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Evaluation of a Brief Intervention to Improve Human Papillomavirus-Related Awareness, Knowledge, and Attitudes Among Ethnically and Sexually Diverse College Students

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EVALUATION OF A BRIEF INTERVENTION TO IMPROVE HUMAN PAPILLOMAVIRUS-RELATED AWARENESS, KNOWLEDGE, AND ATTITUDES AMONG ETHNICALLY AND SEXUALLY DIVERSE COLLEGE STUDENTS

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by

Sharice M. Preston

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To: Dean Tomás R. Guilarte
Robert Stempel College of Public Health and Social Work

This dissertation, written by Sharice M. Preston, and entitled Evaluation of a Brief Intervention to Improve Human Papillomavirus-Related Awareness, Knowledge, and Attitudes Among Ethnically and Sexually Diverse College Students, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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Date of Defense: June 15, 2018

The dissertation of Sharice M. Preston is approved.

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Andrés G. Gil
Vice President for Research and Economic Development
and Dean of the University Graduate School

Florida International University, 2018

DEDICATION

For my mother, Elsa.

There is no expression of gratitude that can adequately capture the overwhelming appreciation I feel for you and your every sacrifice that made this conceivable. Thank you for instilling in me a sense of grit and perseverance that, in the long run superseded anything I've ever read in my books. It is your shoulders that I stand on now. I love you, Mom.

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"Work willingly at whatever you do, as though you were

working for the Lord rather than for people."

Colossians 3:23

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ABSTRACT OF THE DISSERTATION

EVALUATION OF A BRIEF INTERVENTION TO IMPROVE HUMAN PAPILLOMAVIRUS-RELATED AWARENESS, KNOWLEDGE, AND ATTITUDES AMONG ETHNICALLY AND SEXUALLY DIVERSE COLLEGE STUDENTS

by

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Florida International University, 2018

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Professor William Darrow, Major Professor

Human papillomavirus (HPV) is a preventable infection responsible for anogenital and oropharyngeal cancers, as well as genital warts. Two safe and effective vaccines are recommended for adolescents and young adults to protect against HPV infection. Both are severely underutilized. Sexual and ethnic minorities are disproportionately affected by HPV infection and its sequelae. The goals of this study were to (1) assess baseline differences in HPV-related awareness, knowledge, and attitudes between men and women, and (2) evaluate the differential efficacy of a brief, educational HPV intervention among ethnically and sexually diverse college students. Students attending undergraduate courses from 2015 to 2017 participated in a brief, tailored, classroom intervention designed to improve HPV-related awareness, knowledge, and attitudes. These outcomes were assessed immediately before and following an evidence-based educational presentation about HPV risks, outcomes, treatments, and prevention. At baseline, 84% of participants (N=386) had heard of HPV; 28% of men and 55% of women reported receiving ≥1 dose of HPV vaccine. Vaccinated women were seven times more likely to report favorable attitudes than

unvaccinated women (RR=7.1, CI[3.3-15.5]). Hispanic participants had more positive attitudes toward HPV vaccination (62% vs. 44%; P=0.009) and were more willing to become vaccinated (66% vs. 46%; p=0.02) than non-Hispanic participants at baseline. Gay and bisexual men (92%) were more likely than heterosexual men (68%) to have heard of HPV, to receive any doses of HPV vaccine (37% vs 19%), to view HPV vaccination positively (58% vs 39%), and more willing to be vaccinated (86% vs 39%; P<0.05). Following the intervention, participants' HPV knowledge improved by 41%. Baseline disparities between genders, ethnicities, and sexual orientations dissipated at post-test. Participants rated the intervention components and overall experience positively (93-97%). In summary, significant disparities exist in HPV-related awareness, knowledge, and attitudes between students of different genders, ethnicities, and sexual orientations. Tailored and targeted educational interventions can be a successful method for diminishing these disparities, encouraging HPV vaccination, and relieving the burden of HPV and its adverse outcomes.

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LIST OF ACRONYMS

ACIP	Advisory Committee on Immunization Practices
AIDS	Acquired Immune Deficiency Syndrome
CDC	Centers for Disease Control and Prevention
FIU	Florida International University
HBM	Health Belief Model
HPV	Human Papillomavirus
HSI	Heterosexually-Identifying
LGBTQ	Lesbian, Gay, Bisexual, Transgender, Queer or Questioning
MSM	Men who have sex with men
STI	Sexually Transmitted Infection
TTM	Transtheoretical Model
U.S.	United States
WSW	Women who have sex with women

CHAPTER I

Introduction

Health promotion has been defined by the World Health Organization as "The process of enabling people to increase control over, and to improve, their health. It moves beyond a focus on individual behavior towards a wide range of social and environmental interventions."[1] In the same vein, disease prevention specifically focuses on population- or individual-level prevention efforts aimed at reducing the incidence and burden of diseases and their associated risk factors. Health promotion and disease prevention often share goals, and both often utilize education and educational interventions as a means for reaching specific goals.[2]

Historically, interventions to prevent sexually transmitted infections (STIs) were not a priority among health promotion professionals. STI control was mainly the concern of military and private physicians in the United States (U.S.), with early behavioral efforts targeting high-risk groups, such as prostitutes and military personnel.[3] Behavioral approaches to prevention became secondary to the biomedical model in the early 1900s with improvements in diagnostic techniques, discovery of antibiotics and treatment with heavy metal compounds, and epidemiological methods.[4] With the discovery of autoimmune deficiency syndrome (AIDS) in the early 1980s, the biomedical model was viewed as only a part of the solution; early detection and no cure offered little to prevent transmission of the deadly disease.[4] Modifications of sexual behavior was increasingly acknowledged as not only a potential preventive tool for curtailing STIs, but essential for the success of the biomedical interventions as patient and provider behaviors surrounding screening, diagnosis, and treatment were scrutinized.[4]

In 1990, the Department of Health and Human Services released the report "Healthy People 2000," a strategy for significantly improving the health of the U.S. through 300 specific health objectives spanning areas such as maternal and child health, cancer, sexually transmitted infections (STIs), and vaccines.[1] The legacy of "Healthy People" has continued through the decades, with increasing emphasis on prevention, and expansion of disparity groups. Attention has increasingly focused on preventable cancers, such as cervical cancer caused mainly by human papillomavirus (HPV).[5]

High priority research to advance prevention of HPV-associated cancers includes effective communications about HPV and the safe and effective HPV vaccines to accelerate uptake, and development of cost-effective research to do so efficiently in at-risk populations. Barriers to HPV vaccination include lack of knowledge, missed clinical opportunities to vaccinate, limited access to healthcare, and cost concerns.[5] Effective interventions often employ a specific theoretical model, evidence-based information, rigorous outcome evaluation, and multidimensional measurement (e.g. knowledge and attitudes). Brief, simple educational interventions modeled after early HIV prevention efforts have been shown to improve knowledge of HPV and HPV vaccination.[4]

Purpose of the Study

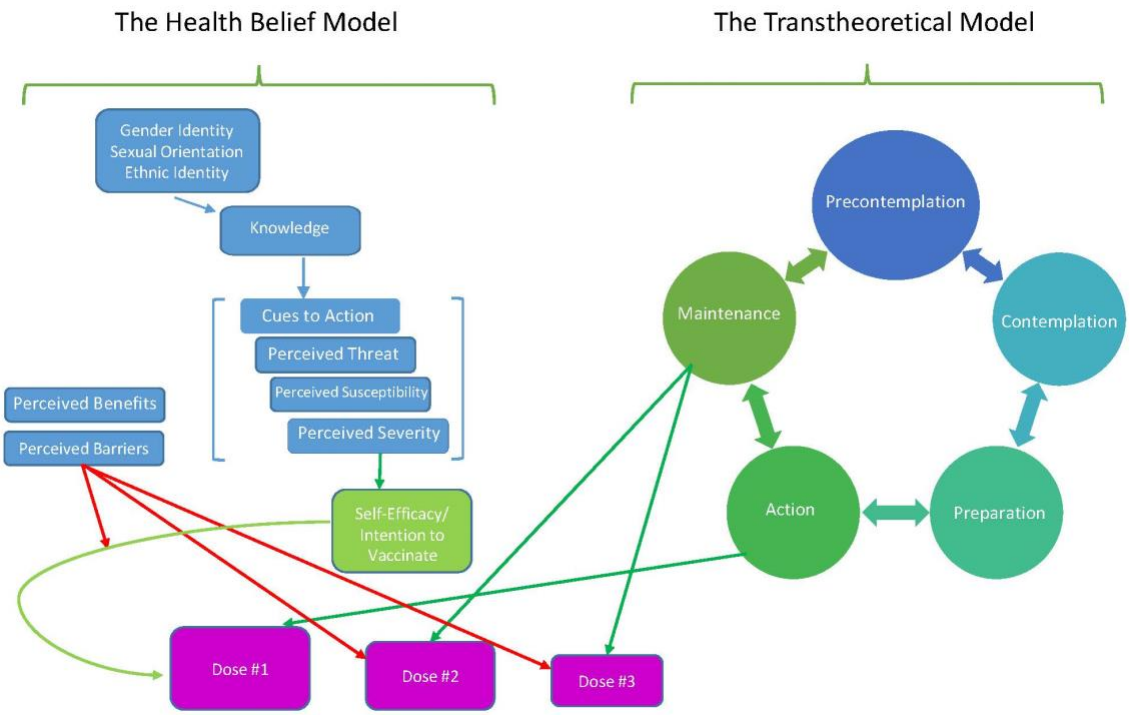
The purpose of this study was to (1) assess the efficacy of a brief educational intervention in improving HPV-related awareness, knowledge, and attitudes and (2) determine if impact varies by gender, ethnicity, and sexual orientation in a purposive sample of ethnically and sexually diverse 18-26-year-old Florida International University (FIU) college students. The intervention group was composed of students registered in the course WST 3641- "LGBT and Beyond: Non-Normative Sexualities in Global

Perspective," a course in which LGBTQ undergraduate students are known to be overrepresented (~35% LGBTQ students).

Theoretical Foundations

To explain how gender, ethnicity, and sexual orientation are associated with levels of knowledge and attitudes towards HPV, the Health Belief Model (HBM) in conjunction with the Transtheoretical Model (TTM) guided the study design, intervention content, and interpretation of results.

Figure 1.1. Model of Theoretical Foundations



HBM posits that beliefs and attitudes about a specific disease influence decisions about prevention, particularly vaccination behavior.[6] HBM has been successfully

validated and used to guide many public health interventions aimed at behavior change among various populations, and develop effective health messages within and without an intervention framework.[7]

This study utilized the HBM constructs of perceived susceptibility, threat, severity, cues to action, as well as perceived barriers and benefits framed within the brief educational presentation aimed at preventing HPV infection and encouraging vaccination. Constructs informed the manner of information presentation, and how to measure uptake of the information by participants. Knowledge, the largest barrier related to HPV-related behaviors, is an integral construct of this theoretical model, being a prerequisite for making informed decisions about behavior change and vaccination.[8]

This study also utilized TTM, a theory that integrates several constructs of behavior change to assess or even predict readiness to engage in a new or healthier behavior.[9,10] Rather than a single decision-making event, TTM considers behavior change as a process in which individuals progress through a series of stages (precontemplation, contemplation, preparation, action, and maintenance) depending on their baseline readiness to adopt or perform a health behavior. These constructs of TTM were used to determine participants' stage of change and associations related to each stage, and were measured at baseline, prior to intervention exposure.

Study Setting: WST 3641 LGBT and Beyond: Non-Normative Sexualities in Global Perspective

WST 3641 is a 3-credit course at Florida International University designed to introduce students to the study of global non-normative sexualities and genders. According to the course syllabus,[11] students gain an interdisciplinary understanding of

gender studies with historical, sociological, and geographical, underpinnings. Through this course, students explore concepts related to lesbian, gay, bisexual and transgender (LGBTQ)-identified individuals as well as those whose sexual and gender identities, practices, and experiences fall outside such designation. In this sense, students learn to understand how and when classifications, assumptions, concepts, and theories of sexuality and gender prove inappropriate for other cultural contexts. Students examined how modern non-normative sexualities and genders around the world exist at the intersection of local and global processes.

Research Aims and Hypotheses

Three research questions were based on student knowledge and attitudes regarding HPV and related topics, which were operationalized based on students' survey results, with intervention acceptability and efficacy determined quantitatively through a post-intervention survey.

Research Question 1. In a sexually diverse sample of undergraduate students what is the difference in knowledge about HPV and the HPV vaccines among students of varying genders, ethnicities, and sexual orientations before and after implementation of a brief educational intervention?

Research Question 2. How can HPV-related attitudes be characterized among samples of undergraduate students of varying genders, ethnicities, and sexual orientations before and after implementation of a brief intervention?

Research Question 3. How acceptable and efficacious is a brief educational intervention in a university classroom setting to educate sexually diverse undergraduate students about HPV and HPV vaccination?

To answer these research questions, the following aims were developed, and the associated hypotheses were tested. Chapters IV, V, and VI, each address one of these aims.

Aim 1 (Chapter IV). To assess baseline differences in HPV-related awareness, knowledge, and attitudes between genders.

H0: There are no differences between genders in baseline awareness, knowledge, or attitudes in HPV-related topics.

H1: At baseline, there are statistically significant differences between men and women in HPV-related awareness, knowledge, and attitudes.

Aim 2 (Chapter V). To evaluate the efficacy of a brief intervention in improving HPV-related awareness, knowledge, and attitudes among ethnically diverse college students.

H0: There are no differences in intervention outcomes between Hispanic and non-Hispanic participants.

H1: There are statistically significant differences in intervention outcomes between Hispanic and non-Hispanic participants.

Aim 3 (Chapter VI). To evaluate the efficacy of a brief intervention in improving HPV-related awareness, knowledge, and attitudes among sexually diverse college students.

H0: There are no differences in intervention outcomes between LGBTQ and heterosexually-identifying participants.

H1: There are statistically significant differences in intervention outcomes between LGBTQ and heterosexually-identifying participants.

Delimitations

Study participation was restricted to students at least 18 years old attending FIU. Students attending college create a unique chance to access individuals who may have missed opportunities to become vaccinated against HPV as minors, and are now of age to make vaccination decisions of their own volition. Students chosen for this study included those registered for the FIU courses WST 3641- "LGBT and Beyond: Non-Normative sexualities in Global Perspective", which allowed for a sample with a diverse blend of ethnicities and sexual orientations, and IDS 3189: "International Nutrition, Public Health and Economic Development", which served as a comparison group.

Limitations

Since this study was performed in the unique urban setting of Miami-Dade County, the results of this research may not be applicable to those attending other universities, and living in other geographical areas. Non-probability purposive sampling was used to include diverse sexual orientations; participants were not representative of all students at Florida International University, or the south Florida area. Collection of self-reported data limited the ability for these data to be independently verified for bias. Recall and social desirability biases may also have affected the responses of study participants.

Assumptions

The underlying assumptions of this research are that the participants responded to survey instruments accurately and truthfully, and that they had at least an 8th grade English reading and comprehension level. Survey instruments were valid and reliable based upon literature reviews and pilot testing.

Importance of Study

Students attending college create a unique opportunity to access individuals who may have missed opportunities to become vaccinated against HPV, and are now of age to make vaccination decisions of their own. The south Florida region has particularly high rates of infection, and low rates of vaccination.[12] Ethnic minorities and LGBTQ individuals are less likely to receive relevant vaccination recommendations from healthcare providers, in addition to perceiving a lower threat of HPV.

To increase HPV vaccination uptake and close gaps in knowledge and health behaviors among sexual and ethnic minority groups, knowledge and attitudes related to HPV and HPV vaccination should be examined and addressed. The results of this study will guide future interventions and policy to create culturally appropriate messages in settings that maximize opportunities for change. This study also represents an opportunity to contribute to multiple Healthy People 2020 goals related to LGBTQ health, and vaccine uptake.[13]

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CHAPTER II

Review of the Literature

Human papillomavirus (HPV) infection is the most common STI globally.[1] High-risk subtypes of the virus are human carcinogens, responsible for cervical, genital, anal, and oropharyngeal cancers. Low-risk subtypes are the cause of genital warts. Almost 80 million sexually active adults, one in four in the United States, are infected with HPV, despite the preventable nature of the infection.[1] Young adults age 15-24 account for approximately half of all new infections every year.[1,2] An estimated additional 14 million will become newly infected each year if action is not taken to provide optimal prevention options to those at highest risk.

Causation and Risk

In 1983, HPV was characterized as the biological factor causing cervical cancer, genital warts, and even penile cancer by a team of researchers led by Harald zur Hausen.[3,4] Primary research was aimed at determining the DNA sequences of the various isolated strains of the virus for detection, determining that HPV-16 and -18 are the most virulent strains, causing the majority of pre-cancerous cervical dysplasia and cervical cancer itself. Zur Hausen was awarded the Nobel Prize for Medicine or Physiology in 2008; soon after discovery, this claim was confirmed in other laboratories.[5]

Once the cause of cervical cancer provided verification that it was indeed sexually transmitted, researchers began to explore the various risk factors and exposures which increase the chances of contracting the disease. As early as 1990, Moscicki et al. studied sexually active female adolescents, finding those with an active HPV infection had significantly more lifetime sexual partners than their uninfected counterparts, likely a

result of exposure to multiple sources of infection.[6] The authors note that the majority of the participants who tested positive for oncogenic HPV strains had normal Papanicolaou (Pap) test results, indicating the need for early preventative and detection measures prior to allowing the disease to advance. It has been suggested that the majority of the HPV infections among younger females are due to exposure through a new partner, and may be a more short-lived, transient infection.[7] A study in Denmark shares these sentiments, adding that these transient infections are more often associated with the low-risk, non-oncogenic HPV types.[8]

A few studies indicate that among older women, persistent and/or latent HPV infections are more common, possibly leading to higher risk for cervical cancer outcomes.[8,9] Munoz et al. (1996) found that among middle-aged women in their 40s and 50s, having six or more lifetime sexual partners was associated with a fourfold increase in risk.[10] In addition, there was a statistically significant positive association between HPV infection and low socioeconomic status as well as previous *C. trachomatis* (chlamydia) infection. Munoz et al. also found that infections were found among women who were not recently sexually active, in accordance with previous findings that indicate that HPV infections could be persistent in nature, creating a clinically significant outcome long after acquisition.

Sexual behavior and characteristics of male sexual partners have been explored among women in college (reported by the woman), and among married men. Burk et al. (1996) found that age >20 years, Black or Hispanic ethnicity, currently not attending college, and increased number of sexual partners among male partners was associated with HPV positivity among the female partners.[11] Related studies among Spanish-

speaking populations confirmed that husbands of women diagnosed with cervical cancer are indeed vectors of the HPV virus, and exposure to the virus is mediated by factors such as extramarital sexual relationships and a large number of sexual partners.[10]

HPV and HPV Vaccination

More than twenty years after the isolation of HV-16 and HPV-18, vaccinations became licensed in the U.S. Safe and effective vaccines have been licensed to protect against HPV since 2006, and have been proven to decrease HPV-related morbidity.[12] The quadrivalent HPV vaccine protects against the two main high-risk and the two main low-risk HPV subtypes. The 9-valent HPV vaccine protects against these and an additional five subtypes.[12] The suggested age to routinely vaccinate is 8-11 years old, but the recommendation is extended for women up to age 26 and men up to age 21 if they were not vaccinated when younger. It is ideal for adolescents to be vaccinated prior to first sexual contact. Those with compromised immune systems as well as gay or bisexual men are also urged to receive the vaccination though age 26.[13]

Both vaccines operate on the same dosage and administration schedule. Each dose consists of 0.5mL of virus-like particles (not live virus), which is injected intramuscularly in two doses if given between 8-11 years old, three doses otherwise. The second dose is administered between 4 and 8 weeks after the first, and the third is administered 12 weeks after the second. Women who experience abnormal Pap test results are still encouraged to become vaccinated to protect against infection by other HPV types.[13]

The U.S. Department of Health and Human Services calculates that approximately 53,000 cases of cervical cancer can be prevented if 80% HPV vaccination coverage can be achieved among eligible adolescents and young adults who remain a

priority population due to disproportionately high HPV incidence.[14] The available HPV vaccines are currently underutilized in the adolescent and young adult population for which they are intended, generating a setting for preventable HPV-associated malignancies and related mortality to rise.[15] Despite advancements in screening, the state of Florida has one of the highest cervical cancer incidence rates nationwide.[16]

The efficacy and safety of the vaccines has prompted countries other than the U.S. to begin routine vaccination of their adolescents and young adults, with positive results. In 2008, Scotland commenced a nation-wide HPV vaccination program in which all adolescent females between 12 and 18 years of age were recommended to become routinely vaccinated.[17] Since 2008, the percentage of fully vaccinated girls has increased to over 90% annually in the 12-13 year old cohorts, effectively reducing the prevalence of HPV-16 and -18 from 29.8% to 13.6%.[18] Additionally, there was a significant finding that the bivalent vaccination also provided cross-protection against emerging HPV types found to cause cervical cancer.

