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Factors Influencing Use of Pre-Exposure Prophylaxis Among Men Who Have Sex With Men

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Walden University

College of Health Sciences

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Justin Terry-Smith

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Walden University
2018

Abstract

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by

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MPH, Walden University, 2015

BA, Ashford University, 2012

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Prevention is key to keeping men who have sex with men (MSM) protected from Human Immunodeficiency Virus (HIV). Despite new and innovative HIV prevention resources such as pre-exposure prophylaxis (PrEP), factors such as education level, employment status, number of sexual partners, and access to health resources may inhibit certain populations from using PrEP. The purpose of this cross-sectional study was to examine the association between education level, employment status, number of sexual partners, and access to health resources and the use of PrEP among MSM. The fundamental cause theory was used to examine how socioeconomic barriers are associated with the use of PrEP among MSM in the United States. Secondary data from 217 surveys were collected from the Public Library of Science. Findings from multiple regression analyses indicated that employment status, access to health resources, and number of sexual partners were not associated with use of PrEP among MSM. Those who had at least some high school or a high school diploma were 3.98 times more likely to be likely to extremely likely to use PrEP, compared to those who had less than a high school education ($OR = 3.98, p = .048$). Those who had some college were 6.91 more likely to be likely to extremely likely to use PrEP, compared to those who had less than a high school education ($OR = 6.91, p = .028$). Findings may be used to assist public health professionals in identifying factors that prevent the use of PrEP. By addressing these health threats, and social barriers, specialists could have the ability to increase HIV prevention activity in populations that are more susceptible to being infected with HIV and may decrease HIV infections not only within the MSM population but also in other populations.

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Section 1: Foundation of the Study and Literature Review

According to the Centers for Disease Control and Prevention (CDC, 2015), pre-exposure prophylaxis (PrEP) is a HIV preventative measure that if used is 92% effective. Public health stakeholders and communities most affected by HIV can be either receptive or nonreceptive to new HIV preventative measures. These stakeholders are the catalysts to help not only the communities that suffer from health disparities but the general public as well to be knowledgeable of the most up-to-date preemptive procedures and medicines in HIV prevention (CDC, 2015).

Krakower and Mayer (2012) suggested that health care providers are familiar with and tend to rely on more conventional HIV prevention approaches (i.e., condom distribution and use). The CDC (2015) reported that scientists have continued to make advances in effective HIV preventative methods. Public health professionals choose to either support or not support more innovative HIV preventative methods (Krakower & Mayer, 2012). According to the World Health Organization (2012), such support is paramount to the public health community and the general population, as it encourages sound choices regarding HIV prevention and treatment. PrEP is a relatively new intervention that offers a different approach to preventing human-to-human transmission of HIV, but PrEP has been a subject of debate within public health community (Blumenthal & Haubrich, 2014). Cohen, Muessig, Smith, Powers, and Kashuba (2012) stated that public health professionals showed concern for making PrEP available because when participants were given PrEP in a clinical trial the participants were only

protected against HIV and not protected against other sexually transmitted infections (STIs).

According to Smit et al. (2012), for years men who have sex with men (MSM) and gay communities have been closely associated with HIV, which has encouraged both communities to fight against HIV and to be at the forefront of HIV prevention, awareness, and education (Smit et al., 2012). Logie, Newman, Chakrapani and Shunmugam (2012), stated that these communities have also been subject to stigma, bias, and other forms of negative reinforcement about HIV and other STIs. Because MSM and gay male communities are at increased risk of transmitting HIV, they remain a key stakeholder for innovative preventive measures (CDC, 2015). MSM is defined by epidemiologists as men who engage in a range of sexual behavior with men no matter what sexual orientation they identify with themselves (Beyrer et al., 2012). Boily et al. (2012) stated that the future of HIV prevention looks promising because there will be many demanding assessments of the impact of HIV prevention measures.

Health care providers and public health professionals are the champions of new and emerging prevention and treatment efforts (Krakower & Mayer, 2012). The influence of these professionals cannot be underestimated, but such influence is effective only if the barriers to implementation with specific populations are recognized and addressed. This study addressed some of the barriers regarding the effective use of PrEP among MSM.

According to the CDC (2015), PrEP is a prevention method to decrease human-to-human transmission of HIV in populations that are at high risk of HIV infection and transmission. Truvada is the brand name of PrEP, which is a blend of the medications

tenofovir and emtricitabine; these two medications are taken in a single pill. PrEP is 92% effective in decreasing the rate of HIV infection when patients are 100% compliant with taking PrEP daily (CDC, 2015). MSM and men in gay communities are being targeted for PrEP because they are considered at high risk for transmitting or being infected with HIV (Arnold et al., 2012).

Problem Statement

Liu, et. al. (2008), stated that because there is a low awareness of the efficacy of PrEP within certain communities, there is a high need for educating the target population and health providers who serve them. This is particularly important for members of the target population who are on the lower rungs of the socioeconomic strata, having less access to health resources and gainful employment. Even though PrEP is a recognized effective HIV prevention method, there are still members of the MSM and gay populations who are not able to access this resource (McAllaster & Ervin, 2016).

According to Golub, Gamarel, Rendina, Surace, and Lelutiu-Weinberger (2013), there has been little research that has addressed factors that impede this population from benefiting from this HIV prevention method. Millett et al. (2012) stated that there are barriers including education level, access to health resources, employment status, and number of sexual partners that interfere with the effective and consistent use PrEP in the MSM population.

A quantitative study to analyze risk factors and barriers that impede the use of PrEP as a health intervention could support efforts to increase use among the high-risk population and reduce transmission of HIV among MSM. According to Pérez-Figueroa,

Kapadia, Barton, Eddy, and Halkitis (2015), there is inadequate understanding of the stagnant use of PrEP in the MSM population in the United States. In this study, I sought to reduce the gap in knowledge by examining to what degree education level, access to health resources, employment status, and number of sexual partners impact the use of PrEP in the MSM population.

Purpose of the Study

The purpose of this quantitative cross-sectional study was to determine whether education level, employment status, access to health resources, and number of sexual partners were associated with the use of PrEP among MSM in the United States.

Research Questions and Hypotheses

Research Question 1: What is the association between education level and the use of PrEP among MSM after controlling for age and race?

H_01 : There is no association between education level and the use of PrEP among MSM.

H_a1 : There is an association between education level and the use of PrEP among MSM.

Research Question 2: What is the association between employment status and the use of PrEP among MSM after controlling for age and race?

H_02 : There is no association between employment status and the use of PrEP among MSM.

H_a2 : There is an association between employment status and the use of PrEP among MSM.

Research Question 3: What is the association between the number of sexual partners and the use of PrEP among MSM after controlling for age and race?

H₀₃: There is no association between the number of sexual partners and the use of PrEP among MSM.

H_{a3}: There is an association between the number of sexual partners and the use of PrEP among MSM.

Research Question 4: What is the association between the access to health resources and the use of PrEP among MSM after controlling for age and race?

H₀₄: There is no association between the access to health resources and the use of PrEP among MSM.

H_{a4}: There is an association between the access to health resources and the use of PrEP among MSM.

Theoretical Foundation

The fundamental cause theory (FCT) was the theoretical framework for this study. Phelan, Link, and Tehranifar (2010) stated that in 1995 the FCT was developed to focus on why the effects of socioeconomic status and mortality have persisted even though there are fundamental variations in illnesses and risk factors that are supposed to clarify it. The FCT also suggests that there is an ongoing correlation between knowledge, power, and beneficial social networking that can protect a person's health. The FCT connects health disparities by considering the cause and effects of numerous illness outcomes through multiple risk factors involved in access to resources.

I used the FCT to bring attention to socioeconomic factors related to deterring HIV infection among the MSM community. Some important principles of FCT are that socioeconomic status is directly associated with multiple health risk issues and mortality, socioeconomic status influences multiple illness results, and distribution of resources plays a critical role in the relationship between socioeconomic status and health/mortality (Phelan & Link, 2013). According to Eikemo, Bambra, Huijts, and Fitzgerald (2016), in the FCT the cause affects numerous disease results, affects illness outcomes through numerous risk factors, and encompasses access to resources that can help in circumventing health risks or minimizing the sequelae of illnesses. The relationship between health and a fundamental cause is duplication over time, which originates from the replacement of intervening mechanisms (Mackenbach, 2012). Table 1 shows the constructs and variables used in the study.

Table 1

Constructs and Variables

Constructs	Variables
Income	Employment status
Knowledge/ beneficial social networking	Education level
Power	Number of sexual partners
Beneficial social networking	Access to health resources

Nature of the Study

I employed a cross-sectional design to determine the association between factors that impact the use of PrEP in the MSM population. I examined the association between the independent variables of employment status, access to health resources, education level, and number of sexual partners and the dependent variable of use of PrEP. I used a cross-sectional design to analyze two or more quantitative variables, one or more of which could be a covariate, to determine whether associations existed.

Secondary data were collected from the Public Library of Science (PLoS) and National Institute of Health (NIH), which measured the knowledge, attitudes, and acceptability of PrEP among individuals living with HIV in an urban HIV clinic. The data set was selected because it contained needed data on target population of MSM. According to Cheng and Phillips (2014), the rationale for use of a secondary data source is that the reliability and validity have already been established on original data. Using existing data allowed me to be cost efficient in the study. Because there was little research on PrEP, secondary data analysis may lead to future research questions and more collection of primary data (see Cheng & Phillips, 2014).

