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HIV Prevention: Pre-Exposure Prophylaxis, Sexual Decision Making, Risk Taking, and Condoms

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Walden University
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Abstract

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MPH, Walden University, 2013

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Public Health—Epidemiology

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Abstract

HIV is an infectious disease that continues to have new cases each year within high-risk populations, such as men who have sex with men (MSM). To help in the fight against new HIV infections within the MSM population, new medications such as pre-exposure prophylaxis (PrEP) are being used. The purpose of this cross-sectional online survey study was to address whether PrEP use had any relationship with (a) sexual decision-making, (b) risk-taking, and (c) condom use in the MSM population 18-64 years of age, after controlling for socioeconomic status, race, and age while using the behavioral disinhibition and risk compensation models. Given that PrEP protects only against HIV and no other sexually transmitted diseases (STDs), it is important to consider at-risk behaviors among MSM on PrEP to determine whether they show signs of increasingly risky behaviors in relation to sexual decision-making, risk-taking, and condom use. The data were analyzed using multivariate logistic regression and the analysis indicated that for the three dependent variables outcome data, the main independent variable of PrEP use was not associated with the three dependent variables used within this study (i.e., sexual decision-making, risk-taking, and condom use). This study indicated that after the confounders were adjusted, only age, income level, and race had any association with the main outcomes on the dependent variables of sexual decision-making, risk-taking, and condom use by MSMs. This study may contribute to positive social change by helping to determine whether PrEP use within the MSM population is related to certain social factors or variables that might be addressed and changed with public health interventions or strategies to help in the fight against new HIV cases.

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Dedication

This dissertation is dedicated to three women in my life who have provided me with the heart and soul that have given me the direction to understand that helping others is vital for being happy in one's own heart. I dedicate this dissertation to the memory of my grandmother or my Mema, Guynell Ellis Smith, and my best friend, Laura Watkins, who both passed away in 2008, which helped to start my journey into the world of public health and public service of others. The last woman is my mother, Shelia Spencer, who has shown me how blessed I truly am and to put others before myself the way that Jesus has and will continue to do. I would also like to make a dedication to my entire family that provided support during this long dissertation process, with special thanks to my brother, Daniel Spencer; his wife, Amber Spencer; and two of the most important people in my life, my nephew, Austin Spencer, and my niece, Autumn Spencer.

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I would first like to show acknowledgment to Walden University for having a structure that crosses all cultural barriers and allows many different types of people from around this great world of ours to gain an education to help create positive social change for others. I would also like to thank my committee chair, Dr. Raymond Panas, for the many conversations we have had when it came to the direction of my dissertation, along with the guidance, encouragement, and sometimes even words that I didn't want to hear but needed to hear in order to finish this long and hard process of getting my dissertation done. I would also like to acknowledge my methodologist committee member, Dr. Wen-Hung Kuo, who provided much direction on my dissertation topic of HIV and PrEP, along with my URR committee member, Dr. Mehdi Agha.

During this long dissertation process, I would also like to acknowledge all the many other faculty members at Walden University who provided help during my dissertation process. Lastly, I would like to acknowledge the many wonderful HIV/AIDS public health clinics and healthcare professionals that provided much direction and help during my dissertation process, especially with the data collection.

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Chapter 1: Introduction to the Study

HIV Prevention Method: Pre-Exposure Prophylaxis

The new frontier of human immunodeficiency virus (HIV) prevention is pre-exposure prophylaxis (PrEP) with antiretroviral (ARV) medications. PrEP involves a combination of two HIV medications, tenofovir and emtricitabine, sold under the name Truvada (Gilead, Foster City, CA), which is the brand name of a pill taken once a day by HIV-negative people who are considered at high risk of acquiring HIV through sexual intercourse or intravenous drug use (Centers for Disease Control & Prevention [CDC], 2015b). The highest rate of new HIV infections continues to occur within the population of men who have sex with men (MSM), which encompasses individuals diverse in age and race (CDC, 2015a).

PrEP has been shown to be effective if used correctly. However, it also seems that the availability of PrEP is shifting attitudes and beliefs concerning HIV and condom use within the MSM population. According to Mansergh, Koblin, and Sullivan (2012), the messages being communicated about PrEP to various MSM-related audiences are not consistent, possibly due to lack of education and knowledge among both healthcare professionals and members of MSM populations, as well as healthcare professionals not prioritizing HIV. Within MSM populations, PrEP is seen as a cure or a reason to stop adhering to safe sex practices such as using condoms.

There are many myths about PrEP use within the MSM population, such as "PrEP is a reason to stop using condoms," "PrEP is the gay birth control," and "I'm on PrEP, so I don't need to care about getting HIV." These untruths typically come from a lack of

education and knowledge about PrEP and HIV (CDC, 2015b). MSM who receive information about this new HIV prevention method through gossip or word of mouth may see it as giving them a reason to not use condoms. This may promote the practice of *barebacking*, or having sexual intercourse without using a condom, which is a growing epidemic within MSM communities (CDC, 2015a). Harmful attitudes and beliefs about PrEP must be addressed within MSM communities before PrEP may be considered a viable HIV prevention method.

Problem Statement

This study was conducted to address gaps within the literature related to sexual decision making, risk taking, and condom use among members of the MSM population 18-64 years of age once they decide to start using PrEP. Many studies have been conducted on willingness to use PrEP in high-risk populations such as MSM by researchers including Holt et al. (2012), Jackson et al. (2012), and Young, Li, and McDaid (2013). The following six themes have emerged from existing literature on PrEP use within MSM populations: "(1) motivations to use PrEP, (2) barriers to PrEP use, (3) facilitators to PrEP use, (4) sexual decision-making in the context of PrEP, (5) prospective PrEP education content, and (6) perceived effective characteristics of PrEP delivery personnel" (Taylor et al., 2014, p. 871). In this study, I addressed gaps within this literature, which, according to Golub, Kowalczyk, Weinberger, and Parsons (2010); Taylor et al. (2014); McCormack et al. (2016); and Frankis, Young, Lorimer, Davis, and Flowers (n.d.), suggest that evidence is still lacking when it comes to sexual decision making, risk taking, and condom use within the high-risk MSM population.

There remains a need to understand whether PrEP use is having an effect on individuals' sexual decision making, risk taking, condom use, number of partners, and drug or alcohol use. The aim of this study was to determine whether changes need to occur within MSM populations in relation to individuals' sexual decision making, risk taking, and condom use once on PrEP. It is necessary to understand whether riskier behaviors and decreased condom use occur due to certain variables within the MSM population, or whether these may be more attributable to how PrEP is presented to this population.

There have been many PrEP research studies, starting with the first big IPrEx trial, which involved 2,499 MSM from 2007 to 2009 within numerous countries (Marcus et al., 2013). In this trial, randomly nominated MSM were placed into either a control group that received Truvada (PrEP medication) or a placebo group that did not receive Truvada, with pre and post follow-ups conducted using questionnaires to gather data on sexual behaviors (Marcus et al., 2013). According to the results of the IPrEx trial (Marcus et al., 2013) and the CDC (2015a), when used with proper adherence, PrEP's effectiveness rate in preventing HIV infection is only 96% without other forms of protection such as condoms. It is important to consider how MSM approach sexual decision making and risk taking, especially given that PrEP protects against HIV and no other sexually transmitted diseases (STDs) or sexually transmitted infections (STIs; CDC, 2015a).

Purpose

The purpose of this online survey study was to apply the behavioral disinhibition and risk compensation models (Hogben & Liddon, 2008) to explore PrEP use in relation to sexual decision making, risk taking, and condom use in the MSM population 18-64 years of age. The purpose was to determine what, if any, variables and relationship there may be between the variables used in the studies survey of the MSM population. This survey will include variables such as; age, demography, income, education, HIV status, relationship status, sexual risk behaviors, substance use (drug or alcohol), knowledge/education of PrEP and psychosocial (arousal barriers to condom use & risk perception motivations for condom use) links of PrEP use is having an effect with their sexual decision-making, risk-taking, condom use, number of partners, drug or alcohol use while on PrEP.

Research Questions and Hypotheses

In this study, I used a quantitative cross-sectional survey design to gather data from the MSM population in order to address three research questions and associated hypotheses on PrEP use, sexual decision making, risk taking, and condom use. The *p*-values for this study used the significance $p < 0.05$ (Field, 2013).

RQ1: Does PrEP have a relationship with sexual decision making in the MSM population, controlling for socioeconomic status, race, and age?

Ho1: There is no statistically significant relationship between PrEP use and sexual decision making within the MSM population.

Ha1: There is a statistically significant relationship between PrEP use and sexual decision making within the MSM population.

RQ2: Does PrEP use have a relationship with risk taking in the MSM population, controlling for socioeconomic status, race, and age?

Ho2: There is no statistically significant relationship between PrEP use and risk taking within the MSM population.

Ha2: There is a statistically significant relationship between PrEP use and risk taking within the MSM population.

RQ3: Does PrEP use have a relationship with condom use in the MSM population, controlling for socioeconomic status, race, and age?