Australia, which implemented school-based delivery of the quadrivalent HPV vaccine to 12-13 year old girls in 2007, decided in 2010 to extend the use of the vaccine to boys and men up to age 26.[19] Recognizing the risk that HPV poses to men who have sex with men (MSM) in addition to the benefits to women from men receiving the vaccine, Australian health officials have found that extending the vaccine to adolescent and young men is not only cost-effective, but necessary to reduce the burden of HPV-related disease. Georgousakis et al. (2012) indicate that practices in Australia can serve as an example of how other countries can implement an immunization program which maximizes coverage and is cost-effective.[19]

The burden of HPV-related disease in the U.S. exacerbates rising healthcare costs despite undeniable evidence the vaccines can reduce HPV incidence.[20] In the absence of a national vaccination program similar to those proven successful in other high-income countries,[21] coverage rates are marginal in the U.S., primarily due to safety concerns and controversy.[2,16] In 2014, all three doses of the HPV vaccine were completed by 40% of adolescent girls and 22% of boys in the U.S.,[16] falling far below the objective of 80% as outlined in Healthy People 2020.[22] Despite a modest increase in vaccination since 2012 (particularly in young men), HPV vaccine coverage in the U.S. remains considerably lower than other routine adolescent vaccines.[16] Prelicensing studies specified that the implementation of vaccination of males would be acceptable, though parents were still more comfortable with vaccinating girls rather than boys for HPV.[23]

A systematic review conducted by Kessels et al. (2012) found that vaccine uptake until 2011 (excluding males) was largely based on structural barriers such as having health insurance, having a healthcare provider, and utilization of healthcare.[24] In addition, the authors discovered that positive vaccine attitudes and higher vaccine knowledge also played a major role in the uptake of the vaccine among teenaged girls as well as intention to vaccinate. Negative predictors among parents of vaccine uptake were found to be concerns regarding the safety of the vaccine, and possible negative side effects. Several studies on parental acceptance of the HPV vaccine indicated that many parents felt that vaccinating their child may lead to early initiation of sexual activity and even promiscuity, prompting parents to delay vaccination of their child until they were older.[25–27] Despite widespread concerns related to sexuality and the HPV vaccine among

parents across the world, multiple studies have indicated that receiving the vaccine has no effect on sexual debut or increase of risky sexual behavior at any age.[28,29]

College Students' Knowledge of HPV

An early study found that of various STIs assessed, college students knew the least about HPV, with 37% of students never even hearing of the virus.[30] Among female students who reported being diagnosed with HPV, 68% had not heard of the virus before being diagnosed. Men were less knowledgeable about HPV, despite their high prevalence of HPV infection.

HPV knowledge deficits among college students have not been resolved: a 2012 survey of college males aged 18-25 found that 74% of the participants had not received the HPV vaccination, and only 14.2% had completed the full series.[31] This study also found similar results as previous studies regarding knowledge of the virus and vaccine: almost 50% of the respondents had never heard of HPV, nor were they aware that there was a vaccine. Furthermore, many of the young men did not perceive risk for contracting the virus. Participants also had low awareness that men should be vaccinated against HPV, and low awareness that they fell within the age bracket recommended for vaccination. These perceptions were common despite reporting low condom use and high numbers of lifetime sexual partners. Compounded by the gender disparities in vaccination uptake, knowledge deficits about HPV and HPV vaccine exist for ethnic and sexual minorities, contributing to an increased risk in minority populations.[32]

Hispanic Attitudes toward HPV

Hispanics or Latinos are the largest, and fastest-growing minority population in the U.S.[33] They share a common language and culture, with attitudes and values that tend

to differ from those of non-Hispanics. Hispanics are generally grouped as a single ethnic category (independent of self-identified race), although they represent multiple nationalities and are culturally heterogeneous.[33]

In the U.S., Hispanic women suffer from the highest cervical cancer incidence rates, and Hispanic men have a higher incidence of HPV-associated penile cancer than non-Hispanic men.[34] These disparities prompted health agencies to prioritize Hispanics for cervical cancer screening, STI prevention, and educational interventions.[35] Hispanics are less likely to have heard of HPV or HPV vaccination than non-Hispanic whites.[36] HPV-related knowledge has been examined as a determinant of HPV vaccine acceptability and uptake; however, distinctions between Hispanics of different demographic backgrounds are not often made.[37,38] Immediately following the recommendation for HPV vaccination, Hispanic rates of HPV vaccination uptake were lower than non-Hispanic whites,[39] although vaccine initiation is now higher among Hispanics.[40] Despite this, Hispanic parents are more likely to be concerned about vaccine safety than non-Hispanic whites,[38] yet are also more likely to follow a healthcare provider's recommendations and less likely to refuse a vaccine when recommended.[41]

The majority of studies assessing HPV-related topics among men focused on immunocompromised men or MSM, and rarely examined Hispanic men.[42–44] Heritage and culture may play a large role in the healthcare decisions of Hispanic men, especially in health-seeking behaviors such as vaccination.[45] Beyond ethnic identity, the socially constructed composite defining Hispanic masculinity and other gender norms may also influence HPV knowledge and vaccination behaviors.[46] Machismo has a role in framing the views that health enables manhood, and the identity of manhood dictates health-

seeking behaviors.[45] Among 113 Hispanic college men surveyed in southeastern U.S., only 30% agreed that men were at risk for contracting HPV, and only 12% felt personally threatened by that risk.[45] Less than half intended on becoming vaccinated against HPV.

LGBTQ and HPV

Healthy People 2020 indicates that "improving health of LGBTQ is a public health priority".[22] Whereas several studies describe the lack of knowledge and poor perceptions of HPV risk among college students,[47–50] limited data are currently available about HPV knowledge and attitudes among LGBTQ university students. Despite having similar prevalence as heterosexuals, many LGBTQ persons are less knowledgeable about HPV, perceiving they are less susceptible to HPV and its effects due to sex behavior differences.[51]

MSM have specific risks for anogenital warts and associated cancers, making this often-overlooked group especially needy of the HPV vaccine, despite having consistently low knowledge of HPV, similar to heterosexual males.[52] Although LGBTQ are cited as a public health priority, only 4.9% of MSM reported receiving any number of doses of HPV vaccine as reported in the National HIV Behavioral Surveillance System in 2011.[53] Approximately 75.9% of the sample had visited a healthcare provider within the previous year.[51] A 2012 meta-analysis found anal HPV infection to be very common in MSM (63.9%), especially in immunocompromised individuals (92.6%), many exhibiting signs of anal cancer.[54]

Up to 30% of women who have sex with women (WSW) have a current HPV infection, with up to 25% of WSW reporting diagnoses of cervical abnormalities, a rate that is similar to heterosexual women.[55] Despite the similarities between WSW and

heterosexual women in this respect, many sexual minority women perceive that they are less susceptible to HPV and its effects given the nature of their sexual activities. A recent study found that from 2009-2012, WSW received the HPV vaccine at similar rates as heterosexual women, although predictors of vaccine uptake were different for the two groups.[56]

With so many studies consistently describing the lack of knowledge of HPV and HPV vaccine among young women, and even more so among young men, recommendations have been made that educational interventions be targeted at the young adult population.[52] The college and university setting create an optimal environment for education about the virus and uptake of the vaccine, and possibly removing structural barriers which prevent vaccination among those who are knowledgeable about the vaccine. There is a need for HPV research with more diverse samples of men, especially in southern states, a region which experiences some of the lowest HPV vaccination rates in the country as well as some of the highest HPV infection incidence rates.[57] Many studies[30,58] concurrently indicate the need for implementing HPV educational and vaccine promotion programs, as well as continued focus on the importance of male HPV vaccination.[59]

It has been over ten years since the bivalent and quadrivalent HPV vaccines were recommended in the U.S. With the recent licensure of an improved 9-valent HPV vaccine in December 2014, increased global media attention has been paid to HPV related issues of vaccine uptake and attitudes. [60,61] Barriers such as lack of knowledge and unsupportive attitudes must be characterized to close the gap of vaccination uptake and health disparities among genders, ethnicities, and sexual identities and orientations.[15] The

proposed project represents a timely assessment of the progress that has been made in increasing awareness and improving attitudes of this underutilized vaccine.

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CHAPTER III

Methodology

Sample

Institutional Review Board approval was obtained from Florida International University's Office of Research Integrity and granted through April 2017 for implementation of the intervention and collection of survey data from approximately 400 participants enrolled in the FIU Women's Studies course WST 3641: "LGBT and Beyond: Non-Normative Sexualities in Global Perspective" (Appendix A). This IRB protocol was amended in November 2016 to reflect the addition of data collection in the course IDS 3189: "International Nutrition, Public Health and Economic Development" in the semesters of fall 2016 and spring 2017 as a control group for the intervention. Survey data were collected once per semester per course until spring 2017, with the exception of fall 2015. The intervention group was a purposive sample; the womens' studies course was selected for this study due to the historical overrepresentation of LGBTQ students enrolled. Students 18 years of age or older were eligible to participate in the study. Any students who did not meet the age requirement were allowed to participate in educational activities, but did not take part in survey data collection. Based upon a power analysis, a sample size of 317 should have produced 80% power at the .05 level of significance to detect expected effects based on a review of relevant literature. Enrollment of WST 3641 was between 65 and 90 students per semester.

Questionnaires

Pre- and post-tests, which were self-administered written surveys, were adapted from the North Carolina Men's Health Survey[1,2] and developed by a team of graduate

public health students in the spring semester of 2015 in the course PHC 6750: "Program Implementation and Evaluation" (Appendix B). The pre-/post-test surveys were pretested with a focus group of 16 graduate public health students. Each survey took approximately five minutes to complete.

Demographic data were collected about the participants (age, gender identity, ethnicity/race, health insurance status, relationship status, sexual practices), followed by questions regarding current HPV vaccination status and willingness to receive the vaccines. True/False questions were used to measure knowledge about HPV and the HPV vaccine, and a five-point Likert scale was used to rate questions regarding attitudes toward severity, susceptibility, and acceptability related to HPV and the available HPV vaccines.

Data Collection

At the beginning of the designated class, students were read a brief statement regarding voluntary participation and consent, then administered the pre-test survey. After collection of the completed surveys, the students participated in an educational intervention, which consisted of dissemination of HPV and HPV vaccination information through a 30-minute PowerPoint presentation followed by a 10-15-minute question and answer session. Post-intervention data were collected through the administration of the post-test, which measured the same components as the pre-test, in addition to an evaluation of the components of the intervention.

Data Analysis

The means, standard deviations, and other descriptive statistics were calculated and subsequently analyzed by gender, sexual identity, and race/ethnicity to determine

homogeneity between data collection points (semesters) and explore differences among these groups. Some survey questions were reverse-scored so results can be analyzed with all responses in the same direction. Wilcoxon-Rank Sum and repeated measures ANOVA were performed on matched-pair (pre- and post-test) Likert questions to determine if these differences were statistically significant. Binomial tests were performed to determine post-intervention outcomes for students who specified "don't know" on baseline knowledge items. Analysis of covariance (ANCOVA) was used to determine whether the post-intervention knowledge means, adjusted for pre-test scores, differed by gender.[3] Repeated measures ANOVA were also used to assess if the intervention influenced mean change in knowledge scores from pre to post differed by independent variables. Pearson's Chi-Square test or Fisher's Exact test was performed to determine differences in between and among groups and categorical variables, and Cochrane-Mantel-Haenszel tests characterized individual pre- versus post-intervention categorical measures stratified by certain demographic characteristics. Statistical significance was set at $P<0.05$. All analyses were performed using SPSS 20.0.[5]

Pilot Testing

Intervention planning and implementation are iterative processes. Each time the intervention was carried out is a learning experience for not only the participants, but the researchers as well. Process evaluations of the pilot intervention conducted in April 2015 prompted enhancements for the presentation component of the intervention, as well as the surveys.

Summary of Pilot Findings

Selected intervention evaluation results of the pilot study were presented the 30th International Papillomavirus Conference in September 2015.[4] LGBTQ students (n=38) were similar to heterosexual students (n=43) regarding demographic characteristics and lifetime sexual experiences (Table 1.1).

Table 3.1 Differences Between LGBT and Heterosexual Students

Table 1. Differences Between LGBT and Heterosexual Students

Characteristics	LGBT (n=38)	Heterosexual (n=43)	% of Total (n=81)	p
Age, mean years	20.78	20.88	20.84	
Female	73.0%	74.4%	73.8%	0.884
Hispanic Ethnicity	64.9%	59.5%	66.3%	0.847
>5 Lifetime Partners	39.5%	27.9%	33.3%	0.181
Ever had vaginal sex	67.6%	65.1%	66.2%	0.391
Ever had oral sex	84.2%	74.4%	79.0%	0.816
Ever had anal sex	50.0%	31.7%	40.3%	0.102

LGBTQ students found the question and answer session more useful and rated the overall session "very positive" (P<0.10) (Table 1.2).

Table 3.2 Student Responses Regarding a Brief HPV Educational Intervention

Table 2. Student Responses Regarding a Brief HPV Educational Intervention

Survey Question	LGBT	Heterosexual	% of Total	p
Highly Knowledgable Before the Intervention (n=75)	33.3%	17.9%	25.3%	0.126
Q&A Session Was Useful (n=78)	54.1%	34.1%	43.6%	.077*
Learned Much About HPV (n=79)	70.3%	59.5%	64.6%	0.319
Overall Positive Experience (n=79)	45.9%	26.2%	35.4%	0.067*

*Statistically Significant (p<0.10)

All participants regarded the session helpful in formulating a decision about vaccine uptake (Table 3). Thirty-five percent expressed strong intentions to be vaccinated after the classroom intervention (P=.04).

Table 3. Intervention Results by Student Sexuality

Table 3. Intervention Results by Student Sexuality

Characteristics	% of LGBT		p	% of Heterosexual		p	% of Total	
	Pre	Post		Pre	Post		Pre	Post
Strong HPV Awareness	13.2%	35.1%	0.376	4.7%	26.2%	0.123	8.6%	30.4%
Strong HPV Vaccine Awareness	5.3%	35.1%	0.891	4.7%	33.3%	0.073*	4.9%	34.2%
Strong Intention to Vaccinate	31.6%	64.9%	0.097*	39.0%	53.7%	0.014*	35.4%	59.1%
Strongly Agree Men Should be Vaccinated	39.5%	75.7%	0.082*	26.8%	65.0%	0.007†	32.9%	70.1%
Strongly Agree Women Should be Vaccinated	44.7%	77.8%	0.089*	38.2%	67.5%	0.001‡	41.3%	72.4%
Agree No One Should be Vaccinated	2.6%	13.5%	<0.001‡	7.3%	9.8%	<0.001‡	5.0%	11.5%

* Statistically significant (p<0.10)
† Statistically Significant (p<0.01)
‡ Statistically Significant (p<0.001)

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CHAPTER IV

Are Men Being Left Behind (Or Catching Up)? Gender Differences in HPV-Related Awareness, Knowledge, and Attitudes Among Diverse College Students

Abstract

Objective: We assessed awareness, knowledge, and attitudes about human papillomavirus (HPV). **Participants:** From April 2015 to February 2017, 386 undergraduates were recruited in a South Florida university. **Methods:** A survey of HPV-related awareness, knowledge, and attitudes was designed and conducted. **Results:** Most (84%) had heard of HPV, and 70% had favorable attitudes toward vaccination. Only 28% of men and 55% of women had received ≥1 dose vaccine, 4% reported receiving three doses. Those with ≥1 dose were more knowledgeable about HPV (P=0.01). High knowledge scores were recorded for 30% of respondents, and strongly associated with perceived knowledge (P<0.001). Negative attitudes toward HPV vaccine acceptance were associated with low knowledge scores and undervaccination. **Conclusions:** HPV knowledge and vaccine uptake remain problematic among college students, and both are associated with negative HPV vaccine attitudes. HPV educational efforts should target young men as HPV-related cancer morbidity continues to rise in men.

Key Words: HPV, College Students, HPV Vaccine, Awareness, Knowledge, Attitudes

Introduction

Human papillomavirus (HPV) infection is the most common sexually transmitted infection (STI) in the world.[1] Although most HPV-infected persons clear the virus completely, HPV causes multiple adverse clinical outcomes in both men and women. Due to the long-established connection between some HPV subtypes and cervical cancer, women were initially thought to be the only population burdened by the virus' clinical outcomes,[2,3] resulting in treatment and prevention solutions solely targeting women.[4–6] Several studies estimate that HPV incidence and prevalence in men are similar to women's, although substantial variability may exist by location and population.[7] This evidence has shown HPV to be the cause of over 90% of genital warts in men, who experience a longer duration of this outcome than women, and incur more treatment costs. HPV is also responsible for the majority of male anal, oropharyngeal, and penile cancers,[8,9] creating substantial health and economic burden beyond that of cervical cancer. The direct medical costs of HPV-related outcomes in the U.S. were estimated to be $1.7B in 2008.[10] HPV-related cases of oropharyngeal cancers in otherwise healthy men will soon surpass the number of cervical cancer cases in the U.S.[11] Despite this trend, men's knowledge and attitudes toward HPV have continued to lag behind women's, a seemingly continuous effect of previous female-focused prevention efforts.

The Advisory Committee on Immunization Practices has recommended safe and effective HPV vaccination for 9-26 year old girls and women since 2006.[12] Substantial decreases in vaccine-preventable HPV subtype infections were evident after only the sixth year of vaccine implementation in the U.S.; a 64% decrease was observed among those 14-19 years and a 34% decrease among those 20-24 years.[13] The quadrivalent HPV

vaccine was additionally recommended for boys and young men in 2011.[12] Despite its proven success, HPV vaccination rates among boys and men in the U.S. are far below the recommended Healthy People 2020 target of 80% coverage easily achieved for other routine vaccines.[14]

For college students, HPV infection constitutes a substantial threat considering this population's increased sexual activity and sexual risk-taking.[15–17] College-aged young adults (20-24 years old) have the highest prevalence of anogenital HPV infection.[8,13] Most universities provide onsite medical facilities for students, offering HPV vaccination and education among other preventive services.[18] Despite the availability of these services, HPV-related knowledge in college students may be low compared to other STIs, especially among young men.[19] The sluggishly growing HPV vaccination rates leave a large population of college-aged young adults unprotected, despite eligibility to receive catchup doses.[20] Several studies report that vaccine acceptability is correlated with awareness and knowledge about HPV,[21–24] yet until recently, little research has included college-aged men's attitudes toward HPV vaccination.[25–27]

Research focused on characterizing disparities in awareness and knowledge is especially needed in ethnically diverse areas such as the state of Florida, which has some of the lowest HPV vaccination rates in the country, as well as some of the highest cervical cancer rates.[28] Evaluating what men and women in college know, think, and do about the threat of HPV can offer possible solutions to remedy the underutilization of the HPV vaccine in a population at high risk for contracting this preventable infection. This

report explores differences in HPV-related awareness, knowledge, attitudes, and practices among college students in south Florida.

Methods

A cross-sectional study of university students focusing on students' HPV-related awareness and knowledge, as well as attitudes and uptake of HPV vaccination, was conducted from March 2015- February 2017. The university's institutional review board granted exempt approval status prior to study implementation.

Participants

Men and women registered in four sections (semesters) of an undergraduate gender studies course taught by the same instructor from March 2015- February 2017 were recruited for this study. Additionally, students enrolled in undergraduate public health and dietetics courses in January and February of 2017 were recruited. Students aged 18 or older who were present on the day of data collection were invited to participate by completing a questionnaire. Participants were read a brief statement regarding voluntary participation and consent. Students were not required to answer every item or return the questionnaire to the study team.

Students were included in the current study if they were (a) 18 years or older at the time of data collection, (b) registered for the college course in which data collection took place, and (c) were present in class at commencement of data collection.

Survey Procedures

At the time of data collection, the research team explained the purpose of their visit to the class and presented the statement of informed consent. Participants under the

age of 18 years were identified and excluded from participation, but were welcome to remain in the classroom. Written, self-administered questionnaires were then distributed to eligible participants. The survey took approximately 5-10 minutes to complete. Upon completion surveys were deposited by each student into a large envelope or box carried by circulating research team members. Participants received tokens of appreciation for their time, such as promotional pens, pencils, lip balm, and condoms.

