

COLLEGE PARTICIPANT RECRUITMENT THROUGH FACEBOOK ADS: IS
ANYBODY LISTENING?

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To combat cervical cancer, the United States public health policy has advocated Human Papillomavirus (HPV) vaccination for all adolescent females. This female-only HPV vaccination campaign has failed to reach sufficiently protective uptake levels. New research describing strong associations between HPV and cancers afflicting both sexes, revised cost-effectiveness models, and the FDA licensure of a vaccine for men, has led to the inclusion of males into the U.S. HPV vaccination campaign. Including men in the ongoing campaign has raised new research questions and logistical challenges. Among those, is the challenge of how to effectively recruit men into HPV vaccine trials. Communication about HPV infection has been strongly linked with female cancers and suffers from sexual stigmatization. This study compared conventional recruitment of 18-25 year old men into a clinical HPV vaccination trial with recruitment through Facebook Ads™. Facebook Ads™ produced 20% of the study sample. Of the 44 men who first heard about the study through social sites, only 13 of these men also heard about the study through a conventional recruitment strategy, suggesting that conventional recruitment methods can be supplemented by social media recruitment. A larger than expected proportion of Facebook recruits were homosexual or bisexual ($p=.02$) and were also more active in social media ($p=.02$) than expected. The findings of this investigation suggest that Facebook and other social platforms could be a useful public health communication and recruitment tool for interventions or studies targeting 18-25 year old men, especially those who are homosexual or bisexual.

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1.0 BACKGROUND

1.1 HUMAN PAPILLOMAVIRUS PREVENTION: PUBLIC HEALTH OVERVIEW

Until recently, Human Papillomavirus (HPV) infection was considered a benign, albeit unsightly malady responsible for various cutaneous and genital warts. Within the past decade, the medical community has escalated the prevention of this previously unremarkable disease to a public health priority. The current prevention efforts are an excellent case study of the positive results of collaboration among researchers, clinicians, and public health professionals. HPV vaccination has emerged as the leading primary prevention strategy to address the compelling public health burden of several types of cancer. This vaccination campaign is rapidly evolving in response to outcome monitoring and the assimilation of new evidence from epidemiology, virology, genetics, and the behavioral sciences. Few other modern health interventions encompass such a perfect cross-section of public health practice.

The discovery of a causal association between HPV and cervical cancer initiated the widespread investigation of HPV and has resulted in a proliferation of data that has informed the current strategy of vaccination (Koutsky, 2009). Ongoing research continues to shape public health interventions in an exciting and dynamic battle with this preventable disease. Similar to John Snow's discovery of the source of cholera, the link between HPV and cervical cancer was uncovered by the epidemiologic investigation of a suspected causal agent transmitted through

human behavior. As the technology of genetic sequencing advanced through the 1980s it became possible to identify HPV DNA within cervical cancers and precancerous lesions. HPV DNA from a discrete range of genotypes has now been observed in 100% of cervical cancers. More recently, HPV has been implicated in a sizeable proportion of head and neck, penile, and anal cancers. Theoretically, eliminating HPV could also eliminate nearly all cervical cancers and reduce the incidence of several other cancers, thus saving tens of thousands of lives annually (Moscicki, 2008; Plotkin, 2008).

1.2 HPV BIOLOGY

Overt symptoms of HPV infection are warts, irritation, pain, and itchiness resulting from abnormal changes in the epithelium (Plotkin, 2008). Human Papillomaviruses are a family of over 120 identified viruses with a hypothesized equal number of viruses yet to be categorized. The characteristic mechanism of action is infection of basal epithelial cells through tissue micro trauma. Most strains spontaneously disappear and never result in any overt symptoms of infection; however, approximately 20 strains are considered high-risk, with strains 16 and 18 most frequently associated with cervical cancers. External genital warts are most commonly associated with HPV 6 or 11 (Insinga, Liaw, Johnson, & Madeleine, 2008; Wiley & Masongsong, 2006). In addition to the high risk mucosal infections, genetically distant yet related papillomaviruses are also responsible for foot, hand, and other cutaneous infections which range from completely asymptomatic to the appearance of visible warts. Though a prolific and diverse group of genotypes, targeted vaccination is possible because of the relatively few oncogenic strains. The specific biologic mechanism that separates the low-risk strains from the

high-risk strains is not yet explained. However, the persistence of the infection does relate to the propensity of a strain to result in cancer. This characteristic may explain why the particularly resilient HPV16 is implicated in 50% of cervical cancers worldwide (Plotkin, 2008).

Several biologic factors specific to HPV argue for immunization over other possible interventions. HPV is generally acquired soon after sexual debut and is common among women with as few as one lifetime sexual partner (Manhart et al., 2006). The high attack rate and infectivity work against other common prevention measures like condoms, and abstinence because of the risk of inconsistency and the ability of the virus to infect sites other than those commonly protected by physical barriers (Stanley, 2007). Unlike some other sexually transmitted diseases, HPV can be transmitted between partners easily during sexual encounters other than sexual intercourse. Once infected, the human immune system has a particularly difficult time combating persistent HPV strains. Often, the infection is undetected by the immune system and in over one half of cases, no antibodies are ever produced. Additionally, papillomaviruses are unusually species-specific. This makes research in human analogs virtually impossible (Plotkin, 2008).

1.3 THE PREVALENCE OF DISEASE

Estimating the prevalence of HPV has been a challenge. HPV is not a reportable disease. New cases are not systematically cataloged. The infection may not produce any symptoms, nor result in any immediate immune response making the total incidence difficult to quantify. Moreover, HPV cannot be reliably cultured so more expensive and complicated DNA and RNA assays are required to establish the presence of HPV in a sample (Koutsky, 1997).

Sexually transmitted diseases (STD) are common among United States teens and young adults, with 9.1 million new cases of sexually transmitted disease reported annually among 15-24 year olds. HPV accounts for over half of those reported infections (4.6 million) with an estimated prevalence, in 2000, of 9.2 million cases (Weinstock, Berman, & Cates, 2004). Approximately 75% of the United States population aged 15-49 has clinically detectable evidence of HPV infection. One percent of the U.S. population has genital warts, 14% is positive for HPV DNA or have had a positive colposcopy, with the remaining 60% testing negative for HPV DNA but positive for HPV antibodies (Koutsky, 1997; Wiley & Masongsong, 2006).

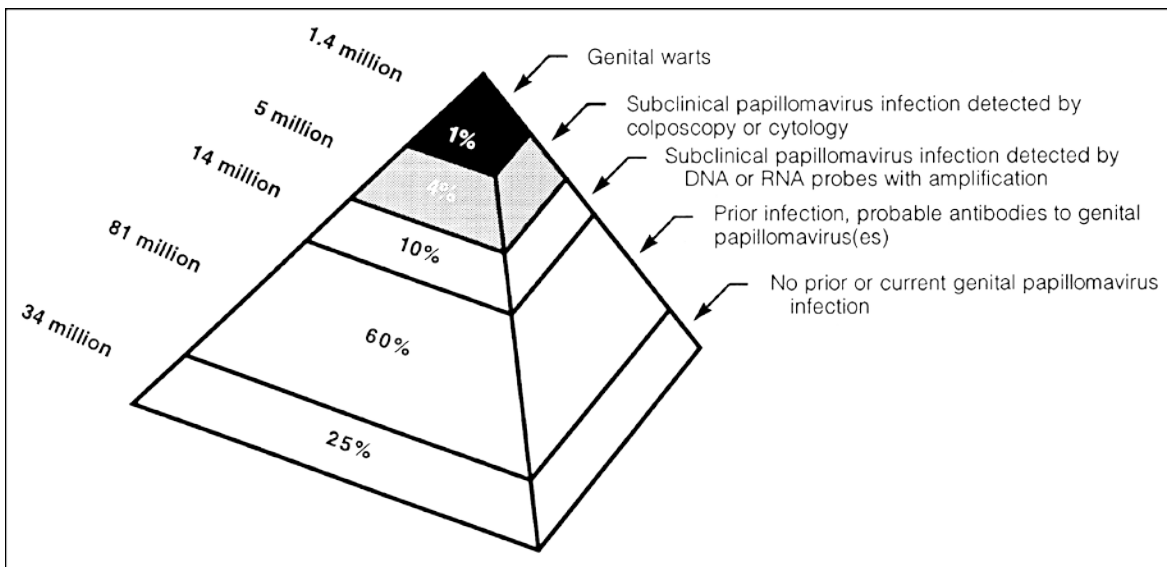


Figure 1: Estimated prevalence of genital HPV infection among men and women 15-49 years of age in the United States in 1994

Reprinted with permission (Koutsky, 1997)

The 2003-2006 National Health and Nutrition Examination Survey (NHANES) included collection of self-provided cervicovaginal swab specimens. The prevalence of HPV types 6, 11, 16, and 18 were reported and found to be associated with age group, education, marital status, and sexual behavior. The low-risk types 6 and 11 were most common in the youngest girls (see Figure 2). The high-risk types 16 and 18 were most common in young women 20-24 years old

who also had the highest overall prevalence (18.5%). A reduction in the prevalence of HPV among young women will be an important marker of HPV vaccine effectiveness (Dunne et al., 2011).

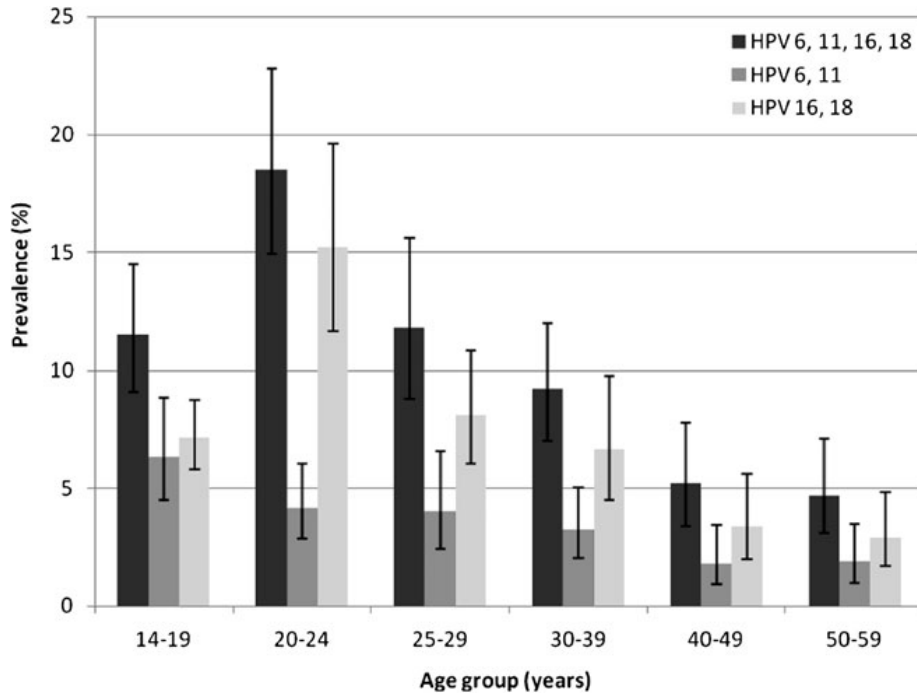


Figure 2: Weighted prevalence of HPV by type and age

Reprinted with permission (Dunne et al., 2011)

A 2005 review of the literature reports the study population, sample size, and HPV prevalence among selected studies of adolescent girls and young women in the United States. Prevalence of HPV varied by population and ranged from 14% to 90%. The data are illustrated in Figure 3. The samples with the highest prevalence of HPV were drawn from the populations of STD clinics and from college students. The authors conclude that these groups should receive priority attention in prevention efforts (Revzina & Diclemente, 2005).

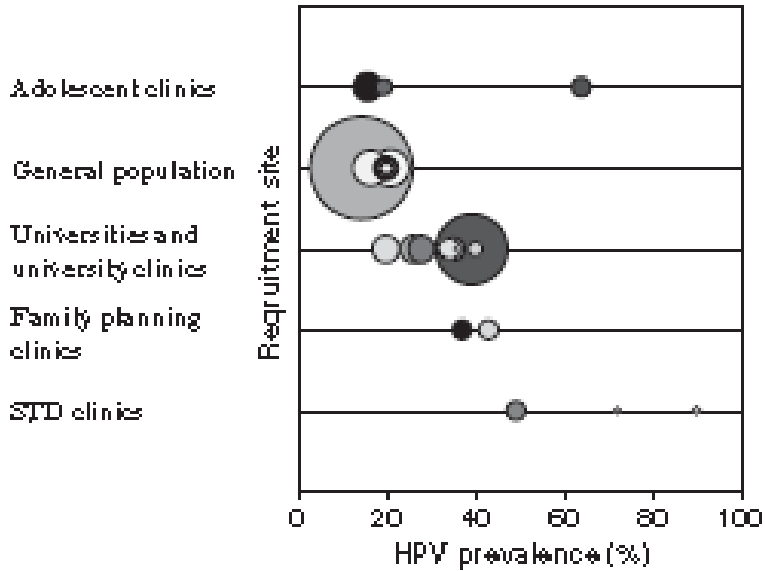


Figure 3: Study population, study sample size, and reported HPV prevalence of included studies
 Reprinted with permission (Revzina & Diclemente, 2005)

1.4 THE COST OF HPV INFECTION

The financial burden of HPV-associated disease is high. In the United States, the estimated annual cost of treatment of cervical intraepithelial neoplasia, head and neck malignancies, recurrent respiratory papillomatosis (RRP), and genital warts exceeds \$7 billion. This excludes non-medical indirect costs attributable to infection such as lost work or quality-adjusted life years (QALY). One study in the United Kingdom reported an estimation of QALY lost to the single malady of genital warts as .0045 years - .023 years. The authors concluded that even this benign condition had a substantial enough burden to be included as a factor in economic models of HPV prevention (Woodhall et al., 2009). Similarly, among a United States commercially insured population in 2004, the cost of genital warts was found to be \$647 per episode and \$760

per newly diagnosed case. Adjusted to the US population, the total direct costs due to genital warts was \$220 million (Hoy, Singhal, Willey, & Insinga, 2009).

The cost of treatment per case is disproportionately high. Population-based cervical cancer screening, multiple follow up visits, high cost of treatments, and frequency of disease, all contribute to large economic burden per incidence. For example, the average annual cost of treatment and maintenance of diabetes is \$1541 per case, while the average cost per episode of care for cervical intraepithelial neoplasia is \$1709 (Barr & Sings, 2008). Other HPV-attributable conditions have also had a measurable financial impact on patients and on the health system. Hu and Goldie (2008) found the total lifetime cost of new noncervical HPV-attributable disease cases occurring in 2003 to be \$418 million. Analysis of the seven major noncervical HPV-attributable conditions revealed an average discounted lifetime cost per new case ranging from \$379 for anogenital warts to \$54,800 for juvenile-onset recurrent respiratory papillomatosis (Hu & Goldie, 2008).

Compared to other STDs, HPV is second only to HIV in direct medical costs. This extraordinary cost is a function of the high lifetime cost per case and the overwhelming number of new cases of HPV diagnosed annually. HPV infects more individuals each year than the seven other leading STDs combined (see Table 1). In the year 2000, 9.1 million new cases of STDs were reported among 15-24 year old Americans. Of the \$6.5 billion of direct medical costs projected to be incurred from these cases, \$2.9 billion will result from HPV (Steben & Duarte-Franco, 2007).