Ho3: There is no statistically significant relationship between PrEP use and condom use within the MSM population.

Ha3: There is a statistically significant relationship between PrEP use and condom use within the MSM population.

Framework: Behavioral Disinhibition and Risk Compensation Models

The conceptual framework that helped in determining the relationship between PrEP use and sexual decision making, risk taking, and condom use among MSM consisted of the behavioral disinhibition and risk compensation models. Golub et al. (2010) put forth these two models, which help in describing the mechanisms through which PrEP might increase risk behaviors of members of the MSM population who use PrEP. According to Taylor et al. (2014), evidence is lacking on decision making in the context of PrEP use, risk taking, and condom use. Subsequently PrEP use and risk taking

look at risk-reduction strategies which originated on the grounds in the way that MSM make their decisions about risk, and how they would respond to attempts to influence them to change their risk for PrEP use and risk taking within the MSM population.

Operational Definitions

PrEP is a combination of two different HIV medications, tenofovir and emtricitabine, sold under the name Truvada (Gilead, Foster City, CA; CDC, 2015b), which is to be taken daily to help prevent the spread of HIV. Many studies using surveys and questionnaires have been conducted to understand individuals' willingness to use PrEP, the risk factors involved for groups whose members need to use PrEP, risk behaviors, risk taking, and condom use. In this study using instruments like surveys will help gain data from the MSM population who are at high risk of acquiring new cases of HIV. Surveys help gain data on PrEP use once the MSMs have started using PrEP along with collecting data on their risk behaviors, sexual decision-making, risk-taking, and condom use. Many studies using different research designs, scales, and measurements have found that within the MSM population, decreased condom use was due to the use of PrEP as an HIV prevention method. In this study, I sought to determine whether there is a common link within the data on decreased condom use, sexual decision making, and risk taking within the MSM population.

Assumptions, Limitations, and Delimitations

An assumption that I made for this research was that I would receive honest responses to surveys from participants representing the MSM population who had started using PrEP as an HIV prevention method. I assumed that their responses would indicate

whether any changes were happening with their sexual decision making, risk taking, and condom use due to taking this new biomedicine for HIV prevention.

This cross-sectional online survey study was subject to limitations. The study may have been limited in the abilities to gain the exact type or geographical scope of the subjects needed for this study. The individuals who took the online survey may not have represented a truly random sample. Further, because the cross-sectional online survey design is a common test for data conclusions, the results may have been limited by the reliability of the test being used. With a cross-sectional survey design, which is conducted during a certain time period, the results are affected by the operations of society at that particular point in time. Moreover, when using the cross-sectional design, which is the most used quantitative statistical model, it is possible to determine only correlation, not causation.

The purpose of this study was to determine which factors or variables, if any, relate to risk taking or showing signs of decreased condom use for members of the MSM population once they start using PrEP for the prevention of HIV. Delimitations for this study were to ensure that I had a wide range of ages and races for the MSM population, which these MSMs need to understand what PrEP is and used for along with understating that HIV can be prevented by using PrEP properly along with condoms. Another delimitation was the use of closed-ended nominal scale answers in the survey, rather than supplementary, open-ended questions, which created a better chance that members of the MSM population would complete the survey.

Nature of the Study

This study was a quantitative cross-sectional research study applying the behavioral disinhibition and risk compensation models (Golub et al., 2010; Hogben & Liddon, 2008) to address the mechanism through which PrEP use might increase or change sexual decision making, risk taking, and condom use in members of the MSM population 18-64 years of age who use PrEP. Results from the IPrEx trial (Marcus et al., 2013) and the CDC (2016) indicate that when used with proper adherence, PrEP only has a 96% effectiveness rate for protection against HIV without other forms of protection such as condoms. Furthermore, PrEP protects only against HIV, not other STDs and STIs. When it comes to HIV prevention methods like PrEP this study will look at variables like socioeconomic status, race, and age associated with sexual decision-making, risk-taking, and condom use within the MSM population that might help understand the gaps within the literature. This study may promote positive social change within the MSM community by providing information that is helpful in the fight against HIV in the 21st century.

Significance

The significance of this research resides in the effort to determine which variables, if any, may be causing members of the MSM population 18-64 years of age to change their sexual decision making, risk taking, and condom use once they start using PrEP for HIV prevention. This research may aid public health interventions by addressing whether variables within the MSM population may be causing issues with PrEP adherence, sexual decision making, risk taking, and condom use. In this study, I

also explored whether other factors may be affecting PrEP use, such as the manner in which healthcare professionals and HIV clinics are providing PrEP information to the high-risk MSM population. According to Taylor et al. (2014), there are concerns for PrEP use related to sexual decision making, risk taking, and condom use within the MSM population. PrEP use and risk-taking look at risk-reduction strategies which deals with how the MSM population make their decisions about risk, and how they would respond to attempts to influence them to change their risk-taking once they start using PrEP along with their risk-taking methods while on PrEP Golub et al. (2010) found that 35% of a sample of high-risk MSM reduced condom use once on PrEP.

Summary

With the aim of supporting positive social change within MSM communities, I sought in this study to determine whether sexual decision making, risk taking, or decreased condom use may be attributed to a certain variable that a conceptual framework like the behavioral disinhibition and risk compensation models (Hogben & Liddon, 2008) can help answer the question about what is the relationship between PrEP use, sexual decision-making, risk-taking and condom use among the MSM population. Like the two models that help describe the mechanism through which PrEP might increase risk behaviors of the MSM population who use PrEP with the behavioral disinhibition and risk compensation models put forth by Taylor et al. (2014) and Golub et al. (2010).

This study has potential implications for positive social change. Information on factors or variables in PrEP use in the MSM population may be useful to HIV clinics,

manufacturers of PrEP, healthcare professionals, and other clinical workers, who may not be providing correct information about PrEP use. Adherence is vital for the success of PrEP as an HIV prevention method in the MSM population. In this study, I explored whether changes are needed in the PrEP-related training received by healthcare professionals. Additionally, I considered the need for changes to public health polices to ensure that members of the MSM population are gaining proper information about PrEP once they start using this HIV prevention medication. The outcome data of this research may support positive social change if they indicate that a certain variable needs to be addressed within the MSM population or if policy changes need to be pursued within the public health field for anyone providing PrEP to the MSM population.

Chapter 2: Literature Review

Introduction

Since the early 1980s, when HIV was first recognized by the world and healthcare professionals discovered how it was transmitted and who was most at risk of acquiring it, counseling, testing, and knowing one's HIV status have been the forefront of the HIV fight. Additionally, antiretroviral (ARV) drugs have been developed to help in the fight against HIV (CDC, 2015b). In 2012, to help with the prevention of new HIV cases, the U.S. Food and Drug Administration (FDA) approved a combination of two HIV medications, tenofovir and emtricitabine, sold under the name Truvada (FDA, 2012). The new frontier of HIV prevention represented by Truvada is known as PrEP, a term that refers to the newest form of ARV medications.

Truvada is a pill that is to be taken once a day by HIV-negative people who are considered at high risk of acquiring HIV through sexual intercourse or intravenous drug use (CDC, 2015b). MSM populations of all ages and races still account for the highest rate of new HIV infections (CDC, 2015a). PrEP has been shown to be effective if used correctly, but it also seems that PrEP is shifting attitudes and beliefs about HIV prevention, sexual decision making, risk taking, and condom use within MSM populations. According to Mansergh et al. (2012), the effective message being communicated about PrEP within the MSM community is not the same with all PrEP providers and this could be due to a lack of education and knowledge among both healthcare professionals and members of the MSM population. Within MSM populations, PrEP is seen as a cure or a reason to stop adhering to safe sex practices such

as using condoms. Such shifting attitudes and beliefs affecting sexual decision making and risk taking have to be addressed within MSM communities before PrEP can be considered a viable HIV prevention tool within the MSM population.

According to Taylor et al. (2014), there are concerns about PrEP use as it relates to sexual decision making, risk taking, and condom use within the MSM population. PrEP use and risk-taking look at risk-reduction strategies which deals with how the MSM population make their decisions about risk, and how they would respond to attempts to influence them to change their risk-taking once they start using PrEP along with their risk-taking methods while on PrEP Golub et al. (2010) found that 35% of a sample of high-risk MSM reduced condom use once on PrEP. In this study, I explored the gaps within the literature, which, according to Gould et al. (2010), Taylor et al. (2014), McCormack et al. (2016), and Frankis et al. (2016), suggest that evidence is still lacking when it comes to sexual decision making, risk taking, and condom use within the high-risk MSM population. I sought to determine whether PrEP use is having an effect on the sexual decision making, risk taking, condom use, number of partners, and drug or alcohol use of MSM while on PrEP. The aim of this study was to find if there is a need for changes within the MSM population's attitudes and beliefs concerning sexual decision making, risk taking, condom use, and HIV. Further, I sought to determine whether risker behaviors and decreased condom use among MSM once on PrEP are due to certain variables within the MSM population or relate more to how PrEP is presented to this population.