Measures

The questionnaire consisted of 34 items. Nine were sociodemographic or descriptive items. Eighteen items were adapted from the 100-item 2009 University of North Carolina Men's Health Survey.[25,29] The remaining items were developed in March 2015 after a review of the literature and were based on the aims of the current study. Questionnaires were pretested with a focus group of 16 graduate public health students and revised based on feedback received (questionnaire is available from authors upon request).

Sociodemographic and baseline data (i.e. age, gender identity, ethnicity/race, health insurance status, sexual orientation, relationship status, sexual activities, and number of partners) were self-reported. Awareness of HPV was assessed with a single question that asked participants, "Have you heard of HPV or human papillomavirus before today?" (yes, no, don't know). Participants then indicated how many doses of HPV vaccine they had received as of that day (0, 1, 2, 3, don't know), and subsequently if they were not already fully vaccinated, if they were willing to take the HPV vaccine (yes, no, don't know). Participants also responded to the question, "Before today, I have never thought of getting the HPV vaccine for myself" (yes, no, don't know).

Eleven questions measured beliefs about various HPV-related statements on a five-point Likert scale ranging from "strongly agree" to "strongly disagree" with an additional "don't know" option. We developed an ad-hoc scale consisting of the five Likert items specifically addressing vaccination. We found the Carolina HPV Immunization Attitudes and Beliefs Scale by McRee et al.[30] for caregivers and adapted by Dempsey et al.[31] for young women to be well suited for our investigation, but too lengthy for inclusion in our brief questionnaire. Our scale succinctly gauged participants' attitudes toward the HPV vaccine, who are appropriate recipients, and vaccines in general (e.g., "Vaccines in general are safe and effective," "My opinion of the HPV vaccine is mostly positive"). Items were coded such that "strongly agree" or "agree" corresponded to a positive attitude toward that topic. Reliability assessment of the vaccine attitudes scale was conducted with Cronbach's alpha ($n=397$, $\alpha=0.91$).

Participants were then asked to describe their perceived level of knowledge of HPV and the vaccine in two separate questions as "Nothing at all," "a little," "a moderate amount," or "quite a lot". Aside from respondents' reported self-perceived knowledge related to HPV, we measured knowledge with seven true/false items. We created a composite knowledge score by summing the number of correct responses (maximum of seven total). Respondents' knowledge was categorized as either high (four or more questions correct) or low (three or less questions correct). Knowledge items included questions such as "Some strains of HPV are harmless" (True) and "The HPV virus causes herpes in men and women" (False). Participants were not required to answer each question before proceeding to the next. We report percentages for the complete sample, and percentages (n/N) when analyses contain missing data.

Data Analysis

Univariate means or percentages were first calculated for sociodemographic variables in the entire sample and then by gender. Descriptive statistics were subsequently calculated to determine homogeneity between data collection points and sites (semesters and courses). When differences were negligible, data were pooled.

Categories for items regarding awareness of HPV and number of doses categories were collapsed into dichotomous outcomes. Likert questions were collapsed into "Strongly Agree/Agree", "Disagree/Strongly Disagree", and "Neutral/Don't Know". Likert items were reverse-scored if necessary to allow results to be analyzed together. Demographic differences in the knowledge score and HPV attitudes scale were determined using Pearson's chi-square test.

We then explored correlates of five HPV-related outcomes: awareness, self-perceived knowledge, measured knowledge (score), willingness to vaccinate, and vaccine beliefs (scale). Sociodemographic characteristics such as age, gender, race, ethnicity, health insurance status, HPV awareness, and HPV vaccine uptake were among potential correlates.

A post-hoc power analysis was conducted with GPower,[32] which indicated a sample size of 358 was needed to detect effect sizes of w=0.5 for tests of independence. Statistical significance was set at $P<0.05$. All analyses were performed using SPSS 20.0.[33]

Results

Sample Characteristics

Of the 409 students eligible to participate, 389 (95%) completed the survey and were included in the current analysis. Three participants were under the age of 18 and were excluded. Participants had a mean age of 22.3 years (SD=4.9) and were mostly

female (70%). Approximately two-thirds were Hispanic (66%) and single (66%), and over half identified their race as white (59%). Less than two thirds (62%) identified their orientation as heterosexual/straight and 55% reported between one and five lifetime sexual partners at the time of survey. Men were more likely to report greater than ten lifetime sexual partners than women (28% vs. 10%, respectively). Students reported ever having more oral (80%) and vaginal (69%) lifetime sexual experience than anal sex experience (36%). Fourteen percent reported having no lifetime sexual partners. Over three-fourths reported having health insurance coverage (78%; Table 1).

HPV Awareness and Vaccination Status

Overall, most participants (84%) had heard of HPV; more women were aware of the virus than men (86% versus 77%, respectively), although this difference was not significant (P=0.07). Number of lifetime sex partners was not associated with HPV awareness; however, participants who reported being single were less likely to be aware of HPV than those in a relationship (P=0.01). No significant differences were found by race (Black, White, other), insurance status, or age.

Despite being mostly aware of HPV, the majority (60%) of participants had not received any HPV vaccine doses or did not know their vaccination status at the time of survey. Participants who had received any doses of HPV vaccine were more likely to report having heard of HPV ($P \leq 0.001$; Table 2). While 40% of respondents had at least one dose of HPV vaccine, only 15.3% had received three doses. Significant vaccination differences by gender were evident; 72% of men had received no or an unknown number of doses of HPV vaccine compared to 55% of women (P=0.01). Only 4% of men in this sample had all three doses compared to 26% of women ($P \leq 0.001$). Forty-five percent of

men and 27% of women said they had never thought about getting the HPV vaccine for themselves (an additional 23% of men said they don't know; $P<0.001$).

Perceived and Measured HPV-Related Knowledge

In response to the question "How much would you say you know about HPV?" (perceived knowledge), 69% of men and 62% of women perceived that they knew nothing or little (NS), and even more reported knowing nothing or little about the HPV vaccine (72% men and 67% women, NS). Seventy percent of participants scored low (≤3 correct out of seven) on the True/False knowledge section. There were no significant gender differences in overall mean knowledge score; men earned an average score of 2.1 out of seven (SD=2.1), and women earned an average of 2.5 (SD=1.9, NS). Despite this, men (38%) were more likely than women (24%) to score zero points ($P=0.005$). Only seven participants (1.8%) answered all seven questions correctly (Figures 1 and 2).

Age group was significantly associated with knowledge score; 82% of 18-20-year olds in this sample were categorized as having low knowledge versus 62% of 21-23-year olds ($P<0.001$). A simple main effects analysis showed that age group was not a statistically significant influence on men's knowledge scores ($F(1, 106)=0.13$, $P=0.72$). However, age was a significant factor in women's HPV knowledge score ($F(3, 256)=11.3$, $P<0.001$). Age was further analyzed in women by pairwise comparisons using Tukey's post-hoc test, which showed that women in the 18-20-year-old age group had a significantly lower mean knowledge score than the other three age groups, and knowledge progressively increased with age group ($P<0.001$; Figure 3).

Half or more of respondents incorrectly identified herpes or AIDS as diseases caused by HPV (58% and 50%, respectively), with no significant differences by gender. Participants who received any doses of HPV vaccine (47%) or had >10 lifetime sexual partners (46%) were significantly more likely to score high on the knowledge items than others ($P \leq 0.001$ and $P=0.02$, respectively).

There was a strong relationship between perceived and actual HPV-related knowledge. Respondents who characterized their HPV-related knowledge as low (77%) earned low knowledge scores ($P \leq 0.001$). Only 51% of those with a high score perceived themselves to be knowledgeable. Similar to knowledge score and age, there was a significant difference in gender. A simple main effects analysis showed that men's perceived knowledge was not independently associated with men's knowledge scores ($F(1, 109)=2.6$, $P=0.11$). However, among women, perceived knowledge was significantly associated with HPV knowledge score ($F(1, 263)=12.7$, $P<0.001$), with women who perceived to know moderate/a lot about HPV performing better in knowledge score (M=3.0, SE=0.19) than those who perceived themselves to have no/little HPV knowledge (M=2.1, SE=0.15, $P<0.001$).

Vaccine Attitudes

In response to the five-item vaccine attitudes scale, 70% of total participants reported positive attitudes toward HPV vaccination, with men and women responding similarly. Number of doses of HPV vaccine received was significantly associated with vaccine attitudes; an association which differed between men and women ($\chi^2_{MH}(1)=30.9$, $P<0.001$). Vaccinated women were over seven times more likely than unvaccinated

women to report positive vaccine attitudes (RR=7.1, CI[3.3-15.5]). This contrasts with men, whose vaccination status was not significantly associated with vaccine attitudes (RR=2.9, CI[0.9-8.7]).

Of the participants reporting negative attitudes toward vaccines, 85% had received either zero or an unknown number of HPV vaccinations (χ^2=31.8, P<0.00). Eighty percent of participants with negative HPV vaccine attitudes scored low (≤3/7) on the measured knowledge portion of the questionnaire (χ^2=7.6, P=0.01). Of those not vaccinated or undervaccinated (vaccine series initiated but incomplete), 58% were willing to receive the HPV vaccine, and 27% did not know if they wanted to be vaccinated. Participants who had heard of HPV before the day of the survey were more willing to be vaccinated than those who had not heard of the virus before (67% vs 27%; χ^2=34.8, P<0.001).

Comment

Vaccinating both men and women against HPV is essential to protect against the rising HPV-related cancer rate. We focused on gender differences in HPV awareness, HPV vaccine uptake, perceived and actual HPV knowledge, and vaccine attitudes. Men in our sample appeared to be catching up to women in awareness and knowledge, though women were still ahead in HPV vaccine uptake and vaccination intentions.

Awareness

Men and women had high levels of HPV awareness (>80%). In 1999, college students were largely oblivious to HPV; only 37% of students at a Florida university had ever heard of the virus.[34] Although men were less aware than women, we found no statistically significant difference in 2015-2017. The gender disparity gap may be closing

as overall awareness increases among both men and women, an apparent improvement compared with earlier research that showed college women were significantly more aware of HPV than college men.[28,35–37]

Perceived and Measured Knowledge

Despite high levels of HPV awareness among undergraduate students in South Florida, both men and women reported disconcertingly low levels of perceived and measured knowledge on the topic. Poor knowledge scores, especially among the youngest participants, who would have the most to benefit from vaccination, confirmed their self-perceptions. A staggering 38% of men in our study answered no questions at all correctly on HPV knowledge. Our results are consistent with previous studies indicating that despite being acutely aware of HPV and HPV vaccination, significant knowledge deficits persist regarding how HPV is transmitted, what diseases result from HPV infection, as well as how to prevent infection effectively. Of various STDs evaluated in the late 1990s and early 2000s, college students knew the least about HPV,[34,38] and as in our study, they confused HPV outcomes with herpes simplex virus or HIV.[39]

The youngest women in our sample received significantly lower scores than women in older age groups, similar to findings in previous research on age differences.[39] HPV knowledge disparities by age may be explained by older women having more encounters with sexual health education, HPV screening in the medical setting, knowing someone who has been diagnosed with an HPV infection or related disease, or experiencing infection themselves.[39]

After the quadrivalent vaccine was introduced and approved for girls and women in 2006, there was intense marketing from the pharmaceutical manufacturers and health

agencies, but the manufacturer's decision to market the vaccine to middle class consumers as an "anticancer vaccine" effectively detached cervical cancer from its sexually transmitted origins, and gender nonspecificity.[40] A campaign that provided little HPV information possibly may have increased awareness, but failed to increase scientific knowledge.[41] Low knowledge combined with high awareness may also reflect a lack of comprehensive sexual education during the formative years. For over 20 years, Florida public schools have adhered to an abstinence-only or abstinence-based sexual health curriculum.[42] Despite this mandate, Florida lacks consistent state standards for the sexual education that is provided, with many students receiving no sexual health education at all. These results highlight the need for comprehensive sexual health education at all ages, whether it is received from a health care provider, school-based program, or another reliable source.

Attitudes

We were interested in exploring attitudes toward HPV vaccination, and how those attitudes may be associated with vaccination intentions and behaviors. Over 70% of men had not been vaccinated in our study, and only 26% of women and 4% of men had received all three doses of HPV vaccine, despite men reporting similar awareness and knowledge as women. Participants reported favorable vaccine attitudes (70%), yet vaccinated women were seven times more likely to have positive views of vaccination than unvaccinated women, a distinction not observed in young men.

The first vaccines approved in 2006 were initially promoted for girls, creating earlier mindfulness of HPV and prevention among them. Previous studies with young men have found that acceptability of the HPV vaccine has varied from modest (33%–

48%) to high (78%).[21,23,43,44] In the past, the case has been made for altruistic motivation for men to be vaccinated, thereby protecting women through their vaccination.[45] However, the steep rise in HPV-related oropharyngeal cancer morbidity in men and the potential protective effect of the HPV vaccine for oropharyngeal infection[46,47] suggest an urgent need to improve vaccine uptake in men to protect themselves from adverse consequences to their health.

Those with negative attitudes toward HPV vaccination were overwhelmingly uninformed about HPV, and were likely to be unvaccinated. The positive correlation between a favorable attitude and vaccine uptake may be an effect of attitude-behavior consistency. Longitudinal attitude studies have found that positive correlations between attitude and behavior strengthen as a function of information available on the topic, as well as direct experience with the attitude object.[48,49] In our sample, those with positive attitudes tended to be more knowledgeable, but were also more likely to have already received at least one dose of HPV vaccine.

Limitations

Limitations of this study include its cross-sectional nature, which precludes ability to infer causation or establish a temporal connection in variables of interest, such as HPV knowledge and vaccine uptake. This study used a non-probability sample to maximize diversity, thus, generalizability is limited. We collected self-reported data from the participants, which may subject our results to social desirability and recall biases.

Our study was conducted in an urban area of south Florida, a state among those with the highest percentages of Hispanic and foreign-born residents.[50] Florida

(specifically Miami-Dade County) also leads the country in number of Cuban-descent residents, who are typically not representative of Hispanics from other countries.

Despite these limitations, these results provide evidence that a significant number of young adults in the U.S. lack accurate knowledge about HPV, the HPV vaccine, and the importance of preventing HPV infection.

Implications and Future Research

Our results suggest that educational interventions should be delivered to increase knowledge and change attitudes toward HPV and HPV vaccination among college students, especially men and freshman women. The college setting provides an optimal environment for education about the virus and uptake of the vaccine. Furthermore, student health centers can assist in removing structural barriers which prevent vaccination among those who are knowledgeable.[51,52]

Future research can integrate these findings to fine-tune which populations should be targeted, and support research aimed at improving knowledge and attitudes regarding HPV among men. Qualitative research can be conducted with at-risk groups, such as men, to inform the design and development of tailored interventions. This type of research would be useful in determining what messages are suitable for this population, as well as who provides messages, where messages are delivered, and which approaches should be utilized.[27]

To expedite the achievement of state and national vaccination goals, several actions can be pursued. Florida and other states can review options for the implementation and evaluation of comprehensive sexual education for elementary, middle, and high school students. Many studies have reported support for such programs

from both teachers and parents.[42,53] Because there is not a cure for HPV and other viral STIs, primary prevention is essential. Florida and other states may in the future follow the lead of states such as Virginia, Rhode Island, and the District of Columbia in requiring HPV vaccination for school matriculation along with other routine vaccinations.[54]

In 2012, former Florida Senator Thad Altman introduced Senate Bill 146, requiring that parents and caregivers of students entering grade six at least be given information about HPV, related diseases, and the availability of vaccines to prevent its transmission.[54] The bill died in the Health Policy Committee. In January 2018, Senate Bill 1558 was introduced in Florida by Miami Senator Jose Javier Rodriguez which would make it mandatory for 11 and 12-year olds attending public school to become vaccinated against HPV.[56] The bill died in the Health Policy Committee.

If HPV vaccination were also required for college matriculation, dramatic reductions in HPV-related outcomes might be seen. For young adults, increased gender-inclusive, targeted information for college students in clinical settings would reinforce health promotion messages. To remove barriers such as cost and access, student health centers and clinics could determine mechanisms to offer HPV vaccination to students free of charge. Providers could conduct a vaccine eligibility assessment at each visit, regardless of gender, and during general non-STD visits also. National vaccine registries and reporting systems should be integrated and intuitive for clinicians, which would help strengthen vaccine reporting and support vaccine recommendation equality.

Conclusions

Carrying the majority of the HPV burden, there is a distinct opportunity for preventive measures to be improved among 18-26 year olds across the country. Our

findings indicate the need for aggressive targeting of young adults for education and behavioral intervention, with particular attention on young men. Despite general awareness of "HPV" and "HPV vaccine" as hot-button terms, participants in this study demonstrated an astonishing lack of detailed knowledge about HPV, which is associated with negative vaccine attitudes and uptake. Knowledge among young men seems to be slowly improving, yet these deficits place unreasonable burden on women to protect against a virus that increasingly affects men. Increased knowledge about young adults' awareness, knowledge, and attitudes toward HPV and HPV vaccination is imperative to reach the goal of 80% HPV vaccination coverage to reduce the burden of HPV-related disease in the U.S.

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TABLES

Table 4.1. Sociodemographic Characteristics of Participants By Gender

Characteristics	Total N=386	Female n=264	Male n=110
	Mean(SD)	Mean(SD)	Mean(SD)
Age, y	22.4 (5.0)	22.2 (4.5)	22.6 (5.4)
Ethnicity	n	n(%)	n(%)
Hispanic/Latino	248(64.7)	171 (63.6)	77 (67.5)
Not Hispanic/Latino	128(33.4)	95 (35.3)	34 (29.8)
Not Sure/Unknown	7(1.8)	3 (1.1)	3 (2.6)
Race			
White/Caucasian	235(62.5)	164 (62.4)	75 (66.4)
Black/African American	81(21.5)	57 (21.7)	25 (22.1)
American Indian/Alaska Native	2(0.5)	1 (0.4)	0 (0)
Asian/Pacific Islander	14(3.7)	9 (3.4)	5 (4.4)
More than one race	27(7.2)	23 (7.6)	3 (2.7)
Not Sure/Unknown	17(4.5)	12 (4.6)	5 (4.4)
Sexual Orientation			
Straight	248(64.9)	184 (68.1)	64 (57.1)
LGBTQ	134(35.1)	86 (31.9)	48 (42.9)
Lifetime Sexual Partners			
0	54(14.1)	38 (14.1)	16 (14)
1-5	214(55.8)	166 (61.7)	48 (42.1)
6-10	57(14.8)	39 (14.5)	18 (15.8)
>10	58(15.1)	26 (9.7)	32 (28.1)
Health Insurance			
Insured	238(78)	161 (75.9)	77 (82.8)
Uninsured	53(17.3)	42 (19.8)	11 (11.8)
Don't Know	14(4.6)	9 (4.2)	5 (5.4)
Relationship status			
Single	254(65.9)	171 (63.1)	83 (72.8)
Married	16(4.2)	12 (4.4)	4 (3.5)
Divorced/Widowed	4(1.0)	3 (1.1)	1 (0.9)
In a Relationship	111(28.8)	85 (31.4)	26 (22.8)

Table 4.2. Differences in HPV-Related Awareness, Perceived Knowledge, and Vaccine Attitudes by Vaccine Initiation

Characteristics	Total	0 Doses HPV Vaccine n(%)	≥1 Dose HPV Vaccine n(%)	P-value
Heard of HPV before today				
Yes	257	143 (77.7)	114 (92.7)	0.001
No/Don't Know	50	41 (22.3)	9 (7.3)	
Perceived knowledge of HPV				0.007
Nothing/Little	216	140 (76.1)	76 (61.8)	
Moderate/a Lot	91	44 (23.9)	47 (38.2)	
Perceived knowledge of HPV vaccination				<0.001
Nothing/Little	238	159 (86.9)	79 (64.2)	
Moderate/a Lot	68	24 (13.1)	44 (35.8)	
Vaccine attitudes				<0.001
Positive	210	105 (57.7)	105 (88.2)	
Negative	91	77 (42.3)	14 (11.8)	

FIGURES

Figure 4.1. Low Versus High Perceived Knowledge of HPV by Measured Knowledge Score