Table 1. Estimated medical costs of 8 STDs in Americans aged 15-24 years

Reprinted with permission (Steben & Duarte-Franco, 2007)

STD	No. of new cases Year 2000	Average lifetime cost per case (US\$)	Total direct medical cost (US\$)
HIV	15,000	199,800	3.0 billion
HPV	4.6 million	1,228 women 27 men	2.9 billion
Genital herpes	640,000	417 women 511 men	292.7 million
Hepatitis B	7,500	779	5.8 million
Chlamydia	1.5 million	244 women 20 men	248.4 million
Gonorrhea	431,000	266 women 53 men	77.0 million
Trichomoniasis	1.9 million	18	34.2 million
Syphilis	8,200	444	3.6 million
Total	9.1 million	NA	6.5 billion

1.5 HPV AND CANCER

HPV is a causal factor in cervical cancer and is implicated in several other cancers including vulvar and vaginal, anal, penile, and head and neck cancers. Though rare, recurrent respiratory papillomatosis (RRP) is also caused by HPV and is responsible for high morbidities in infected children (Barr & Sings, 2008; Parkin & Bray, 2006). Globally, cancers attributable to HPV represent 5.17% or 561,000 potentially preventable cases of cancer (Parkin & Bray, 2006).

Cervical cancer was the first cancer linked to HPV infection. Since the discovery of this association, subsequent investigations of other cancers have revealed connections to HPV, but none as overwhelmingly as that of cervical cancer. This fact eventually led to the formulation and licensure of a quadrivalent HPV vaccine and the 2007 Advisory Committee on Immunization Practices (ACIP) recommendation for routine vaccination of females aged 9-26. The committee based its decision on the existing evidence of efficacy in females, the lack of

evidence in males, and the results of cost effectiveness modeling within the context of cervical cancer (Markowitz et al., 2007). A summary of the cost effectiveness trials cited in the ACIP recommendation is presented in Table 2. Though highly variable, these models suggested that vaccination could be a cost effective strategy to prevent cervical cancer. Compared with the existing strategy of no vaccination, the models predicted the cost of one quality adjusted life year (QALY) to range from \$3,000 to \$24,000 and population level risk reduction of cervical cancer from 20% to 75% (Markowitz et al., 2007).

Table 2: Summary of cost effectiveness models of United States female HPV vaccination program

Model	Markov	Markov	Dynamic Transmission	Dynamic Transmission
Vaccination Age	12	12	12	<=12
Vaccine Coverage	100%	70%	70%	70%
Vaccine Efficacy	90%	75%	90%	90%
Cost of Vaccination	\$377	\$400	\$400	\$360
Risk Reduction of Cervical Cancer	58%	20%	62%	75%
Cost per QALY	\$24,300	\$22,800	\$14,600	\$3,000

As with all computational models, the accuracy of prediction is only as good as the estimations of the input parameters and the appropriateness of the model selected. In this case, the most influential parameters are vaccination age, population coverage, vaccine efficacy, and the cost of vaccination. The model selection is reflected in the reduced cost per QALY and higher risk reduction per unit of coverage. The dynamic transmission models incorporate herd immunity while the Markov models do not. As the vaccination strategy is implemented, variations in any of these parameters will alter the accuracy of the predicted outcomes. A similar review conducted by Newall, Beutels, Wood, Edmunds, and MacIntyre (2007) compared four models and concluded that routine HPV vaccination could be cost effective. The authors noted

the uncertainty of the input parameters and suggested that more models including boys should be developed.

1.6 ENDING HPV: THE UNITED STATES VACCINATION STRATEGY

The prevalence and inherent biology of HPV transmission make it an ideal candidate for control through vaccination. In June 2006, the U.S. Food and Drug Administration (FDA) licensed the use of the quadrivalent human papillomavirus (HPV) vaccine GARDASIL™ as produced by Merck and Co, Inc. for use in females aged 9-26 years old. In March 2007 the U.S. Centers for Disease Control (CDC) Advisory Committee on Immunization Practices (ACIP) issued recommendations for the vaccine's use in females as follows:

The vaccine is administered by intramuscular injection, and the recommended schedule is a 3-dose series with the second and third doses administered 2 and 6 months after the first dose. The recommended age for vaccination of females is 11--12 years. Vaccine can be administered as young as age 9 years. Catch-up vaccination is recommended for females aged 13--26 years who have not been previously vaccinated. Vaccination is not a substitute for routine cervical cancer screening, and vaccinated females should have cervical cancer screening as recommended. (Markowitz et al., 2007, p. 1)

An enormous limitation in the current vaccination strategy has been the lack of routine surveillance data related to HPV infection. Fortunately, the United States epidemiologic surveillance systems are being modified to provide relevant process and outcome measures. Historically, outcomes measurements of HPV prevention and treatment have been inferred from routine United States health surveillance of related behaviors like colposcopies, surgical

procedures, or rates of vaccine utilization. Table 3 presents the HPV diagnostics added to the battery of routine US population surveys. A complete description of each instrument and methods of collection for each outcome has been published by Tiro et al. (2008). Going forward, researchers will have standardized population-based measures of program effectiveness.

Table 3: HPV routine surveillance

	<i>Behavioral Risk Factor Surveillance System (BRFSS)</i>	<i>Health Information National Trends Survey (HINTS)</i>	<i>National Health and Nutrition Examination Survey (NHANES)</i>	<i>National Health Interview Survey (NHIS)</i>	<i>National Immunization Survey (NIS)</i>	<i>National Survey of Family Growth (NSFG)</i>	<i>National Survey of Children's Health (NSCH)</i>	<i>Youth Risk Behavior Surveillance System (YRBS)</i>
Sexual Behavior			X			X		X
HPV Vaccine	Optional by State	X	X	X	X	X	X	
Pap Test	X	X		X		X		
HPV Test		X	X					

Accurately measuring the performance of the United States HPV vaccination program has implications beyond reducing the number of cases of cervical cancer. The outcomes of this program will also measure the equity of our public health system. Cervical cancer incidence is strongly associated with poverty. Women living below the poverty line are three times more likely to contract a high risk HPV infection than women who are not poor (Downs, Scarinci, Einstein, Collins, & Flowers, 2010). Altering the outcomes of the vaccination program will require a thorough understanding of the leverage points at all levels of the social ecological framework. Presently, the majority of empirical findings have described factors at the interpersonal and intrapersonal levels. The most abundant data describes vaccine acceptability and vaccine uptake. Vaccine acceptability describes the willingness to get vaccinated. Vaccine uptake is a quantitative measure of individuals completing the three dose series of vaccinations (Downs et al., 2010).

In a review of the literature, Sheinfeld Gorin, Glenn, and Perkins (2011) examined reasons for the lower-than-expected vaccination rates. The summarized literature reported potential leverage points in two of the major arms of public health practice; behavioral and community health sciences, and health policy and management. Parental attitudes and beliefs played a large role in the acceptability of the vaccine. Parents were influenced by real and/or perceived barriers, vaccine-related attitudes, perceived approval of family and friends, physician recommendation, beliefs about vaccine safety, endemic rates of cervical cancer, level of information, and religious background. Health policy and management effects were cost of the vaccine, vaccine availability, and the logistical challenges to immunization.

1.6.1 Female HPV vaccine uptake

Despite the clinical efficacy of the vaccine (Rambout, Hopkins, Hutton, & Fergusson, 2007), effective vaccination against HPV has proven difficult. Five years after the introduction of the vaccine, less than half of the eligible female adolescents (44%) initiated the HPV vaccination series with only 27% of eligible female adolescents completing the three dose series (Sheinfeld Gorin et al., 2011). As compared to the predictive models informing the vaccination strategy, the observed rate of vaccination of United States females falls at least 43% below the assumed inputs. Moreover, these results are substantially lower than those achieved in other countries. Australia almost doubled the U.S. initiation rate among girls with 83% starting the series, and Canada surpassed the U.S. initiation rate by 50% (Sheinfeld Gorin et al., 2011).

Widdice, Bernstein, Leonard, Marsolo, and Kahn (2011) conducted an analysis of the records of 3297 9-26 year old female HPV vaccine initiators at Cincinnati Children's Hospital Medical Center. Only 378 patients (11.5%) received all three doses as recommended by the

ACIP, and only 27.7% had completed the series within 12 months of initiation. By comparison, the 12 month completion rate of the three dose hepatitis B vaccine was 63.4% among 9-12 year old girls insured by one of seven managed-care organizations participating in a pooled analysis of vaccination. In addition to reporting uptake rates, they also reported significant relationships with the predictor variables black race, insurance type, and use of DMPA, an injectable birth control method. It is administered every three months.

Similar results were observed by Chou, Krill, Horton, Barat, and Trimble (2011). Of the 1,413 girls in their study only 33.2% completed the series within 12 months. Again, private insurance and non-black race were significant predictors of completion as was suburban practice location. The significant associations with race, insurance, and DMPA suggest weaknesses of the current strategy. Racial disparities in uptake suggest systemic problems with the administration of the vaccine program. Insurance and DMPA effects are possibly representative of two other barriers; cost and timing.

Schluterman, Terplan, Lydecker, and Tracy (2011) expanded the parsing of uptake factors. Similar to other studies, a completion rate of 33% was observed in the population of gynecologic patients 9-13 years old at the University of Maryland Medical Center outpatient clinic. Additionally, the highest rate of initiation (91%) was observed in the youngest age group as compared to 64% in 14 to 17 year old girls and 18% in 18- 26 year old girls. Rates of initiation were not associated with race, but rates of completion were significantly predicted by white race. Contrariwise, lack of insurance was associated with initiation but not completion.

1.6.2 Female HPV vaccine acceptability

On a per-case basis, vaccination is far less expensive than the existing cervical cancer prevention program of screening and cancer treatment. However on a population basis, the expense of vaccination is only financially justified and sufficiently protective when the uptake of the vaccine is high. If vaccination is used only as a supplement to the existing cervical cancer screening protocol, the financial benefits and lives saved will be minimal (Raffle, 2007). A more complete understanding of the factors associated with the poor uptake outcomes is necessary to improve vaccine coverage.

The importance of vaccine acceptability is paramount, as HPV vaccination is not compulsory. This variability effects both the social/behavioral and policy/management domains of the vaccination program. States decide which vaccinations are required for school attendance. As several states considered including HPV in the panel of required vaccines, opposing constituents argued that this immunization was qualitatively different from other immunizations. Opponents against mandatory vaccination argued that HPV is not readily transmissible in the school environment and that vaccination would imply institutional consent for adolescent sexual behavior, leading to a reduction in the perceived risk of sexual activity and increase in the social acceptance of sexual activity. While most pediatricians support universal vaccination, many acknowledge that better strategies are necessary to educate parents and overcome the barriers to effective immunization (Askelson et al., 2010; Fisher, Darrow, Tranter, & Williams, 2008).

Allen et al. (2010) published a systematic review of the literature relating to HPV vaccine acceptability existing prior to May 2008. Because the majority of these studies were conducted prior to vaccine availability, the most commonly reported measures were knowledge, attitudes about HPV vaccination, and parental intention to vaccinate their daughters. The authors reported

a wide spectrum of research quality. The most notable deficits in the body of research were cited as:

1. High prevalence of measures estimating only awareness and/or knowledge about HPV;
2. Lack of underlying theoretical framework and/or inconsistency with established theoretical constructs;
3. Lack of reliability measures;
4. Lack of validity measures; and
5. Homogeneous convenience samples.

These observations are not surprising, given the immaturity of the HPV immunization program. A useful figure of the number of constructs included in the published literature is presented in Figure 4.

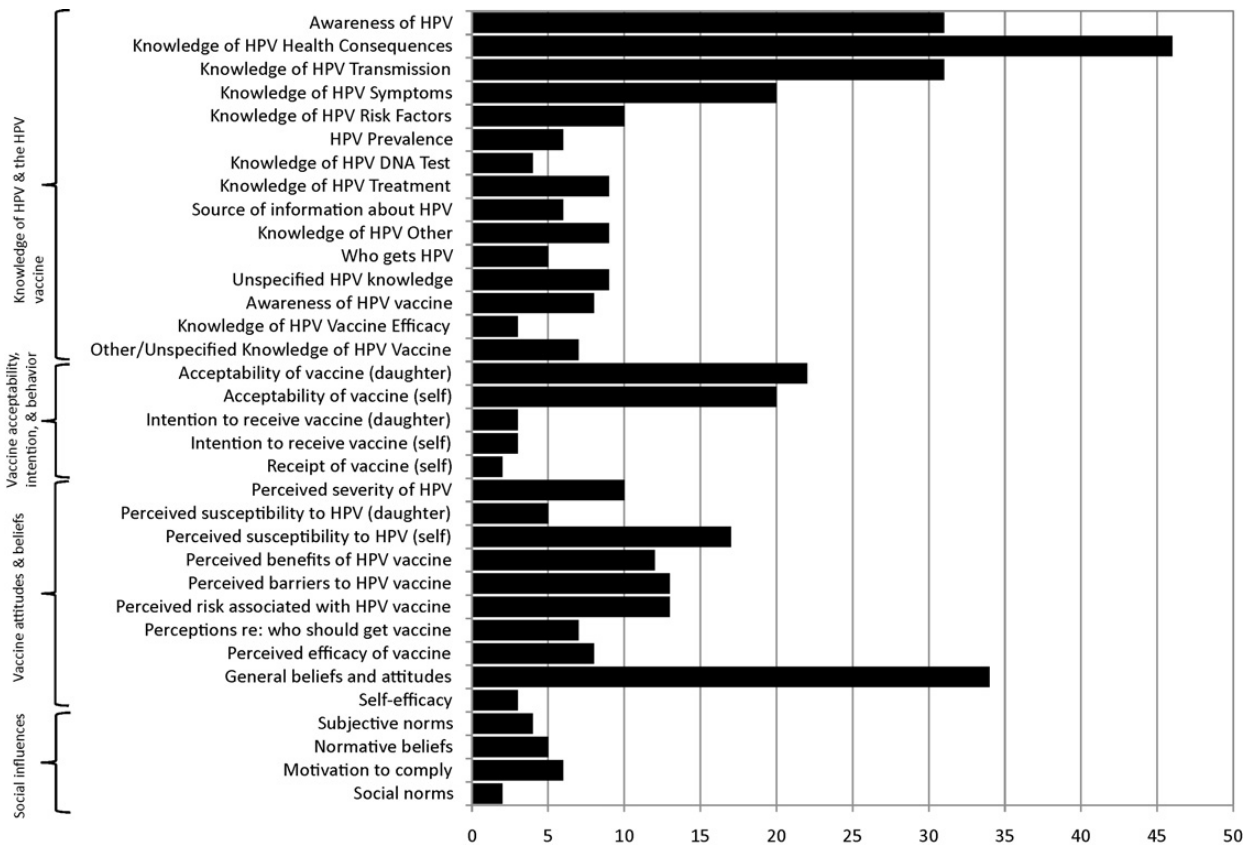


Figure 4: Number of studies measuring specified construct

Reprinted with permission (Allen et al., 2010)

In a systematic review of the qualitative literature available from 1995 to 2007, Brewer and Fazekas (2007) summarized the findings of 28 studies of HPV-related beliefs and HPV vaccine acceptability. The authors categorized study findings into awareness and knowledge measures, data within the constructs of the Health Belief Model (HBM), and a miscellaneous category of “other factors.” The Health Belief Model is a widely accepted and useful health behavior theoretical model that describes an individual’s motivation to perform a specific health behavior. The model is composed of six constructs.