Literature Search Strategies

I conducted this study to increase awareness of the role of a new HIV prevention method, PrEP, in sexual decision making, risk taking, and condom use within the MSM population. The literature review for this study contains several sections, each section will provide an overview of how behavioral risk, which include sexual decision-making and risk-taking to risk reduction strategies like condom use will provide perception into the research inquiry of PrEP as an HIV prevention method on the MSM population. To gather relevant materials for this literature review, I searched for articles that had been peer reviewed. Additionally, I conducted online searches for materials from health-related websites such as those of the CDC, World Health Organization (WHO), and National Institutes of Health (NIH), as well as websites dedicated to HIV, such as those of the Joint United Nations Programme on HIV/AIDS (UNAIDS), Avert, and the Kaiser Family Foundation. I also located literature through the Walden University library website using EBSCO, ProQuest, PubMed, and Google Scholar, using the key terms *HIV, pre-exposure prophylaxis (PrEP), MSM, behavior risk, sexual decision-making, risk-taking,* and *condom use*. Search terms were entered in these databases both individually and in various combinations with each other. The database search focused on articles that were less than 5 years old; however, I included certain articles and/or books in my review that were up to 20 years old because they provided background data on HIV, PrEP, and the theoretical framework for this study, along with showing the advancement of HIV prevention methods.

Theoretical Framework

The theoretical framework used to address the research questions in this study consisted of the behavioral disinhibition and risk compensation models (Hogben & Liddon, 2008). Golub et al. (2010) suggested that these two models help to describe the mechanism through which PrEP use might increase risk behaviors of the MSM population. According to Golub et al., the evidence is lacking on PrEP use and risk taking. In that PrEP use and risk taking involve risk-reduction strategies, this study was conducted to help identify which variables are leading members of the MSM population to take more risks, engage in riskier sexual decision making (in the context of PrEP), or change their condom usage habits due to the HIV prevention method PrEP.

The behavioral disinhibition model indicates that PrEP may increase risk-taking in MSM taking PrEP for HIV prevention by decreasing their voluntary limitations of high-risk behaviors. This concentration on the MSMs pleasure-driven and emotional aspects of risk taking when an individual who desires condomless sex will see PrEP as a reason for not using condoms in social sexual setting (Golub et al., 2010; Hogben & Liddon, 2008).

The risk compensation model indicates that the convenience of PrEP may lead to decreased condom use by reducing individuals' insight into HIV transmission risk. Meaning that one will concentrations on the intellectual facets of dangerous resolution production and with the MSM population will base choices about condom use on the superficial risk that during sexual encounters if on PrEP unprotected sex is acceptable (Golub et al., 2010; Hogben & Liddon, 2008).

Behavioral Disinhibition and Risk Compensation Models

Many theoretical frameworks and models have been used in earlier research on HIV/AIDS, particularly within the paradigm of social cognitive theory (SCT). Models such as the health belief model (HBM), theory of reasoned action (TRA), and theory of planned behavior (TPB) may be applied to understand how individuals view their actions and risk factors, thus shedding light on individuals' sexual decision making, risk-taking, and condom use once on PrEP. The behavioral disinhibition and risk compensation models (Hogben & Liddon, 2008) which will aid the individual or MSM to better understand their own sexual actions and not just to view their sexual actions but to make better sexual decision making, risk taking, and condom-use decisions when dealing with PrEP use as an HIV prevention tool.

Stolte, Dukers, Geskus, Coutinho, and Wit (2004) investigated the use of highly active antiretroviral therapy (HAART), a precursor to PrEP, to determine the beliefs of members of the MSM population toward this therapy, as well as the changing of their risk factors from protected to unprotected sex at each one's own individual level. Stolte et al. conducted a study with 217 HIV-negative men to gain data on three HAART-related perceptions, which they described as "perceiving less HIV/AIDS threat since HAART, perceiving less need for safe sex since HAART, and perceiving high effectiveness of HAART in curing HIV/AIDS" (p. 307). In so doing, they sought to investigate how members of the MSM population might have been shifting from protected to unprotected sex once they understood the benefits of HAART. Using multivariate analyses, Stolte et al. found that the more that members of the MSM population agreed with false beliefs,

the more likely they were to start having more unprotected sex (*OR* = 1.60, CI = .95, 1.16, 2.22), which led them to find that the more that MSM perceived HIV as a reduced threat due to biomedicines, the more likely they were to be involved with condomless sexual encounters, leading the authors to find that social cognitive theory will aid in PrEP use and condom use. Studies conducted with a SCT framework may provide more valuable data on attitudes and beliefs concerning PrEP use and condom use within MSM populations to ensure that PrEP is not linked to riskier behavior.

In a 2005 article, Boily, Godin, Hogben, Sherr, and Bastos mentioned the hypothesis that increases in risk-taking behaviors among the MSM population could be attributed to ART, the leading precursor to PrEP in the fight against HIV prevention. In the early and late 1990s, due to the AIDS epidemic, the MSM population had a reduced level of risky behaviors such as engaging in sex with multiple partners, as well as an increase in condom use. However, once ART hit the market in the late 1990s, MSM saw that even if they were HIV positive, they could live normal, healthier, and longer lives. The entire MSM community then saw an increase in unsafe sexual behaviors. Boily et al. found that once high-risk individuals saw the benefits of ART, numbers of new HIV cases began to rise among MSM.

Boily et al. (2005) contended that the TPB could be applied to understand recent increases in risk taking among the MSM population that could be attributed to ART and individuals' personal beliefs concerning risk taking in relation to this new biomedical therapy. Social-cognitive approaches such as the TPB may be used to analyze individuals' health-related understandings, predictions, and intentions. As such, these

approaches may help in understanding the relationship between PrEP use and condom use among MSM. Boily et al. hypothesized correctly that high risk-taking individuals who had once reduced risky behaviors due to a lack of other individuals who wanted to participate in high-risk sex acts would be able to resume high-risk practices once the pool of MSM had been replenished over time due to ART medications. Following this logic, one would hypothesize that PrEP, as the newest of these biomedicines, is likely to lead to increased high-risk behaviors within MSM populations (Boily et al., 2005).

Mimiaga, Case, Johnson, Safren, and Mayer (2009) conducted a study with the aim of understanding attitudes toward PrEP among high-risk MSM in the Boston area. In their study, conducted in 2007, 227 HIV-negative subjects were surveyed using a modified respondent-driven interview. Using a quantitative survey method, the researchers focused on prior PrEP use and knowledge, intent to use PrEP in the future, demographics, sexual risk history, psychosocial variables, and alcohol or drug use. The objective to participate in a risky behavior is a proximal conjecturer of one's behavior. Mimiaga et al.'s research was reinforced by the TRA and TPB, required to explain the behavioral and demographic connotations of objectives to use PrEP (i.e., if shown to be safe and effective) among the MSM population. Furthermore, identifying demographic and behavioral predictors of aims to use PrEP may be helpful in recognizing trial subjects for future PrEP-related studies or interventions. The results of Mimiaga et al.'s research indicated that 19% of the 227 subjects had previously heard of PrEP, and 74% of the subjects reported intent to use PrEP after gaining more knowledge of its potential to help with the spread of HIV. According to Mimiaga et al., the main predictors of intent to use

PrEP included "less education (*OR* = 7.7; *p* = 0.04), moderate income (*OR* = 13.0; *p* = 0.04), no perceived side effects from taking PrEP (*OR* = 3.5; *p* = 0.001), and not having to pay for PrEP (*OR* = 4.2; *p* = 0.05)" (pp. 4-5). These data suggest that using the social-cognitive approaches of the TRA and TPB that aids an individual in how they view their actions. When it comes to PrEP use, the behavioral disinhibition and risk compensation models (Hogben & Liddon, 2008) may aid MSM in better understanding their actions and not just to view their actions to make healthier choices when it comes to sexual decision making, risk taking, and condom use decisions when dealing with PrEP use.

Newer studies conducted by McCormack et al. (2016) and Punyacharoensin et al. (2016) on the MSM population and PrEP use have indicated that the behavioral disinhibition model, and, to a greater extent, the risk compensation model (Hogben & Liddon, 2008) could be offset by these MSM when using PrEP. McCormack et al. (2016) used the PROUD method in an open-label randomized trial involving 13 sexual health clinics in England to collect data. Among participants enrolled in the study who stated that they had had condomless anal sex with past 90 days (*n* = 544), approximately half (*n* = 275) were placed in the immediate group, whose members started receiving PrEP when the trial started, and the remaining half were placed in the deferred group (*n* = 269), whose members started receiving PrEP 1 year after the trial began (McCormack et al., 2016). The study had a resolution of using placebo which was to avoid confounding bias due to risk compensation, "which occurs if individuals perceive themselves to be protected by PrEP and so become more likely to engage in riskier sexual practices" (McCormack et al., 2016, p. 54). During this study, the observing committee was

notified of a significantly increased risk of HIV infections in the deferred group due to risk compensation and directed the steering committee to start offering PrEP to all participants within the deferred group who had not yet been presented with the occasion to take PrEP within the year (n = 163 of n = 269). Baseline characteristics were aligned within both groups for age, education level, being gay or MSM, having condomless anal sex within past 90 days, and being tested for HIV within the sexual health facility setting. Results indicated that at follow-up, HIV incidence was lower in the immediate group, with 243 of the 259, or 94%, of the participants testing HIV negative, compared to 222 or 90% of the 245 participants of the deferred group, with three HIV infections in the immediate group and 20 HIV infections in the deferred group (McCormack et al., 2016). These data showed that in high-risk populations such as MSM, PrEP offers better protection against new HIV infections for those having condomless sex in a real-world setting when added to HIV prevention methods for the MSM population.