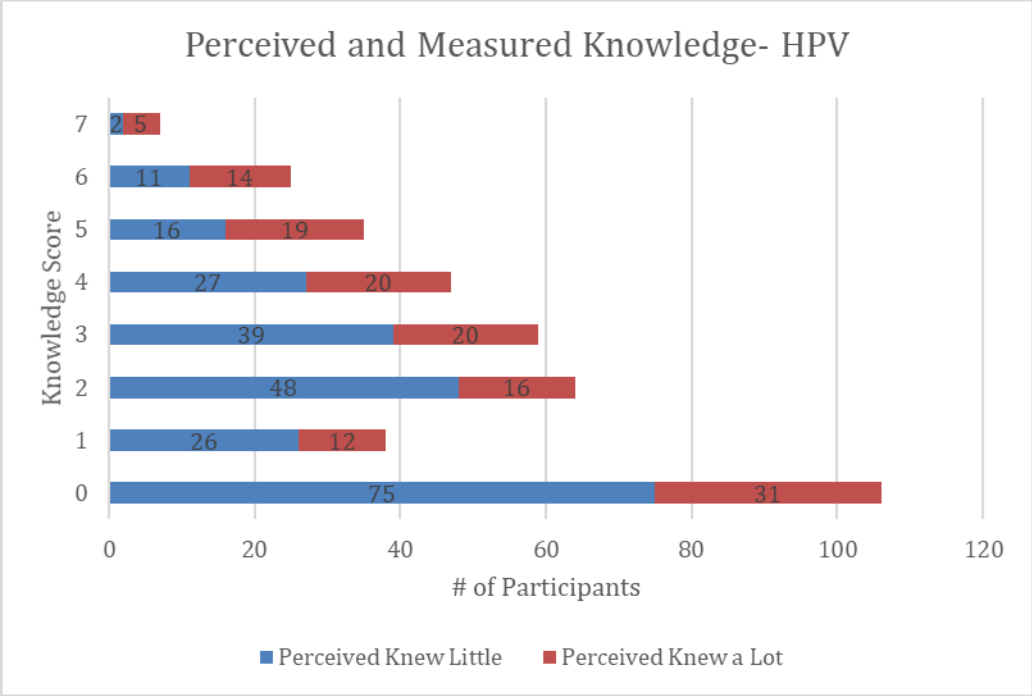


Figure 4.2. Low Versus High Perceived Knowledge of HPV Vaccination by Measured Knowledge Score

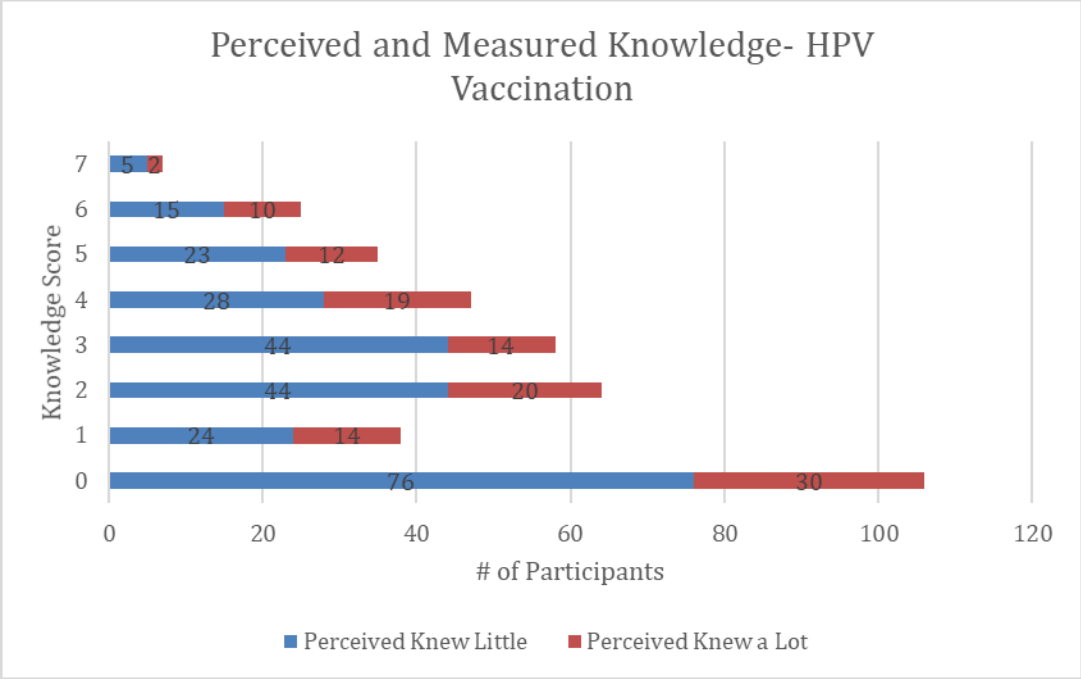
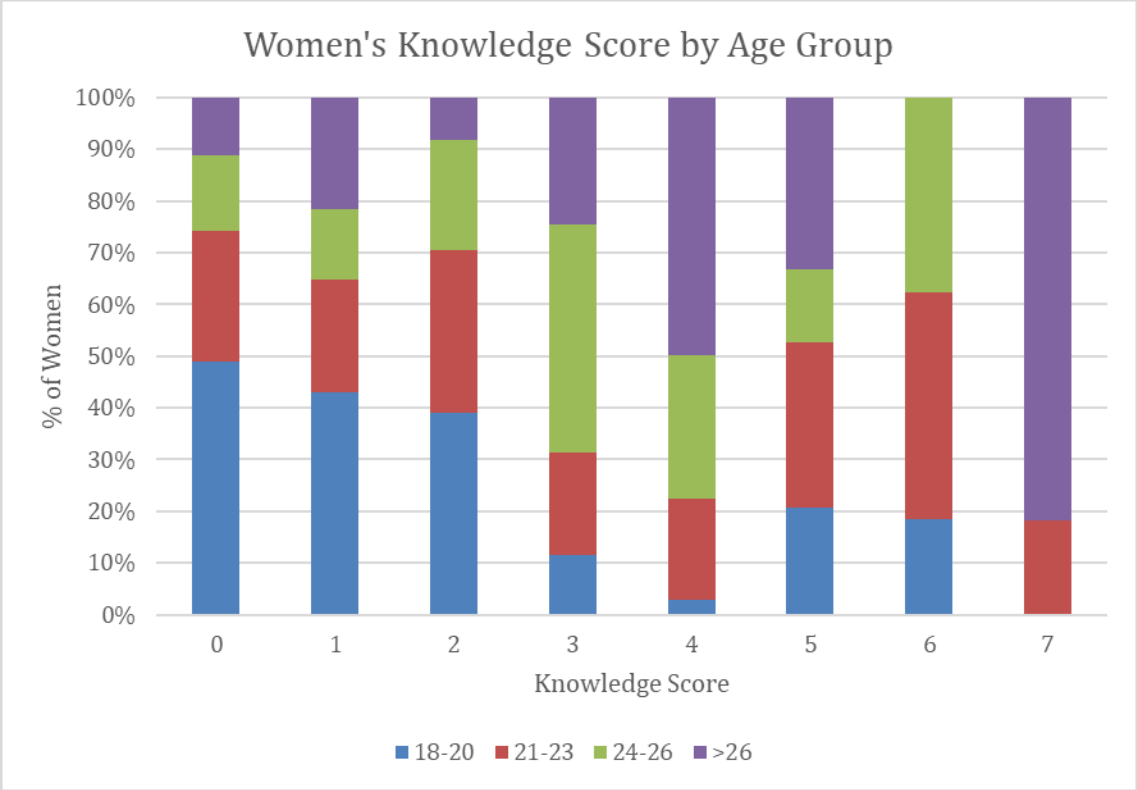


Figure 4.3. Women's HPV Knowledge Score, Stratified by Age Group



CHAPTER V

Usefulness of a brief intervention in improving HPV-related knowledge and attitudes in ethnically diverse students attending a Hispanic-Serving Institution

Abstract

Purpose: To evaluate an intervention designed to improve human papillomavirus (HPV) and HPV vaccine awareness, knowledge, and attitudes. Design: Pre- and post-intervention surveys. Setting: An urban Hispanic-Serving south Florida university. Subjects: Three hundred eighty-seven diverse college students attending a gender studies course. Intervention: Students received a brief educational message designed to improve HPV-related knowledge and attitudes. Baseline and followup survey data were collected. Measures: Outcome measures included baseline and followup awareness of HPV, perceived knowledge of HPV and HPV vaccination, measured knowledge score, and vaccine attitudes. Analysis: Chi square, ANCOVA, and Wilcoxon Rank-Sum tests were used to evaluate the efficacy of the intervention. Results: Hispanic women (48%) were more likely to have initiated HPV vaccination than Hispanic men (27%; P=0.006). At baseline, 70% of participants scored <4/7 points in knowledge. Hispanic participants had more positive attitudes toward HPV vaccination (62% vs. 44%; P=0.009) and were more willing to become vaccinated (66% vs. 46%; P=0.02) than non-Hispanic participants. Participants' HPV knowledge improved by 41% after the intervention, with no difference by ethnicity in post-intervention score. Conclusion: The intervention was useful in improving HPV-related knowledge and attitudes among diverse college students. Future studies should examine barriers to vaccination among ethnic minorities.

Purpose

Human papillomavirus (HPV) infection is the most common sexually transmitted infection globally, and is responsible for multiple clinical outcomes, such as genital warts and cervical, anal, and oropharyngeal cancers.[1] Three safe and effective vaccines have been licensed to protect against HPV, and have been proven to significantly decrease HPV-related morbidity.[2] Recent data have not shown any differences in other routine vaccine coverage rates by ethnicity; however, there is evidence that Hispanic parents are more likely to be very concerned about vaccine safety than non-Hispanic whites.[3] Despite this, Hispanic parents are also more likely than non-Hispanic whites to follow a healthcare provider's recommendations and less likely to refuse a vaccine for their children.[4]

Hispanics make up the largest ethnic minority group in the U.S. Florida leads the country in number of residents of Cuban descent.[5] Hispanics residing in the U.S. generally have lower rates of cancers compared to non-Hispanic whites, apart from cancers caused by an infectious agent, as is the case with cervical cancer and HPV.[6] Hispanic women have high rates of HPV infection and low rates of cervical cancer screening, leading to higher incidence of cervical cancer than non-Hispanic white and Black populations.[7,8] While significant variability in cancer rates exists between Hispanics of different countries of origins, it has been shown that unlike other Hispanic populations, Cubans living in the U.S. have lower cervical cancer rates that are similar to non-Hispanic whites.[9] This distinct cancer profile may be due to a higher observed

education level in comparison to Hispanics from other countries residing in Florida, and to Cuban cervical cancer screening rates similar to the U.S.[10]

Despite advancements in screening, the state of Florida has one of the highest cervical cancer death rates nationwide.[11] Despite HPV being vaccine-preventable, and clinical outcomes of infection ranging from stigmatizing to deadly, HPV-related knowledge is reportedly low among Hispanic populations compared to non-Hispanic whites in the U.S.[12,13]

HPV educational interventions have been efficaciously employed in various settings, primarily with women and parents.[14–17] However, less is known about the potential impact of HPV education for ethnically diverse communities on knowledge and vaccine attitudes. Recent studies have had mixed results in correlating Hispanic ethnicity with HPV vaccine acceptability, and many of these had limited participation of Hispanic men.[18–20] None of these examined HPV vaccinations as a function of vaccine hesitancy, which the World Health Organization defines as a "delay in acceptance or refusal of vaccines despite availability of vaccination services".[21] Hispanic and other ethnic minority groups should be knowledgeable about the potential risks of HPV and the benefits that can accrue by becoming vaccinated against it. Additionally, very little is known about HPV-related attitudes among young Hispanic residents of south Florida. In support of the Healthy People 2020 goal to reach 80% HPV vaccine coverage, the aim of this study was to develop and then test the efficacy of an educational intervention for improving HPV-related knowledge and attitudes among ethnically diverse students

enrolled in a Hispanic-Serving Institution (HSI) in south Florida, a region known to have many Cuban and other Hispanic populations and a high incidence of cervical cancer.

Methods

Design

From April 2015 to February 2017, we conducted a brief in-class intervention in English with students enrolled at a public, urban HSI in south Florida. The university requires all students to speak, read, write, and understand English when enrolled. The intervention utilized a pre-test and post-test to evaluate the efficacy of a 30-minute educational presentation and question and answer session designed to improve basic knowledge of HPV and HPV vaccination.

Sample

The educational intervention was targeted to an ethnically diverse purposive sample of students enrolled at a large Hispanic-serving university situated in south Florida. We recruited from four undergraduate gender studies courses from the spring 2015 to spring 2017 semesters. In addition, we sampled from three dietetics and public health courses in January and February of 2017. Every member of the seven classes who attended on the day of data collection was asked to participate (total enrollment of 409). Participants were read a brief statement regarding voluntary participation and consent, and students were permitted to leave the room at any point if they did not wish to participate. Students under the age of 18 were excluded from study participation. The university's Institutional Review Board approved the study protocol prior to implementation.

Measures

The self-administered written questionnaires elicited self-perceived and measured knowledge about HPV, as well as attitudes regarding severity, susceptibility, benefits, and barriers related to HPV and HPV vaccination. The matched pre- and post-intervention questionnaires consisted of a total of 62 items (38 in the pretest, 24 in the posttest). It was adapted in part from the 2009 University of North Carolina Men's Health Survey,[22, 23] with additional questions added after a review of the more recent literature. Surveys were pre-tested in a focus group and subsequently revised.

At baseline, demographic data (i.e. age, gender identity, ethnicity/race, health insurance status, sexual orientation, relationship status, sexual practices, and number of partners) were collected from participants. This was followed by a single question asking participants if they had ever heard of HPV or human papillomavirus before that day (yes, no, don't know). Participants then indicated how many doses of HPV vaccine they had received as of that day (0-3, don't know), and subsequently if they were not already fully vaccinated, if they were willing to take the HPV vaccine (yes, no, don't know). Participants were then asked to describe their self-perceived knowledge of HPV and HPV vaccines in two separate questions as "Nothing at all," "a little," "a moderate amount," or "quite a lot".

We measured actual HPV knowledge with seven true/false items; correct scores were totaled, and respondents were categorized as either high knowledge (four or more questions correct) or low knowledge (three or less questions correct). Eleven questions measured attitudes toward various HPV-related statements on a five-point Likert scale ranging from "strongly agree" to "strongly disagree" with an additional "don't know"

option. All knowledge items were addressed in the educational portion of the intervention, and further clarified if needed during the question and answer session. The posttest included followup knowledge and attitude questions identical to the pretest with additional questions regarding participants' experience with the intervention.

Intervention

The intervention was designed to improve knowledge and attitudes regarding HPV and HPV vaccination. It was piloted in its entirety in April 2015. The intervention took from 40-50 minutes to complete and consisted of a pretest, moderated educational presentation, question and answer session, and an immediate posttest.

Pre- and post-questionnaires were distributed before delivery of the intervention, matched by identical numerical identifiers. Each survey took approximately 5-10 minutes to complete, and was collected immediately upon completion. The evidence-based presentation contained 26 PowerPoint slides and introduced general information about HPV, including virus subtypes, transmission, clinical outcomes, diagnosis, treatments, prognosis, and vaccination/prevention options. Presentation messages were tailored for ethnically diverse young adults by incorporating physical Hispanic representation in intervention materials.[24] This was intended to develop "felt targetedness" among participants, an important construct in health marketing that identifies the feeling of being the intentional recipient of the health information.[25,26] The question and answer sessions were approximately ten minutes long, and allowed students to ask more specific, often situational questions, although many times the questions were meant to confirm information already presented. Students received tokens of appreciation at the end of data

collection, such as pens, pencils, lip balm, and condoms sponsored by the university's student health center.

Analysis

We report percentages for the complete sample, and percentages (n/N) when analyses contain missing data. Univariate frequencies were calculated for demographic variables in the entire sample, and then stratified by ethnicity (Hispanic versus non-Hispanic). Survey questions were collapsed into dichotomous outcomes where appropriate. Attitude items were coded such that "strongly agree" or "agree" corresponded to a positive attitude toward that topic. Pearson's Chi-Square or Fisher's exact tests were performed to determine differences between and among Hispanic/Non-Hispanic groups. Wilcoxon rank-sum tests characterized pre- versus post-intervention results. In addition, mean knowledge change from pre-test to post-test was evaluated with paired sample *t* tests and one-way ANCOVA. Statistical significance was set at $P<0.05$. Reliability assessment of the knowledge score was conducted using Cronbach's alpha. All analyses were performed using Statistical Package for the Social Sciences (version 22.0).

Results

Descriptive Analyses

Of the 409 students consenting to participate, two were under the age of 18 and excluded from the study. Three hundred ninety-seven participants submitted post-intervention surveys (98%), seven of which did not include baseline data and were excluded. Of these, 382 reported an ethnic identity and were included in the current analysis. Participants were mostly female (71%), with an average age of 22 years

(SD=5.1). Over half were Hispanic (66%), white (61%), and single (66%). The majority identified their orientation as heterosexual or straight (64%). Most had already initiated some form of sexual activity (83%) and had between one and five lifetime sexual partners (56%) at the time of survey. Most reported having insurance coverage (78%). No statistical differences were evident between Hispanic and non-Hispanic participants regarding age, gender, sexual orientation, lifetime sexual experiences, relationship status, or insurance status (Table 1).

Baseline

Awareness and Knowledge

Hispanic participants (86%) were more likely than non-Hispanic participants (78%) to have heard of HPV prior to the intervention (P=0.05). Non-Hispanic (63%) participants were more likely than Hispanic participants (54%) to report receiving at least some information about HPV prior to the intervention, although this difference was not significant at the 95% confidence level (P=0.06).

Twenty-one percent of Hispanic males had never heard of HPV before the intervention experience and 58% reported receiving no information about HPV (similar to non-Hispanic men) compared with 41% of Hispanic women (P=0.02). When asked "How much would you say you know about HPV?" about a third of Hispanic and non-Hispanic participants described their knowledge as "moderate" or "a lot". Regarding HPV vaccination, 32% of participants reported moderate to high self-perceived knowledge. At baseline, 70% of all participants received low scores (<4/7) on HPV knowledge, with no difference by ethnicity.

Vaccine Uptake

While 41% of respondents reported receiving at least one dose of HPV vaccine, only 20% of respondents had received three doses (Figure 1). Forty-one percent of Hispanic participants reported having one or more doses of HPV vaccine, a similar percentage as non-Hispanic participants (39%, $P>0.05$). Hispanic women (48%) were more likely than Hispanic men (27%) to have received at least one dose of HPV vaccine ($P=0.006$), but non-Hispanic men and women were equally likely to report receiving at least one dose ($P>0.05$).

Vaccine Attitudes

Regardless of ethnicity, 69% of participants reported that HPV was a serious concern for women, while only 47% reported that HPV was a serious concern for men. Hispanic men were significantly more likely than Hispanic women to be unsure regarding many of the attitude questions. Fifty-seven percent of Hispanic men reported being unsure if HPV was a rare infection. Despite this, 39% percent of Hispanic men were unsure if HPV was a serious concern for women, while 49% were unsure about the threat to men.

The majority of participants (72%) reported positive attitudes toward general vaccine safety and effectiveness. Hispanic students (62%) were more likely to have a positive opinion at baseline of the HPV vaccine (versus 44%, $P=0.009$), and more likely (66%) than non-Hispanic students (46%) to be willing to take the HPV vaccine if not already vaccinated ($P=0.02$). Hispanic students were more likely than non-Hispanic students to report that women (74% versus 62%, $P=0.04$), and to a lesser extent, men (68% versus 58%, $P=0.04$) should be vaccinated against HPV. Twelve percent of

participants who agreed that women should be vaccinated against HPV disagreed or were unsure if men should be vaccinated. Two-thirds of Hispanic participants (67%) agreed with the statement "everyone should be vaccinated against HPV" compared with 55% of non-Hispanic participants (P=0.04). Non-Hispanic men (37%) were less likely to believe that everyone should be vaccinated against HPV than non-Hispanic women (61%, P=0.03).

Post-Intervention

Knowledge

Immediately after the intervention, participants showed a statistically significant improvement in knowledge and attitudes toward HPV and vaccination. When asked again about their self-perceived knowledge of HPV, 94% of those who felt limited knowledge at baseline felt they knew more following the intervention. Similarly, 91% felt more knowledgeable about the HPV vaccines following the intervention. Participants improved their average knowledge score from 2.4 points (SD=2.0) to 5.3 (SD=1.5) out of seven (P<0.001). There was no difference in post-intervention knowledge score between ethnicities after means were adjusted for pre-intervention score F(1, 349)=.276, P=.60. Further stratification by gender showed that men, regardless of ethnicity, performed just as well as women on the post-test despite earning slightly lower baseline knowledge scores (Fig. 2). Individual item analysis showed that participants significantly improved in each knowledge measure except one. At post-test 46% of participants still incorrectly answered that herpes was caused by HPV, despite this being an improvement from 83% incorrect at baseline.