Literature Review

In this section, I present an overview of the research literature to further an understanding of PrEP and the impact on the target population. This literature review begins with a brief history of HIV, the various methods used to prevent its spread, and treatment impact to elucidate the challenges faced by the target population. Findings from a variety of sources were used to clarify the problem and refine the research questions. I

also reviewed the contemporary literature to understand the theoretical construct for this study and to facilitate a deeper understanding of the nature and significance of this study.

Literature Search Strategy

I compiled the selection of articles used for this literature review from the Thoreau Multi-Database, Google Scholar, Public Library of Science, *New England Journal of Medicine*, *AIDS Official Journal of the International*, National Institute of Health, and the Centers for Disease Control and Prevention. The selected articles were published between 1981 and 2016. Key words and phrases that were used to find articles were *HIV prevention*, *PrEP*, *pre-exposure prophylaxis*, *PEP*, *post-exposure prophylaxis*, *socioeconomic status*, *education level*, *MSM*, *men who have sex with men*, *gay community*, *HIV stigma*, *HIV prevention methods*, *history of HIV*, *employment status*, *household income*, *HIV awareness*, *HIV knowledge*, *PrEP knowledge*, *PrEP psychosocial factors*, *PrEP implications and barriers*, *PrEP clinical trials*, *PrEP acceptability*, and *AIDS*. I also used the articles for background and methodological precedent.

Historical Background and Perspective

Gallo and Montagnier (2003) noted that HIV is the cause of acquired immune deficiency syndrome (AIDS). The CDC first published an account of a rare form of cancer (pneumocystis carinii pneumonia or PCP) that had appeared in five previously healthy gay men in June 1981. This report established the connection between this emerging disease and the gay male population (CDC, 1981).

By 1992, a stronger connection between this emerging disorder and the gay male population was established as a cluster of PCP and Kaposi's sarcoma (as well as other

diseases) were found in Orange County California and New York (CDC, 1982). These reports also established the connection between the spread of these diseases among the gay male population and sexual activity (CDC, 1982). By 1984, the virus now known as HIV, first referred to as human T-lymphotropic virus Type III, was isolated (Gallo et al., 1984). According to Altfeld et al. (2016), HIV is an infection that weakens the immune system by eradicating cells in the body that help to combat infections.

Stigma of Disease and Mistrust of Treatment

Valdiserri (2002) stated that the history of HIV stigma has been filled with prejudice, discounting, discrediting, and discrimination toward people living with or perceived to have HIV. Valdiserri also asserted that similar to the historic early infections of cholera in which people who were infected were seen as uncontrolled, lethargic, and vice-ridden, health care providers were often unwilling to treat HIV/AIDS patients because the patients were considered to be immoral and undeserving of care (Valdiserri, 2002), thereby contributing to a mistrust of care providers and treatment efforts. Doyal (2013) posited that in the 1980s, HIV started infecting the MSM population at a disturbing frequency. People lived in fear of those living with HIV and MSM, and gay populations were frequently viewed as undesirable and contemptuous. Martin (1986) observed that HIV was once recognized as gay-related immunodeficiency disease because it was believed that HIV only infected gay men and MSM; the general population did not see the impact of HIV infections until heterosexuals in large numbers started becoming infected with the virus.

Martin (1986) reported that HIV was repeatedly overlooked as an insignificant problem. Martin contended that policymakers and elected officials did not bother to implement HIV prevention and awareness policies or set aside funding for HIV program. According to the U.S. Department of Health and Human Services (HHS, 2009), the onset and rapid spread of HIV and the subsequent progression of AIDS in the early days cast significant stigma on the MSM population.

Whetten et al. (2006) reported that mistrust of the medical community can be dated back to the times of slavery when Black slaves were made to be medical subjects for experiments. According to the CDC (2016g), in 1932 the Public Health Service partnered with the Tuskegee Institute to study 600 Black men, of whom 399 were infected with syphilis and 201 were not infected with syphilis. The participants did not give their consent to be in the study. The researchers told the participants that they were being treated for bad blood and that it was for a short period of time. The study continued for nearly 40 years. None of the participants were properly treated for syphilis even though penicillin had been known to treat Syphilis since 1947. In 1972 the study was classified as ethically unjustified (CDC, 2016g). Whetten et al. added that the study contributed to distrust of public health professionals and reinforced the AIDS conspiracy theory that the government engineered HIV/AIDS as a weapon to kill the African American population. Ross, Essien, and Torres (2006) contended that a prevention method (i.e., vaccine) that was government funded was not trusted by 38% of Latino, 25% of Black, and 15% of White Americans.

History of Treatment and Prevention

Palella et al. (2006) shared that in the late 1990s, treatments emerged for HIV/AIDS patients referred to collectively as antiretroviral therapy (ART) or highly active antiretroviral therapy. These medication regimes required multiple pills taken multiple times a day to attack the virus or prevent its replication and spread to other healthy cells (Palella et al., 2006). PLoS (2016) stated that the side effects of the medications were as detrimental to the body as the disease they were intending to treat. Lipodystrophy, liver and kidney dysfunction, fatigue, and other conditions often made it difficult for patients to manage day to day (NIH, 2016).

Samji et. al. (2013), explained that instead of the life expectancy of only a few years, ART allowed AIDS patients to live much longer. Samji et. al. (2013) clarified that if left untreated, HIV would destroy helper cells and leave the person open to multiple opportunistic infections like certain rare cancers that first emerged in the epidemic (i.e., Kaposi's sarcoma, Burkitt's lymphoma, primary central nervous system lymphoma, cervical cancer, PCP, and other catastrophic infections). Hammer et al. (1996) explained that AIDS is diagnosed when the T cell count in the body goes below 200. When opportunistic infections occur in someone who is HIV positive and untreated, there is a high chance that the HIV infection will progress to a clinical diagnosis of AIDS. The CDC (2016a) added that this individual will also likely be able to readily transmit the virus to others through unprotected sexual activity or other risky behaviors. Presently, there is no cure for HIV, but there is treatment. Once a person maintains treatment adherence, he or she can lead a normal if not full life (May et al., 2014).

HIV Medications as Prophylaxis

Post-exposure prophylaxis (PEP) is the combination of two HIV medications (Truvada and Kaletra) that is only for emergency uses in cases where there is a possible HIV exposure or infection and is an ART medication that is taken once or twice a day for approximately 28 days to prevent seroconversion (CDC, 2016d). Panlilio, Cardo, Grohskopf, Heneine, and Ross (2005) stated that the U.S. Public Health Service recommended the use of PEP in 1996 after occupational exposure to HIV. When someone suspects that he or she has been exposed to HIV, there is a possibility that infection can be stopped from entering into the cells of their body (Panlilio et al., 2005). The CDC (2016d) stated that taking PEP within 72 hours after a possible exposure to HIV dramatically decreases the chances of HIV infection. According to the CDC (2016d), even though PEP is not 100% effective, it is still the best method to fight against any possible infections of HIV when there has been a likelihood of HIV infection. Kahn, et. al. (2001), added that PEP was first used after perinatal and occupational exposures to HIV, which prompted researchers to find out whether PEP would be effective for HIV exposures resulting from sexual activity or injection drug use.

Traditional Prophylaxis

Kippax and Stephenson (2012) stated that preventing HIV has transitioned from the more traditional HIV prophylaxis (i.e., condoms) to a bio-medicalized approach, which includes PrEP. Kippax and Stephenson added that to advance to more groundbreaking methods to guard the general population's public health, individuals need to be more open-minded when there are new preventative methods. Laga and Piot (2012)

observed that programs in HIV prevention have employed a traditional strategy of disease prevention, and leadership and management of prevention programs have been considered ineffective. Shattock, Warren, McCormack, and Hankins (2011) reported that 2.6 million people in 2009 were infected with HIV. Shattock et al. added that the 2009 statistic of people infected was greater than the frequency with which people had received HIV treatment. Leaders should turn their attention to prevention methods, such as PrEP, instead of treatment (Shattock, 2011).

Caceres, Salazar, Silva-Santisteban, and Nunez-Curto (2014) explained that a conversion from the traditional approach of leadership and activism is inevitable, even though PrEP is novel, and some activists are still advocating that the only HIV prophylaxis that should be considered is the condom. Advocating for positive social change implies a need for education and training for leaders and stakeholders (Caceres et al., 2014). Oster et al. (2011) added that HIV preventative methods (i.e., having dialogues about HIV status between MSM and their sexual partners) and further educational efforts may significantly reduce HIV infection.

PrEP

According to the CDC (2016e), PrEP is an HIV prophylaxis that is a combination of two medications (tenofovir and emtricitabine) into one pill called Truvada. If PrEP is taken daily and as prescribed, it is 92% effective in protecting persons from being infected by HIV (CDC, 2016e). In 2012, the Food and Drug Administration approved PrEP to be used as an HIV prophylaxis (Food and Drug Administration, 2015). However, the CDC (2016e) added that PrEP only decreases the chances of transmitting HIV from

one human to another and does not protect an individual from other STIs, such as syphilis, hepatitis, chlamydia, and gonorrhea. The approval of PrEP provided the only alternative prophylaxis to the condom and abstinence (CDC, 2016e). Some populations in the United States are more likely to be infected with HIV than others and are referred to as high-risk groups; MSM are included in that group (Millett et. al., 2012).

Mayer (2011) stated that STI rates among MSM have risen across the United States since 2004. Panlilio et al. (2005) postulated that PrEP was made available to the general population and was being targeted toward the populations of MSM in the United States because HIV disproportionately affects the MSM population. Molina et al. (2015) suggested that PrEP has given the gay and MSM communities another option to protect themselves from HIV infection other than the traditional method of a prophylaxis. Golub, Kowalczyk, Weinberger, and Parsons (2010) stated that in a study of gay men and MSM, many participants said they did not like using condoms because “sex feels better without a condom” and “I am tempted to have unprotected sex when I am very sexually aroused” (para. 14). These findings suggested the need for an alternative prophylaxis.