1. Perceived susceptibility to a given condition;
2. Perceived severity of a given condition;
3. Perceived benefits of taking actions that will reduce severity or susceptibility;

4. Perceived barriers to taking action;
5. Cues to action from the environment; and
6. Self-efficacy – the ability to perform the behavior (Glanz, Rimer, & National Cancer, 1997).

The authors noted many of the same methodological limitations as did Allen et al. (2010) and discussed conclusions based on the most rigorous evidence. Though many studies measured HPV knowledge, the effect of knowledge on uptake remains unknown. In the homogenous populations surveyed, United States parents seem to have a favorable perception of HPV vaccination despite their lack of information about the vaccine and the disease. The constructs of the HBM that had the strongest support were perceived effectiveness (of the vaccine), perceived likelihood (of HPV infection), cues to action (physician recommendation), and perceived barriers (financial cost and possible increased sexual promiscuity). Though other factors may play an important role in vaccine acceptability, the existing literature has not reported sufficient evidence to evaluate any possible relationships.

A more recent literature review from Gamble, Klosky, Parra, and Randolph (2010) largely supports the points discussed above. The authors also suggest that future interventions should consider adolescent knowledge of HPV, adolescent attitudes toward HPV vaccination, and parent/adolescent communication skills (especially relating to sexual topics), in addition to physician recommendation, parental knowledge of HPV, and parental attitudes toward HPV vaccination. It is clear that, interventions will have to target more than just increasing knowledge. Knowledge is only one component of acceptability and acceptability is far from uptake (Dempsey, Zimet, Davis, & Koutsky, 2006).

1.6.3 Revising the vaccination strategy

Several program level opportunities to improve the current United States HPV vaccination strategy have been identified in the literature. Disparities by race and income have been observed in uptake rates. These systematic differences will undermine the effectiveness of the population-based program and leave at-risk individuals unprotected from HPV infection. Downs et al. (2010) suggest the adoption of the socio-ecological model as a framework for implementing the HPV vaccination campaign. The socio-ecological model (SEM) or ecological perspective is a theoretical model that stratifies interventions into social levels ranging from the intrapersonal level to the level of public policy. This perspective suggests that different interventions will impact a population cumulatively as the level of intervention is moved away from the individual (Glanz et al., 1997). Therefore, disparities will be more likely to be eliminated as more social stratifications are included in the vaccination effort.

Herzog, Huh, and Einstein (2010) agree that policy level dynamics will be critical to achieving better uptake rates. Indeed, achieving high levels of acceptability is insufficient if the vaccine is not available, one's physician does not recommend the vaccine, or the vaccine is too expensive. At \$360, the quadrivalent HPV vaccine GARDASIL™, is the most expensive vaccine ever marketed in the United States (Fisher et al., 2008). The affordability of the three dose series is a significant barrier to many people even when the cost is subsidized (Schluterman et al., 2011). Thus, securing funding for the vaccination of the entire US population of pre-adolescent girls is a prerequisite to any serious attempt at 100% coverage of eligible children. The mechanism in place for funding immunizations to uninsured or underinsured children, is the Vaccines for Children (VFC) program. At the discretion of the ACIP, a vaccine can be added to the VFC. The program then subsidizes the cost of the vaccine for eligible children. The VFC

does not provide vaccinations to individuals 18 years old or older. This may make vaccination financially prohibitive for the cohort of young adults that are not vaccinated before age 18 (Khan et al., 2008).

Another logistical barrier that became evident in the female vaccination program, is the three dose schedule. The low completion rates of the series suggest that the number or timing of doses is problematic to vaccine compliance. Interestingly, the significant association with DMPA injections described by Widdice et al. (2011) may support this conclusion. DMPA is injected every three months to prevent unwanted pregnancies. The authors suggest that the increased contact with the patient, and increased vaccination opportunities provided by the regular visits are a logical explanation for the higher than expected completion rates.

Finally, a conspicuous omission from the original US HPV vaccination policy is the entire population of males. Boys were originally excluded from vaccination recommendations because GARDASIL™ was not FDA licensed for use in males until October 16, 2009 (Centers for Disease & Prevention, 2010). Once a licensed vaccine for boys became available, the United States public health leadership was forced to decide if it makes sense to vaccinate boys to prevent cervical cancer.

1.6.4 Rationale for an alternative schedule

Very little research exists in male HPV vaccination implementation and only a small body of knowledge exists from the female program (Nandwani, 2010; Petrovic, Burney, & Fletcher, 2011; Sheinfeld Gorin et al., 2011), the current study was constructed from the best available data in related fields and from lessons learned from the female vaccination program. We considered several points especially important to address in the current research design. Among

these considerations were the interpersonal and intrapersonal theoretical frameworks that influence vaccine uptake, points of similarity and contrast between the male and female perceptions of HPV and HPV vaccination, and program implementation dynamics.

The three dose regimen (0, 2, 6 months) has been reported as significant barrier to successful HPV vaccination (Sheinfeld Gorin et al., 2011). In the young adult college population, this may be an especially pronounced limitation as only students initiating the vaccination course during March, and September-November will have the follow up windows fall within a typical school session. As college students have one of the highest prevalence rates of HPV infection, reducing the barriers to action in this group is particularly important.

A possible solution to this timing problem was evaluated in a randomized clinical trial among college age women. An alternative dosing schedule of 0, 2, 12 months was compared to the standard 0, 2, 6 month protocol. The experimental condition was found to be non-inferior to the standard schedule (Zimmerman et al., 2010). This alternate schedule increases the time a student could initiate the course of vaccine from four to seven months. Only two months of the school calendar would result in vaccine windows that fall during the summer break.

1.6.5 Including males in The HPV population vaccination strategy

After GARDASIL™ was licensed by the FDA, the ACIP declined to recommend routine vaccination of males instead supporting optional vaccination to prevent genital warts. In the policy statement, the ACIP cited mathematical models that suggested routine vaccination of boys to be an inefficient use of public health resources (Centers for Disease & Prevention, 2010). Eventually, the permission to vaccinate boys was expanded to a recommendation to vaccinate all boys age 11 to 12 years old (Schuchat, 2011).

The cost benefit analysis of emerging HPV vaccination trends and the inclusion of noncervical cancers were deciding factors in the December 2011 ACIP recommendation to routinely vaccinate 11 and 12 year old boys. Original models suggested that the most efficient use of public health funds would be to channel resources to female vaccination programs. As the uptake rate among females remained poor and population coverage low, revised economic models suggested that prophylactic vaccination in boys would more expeditiously protect the population from HPV-related diseases than vaccination of females alone (Barr & Sings, 2008; Schuchat, 2011). Further study of noncervical HPV-attributable conditions increased awareness of the significant burden of disease that was overshadowed by the focus on cervical cancer. While these diseases would be naturally mitigated by campaigns aimed at reducing cervical cancer, quantifying the burden of noncervical cancers was useful in compiling more complete economic models.

In 2003 (the year before the vaccine was introduced) the economic burden of noncervical HPV disease was estimated at \$418 million in direct medical costs (Hu & Goldie, 2008). Noncervical cancers that are attributable to HPV infection include cancers of the oropharynx, anus, vulva, penis, and vagina. Though a smaller proportion of noncervical cancers are causally associated with HPV than cervical cancer, vaccination against HPV would prevent a large number of cases. Approximately as many cases of HPV-related noncervical cancers are diagnosed each year as cervical cancers; of those cases 50% (approximately 5,000) occur in men. While rates of cervical cancer have been declining, the rates of noncervical cancers have been increasing (Gillison, Chaturvedi, & Lowy, 2008). These, and similar observations provided more data to refine economic models. In December 2011, the ACIP endorsed routine HPV4 vaccination of males age 11 to 12 years and suggested vaccination of unvaccinated boys and

young men age 13 to 21 years. The decision to include males in the routine vaccination recommendations was based on safety, efficacy, and computational modeling studies that became available after the FDA approval of male vaccination (Schuchat, 2011).

Estimates of HPV prevalence show similar patterns in men and women. HPV prevalence is high in both sexes, even among those at low risk for contracting other STDs. Age stratification was also similar in both sexes with young adults showing the highest rates of infection. Samples drawn from STD clinics and universities yielded populations of both sexes with the highest rates of infection. These disease characteristics suggest that an early age, population-level vaccination program would be most effective to prevent HPV transmission (Dunne, Nielson, Stone, Markowitz, & Giuliano, 2006; Garland, 2010; Manhart et al., 2006; Revzina & Diclemente, 2005; Smith, Gilbert, Melendy, Rana, & Pimenta, 2011). However, successful execution of a male HPV vaccination campaign may not parallel its female counterpart because of the gender specific context of HPV.

1.6.6 Male HPV vaccination acceptability

Some preliminary research has been done to clarify the male perspective on HPV vaccination. Similar to females, HPV knowledge and health self-efficacy were observed as strong independent predictors of vaccine intention (Petrovic et al., 2011). Other factors that have been observed to increase vaccine acceptance in males are:

- Level of sexual activity
- Perceived susceptibility
- Perceived severity of infection
- Perceived benefit of vaccination

- Perceived norms
- Physician recommendation
- Financial cost

Assessments of male knowledge of HPV reflect a poor understanding of the disease. Despite the recent attention directed to females, accurate knowledge about HPV seems to be an opportunity for improvement in both sexes (Nandwani, 2010).

If one assumes that knowledge of the disease is necessary to motivate action, clinicians and educators will have to provide more information to males than females to move boys to action in the absence of mandatory vaccination. In studies measuring vaccination acceptance after a brief HPV message, most males indicated that they would be willing to get vaccinated. The size of the effect was not influenced by the nature of the message. Men were equally likely to accept vaccination if the message presented a self-protection or a partner protection message. This suggests that perceived susceptibility predicts intention. However, without priming, most men do not believe themselves to be susceptible nor do they perceive HPV infection to have severe consequences (McPartland, Weaver, Lee, & Koutsky, 2005; Nandwani, 2010). Moreover, perceived severity produces only a moderate interest in vaccination. In a study comparing messages presenting a vaccine against genital warts alone, or genital warts and either anal, oral, or penile cancer, only 60% of participants exposed to the increased severity message were willing to be vaccinated. This study also clarifies the nature of the severity message for men, as no effect was observed when priming messages included protecting one's partner from cervical cancer (McRee, Reiter, Chantala, & Brewer, 2010).

A large barrier for many adolescent boys was the context of the ACIP guideline. Many insurers, including the Vaccines for Children program, fund only vaccines that are specifically

recommended for children. Since the male HPV vaccine was not explicitly recommended, its substantial cost was not absorbed by insurers. The 2011 ACIP recommendation bridged this barrier for boys, but not necessarily for young men. The cost of the vaccine is especially relevant to young adults who may not be able to afford vaccination without coverage by the VFC program. While most children would be eligible for at least partial support, the \$360 course of vaccine is less likely to be covered by the health options available to individuals over 18 (Sheinfeld Gorin et al., 2011). Testing an Alternative Dosing Schedule

2.0 INTRODUCTION

2.1 INTERNET RECRUITMENT: REVIEW OF THE LITERATURE

The present study describes the recruitment methods and reports the outcomes of those methods during enrollment for the randomized trial testing an alternative HPV dosing schedule in males. This study evaluates the results of the Facebook® Ads arm of the recruitment effort as compared to the traditional methods recruitment arm.

Although existing scholarly literature describing and/or evaluating internet recruitment campaigns is scarce (Backinger et al., 2008; Gordon, Akers, Severson, Danaher, & Boles, 2006; Ramo, Hall, & Prochaska, 2010), the increasing use of the internet and popularity of internet media platforms suggests that an online campaign could be a viable recruitment option to researchers. A 2009 Pew Research U.S. survey found that 87% of 18-32 year olds access the internet or “go online.” Additionally, 67% use social networking sites and 68% get health information from the internet (Jones, 2009). The number of Facebook users, at 800 million, exceeds the population of almost all countries in the world (Facebook.com, 2011). In a US study of male HPV vaccine attitudes, the internet was selected by over one quarter (28.3%) of participants as most likely to influence their decision to receive the HPV vaccine (Nandwani, 2010).

Two recent tobacco studies reported outcomes of internet recruitment. A smokeless tobacco cessation program compared recruitment from media coverage about the intervention (newspaper, radio, and T.V.), online promotion (Google Adwords® campaign and referrals from similar websites), and all other methods (paid newspaper ads, direct mailings, and other). The results are reported in Table 4. Of the 2,523 participants, the majority (50.6%) were referred through media coverage at a cost per recruit of \$91.75. The online campaign resulted in over a third of enrollments and was more economical. The Google Adwords® campaign yielded 9,155 clicks. Of those clicks, 511 individuals enrolled, producing a conversion rate of 5.58% at a cost of \$6.70 per recruit (Gordon et al., 2006).

Table 4: Tobacco Cessation Recruitment by Source

<i>Source</i>	<i>% of Enrolled Participants</i>	<i>Cost per recruit</i>
Media Coverage	50.6	\$91.75
Online Promotion	34.6	\$6.70
All Other	14.8	\$884.14

Ramo et al. (2010) compared three online recruitment tools, ads on Craigslist.org, email survey sampling, and paid internet advertisements. Table 5 presents the summary of recruitment results. The authors concluded that:

- Craigslist.org was neither sensitive nor specific, but was cost-effective (generated essentially random traffic but was nearly free).
- Internet advertising was sensitive but not specific (generated willing but not eligible traffic at a high cost per participant).

- Survey sampling was sensitive, specific, and cost effective (generated willing and eligible traffic at a reasonable price).

Additionally, the authors noted significant differences in several variables among recruitment methods.

Table 5: Summary of Recruitment Methods

Reprinted with permission (Ramo et al., 2010)

<i>Recruitment method</i>	<i>Number who reached survey</i>	<i>Number valid signed consents/screened (% of total)</i>	<i>Number meeting criteria (% of total)</i>	<i>Number providing smoking data (% of total)</i>	<i>Number completing surveys (% of total)</i>	<i>Cost/participant</i>
Survey sampling	182	129 (18.2)	76 (22.6)	72 (25.7)	67 (33.3)	\$ 19.24**
Internet advertising	4424	450 (63.6)	200 (59.5)	156 (55.7)	91 (45.3)	\$ 42.77
Craigslist	_*	128 (18.1)	60 (17.9)	52 (18.6)	43 (21.4)	\$ 0.66
Total	>4606	707	336	280	201	

*It was not possible to track how many individuals reached the survey homepage through Craigslist but did not indicate whether they consented or did not consent to participate in the survey.
 ** Only charged for completed surveys

2.2 RESEARCH QUESTIONS AND HYPOTHESIS

The present study was designed to test the effectiveness of the online recruiting of 18-25 year old young men into the modified HPV vaccination dosing schedule clinical trial. Specifically:

- Can Facebook Ads™ be used to recruit 18-25 year old men into a clinical HPV efficacy trial?
- Do participants recruited through Facebook Ads™ differ systematically from participants recruited through conventional sources?

To test these questions, we planned recruitment for the clinical trial using conventional recruiting mechanisms and Facebook Ads™. The authors tested the hypothesis.

- Participants referred through online social media would not differ significantly from participants referred through conventional recruiting methods on any demographic characteristics.