Vaccine Attitudes

Consideration of HPV as a serious concern for women increased from 69% at baseline to 92% (Z=-10.2, $P<0.001$), and from 47% to 86% for men (Z=-8.2, $P<0.001$). Despite this, only 63% of women and 73.6% of men felt HPV was a threat to their own health. Hispanic participants were still more likely than non-Hispanic participants to agree that women (93% versus 86%, respectively; $P=0.05$) and men (92% versus 86%, respectively; $P=0.05$) should be vaccinated against HPV.

Attitudes toward general vaccine safety and effectiveness moderately increased following the intervention (from 72% in pre-test to 81%). Opinions of the HPV vaccine improved overall at followup, with non-Hispanic attitudes improving to 73%, yet not enough to close the significant attitude gaps seen at baseline compared to Hispanic participants (81%, $P=0.04$).

Intervention Evaluation

No differences were found in evaluating components of the intervention. Both Hispanic and non-Hispanic participants found the intervention experience to be highly acceptable; 93% rated the overall intervention experience to be “positive” or “very positive”. When assessing each component of the intervention, 96% of participants found the educational presentation to be an appropriate length. Ninety-eight percent felt the question and answer session that followed the educational portion to be useful, and 97% felt they learned a great deal from their participation.

Discussion

College students aged 18-26 are in a unique position to participate in catch-up HPV vaccination and should be educated on HPV and vaccination options. A brief HPV

educational intervention administered to ethnically diverse, undervaccinated young adults can potentially improve vaccination rates. HPV knowledge and attitudes can significantly be altered; gender and ethnic disparities can be dramatically reduced.

Baseline knowledge of HPV and HPV vaccination was equally low in our sample of undergraduate students. Women had similar baseline knowledge of HPV and HPV vaccination as their male counterparts, which was a surprising finding, given that the vaccine was initially intended and marketed for women and girls.[27] Several studies to find women surpassing men in HPV-related knowledge.[28,29] Vaccine initiation (≥1 dose) in Hispanic students was 41%, similar to non-Hispanics in this sample, despite reporting receiving less HPV-related information prior to involvement in the intervention. Hispanic adolescents surveyed in a 2015 Florida study reported 61.7% of women and 50.1% of men having received at least one dose of HPV vaccine.,[30] a higher coverage than observed in our study. Results at our university fall well below national HPV vaccine coverage of 63% for adolescent women, and far below the 80% coverage rate needed to see real reductions in the medical burden of HPV.

Despite finding similar rates of vaccine initiation in Hispanic and non-Hispanic participants in our study, there were significant differences in the way Hispanic participants viewed HPV vaccination compared to non-Hispanic participants, which extended into differences in willingness to become vaccinated in the future. Several studies describe Hispanic vaccine consumers as being wary of side effects,[3,4] though we found Hispanic students to have more positive views of HPV vaccination. This may be explained by a burgeoning hesitancy to vaccines among non-Hispanic whites, who rely

less on the medical opinions of doctors than Hispanics to help them make vaccination decisions.[31]

Hispanic participants were more likely to believe that HPV is a serious concern, and expressed more willingness to become vaccinated if not already. Hispanic participants also reported receiving less information on the topic of HPV and HPV vaccination, even with similar insurance coverage as non-Hispanic participants. In addition, Hispanic participants had more positive views of the safety and effectiveness of vaccination in general. These observations suggest that Hispanic students would have higher vaccine coverage than non-Hispanic students if they were provided with the amount of information that non-Hispanic students reported receiving before the intervention. Nevertheless, Hispanic positive attitudes toward vaccination in general as well as toward HPV vaccine may not be enough to influence vaccine coverage rates among Hispanics in Florida and can be greatly improved.

There were several limitations in this study. It was conducted at a single HSI with students enrolled in a limited number of classes. Enrolled students may not be representative of the community or the population of college students in south Florida. Results of this study should not be generalized to other universities or the south Florida community without due caution. We recruited from a region known to have a large Cuban population; while identifying themselves primarily as Hispanic, we cannot generalize our findings to non-Cuban Hispanic populations due to sociodemographic and other differences between Cubans and other Hispanic nationalities. Our assessments were conducted at baseline and immediately post-intervention, so sustainable changes in knowledge, favorable attitudes, and vaccine acceptance were not determined. Vaccination

status was not assessed again in the weeks after the intervention, so we were unable to make any claims that the intervention prompted undervaccinated participants to become vaccinated.

Comparison groups could be utilized in future studies to determine the comparative efficacy of a brief educational intervention to other prevention strategies. Future studies assessing the role of education on HPV knowledge and attitudes should include more measures on ethnicity and pre-existing vaccination stances so that factors related to vaccine intentions can be thoroughly assessed. Providers should prioritize young adults during routine health screenings, and work to minimize missed opportunities for vaccination in a culturally competent and inclusive manner. Particular care should be taken to tailor HPV educational messages for Hispanic young men and women in both clinical and non-clinical settings.

Conclusions

HPV-related knowledge and attitudes can be improved through a brief, tailored and culturally competent educational intervention experience in a college setting. Differences between Hispanic and non-Hispanic students at baseline disappeared at posttest, suggesting that culturally tailored educational materials are a meaningful method for addressing knowledge disparities in ethnic minority communities. Our findings also highlight the ongoing implications of vaccine-hesitant attitudes, despite the proven safety and effectiveness of HPV vaccines. While our approach was successful in bridging a gap for participants with vaccine-hesitant attitudes, more comprehensive strategies might be needed in the future to reach 80% HPV vaccination rates nationwide.

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Tables

Table 5.1. Sociodemographic Characteristics of Participants by Ethnicity.

Characteristics	Total N=382	Hispanic n=252	Non-Hispanic n=129
	Mean(SD)	**Mean(SD)**	**Mean(SD)**
Age, y	22.4(5.0)	22.2(4.5)	22.6(5.4)
	n	**n(%)**	**n(%)**
Sexual Orientation			
Straight	244	154(61.4)	90(70.3)
Gay/Lesbian	66	48(19.1)	18(14.1)
Bisexual	53	36(14.3)	17(13.3)
Other	16	13(5.2)	3(2.3)
Race			
White	233	197(77.9)	36(27.9)
Black	82	15(5.9)	67(51.9)
Other	67	41(16.2)	26(20.2)
Lifetime Sexual			
0	54	36(14.3)	18(14)
1-5	214	150(59.8)	64(49.6)
6-10	55	32(12.7)	23(17.8)
>10	57	33(13.1)	24(18.6)
Health Insurance			
Insured	234	158(79.4)	76(74.5)
Uninsured	52	30(15.1)	22(21.6)
Don't Know	15	11(5.5)	4(3.9)
Relationship status			
Single	254	162(64.0)	90(69.8)
Married	16	10(4.0)	6(4.7)
	4	2(0.8)	2(1.6)
In a Relationship	110	79(31.2)	31(24.0)

Figures

Figure 5.1. HPV Vaccine Initiation and Completion Rates by Gender and Ethnicity.

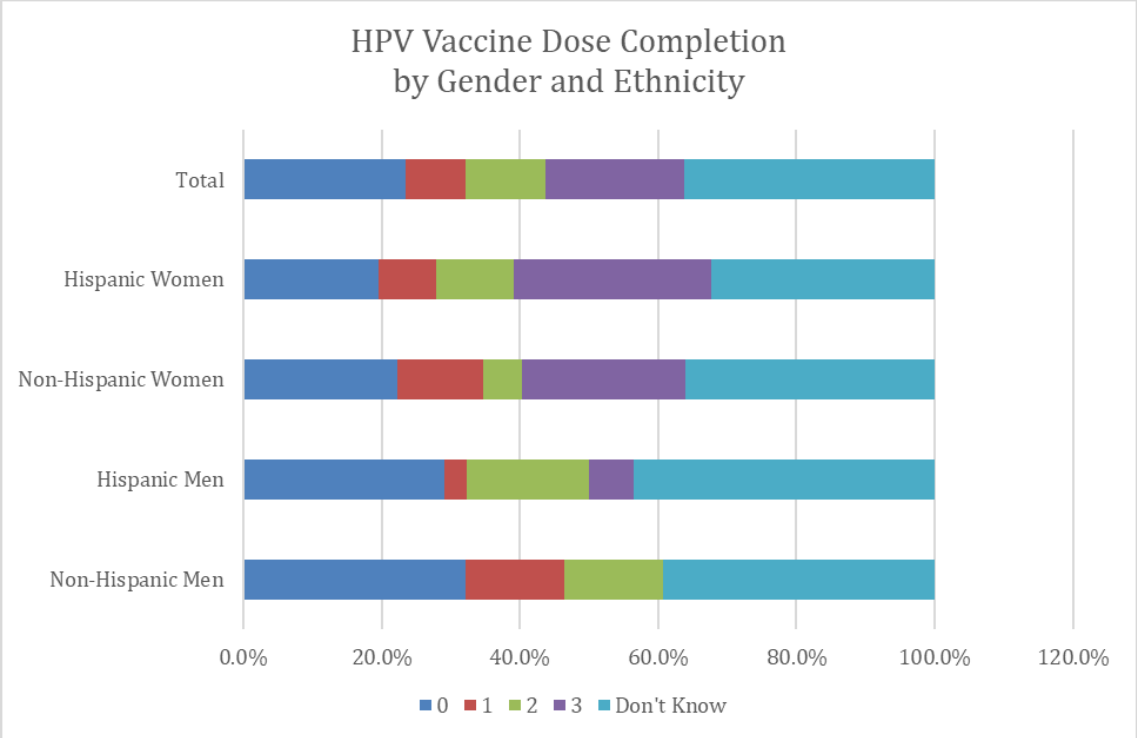
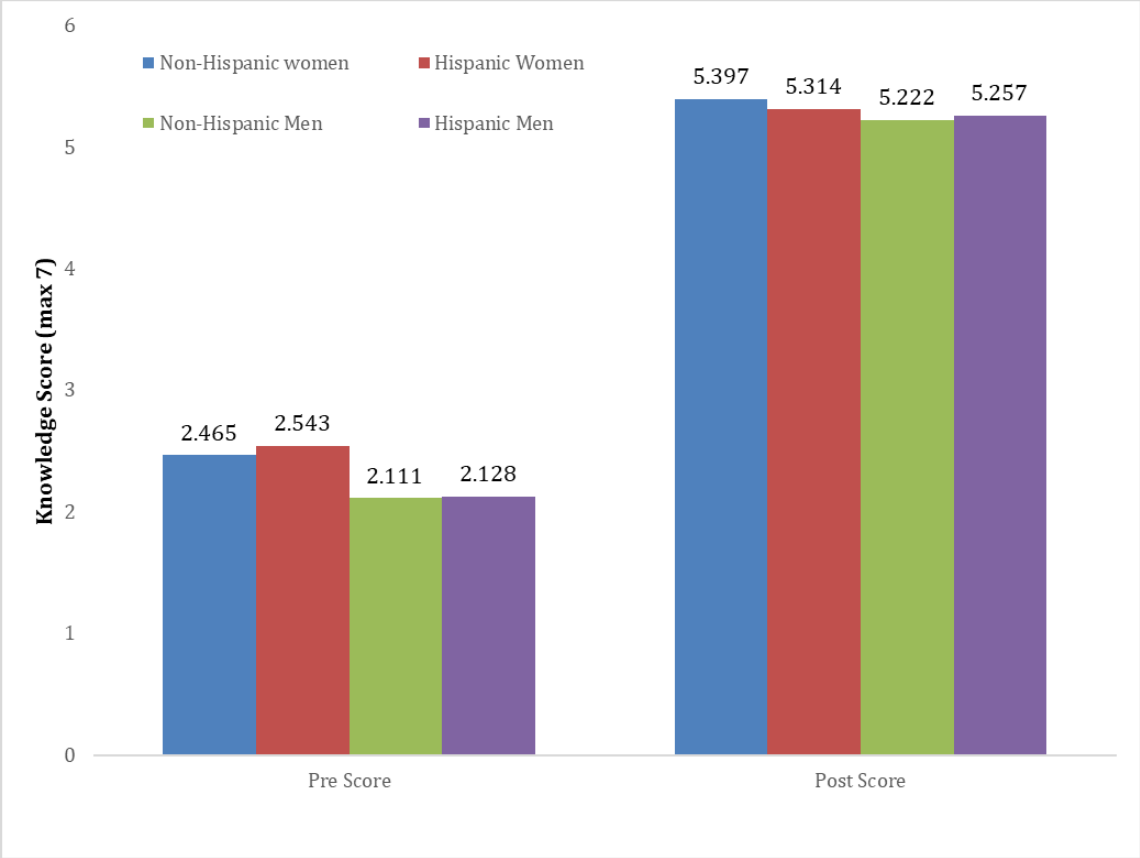


Figure 5.2. Change in Mean Knowledge Score From Baseline to Post-Intervention by Ethnicity and Gender.



CHAPTER VI

Impact of a brief educational HPV intervention among sexually diverse college students

Abstract

Self-identified lesbian, gay, bisexual, transgender, or queer (LGBTQ; n=131, 43.5%) and heterosexually-identified (HSI; n=170, 56.9%) students enrolled in gender studies courses at a Florida university from 2015 to 2017 completed a questionnaire regarding human papillomavirus (HPV) and HPV vaccine knowledge, attitudes, and practices. Women who have sex with women (WSW; 88%) were just as likely as HSI women (86%) to have heard of HPV, received any doses of HPV vaccine (42% vs 46%, respectively), and positively view HPV vaccination (62% vs 59%, respectively); yet were more willing to be vaccinated than HSI women (71% vs 53%; P=0.04). Similarly, men who have sex with men (MSM, 50%) were just as likely as HSI men (41%) to believe HPV is a serious concern for men and that men should be vaccinated (73% vs 58%; P>0.05). Nevertheless, MSM (92%) were more likely than HSI men (68%) to have heard of HPV, to receive any doses of HPV vaccine (37% vs 19%), positively view HPV vaccination (58% vs 39%), and were more willing to be vaccinated (86% vs 39%; $P\leq$0.05). LGBTQ students have positive views towards HPV vaccination and are more interested in becoming vaccinated than heterosexual students, but require prevention information and education pertinent to their particular health needs. Opportunities to engage, educate, and vaccinate sexual minority young adults should be capitalized upon.

Introduction

High-risk, oncogenic human papillomavirus (HPV) subtypes can cause cancers of the cervix, genitals, anus, and oropharynx. Low-risk, non-oncogenic subtypes can cause genital warts.[1] Cervical cancer has prevailed for decades as the clinical paradigm for cancer caused by HPV, with an established clinical framework for screening and treatment in women.[2] Recent evidence has established the natural history of oropharyngeal cancers in high-risk groups, and indicates substantial biological homology to the relationship between cervical cancer and HPV.

Although there are many acceptable terms used to refer to lesbian, gay, bisexual, and transgender people, we will use the acronym LGBTQ (lesbian, gay, bisexual, transgender, questioning) when collectively describing those who identify as sexual minorities, and HSI (heterosexually-identifying) to describe those who self-identify as heterosexuals. The terms men who have sex with men (MSM) and women who have sex with women (WSW) will be used to describe those who self-report as sexual minority males and females, respectively. The terms lesbian, gay, and bisexual are used when we are able to delineate specific differences.

LGBTQ are a medically underserved, priority health group, and require specific attention.[3] The majority of school-based sexual education programs are not comprehensive and typically omit LGBTQ sexual health topics. By the time they reach college age (18-26 years), MSM and WSW will have already experienced a multitude of sexual health inequities which put them at elevated risk for HPV outcomes, often complicated by reluctance to share information about their sexual orientation with healthcare providers.[3,4] MSM in particular have higher rates of HPV infection and disease

than HSI men; a 2016 study estimated 78% of HIV-negative MSM had anal HPV infection and 35% of these infections were found to be cytologically abnormal, a higher rate than HSI men's infections.[5] Positive HIV status increases the risk for anal HPV infection among MSM. Fewer studies examined HPV-related topics among WSW, who are at higher risk for HPV infection than HSI women.[6] None were interventions. Despite this shortcoming, a common misconception is that sexually active WSW are at less risk due to underestimation of prior heterosexual infection, reduced likelihood to receive Pap testing, and MSM-dominated sexual health promotion efforts.[7,8] From 2003-2012, an estimated 49.7% of WSW were infected with any HPV, compared with 41% of HSI women, with even larger differences for oncogenic high-risk types (37.7% in WSW vs. 28.2% in HSI women).[9] Evidence also suggests that like MSM, WSW have a higher prevalence of oral HPV infection than HSI women.[10]

The 9-valent vaccine against HPV is recommended in the U.S. to prevent genital warts and HPV-related cancers, including cervical and oropharyngeal.[11] The Advisory Committee on Immunization Practices (ACIP) currently recommends routinely vaccinating 9-14-year-old children on a 2-dose schedule, regardless of gender, and providing catch-up vaccination for women until ages 21-26. Men should receive catch-up vaccination until age 21. For MSM, the ACIP recommends routine HPV vaccination through age 26. Bisexual women have a higher odds of vaccine initiation and completion than lesbian and HSI women.[4,12] Gay men have higher odds than HSI and bisexual men,[12] with an estimated 21% of MSM and 45% of WSW receiving at least one dose.[13,14] Several affiliations strongly advocate for HPV vaccination to be established as a national priority.[15,16] They suggest that advancement of research on effective HPV educational

interventions be conducted. Two recent systematic reviews of interventions to increase vaccine uptake found no interventions tailored for LGBTQ college students.[17,18] Future HPV interventions should emphasize cultural competence to influence HPV vaccine uptake among diverse groups.

Positive HPV vaccine attitudes are a predictor of vaccine uptake, along with provider recommendation and older age.[13,19] Most studies find LGBTQ young adults to be lacking in knowledge.[20,21] Here we report on a brief, tailored intervention designed to educate sexually diverse college students about HPV and promote HPV vaccination as a safe and effective means of prevention. We describe immediate effects on HPV-related awareness, knowledge, and attitudes, as well as the acceptability of the intervention in a sexually diverse sample.

Methods

The educational intervention was designed to improve knowledge and attitudes regarding HPV and HPV vaccination. The project was piloted in its entirety in April 2015. The project took from 30-45 minutes to complete, including a pretest, moderated educational presentation, question and answer session, and an immediate posttest. The self-administered written pre-/post-tests elicited self-perceived and measured knowledge about HPV, as well as attitudes regarding severity, susceptibility, benefits, and barriers related to HPV and HPV vaccination.

We recruited during four semesters of an undergraduate gender studies course from the spring 2015 to spring 2017 semesters. In addition, we recruited from three undergraduate dietetics and public health courses in January and February of 2017. Every member of the seven classes who attended on the day of data collection was asked to

participate (total enrollment=409 students) and was provided with a statement regarding consent. Students under the age of 18 were excluded from study participation. The university's Institutional Review Board approved the study protocol prior to implementation.

The matched pre- and post-questionnaires consisted of a total of 62 items (38 pretest, 24 posttest). It was adapted in March 2015 from the 2009 University of North Carolina Men's Health Survey (100 items),[22,23] with additional questions derived from a review of relevant scientific literature, using constructs of the Health Belief and Transtheoretical Models as a theoretical guide. Questionnaires were pre-tested in a focus group of seven graduate public health students and was subsequently revised. Pretests and posttests were matched by numerical identifiers. No personal identifying information was requested or recorded.

Each questionnaire took approximately 5-10 minutes to complete. At baseline, we asked participants to self-report information about their sociodemographic characteristics (age, gender identity, ethnicity/race, health insurance status, sexual orientation, relationship status, sexual practices, number of partners), awareness of HPV, HPV vaccine experiences, and willingness to become vaccinated if not already completely protected. Participants were then asked to rate their self-perceived knowledge of HPV and HPV vaccines. Eleven questions (six from UNC Men's Health Survey, five adapted from the literature) measured attitudes toward various HPV-related statements on a five-point Likert scale ranging from "strongly agree" to "strongly disagree" with an additional "don't know" option. We measured actual HPV knowledge with seven true/false items, four of which were adapted from UNC's Men's Health Survey.

Following the baseline questionnaire, the evidence-based presentation contained 26 PowerPoint images and messages that introduced general information about HPV, including subtypes, transmission, infection outcomes, diagnosis, treatments, prognosis, and vaccination/prevention options. The educational presentation was tailored to diverse young adults by incorporating gender neutral and orientation-sensitive language. LGBTQ-positive images with multicultural ethnic representation were shown. All knowledge items assessed in the pre- and post-test questionnaire were addressed in the presentation. The question and answer sessions immediately followed the presentation, usually lasted about ten minutes, and allowed students to ask more specific, often situational questions. The participants then completed the posttest, which included followup knowledge and attitude questions identical to the pretest with additional questions regarding participants' experience with the intervention. Students received tokens of appreciation such as pens, pencils, lip balm, and condoms.