According to Horberg and Raymond (2013), PrEP’s annual cost can exceed \$17,000, and there is no policy that has included PrEP coverage in a health plan. Horberg and Raymond also stated that under limited circumstances described by the CDC, private health insurance is willing to cover the cost of PrEP. Horberg and Raymond added that neither Medicare nor Medicaid cover the cost of PrEP and that the Ryan White Act, a medication assistance program, covers medication for treatment but not for prevention. Horberg and Raymond explained that health plans that have no or low deductibles will

have more PrEP benefits, a health plan that has a high deductible will have fewer PrEP benefits, and self-insured medical plans will limit their health benefits for PrEP coverage. Horberg and Raymond suggested that the more widespread PrEP use becomes, the more private insurers will be willing to cover the cost.

Target Population

In this study, I examined the factors that influence the use of PrEP by the MSM population. MSM included sexual behavior between men instead of classifying them by sexual orientation. Prejean et. al. (2011) stated, that between 2006 to 2009 HIV infection rates remained stable except among MSM populations, which continued to increase across the United States. According to the CDC (2016b), MSM makes up the largest population in the United States that are infected with HIV. Furthermore, the CDC reported that in 2014 amongst all males aged 13 and older, 83 % (29,418) of new HIV infection were from gay and bisexual men, which also made up 67% of the total estimated new AIDS diagnoses in the United States; 54% (11,277) of persons who are diagnosed with AIDS are gay and bisexual men (CDC, 2016b). In addition of those that were diagnosed with AIDS, 39% were African-American, 32% were white, and 24% were Hispanic/Latino (CDC, 2016b). The CDC (2016c) further reported that there is a 2.1% HIV prevalence rate found in impoverished urban areas in the U.S. exceeding the well-established threshold for an epidemic of 1% of a population impacted. This rate is alarmingly similar to the rates found in several developing countries (CDC, 2016c).

Variables

As PrEP is a relatively new method of HIV prevention, there is little research or data on this approach. While there have been several advances in antiretroviral therapeutics and in adherence to HIV treatment regimes, there has been little in bio-behavioral or bio-medical adherence and prophylaxis (Muchomba, Gearing, and El-Bassel, 2012). PrEP is a form of bio-medical/bio-behavioral prophylaxis. Muchomba et. al., (2012) identified several barriers to effective use of bio-behavioral/bio-medical approaches to including inadequate patient-provider relationships, inadequate social supports, stigma and negative publicity, poverty distance from or access to health providers, mental health and substance abuse, and finally disempowerment and lack of involvement of community in program planning. Muchomba et. al., (2012) thus suggested that further scholarly inquiry into both adherence barriers and strategies to promote the initiation of and adherence to PrEP is required.

I have described several of the factors that contribute to the barriers and to the effective use of PrEP amongst the target population. These variables impact the initiation and adherence to PrEP as a bio behavioral prophylaxis. These variables include employment status, education level, access to health resources and the number of sexual partners influences. The following summarizes literature relevant to these variables.

Access to Health Resources

In a cross-sectional survey of 1507 young man who have sex with men (YMSM) Bauermeister, Meanley, Pingel, Soler and Harper (2013) stated that the perceived barriers to having the ability to use PrEP were cost and accessibility of PrEP and availability to

health insurance. Furthermore, Bauermeister et. al. (2013) stated that YMSM who were medically insured were less likely to worry about the cost of PrEP than YMSM who were not medically insured; more specifically YMSM Asian/Pacific Islanders were less likely to worry about the cost of PrEP than their White counterparts. However, older YMSM were more likely to state that they could not afford PrEP (Bauermeister et. al. 2013). Liu, et. al. (2014), stated that the medical insurance company, Kaiser Permanente covers more than 185,000 residents in the city of San Francisco 2,500 if those residents are HIV positive. Furthermore, according to Liu (2014) residents who are both HIV positive and negative have access to Kaiser insurance, employer-based programs, Medi0Cal, Healthy San Francisco and other programs that focus on low-income residents.

Liu et. al. (2014) reported that HIV specialists did not initiate PrEP because of patients having lack of medical insurance; insurance coverage is paramount in considering the use and nonuse of PrEP in the target population (Liu, 2014). Arnold et. al. (2012) stated that in a qualitative inductive cross-case analysis, health care providers from public clinics would only prescribe PrEP if it would be at a low or no cost and health care providers would only prescribe PrEP to patients who had insurance to cover the cost of PrEP (Arnold et. al., 2012).

Bauermeister et. al. (2013) did not consider the participants' different types of medical insurance. PrEP may be more affordable in some medical insurances than others. The research would be improved by exploring how much PrEP would cost under specific medical insurance and survey the respondents on which medical insurance they use. Thus, this would have given more perspective on perceptions of barriers involving the

use of PrEP. All different groups listed above are having issues with the affordability of PrEP, medication or other prophylaxis means. Arnold et. al., (2012) did not consider specific doctor-patient relationships and how that may affect PrEP accessibility or perception for each individual patient.

Education

Philip, Yu, Donnell, Vittinghoff, Buchbinder (2010) found that white MSM who were highly educated were more likely to actively look for sexual partners with the same HIV status, these respondents reported having 10 or more sexual partners in a 6-month period. Sanchez et. al. (2006) noted in a study of 10,030 MSM respondents that 47% reported having a sexual encounter with another MSM without an HIV prophylaxis. Sanchez et. al. (2006) added that MSM who had some college or technical school reported having casual sexual encounters with MSM without an HIV prophylaxis.

Balaji, (2014) added that Black MSM incidence of HIV infection was the highest out of all demographics because of the underlying influences such as not attaining a high school diploma, being under the influence of either drugs and/or alcohol before engaging in sexual activity, not being tested for HIV or not going to a primary care provider in the past year. Millet (2011) concurred that Black and Latino MSM who were infected with HIV were associated with having less than a high school diploma.

A limitation of both the Philip's and Millet's studies were that neither one focused on the change in education level of the participants. The studies did not take into consider whether the respondents sought higher education during their participation in the study. Millet (2011) is further limited by not considering discrepancies for participant's self-

reported sexual behavior. A survey that would be taken by the respondents weekly focusing around the number of sexual partners would alleviate this limitation. A limitation to the Sanchez's (2006) study was that respondents were made up of mostly White (non-Hispanic) MSM who were ages 25 - 44 years of age in which 78% stated they has some college or technical school. Sanchez could have looked for participants with more of a diverse educational level in professional or academic environments. All the findings above indicate the importance of education and education level on sexual and the use of prophylaxis in the prevention and spread of HIV.

Perception and Number of Sexual Partners

In Millet's (2011) multivariate analysis of the Latino MSM participants indicated, being HIV-positive was related to identifying with the *gay community*, which many Latino MSM do not, thus these respondents believed that sex with other Latino MSMs would reduce their risk of being infected with HIV. Millet (2011) also noted that amongst Black MSM, there was a belief that having a moderately higher income and having sexual relationships with other Black MSM reduced HIV transmission risk. Millet (2011) explained that both Latino and Black MSM felt more comfortable and safest amongst sexual partners who belong to their own race or ethnicity and that limiting reduced the risk of infection and lowered the need for discussion.

Sanchez et. al. (2006) reported that from 2003-2005 the National HIV Behavioral Surveillance System (NHBSS) collected data from MSM respondents who were 18 years or older in 42 metropolitan areas in the United States. Sanchez et. al. (2006) found that over 11% of MSM who were HIV negative stated that they had sexual encounters

without a prophylaxis. Sanchez (2006) added that respondents who stated that they tested HIV negative considered their sexual partners' HIV status, when determining whether they engaged in receptive or insertive anal sex with or without a condom.

Sanchez et. al. (2006) reported that out of 10,030 MSM, 7,628 respondents stated that they have more than one male sexual partner in the past year; 7,547 stated having casual male sexual partners; 6,856 had a main male sexual partner; 1,450 respondents reported only having oral sex with male sexual partners; and 120 respondents reported only having oral sex with female sexual partners. Sanchez et. al. (2006) adds that HIV infection amongst MSM can be decreased by adhering to effective protective behaviors, reduction of sexual partners, and monogamy.

Millett (2011) reported, that of 1208 MSM (597 Black and 611 Latino), 11% were HIV-positive and did not know their HIV status (18% Black; 5% Latino) (Millett, 2011). Millet (2011) explained that Black MSM that were cognizant of their HIV status were associated with having higher annual incomes and better health insurance than those who were unaware of their status. The author concluded that out of the Black MSM who were unaware they were infected with HIV almost 50% made more than \$100,000 annually; conversely over 60% of Black MSM who were not infected with HIV made less than \$9,999 for their annual income.

Millet (2011) suggested that only MSM who are a part of sexual networks are at higher risk for being infected with HIV; there is no evidence to validate this assumption. Furthermore, Millet (2011) only surveyed participants with low income in major cities and who self-reported sexual behavior of only the last sexual encounter. The researcher

should have gauged sexual activity more than just the last sexual encounter to have a broader base and to get more accurate results.

Philip (2011), Millet (2011), and Sanchez et. al. (2006) utilized self-reporting from respondents. For better results Millet (2011), Philip (2011), and Sanchez et. al. (2006) could have used self-reporting; weekly to get better results. Sanchez may have benefited from using a model that was multivariate since the study involved observation and the analyzing of more than one statistical outcome variable simultaneously. These studies imply that MSM, particularly MSM of color, who do not self-identify as gay, may perceive themselves at less risk of contracting HIV and more likely to have multiple sex partners. This same perception leads to the misperception of the need for PrEP or any other prophylaxis.