2.3 THEORETICAL FRAMEWORK

The research team considered several advertising media and chose to use Facebook Ads™ over other online advertising resources because of the unique positioning in a social network. Facebook Ads™ are displayed while the viewer is engaged in social behavior. The team believed that this placement was congruous with the current research of the theoretical constructs found to increase male HPV vaccine acceptance. Using the Health Belief Model as a framework, we designed the advertising campaign to be sexually appealing, to increase the perceived norm of vaccination by placement in social media, to increase individuals' self-efficacy of vaccination by providing a simple path to enrollment, and to eliminate the financial cost of enrollment by funding the vaccine and administration.

3.0 METHODS

The study protocol was approved by the University of Pittsburgh Institutional Review Board on September 15, 2010. Shortly thereafter, enrollment was opened and recruitment efforts began in earnest. Because the target population was age 18-25 year old males and required four visits to the University of Pittsburgh campus, recruitment was focused college campuses within 10 miles of the clinical facilities. Both conventional recruitment and online recruitment occurred simultaneously at all locations. No attempt was made to limit exposure of either method by location. The first eligible screening form was submitted on October 13, 2010. Recruitment was completed seven months later on May 4, 2011 when the 220th participant was enrolled in the study.

3.1 RECRUITMENT, ELIGIBILITY SCREENING, AND ENROLLMENT PROCESS

Recruitment followed the process illustrated in Figure 5 and Figure 6. All print advertisements displayed a phone number, email address, and a website. All online advertisements directed clicks to an online screening questionnaire. Any person, who called the telephone number or contacted the team through email, was given a scripted description of the study protocol (see A.1). This script included a brief overview of the study protocol and inclusion criteria. If the individual expressed an interest in participating, he was directed to the online screening form.

The team was prepared to complete the online process for any individual without access to the online screening form.

The online screening survey (see A.2.2) began with an overview of the study and inclusion criteria and ended with the questions, “Does it sound like you might be interested in taking part in the study and that you are eligible? Would you be able to commit to four visits at UPMC Montefiore CTRC?” If the individual clicked the “yes” button, he was presented with a brief 17 question survey to assess eligibility (see A.2.3). This survey was programmed to require responses and to evaluate eligibility based on responses. If the individual was assessed as eligible for participation, a message confirming his eligibility was displayed, an email dispatched to the research team, and he was contacted to schedule his first visit. At that time, the individual was assigned a random four digit study ID and randomized into either the standard or experimental protocol. Exclusion criteria are presented in Table 6.

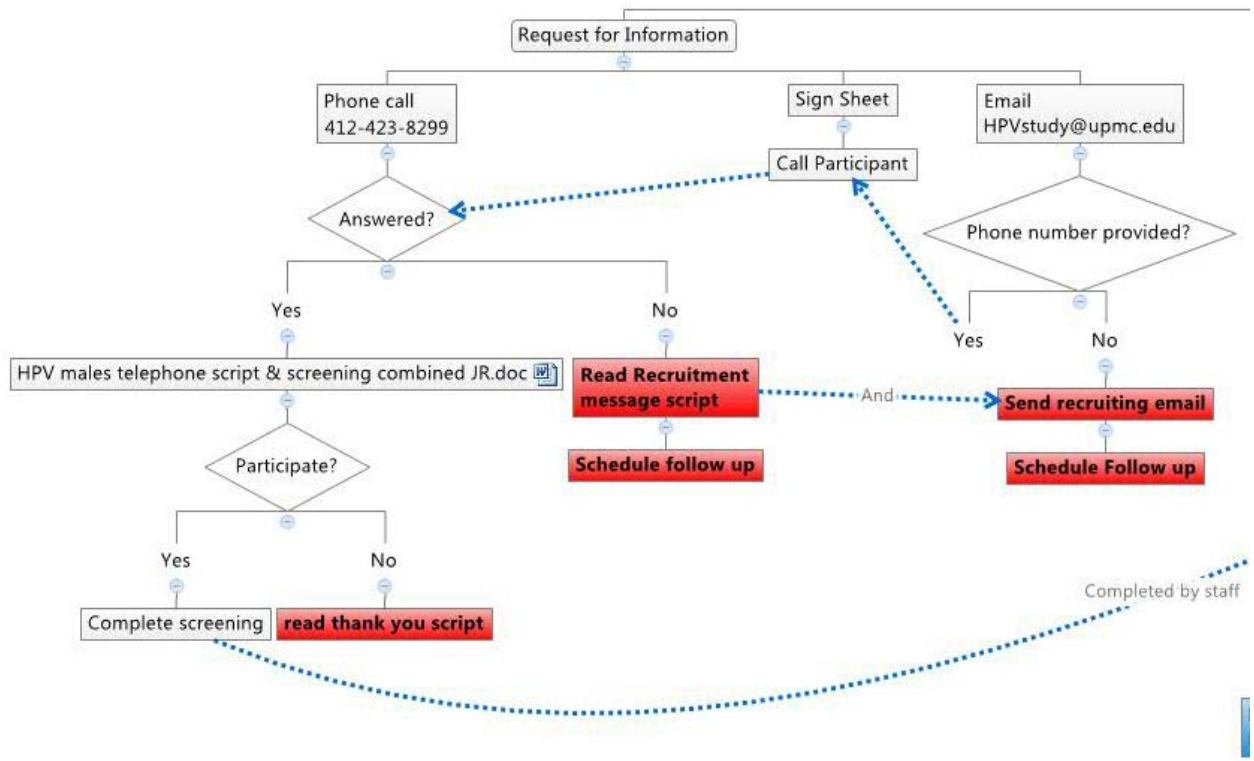


Figure 5: Flowchart of recruitment process (personal contact)

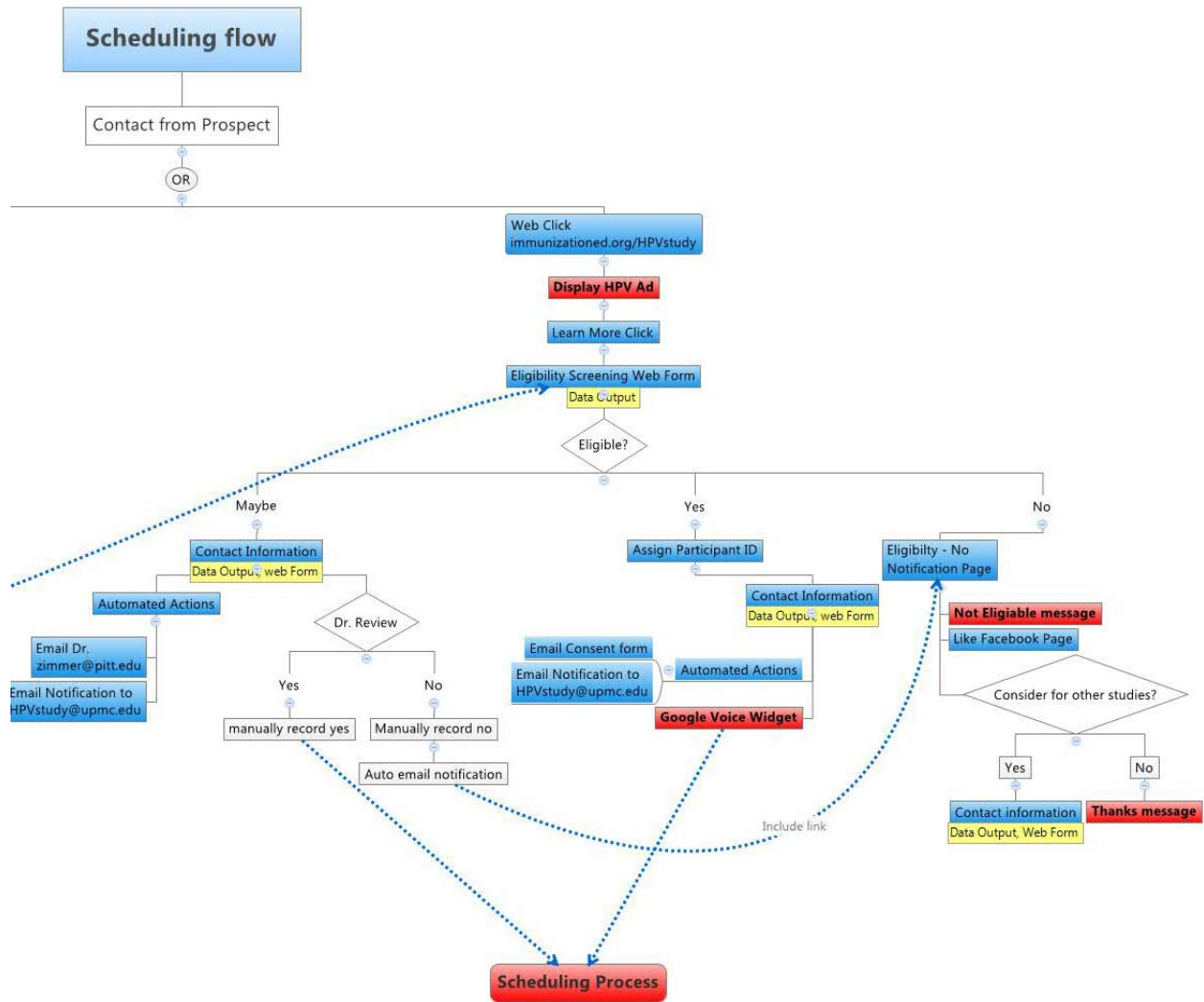


Figure 6: Flowchart of recruitment process continued (online contact)

Table 6: Exclusion Criteria

Criterion	Exclusion for Enrollment	Elimination during Study
<5 sexual partners (i.e., insertive intercourse)	X	NA
No other drug studies within 30 days of proposed HPV vaccination	Temporary	Temporary
History of genital warts	X	NA
Immunosuppression	X	X
No other vaccines within 8 days of proposed HPV vaccination	Temporary	Temporary
No HPV vaccine outside of study ever	X	X
Hypersensitivity to yeast or HPV vaccine components	X	X
Known autoimmune disorders	X	NA
Hospitalization within last year	X	NA
Receipt of immunoglobulins or blood product within 90 days of enrollment (may defer until 90 days completed)	Temporary	Temporary
Acute moderate or severe illness (may defer until well)	Temporary	Temporary
Serious Adverse Reaction to HPV vaccine	X	X

3.1.1 Visit schedule

The visit timeline was defined by the standard dosing schedule and the alternative dosing schedule. Surveys were scheduled to coincide with clinical visits to capture relevant clinical data and streamline communication with the participants. Table 7 presents the chronology of the study.

Table 7: Table of Visits and Surveys

Visit	1	2	3A	4A	3B	4B
Timing	Day 0	Month 2	Month 6	Month 7	Month 12	Month 13
Target day	0	30-60	182	Visit 3A+14 to Visit 3A+49	365	Visit 3B+14 to Visit 3B+49
Window (days)	0	28-70	168-199		349-380	
Visit	✓	✓	Group A	Group A	Group B	Group B
Consent	✓					
Exclusion/ elimination criteria	✓	✓	✓		✓	
Medical history	✓					
Enrollment Survey	✓					
Blood sampling	✓			Group A		Group B
Pre-Visit Survey		✓	Group A		Group B	
Vaccination	✓	✓	Group A		Group B	
Post vaccine side effect survey	✓	✓	Group A		Group B	
Exit Survey				Group A		Group B

Both groups followed the same protocol for visits. During the first visit, the potential subject provided informed consent, completed the first survey (see B.1.1), and was escorted to the Clinical and Translational Research Center (CTRC) at Montefiore Hospital. The CTRC staff obtained a medical history, assessed his eligibility for vaccination according to the exclusionary criteria in Table 6, collected a blood sample, and administered the first dose of vaccine according to the manufacturer’s specifications. He was informed of his group assignment, given instructions for follow up scheduling, and provided a Vaccine Information Statement (see A.1.2). The second and third visits were completed at the CTRC or The University of Pittsburgh Student Health Center, where the participant was screened for exclusionary criteria, and administered the second dose of vaccine according to the manufacturer’s specifications. The final visit was

conducted at either the CTRC or the Montefiore Outpatient Laboratory where the patient provided a blood sample.

Shortly before the opening of each participant's second and third vaccination window, he was contacted to schedule an appointment. During this encounter he was asked to complete an online survey (see B.1.3 Pre-visit 2 & 3 survey). After each successful vaccination was confirmed, payment was disbursed and the participant was asked, via email, to complete a brief follow up survey to record any adverse events or side effects (see B.1.2 Post-vaccination survey). If the participant reported any significant adverse events or side effects, his responses were reviewed by the staff medical doctor who provided appropriate follow up instructions. After the fourth visit each participant was reminded to complete a final online survey (see B.1.4). Once his visit and survey were confirmed, his final payment was disbursed.

3.1.2 Participant incentive

Individuals were offered a cash incentive for participation and reminded of the additional financial incentives included in the protocol. Cash incentives were paid using the University of Pittsburgh WePay system. This mandatory institution-wide system provides a single way for researchers at the University of Pittsburgh to pay study participants while maintaining appropriate accounting records and insuring participant confidentiality. Each subject was issued a MasterCard branded WePay debit card that could be loaded by the research team. The cards could be used at any vendor who accepts MasterCard and/or can be redeemed for cash at participating banks. The total cash payment for completion of the study was \$130.00 and was scheduled as follows:

- Visit 1 \$30.00

- Visit 2 \$10.00
- Visit 3 \$10.00
- Visit 4 \$80.00

The majority of the payment was weighted after visit four to encourage study completion.

In addition to the cash payment, participants were also reminded that the vaccine and administration were being provided for free. The estimated cost of the three doses of vaccine was \$360 plus any provider visit costs or copays. This benefit was especially relevant to the population as they were all too old to receive benefits from the VFC program. Additionally, male HPV vaccination was not widely insured during the time of the study. Finally, participants were offered the opportunity to be notified of the results of their final blood analysis.

3.1.3 Conventional recruitment methods

Conventional recruitment methods included all methods that did not involve content posted on the internet. This included:

- Advertisements (fliers/posters) posted in on-campus and off-campus locations like residence halls, student health centers, student unions, public bulletin board sites, coffee shops, academic buildings, and places of business frequented by students
- Fliers distributed at health fairs, classes, sports and other campus events
- Emails to students, to groups, and to any accessible mailing lists
- Newspaper advertisements
- Display ads on city busses

- Class announcements
- Announcements in newsletters

All printed ads and fliers were designed to be thematically similar. All included a large title, at least one image of a young adult or couple, a brief text description of the study, and a phone number, email address, and website. Samples are presented in appendix A.3. We selected male portraits that represented the target population in age, race, and overall appearance as well as female portraits likely to be perceived as attractive by the target population. All conventional recruitment methods directed individuals to a phone number, email address, and website where eligibility and enrollment procedures were implemented as described in 3.1.1 Visit schedule.

3.1.4 Facebook Ads™ method

Facebook Ads™ ran concurrently with conventional recruitment efforts. Ads were purchased and formatted using the Facebook Ads™ online interface. During the placement process we configured all the parameters necessary to successfully display the ads. As a part of the ads system, Facebook provides to advertisers interactive tools that report near real-time ad performance and allows adjustment of most parameters. Ad performance was analyzed at least weekly and adjustments to placement were made as performance declined.

The Facebook Ads™ submission process is a multi-step interactive process whereby an advertiser selects display options to target the correct audience and minimize cost. This process is complex and requires specialized knowledge of social media advertising. The most important parameters of the ad campaign are listed in Figure 7 (Facebook.com, 2010).

Campaign performance glossary

Ad Name: The title you've given your ad.