Analysis

All analyses were performed using Statistical Package for the Social Sciences (version 22.0).[24] Statistical significance was set at $P<0.05$. Reliability assessment of the pre and post knowledge score and attitude scales were conducted using Cronbach's alpha. We report percentages for the complete sample, and percentages (n/N) when analyses contain missing data. Univariate frequencies were calculated for sociodemographic variables in the entire sample, and then examined by self-reported gender and orientation (LGBTQ versus HSI) to determine if there were differences between groups. Responses were collapsed into dichotomous outcomes where appropriate. Attitude items were coded

such that “strongly agree” or “agree” corresponded to a positive attitude toward that topic.

Pearson’s Chi-Square or Fisher’s exact tests were performed to determine differences between and among LGBTQ and HSI groups for categorical items. We calculated the mean knowledge score at baseline and followup, and performed one-way ANOVA with Tukey’s post-hoc analysis to determine if baseline mean scores differed by binomial orientation.[25,26] Differences between groups in baseline attitude score was analyzed with Mann-Whitney-Wilcoxon test by gender.[27,28] Participants who responded “don’t know” to baseline knowledge questions were further examined with a nonparametric binomial test to determine how they responded following the intervention.[29] Intervention effects on knowledge and attitude were tested using a repeated measures ANOVA with Greenhouse-Geisser correction, with partial eta squared measuring effect size of the intervention.[30,31] Post-hoc Tukey tests determined if the mean change in scores differed by orientation groups.

Results

Of the 409 students enrolled in the seven classes, 390 (95%) completed the baseline questionnaire, and 364 (89%) completed both a baseline and a posttest questionnaire and answered the two questions regarding self-identified gender and sexual orientation. Most participants (n=232, 64%) self-identified as heterosexual, 132 (36%) identified as LGBTQ. LGBTQ were more likely to be enrolled in the gender studies class (43%) than in the Dietetics and Nutrition classes (1%). Participants had a mean age of 22.5 years (SD=5.16), and identified mostly as female (70.8%). Approximately two-thirds were Hispanic (66.7%) and single (65.9%). Over half identified their race as white

(61.0%). Over half (57%) reported between one and five lifetime sexual partners at the time of survey. Fifty-three (15%) reported having no lifetime sexual partners. Students reported ever having more oral (82.9%) and vaginal (71.7%) lifetime sexual experience than anal sex experience (36.5%). Over three-fourths reported having health insurance coverage (78.9%; Table 1).

LGBTQ students were similar to HSI students regarding age, race and ethnicity, and insurance status, (P>0.05). LGBTQ (89%) were just as likely as straight students (83%) to have heard of HPV and to have received at least one dose of HPV vaccine (40% vs 42%, respectively). Almost half (46%) of LGBTQ students did not know their HPV vaccination status compared with 35% of straight students (NS). Despite this, LGBTQ students were more likely to have positive attitudes toward HPV vaccination (77% vs 66%; P=0.03). In addition, LGBTQ students were more willing to receive the HPV vaccine (79% vs 58%, respectively; P=0.02), and more likely to believe men should be vaccinated (75% vs 57%, respectively; P=0.002).

Men's HPV Awareness and Vaccine Uptake

MSM were more likely to report greater than ten lifetime sexual partners than HSI men (37% vs 18%, respectively, P=0.047). Regarding awareness of HPV, 92% of MSM had heard of HPV compared to 74% of HSI men (P=0.03). HSI men (39%) were more likely to have received zero doses of HPV vaccine than MSM (15%, P=0.035; Figure 1). HSI men (70%) were more likely than any other orientation group (average of 45%) to report receiving little to no information about HPV prior to the intervention experience (P=0.001; Table 2). At baseline, MSM were more willing than HSI men to become vaccinated against HPV if not already (85% vs. 40%, respectively; P=0.001), despite no

differences being reported between the two groups regarding insurance coverage.

Men's Knowledge and Attitudes

At baseline, men's mean knowledge score differed significantly by orientation ($F(2,106)=5.32$, $P=0.006$), with HSI men scoring lower than gay men ($P=0.005$). There was no significant difference in mean baseline score between bisexual men and HSI or gay men ($P>0.35$; Figure 3). Men's mean HPV knowledge scores significantly increased following the intervention (Wilk's Lambda=0.34, $F(2, 95)=184.7$, $P<0.001$, partial eta squared= 0.66). Gay men's mean score change from baseline to post-test was significantly larger than HSI men (Tukey's HSD, $P=0.03$; Table 3).

Regarding the HPV vaccine attitudes scale, we found that although MSM reported more positive views than HSI men at baseline, the differences in distributions of median scores did not differ significantly at baseline ($U=418.5$, $Z=-1.76$, $P=0.08$) or post-test ($U=652.5$, $Z=-0.76$, $P=0.45$; Figure 4). Individual item analysis, however, showed that baseline differences lay with certain questions. MSM were more likely than HSI men to have a positive opinion of HPV vaccination (70% versus 44%, $P=0.03$), and think everyone should be vaccinated against HPV (83% versus 61%, $P=0.02$), despite 70-72% of both groups having positive views of vaccines in general. At post-test, there remained a significant difference in their opinion of HPV vaccination, with MSM men (88%) still more likely to have a positive opinion than HSI men (67%, $P=0.03$). Men's attitudes improved significantly following the intervention, with no differences by sexual orientation (Wilk's Lambda=0.34, $F(1, 54)=106.6$, $P=0.00$, partial eta squared= 0.66).

Women's HPV Awareness and Vaccine Uptake

Women of all orientations reported similar numbers of sexual partners (59-63% reported 1-5 partners). WSW (88%) were just as likely as HSI women (86%) to have heard of HPV, received any doses of HPV vaccine (42% vs 46%, respectively), but expressed more willingness to be vaccinated (71% vs 53%; P=0.04).

Women's Knowledge and Attitudes

Baseline knowledge score differed significantly between women's orientation groups (F(2,250)=4.19, P=0.016). Specifically, lesbian and bisexual women's baseline mean scores significantly differed (Tukey's HSD, P=0.01). Bisexual women scored the highest on baseline HPV knowledge with an average of 45% correct, followed by HSI (39%) then lesbian women (28%). From baseline to post-test, women's overall mean HPV knowledge score increased (Wilk's Lambda=0.37, F(1, 241)=411.56, P=0.00, partial eta squared= 0.63), with no differences in knowledge score mean change between HSI, lesbian, and bisexual women (P≥0.09; Figure 5).

In response to the HPV vaccine attitudes scale, WSW and HSI women had similar scores at baseline (28/40 points; U=1696.5, Z=-1.87, P=0.06). Women's mean change in attitude score shifted significantly in a positive direction following the intervention (Wilk's Lambda=0.53, F(1, 132)=118.1, P<0.001, partial eta squared= 0.47; Figure 6). Bisexual women's mean change was significantly larger than HSI women's (Tukey's HSD, P=0.01), with no significant difference between HSI and lesbian or bisexual and lesbian women (P≥0.2; Table 3).

Intervention Evaluation

At post-intervention reassessment, participants also rated the intervention and its key components. Regarding the overall intervention experience, 93% of all participants rated the intervention experience "positive" or "very positive." Participants (97%) felt they learned much from the educational presentation, and 95% found the presentation to be an appropriate length when given the choice between that or "too long" or "too short". Almost all (98%) participants found the questions and answer session "helpful" or "very helpful". Subgroup analyses yielded no differences by gender or sexual orientation in the evaluation of the intervention elements.

Discussion

As serious HPV-related outcomes become more commonplace, especially among LGBTQ, we must determine the impact of HPV education in risk-reduction and prevention on sexually diverse intervention participants. Governmental and non-governmental health organizations are increasingly calling for efficacious interventions to address a myriad of factors related to HPV prevention[16,32–34] amidst troublingly low HPV vaccination coverage. Few established interventions focus on the impact of participation on the LGBTQ community. Fewer still focus on adolescent or young adult LGBTQ, and not one has targeted the WSW community.[35,36]

We developed and evaluated the acceptability and efficacy of a brief HPV educational intervention designed to inform and encourage HPV vaccination among diverse college students. Young adults who were exposed to the intervention showed immediate knowledge and attitude improvements. Our pre-post intervention design evaluated two specific intervention outcomes between groups. The largest effect sizes

were in knowledge of HPV. We found smaller, yet still significant effects in attitudinal measures regarding general and HPV vaccine acceptability and perceived threat of HPV.

In addition to overall intervention efficacy, we found significant between group differences by sexual orientation. HSI men in our sample reported receiving less information about HPV than MSM prior to the intervention and reported lower levels of HPV knowledge and less positive vaccine attitudes at baseline. At followup evaluation, HSI men reported significantly lower gains in knowledge than MSM. This finding is consistent with research on multidimensional education programs, which find more reliable immediate effects on knowledge than on attitudinal measures.[37,38] Whereas HPV knowledge improved immediately after information is provided, changes in strong attitudes toward vaccination may require larger intervention doses to permanently affect outcomes, despite knowledge being an important determinant in attitude formation and subsequent vaccine intentions and behaviors.

Our findings among men agree with previous investigations into HPV knowledge and with the few HPV interventions targeting MSM. Prior to the recommendation for men to also become vaccinated against HPV in 2011, Gerend et al. found that HSI men were resistant to messages regarding partner protection against HPV, with intervention treatment participants reporting similar acceptability of the HPV vaccine to the control group.[39] McRee et al. documented relatively high HPV knowledge among MSM. However, they did not have an HSI comparison group.[36] Young MSM in their 2016 online intervention were over twice as likely as the control group to initiate HPV vaccination. Our findings suggest that HSI may not see HPV as a serious threat.

Conversely, we found that lesbian women had the lowest mean knowledge score among women (but still higher than that of HSI men), and the lowest mean HPV attitude score of all the groups regardless of gender. Bisexual women had more positive attitudes toward HPV vaccination, and bisexual women also had the highest knowledge at baseline among all groups. Women in our study were more likely to identify as bisexual than men. This is supported by national datasets in which women have a greater probability than men of being bisexual, whereas men are more likely to report being either heterosexual or homosexual.[40] Our study indicates that bisexual women are above average in HPV knowledge and willingness to become vaccinated, despite being just as likely as HSI and lesbian women to have heard of HPV and initiate vaccination. This is reflected in previous studies assessing HPV vaccine uptake among WSW,[4] with lesbian women tending to be less prevention-oriented in their health behaviors due to misconceptions about risk.

We found no interventions tailored specifically for WSW, despite their designation as a special health population.[41] This indicates that WSW are not prioritized in HPV prevention, though lesbians tend to manifest multiple sexual health risk indicators, such as lack of knowledge and lower likelihood of pap testing or HPV vaccination.[4,8,14] Lesbian women, who are continually left out of sexual health education and prevention messaging,[6] displayed high potential for knowledge retention and positive attitudinal change as seen at post-intervention assessment. This could be attributed to the LGBTQ-inclusive material presented to the participants. Despite receiving low knowledge scores, lesbian women reported being just as frequently vaccinated as HSI women, suggesting lesbian women either face barriers in health seeking behaviors, or are

systematically overlooked in HPV education and prevention.[42] The socially-accepted idea that HPV as transmitted only via penetrative sex acts (involving a penis) conflates sexual orientation and risk. This inaccuracy suggests that sexually active heterosexuals and MSM are exclusively at risk, and is problematic for preventive efforts among WSW.

Tailored HPV education targeting sexually diverse college students is not only efficacious but also wanted and needed. Participant attitudes toward the in-class educational intervention experience were very positive. Ratings of each component of the intervention were very high, with no differences by gender or sexual orientation.

Limitations

The positive results of this initial outcome evaluation indicate that the intervention should be evaluated more rigorously in a multicenter randomized controlled trial. In lieu of a control group, we assessed change with a pre-post design. Post-intervention outcomes were assessed immediately after exposure to the intervention. As such, it is possible that improvements in HPV knowledge and especially attitude could regress over time as we use only one brief session to deliver the intervention. Future studies should employ a third evaluation to characterize effects over a longer follow-up period. Finally, we relied on participants' self-reported knowledge and attitudes, which is subject to recall, response, and social desirability bias. Utilizing a brief intervention methodology, it was not possible to include behavioral outcomes such as initiation or completion of HPV vaccination. Future studies should assess intention to vaccinate or HPV vaccination behaviors as an outcome of the intervention and explore knowledge and attitude as correlates of behavioral intentions and subsequent vaccine uptake.

Conclusion

LGBTQ students have positive views towards HPV vaccination and are interested in becoming vaccinated, but require prevention information and education pertinent to their health needs. Opportunities to engage, educate, and vaccinate sexual minority young adults should be capitalized upon while still prioritizing HSI men as a group in need of intensive and reinforced HPV education.

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Tables

Table 6.1. Participant Soiciodemographic Characteristics by Orientation.

Variable	Male				Female			
	HSI (n=64)	Gay (n=34)	Bisexual (n=11)	P-value	HSI (n=184)	Lesbian (n=31)	Bisexual (n=42)	P-value
Age (Mean, SD)	24(6.7)	21(2.1)	20(1.0)		23(5.0)	22(3.3)	21(3.6)	
Race/Ethnicity				0.07				0.14
Non-Hispanic White	9(14.5)	2(6.3)	--		16(9.5)	2(7.1)	4(11.1)	
Hispanic	37(59.7)	27(84.4)	9(81.8)		116(68.6)	20(71.4)	25(69.4)	
Black	16(25.8)	3(9.4)	2(18.2)		37(21.9)	6(21.4)	7(19.4)	
Relationship Status				0.9				0.33
Single	45(70.3)	26(76.5)	8(72.7)		109(67.7)	19(61.3)	30(71)	
Married	3(4.7)	1(2.9)	--		10(6.2)	--	2(5)	
Divorced/widowed	1(1.6)	--	--		30(18.6)	--	--	
In a relationship	15(23.4)	7(20.6)	3(27.2)		12(7.5)	12(38.7)	10(24)	
Insurance Status				0.07				0.21
Insured	42(79.2)	22(84.6)	9(34.6)		117(78)	16(84)	20(69)	
Uninsured	10(18.9)	0(0)	1(3.8)		29(19)	3(16)	7(24)	
Don't Know	1(1.9)	4(15.4)	0(0)		5(3)	--	2(7)	
Lifetime Sex Partners				0.003				0.1
0	11(17.2)	3(8.8)	--		26(14)	2(7)	5(39)	
1-5	30(46.9)	13(38.2)	3(27.3)		115(64)	20(65)	5(39)	
6-10	9(14.1)	4(11.8)	5(14.7)		23(13)	26(62)	1(8)	
>10	14(21.9)	14(41.2)	3(8.8)		17(9)	5(39)	2(15)	
Vaginal Sex Experience	44(69)	5(16)	7(70)	<0.001	150(82)	27(87)	33(79)	0.22
Oral Sex Experience	50 (79)	30(88)	10(100)	0.005	147(82)	29(94)	37(88)	0.05
Anal Sex Experience	12(20)	29(85)	10(91)	<0.001	55(32)	8(30)	2(17)	0.62

Table 6.2. Item-Wise Post-Test Response of Participants Who Responded "Don't Know" at Baseline.

Item	n(%) Don't Know baseline	Post-Test Response n(%)		
		Correct	Incorrect	P-value
Q1.HPV infection is rare	167(43.6)	136(96%)	5(4%)	0.00
Q2. HPV causes herpes	218(58.3)	114(57%)	86(43%)	0.06
Q3. AIDS is caused by HPV	191(50)	132(75%)	43(25%)	0.00
Q4. The only way to protect yourself from HPV is to use a condom	142(37.2)	121(92%)	10(8%)	0.00
Q5. Some strains of HPV are harmless	223(58.4)	164(80)	40(20)	0.00
Q6. HPV infection can cause cancer	193(50.7)	169(95%)	9(5%)	0.00
Q7. Student Health Services offers HPV vaccination	284(74.9)	225(96%)	9(4%)	0.00

*nonparametric Binomial test

Table 6.3. Baseline and Post-Intervention Outcome Mean Scores by Sexual Orientation Group.

	Knowledge M(SD)		Attitude M(SD)	
	Baseline	Followup	Baseline	Followup
Male				
HSI	0.24(0.25)	0.81(0.16)	27(4.72)	34.3(5.32)
Gay	0.43(0.30)	0.89(0.12)	27.9(4.78)	36.8(4.15)
Bisexual	0.36(0.35)	0.79(0.19)	29.8(2.39)	36.8(1.9)
Female				
HSI	0.39(0.27)	0.86(0.15)	27.5(3.78)	34.2(4.58)
Lesbian	0.27(0.27)	0.85(0.13)	26.3(4.31)	35.8(4.75)
Bisexual	0.45(0.26)	0.85(0.13)	30.4(4.01)	36.9(2.98)

Figures

Figure 6.1. Women's HPV Vaccine Uptake by Orientation.

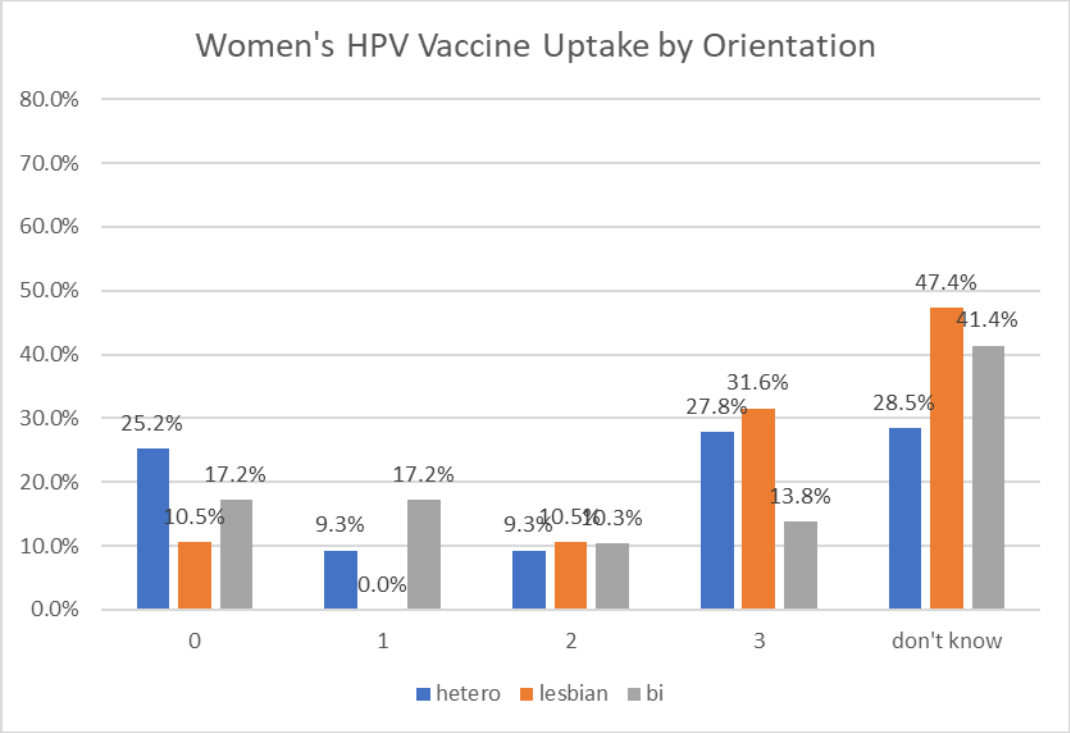


Figure 6.2. Men's HPV Vaccine Uptake by Orientation.