Income and Employment Status

Denning and DiNenno (2010), suggested that lack of income and employment status may explain some of the racial and ethnic disparities found in HIV prevalence rates for the overall U.S. population. Das et. al. (2010), examined trends of community viral load of MSM as an indicator of HIV transmission risk from 2004 to 2008 and believed that the disparity of income and employment status in the MSM population may influence both access to HIV prevention resources and treatments. Das et. al. (2010) added that HIV positive MSM living in low-income neighborhoods have trouble being in proximity to health care and health care programs and concluded that addressing income disparity and adding prevention resources should lower HIV infection. Denning and DiNenno (2010), examined employment status using the categories of employed,

unemployed, disabled and other (homemaker, retired and student). Denning and DiNenno (2010), reported that there was more of a HIV prevalence in participants who were unemployed than employed, disabled and other.

A limitation of Denning and DiNenno's (2010) study is that the population was a convenience sample taken from specific cities. Meaning the residents who took the survey may not have been a good representation of all urban poverty area residents in the United States. The study did include non-urban impoverished area and the results of the study in some instances may have overestimated the spread of HIV in urban poverty areas. The researchers should have used respondents that were from both rural and urban populated areas; this could have been completed by using a virtual survey targeted to both urban and rural participants.

Das et. al. (2010), did not conduct a longitudinal study, therefore was not reliable way of determining if the respondents are now HIV positive and solely included respondent who were diagnosed and reported in the HIV/AIDS Surveillance registry. The study should have used more than just one source for looking for HIV and viral load reportage. One way to improve the work of the researchers a longitudinal study should be conducted with more participants than the initial study.

Definitions

In this study, the construct of "access to health resources" was synonymous with medical insurance or coverage and the co-variate was employment status. Another independent variable was the number of sexual partners. Sexual partners are defined as the number of separate intimate relationships and individual MSM that has potential for

exposure and/or transmission of HIV. The dependent variable was the use of PrEP. MSM was not used synonymously with gay community. Beyrer et. al. (2012), defines MSM as men who have sex with men who identify as gay, bisexual, or heterosexual.

For the variable of education level, 0 was the value for some high school, 1 for completion of high school/general education diploma (GED), 2 for some college, 3 for completion of undergraduate studies and 4 for completion of graduate studies and beyond. The variable of sexual partners was defined by the value of 0 for up to 25 sexual partners annually, the value of 1 for 26 to 49 sexual partners annually, the value of 2 for 50 to 74 sexual partners annually, and the value of 4 for 75 or more sexual partners annually. For the variable employment status, 0 was the value for unemployed, 1 was for the value of part-time employment and 2 was for the value of full-time employment. For the variable of medical insurance, 0 was the value for employed and 1 was the value of unemployed.

Assumptions

An assumption made for this study was that the target population in the study are sexually active or may have multiple partners, and relationship status will not be taken into consideration. The relationship status was difficult to ascertain and was not included in the study.

Scope and Delimitations

Lieb (2011), asserted that there are approximately 7.1 million MSM who live in the United States. MSM historically have been the highest population impacted by HIV. Despite the significant advances in HIV prophylaxis, the rates of new infections have

continued to increase. There is a clear reluctance on the part of this population to embrace new and/or effective preventative measures. In this study, I planned to seek to identify factors that may contribute to the lack of use of prophylaxis, PrEP amongst the target population. While the HIV epidemic spans much larger than just the MSM population, in this study I have focused on this population because of significant historic and present-day disease impact. Specifically, in this study I examined an urban MSM population, majority of which were HIV positive. Historically, the urban MSM population has had higher infection rates and thus a greater vulnerability. As previously stated, little research has been done in this area. In the study, I did not account for all potential risk factors but the FCT eludes that health disparities are directly connected to illness outcomes and accessible resources that would provide tools to mitigate various health risk amongst other factors. While in the study, the main emphasis was on an urban population of MSM, the findings was relevant for and can be extrapolated to other MSM population throughout the United States.

Significance

I conducted a unique study because PrEP is a recent HIV preventative measure and focuses on preventing the spread of HIV amongst the targeted population of MSM. Little research has been done to understand the uses of PrEP. The results of this study could provide much-needed insight into the risk factors associated with the use of PrEP within the MSM community. This study has the potential to affect social change by assisting public health professionals in identifying individual characteristics that inhibit the use of PrEP. By identifying these characteristics, the use of the study results can

allow public health professionals to avert future illness, infection, and disease in the targeted community. Further, these results can lead to better understanding and innovations of future HIV prophylaxis and preventative measures as well as provide for social change. The health care community can by apply new strategies to decrease and inevitably end HIV infections amongst the MSM populace, thus improving human and social conditions.

Bekker et al (2012), proffered that nearly 2.5 million new HIV infections occur worldwide each year. Regrettably, as previously stated, MSM still maintain one of the highest infection rates of any population. Understanding and employing every available angle to prevent the further spread of this disease is paramount. Behavioral/biomedical approaches have demonstrated some of the most effective means. Bekker et al (2012), further offered that systemic analysis of the local dynamics and context -that is localized populations, approaches, and engagement- provide the most effective preventive strategies.

Summary

The MSM population has a long extensive history with the HIV/AIDS epidemic. Given that the MSM population is at a continued high risk of HIV infection, PrEP as a behavioral/biomedical prophylaxis was vital in decreasing infection rates amongst this population. PrEP being the newest prophylaxis has been targeted to the MSM. Before implementing innovative HIV prevention measures, researchers must keep in mind the mistrust in the government and stigma related to HIV that MSM face. In this doctoral study, I intended to study the associations between education level, employment status,

number of sexual partners, and access to health resources and the use of PrEP among MSM. Rhodes, Yee and Hergenrather (2006), stated that the MSM community is disproportionately affected by HIV.

The CDC (2016f), reported that if HIV infection rates persist then 1 out of 2 Black MSM and 1 out of 4 Latino MSM and 1 out of 11 White MSM was diagnosed with HIV in their lifetime. PrEP is a known, effective, biomedical prophylaxis that when coupled with behavioral interventions, has demonstrated efficacy in decreasing infection rates in all MSM demographics. By unmasking further implications and barriers to the effective use of this known approach to combating further spread, this study stands to have widespread positive implications and outcomes. To this end, a quantitative research study to determine the association between the variables identified and how they impact the use of PrEP based on the foundation of the fundamental cause theory (FCT) was conducted.

Section 2: Research Design and Data Collection

The purpose of this quantitative study was to investigate whether education level, employment status, access to health resources, and number of sexual partners were associated with the use of PrEP among MSM in the United States. The covariates in this study were age and race. In this chapter I describe the research design and rationale, methodology, target population, sampling measures, instrumentation and operationalization of constructs, internal and external threats to validity, and ethical measures.

Research Design and Rationale

I used a cross-sectional design to determine the association between factors that impact the use of PrEP in the MSM population. The independent variables for this study were education level, employment status, access to health resources, and number of sexual partners, and the dependent variable was the use of PrEP in the MSM population in the United States. The covariates were age and race. Salazar, Crosby, and DiClemente (2015) stated that a cross-sectional design is based on a fixed time and includes one or more samples that are acquired from the target population. The choice of a cross-sectional design was consistent with research strategy needed to advance knowledge in the discipline, by being used to document the prevalence of a public health issue (see Salazar et al., 2015). A cross-sectional design enables the researcher to investigate associations between variables, which can disqualify casual associations (Salazar et al., 2015). Table 2 shows how the variables related to the research questions and data elements. Table 3 shows how the variables were defined and coded.

Table 2

Reflects the Variable in Relation to the Research Questions and Identifies the Related Data Elements

Variables	Research question	Data elements
Education Level	What is the association between education level and the use of PrEP among MSM?	Highest education level obtained?
Employment Status	What is the association between employment status and access to resources and the use of PrEP among MSM?	What is your employment status?
Number of Sexual Partners	What is the association between the number of sexual partners and the use of PrEP among MSM?	How many sexual partners have you had in the past 3 months? How many sexual partners have you had in the last year? Do you presently have a main sexual partner? Have you had a main sexual partner in the past 3 months?
Access to health resources	What is the association between employment status and access to resources and the use of PrEP among MSM?	Are you currently covered by medical insurance? Does that medical insurance cover drug cost? Would you be willing to pay for PrEP? Should PrEP be made available without a prescription?
Age	What is the association between age and the use of PrEP among MSM?	How old are you?
Race	What is the association between race and the use of PrEP among MSM?	What race do you identify as?

Table 3

Study Variables, Meaning, and Code

Variables	Meaning	Coding
Education Level	High School Student	1
	High School/General Education Diploma (GED)	2
	Some College	3
	Completion of Undergraduate Studies	4
	Completion of Graduate Studies	5
Variables	Meaning	Coding
Employment Status	Unemployed	1
	Part-time Employment	2
	Full-Time Employment	3
Variables	Meaning	Coding
Number of Sexual Partners	Up to 25 Sexual Partners Annually	1
	26 to 49 Sexual Partners Annually	2
	50 to 74 Sexual Partners Annually	3
	75 or more Sexual Partners Annually	4

Variables	Meaning	Coding
Access to health resources	Full time	1
	Part-time	2
	Unemployed	
Variables	Meaning	Coding
Age	0-20	1
	21-30	2
	31-40	3
	41-50	4
	51-60	5
	60 and above	6
Variables	Meaning	Coding
Race	Black	1
	White	2
	Latinx/Hispanic	3
	Asian	4
	Mixed Race	5
	Other	6

Data Collection

There were foreseen time and resource constraints consistent with the design choice. Salazar et al. (2015), stated that a longitudinal study in which participants are observed over a period of time is the ideal method for conducting research of this kind. Time and resource constraints prevented the use of that methodology. The study also included self-reported data. A constraint of self-reporting data is bias, which can alter or distort the data (Salazar et al., 2015).