Status: Your ad can be active (running), paused (stopped but able to be restarted), disapproved or deleted.

Bid: The amount you've indicated you're willing to spend on that ad per click (CPC) or thousand impressions (CPM).

Type: Whether the ad is bid on a CPC (cost per click) or CPM (cost per thousand impressions) basis.

Impressions: Impressions, or the number of times your ad has been shown to users on the site.

Social %: The percentage of impressions where the ad was shown with a "social story" about one or more friends who were associated with the content you're advertising (e.g. Jane Smith likes this Page).

Clicks: The number of times users have clicked on your ad on the site.

CTR (%): The click-through rate for your ad, calculated as the number of clicks received divided by the number of impressions.

Avg. CPC: The average cost per click for this ad, calculated as the amount spent divided by the the number of clicks received.

Avg. CPM: The average cost per thousand impressions on this ad, calculated as the amount spent divided by the the number of impressions received.

Spent: The total charges accrued by this ad.

[Go to help center](#) [Close](#)

Figure 7: Campaign Performance Glossary

Reprinted with permission (Facebook.com, 2010)

The first ad (see Figure 8) was placed on November 5, 2010. The daily budget was set at \$10 per day at a cost per impression of no more than \$.32. The audience was specified as Facebook users:

- “Who live in the United States
- Who live in Pittsburgh PA
- Exactly between the ages of 18 and 25 inclusive
- Who are male

- Who are at Carnegie Mellon, Pittsburgh, Duquesne, RMU, or Point Park
- Who are single or in a relationship
- Who speak English (UK), English (Pirate), English (Upside down), or English (US)
- Who are not already connected to Pittvax” (the title of our Facebook page)



Figure 8: First Facebook ad – Red Pointing Guy

Using these parameters, the estimated reach of the first ad was approximately 80,000 users. The ad was monitored daily and quickly supplemented by other ads with different images and/or different parameter specifications. During the entire campaign, a total of 15 unique ads were placed (see A.4 Sample Facebook Ads). Each ad was monitored and adjusted to yield the highest number of clicks possible within the study budget. A click on any ad launched the Online screening survey landing page (see A.2.2).

3.1.4.1 Targeting

Through the iterative optimization process, we identified two target user groups. One group was defined by a long list of keywords thought to be representative of the keywords associated with our target population of sexually naïve 18-25 year old males attending college.

The list was started by collecting interests through informal interviews with men representative of the target population. It was further expanded using keywords supplied by the Facebook Ads™ keyword tool. This tool supplied additional keywords that were commonly associated with the ones provided as input. The details of the association algorithm are proprietary and were not disclosed, however the resulting list seemed to meet face validity. The second group was much less specific and was bounded only by sex, age, language, and geography. Isolating these two groups provided a convenient way to refresh images periodically to recapture waning attention.

3.1.4.2 Ad composition

Copy for Facebook Ads™ was extremely limited. The ad was allowed a 25 character title and a 135 character body with spaces counted as characters. The domain of the destination URL was also displayed as a sub-heading. Four variations of body were created within the limitation of the character allowance and IRB approval.

Each ad was allowed a small image. The same images used for the print ads were used in the online ads. The graphic design of the image was adjusted to fit the thumbnail size and horizontal orientation while maintaining thematic consistency with the print ads. Samples of the ads are presented in Sample Facebook Ads A.4

3.2 DATA COLLECTION METHODS

3.2.1 Facebook metrics

Facebook Ads™ are integrated with a real-time data dashboard where users can view ad performance and make rapid adjustments to the ad placement parameters. This tool was used for monitoring ad performance and recording data. The metrics that were most important in the ongoing ad campaign were:

Impressions – the number of times the ad was displayed

Clicks – the number of times an ad was clicked

Click through rate – the ratio of impressions to clicks

Spend – the dollars spent

Cost per click – the ratio of spend to click

Of those measures, spend, clicks, and cost per click were used for outcome monitoring and cost analysis. A sample of the online dashboard is presented in Figure 9. From these data, we were able to determine the number of individuals who were directed to the web survey landing page.

View Advertising Report

Export Report (.csv) Generate Another Report Schedule this Report

Report Type: Advertising Performance Summarize By: Ad Time Summary: Custom Date Range: 9/1/2010 - 6/1/2011

21,737,783 Impressions 3,884 Clicks 0 Connections 0.018% CTR \$4,819.66 Spent \$0.22 CPM \$1.24 CPC

Date Range ?	Campaign ?	Ad Name	Impressions ?	Clicks ?	CTR ?	CPC ?	CPM ?	Spent ?
09/01/2010-06/01/2011	HPV in men	Pointing Guy College	1,844,227	244	0.013%	1.09	0.14	266.90
09/01/2010-06/01/2011	HPV in men	Blue Asian Geeky	132,743	20	0.015%	1.08	0.16	21.62
09/01/2010-06/01/2011	HPV in men	Pointing Guy Geeky	449,865	68	0.015%	1.04	0.16	71.02
09/01/2010-06/01/2011	HPV in men	Blue AA College	229,723	25	0.011%	1.25	0.14	31.27
09/01/2010-06/01/2011	HPV in men	Red AA HPV College	522,492	60	0.011%	1.39	0.16	83.15
09/01/2010-06/01/2011	HPV in men	Pointing Guy all Pittsburgh	453,808	58	0.013%	0.82	0.10	47.60
09/01/2010-06/01/2011	HPV in men	Blond Pittsburgh	2,847,698	578	0.020%	0.79	0.16	458.49
09/01/2010-06/01/2011	HPV in men	Brunette Geeky	814,560	196	0.024%	0.73	0.18	143.91
09/01/2010-06/01/2011	HPV in men	Blond All Pittsburgh CPM	224,709	27	0.012%	1.01	0.12	27.27
09/01/2010-06/01/2011	HPV in men	Blond Geeky	197,441	40	0.020%	1.05	0.21	41.81
09/01/2010-06/01/2011	HPV in men	Brunette Pittsburgh	3,536,829	921	0.026%	1.11	0.29	1,026.55
09/01/2010-06/01/2011	HPV in men	Blond Geeky .34 CPM	103,926	8	0.008%	1.39	0.11	11.15
09/01/2010-06/01/2011	HPV in men	Brunette Pittsburgh CPM .40	2,142,688	219	0.010%	1.09	0.11	238.03
09/01/2010-06/01/2011	HPV in men	Brunette Geeky 2.00 CPC	7,382,341	1,268	0.017%	1.66	0.29	2,108.66
09/01/2010-06/01/2011	HPV in men	Blond All Pittsburgh 1.10 CPC	854,733	152	0.018%	1.59	0.28	242.23

Figure 9: Live metrics screenshot image

3.2.2 Web survey data collection

Any individual who clicked a Facebook ad or entered the study ad URL manually was directed to the web survey landing page. After reading the study description and clicking a button, the visitor was presented with the screening survey (see A.2.3 Online screening survey eligibility page). Visitors who completed the survey and met the inclusion criteria were assigned a study ID. Responses were logged into a database and reported to the research team through an online web report. Subsequent surveys were also managed using this procedure. The only variables of interest that were collected prior to consent and enrollment were age and referral source. The remaining variables were collected during the first visit (see B.2 Variable codebook).

3.2.3 Data cleaning and analysis

Data collected from the online surveys were retrieved from the web reports and imported into SPSS version 19.0.0. Cases were merged by study id and examined for duplicate entries. Most duplicate entries appeared to be caused by either accidental submission of an incomplete survey, or the duplicate submission of an already completed survey. In the case of incomplete submission, the entry with more missing values was deleted. In the case of duplicate submission of the same survey, the older survey was deleted. Variables were programmatically recoded and labeled to facilitate analysis. Frequencies were analyzed to insure correct recoding and labeling.

Associations between categories were explored with Pearson Chi-square tests. To increase expected cell counts and improve test sensitivity, most variable levels were collapsed into aggregate groups. For example, age was transformed from eight groups representing one year per value to four groups representing two years per value. Likewise, scales like “strongly disagree, disagree, agree, strongly agree” were transformed into representative dichotomies like, “disagree, agree.” In cases where value consolidation could not produce sufficient expected cell counts, Fisher’s exact test was used for 2 X 2 comparisons. For comparisons greater than 2 X 2, the Monte Carlo sampling procedure was used to create 99% confidence intervals from 10,000 samples. Significant cells were identified by conducting z-tests of column proportions. For comparisons of more than 2 X 2 variable levels, Bonferroni adjusted p-values were used. Two-sided significance for tests was established at $\alpha=.05$.

4.0 RESULTS/FINDINGS

4.1 POPULATION DESCRIPTORS AND DESCRIPTIVE STATISTICS

4.1.1 Demographics

A total of 311 men completed the online screening survey and met the inclusion criteria. From those, 220 were enrolled on a first come, first served basis. Among the enrolled, age was constrained by inclusion criteria to range from 18 to 25 years old inclusive. The mean age was 21.34 (SD = 2.24). The highest numbers of enrolled men were age 20, 19, or 24 years old. The majority of participants were white (80.9% N=178), 12.7% were Asian (N=28), 2.3% were black (N=5), and 4.1% selected “other” (N=9). Nine individuals (4.0%) were of Hispanic or Latino ethnicity. Sexual orientation data was missing for two individuals. Of the remaining 218, 85% were heterosexual (N=187), 9.1% were homosexual (N=20), and 5% were bisexual (N=11). Only 9.5% of the enrolled men were not students. Graduate students accounted for 29.5% of participants and 60.9% were undergraduate students. The distribution by age and grade is presented in Figure 10. All variable frequencies can be found in Appendix B.3.

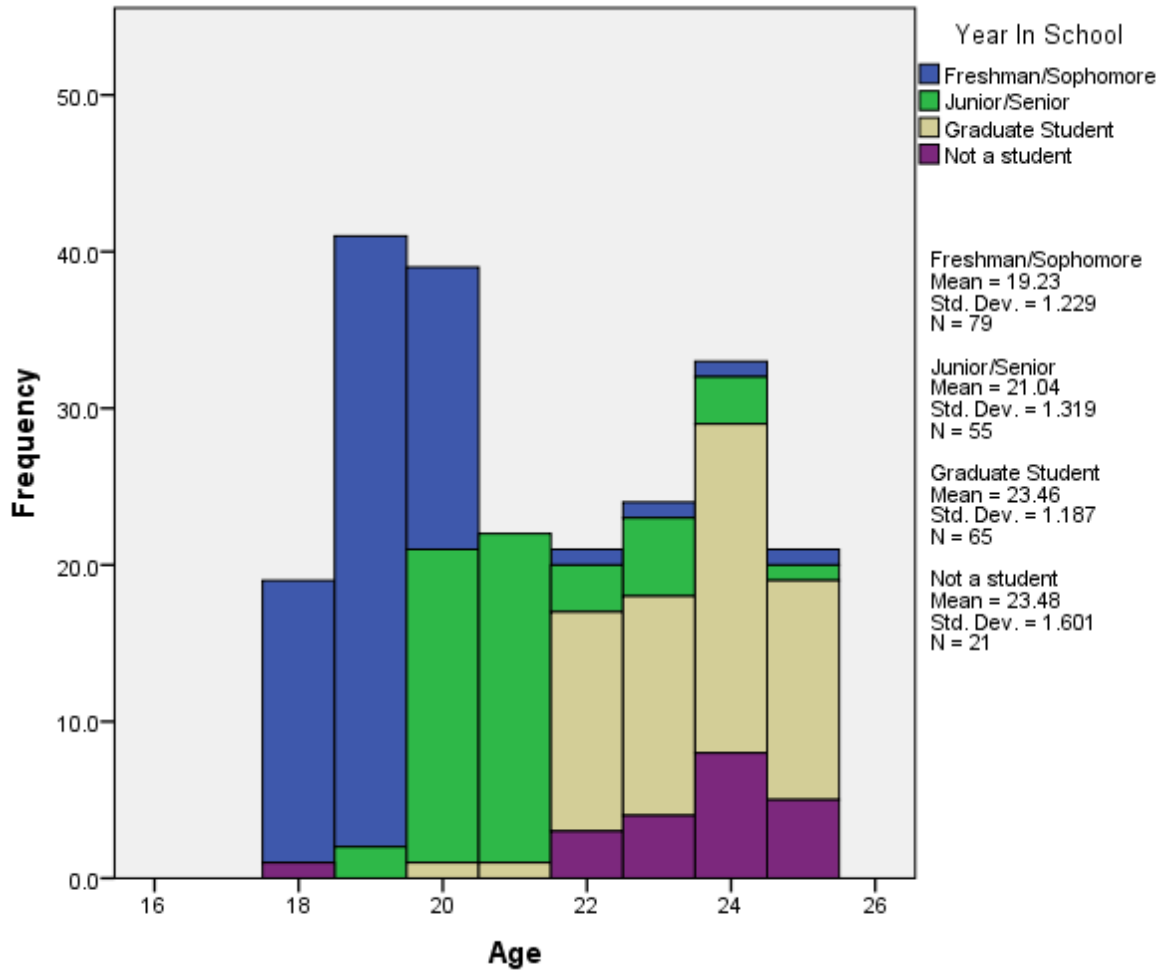


Figure 10: Histogram of enrolled men age 18-25 years old by grade in school

4.1.2 Referral sources

Table 8 shows the number of enrolled participants by first referral source and the tabulation of all the ways participants heard of the study. Half of the enrolled participants (N=111) first heard about the study through a printed ad. Almost a quarter (22.3%) of participants responded to social media or electronic message; the remainder first heard from a friend (16.8%) or from an announcement (10.5%). Participants were also asked to list all of the ways that they heard about the study. A total of 259 advertising impressions were reported. At least one conventional

recruiting method touched 85.0% of the participants (N=187), and at least one social media method touched 20% of the participants (N=44). Only 5.5% reported hearing about the study through both social media and conventional recruitment (N=12). Participants reported the number of friends they referred to the study. These referrals produced an additional 151 recruitment impressions to 109 friends of enrolled participants. Most referrals (68.9%) were made in person.

Table 8: Referral sources of enrolled participants

	First heard of Study		All ways heard of study	
	Frequency	Percent	Frequency	Percent
Flyer	89	40.5	98	37.8
Facebook or other social networking site	44	20.0	44	17
Friend(s) talking or texting	37	16.8	56	21.6
Announcement by faculty/staff	22	10.0	26	10.0
Ad in newspaper	21	9.5	25	9.7
Other electronic source	5	2.3	8	3.1
Bus ad	1	.5	1	.4
Presentation to student group	1	.5	1	.4
Total	220	100.0	259	100.0

4.1.3 Attitudes about participation

Financial reasons and health reasons were the most important drivers of enrollment. Approximately half of the participants cited the free vaccine or incentive payment as the primary reason for enrollment with an equal number citing protection from infection for self or others as a secondary reason. Combined, “free vaccine, incentive payment, and protect self or others from infection” accounted for 84.5% of the primary reason for enrollment and 81.7% of the secondary reason for enrollment.

Participants were supportive of the project. Ninety percent agreed with the statement, “I think this study addresses an important problem in my community.” Ninety-eight percent agreed with the statement, “I believe my participation in this study will result in a benefit to others” and 92.3% agreed with the statement, “I feel like I am an important part of this research project.”