Punyacharoensin et al. (2016) conducted a mathematical modeling study on HIV transmission using comprehensive behavioral and surveillance data from the United Kingdom to assess the effect of seven different HIV interventions executed from 2014 to 2020 in the MSM population. The seven HIV interventions that were modeled were as follows:

> (2.1) test once a year and decease unprotected anal intercourse with repeat sexual partners, (2.2) reduce the number of repeat sexual partners and decrease unprotected anal intercourse with repeat sexual partners, (2.3) test once a year and test and treat, (2.4) PrEP and test and treat, (2.5) PrEP and decrease unprotected

> anal intercourse with repeat sexual partners, (2.6) PrEP and reduce the number of repeat sexual partners, and (2.7) all individual interventions except test once a year (Punyacharoensin et al., 2016, p. 3)

Additionally, Punyacharoensin et al. completed sensitivity analyses on risk compensation for the use of these interventions in a real-world setting for the MSM population in the United Kingdom. The results of this study indicated that of all of the HIV intervention combinations, testing, treating, and yearly HIV testing (61.8%, IOR 47 • 2-81 • 8, of total incidence) was the best HIV intervention, no matter the combination of interventions used or modeled. Punyacharoensin et al. found that when an individual from the MSM community had 100% health coverage, PrEP prevented the greatest number of HIV infections. They similarly found that in the United Kingdom, PrEP, even when used only in targeted high-risk MSM populations, was the most effective HIV intervention than all others HIV interventions combined in the United Kingdom for the MSM population. The only concern that Punyacharoensin et al. (2016) found with their research in a real-world setting was based on how PrEP adherence affects MSM and risk compensation. For a real-world setting without proper adherence to PrEP will lead to PrEP not being effective as an HIV prevention method. This could lead the MSM population to have more condomless sex with multiple partners, which would allow for new cases of HIV infections which would make PrEP an ineffective HIV prevention tool.

Different studies from Boily et al. (2005), Golub et al. (2010), McCormack et al., (2016), Mimiaga et al. (2009), Punyacharoensin et al. (2016), and Stolte et al. (2004) show the evolution by using the many different social-cognitive theories on PrEP use

within the MSM population along with the behavioral disinhibition and risk compensation models (Hogben & Liddon, 2008) for this study. This outcome data will aids the individual or MSM to better understand their actions and not just to view their actions to make better sexual decision making, risk taking, and condom use decisions together when dealing with PrEP use. This data help shows the gap within these many studies on how these MSM view their actions and not just understanding their actions once on PrEP. When dealing with MSMs using PrEP, these studies have relied more on how MSM should view their actions, instead of understanding their actions when it comes to sexual decision making, risk taking, and condom use together once on PrEP.

Behavioral Risk

Sexual Decision Making

Sexual decision-making is when an MSM makes choices about their sexual health like taking PrEP, getting HIV tested and knowing their HIV status and how this will be used in their daily sex lives. Many studies have been done dealing with the many sexual behavioral risk variables and how they relate to HIV and PrEP use within the MSM populations leaving a gap within the literature on the risk variables of sexual decision-making, risk-taking and condom use together that need to be address when these MSMs start using PrEP as an HIV prevention tool. In the research work done by Marcus et al. (2013) using data from the first study which was the IPrEx trial on Pre-Exposure Prophylaxis (PrEP) and the MSM population (Grant et al. 2010) that used self-reported sexual risk behaviors which had decreased overall in the IPrEx trial. Marcus et al. (2013) wanted to evaluate risk compensation within the MSM population using PrEP which can

help provide data on relationship between PrEP use and condom use. Using the risk compensation theory which is when an individual adjusts their own behavior response to changes in their perceived level of risk and in this case risk of acquiring HIV. The IPrEx trail used 2,499 MSM from 2007 to 2009 within several different countries and randomly selected into a control group receiving Truvada (PrEP medication) or placebo group (no Truvada) with pre and post follow-ups using questionnaires to gain data on sexual behaviors. The results found that HIV infection along with syphilis had decreased during all of the follow-up but when they compared the subjects believing they had received the placebo to the subjects believing they had received the FTC/TDF (Truvada) reported more open anal intercourse partners before getting the medication (12.8 vs. 7.7, $p = .04$) (Marcus et al., 2013). Whereas, "belief in receiving FTC/TDF was not associated with an increase in receptive anal intercourse with no condom (ncRAI) from baseline through follow-up (risk ratio [RR] 0.9, 95% confidence interval [CI]: 0.6–1.4; $P = 0.75$), nor with a decrease after stopping study drug (RR 0.8, 95% CI: 0.5–1.3; $P = 0.46$). In the placebo arm, there were trends toward lower HIV incidence among participants believing they were receiving FTC/TDF (incidence rate ratio [IRR] 0.8, 95% CI: 0.4–1.8; $P = 0.26$) and also believing it was highly effective (IRR 0.5, 95% CI: 0.1–1.7; $P = 0.12$)" (Marcus et al., 2013, p. 4). This study found that no matter which group the subjects where in that risk behaviors (risk compensation) was not a significance of PrEP use without any new knowledge on the participants sexual decision-making, risk-taking and condom use together.

In the work conducted by Holt et al. (2012) examining Australian MSM and bisexual men on their willingness to use the HIV prevention method PrEP and the likelihood they would have decreased condom use. Data was composed from April to May 2011 using an online cross-sectional national survey design on 1161 HIV negative or untested men with chi-square or Fisher's exact test to assess the bivariate relationships within the data and using multivariate logistic regression analysis to assess the independent variable relationship outcomes. The study found that prior use of antiretroviral (ARTs) drugs like PrEP was rare (n = 6) at the time of this research and of the 1161 men surveyed that 327 or 28.2% of the participants were categorized as willing to use PrEP. The data found that the willingness to use PrEP was independently related with the younger participants who felt more at risk of acquiring HIV from unprotected and intercourse with causal partners. Of the 327 participants only 26 men (8%) showed they would be less likely to use condoms while if on PrEP. Decreased condom use was independently related with older participants who like the younger participants felt more at risk of acquiring HIV from unprotected and intercourse with causal partners. This study found that the participants would use PrEP because they felt more at risk of acquiring HIV from unprotected and intercourse with causal partners with a low rate or risk compensation and behavioral disinhibition. This data provides the idea that certain participants would be more willing to use PrEP for many differ reasons but leaves out what the participant's sexual decision-making process was and how it would relate to their risk-taking except to relate their likely hood of deceased condom use.

In the study conducted by Fallon, Park, Ogbue, Flynn, and German (2017) they wanted to assess the characteristics that might be associated with the awareness of and willingness to take PrEP as an HIV prevention method within the Baltimore, MD MSM population using (n = 399) participants. The authors used data they collected from the BESURE-MSM3, which was a venue-based cross-sectional HIV surveillance study conducted among MSM in 2011 (Fallon et al., 2017) using a multivariate regressing to help identify these characteristics that are associated with PrEP. The results found that 11% of the participants had heard of PrEP, 48% would be willing to use PrEP and none of the 399 participants had eve used PrEP before as an HIV prevention method. This study found that when dealing with the behavioral risk and characteristics of these MSM participants on their awareness of and willingness to use PrEP that several main ideas where found. The authors first found that with a low proportion of the participants aware of PrEP suggested to the authors that PrEP information was most likely not reaching the MSM within Baltimore and could explain why only 11% of these MSM had heard of PrEP. Second, the authors found that when dealing with different races like being non-Hispanic black was found to be related with low awareness of PrEP and individuals within many races like the African-American and Hispanic populations that these individuals who perceived an HIV positive person were less likely to hear or use PrEP. Intolerance, discrimination, and stigma of HIV or having sex with men within many non-white communities have many more barriers when dealing with their own behavioral risk and how they may receive HIV testing, HIV prevention methods like PrEP and even coming out to others and to themselves. These factors can aid many MSM to have

behavioral risk factors that will make them unaware of PrEP and/or not willing to use PrEP for HIV prevention. These behavioral risks can affect the sexual decision-making, risk-taking, and condom use within these MSM and how PrEP can be used to help with new HIV infections. Fallon et al. (2017) found that further information and education is needed within all MSM communities along with finding that HIV prevention efforts should address the link between discrimination and potential PrEP use within all MSM communities, specifically among men of color.