Data collection in cross-sectional studies is implemented at one time. If the researchers wish to know more information over time, then they must collect data over time (Salazar et al., 2015). In a paper questionnaire, a constraint might be having enough resources such as paper or funding to pay for the paper. Also, if mailed participants can keep the questionnaire or survey, then the participant might not return the questionnaire or survey back to the researcher. Constraints on face-to-face interviews include the expense to train each interviewer, and changes or variations during the interviews can influence the data outcomes (McKenzie, Neiger & Thackeray, 2016).

For the current study, these constraints may have impacted the original data collection; however, they had no bearing on the outcomes of the current study. The constraints that were anticipated were of a logistical nature and included going beyond the time allotted for the completion of the work, obtaining permission for the use of the data set, or delays in receiving IRB approval to proceed.

According to Creswell (2013), cross-sectional research offers insights into a population's trends, attitudes, and beliefs. The current study included a cross-sectional

design to examine the association between education level, access to health resources, employment status, and number of sexual partners impact the use of PrEP in MSM. Findings may be used to enhance the development and application of known and unknown HIV preventative measures.

Methodology

Target Population

The target population for this study was MSM who are HIV positive or negative and reside in the United States. According to Grey et al. (2016), it is estimated that MSM in the United States make up 3.9% of the population and 58-65% of HIV transmission. The data set showed that data were collected from 217 participants in the original study (PLOS, 2016).

Sampling and Sampling Procedures

McKenzie et al. (2016), stated that sampling is necessary to decide participants from whom data was procured. Sampling is used when a population is too large to survey or interview or when some manner of sorting is necessary (McKenzie et al., 2016). In the original study, trained researchers interviewed patients in the waiting room at the Partnership Comprehensive Care Clinic and Drexel University College of Medicine in Philadelphia, Pennsylvania. Researchers chose only those who were 18 years or older and who self-reported their HIV status (PLOS NIH, 2016). Each participant was compensated by being given a \$10 gift card to the hospital cafeteria. Patients who were newly diagnosed with HIV were excluded from the study. According to Charan and Biswas

(2013), cross-sectional studies are used to approximate a target population's occurrence and determine the average value of a quantitative variable in the target population.

There was no unique procedure used to gain access to the data set, and it was unnecessary to obtain permission to access the data, as it was in the public domain (PLOS NIH, 2016). There were no historical or legal documents used as sources of data.

According to PLOS NIH (2018, para. 5),

This site is maintained by the U.S. Government and is protected by various provisions of Title 18 of the U.S. Code. Violations of Title 18 are subject to criminal prosecution in a federal court. For site security purposes, as well as to ensure that this service remains available to all users, we use software programs to monitor traffic and to identify unauthorized attempts to upload or change information or otherwise cause damage. In the event of authorized law enforcement investigations and pursuant to any required legal process, information from these sources may be used to help identify an individual.

In the initial data collection, the sample included 217 respondents (PLOS NIH, 2016). For the current study, all 217 respondents were included in the sample. I conducted a G*Power analysis to determine the minimum sample size, which was 200 participants. The difference between two independent means (two groups) was the statistical test that was inputted in the G*Power program when calculating the sample size. I used a medium effect size of .4, an alpha level of .05, a power of .80, and a two-tailed test. The effect size was not based on a prior study but was inputted in the

G*Power program when calculating effect size. The statistical test that was used to answer the research questions was multiple logistic regression.

Instrumentation and Operationalization of Constructs

The cross-sectional survey was developed and used in 2013 and published in 2016 by the PLoS, the cross-sectional survey was appropriate for this study because it is less time consuming, inexpensive, and gives a quick picture of the prevalence of exposure and outcome (see Salazar et al., 2015). The data set was available for access by the general public (PLOS NIH, 2016). The data collectors used verbal labels to improve data quality and a 5-point Likert type scale to decrease the perception of risk and acceptability questions.

After all chosen participants completed an IRB-approved written consent form, the participants were given a 37-item survey, which was divided into two sections. The survey focused on knowledge, attitudes, and acceptability of PrEP. To compare proportions for accessibility and risk perception, the chi square and Fisher's exact test were used. The survey was an adaptation from the CDC's risk assessment survey (PLOS, 2016). The first section of the survey elicited demographic information, risk assessment, and perception of risk of HIV infection to a partner who was not infected with HIV; the second section of the survey focused on acceptability and knowledge of PrEP. The CDC's risk assessment survey was used as a comprehensive clinical practice guideline for PrEP by the CDC on May 14, 2014 (PLOS, 2016). The independent variables in the current study were education level, employment status, access to health resources, and number of sexual partners; the dependent variable was the use of PrEP.

Table 4

Operationalization of Constructs

Variables	Definition	Measured/Manipulated
Education Level	Defined as if the participant has completed a high school/general education diploma (GED), some college, completed undergraduate studies or completed graduate studies and beyond	This was measured by survey
Employment Status	Defined whether the participant is unemployed, part-time or full-time	This was measured by survey
Number of Sexual Partners	Defined has how many sexual partners the participant has had in one year	This was measured by survey
Access to health resources	Defined if the person is employed or unemployed	This was measured by survey
Age	Defined as how old the participant is	This was measured by survey
Race	Defined as to what the participant's race is	This was measured by survey

Data Analysis Plan

Intellectus Statistics was used to analyze the data. A multiple logistic regression was used to model the dependent variable (binomial), the use of PrEP, with the independent variables of education level, employment status, number of sexual partners, and access to health resources (categorical), which will allow to test the impact of each independent variable on the dependent variable. 95 % confidence intervals (C.I.) will also be calculated. According to Watthananon and Mingkhwan (2012), data cleansing focuses on examining the integrity and reliability of information or data used in the study and

research. I examined all data that is to be used. The goal would be to make sure all data is valid and current.

Statistical Analysis for RQ1

RQ1: What is the association between education level and the use of PrEP among MSM after controlling for age and race?

H_01 : There is no association between education level and the use of PrEP among MSM.

H_a1 : There is an association between education level and the use of PrEP among MSM.

I used a multiple logistic regression to model the significance of the finding of the dependent variable (binomial), the use of PrEP, with the independent variable of education level, to make the decision to either accept or reject the null hypothesis. The significance level was $p < 0.05$.

Statistical Analysis for RQ2

RQ2: What is the association between employment status and the use of PrEP among MSM after controlling for age and race?

H_02 : There is no association between employment status and the use of PrEP among MSM.

H_a2 : There is an association between employment status and the use of PrEP among MSM.

I used a multiple logistic regression to model the significance of the finding of dependent variable (binomial), the use of PrEP, with the independent variable of

employment status, to make the decision to either accept or reject the null hypothesis.

The significance level was $p < 0.05$.

Statistical Analysis for RQ3

Research Question 3: What is the association between the number of sexual partners and the use of PrEP among MSM after controlling for age and race?

H₀3: There is no association between the number of sexual partners and the use of PrEP among MSM.

H_a3: There is an association between the number of sexual partners and the use of PrEP among MSM.

I used a multiple logistic regression to model the significance of the finding of the dependent variable (binomial), the use of PrEP, with the independent variable of number of sexual partners, to make the decision to either accept or reject the null hypothesis. The significance level was $p < 0.05$.

Statistical Analysis for RQ4

RQ4: What is the association between the access to health resources and the use of PrEP among MSM after controlling for age and race?

H₀4: There is no association between the access to health resources and the use of PrEP among MSM.

H_a4: There is an association between the access to health resources and the use of PrEP among MSM.

I used a multiple logistic regression to model the significance of the finding of the dependent variable (binomial), the use of PrEP, with the independent variable of access

to resources, to make the decision to either accept or reject the null hypothesis. The significance level was $p < 0.05$.

Threats to Validity

Creswell (2013), stated that validity is the ability to draw significant and useful extrapolations from measurements on the instruments used in the study. External validity threats are the occurrences of when researchers make incorrect extrapolations from the sample information to other individuals, surroundings, and circumstances that are in the past or future. Creswell (2013), detailed that Interaction of history and treatment is when the outcomes of the research are constrained by time, an investigator cannot simplify results to previous and impending situations. There is a possibility of the Interaction of history and treatment threat validity to occur because a longitudinal study is not being used and because of the use of a secondary data source, there is not the ability to replicate the study with the same participants in later times to determine if the same results occur. Furthermore, Creswell (2013), explained because of the narrow characteristics of participants in the study, the experimenter cannot take a broad view of individuals who do not have the characteristics of the participants. Pre-existing data only allows to survey certain participant and does not allow the fore boarder generalization of findings.

Internal validity threats are the occurrences of when investigators use experimental steps, treatments or practices of the participants that impend on the researcher's aptitude to attract precise extrapolations from the information about the populaces in the study. Creswell (2013), clarified that the internal threat of validity, selection, is when individuals in the study can be chosen who have certain characteristics

that influence them to have certain results. The initial participant may have been predisposed to bias information on the dependent variable by outside courses

Statistical conclusion validity occurs when researcher makes inaccurate inferences from the information because of insufficient inadequate statistical power and construct validity happens when researchers use insufficient descriptions of variables. There are no foreseen construct or statistical conclusion or validity threats because all variables are clearly defined and articulated, and there is a possibility of inaccurate inferences, inadequate statistical power, and violation of statistical assumptions. (Creswell, 2013).