4.1.4 Social media use among participants

The 18-25 year old men in this study reported being highly active in social media. Ninety percent of participants agreed with the statement, “I stay connected to the people in my life through Facebook, Twitter, or another social media service.” Reading other people’s updates was more common than posting updates with 91.8% of participants reporting reading other people’s updates at least once a week. Additionally, 64.5% of participants reported reading other people’s updates at least once a day. Posting updates was less frequent as 54.5% posted updates at least once a week, and 19.5% posted updates at least once a day. At the time of enrollment (October 2010-May 2011), the majority of participants (84.5%) reported using a computer as their primary way to access social networking sites. Only 14.5% reported using a mobile device for primary access.

4.2 MEASURES OF ASSOCIATION

Demographic and descriptive factors were tested for any significant associations in cross-tabulations with study variables. Table 9 presents the p-values of the chi-square tests for each cross-tab table.

Table 9: Study variables compared with demographic variables

	<i>Grouped ages</i>	<i>White / Not White</i>	<i>Sexual Orientation</i>
How participant first heard about screening survey	.02_{a,c}	.11 _c	.09 _c
Participant heard through a presentation or announcement	<.00_a	<.00_{a,b}	.39 _b
Participant heard through bus or print ad	0.64	.18 _b	.55 _b
Participant heard through other electronic means	.38 _c	.65 _b	.61 _b
Participant heard through at least one social media method	.71	.15	.02_a
Participant heard through at least one conventional method	.76	.53	.03_{a,b}
Participant heard through both social and conventional recruiting methods	.92 _c	.47 _b	.68 _b
First reason enrolled	.26	.03_a	.06 _c
Second reason enrolled	.79	.34	.08
I feel like I am an important part of this research project.	.32 _c	.36 _b	.46 _b
I think this study addresses an important problem in my community.	.61 _c	.56 _b	.51 _b
I believe my participation in this study will result in a benefit to others.	.54 _c	.17 _b	1.0 _b
I stay connected to the people in my life through Facebook, Twitter, or another social media service.	.32 _c	.58 _b	.75 _b
Over the past month, about how often did you post updates?	.01_a	0.46	.02_a
Over the past month, about how often did you read other people's updates?	.06 _c	.96 _c	.57 _c
What is your primary way to access social networking sites?	.16	.32	.03_{a,b}

a- Significant at p=.05

b - Fisher's exact test

c - Fisher's exact test using Monte Carlo sampling with 99% CI

4.2.1 Age

The eight age categories were collapsed into four, 18-19, 20-21, 22-23, 24-25. Significant relationships were observed between age and how participants first heard about the study ($p=.022$), having heard through a presentation or class announcement ($p=.003$), and the frequency of posting updates ($p=.012$). In both of the advertising impression measures, older participants were more likely to have heard of the study through a class presentation or announcement and younger participants less likely to have heard through that recruitment strategy (see Figure 11: Referral sources by age). Among participants who post status updates once a day or more, no differences were noted across ages. However, among men who post less frequently than once a day, the youngest group posted significantly more status updates than expected and the oldest group posted significantly fewer status updates than expected.

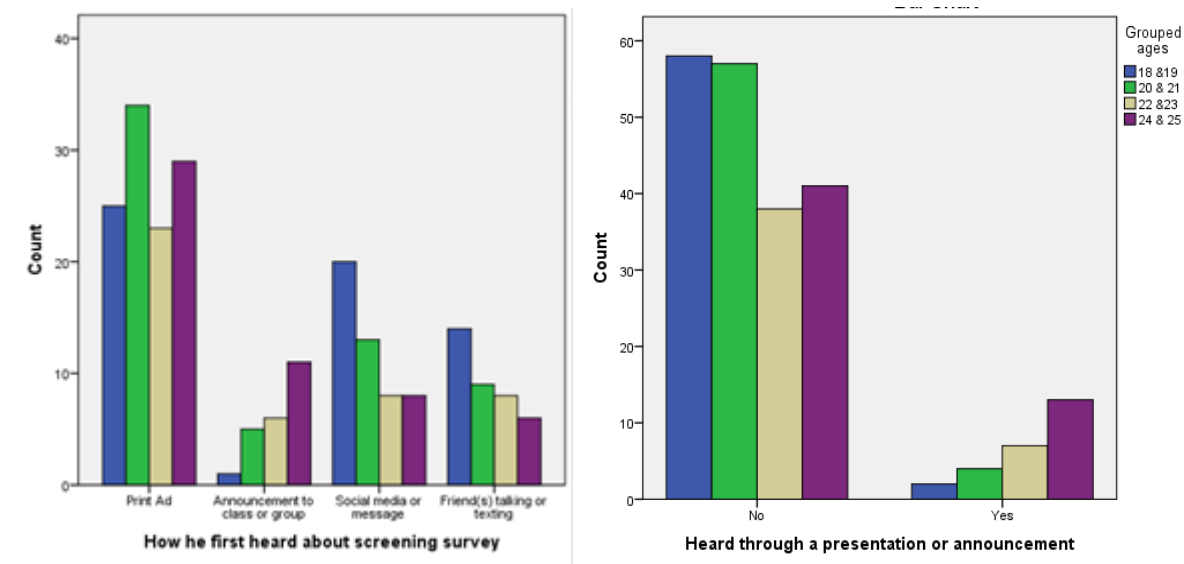


Figure 11: Referral sources by age

4.2.2 White vs. not white

Significant associations were identified in the proportion of non-white participants who heard about the study in a presentation or announcement ($p < .000$) and whose primary reason for participation was not financial or health ($p = .033$). Parsing the primary reason for participation “other” into the categories, “peer participation” and “help science” resulted in an underpowered chi-square with inconclusive results.

4.2.3 Sexual orientation

Men who were homosexual or bisexual reported having heard about the study through social media more frequently than men who were heterosexual ($p = .022$). Also, homosexual or bisexual men reported fewer impressions of conventional recruitment methods than heterosexual men ($p = .029$), though no particular conventional recruiting method was any less effective than another. Homosexual or bisexual participants were significantly more likely than heterosexual men to post updates at least once a day ($p = .018$). Finally, homosexual or bisexual men were significantly more likely to use a mobile device rather than a computer as their primary form of access to social networking sites while heterosexual men were significantly more likely to use a computer rather than a mobile device as their primary access to social networking sites ($p = .025$).

4.2.4 Primary and secondary recruitment sources

The comparison of first recruitment method with all methods of recruitment was significant. Participants who first heard about the study through a conventional method were unlikely to have

reported also hearing about the study through a social method ($p < .000$). Of the 176 participants who reported first hearing about the study through conventional methods, only 5 reported also hearing through social media. Similarly, of the 44 men who first heard about the study through social media, only 13 also heard through a conventional source ($p < .000$).

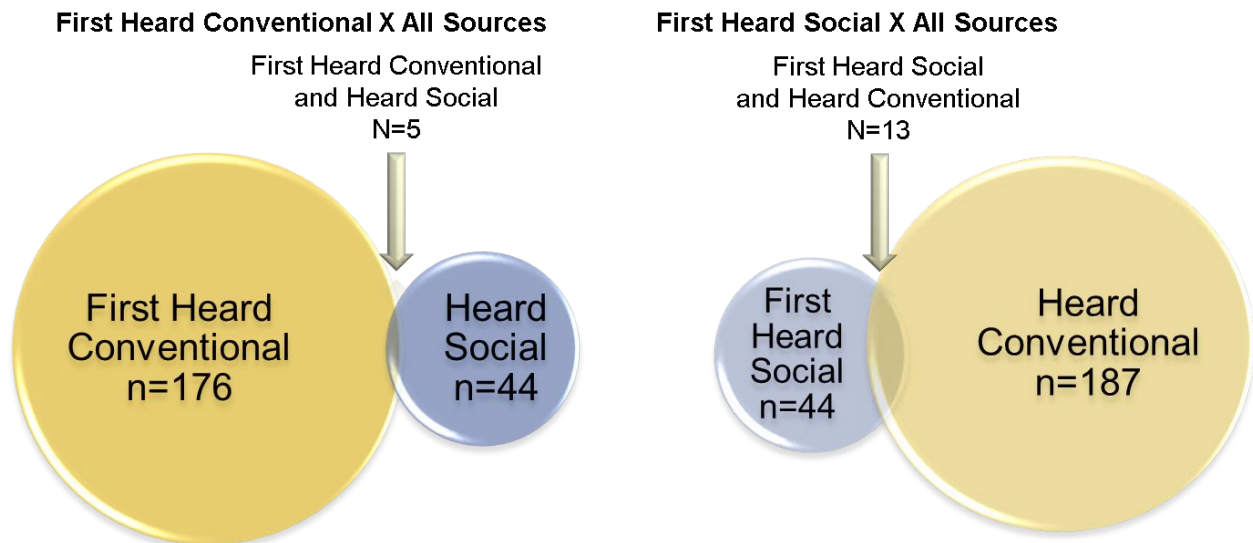


Figure 12: Overlap of recruiting methods

5.0 DISCUSSION

This study is an important record of recruiting college age men through Facebook Ads™. While many researchers may have tried contemporary online recruitment strategies, very little published literature discusses these new advertising mediums. A disadvantage of using the peer-review publication process for communicating findings about emerging technology is the temporal lag between investigation and dissemination. In the case of online advertising, this delay is long enough to render specific findings or recommendations obsolete. However, the persistence of the Facebook platform, emergence of competing social services, and widespread integration of internet connectivity into consumer devices ranging from home thermostats, to cars, to bathroom scales, seems to argue for the eventuality that online social media advertising could become as universally accessible as newspaper, radio, or television advertising. Until that time, online recruitment can potentially introduce a selection bias. Any form of internet-based communication requires special equipment and skills that may not be normally distributed through a population.

In this study we explored potential selection bias during recruitment of 18-25 year old males from a large state university into a clinical vaccination trial. We believed this trial was especially well-suited for testing the effectiveness of social media recruitment for the following reasons:

- We expected that all members of the target population would have equal access to both social and conventional media;
- Young men might be especially difficult to engage publicly through conventional recruiting methods given the potential stigma of HPV vaccination; and
- Online recruiting would allow us to expand recruitment beyond the reach of conventional recruitment tools.

We found that these assumptions were accurate and that Facebook Ads™ were a successful supplement to our conventional recruiting methods.

5.1 ANSWERING THE RESEARCH QUESTIONS

Our primary research question was, “Can Facebook Ads™ be used to recruit 18-25 year old men in a clinical HPV efficacy trial?” At the conclusion of enrollment, 20% of participants first heard about the study through Facebook or a social networking site. 31 of those 44 participants did not hear about the study through any conventional sources. Thus, social media reached a population that would not have been recruited through conventional methods. Facebook Ads™ also reached a larger proportion of homosexual or bisexual men than conventional recruitment. This is an especially important subpopulation of men within the context of HPV vaccination strategy and risk communication.

Clearly, Facebook Ads™ cannot be used as the sole method of participant recruitment. The labor intensive strategy of posting flyers was the most effective means of reaching potential recruits. Additionally, the multiplicative impact of social media was not observed in friend referral patterns to this study. Part of the appeal of social media advertising is the exponential

increase in message exposures gained through social sharing. In this trial, very few participants referred friends through public social media channels and opted for the more private methods of talking to or sending personal messages to friends. As 16.8% of participants first heard about the study through a referral from a friend, harnessing the power of social sharing might be a way to increase the productivity of an online recruitment campaign. Presumably, there are few other topics that could be more difficult to promote through social sharing than the present study of HPV vaccination in men. Other recruitment campaigns might find this form of referral much easier to utilize with a less stigmatized topic.

Social media recruitment should be considered by researchers hoping to reach college age men. Over 90% of the participants in this trial reported using social media to stay connected with their friends and supported that belief by engaging in the specific behavior of reading posts at least once a week. Furthermore, 65% reported reading posts at least once a day. Though fewer men proactively posted updates, over half of the subjects did so at least weekly. The frequency of posting updates seemed to be associated with age. Among those who posted less frequently than once per day, younger participants were more active while older participants were less active. Age was not significantly associated with the behavior of reading updates, nor on the reported use of social media to stay connected with friends, suggesting that older participants still consume social media, but are less actively engaged in making contributions.

Based on the significant finding of association between sexual orientation and social media recruitment, we reject the null hypothesis of no effect. We conclude that the sample recruited through social media systematically differs from the sample recruited through conventional methods. No significant differences were observed in race or age between social media vs. conventional recruitment methods. This lack of effect is not evidence for equivalence

between the methods, however. Future studies should test these relationships by enrolling more non-white participants and further parsing the effect that school attendance may exert on social media engagement.

5.2 ADDITIONAL FINDINGS

This study also collected useful information to inform HPV vaccination strategies. As the United States HPV vaccination campaign has struggled to achieve sufficient uptake, any information about leverage points is potentially useful to the evolving public health program. The predominant theoretical model used in this program is the Health Belief Model. Application of this model is supported by the results of the present study. The top reasons for enrollment in the study reflected an awareness of perceived susceptibility (to protect myself or others from infection), mitigation of a barrier to action (affordability of the vaccine), and cue to action (incentive payment). Additionally, 90.5% of participants believe that HPV is an important problem in their community and nearly 100% of participants believed that their participation would be beneficial to others. This suggests that efforts to increase perceived severity and susceptibility may have had an impact on this population. Other factors like the burdensome dosing schedule or expense of the vaccine may be the current barriers to uptake.

This may not be an accurate assessment of the state of acceptance among all participants, however. We observed a significant relationship between non-white participants and selection of an alternative reason for participation. This could be a reflection of comparatively lower levels of perceived severity/susceptibility, lower perceived cost of vaccination, or an unidentified effect. A potential explanation for these results in this study may be attributed to an untested demographic

factor. A significantly larger proportion of non-white participants were enrolled through presentations or announcements. Most of these presentations and announcements were made to graduate students in the medical, nursing, and dental schools. While race may have revealed the alternative reason for participation, it is entirely possible that the observed effect is confounded by curriculum, or another person factor related to graduate education in the health sciences. A more purposeful exploration of this dynamic among non-white men could help to reveal alternative cues to action, additional social leverage points, or additional perceived benefits to vaccination.

6.0 CONCLUSION

The generalizability of this study is limited by the observational methodology. The two recruitment conditions were not evaluated empirically as doing so would have harmed the primary objective of expeditiously recruiting participants for the clinical vaccination trial. Therefore, subjects were not randomly selected from the population. All participants were willing to be vaccinated, geographically bound, and likely to be enrolled in college. Hence, their attitudes about vaccine acceptance, likelihood of being exposed to recruitment messages, and access to social media would not be representative of the broader population. Finally, the small sample size limited the specificity of the comparisons between groups. Even within these limitations, several interesting relationships were observed.

College-age men are indeed listening to Facebook Ads™. HPV vaccination proponents, public health officials, and researchers hoping to recruit young men, especially homosexual or bisexual men, should also take note. In this comparison of Facebook Ads™ recruitment with conventional methods of recruitment, Facebook Ads™ were the second most productive recruitment strategy yielding 20% of the study sample. The majority of these men were untouched by any of the conventional recruitment strategies and therefore represent a population that would have been overlooked by conventional recruitment. A larger than expected proportion of Facebook recruits were homosexual or bisexual. These men were also more active in social media, suggesting that Facebook and other social platforms could be good recruitment sources

for studies or interventions targeting homosexual or bisexual young men. Using social media for recruitment in studies of less stigmatized subjects and finding ways to increase the use of social sharing may increase the effectiveness of social media recruitment ads.