Of these studies from this literature review found that Fallon et al. (2017), Holt et al. (2012) and Marcus et al. (2013) the willingness to use PrEP along with the behavioral factors associated with PrEP in the MSM populations found that many variables play a role in how and when a MSM may be willing to use PrEP but never enclosed the sexual decision-making process of these MSMs and how this would play a role or outcome in the objective of using PrEP. Sexual decision-making is vital for these MSM when they are using PrEP and the outcome of how PrEP affects their sexual decision-making process once they start using PrEP as an HIV prevention tool for fighting against new cases of HIV. This literature has shown that when MSM use PrEP as an HIV prevention method that many behavioral variables are looked at on an individual level but not at the individual's level of sexual decision-making, risk-taking and condom use together which are vital in combination for HIV prevention once these MSM start using PrEP.

Risk Taking

Risk-taking is a vital part of new cases of HIV today due to how the MSM that are using PrEP may change their risk-taking habits once they start taking PrEP as a HIV

prevention tool. Unlike sexual decision-making, risk-taking look at risk-reduction strategies which originated on the grounds in the way the MSM population make their decisions about risk, and how they would respond to attempts to influence them to change their risk for PrEP use and risk taking within the MSM population. The research conducted by Krakower et al. (2012) used a cross-sectional national internet based survey that they administered to U.S. based subjects using the most popular American MSM social media sites to assess the awareness, interest and experience of PrEP among at risk MSM population before and after the IPrEx trial to determine behavioral risk factors using the measures of demographics, psychosocial factors, sexual risk, self-perceived risk of HIV acquisition, engagement in healthcare and communication with provides. The results found that two months before (n = 398) and 1 month after (n = 4,558) subject comparison had been made with regards to knowledge, interest and experience of PrEP and found subjects were mainly Caucasian, educated and indicate high-risk with their sexual behaviors with awareness of PrEP was limited pre and post the IPrEx trials (13% vs. 19%), while concern levels after being delivered the explanation of PrEP persisted to be high (76% vs. 79%). PrEP use continued infrequent (0.7% vs. 0.9%), PrEP use was linked with PEP awareness (*OR* 7.46; CI 1.52–36.6) and PEP experience (*OR* 34.2; CI 13.3–88.4). PrEP attention was related with MSM that were older (*OR* 1.01; CI 1.00–1.02), decreased condom use was ≥ male companions in the previous 3 months (*OR* 1.40; CI 1.10–1.77), and distinguishing oneself at greater risk of acquisition HIV (*OR* 1.20; CI 1.13–1.27) (Krakower et al., 2012). The results of this research found that the MSM

population that reported more high risk sexual behaviors like not using condoms were more interceded in PrEP use than other MSM subjects.

Taylor et al. (2014) conducted research on 39 HIV negative men considered at high risk to find what to identify potentially useful adherence behavioral intervention content using six objectives "(1) motivations to use PrEP, (2) barriers to PrEP use, (3) facilitators to PrEP use, (4) sexual decision-making in the context of PrEP, (5) prospective PrEP education content, and, (6) perceived effective characteristics of PrEP delivery personnel. These objectives could aid in behavioral interventions with the prescribing of PrEP and could affect the best packaging public health programs that implement PrEP for high-risk MSM" (Taylor et al., 2014, p. 5). The results of the six objectives the authors found that for motivation to use PrEP that most of the subjects were highly motivated to use PrEP to help the spread of HIV. With barriers to PrEP use the subjects discussed many barriers such as adherence to taking a pill daily, mental health concerns, cost, drug and/or alcohol abuse, stigma associated with PrEP and discussing sexual behaviors with healthcare professional. Facilitators to PrEP use if already taking other medication a daily would not be an issue but if PrEP only medication than either an email or text from healthcare provider would help. With sexual decision-making, the general concern with all subjects was it would affect their sexual decision-making like feeling the need not to use condoms due to PrEP use and still feeling protected against HIV no matter if single, in a monogamous relationship or an open relationship. PrEP education information was the most important for the subjects as they felt counseling about adherence along with proper education would make them feel the

need to use PrEP along with condoms. When it came to PrEP delivery personnel the subjects felt they must be well educated and trained to make the MSM population understand the full effects of PrEP and how condom use was still essential due to the fact that PrEP only protects against HIV and not against other STDs. These results showed that demographics, age, education, and prior STDs help along with proper education and training on how PrEP worked especially with sexual decision-making and risk-taking.

The worked completed by Young, Li and McDaid (2013) did an examination of the awareness of and willingness to use PrEP as an HIV prevention methods to take part in a study to gain data on PrEP use. They used a cross-sectional survey of 17 gay marketable locations in Scotland of PrEP use and gay and bisexual men with (n = 1515) subjects with a 65.2% rate of responses. They found that 31.2% of the subjects has heard of PrEP (n = 434) with the older MSM population that were using condomless sex and having been tested for HIV or other STDs within past 12 months. Young et al. (2013), found that 49.9% (n = 695) willing to take part in PrEP study or 54/3% (n = 765) take PrEP as required on a daily basis. According to Young et al. (2013), using multivariate analysis the MSM population willing to take PrEP was linked with lower levels of education, being a regular within the gay scene, high-risk UAI (unprotected anal intercourse) and testing for HIV or STI in the previous 12 months along with explanations for not wanting to partake in a PrEP study or take PrEP involved observations of low personal risk of HIV and anxieties with using biomedicines for HIV prevention method. This showed the authors that sexual risk behaviours and sexual

decision-making was one of the main priorities for the MSM population and they needed to feel that they were at risk of acquiring HIV with PrEP use.

Mustanski, Johnson, Garofalo, Ryan and Birkett (2013) conducted a study using a cross-sectional with 171 HIV negative young men who have sex with men (YMSM) subject's ages 16–20 years of intent to use PrEP and collected data from interviews of subjects six months after enrollment on side-effects, dosing and efficiency were measured. According to Mustanski et al., they found that with the measure of associations with psychometric analyses was using concentrated probability, two factors with eigenvalue greater than 1.00 were extracted (Factor 1 = 3.85; Factor 2 = 1.06). The total variance explained was 61.4% which has a mean PrEP interest subjects reported 73.7% (*SD* = 24.7) of knowledge of HIV objects properly, reported using 0.8 (*SD* = 1.2) altered kinds of substances, and having 3.9 (*SD* = 9.1) sexual companions (male and female) and 0.7 (*SD* = 1.7) male unprotected anal sex partners, and engaging in 8.7 (*SD* = 21.2) unprotected anal sex acts in the past 6 months and with risk behaviors and PrEP use for MSM has a significant negative correlation of (Spearman's' rho = -.22, $p < .05$), with intentions to use PrEP in risk situations and with condoms. The results for intention to use PrEP in risk situation and with condoms the authors found "Three binary logistic regression models were run with these specific risk situations as dichotomous outcomes (*not at all likely* = 0; *somewhat likely* and *very likely* = 1) and the mean PrEP scale as the independent variable. The PrEP interests score was positively associated with willingness to use condoms when on PrEP (*OR* = 3.86, 95% CI (1.96, 7.61), $p < .001$), willingness to use PrEP in a serodiscordant monogamous relationship (*OR* = 8.39, 95% CI = (3.67,

19.16), $p < .001$), and willingness to use PrEP when only having casual partners (*OR* = 14.03, 95% CI = (5.84, 33.73), $p < .001$)" (Mustanski, Johnson, Garofalo, Ryan & Birkett, 2013, pp. 2176-77).

Looking at the research done by Krakower et al. (2012), Mustanski et al. (2013), Taylor et al. (2014) and Young et al. (2013) on risk-taking the conclusion of these studies found again that the willingness to use PrEP is there for the MSM population but are leaving a gap within their literature on how PrEP use is affecting the MSM's sexual decision-making which is linked to their risk-taking and condom use. In the work conducted by Taylor et al. (2014) finds six themes that are emerging for PrEP use within the MSM population which are; "(1) motivations to use PrEP, (2) barriers to PrEP use, (3) facilitators to PrEP use, (4) sexual decision-making in the context of PrEP, (5) prospective PrEP education content, and, (6) perceived effective characteristics of PrEP delivery personnel" (p. 5) but only mention the sexual decision-making in the context of PrEP. Taylor et al. (2014) provides no data on risk-taking and condom use which many studies are finding are related to the willingness to use PrEP within the MSM population but are not linking them to the MSM sexual decision-making, risk-taking and condom use which are known variables within the MSM population once they start using PrEP. Looking at sexual decision-making, risk-taking and condom use will help provide any gaps within the literature that help with PrEP use within the MSM population once they start using PrEP as an HIV prevention tool to help reduce new cases of HIV infections in the 21st century and beyond.