The research focused on what is the association between education level, employment status, number of sexual partner and access to resources impact and the use of PrEP among MSM. A cross-sectional analysis was employed to examine the survey data. Information that is self-reported in surveys are subject to bias, because participants may change their answers based on how familiar they are with the researchers that are interviewing with them (Creswell, 2013). Participant may report falsely on employment status, number of sexual partners and education level

In addition, answers can be changed or dishonest based on how personal the survey questions are. There are some foreseen validity threats, such as participant may drop out of the study before its conclusion. Creswell (2013), explained that the threat of mortality can occur when participants drop out during the study, which can affect the study by slowing it down and interfering with data collection. One concern is that there is no mention of coding or a method to conceal participant's names. According to Creswell

(2013), putting participants at risk of being identified in a study is an ethical issue that can result in physical, psychological, social, economic, and/or legal harm.

The participants were given \$10 gift cards for the hospital cafeteria as an incentive for participating in the study. For participants that are given an incentive to participate in a research study, there is a threat that they will not honestly answer questions on a survey but will answer the questions falsely just to receive the incentive, which will result in the compensatory threat of validity (Creswell, 2013).

Ethical Procedures

Since the dataset can be accessed by the general public there was no permission needed. Drexel University College of Medical's IRB permitted the practice for this research between January 2013 and June 2013. Every participant signed consent forms that were permitted by the IRB. There are no ethical apprehensions connected to recruitment resources and procedures as defined in secondary data set resources.

There are no ethical concerns connected to data gathering as defined in the secondary data set resources such as participants declining to contribute information or premature departure from the study and reactions to any predicable opposing occasions. The data was not coded but the participants' identities were protected by not mentioning their names, the data then remained anonymous and confidential. This allowed the researchers to make the dataset accessible to the general population.

The data in this study was secured by encrypting the dataset file with a password. The password was changed every 6 months, this is so it cannot be tampered with. The data was then stored on an external hard drive which will also be password protected, the

password was changed every 6 months. The hard drive was stored in a locked safe, that was password protected with a key lock. The safe was in a secured room that requires a keyless entry passcode.

Summary

The study that was conducted was quantitative in nature. The cross-sectional study will use a dataset from a secondary data source of the PLOS, NIH. The dataset focuses on knowledge, attitudes, and acceptability of PrEP among individuals living with HIV. Intellectus Statistics was used to focus on the associations between education level, employment status, number of sexual partner and access to resources and what impact that they have on the use of PrEP among MSM in the dataset. Section 3 includes the data collected and analyzed results.

Section 3: Presentation of the Results and Findings

The purpose of this quantitative study was to examine whether education level, employment status, access to health resources, and number of sexual partners were associated with the use of PrEP among MSM in the Philadelphia. The research questions and hypotheses addressed the association between education level, employment status, number of sexual partners, and access to health resources and the use of PrEP among MSM after controlling for age and race.

Results

The sample consisted of 217 participants. The most commonly detected group by gender was male ($n = 125$, 58%). The most commonly detected group by marital status was single ($n = 137$, 63%). The most commonly detected group by race was African American ($n = 166$, 76%). The most commonly detected group by education level was high school GED ($n = 69$, 32%). The most commonly detected group by employment status was no ($n = 170$, 78%). The most commonly detected group by access to health resources was yes ($n = 190$, 88%). Frequencies and percentages are presented in Table 5.

Table 5

Frequency Table for Nominal Variables

Variable	<i>n</i>	%
Gender		
Female	91	41.94
Male	125	57.60
Transgender	1	0.46
Missing	0	0.00
Marital status		

		43
Divorced	15	6.91
Live with partner	35	16.13
Married	8	3.69
Separated	12	5.53
Single	137	63.13
Widowed	10	4.61
Missing	0	0.00
Race		
African American	166	76.50
Asian or Pacific Island	1	0.46
Caucasian	19	8.76
Hispanic or Latino	13	5.99
Mixed	14	6.45
Other	3	1.38
Missing	1	0.46
Education Level		
4-year college	13	5.99
8th grade	7	3.23
High school GED	69	31.80
Less than 8th grade	7	3.23
Masters & beyond	3	1.38
Some college	50	23.04
Some high school	68	31.34
Missing	0	0.00
Employment Status		
Full time	27	12.44
No	170	78.34
Part time	16	7.37
Student	2	0.92
Missing	2	0.92
Access to health resources		
No	25	11.52
Yes	190	87.56
Missing	2	0.92

Note. Percentages may not equal 100% because of rounding figures.

The participants had a mean age of 44.18 ($SD = 11.68$, $SE_M = 0.79$, $Min = 18.00$, $Max = 67.00$). Skewness and kurtosis were also calculated. When the skewness is greater

than or equal to 2 or less than or equal to -2, then the variable is considered to be asymmetrical about its mean. When the kurtosis is greater than or equal to 3, then the variable's distribution is markedly different than a normal distribution in its tendency to produce outliers (Westfall & Henning, 2013). The results for interval and ratio variables are presented in Table 6.

Table 6

Summary Statistics Table for Interval and Ratio Variables

Variable	<i>M</i>	<i>SD</i>	<i>n</i>	<i>SE_M</i>	Skewness	Kurtosis
Age	44.18	11.68	217	0.79	-0.26	-0.78

Hypothesis Testing

A series of binary logistic regressions was used to answer the research questions. For each logistic regression, the dependent variable was likelihood to use PrEP, coded as likely to extremely likely, with a reference category of extremely unlikely to unsure. Each regression included a covariate of age and race. Because race was a variable with multiple categories, and because of small cell frequencies, the variable was dummy coded and reduced to the categories Black versus all other races, with all other races as the reference category. Following the same reasoning, education was dummy coded and reduced to the categories some high school to high school, some college, and 4 year college and above, with less than high school as the reference category. Prior to the analysis of each research question, the assumption of absence of multicollinearity was assessed.

Age, Race, and Education

A binary logistic regression was used to determine whether age, race, and education level had a significant effect on the odds of observing the likely to extremely likely group of use of PrEP among MSM. The reference group for the use of PrEP among MSM was unsure to extremely unlikely. Variance inflation factors (VIFs) were examined to detect the presence of multicollinearity between predictors. High VIFs indicate increased effects of multicollinearity in the model. VIFs greater than 5 are cause for concern, whereas VIFs of 10 should be considered the maximum upper limit (Menard, 2009). All predictors in the regression model had VIFs less than 5. The results for age, race, and education level are presented in Table 7.

Table 7

Variance Inflation Factors for Age, Race, and Education Level

Variable	VIF
Age	1.06
Race	1.08
Education Level	1.10

The overall results were not significant, $\chi^2(5) = 9.02, p = .108$, suggesting that age, race, and education level did not have a significant effect on the odds of observing the likely to extremely likely category of the use of PrEP among MSM. McFadden's R-squared was calculated to examine the model's fit, where values greater than .2 were indicative of models with excellent fit (see Louviere, Hensher, & Swait, 2000). The McFadden R-squared value calculated for this model was 0.06. Despite overall nonsignificance, two categories of education were individually significant. Those who

had at least some high school or a high school diploma were 3.98 times (or 398%) more likely to be likely to extremely likely to use PrEP, compared to those who had less than a high school education ($OR = 3.98, p = .048$). Those who had some college were 6.91 (or 691%) more likely to be likely to extremely likely to use PrEP, compared to those who had less than a high school education ($OR = 6.91, p = .028$). The null hypothesis was partially rejected. Despite the collective nonsignificance, the individual predictors were examined further. The results of logistic regression with age, race, and education level predicting the use of PrEP among MSM are presented in Table 8.

Table 8

Logistic Regression Results With Age, Race, and Education Level Predicting the Use of PrEP Among MSM

Variable	<i>B</i>	<i>SE</i>	χ^2	<i>p</i>	<i>OR</i>	<i>95% CI</i>	
						Lower	Upper
(Intercept)	1.00	1.24	0.64	.423			
Age	-0.01	0.02	0.22	.642	0.99	0.95	1.03
Race (ref: all other)							
Black	1.08	0.67	2.59	.108	2.95	0.79	11.06
Education Level (ref: less than high school)							
At least some high school to high school	1.38	0.70	3.92	.048	3.98	0.10	3.31
Some college	1.93	0.88	4.83	.028	6.91	0.56	9.07
4-year college and above	0.57	0.90	0.40	.525	1.77	0.68	22.24

02, $p = .108$, McFadden $R^2 = 0.06$.

Age, Race, and Employment

I conducted a binary logistic regression to examine whether age, race, and employment status had a significant effect on the odds of observing the likely to extremely likely group of use of PrEP among MSM. The reference group for the use of

PrEP among MSM was unsure to extremely unlikely. Employment status was coded into employed, with not employed as the reference category. VIFs were calculated to detect the presence of multicollinearity between predictors. High VIFs indicate increased effects of multicollinearity in the model. VIFs greater than 5 are cause for concern, whereas VIFs of 10 should be considered the maximum upper limit (Menard, 2009). All predictors in the regression model had VIFs less than 5. The VIF results for each predictor of age, race, and employment status in the model are presented in Table 9.

Table 9

Variance Inflation Factors for Age, Race, and Employment Status

Variable	VIF
Age	1.10
Race	1.01
Employment Status	1.09

The overall results were not significant, $\chi^2(3) = 2.98, p = .395$, suggesting that age, race, and employment status did not have a significant effect on the odds of observing the likely to extremely likely category of use of PrEP among MSM. McFadden's R-squared was calculated to examine the model's fit, where values greater than .2 were indicative of models with excellent fit (see Louviere et al., 2000). The McFadden R-squared value was 0.02. Because the overall results were not significant, the individual predictors were not examined further. The results of the regression model of age, race, and employment status are presented in Table 10.