Application of the Health Belief Model to HPV vaccination strategy is supported by this study. The constructs of perceived severity and perceived susceptibility seem to be motivating factors for HPV vaccination in this population. Additionally, cost of the vaccine may be a barrier to uptake. An incentive payment may be a sufficient cue to action to facilitate HPV vaccination. Beyond financial reasons and protection from infection, other factors may be influential in increasing HPV vaccine acceptance especially among non-white young men.

APPENDIX A: RECRUITMENT MATERIALS

A.1. RECRUITMENT SCRIPTS AND FORMS

A.1.1. Telephone Script

Hello, my name is _____. I'm a researcher at the Department of Family Medicine, returning your call (e-mail message) about the HPV vaccine study. May I tell you a little bit about our research project?

The University of Pittsburgh is looking for healthy men aged 18 to 25 to participate in a research study where they will receive the federally approved human papilloma virus (or HPV) vaccine. HPV is the cause of genital warts the most common STD in the U.S. The HPV vaccine has been shown to be effective against HPV infection and has been approved by the Federal Drug Administration. It is given as an injection in the upper arm in three separate visits.

Participants in this research study will visit the Montefiore Hospital Clinical and Translational Research Center (CTRC) for a total of four visits over a period of either 7 or 13 months. At those visits, participants will receive the HPV vaccine at no cost to them or to their health insurance carriers. In addition, a small amount of blood will be drawn at the first and last visits. Volunteers who complete the project will receive a total of \$130.00 for their participation or the option for an iPod Nano.

To be eligible for this study, volunteers should be men 18-25 years old, in good health, and planning to return to Pittsburgh next fall. Volunteers should not have had more than four sexual partners or have already had genital warts.

Does it sound like you might be interested in taking part in this study? Do you think that you are eligible for this study? Do you think that you would be able to commit to four visits at UPMC Montefiore CTTC?

“No.” Thank you for your call.

“Yes.” Okay, I will set up your first appointment. They will explain the project to you in more detail and if you qualify and are still interested, they will get you started.

Schedule appointment.

After setting the appointment: I will email you the directions.

A.1.2. GARDASIL™ Vaccine Information Statement

HPV (HUMAN PAPILLOMAVIRUS) VACCINE

Gardasil®

WHAT YOU NEED TO KNOW

Many Vaccine Information Statements are available in Spanish and other languages. See <http://www.immunize.org/vis>.

1 What is HPV?

Genital human papillomavirus (HPV) is the most common sexually transmitted virus in the United States. More than half of sexually active men and women are infected with HPV at some time in their lives.

About 20 million Americans are currently infected, and about 6 million more get infected each year. HPV is usually spread through sexual contact.

Most HPV infections don't cause any symptoms, and go away on their own. But HPV can cause **cervical cancer** in women. Cervical cancer is the 2nd leading cause of cancer deaths among women around the world. In the United States, about 10,000 women get cervical cancer every year and about 4,000 are expected to die from it.

HPV is also associated with several less common cancers, such as vaginal and vulvar cancers in women and other types of cancer in both men and women. It can also cause genital warts and warts in the throat.

There is no cure for HPV infection, but some of the problems it causes can be treated.

2 HPV vaccine - Why get vaccinated?

HPV vaccine is important because **it can prevent most cases of cervical cancer** in females, if it is given before a person is exposed to the virus.

Protection from HPV vaccine is expected to be long-lasting. But vaccination is not a substitute for cervical cancer screening. Women should still get regular Pap tests.

The vaccine you are getting is one of **two vaccines that can be given to prevent HPV**. It may be given to both males and females. In addition to preventing cervical cancer, it can also prevent **vaginal and vulvar cancer** in females, and **genital warts** in both males and females.

The other vaccine is given to females only, and only for prevention of cervical cancer.

3 Who should get this HPV vaccine and when?

Females: *Routine Vaccination*

- HPV vaccine is recommended for girls **11 or 12 years of age**. It may be given to girls starting at age 9.

Why is HPV vaccine given to girls at this age?

It is important for girls to get HPV vaccine **before** their first sexual contact – because they won't have been exposed to human papillomavirus.

Once a girl or woman has been infected with the virus, the vaccine might not work as well or might not work at all.

Females: *Catch-Up Vaccination*

- The vaccine is also recommended for girls and women **13 through 26 years of age** who did not get all 3 doses when they were younger.

Males

Males **9 through 26 years** of age may get HPV vaccine to prevent genital warts. As with females, it is best to be vaccinated before the first sexual contact.

HPV vaccine is given as a 3-dose series

1st Dose	Now
2nd Dose	1 to 2 months after Dose 1
3rd Dose	6 months after Dose 1

Additional (booster) doses are not recommended.

HPV vaccine may be given at the same time as other vaccines.

4 Some people should not get HPV vaccine or should wait

- Anyone who has ever had a life-threatening allergic reaction to any component of HPV vaccine, or to a previous dose of HPV vaccine, should not get the vaccine. Tell your doctor if the person getting vaccinated has any severe allergies, including an allergy to yeast.

- HPV vaccine is not recommended for **pregnant women**. However, receiving HPV vaccine when pregnant is not a reason to consider terminating the pregnancy. Women who are breast feeding may get the vaccine.

Any woman who learns she was pregnant when she got this HPV vaccine is encouraged to contact the manufacturer's **HPV in pregnancy registry** at 800-986-8999. This will help us learn how pregnant women respond to the vaccine.

- People who are mildly ill when a dose of HPV vaccine is planned can still be vaccinated. People with a **moderate or severe illness** should wait until they are better.

5 What are the risks from this vaccine?

This HPV vaccine has been used in the U.S. and around the world for several years and has been very safe.

However, any medicine could possibly cause a serious problem, such as a severe allergic reaction. The risk of any vaccine causing a serious injury, or death, is extremely small.

Life-threatening allergic reactions from vaccines are very rare. If they do occur, it would be within a few minutes to a few hours after the vaccination.

Several **mild to moderate problems** are known to occur with HPV vaccine. These do not last long and go away on their own.

- Reactions in the arm where the shot was given:
 - Pain (about 8 people in 10)
 - Redness or swelling (about 1 person in 4)
- Fever:
 - Mild (100° F) (about 1 person in 10)
 - Moderate (102° F) (about 1 person in 65)
- Other problems:
 - Headache (about 1 person in 3)
 - Fainting. Brief fainting spells and related symptoms (such as jerking movements) can happen after any medical procedure, including vaccination. **Sitting or lying down for about 15 minutes after a vaccination can help prevent fainting and injuries caused by falls.** Tell your provider if the patient feels dizzy or light-headed, or has vision changes or ringing in the ears.

Like all vaccines, HPV vaccines will continue to be monitored for unusual or severe problems.

6 What if there is a severe reaction?

What should I look for?

Serious allergic reactions including rash; swelling of the hands and feet, face, or lips; and breathing difficulty.

What should I do?

- Call a doctor, or get the person to a doctor right away.
- Tell the doctor what happened, the date and time it happened, and when the vaccination was given.
- Ask your provider to report the reaction by filing a Vaccine Adverse Event Reporting System (VAERS) form. Or you can file this report through the VAERS website at <http://www.vaers.hhs.gov>, or by calling 1-800-822-7967.

VAERS does not provide medical advice.

7 The National Vaccine Injury Compensation Program

The National Vaccine Injury Compensation Program (VICP) was created in 1986.

Persons who believe they may have been injured by a vaccine may file a claim with VICP by calling 1-800-338-2382 or visiting their website at <http://www.hrsa.gov/vaccinecompensation>.

8 How can I learn more?

- Ask your provider. They can give you the vaccine package insert or suggest other sources of information.
- Call your local or state health department.
- Contact the Centers for Disease Control and Prevention (CDC):
 - Call **1-800-232-4636 (1-800-CDC-INFO)** or
 - Visit CDC's website at <http://www.cdc.gov/hpv> and <http://www.cdc.gov/vaccines>



DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION




Vaccine Information Statement (Interim)
Human Papillomavirus (HPV) *Gardasil* 3/30/2010

A.2. ONLINE RECRUITMENT WEB PAGES

A.2.1. Online landing page

<https://immunizationed.org/hpvstudy/Default.aspx>

HPV VACCINE FOR MEN
Ages 18 to 25



HPV VACCINE FOR MEN

Ages 18 to 25

The University of Pittsburgh is looking for men to participate in an HPV vaccine research study.

MEN who fit the following criteria are eligible:


- Ages 18-25 years old
- In good health
- Fewer than 5 total sexual partners
- Have not yet received the HPV vaccine
- Plan to stay in the Pittsburgh area for at least 13 months

Participants will:

- Be asked to commit to 4 visits over a 13 month period
- Receive 3 doses of the HPV vaccine AT NO COST
- Have two blood samples taken
- Receive payment up to \$130.00 over the study period

To learn more:

E-mail: HPVstudy@upmc.edu
Call: 412-423-8299 or 412-HAD-VAXX
Visit: www.immunizationed.org/HPVstudy



Enrollment is now closed

A.2.2. Online screening survey landing page

<https://immunizationed.org/hpvstudy/hpvstudyscreening.aspx>

HPV VACCINE FOR MEN

Ages 18 to 25



The University of Pittsburgh is looking for healthy men aged 18 to 25 to participate in a research study where they will receive the federally approved human papilloma virus (or HPV) vaccine. HPV is the cause of genital warts the most common STD in the U.S. The HPV vaccine has been shown to be effective against HPV infection and has been approved by the Federal Drug Administration. It is given as an injection in the upper arm in three separate visits.

Participants in this research study will visit the Montefiore Hospital Clinical and Translational Research Center (CTRC) for a total of four visits over a period of either 7 or 13 months. At those visits, participants will receive the HPV vaccine at no cost to them or to their health insurance carriers. In addition, a small amount of blood will be drawn at the first and last visits. Volunteers who complete the project will receive a total of \$130.00 for their participation or the option for an iPod Nano.

To be eligible for this study, volunteers should be men 18-25 years old, in good health, and planning to return to Pittsburgh next fall. Volunteers should not have had more than four sexual partners or have already had genital warts. Does it sound like you might be interested in taking part in this study and that you are eligible? Would be able to commit to four visits at UPMC Montefiore CTRC?

YES NO

Web, Desktop & PDA Software Solutions and Services
[Daniel Weaver](#)

A.2.3. Online screening survey eligibility page

HPV VACCINE FOR MEN

Ages 18 to 25



We would like to ask you the questions below to determine if you qualify. They will take only a few minutes. You may refuse to answer any question. If you are not eligible for the study, we will retain your information without personal identifiers for data analysis purposes only. Please proceed if you would still like to participate.

HPV Study Screening Form

•How did you *first* hear about this study?:

If other please specify:

How old are you?:

•Are you planning to be in the Pittsburgh Area:

•Have you previously received the human papilloma virus (HPV) vaccine?:

•Have you had five or more sexual partners in your lifetime?:

•Have you ever had genital warts?:

•Are you allergic or hypersensitive to yeast?:

•Do you have or have you been treated for an autoimmune disorder or for an immune system-compromising disorder?: **Comments:**

•Do you have a bleeding disorder?:

•Are you on anticoagulant therapy (blood thinners)?:

•Have you been hospitalized within the past year?: **Comments:**

•Have you participated in a drug research study in the last 30 days?:

•Are you currently under treatment for any serious medical condition?: **Comments:**

•Have you received immunoglobulins or other blood products within the past 90 days?:

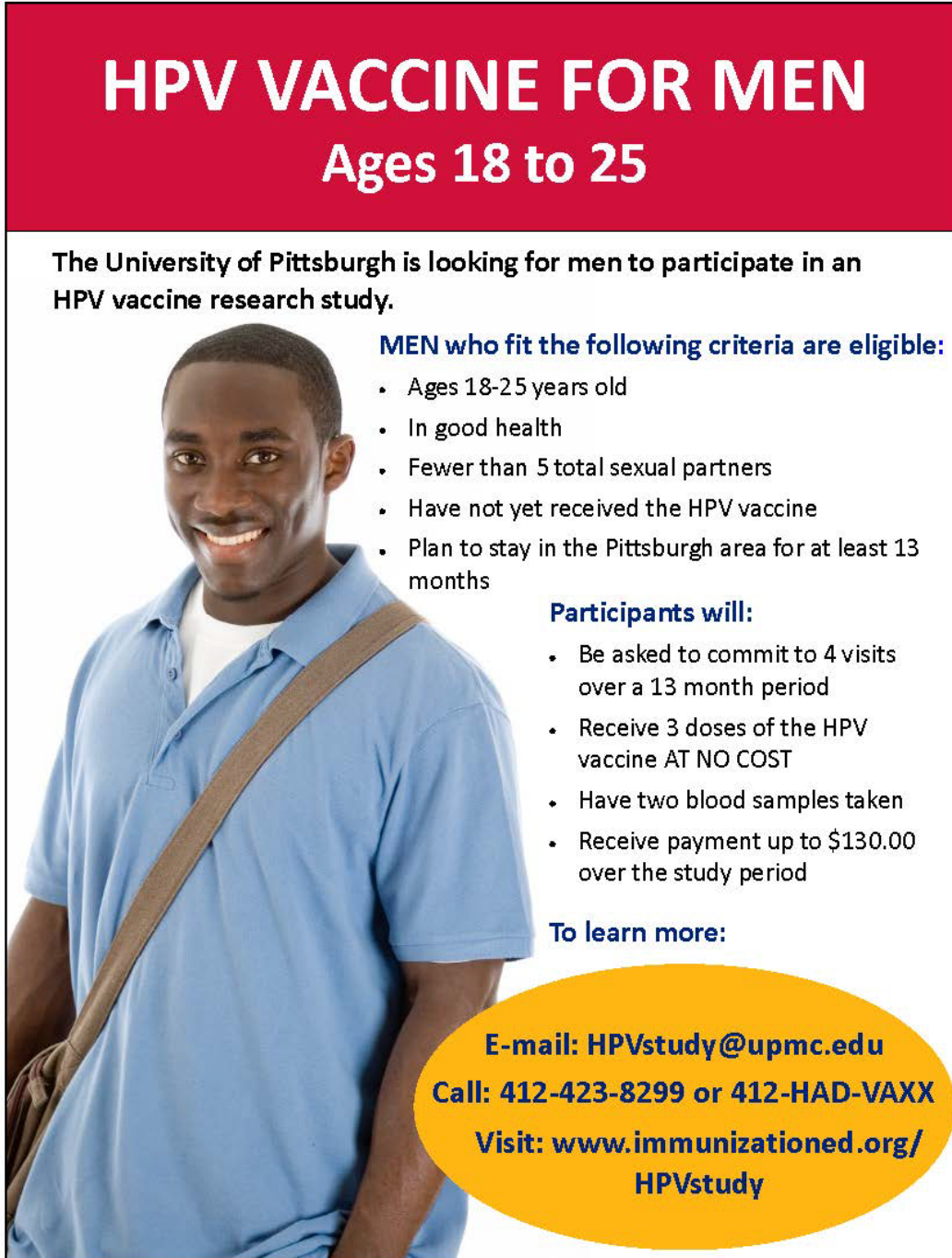
•Have you received prednisone, other steroid therapy or immunosuppressive therapy within the past two weeks?: **Comments:**

•Have you had any vaccines in the last 8 days?:

•Do you currently have an acute illness?: **Comments:**

A.3. SAMPLE PRINT ADS

A.3.1. Sample flier - african american male



HPV VACCINE FOR MEN

Ages 18 to 25

The University of Pittsburgh is looking for men to participate in an HPV vaccine research study.

