcher
4) Questionnaires

Protocol No. 175.1/55
Date of Approval 11 JAN 2013
Approval Expire Date 10 JAN 2014

The approved investigator must comply with the following conditions:

1. *The research/project activities must end on the approval expired date of the Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University (ECCU). In case the research/project is unable to complete within that date, the project extension can be applied one month prior to the ECCU approval expired date.*
2. *Strictly conduct the research/project activities as written in the proposal.*
3. *Using only the documents that bearing the ECCU's seal of approval with the subjects/volunteers (including subject information sheet, consent form, invitation letter for project/research participation (if available).*
4. *Report to the ECCU for any serious adverse events within 5 working days*
5. *Report to the ECCU for any change of the research/project activities prior to conduct the activities.*
6. *Final report (AF 03-12) and abstract is required for a one year (or less) research/project and report within 30 days after the completion of the research/project. For thesis, abstract is required and report within 30 days after the completion of the research/project.*
7. *Annual progress report is needed for a two- year (or more) research/project and submit the progress report before the expire date of certificate. After the completion of the research/project processes as No. 6.*

VITAE

Name: Ms. Melissa Marie Baker

Date of Birth: October 13, 1982

Place of Birth: Ottawa, Canada

Education:

2011-2014 Doctor of Philosophy in Public Health, College of Public Health Sciences, Chulalongkorn University, Bangkok, Thailand

2006-2007 Master of Arts, University of Windsor, Canada

2001-2005 Bachelor of Arts (Honors), University of Guelph, Canada

Work:

2008-present Advisor, Canadian Institutes of Health Research, Canada

2007-2008 Analyst, International Affairs Directorate, Canada Border Services Agency, Canada

2005-2007 Capacity Building Officer, Canadian International Development Agency (CIDA), Guatemala, Central America/Ottawa, Canada

Publications:

Baker M., and R. Somrongthong. (2013) Expatriate Parents' Knowledge and Perception of the Human Papillomavirus and Vaccination Intention in Bangkok, Thailand. *European Journal of Scientific Research*, 101: 2(15).

Baker M., Grundy M., Junmookda K., Macer D., et al. *Educational Frameworks for Environmental Ethics*. (2012) Bangkok, Thailand: United Nations Educational, Scientific and Cultural Organization (UNESCO).

Scholarship:

2013: Research funding (AS1148A-55) from the Higher Education Research Promotion and National Research University Project of Thailand, Office of the Higher Education Commission.

2006/7: Research grant from Canadian Research Chair in the History of International Health