Table 10

Logistic Regression Results With Age, Race, and Employment Status Predicting the Use of PrEP Among MSM

Variable	<i>B</i>	<i>SE</i>	χ^2	<i>p</i>	<i>OR</i>	95% CI	
						Lower	Upper
(Intercept)	2.56	0.95	7.29	.007			
Age	-0.02	0.02	0.76	.382	0.98	0.95	1.02
Race (ref: all other)						0	
Black	0.80	0.64	1.54	.215	2.22	0.63	7.84
Employment Status (ref: not employed)							
Employed	0.15	0.56	0.07	.795	1.16	0.29	2.59

Note. $X^2(3) = 2.98$, $p = .395$, McFadden $R^2 = 0.02$.

Age, Race, and Sex

I conducted a binary logistic regression to examine whether age, race, and number of sexual partners had a significant effect on the odds of observing the likely to extremely likely group of use of PrEP among MSM. The reference group for the use of PrEP among MSM was unsure to extremely unlikely. Number of sexual partners was a continuous variable. VIFs were calculated to detect the presence of multicollinearity between predictors. High VIFs indicate increased effects of multicollinearity in the model. VIFs greater than 5 are cause for concern, whereas VIFs of 10 should be considered the maximum upper limit (Menard, 2009). All predictors in the regression model had VIFs less than 5. The VIF results for each predictor of age, race, and number of sexual partners are presented in Table 11.

Table 11

Variance Inflation Factors for Age, Race, and Number of Sexual Partners

Variable	VIF
Age	1.02
Race	1.01
Number of sexual partners	1.01

The overall results were not significant, $\chi^2(3) = 3.18, p = .365$, suggesting that age, race, and number of sexual partners did not have a significant effect on the odds of observing the likely to extremely likely category of use of PrEP among MSM. McFadden's R-squared was calculated to examine the model's fit, where values greater than .2 were indicative of models with excellent fit (see Louviere et al., 2000). The McFadden R-squared value was 0.02. Because the overall results were not significant, the individual predictors were not examined further. The logistic regression results for age, race, and number of sexual partners and number of sexual partners are presented in Table 12.

Table 12

Logistic Regression Results With Age, Race, and Number of Sexual Partners Predicting the Use of PrEP Among MSM

Variable	<i>B</i>	<i>SE</i>	χ^2	<i>p</i>	<i>OR</i>	95% <i>CI</i>	
						Lower	Upper
(Intercept)	2.60	0.94	7.68	.006			
Age	-0.02	0.02	0.73	.393	0.98	0.95	1.02
Race (ref: all other)							
Black	0.84	0.64	1.70	.193	2.31	0.66	8.14
Number of sexual partners	0.01	0.04	0.04	.849	1.01	0.94	1.08

Note. $X^2(3) = 3.18$, $p = .365$, McFadden $R^2 = 0.02$.

Age, Race, and Resources

I conducted a binary logistic regression to determine whether age, race, and access to health resources had a significant effect on the odds of observing the likely to extremely likely group of use of PrEP among MSM. The reference group for the use of PrEP among MSM was unsure to extremely unlikely. Access to resources was coded as yes, with no as the reference category. VIFs were calculated to detect the presence of multicollinearity between predictors. High VIFs indicate increased effects of multicollinearity in the model. VIFs greater than 5 are cause for concern, whereas VIFs of 10 should be considered the maximum upper limit (Menard, 2009). All predictors in the regression model had VIFs less than 5. The VIF results for age, race, and access to health resources for each predictor are presented in Table 13.

Table 13

Variance Inflation Factors for Age, Race, and Access to Health Resources

Variable	VIF
Age	1.04
Race	1.01
Access to health resources	1.03

The overall results were not significant, $\chi^2(3) = 3.16, p = .367$, suggesting that Age, Race, and Access to health resources did not have a significant effect on the odds of observing the Likely to Extremely Likely category of the use of PrEP among MSM. McFadden's R-squared was calculated to examine the model's fit, where values greater than .2 are indicative of models with excellent fit (Louviere, Hensher, & Swait, 2000). The McFadden R-squared value calculated for these results were 0.02. Since the overall results were not significant, the individual predictors were not examined further. The Logistic Regression Results with Age, Race, and Access to health resources Predicting The use of PrEP among MSM in the model are presented in Table 14.

Table 14

Logistic Regression Results with Age, Race, and Access to health resources Predicting The use of PrEP among MSM

Variable	<i>B</i>	<i>SE</i>	χ^2	<i>p</i>	<i>OR</i>	95% CI	
						Lower	Upper
(Intercept)	2.86	1.09	6.91	.009			
Age	-0.01	0.02	0.55	.459	0.99	0.95	1.02
Race (ref: all other)							
Black	0.81	0.64	1.58	.209	2.24	0.64	7.92
Access to health resources							
Yes	-0.36	0.79	0.21	.644	0.70	0.15	3.24

Note. $X^2(3) = 3.16$, $p = .367$, McFadden $R^2 = 0.02$.

Summary

In this study I measured the potential association between Education Level, Employment Status, Number of sexual partners, and Access to health resources and the use of PrEP among MSM. Two hundred and seventeen MSM participants were recruited for the study. Data collected were analyzed using a binary logistic regression and the results were used to answer the research questions and the hypothesis associated with each research question. The details of each analysis are described below, organized by research question. For each logistic regression, the dependent variable was Likelihood to Use PrEP, coded as *Likely to Extremely Likely*, with a reference category of *Extremely Unlikely to Unsure*. Each regression included a covariate of Age and Race. Because Race was a variable with multiple categories, as well as because of small cell frequencies, I dummy-coded and reduced the variable to the categories *Black* versus *all other Races*. Prior to the analysis of each research question, I assessed the assumption of absence of multicollinearity. For RQ1, I conducted a binary logistic regression with an independent

variable of Education Level, with the covariates of Age and Race. Because Education Level was a multicategory variable, I dummy coded it into multiple variables: at least some high school to high school, some college, 4-year college and above, with a reference category of below high school. There were no significant associations, $\chi^2(5) = 9.02, p = .108$, suggesting that Age, Race, and Education Level did not significantly predict the odds of observing the Likely to Extremely Likely category of the Likelihood to use PrEP. However, two categories of education were individually significant. The participant who had at least some high school or a high school diploma were 3.98 times (or 398%) more likely to be Likely to Extremely Likely to use PrEP, when compared to those who had a less than high school education ($OR = 3.98, p = .048$). Those who had some college were 6.91 (or 691%) more likely to be Likely to Extremely Likely to use PrEP, when compared to those who had a less than high school education. For RQ2, I conducted a binary logistic regression with an independent variable of Employment Status, with the covariates of Age and Race to answer this research question.

Employment Status was coded into yes, with no as the reference category. The overall model was not significant, $\chi^2(3) = 2.98, p = .395$, suggesting that Age, Race, and Employment Status did not significantly predict the odds of observing the Likely to Extremely Likely category of Likelihood to use PrEP. For RQ3, I conducted a binary logistic regression with an independent variable of Number of sexual partners within the last year, with the covariates of Age and Race to answer this research question. The overall model was not significant, $\chi^2(3) = 3.18, p = .365$, suggesting that Age, Race, and the Number of sexual partners did not have a significant effect on the odds of observing

the Likely to Extremely Likely category of the use of PrEP among MSM. For RQ 4, I conducted a binary logistic regression with an independent variable of Access to resources within the last year, with the covariates of Age and Race to answer this research question. Access to resources was coded as yes, with no as the reference category. The overall model was not significant, $\chi^2(3) = 3.16, p = .367$, suggesting that Age, Race, and Access to health resources did not have a significant effect on the odds of observing the Likely to Extremely Likely category of the Likelihood to use PrEP among MSM. Section 4 includes a detailed interpretation of the findings, limitations of study, recommendations and implications for professional practice and social change.

Section 4: Application to Professional Practice and Implications for Social Change

The purpose of this cross-sectional study was to determine whether education level, employment status, number of sexual partners, and access to health resources related to the use of PrEP amongst 217 MSM in Philadelphia. According to Chaudoir, Dugan, and Barr (2013), it is paramount that researchers discover whether factors are significant or insignificant to comply with HIV preventative measures to learn what is effective in preventing further HIV infections in the MSM population. According to Beyrer et al. (2013), the continued spread of HIV among MSM indicates present prevention and treatment approaches are deficient. Findings from this study may assist in filling the gap regarding factors that are related to the use of PrEP among MSM. Public health professionals may use the findings to understand factors that may influence the use of PrEP in the MSM population.

Primary data were collected through surveys of patients in the Partnership Comprehensive Care Clinic and Drexel University College of Medicine in Philadelphia, Pennsylvania. According to PLOS (2016), the survey was an adaptation from the CDC's risk assessment survey. The data included 217 participants who were recruited in the waiting room of the Partnership Comprehensive Care Clinic and Drexel University College of Medicine in Philadelphia, Pennsylvania. In the current study, the statistical test used to answer the research questions was multiple logistic regression. Results indicated that only education level was significantly related to the use of PrEP. The following section includes an interpretation of the research findings. I also discuss the

limitations of the study and make recommendations for further research. Finally, I discuss implications for professional practice and offer a final conclusion for the study.

Interpretation of Research Findings

I examined the relationship between the independent variables of education level, employment status, number of sexual partners, and access to health resources and the dependent variable of use of PrEP among MSM. The results for each research question are discussed below in terms of previous research and the FCT framework.