Risk Reduction: Condom Use

When dealing with HIV prevention, PrEP use, sexual decision-making, risk-taking, and condom use more studies have been done or shown results of PrEP use and how it relates to condom use than other variables like sexual decision-making and risk-taking when dealing with HIV prevention and PrEP use. In the study conducted by Golub et al. (2010), they examined demographic, behavioral, and psychosocial links of Pre-exposure prophylaxis (PrEP) appropriateness and predicted condom use in the framework of PrEP among high-risk HIV negative men who have sex with men (MSM). The study used a randomized quantitative survey of a 180 HIV negative men that found 70% (n = 124) would use PrEP if there was an 80% effective rate of preventing HIV and of those men that reported using PrEP over 35% of the them reported they would be likely to decrease condom use significantly once PrEP was started (Golub et al., 2010). Based on this data using both behavioral disinhibition and risk compensation models (Hogben & Liddon, 2008) would help in the shaping of both PrEP objectives and condom use while on PREP among high-risk men who have sex with men. While the Golub et al. (2010) article raises a timely and important issue about new medications like PrEP that are being used within high-risk populations like the MSM with great success and the authors bring up the point of allowing high-risk populations to become depend on chemical preventions like PrEP will change the traditional risk reductions methods like condom use and reducing the numbers of sexual partners within these populations that have been at the center of HIV prevention for years. PrEP may help prevent HIV but could end up being a cause of higher-risk behaviors within high risk populations like men

who have sex with men (MSM) which would undermine the entire purpose of PrEP medications for HIV prevention in the fight against HIV in the 21st century.

Otis et al. (2016) conducted a study on how the MSM population have modified their risk reduction such as; "condom-based, non-condom-based and biomedical" (Otis et al., 2016, p. 2814) and sexual practices such as; "finding only HIV negative partners, avoiding certain types of partners, taking PrEP or getting an HIV test" (Otis et al., 2016, p. 2814) throughout the course of the HIV/AIDS epidemic of the early 1980's. This study used the Spot project of Montreal, Canada which offered free and anonymous rapid HIV testing for the MSM community which used inclusion criteria of the participants being elf-identified as male, over 18 years of age, the ability to speak and understand French and/or English, lived in Quebec, had anal sex with other men within last 12 months and had an unknown HIV status. This provided 1, 855 participants and of these 93.8% agreed to participant in the study which gave (n = 1,740) participants to provide results for this study. Of these (n = 1,740) participants the authors used estimated probabilities (EP) of reporting each item and prevalence within the study by class based on latent class analysis for a total of five class solutions (Otis, et al., 2016). Class one, which had (n = 938) participants had the most prevalent patters which include just over half of the MSM sample at 53.9%. Class one's participants used one of the more strict forms of risk reeducation strategies like using serosorting (is the practice of using HIV status as a decision-making point in choosing sexual behavior; Otis, et al., 2016) as their main strategy (EP: top, over 0.86; bottom, over 0.91) which means they would avoid having anal sex with partners that did not know their HIV status or multiple partners

along with using condoms if having sex with a partners that did not know their HIV status (EP: top, 0.75; bottom, 0.63; Otis et al., 2016). Class two, which had (*n* = 380) or 21.8% of participants had the second most common patters for risk reeducation and serosorting (EP; top, over .98; bottom, over 0.98), which was similar to class one except would have more anal encounters with partners of known and unknown HIV status along with a minority reported systematic condom use during these encounters (EP: top, 0.20; bottom, 0.18; Otis et al., 2016). Class three, which had one in five participants (*n* = 320) or 18.4% stand out more since they would likely account having anal sex with partners of unknown HIV status (EP: top, 0.75; bottom, .078) but would tend to use condoms methodically with these types of partner (EP; top, 0.93; bottom, 1.00; Otis, et al., 2016). Class four, which had (*n* = 54) or 3.1% which included the smallest numbers of participants would have sex with persons that where HIV positive (EP: top, .078; bottom, 0.72) and overall these participants did not use condoms systematically (EP: top, 0.39; bottom, 0.45; Otis, et al., 2016). Same as class four, class five (*n* = 49) or 2.8% which included the smallest numbers of participants would have sex with persons that where HIV positive, high viral loads, unknown HIV status (EP: top, 0.47; bottom 0.45) and condom use with these unknown HIV status partners was only reported by half at (EP: top, 0.42; bottom, 0.53) but virtually two-thirds reported regular condom use with partners that where HIV positive, who had unknown viral load or were detectable at (EP: top, 0.63; bottom, 0.62; Otis et al., 2016). This study recognized five patterns within the five classes with respect to how condoms are used within the MSM community when dealing with HIV positive partners and partners with an unknown HIV status.

Participants in classes one, two and three used a strict serosorting strategy to having anal sex with others compared to classes four and five whom would have sexual encounters with partners no matter HIV status even with partner that they knew where HIV positive. The results of this data have shown that strategic positioning such as being a top or a bottom along with knowing the HIV status of one's partner changes the risk reduction strategies of these MSM. This study found that when the MSM participants make strategic use of condoms to some extent but also have and will use other risk reduction strategies based on one's lifestyle, knowledge of PrEP along with effecting ones behavioral and risk reduction strategy for many MSM when dealing with HIV in the world today.

The research conducted by Sagaon-Teyssier et al. (2016) used a double-blind randomized combined prevention trail using (n = 400) participants from France and Canada which the researchers named The ANRS IPERGAY. This research trial was testing the efficacy of a sexual activity-based oral PrEP regimen in MSM considered to be at high risk for acquiring HIV. The main results showed that 86% (95% CI: 40 – 98) of the participants had comparative reduction in HIV incidence in the one group that received tenofovir disoproxil fumarate-emtricitabine (TDF-FTC or PrEP) with (n = 199) vs. the placebo group with (n = 201; Sagaon-Teyssier et al., 2016). This trial collected data using questionnaires online of the participants every two months for 24 months on their sexual behaviors and PrEP adherence regarding their most recent sexual encounters to track the participant's sexual risk behaviors which include PrEP and condom use. According to Sagaon-Teyssier et al., the results showed for PrEP and/or condom use

during the participant's most recent occurrence of sexual intercourse started with month two (M2; since there was no PrEP provided at M0) provided the data that 42.6% of the participants had used PrEP as their sexual prevention method along with over 28% of the participants during their sexual encounters did not have PrEP at their intake, with 16.7% during condomless anal sex (i.e., high-exposure group), and 11.7% during no condomless anal sec (i.e., low-exposure group). Which provided the data that did not develop considerably during follow-up low exposure with or without PrEP at $p = .49$ and $p = .38$, correspondingly high exposure with or without PrEP at $p = .18$ and $p = .86$, correspondingly. This data according to Sagaon-Teyssier et al., highlights the steady high quantities of sexual interaction protected by either PrEP, condom, or both at 83.3% with (min: 70.4%, max: 89.2%). The data found that factors like socio-demographics, education level and knowledge of HIV prevention methods like PrEP can all played a role for participants particularly within this clinical research trial's outcome along with other studies and may not exemplify the diversity of affected groups specifically the MSM who might be interested in PrEP use in a real life setting to help with the spread of new HIV infections. This study found that 83.3% of the ($n = 400$) participants used either PrEP and/or condoms as a form of HIV protection during sexual encounters. According to Sagaon-Teyssier et al., that when PrEP is used with proper adherence along with other comprehensive HIV prevention tools like condoms, HIV testing, counseling and knowing partners and one's own HIV status can improve the lives of the MSM population and help reduce new cases of HIV.

In the research done by Frankis, Young, Lorimer, Davis, and Flowers (2016) used the SMMASH (Social Media, MSM, and Sexual Health) which was a cross-sectional online self-completed survey of (*n* = 386) participants from four Celtic nations who reported condomless anal intercourse (CAI) to find the answer to two main questions. These questions where, 1) which factors are associated with PrEP awareness for these high risk HIV negative or HIV status unknown MSM participants and 2) which factors are associated with PrEP acceptability for these high risk HIV negative or HIV status unknown MSM participants (Frankis et al., 2016)? Of the (*n* = 386) participants came 44% from Scotland (*n* = 170), 22% from Wales (*n* = 85), 19.9% from Republic of Ireland (RoI; n = 73) and 14% from Northern Ireland (*n* = 54; Frankis et al., 2016). The results found that 34% or about one third (132 of 386) of participants had knowledge of PrEP and what is was, with 58.8% which is over half (226 of 356) participants reported would be willing to use PrEP as an HIV preventative method if it was made available to them. The data found that when those MSM that received an HIV test every six months (AOR 2.89, 95% CI 1.54 – 5.42) had more awareness of PrEP and found that PrEP acceptability was only related with these MSM that reported having more than five condomless anal intercourse (CAI) partners (*OR* 2.04, 95% CI 1.2 – 3.46) within the last year (Frankis et al., 2016). When dealing with MSM that have condomless anal intercourse (CAI) with more partners and received more HIV testing would be more inclined to use PrEP as an HIV intervention method. These results tell one that high risk MSM that engage in condomless sex and have multiply partners are more prone to adopt PrEP as an HIV risk reduction strategy instead of using condom which suggest that if high risk MSM have

knowledge, access and awareness of PrEP that there is a great potential for the reduction of new HIV infections. The use of condoms has been one of the only few risk reduction tools for fighting new rates of HIV infections since the HIV epidemic started. With PrEP if these high risk MSM have access and awareness of PrEP and the proper adherence new HIV rates can be lowered exponentially since many MSM feel that condoms are the past and PrEP is the future in the fight against HIV infection rates when having sexual encounters.