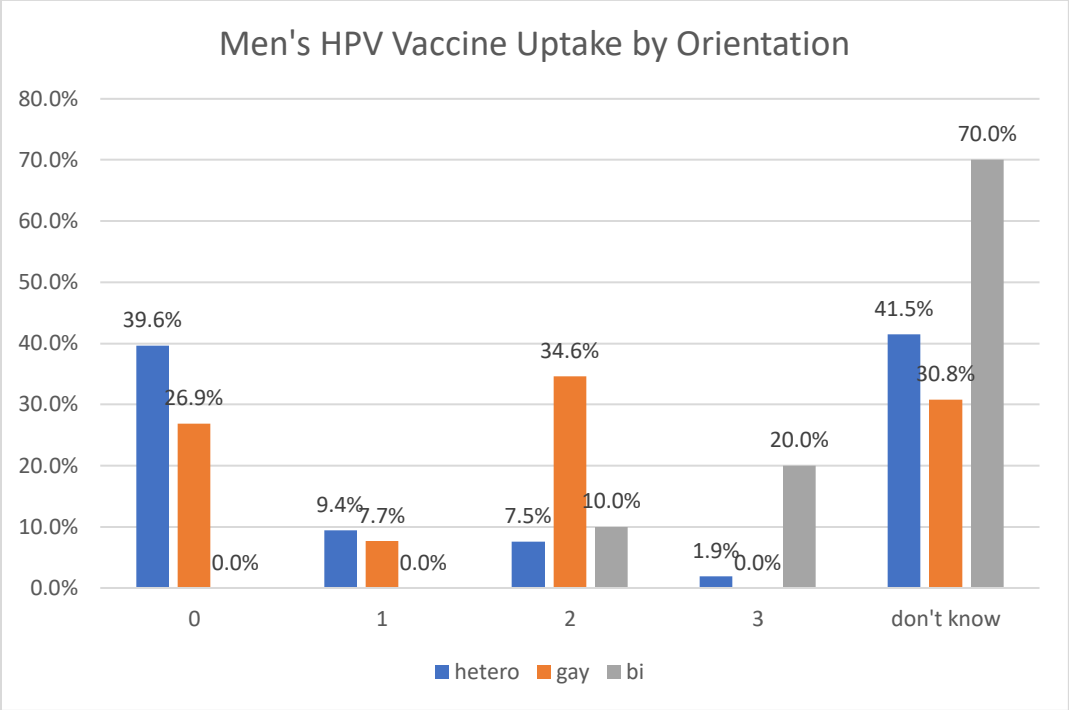


Figure 6.3. Men's Mean Knowledge Scores at Baseline and Post-Test by Orientation.

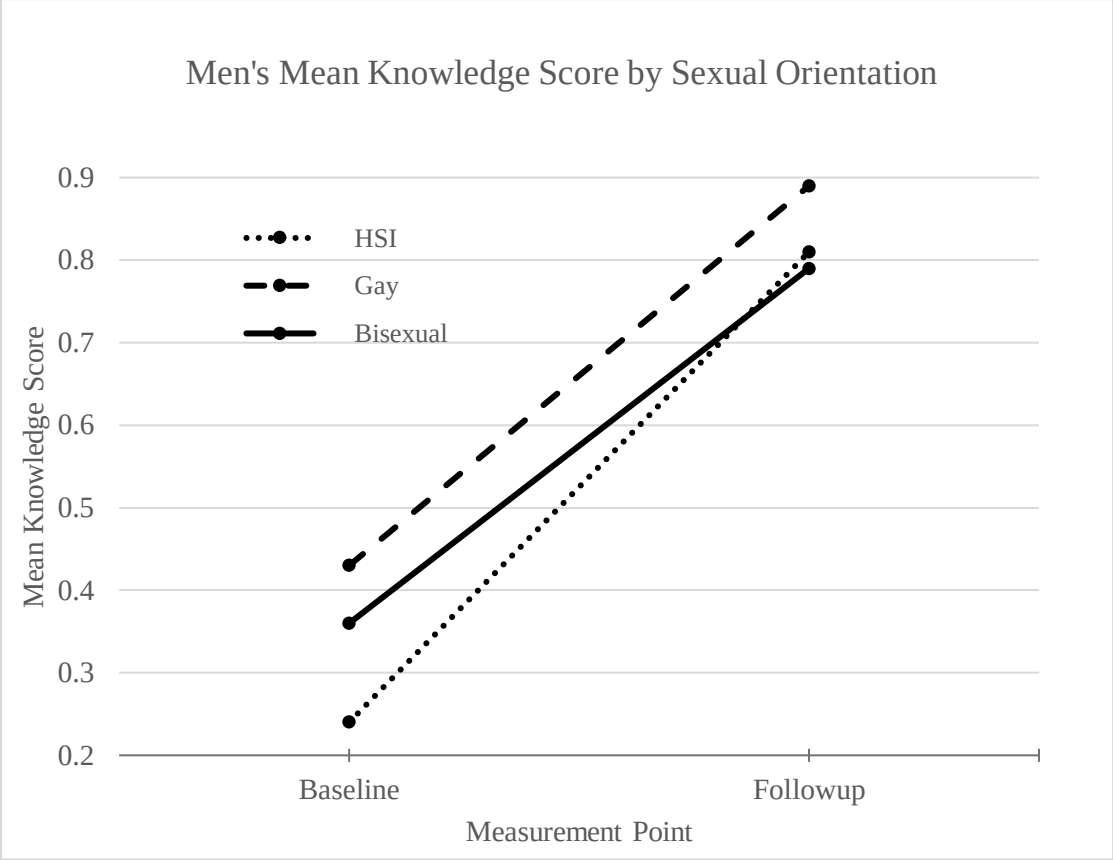


Figure 6.4. Men's Mean Attitude Scores at Baseline and Post-Test by Orientation.

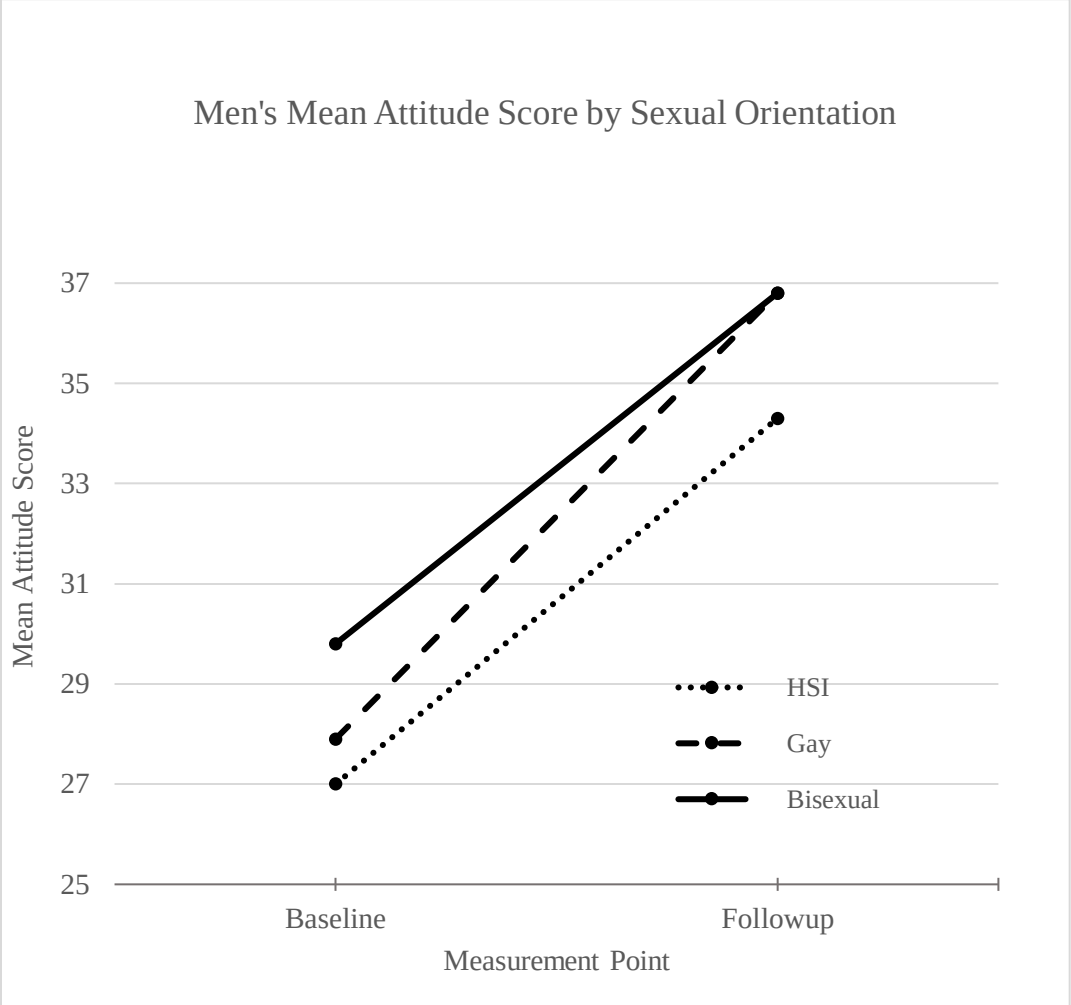


Figure 6.5. Women's Mean Knowledge Scores at Baseline and Post-Test by Orientation.

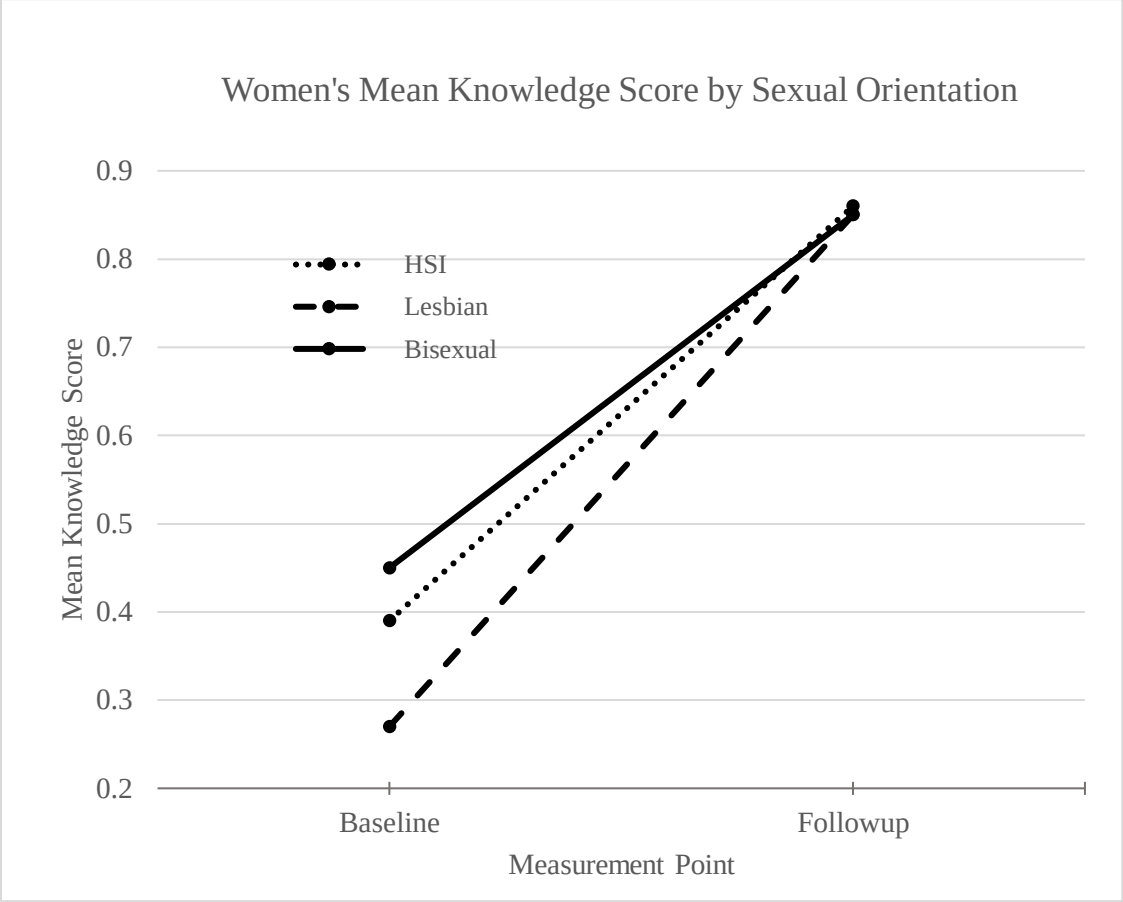
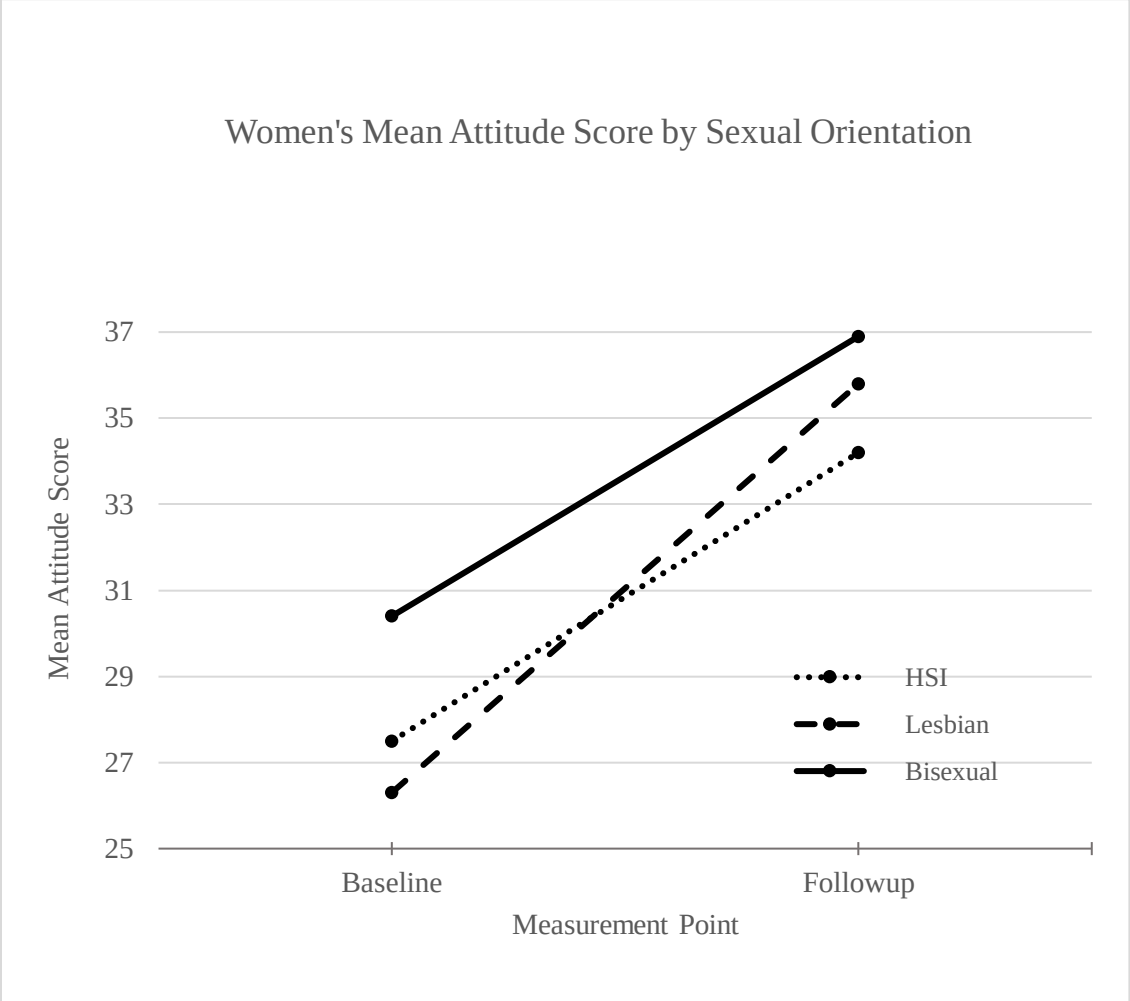


Figure 6.6. Women's Mean Attitude Scores at Baseline and Post-Test By Orientation.



CHAPTER VII

Conclusions

This chapter summarizes the study and primary research findings as delineated in three unique manuscripts presented as Chapters IV, V, and VI. Presented here are also discussions of the primary findings, limitations, and recommendations for future research related to HPV in ethnically and sexually diverse young adults.

Study Summary

Despite the availability of safe and effective HPV vaccines since 2006, HPV vaccination rates continue to be subpar in the United States. Few studies have assessed the acceptability and efficacy of a brief educational intervention to promote HPV vaccine uptake in college students. Furthermore, no previous study has tested an educational intervention tailored for and targeting both ethnically and sexually diverse college students. This study was conducted among college students in a Hispanic-serving university in South Florida. Brief, evidence-based HPV presentations and question and answer sessions were delivered in conjunction with pre- and post-intervention assessments to appraise the educational intervention experience. The Health Belief Model and the Transtheoretical Model (or Stages of Change) were used to guide the study design, intervention content, and interpretation of the results.

The purpose was to examine differences in HPV-related awareness, knowledge, and attitudes among diverse students both before and after exposure to a brief educational intervention. The first study described baseline differences in HPV-related awareness, knowledge, and attitudes between men and women enrolled in undergraduate courses. The second and third studies evaluated the differential efficacy of the educational

intervention in improving HPV-related awareness, knowledge, and attitudes by ethnicity and sexual orientation.

Discussion

The first study examined baseline gender differences in HPV and HPV vaccination awareness, perceived and actual knowledge, and attitudes. Prior to experiencing the intervention, most participants (84%) had heard of HPV, and 70% had favorable attitudes toward HPV vaccination, yet there were significant gaps in vaccine uptake. Over half (55%) of women and only 28% of men had initiated the HPV vaccine series.

Amidst generally low knowledge scores, those who reported receiving one or more doses of an HPV vaccine perceived themselves to be knowledgeable about HPV. The knowledge scores accurately reflected these perceptions. Attitude was positively associated with knowledge, in addition to being significantly associated with number of doses received among women, but not men. Although the percent of women who initiated HPV vaccination was below the state and national averages of 58% and 60% for young women, these percentages are still far below the desired 80% specified by the Department of Health and Human Services.[1]

Disparate knowledge outcomes for young men and women are supportive of evidence finding behavior change is more likely to occur when individuals perceive themselves to be at risk or susceptible to the condition.[2] Until recently, most men were oblivious to HPV-related issues as they weren't directly affected by the primary outcome of cervical cancer, and the vaccine was intended for women only.[3,4] Recently, over 40% of new cases of HPV-associated cancers were found in men.[5] Since the ACIP released

recommendations for men to be vaccinated in 2011, men's awareness and knowledge regarding HPV is slowly rising, yet still falls far behind that of women.[36] Oropharyngeal and anal cancers, which are primarily diagnosed in men, are expected to increase as cases of cervical cancer decrease due to continued gender disparities in HPV knowledge and vaccination.[83]

Few studies have assessed differences in vaccine attitudes among ethnic groups. A climate of vaccine hesitancy continues to grow in the United States, and there is limited evidence of intervention efficacy in changing such attitudes.[84] The second study evaluated the differences in intervention effects between Hispanic and non-Hispanic students, with special attention paid to attitudes toward the safety and effectiveness of vaccines in general as a proxy measure of vaccine hesitancy.

At baseline, 41% of Hispanic and 39% of non-Hispanic participants reported initiating the HPV vaccine series (NS). Hispanic participants (66% vs. 46% non-Hispanic, P=0.02) were significantly more willing to become vaccinated against HPV if not already vaccinated, and more likely to express positive attitudes toward the HPV vaccine at baseline (62% vs. 44%, respectively; P=0.009). Hispanic men (21%) were less likely to know their vaccination status than all others. They were also less likely to report receiving any information about HPV (58%, P=0.02). Following the intervention, Hispanic and non-Hispanic men and women increased their knowledge scores by an average of almost 43%.

Hispanic and non-Hispanic participants evaluated the components of the intervention as very positive. Nevertheless, non-Hispanic students showed less favorable attitudes towards HPV vaccination following the intervention (86% vs >92% in Hispanic

students, P=0.04). In 10% of non-Hispanic cases (vs. 5% in Hispanic cases), participant attitudes were even more negative post-intervention than at baseline, indicating the intervention may have reinforced existing vaccine-hesitant attitudes among some students instead of counteracting them.

Contradictory of early findings that Hispanics are wary of vaccine safety regardless of education level, the results of the second study suggest rather that poor attitudes toward vaccination among non-Hispanic whites are burgeoning, and is stronger than the wariness previously described in Hispanics.[85] For example, in 1995, measles, mumps, and rubella (MMR) vaccination coverage was 2.8% lower among Hispanic children than non-Hispanic white children.[86] MMR coverage increased from 87.9% in 1995 to 92.4% in 2011 for Hispanic children, and became significantly higher than for non-Hispanic white children in 2010. According to assessments of medical records, however, Hispanics had a 4-fold greater odds of over-reporting vaccination receipt than non-Hispanic whites.[87]

While many HPV-related interventions have been designed and evaluated with MSM populations, there were no interventions which targeted WSW, and none which included heterosexual counterparts. The third study in this dissertation aimed to evaluate how intervention effects differed between MSM and WSW and compared with heterosexual men and women. There were significant differences between MSM and HSI in effects on knowledge and attitude, with gay men reporting stronger baseline knowledge and attitudes toward HPV, and retaining an advantage even after the intervention experience. Among women, those who identified as bisexual demonstrated higher knowledge scores than lesbian women at baseline, and had a significantly larger

change in attitudes following the intervention experience. These contrasting findings highlight the divergent HPV attitudes that women of different sexual orientations have, and call attention to the perceived normative beliefs regarding STI susceptibility that inform lesbian health propensities, and ultimately may be a barrier to HPV vaccination.[88,89]

HPV educational efforts should place special emphasis on reaching heterosexual men and lesbian women, who lag behind other sexual orientation subgroups in knowledge and attitudes. There are no HPV interventions which are tailored for HSI men and lesbian women, which reflect national priorities in cancer prevention. Many studies cite provider recommendation barriers such as time constraints, low perceived threat to the patient, and even preferential vaccination recommendations.[90] With the established importance of receiving a provider recommendation for HPV vaccination, healthcare providers may benefit from increased training on inclusive education of all vaccine-eligible patients regardless of gender or orientation.