MEN who fit the following criteria are eligible:

- Ages 18-25 years old
- In good health
- Fewer than 5 total sexual partners
- Have not yet received the HPV vaccine
- Plan to stay in the Pittsburgh area for at least 13 months

Participants will:

- Be asked to commit to 4 visits over a 13 month period
- Receive 3 doses of the HPV vaccine AT NO COST
- Have two blood samples taken
- Receive payment up to \$130.00 over the study period


To learn more:

E-mail: HPVstudy@upmc.edu
Call: 412-423-8299 or 412-HAD-VAXX
Visit: www.immunizationed.org/HPVstudy

A.3.2. Sample flier – white couple

MEN NEEDED

for a compensated research study at the University of Pittsburgh



Eligible participants will:

- Make 4 visits over a 7-month or 13-month period
- Receive 3 doses of the FDA approved HPV vaccine (Gardasil™) AT NO COST
- Have two blood samples taken
- Receive payment up to \$130.00 over the study period

Eligibility criteria are:

- Age 18-25 years and in good health
- No more than 4 lifetime sexual partners
- Have not yet received the HPV vaccine

<p>HPV VACCINE STUDY CALL: 412-423-8298 or 412-HAD-V9XX E-MAIL: hpvstudy@upmc.edu VIST: www.immunizationed.org/hpVstudy</p>	<p>HPV VACCINE STUDY CALL: 412-423-8298 or 412-HAD-V9XX E-MAIL: hpvstudy@upmc.edu VIST: www.immunizationed.org/hpVstudy</p>	<p>HPV VACCINE STUDY CALL: 412-423-8298 or 412-HAD-V9XX E-MAIL: hpvstudy@upmc.edu VIST: www.immunizationed.org/hpVstudy</p>	<p>HPV VACCINE STUDY CALL: 412-423-8298 or 412-HAD-V9XX E-MAIL: hpvstudy@upmc.edu VIST: www.immunizationed.org/hpVstudy</p>	<p>HPV VACCINE STUDY CALL: 412-423-8298 or 412-HAD-V9XX E-MAIL: hpvstudy@upmc.edu VIST: www.immunizationed.org/hpVstudy</p>	<p>HPV VACCINE STUDY CALL: 412-423-8298 or 412-HAD-V9XX E-MAIL: hpvstudy@upmc.edu VIST: www.immunizationed.org/hpVstudy</p>
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A.3.3. Sample newspaper ad – blonde pointing woman

MEN NEEDED

for a compensated research study at the University of Pittsburgh



Eligible participants will:

- Make 4 visits over a 7-month or 13-month period
- Receive 3 doses of the FDA approved HPV vaccine (Gardasil™) AT NO COST
- Have two blood samples taken
- Receive payment up to \$130.00 over the study period

Eligibility criteria are:

- Age 18-25 years and in good health
- No more than 4 lifetime sexual partners
- Have not yet received the HPV vaccine

To learn more:

***e-mail:* hpvstudy@upmc.edu**

***call:* 412-423-8299 or 412-HAD-VAXX**

***visit:* www.immunizationed.org/HPVstudy**

A.3.4. Sample bus ad – brunette woman



MEN NEEDED FOR A HPV RESEARCH STUDY

Eligible participants will:

- Make 4 visits over a 7-month or 13-month period
- Receive 3 doses of the FDA approved HPV vaccine (Gardasil™) AT NO COST
- Have two blood samples taken
- Receive payment up to \$130.00 over the study period

Eligibility criteria are:

- Age 18-25 years and in good health
- No more than 4 lifetime sexual partners
- Have not yet received the HPV vaccine

University of Pittsburgh

412-423-8299 HPVSTUDY@UPMC.EDU

A.4. SAMPLE FACEBOOK ADS

A.4.1. Sample facebook ad – red pointing guy



Audience:

This ad targets users:

- who live in the United States
- who live in Pittsburgh, PA
- exactly between the ages of 18 and 25 inclusive
- who are male
- who like aaron shust, android, android phone tips, androidtapp, apple, apple computers, audio adrenaline, barlow girl, barlowgirl, bible, big daddy weave, biology, biology club, brandon heath, building 429, calculus, casting crowns, charlie hall, chris tomlin, christ, christian, church, church jesus christ latterday saints, church youth group, classical music, computer, computer programming, computer science, computers, david crowder band, dc talk, disciple, droid, droid evo 4g, droid fans, droid x, engineering, falling up, firefight, god is love, google, google chrome, google earth, google reader, google search, google wave, hawk nelson, health, health fitness, health sciences, i am proud be christian, i love jesus, im proud be christian, intervarsity christian fellowship, iphone, ipod touch, ipods, jars clay, jeremy camp, jesus, jesus christ, jesus christ nazareth, jesus daily, jesus freaks, jewish, kj52, kutless, leeland, lincoln brewster, mac, macintosh, mark schultz, math, mathematics, matt redman, matthew west, mercy me, mercyme, microsoft, microsoft careers, microsoft net, microsoft office, microsoft sharepoint, microsoft sharepoint server 2010, microsoft sql server, microsoft windows, microsoft windows 7, mormons, natalie grant, nazareth, newsboys, nichole nordeman, opera, pastor, pastor e adeboye, pastor ea adeboye, pastor joe wood, pastor rick warren, pillar, premed society, premedical, program director, program manager, programming, project 86, rebecca st james, reliant k, reliant k, religion, religions, rick warren, run kid run, sanctus real, seventh day slumber, skillet, sql server, stellar kart, steven curtis chapman, switchfoot, tenth avenue north, testament, third day, thousand foot krutch, toby mac, tobymac, todd agnew, visual basic, visual basic programming or yesus kristus
- who are single or in a relationship
- who speak English (UK), English (Pirate), English (Upside Down) or English (US)
- who are not already connected to Pittvax

Campaign:

HPV in men

Bid Type:

CPM in Ad Space

Bid:

\$0.36 USD per thousand impressions.

Daily Budget:

\$75.00 USD per day

A.4.2. Sample facebook ad - blue african american guy

Ad Preview:



Ad Name:

Vaccination Study for Men

Audience:

This ad targets users:

- who live in the United States
- who live in Pittsburgh, PA
- exactly between the ages of 18 and 25 inclusive
- who are male
- who are at Carnegie Mellon, Pittsburgh, Duquesne, RMU or Point Park
- who are single or in a relationship
- who speak English (UK), English (Pirate), English (Upside Down) or English (US)
- who are not already connected to Pittvax

Campaign:

HPV in men

Bid Type:

CPM in Ad Space

Bid:

\$0.32 USD per thousand impressions.

Daily Budget:

\$75.00 USD per day

A.4.3. Sample facebook ad – blonde pointing woman



This ad targets users:

- who live in the United States
- who live in Pittsburgh, PA
- exactly between the ages of 18 and 25 inclusive
- who are male
- who like aaron shust, android, android phone tips, androidtapp, apple, apple computers, audio adrenaline, barlow girl, barlowgirl, bible, big daddy weave, biology, biology dub, brandon heath, building 429, calculus, casting crowns, charlie hall, chris tomlin, christ, christian, church, church jesus christ latterday saints, church youth group, classical music, computer, computer programming, computer science, computers, david crowder band, dc talk, disciple, droid, droid evo 4g, droid fans, droid x, engineering, falling up, firefight, god is love, google, google chrome, google earth, google reader, google search, google wave, hawk nelson, health, health fitness, health sciences, i am proud be christian, i love jesus, im proud be christian, intervarsity christian fellowship, iphone, ipod touch, ipods, jars day, jeremy camp, jesus, jesus christ, jesus christ nazareth, jesus daily, jesus freaks, jewish, kj52, kutless, leeland, lincoln brewster, mac, macintosh, mark schultz, math, mathematics, matt redman, matthew west, mercy me, mercyme, microsoft, microsoft careers, microsoft net, microsoft office, microsoft sharepoint, microsoft sharepoint server 2010, microsoft sql server, microsoft windows, microsoft windows 7, mormons, natalie grant, nazareth, newsboys, nichole nordeman, opera, pastor, pastor e adeboye, pastor ea adeboye, pastor joe wood, pastor rick warren, pillar, premed society, premedical, program director, program manager, programming, project 86, rebecca st james, reliant k, reliant k, religion, religions, rick warren, run kid run, sanctus real, seventh day slumber, skillet, sql server, stellar kart, steven curtis chapman, switchfoot, tenth avenue north, testament, third day, thousand foot krutch, toby mac, tobymac, todd agnew, visual basic, visual basic programming, yesus kristus, health care assistant, health services or medicine
- who are single or in a relationship
- who speak English (UK), English (Pirate), English (Upside Down) or English (US)
- who are not already connected to Pittvax

HPV in men

CPC

\$0.90 USD per click

\$75.00 USD per day

A.4.4. Sample facebook ad – brunette pittsburgh

Ad Preview:

Licensed HPVvaccine study



Univ of Pittsburgh needs healthy men 18-25 for a vaccine research study. FDA approved vaccine, earn up to \$130. Click for more info.

Ad Name:

Brunette Pittsburgh

Audience:

This ad targets users:

- who live in the United States
- who live in Pittsburgh, PA
- exactly between the ages of 18 and 25 inclusive
- who are male
- who are single or in a relationship
- who speak English (UK), English (Pirate), English (Upside Down) or English (US)
- who are not already connected to Pittvax

Campaign:

HPV in men

Bid Type:

CPC

Bid:

\$0.90 USD per click

Daily Budget:

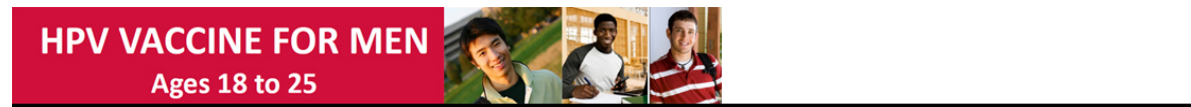
\$75.00 USD per day

APPENDIX B: DATA

B.1. DATA COLLECTION WEB PAGES

B.1.1. Online enrollment survey

<https://immunizationed.org/hpvstudy/hpvstudyvisit1.aspx>



Please answer the following questions below.

HPV Visit 1 Survey Form

*First Name: (*Required!)

*Last Name: (*Required!)

*Date of Birth (MM/DD/YYYY): (*Required!)

*Phone Number: (*Required!) Cell or Land?

Text Capable?

*Best Time to Call: (*Required!)

*Email: (*Required!)

Alt Email:

Year in school (if applicable): -Select- (*Required!)

*In the last month, how often have you felt that you were unable to control the important things in your life?: -Select- (*Required!)

*In the last month, how often have you felt confident in your ability to handle your personal problems?: -Select- (*Required!)

*In the last month, how often have you felt that things were going your way?: -Select- (*Required!)

*In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?: -Select- (*Required!)

*Are you either Hispanic or Latino?: -Select- (*Required!)

*Which one of these groups would you say best represents your race?: -Select- (*Required!)

If other please specify:

•Did you receive the seasonal influenza vaccine last year (2009-2010)?: (*Required)

•Did you receive the H1N1 (swine flu) influenza vaccine last year (2009-2010)?: (*Required)

•Were you sick with the swine flu or seasonal flu last year? (The symptoms of the flu include cough, body aches, headache, sore throat and fever.): (*Required)

•Did you receive the seasonal influenza vaccine this year (2010)?: (*Required)

•Do you take vitamins on a regular basis (daily or almost daily)?: (*Required)

If so, does any of the vitamin supplements contain vitamin D?:

•Do you regularly tan or go to a tanning salon?: (*Required)

•Are you currently a cigarette smoker?: (*Required)

If yes how much do you smoke?: Number of cigarettes/day.

How did you hear about this study? Check all that apply:

- Announcement by faculty/staff
- Facebook or other social networking site
- Flyer
- Friend(s) talking or texting
- Presentation to student group
- Twitter
- Ad in newspaper
- Other

If other please specify:

How many friends, if any, did you encourage to participate in this study?: Approx. number.

What method did you use to tell your friends or acquaintances about the study? Check all that apply:

- Facebook or other social networking site
- Called on phone
- Texted
- Tweeted or retweeted
- Announcement to student group or class
- Talked to in person
- Emailed
- Other

What is the most important reason you decided to enroll in the study?:

What is the *second* most important reason you decided to enroll in the study?:

I have heard of the Pittsburgh Vaccination Research Group (PittVax):

I feel like I am an important part of this research project:

I think this study addresses an important problem in my community:

I believe my participation in this study will result in a benefit to others:

I stay connected to the people in my life through Facebook, Twitter, or another social media service:

Over the past month, about how often did you post updates?:

Over the past month, about how often did you read other people's updates?:

What is your primary way to access social networking sites?:

How would you describe your sexual orientation/preference?:

Submit Form

B.1.2. Post-vaccination survey

<https://immunizationed.org/hpvstudy/postvisit.aspx>



Please answer the following questions below.

HPV Post Visit 1 Survey Form

*First Name: (*Required!)

*Last Name: (*Required!)

*Phone Number: (*Required!) Cell or Land?

*Best Time to Call: (*Required!)

*Email: (*Required!)

Alt Email:

*Did you have local reactions after your last dose of HPV vaccine?:

If other please specify:

*Did you have an general reactions after your last dose of HPV vaccine?:

If other please specify:

B.1.3. Pre-visit 2 & 3 survey

<https://immunizationed.org/hpvstudy/previsit.aspx>

<https://immunizationed.org/hpvstudy/hpvprevisit3.aspx>



Please answer the following questions below.

HPV Pre Visit 3 Survey Form

***First Name:** (*Required!)

***Last Name:** (*Required!)

***Phone Number:** (*Required!) Cell or Land? ▾

***Best Time to Call:** (*Required!)

***Email:** (*Required!)

Alt Email:

***I stay connected to the people in my life through Facebook, Twitter, or another social media service:** -Select- ▾

***Over the past month, about how often did you post updates?:** -Select- ▾

***Over the past month, about how often did you read other people's updates?:** -Select- ▾

***What is your primary way to access social networking sites?:** -Select- ▾

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B.1.4. Final survey

<https://www.immunizationed.org/hpvstudy/Visit4Survey.aspx>



Please answer the following questions below.

HPV Visit 4 Survey Form

***First Name:** (*Required!)

***Last Name:** (*Required!)

***Date of Birth (MM/DD/YYYY):** (*Required!)

***Phone Number:** (*Required!) Cell or Land?
Text Capable?

***Best Time to Call:** (*Required!)

***Email:** (*Required!)

Alt Email:

Did you have local reactions after your last dose of HPV vaccine?: -Select-

If other please specify:

In the last month, how often have you felt that you were unable to control the important things in your life?: -Select-

In the last month, how often have you felt confident in your ability to handle your personal problems?: -Select-

In the last month, how often have you felt that things were going your way?: -Select-

In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?: -Select-

Do you take vitamins on a regular basis (daily or almost daily)?: -Select-

If so, does any of the vitamin supplements contain vitamin D?: -Select-

Do you regularly tan or go to a tanning salon?: -Select-

Are you currently a cigarette smoker?: -Select-

If yes how much do you smoke?: 0 **Number of cigarettes/day.**

Did you receive the seasonal influenza vaccine this year?: -Select-

I feel like I am an important part of this research project: -Select-

I think this study addresses an important problem in my community: -Select-

I believe my participation in this study will result in a benefit to others: -Select-

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