Frankis et al. (2016), Golub et al. (2010), Otis et al. (2016), and Sagaon-Teyssier et al. (2016) have done great research on PrEP use within the MSM population and how it affects condom use but leaves a gap within the literature on how sexual decisions-making, risk-taking relates to condom use once they start using PrEP. Using participants within these studies have helped to look at the gaps within the literature to find if PrEP use within the MSM population has an effect with their sexual decision-making, risk-taking, and condom use which according to Frankis et al. (2016), Gould et al. (2010) and McCormack et al. (2016) research is still lacking.

Summary and Conclusion

Since the first cases of HIV in the early 1980s were reported, this infectious disease has come a long way from people who have contracted this disease as having a death sentence with new medications like ARV medications. Methods such as HIV testing, understanding how HIV is transmitted, the make-up and genetics of HIV and now in the early part of the 21st century new prevention medication like PrEP. This chapter reviewed many articles and studies conducted on PrEP use, the willingness to use PrEP

along with how behavioral risk factors play a role in how the MSM perceive themselves taking PrEP along with PrEP as a new HIV prevention tool to help the spread of new HIV cases within the MSM population who still account for the highest rate of new HIV infections (CDC, 2015b). Understanding that new theoretical frameworks have now emerged like that of the behavioral disinhibition and risk compensation models (Hogben & Liddon, 2008) which will aid the individual or MSM to better understand their actions and not just to view their actions to make better sexual decision-making, risk-taking, and condom use decisions when dealing with PrEP use.

The literature review found that many behavioral risk factors play a role within the MSM population when they start using PrEP as a HIV prevention tool. Limitations for sexual decision-making, risk-taking, and condom use where found within the various research studies conducted for this literature review. While the data found within the many studies used for this literature review had common findings like that the more sexually active these MSM where and the more sexual partners they had the more accepting of PrEP they were to use it. PrEP as an HIV prevention tool along with finding that the higher education one had along with having better healthcare these MSM where likely to use PrEP. The finding also supports that once these MSM understood PrEP and that adherence was vital for the success of PrEP along with having better access to PrEP these MSM would be willing to use PrEP. The data collected for this literature review provided a strong substance of data for this dissertation and the importance of this dissertations topic. Nonetheless, for all the data and support that these research studies provided for this dissertation topic, these articles exposed gaps in the existing research

that this dissertation will address for sexual decisions-making, risk-taking, and condom use within the MSM population once they start using PrEP as an HIV prevention tool.

The limitations these studies found that help identify the gaps within the literature were identified as small participation size, the way these samples were collected, to self-reported data form these MSM, to age, socioeconomic backgrounds and race played a role in how these MSM would address taking or be willing to take PrEP as an HIV prevention tool in the fight against HIV. These studies discussed how behavioral risk played a role in these MSM lives and how it would affect them once on PrEP like having multiply partners and more condomless sex but never considered that these MSM sexual decision-making was vital for these MSM and how this would affect their risk-taking and condom use. Sexual decision-making should be looked at from the start when dealing with these MSM once on PrEP since their sexual decision-making affects their risk-taking, and condom use which has been shown to be affected once these MSM start using PrEP. More studies need to be done on these MSM sexual decision-making process and how once on PrEP that this will have a substantial effect on all other aspects of these MSM sexual encounters with other MSM along with finding if certain variables like socioeconomic status, race and age (18-64 years old) may be associated with the MSM population's sexual decision-making, risk-taking, and condom use once they start using PrEP. The next chapter of this dissertation, chapter 3, will provide this studies research design, online survey design, rational, sample size, participations, and most important methodology to help with the findings and gaps emphasized in this chapter of the dissertation.

Chapter 3: Research Method

Introduction

The aim of this quantitative cross-section online survey study was to examine the relationship between the use of PrEP and sexual decision making, risk taking, and condom use within the MSM population. A cross-sectional survey design, which is observational in nature, allows a researcher to look at a certain population through descriptive research (Campbell & Stanley, 1963). In this study, I sought to gather data on what variables, if any, are having an effect on members of MSM populations in their sexual decision making, risk taking, and condom use once they start using PrEP.

A cross-sectional design involves the collection of data at a singular point in time from participants (in this study, MSM) who have similar characteristics but differ in key factors (e.g., age, income, education, HIV status, relationship status, sexual history, and knowledge/education of PrEP) to determine which of these variables may contribute to behavior (e.g., condom use) within this population. According to Creswell (2013) and Frankfort-Nachmias, Nachmias, and DeWaard (2015), cross-sectional studies allow researchers to collect large amounts of data using self-reported surveys and are relatively inexpensive to conduct. With a cross-sectional design, a researcher can collect data on many different variables for analysis in association with a critical variable of interest. In this study, the critical variable of interest was PrEP use, which I considered in relation to sexual decision making, risk taking, and condom use by MSM, a group that continues to account for the highest rate of new HIV infections (CDC, 2015b). Using a cross-sectional design with surveys allowed me to create a snapshot of the MSM population to

find what was going on at the present moment with this group and to gain insight into HIV prevention through PrEP use as it relates to sexual decision making, risk taking, and condoms use.

According to Frankis et al. (2016), Gould et al. (2010), and McCormack et al. (2016), research is still lacking on the MSM population in relation to sexual decision making, risk taking, and condom use once individuals start using PrEP as an HIV prevention tool. According to Mansergh et al. (2012), the effective message being communicated about PrEP to various MSM-related audiences is not the same within all MSM populations, and this could be due to lack of education and knowledge among both healthcare professionals and the MSM population, as well as lack of interest among healthcare professionals in HIV. Within the MSM population, PrEP is seen as a cure or reason to stop following safe sex practices such as condom use. As such, PrEP may be shifting attitudes and beliefs in the MSM population in relation to sexual decision making, risk taking, and condom use. This phenomenon must be addressed within MSM communities to fill gaps within the literature.

Research Design and Rationale

Cross-sectional research is one of the most used designs within the social sciences, where it is applied most often in studies that involve surveys or questionnaires (Frankfort-Nachmias et al., 2015). This type of study is conducted to gain data on a random sample of individuals that represents a similar population by asking participants "a set of questions about their backgrounds, past experiences, attitudes and so on" (Frankfort-Nachmias et al., 2015, p. 105) to learn about relationships between variables

(e.g., diseases, risk factors, and health outcomes) within that population. The strengths of the cross-sectional research design, according to Creswell (2013), include the following: Such studies are usually quick and easy to conduct, with data only collected once on the variables; such studies are good for descriptive analyses and generating hypotheses; the design is the best for determining prevalence; and data can be studied more using studies like a cohort or randomized controlled study. To answer the three research questions and hypotheses for this study about PrEP use and sexual decision making, risk taking, and condom use in the MSM population after starting this HIV prevention method. I used a cross-sectional research design. Since this study wanted to gain data on the causal relationship of PrEP use and the MSM populations as an HIV preventative method will help with the justification for using the cross-sectional research design.

Research Questions and Hypotheses

RQ1: Does PrEP have a relationship with sexual decision making in the MSM population, controlling for socioeconomic status, race, and age?

Ho1: There is no statistically significant relationship between PrEP use and sexual decision making within the MSM population.

Ha1: There is a statistically significant relationship between PrEP use and sexual decision making within the MSM population.

RQ2: Does PrEP use have a relationship with risk taking in the MSM population, controlling for socioeconomic status, race, and age?

Ho2: There is no statistically significant relationship between PrEP use and risk taking within the MSM population.

Ha2: There is a statistically significant relationship between PrEP use and risk taking within the MSM population.

RQ3: Does PrEP use have a relationship with condom use in the MSM population, controlling for socioeconomic status, race, and age?

Ho3: There is no statistically significant relationship between PrEP use and condom use within the MSM population.

Ha3: There is a statistically significant relationship between PrEP use and condom use within the MSM population.

Significance level: Reject Ho1, Ho2, and Ho3 if p-value < 0.05.

Target Population

Participants in this study were individuals who were using PrEP as an HIV prevention method provided by a healthcare professional or HIV clinic. To be included in the study, individuals needed to be 18 to 64 years of age; needed to self-identify as gay, as bisexual, or as MSM; needed to self-report as HIV negative or as unknown HIV serostatus; and needed to be sexually active individuals who were considered at high risk of acquiring HIV. No incentives were offered for completing the survey for this study. The participants were not given specific details about PrEP but were shown a definition of PrEP on the survey, which stated, "Pre-exposure prophylaxis (or PrEP) is when people at very high risk for HIV take HIV medicines daily to lower their chances of getting infected" (CDC, 2015b, para. 1).

Sampling Strategy

To address the research questions and hypotheses, this study used a sample size of $n = 167$, $B = .20$, $\alpha = .05$, and power at 80% using a nonprobability convenience sampling (Frankfort-Nachmias et al., 2015). This cross-sectional quantitative research study involved a nonprobability convenience sampling of MSM using an online survey to gain data on PrEP use, sexual decision making, risk taking, and condom use within the United States. This strategy was used for this study because MSM are considered a hard-to-reach population with high rates of new HIV infections (CDC, 2015c). Recruitment for this study was done within the United States using the SurveyMonkey.com website (Creswell, 2013), which I used to create a web-based survey along with consent forms that were available for a period of 6 months. A link created by SurveyMonkey.com was used for online participants from social media and gay-related websites such as; Facebook, Instagram, LinkedIn, Twitter, Scruff, Grindr, Grizzly, Daddyhunt, and Tumblr. Snowball samples allow researchers to solicit information from existing participants and gain new participants using seeds or respondent-driven sampling (RDS; Frankfort-Nachmias et al., 2015), as I did from the local HIV healthcare clinics where I volunteer.