PrEP and Education Level

Results for the first research question indicated that age, race, and education level did not have a significant effect on the odds of observing the likely to extremely likely category of use of PrEP among MSM. Although the results showed overall nonsignificance, two categories of education level were individually significant. Those who had at least some high school or a high school diploma were more likely to use PrEP compared to those who had less than a high school education. Those who had some college were more likely to use PrEP compared to those who had less than a high school education. Therefore, the null hypothesis, which stated that education level is not associated with the use of PrEP among MSM, was rejected. The results showed that more education may lead to increased likelihood to use PrEP. This finding was consistent with Obodo (2015), who determined that high school students who were MSM were more likely to use PrEP.

PrEP and Employment Status

Results related to the second research question indicated that age, race, and employment status did not have a significant effect on the odds of observing the likely to extremely likely category of use of PrEP among MSM. Therefore, the null hypothesis, which stated that employment status is not associated with the use of PrEP among MSM, was not rejected. This finding was not consistent with Obodo (2015), who determined that there was a statistically significant association between employment status and the use PrEP in the MSM population. Obodo (2015) found that MSM who work full time and MSM who were unable to work because of health reasons had a statistically significant difference in odds ratio regarding the use of PrEP. However, Obodo (2015) did not group the participants who were unable to work with unemployed participants. This was significant because it may have changed the percentage to 36.4, which was the same percentage of participants who stated that they were employed full time, which could have changed the outcome of the study. Obodo (2015) did not consider that full-time students are unemployed, and he did not include employed part-time students in his logistic regression model.

PrEP and Sex

Results for the third research question indicated that age, race, and number of sexual partners did not have a significant effect on the odds of observing the likely to extremely likely category of use of PrEP among MSM. Therefore, the null hypothesis, which stated that the number of sexual partners is not associated with the use of PrEP among MSM, was not rejected. This finding was consistent with Sanchez et al. (2006),

who determined that HIV infection among MSM can be decreased by adhering to effective protective behaviors. However, Sanchez et al. defined protective sex as sex with condoms. The current study differed from Sanchez et al.'s study in that the current study focused on PrEP as a pharmacological intervention that can be used in conjunction with condoms and other behavioral interventions.

PrEP and Health Resources

Results for the fourth research question indicated that age, race, and access to health resources did not have a significant effect on the odds of observing the likely to extremely likely category of use of PrEP among MSM. Therefore, the null hypothesis, which states that access to health resources is not associated with the use of PrEP among MSM, was not rejected. This finding was consistent with Obodo (2015), who determined that there was no statistically significant association between health care access and the use PrEP among MSM.

FCT Interpretation

The theoretical framework used in the study was the fundamental change theory (FCT). According to Phelan and Link, 2013, the FCT was used to examine the cause and effects of frequent illness outcomes through multiple risk factors, which included access to resources that help avoid health risks. Some important principles of FCT are socioeconomic status is directly associated with multiple health risk issues and mortality, socioeconomic status influences multiple illness results, and distribution of resources plays a critical role in the relationship between socioeconomic status and health/mortality (Phelan & Link, 2013). The FCT was used in the current study to understand

socioeconomic limitations of health resources that are not available for the prevention of HIV infection among MSM.

The findings of this study showed that employment status, number of sexual partners, and access to health resources were not associated with the use of PrEP. Sample characteristics, like most (87.56%, $n = 190$) of participants having access to health resources, might have limited the ability to understand the experiences of those without socioeconomic privileges. Most participants being unemployed (78.34%, $n = 170$) might have affected the generalizability of findings to the wider population. In addition, demographic variables were not associated with increased likelihood that a participant would use PrEP. Some aspects of the sample, such as the mostly African American (76%) composition, may have skewed the results, as the ethnic breakdown was not representative of the United States as a whole (U.S. Census Bureau, 2008). Nevertheless, the sample was large and diverse enough to demonstrate the applicability of FCT. The findings were not consistent with the FCT principle that socioeconomic factors could be used to clarify behavior change (see Eikemo et al., 2016). Thus, would suggest that the FCT would have limited applicability.

Findings showed that education level was associated with the use of PrEP. Participants came from a wide range of educational backgrounds, and the results showed that educational attainment increased the likelihood of using PrEP. According to FCT, there is an association between knowledge, power, and beneficial social networking that can protect a person's health (Phelan & Link, 2013). Education, through the creation of a

network of educated classmates, may prompt MSM to use PrEP to protect themselves from potential HIV infection.

Limitations

There were several limitations in this study. In the data analysis, some of the categories of race were combined to make a more comprehensive analysis. Only one participant identified as Asian or Pacific Islander, and three participants identified as other; therefore, these two categories were combined to make a more comprehensive data analysis. In the variable of education level, there were too many categories. To simplify the data analysis, the categories of eighth grade, less than eighth grade, and some high school were combined. In the category of employment status, student and no employment were combined because there were only two participants who identified as students.

The sample size of the study was relatively small ($N = 217$), which leaves the potential for effects on the reliability of a survey's outcome because it leads to a higher variability (see Simmons, 2017), which can also lead to nonresponse bias (Simmons, 2017). The sampling took place in a waiting room of urban clinics. If the surveyor needed to follow up with participants, it might have been difficult to get a response because of the chance that the participant was not available. The researchers relied on self-reported data, which may have resulted in self-reported bias (PLoS, 2016).

An additional potential limitation was the racial makeup of the sample. Most of the participants identified as African American. In addition, the participants' ethnicities were not reflective of the general ethnic breakdown in the United States, where African

Americans constitute approximately 13% of U.S. citizens (U.S. Census Bureau, 2008). Therefore, the findings may not be generalizable to the broader population of MSM.

Another limitation was that I did not assess the level of knowledge of PrEP that participants may have had before they were interviewed. The data represented MSM in an urban area, which may have affected the outcomes of the current study. Even though the sample consisted of 217 participants, more MSM participants are needed for a comprehensive data set.

Recommendations

The recommendations are based on the limitations and results of the study to assist future studies on PrEP. Considering the specific characteristics of the sample of the present study, such as majority African American, majority unemployed, and majority having access to health resources, I recommend that future researchers examine more diverse samples using a longitudinal design to determine whether and why MSM participants decided to use or not use PrEP. Researchers could also focus on rural areas to determine whether rural MSM have more FCT factors that influence their use of PrEP; conversely, researchers may include both rural and urban participants.

In addition, researchers may examine lack of health resources as a factor in their participant recruitment to get a better sense of whether individuals without health resources are informed about PrEP. Gaining access to more employed individuals may generate results that differ from the present study. According to Dussault and Franceschini (2006), in urban areas there are more educational opportunities, more job opportunities, a different number of sexual partners, and more access to health resources

than in rural areas. Researchers could also replicate the current study using a larger and more diverse sample to enhance generalizability. Based on the present findings, researchers might examine whether education had a longitudinal influence, or what aspects of education influenced a person's likelihood to use PrEP.

Finally, future researchers should be cautious about how they recruit participants and ask questions about the sensitive issue of HIV infection. This data was gathered from interviewing participants in a waiting room. According to Liu et. al. (2014), participants can sometimes feel shamed by others because of their pronouncement to use PrEP, which discouraged some people from using PrEP. Many people might feel apprehension in revealing their HIV status and knowledge of PrEP in front of others fearing stigma, which could alter the results of the study. To ensure patient privacy and increase the likelihood of assuring trust and confidentiality a suggestion would be to conduct interviews while in the privacy of their physicians examine room.

Implications for Professional Practice and Social Change

For professional practice this study could help public health practitioners have a better comprehension and knowledge of HIV prophylaxis and motivators for using PrEP as per your study findings. According to Beyrer (2013) public health professionals should gear information about new and innovative HIV prophylaxis toward specific demographics, such as MSM, whose populations are more susceptible to infection. Specifically, public health professionals need to inform their patients on PrEP regardless of Education Level, Employment Status, Number of Sexual Partners, and Access to Health Resources. In this study the variables that were tested were Education Level,

Employment Status, Number of Sexual Partners, and Access to Health Resources. The results were that Employment Status, Number of Sexual Partners, and Access to Health Resources did not influence the use of PrEP in the MSM community. Although, Education Level was the most significant factor that influenced the likelihood that a person would use PrEP,, public health professionals should not disregard Employment Status, Number of Sexual Partners, and Access to Health Resources as determinants on whether or not a patient would use PrEP (Obodo, 2015). Public health professionals should provide information on PrEP for all patients as a general practice. Providers should also have ready information on resources to assist patients in acquiring PrEP for those with limited means (Baeten et. al., 2013). Intervention strategies should be geared towards relative educational level and in language and nuances appropriate to the population.

The findings may have implications for social change in that the more research that is put into HIV prophylaxis, such as PrEP for underserved populations, such as MSM, the more socially acceptable and accessible protection would be. The knowledge gained from the present study, including the influence of educational status in increasing knowledge of and ultimately the use of PrEP, may aid in lowering HIV infections in the MSM population.

Conclusion

The purpose of this quantitative, cross-sectional, secondary data analysis study was to investigate whether Education Level, Employment Status, Number of Sexual Partners, and Access to Health Resources related to the use of PrEP amongst the MSM

population in Philadelphia. I found no association between Employment Status, Number of Sexual Partners, and access to health resources, while controlling for Age and Race, and the use of PrEP among the MSM population in my sample. However, I found an association between Education Level, while controlling for Age and Race and the use of PrEP among the MSM population in my sample. The findings that there is an association between Education Level and the use of PrEP in the MSM population supports previous studies that associated this variable with the use or nonuse of PrEP in the MSM population. Having clear understandings of the challenges faced by a given population is paramount in fighting the HIV epidemic and decreasing HIV infection, not only in the MSM population in the United States, but for the general global population (Kerrigan et. al., 2015).

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