Strengths and Limitations

A limiting aspect of this study was the absence of a control or comparison group. The rigor of the study could have been maximized by assigning half of the course sections to the intervention as described, and the other half to a control arm receiving a standard practices pamphlet or other written information. Alternately, participants could have been randomly assigned to the intervention or control group following initial recruitment.

For this intervention, a purposive sampling technique maximized sociodemographic diversity among participants. While purposive sampling methods may

be prone to researcher bias, the theoretical knowledge of the participants before the project made researcher bias negligible. The women's studies course from which participants were recruited is historically known to have overrepresentation of LGBTQ individuals. Likewise, the university offering this course is known to have a Hispanic majority, being a Hispanic-Serving Institution. The actual class size and ratios of gender, ethnicity, or sexual orientation groups were unknown and beyond control in the participant recruitment process.

The pre-/post-test design, especially in the context of a brief intervention, was a limitation and also a strength. Because the intervention did not extend beyond the confines of a single class period, we were unable to measure long-term outcomes, such as participant initiation or completion of the HPV vaccine series, or sustained knowledge and/or attitude improvements over time. Usually, this design also prevents researchers from establishing causality in the relationship between the intervention and outcome measures. However, due to the brevity of our design, we can be almost certain that the estimated effect can be attributed solely to our intervention.

The study also depended on self-reported data from participants, which increases the likelihood that responses were subject to social desirability bias and recall bias. Since the HPV vaccine is at least a two-dose series over a six-month period, the chance of uncertainty among participants regarding number of doses received may be higher than if a single-time event were assessed, such as the flu vaccine. However, a study of self-reported vaccine data compared to medical records found that HPV vaccine recall was over 90% accurate.[87]

Despite these limitations, the study had many strengths. The intervention proved to be an excellent method for quickly improving knowledge and changing attitudes about HPV and HPV vaccination among diverse college students. The measures used to evaluate knowledge and attitudes demonstrated strong internal consistency.

The participants received the intervention well, which was evident in the engagement of the students while the material was being delivered. Intervention acceptability was confirmed in the post-test evaluation of the intervention components, which all received positive scores ranging from 93-97% among participants. The intervention itself was inexpensive and easy to implement, making potential widespread use and adaptation feasible.

Recommendations

Lack of knowledge and poor attitudes regarding HPV and HPV vaccination among sexually and ethnically diverse college students are inhibiting HPV vaccine uptake in the United States. Heterosexual men, especially Hispanic heterosexual men, and lesbian women face substantial barriers in learning about HPV. Inclusive, comprehensive, judgement-free education, and the development of tailored and targeted intervention for those less likely to receive information from usual pathways can help improve vaccination rates in diverse populations of young adults. The combined effect of comprehensive education and purposeful intervention would be instrumental in addressing undervaccination, achieving acceptable vaccination rates, and controlling a highly preventable virus.

Qualitative research can be conducted with target groups, such as Hispanic men and lesbian women, to inform the design and development of interventions. HPV

education messages should be tailored for these specific groups, and should incorporate qualitative results to determine strategic and informed options for education providers, locations, and approaches for intervention delivery. HPV interventions focused on Hispanic men should take into account the role of gender in Hispanic culture, and its intersection with class, nationality, sexual orientation, and religion to form the construct of "machismo." [65] Constructs such as "machismo" in Hispanic men frame key health beliefs in Hispanic men and should be explored in future studies as a barrier to health seeking behavior, such as HPV vaccination.[91,92]

As the intervention was implemented as a group with a purposive sample, the next step would be to implement the intervention as a randomized controlled trial with larger samples and in various settings. While the intervention was acceptable and efficacious in the classroom setting, future implementers should be prepared for additional or different barriers when studying diverse populations outside of this setting. Intervention investigators are more frequently utilizing online or mobile platforms for intervention delivery, which offer potential for impactful behavior change.[93] While online interventions are cheap, innovative, easy to populate, and have the benefit of evolving with ongoing technological advances, they present new and unique challenges. Online or mobile interventions are more prone to high attrition rates than face-to-face interventions if the incentive is negligible. It is also difficult to assess the reach of the intervention, and effect sizes are often small or insignificant.[94]

Future intervention research should consider incorporation of a third measurement point at a later date to assess long-term knowledge and attitude outcomes, and to determine if the intervention serves as a cue to action for HPV vaccination. The addition

of another measurement point would also be useful in assessing the strength of behavioral intention to vaccinate at baseline.

Vaccine hesitant attitudes may be a dimension to consider in the endeavor to increase HPV vaccination, and is more difficult to diminish compared to lack of awareness or knowledge, which is relatively easy to remedy. Evidence has shown when vaccine hesitant parents were presented with risk-benefit information, their hesitant attitudes were strengthened instead of lessened.[95] Participants of that study tended to focus on the segments of information which supported their hesitant views, while rejecting the information that supported vaccination. While the current intervention asserted only the safety and efficacy of the HPV vaccine, 10% participants holding hesitant vaccine attitudes were less likely to accept the information. These participants displayed attitude polarization that depended less on the intervention's accuracy and more on whether the information supported their position.[96] Future research can include increased measures of pre-existing vaccine attitudes to assess how hesitant attitudes can be deterred. HPV and other vaccine interventions should include educational materials designed to dispel vaccine myths and reduce judgement errors while concurrently promoting the vaccine.

Finally, special consideration should be given to healthcare providers at all levels of the provider spectrum. Evidence points to provider recommendation as the single strongest event in the behavioral path to vaccination, with adolescents who received a recommendation five times more likely to receive a vaccination.[97] Despite this, providers often do not suggest HPV vaccination with other routine adolescent vaccines, and are less likely to provide recommendations to racial/ethnic minorities. Future studies should

assess attitude and prejudicial predictors of HPV vaccination recommendations among healthcare providers. Medical education programs should also develop HPV and HPV vaccination educational modules to increase provider confidence in giving strong vaccination recommendations, especially in response to hesitant attitudes. As financial barriers to vaccination decrease due to policy and NGO efforts,[90] attention should be turned to address non-financial barriers, such as lack of HPV knowledge, hesitant vaccine attitudes, and weak or optional provider recommendations.

Conclusions

No one intervention is efficacious enough to close all the gaps in HPV knowledge, attitudes, beliefs, and practices.[84] Each intervention assesses and addresses different dimensions of awareness, knowledge, attitude, and behavior, and do so within the confines of specific populations. In this sense, the individual interventions are limited, but if strategically and synergistically placed, together can create a large impact. Public health professionals in education, academic, governmental and non-governmental sectors may increase multidisciplinary, collaborative efforts to achieve such impact. Further intervention is necessary for certain populations and at all ecological levels- individual, community, and policy- to alleviate the burden of HPV infection and reduce HPV-related cancers.

A brief, educational intervention designed to improve HPV-related awareness, knowledge, and attitudes can be efficacious in changing attitudes and increasing knowledge among college students. Tailored and targeted HPV intervention is acceptable to sexually and ethnically diverse college students in south Florida, and may contribute to local and national goals to reduce HPV-related clinical outcomes.

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APPENDICES

Appendix A

IRB Approvals

FIU | FLORIDA INTERNATIONAL UNIVERSITY

Office of Research Integrity
Research Compliance, MARC 270

MEMORANDUM

To: Dr. William Darrow

CC: File

From: Chris Grayson, MBA, CIM, CIP, Director, Research Integrity

Date: March 25, 2015

Protocol Title: Get the Facts, Not HPV (Class Project-PHC 6750).

The Florida International University Office of Research Integrity has reviewed your research study for the use of human subjects and deemed it Exempt via the **Exempt Review** process.

IRB Protocol Exemption #: IRB-15-0105 **IRB Exemption Date:** 03/25/15
TOPAZ Reference #: 103450

As a requirement of IRB Exemption you are required to:

1) Submit an Event Form and provide immediate notification of:
   - Any additions or changes in the procedures involving human subjects.
   - Every serious or unusual or unanticipated adverse event as well as problems with the rights or welfare of the human subjects.
2) Submit a Project Completion Report Form when the study is finished or discontinued.

Special Conditions: N/A

For further information, you may visit the IRB website at http://research.fiu.edu/irb.

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Office of Research Integrity
Research Compliance, MARC 414

MEMORANDUM

To: Dr. William Darrow

CC: File

From: Maria Melendez-Vargas, MIBA, IRB Coordinator

Date: November 18, 2015

Protocol Title: "The EquiVax Project"

The Florida International University Office of Research Integrity has reviewed your research study for the use of human subjects and deemed it Exempt under 46.101(b) (1) of the Common Rule via the **Exempt Review** process.

IRB Protocol Exemption #: IRB-15-0439 **IRB Exemption Date:** 11/18/15
TOPAZ Reference #: 104272

As a requirement of IRB Exemption you are required to:

1) Submit an Event Form and provide immediate notification of:
   - Any additions or changes in the procedures involving human subjects.
   - Every serious or unusual or unanticipated adverse event as well as problems with the rights or welfare of the human subjects.
2) Submit a Project Completion Report Form when the study is finished or discontinued.

Special Conditions: N/A

For further information, you may visit the IRB website at http://research.fiu.edu/irb.

FIU | Research & Economic Development
FLORIDA INTERNATIONAL UNIVERSITY

MEMORANDUM

To: Dr. William Darrow, Principal Investigator

CC: File

From: Eliza Gomez, M.Ed., Coordinator, Research Integrity EG

Date: November 15, 2016

Proposal Title: "The EquiVax Project"

Approval # IRB-15-0439

Reference # 104272

The Florida International University Office of Research Integrity has approved the following modification(s):

- Addition of sampling in FIU course IDS 3189 "International Nutrition, Public Health, and Economic Development.
- Addition of one question to the pre-test questionnaire.

There are no additional requirements in regards to your study. However, if there are further changes in the protocol after you commence your study, then you are required to resubmit your proposal for review. For further information, you may visit the FIU IRB website at http://research.fiu.edu/irb.

Appendix B

Questionnaire

The EquiVax Project

Thank you for agreeing to participate in our study. It explores issues related to human papillomavirus (HPV). The survey is anonymous, and will take about 5 minutes to complete. If you're unsure of what the correct answer is, please give us your best answer.

First, a few questions about you. *Please respond to each of the following:*

1. **What is the month and year of your birth? _____**
2. **What is your gender? (Please circle one)**

   (1) Male (2) Female (3) Transgender M to F (4) Transgender F to M (5) Other: _____
3. **Ethnicity (please circle one):**

   (1) **Not** Hispanic or Latino (2) Hispanic or Latino (3) Not sure or unknown
4. **Race (please circle all that apply):**

   (1) American Indian or Alaska Native (2) Asian/Pacific Islander (3) Black/African American

   (4) White/Caucasian (5) Not sure or unknown (8) Other: _____
5. **Do you currently have any form of health insurance coverage?**

   (1) Yes (2) No (3) Don't Know
6. **Current relationship status (please circle one):**

   (1) Single (2) Married (3) Divorced/Widowed (4) In a Relationship (5) Other: _____
7. **Your sexual orientation (please circle one):**

   (1) Heterosexual/straight (2) Gay/Lesbian (3) Bisexual (4) Not sure (5) Other: _____
8. **Have you ever had: (circle yes or no for each)**

   a.) Vaginal (penetrative) sex? (1) Yes (2) No
   b.) Oral sex? (1) Yes (2) No
   c.) Anal sex? (1) Yes (2) No
9. **How many different sex partners have you had in your lifetime (please circle one)?**

   [0] [1] [2-5] [6-10] [11-15] [>15]
10. **Have you heard of HPV or human papillomavirus before today (please circle one)?**

    (1) Yes (2) No (3) Don't Know
11. **How many doses of HPV vaccine have you received as of today (please circle one)?**

    [0] [1] [2] [3] [Don't know]
12. **If not already fully vaccinated against HPV, are you willing to take the HPV vaccine?**

    (1) Yes (2) No (3) Don't Know

Circle the number that best describes your knowledge or perception at this time.	Nothing at all	A little	A moderate amount	Quite a lot
13. How much would you say you know about HPV or human papillomavirus?	1	2	3	4
14. How much would you say you know about HPV vaccine?	1	2	3	4

Please provide responses for each statement below. Circle the number that best describes your agreement with each statement at this time.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know
15. HPV infection is rare	1	2	3	4	5	6
16. Only people who have sex with lots of other people get HPV	1	2	3	4	5	6
17. HPV is a serious health concern for women	1	2	3	4	5	6
18. HPV is a serious health concern for men	1	2	3	4	5	6
19. HPV infection is a serious threat to my own health	1	2	3	4	5	6
20. I would be willing to use an anal swab on myself to screen for anal cancer	1	2	3	4	5	6
21. Vaccines in general are safe and effective	1	2	3	4	5	6
22. Women should be vaccinated against HPV	1	2	3	4	5	6
23. Men should be vaccinated against HPV	1	2	3	4	5	6
24. Everyone should be vaccinated against HPV	1	2	3	4	5	6
25. My opinion of the HPV vaccine is mostly positive	1	2	3	4	5	6

Please answer the following questions by circling True or False:

26. The HPV virus causes herpes in men and women	TRUE	FALSE	Don't know
27. HPV infection can cause genital warts	TRUE	FALSE	Don't know
28. You can only get HPV from having sex	TRUE	FALSE	Don't know
29. Acquired Immune Deficiency Syndrome (AIDS) is caused by *human papillomavirus*	TRUE	FALSE	Don't know
30. The only way you can protect yourself from HPV is to use a condom	TRUE	FALSE	Don't know
31. Some strains of HPV are harmless	TRUE	FALSE	Don't know
32. HPV infection can cause cancer	TRUE	FALSE	Don't know
33. Before today, I *never* thought about asking about the HPV vaccine for myself	TRUE	FALSE	Don't know
34. Student Health Services offers HPV vaccine	TRUE	FALSE	Don't know

Please evaluate the presentation

1. **What did you think about the PowerPoint presentation (please circle one)?**

   (1) Too long (2) Too short (3) Just about right (4) Other: _____

2. **How much information had you received about HPV *before* the presentation (please circle one)?**

   (1) None (2) Very Little (3) Some (4) Quite a bit (5) A great amount

3. **How useful was the question and answer session that followed the presentation (please circle one)?**

   (1) Very useful (2) somewhat useful (3) not very useful (4) Not at all useful

4. **Please rate your overall assessment of today's HPV educational experience (please circle one)?**

   (1) Very positive (2) Positive (3) Neutral (4) Negative (5) Very Negative

5. **How much did you learn from your participation (please circle one)?**

   (1) Nothing (2) Very Little (3) Some things (4) Quite a bit (5) A great amount

B. Now about HPV. Circle the number that best describes your knowledge or perception at this time.

	Extremely Knowledgeable	Somewhat Knowledgeable	Very Little Knowledge	No Knowledge
6. How much would you say you know about HPV or human papillomavirus?	1	2	3	4
7. How much would you say you know about the HPV vaccine?	1	2	3	4

Please provide responses for each statement below. Circle the number that best describes your knowledge or feelings at this time.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know
8. HPV infection is rare	1	2	3	4	5	6
9. Only people who have sex with lots of other people get HPV	1	2	3	4	5	6
10. HPV is a serious concern for women	1	2	3	4	5	6
Please provide responses for each statement below. Circle the number that best describes your knowledge or feelings at this time.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know
11. HPV is a serious concern for men	1	2	3	4	5	6
12. HPV infection is a serious threat to my own health	1	2	3	4	5	6
13. I would be willing to use an anal swab on myself to screen for anal cancer	1	2	3	4	5	6
14. Vaccines in general are safe and effective	1	2	3	4	5	6
15. Women should be vaccinated against HPV	1	2	3	4	5	6

16. Men should be vaccinated against HPV	1	2	3	4	5	6
17. Everyone should be vaccinated against HPV	1	2	3	4	5	6
18. My opinion of the HPV vaccine is mostly positive	1	2	3	4	5	6

Please answer the following questions by circling True or False regarding HPV:

19. The HPV virus causes herpes in men and women	TRUE	FALSE
20. HPV infection can cause genital warts	TRUE	FALSE
21. You can only get HPV from having sex	TRUE	FALSE
22. Acquired Immune Deficiency Syndrome (AIDS) is caused by *human papillomavirus*	TRUE	FALSE
23. The only way you can protect yourself from HPV is to use a condom	TRUE	FALSE
24. Some strains of HPV are harmless	TRUE	FALSE
25. HPV infection can cause cancer	TRUE	FALSE
26. Before today, I *never* thought about asking about the HPV vaccine for myself	TRUE	FALSE
27. Student Health Services offers HPV vaccine	TRUE	FALSE

Major: _____

Thank you!

VITA

SHARICE M. PRESTON

Born, Huntington, New York

2002-2007	B.A., Biology Florida State University Tallahassee, Florida
2005-2009	Florida Department of Environmental Protection Tallahassee, Florida
2010-2011	M.S., Biology University of Louisiana at Monroe Monroe, Louisiana
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PUBLICATIONS AND PRESENTATIONS

Preston, S.M., Gabiddon, K., Clarke, R., Darrow, W.W., Madhivanan, P. (May, 2017). *Temporal Trends in HPV-Related Knowledge: A Global Systematic Review.* Oral Presentation at the 23rd Congress of the World Association for Sexual Health, Prague, Czech Republic.

Weissman J, Sebekos E, Preston SM, Latorre W, Alsaif B, Krupp K, Darrow W. (June, 2016). *Can an on-campus medical home improve academic performance in college students? An exploratory cross-sectional study*. Poster presentation at the American College Health Association Annual Meeting, San Francisco, CA.

Weissman, J., Preston, S.M., Sebekos, E., Latorre, W., Alsaif, B., Krupp, K., Darrow, W. (2016). *Associations Between Health and Academic Success at a Florida University: An Exploratory Cross-Sectional Study*. Florida Public Health Review, 13, 91-98.

Preston, S.M., Hibbitt, C., Caceres, S., et al. (December, 2015). *HPV Education Strategies in Ethnically and Sexually Diverse Settings: Lessons From a Pilot Intervention*. Oral presentation at the National Sex Ed Conference, New Brunswick, NJ.

Weissman, J., Preston, S.M., Latorre, W., et al. (November 2015). *Psychological health and academic success in college students: An exploratory cross-sectional study*. Poster presentation at the 143rd APHA Annual Meeting and Expo, Chicago, IL.

Preston, S.M., and Beck-Sagué, C.M. (November, 2015). *Impact of the Ebola Viral Disease Epidemic on Reproductive and Maternal and Child Health Services in Sierra Leone*. Oral presentation at the 143rd APHA Annual Meeting and Exposition, Chicago, IL.

Preston, S.M., Hibbitt, C., Caceres, S., et al. (September, 2015). *HPV knowledge and perceptions among sexually and ethnically diverse college students in the United States: Results of a pilot educational intervention*. Poster presentation at the 30th International Papillomavirus Conference & Clinical and Public Health Workshops, Lisbon, Portugal.

Weissman, J., Preston, S.M.**,** Alsaif, B., Krupp, K., Sebekos, E., Darrow, W.W. (July, 2015). *Significant associations between health and academic success in college students: An exploratory cross-sectional study*. Poster presentation at the 2015 Florida Public Health Association Educational Meeting, Orlando, FL.

Beck-Sagué, C.M., Dévieux, J., Pinzón-Iregui, M.C., Lerebours-Nadal, L., Abreu-Perez, R., Bertrand, R., Rouzier, V., Gaston, S., Ibanez, G., Halpern, M., Pape, J.W., Dorceus, P., Preston, S.M., Dean, A.G., Nicholas, S.W., Blasini, I. (2015). *Disclosure of their HIV status to perinatally infected youth using the adapted Blasini disclosure model in Haiti and the Dominican Republic: preliminary results.* AIDS, 29, S91-S98.

Beck-Sagué, C.M., Lerebours-Nadal, L., Koenig, E., Halpern, M., Rosenberg, R., Preston, S.M., Siegel, J., Atkins, M., Devieux, J.G. (2014). *Depression and response to antiretroviral therapy in the Dominican Republic*. Journal of AIDS and Clinical Research, 5(12).