Sample Size Calculations

According to the CDC (2015b) and Parsons et al. (2017), of the more than 325 million Americans, 2% to 10% may identify as gay or bisexual. Thus, the population of gay or bisexual Americans may number 6-25 million. A recent Bloomberg article indicated that about 193,000 Americans were on PrEP at the end of September 2018,

according to Gilead executives (Tozzi, 2018). The CDC (2015b) and Parsons et al. (2017) have provided data indicating that less than 4% of the seven million (approximately 280,000) gay or bisexual men are using PrEP as an HIV prevention method; such data would be relevant to Gilead, the maker of PrEP (Truvada). Recognizing that it might be difficult to capture the full scope of the population, I set 193,000 as the target sample size (*N*) of this study.

The Raosoft (2004) sample size online calculator showed a sample size with a small effect size of .05, $\alpha = .05$, statistical power at 80% at $n = 165$, a sample size of $n = 271$ at 90%, and a sample size of $n = 384$ at 95%. The sample size of $n = 165$ set at .80 or 80% was used for this study due to anticipated challenges in reaching the MSM population across the United States using SurveyMonkey, Facebook, Grinder, Scruff, and other outreach sources over a 6-month recruitment period. This seemed adequate for the population sample size of $N = 193{,}000$ subjects to assess factors that influence PrEP use, sexual decision-making, risk-taking, and condom use as well as achieving a level of power and minimizing Type II error with a 5% margin of error set given the outreach effort..

Instrumentation

The online survey used with this cross-sectional quantitative research study contained questions assessing demographics, sexual behaviors and practices with men, relationship, HIV testing and HIV status, and data on PrEP from existing researchers. The data collected used descriptive statistics including counts, averages, frequencies, standard deviations, percentages, and proportions (Creswell, 2013). I sought to assess the

bivariate relationship between the dependent variables and independent variable along with multivariate logistic regression models to predict intention of PrEP use and perceptions that PrEP would decrease or increase sexual decision making, risk taking, and condom use. Statistical significance was set at $p < .05$ level so that multivariate logistic regression analysis was used to determine which of the variables identified in the bivariate analyses were independently associated with PrEP use and condom use (decreased or increased). The collected data used a nominal scale or dichotomous survey questions to score for the dependent variables of sexual decision making, risk taking, and condom use (scored with 0 = no or 1 = yes; Frankfort-Nachmias et al., 2015).

Scale, Test, and Population for MSM and PrEP

The purpose of scales and tests within the social sciences is to allow researchers to use these instruments to gain data on the characteristics of human behavior or theoretical constructs of populations being studied but in a more scientific way (Frankfort-Nachmias et al., 2015). Because the purpose of this quantitative research design was to measure effects of the MSM population on the use of PrEP antiretroviral medications as an HIV prevention method using a survey, this study used nominal-scale questions for the dependent variables of sexual decision making, risk taking, and condom use. According to FairTest (2007), testing can come in two forms: *criterion-referenced tests* (CRTs), which measure how well an individual has learned a certain skill or body of knowledge, and *norm-referenced tests* (NRTs), which are used to compare the test takers' knowledge. This study used the CRT model due to the outcome objective of the knowledge held by MSM populations on PrEP antiretroviral medications.

The use of scales and tests within quantitative research would not be possible without populations of participants (both individuals and groups), which allow for surveys and questionnaires to be filled out, and pretests and posttests to be done within an experimental study, which allows researchers to collect data on these populations using indexes, scales, and tests (Frankfort-Nachmias et al., 2015). Populations are vital for the success or even failure of a quantitative research study. A study must have a population, which, according to Creswell (2013), is a set of all individuals, groups, organizations, objects, locations, time periods, or events of interest for one's study. These individuals may be randomly or nonrandomly selected and assigned to control or experimental groups, depending on the type of quantitative study design.

This study used the population of MSM due to new numbers of HIV infections in this population and the use of PrEP antiretroviral medication as an HIV prevention method and a new tool in the fight against HIV (CDC, 2015a). The members of the MSM population who took part in this study were 18 to 64 years old; represented all races and minorities, all educational backgrounds, and different geographical locations; and were partnered, had fewer than six partners within 6 months, or had more than six partners within 6 months. This population included men who identified as gay, as bisexual, or as having sexual intercourse with men. All participants either were HIV negative or did not know their HIV status. The population used did not exclude persons on any illegal drugs or using alcohol, due to this population's known high rate of HIV infections, as I sought to gain insight from all members within the MSM population (CDC, 2015a). Using a wide and vast part of the MSM population provided larger

numbers within the MSM population to ensure better results concerning the effects that this population has on PrEP, HIV prevention, and condom use and a combination of all three of these to find what variables may be affecting the MSM population.

To ensure that the scale used within this study was reliable and valid, I followed Golub et al.'s (2010) recommendation to compare one's data for survey questions to others' outcome research. I sought to confirm that the items related clearly to the attitude being measured and covered the full range of response options, from *strongly agree* to *strongly disagree*. Additionally, I sought to ensure that the survey questions were clear on PrEP antiretroviral medications as an HIV prevention method and that if the same individuals from the MSM population took the survey again, they would have the same results. Using the test-retest method, the parallel-forms technique, and the split-half method helped in ensuring that the study was valid and reliable (Frankfort-Nachmias et al., 2015).

Procedures

I used SurveyMonkey.com as a web-based collection site for all of the online surveys. SurveyMonkey.com is an online survey collection site with tools that help in the delivery of surveys to participants. I used custom web-linked surveys geared toward the MSM community, which I publicized using gay-friendly and other social media sites. I provided consent forms to all subjects who were willing to take the online survey through SurveyMonkey.com (Creswell, 2013), which they electronically signed before completions of the survey.

According to Frankfort-Nachmias et al. (2015), snowball sampling allows researchers to classify one participant of a population (in this case, MSM), communicate to that person, and then ask that person to classify other members within the population and communicate to them, and then ask them to classify others, and so on. The use of snowball sampling may be beneficial when working with tough-to-influence and tough-to-classify populations for which there is no sampling frame but in which members are somewhat interrelated. Snowball sampling is useful for sociometric studies (that chart relationships between members), for determining populations of notice before developing a proper sampling plan, for mounting a survey of familiar frontrunners, and allows for no confidence about how demonstrative the sample is and initial contacts may help shape the entire sample (Frankfort-Nachmias et al., 2015).

As a researcher who had been working within the HIV community in South Carolina for many years, I anticipated that using the snowball sampling method for this study would help with finding participants from local HIV/AIDS healthcare clinics and other outreach programs by having a card with the survey information for SurveyMonkey.com provided to each person willing to take the survey. I expected that snowball sampling would help with finding MSM to take part in the study, who could then prompt others to fill out online surveys from local HIV/AIDS clinics and will have cards with SurveyMonkey.com data to pass out to willing participants.

The rationale for using a descriptive nonexperimental cross-sectional online survey design was that I wanted to obtain a snapshot (Frankfort-Nachmias et al., 2015) of the MSM population at one point in time to discover what variable, if any, has a

relationship with PrEP use and condom use within this population that could warrant future research to make PrEP more effective within the MSM population in preventing new HIV infections, in that PrEP only protects against HIV and not any other STDs. This research used a descriptive nonexperimental cross-sectional online survey design using a convenience sample from the MSM population to find what, if any, causal relationship there might be between the variables used in the survey (age, demographics, income, education, HIV status, sexual risk behaviors, substance use [drug or alcohol], knowledge/education on PrEP, and psychosocial [arousal barriers to condom use & risk perception motivations for condom use]) and sexual decision making, risk taking, and predicted condom use in the environment of PrEP among high-risk MSM. Because I used SurveyMonkey.com as the web-based collection site for all of the online surveys during this study, all surveys were compiled into a spreadsheet with the rest of the data before being entered into the SPSS or PAWS system for analysis.

Survey Questions: Sexual Decision Making

Questions used for this survey study were adapted from the CDC (2018) existing research from the National HIV Behavioral Surveillance (NHBS) and The Behavioral Risk Factor Surveillance System (BRFSS) to gain data on how PrEP use may be affected by the three dependent variables of sexual decision-making, risk-taking and condom use within the MSM population. Since the NHBS (CDC, 2018b) and BRFSS data was collected by a federal agency it has been made public on the CDC's website for review (CDC, 2018a).

The three questions being ask under sexual decision-making use nominal scale data and were coded with 0 = no and 1 = yes. These questions used descriptive statistics to calculate frequency distribution tables for the independent variable to show any affects that the dependent variable of sexual decision-making may have on the independent variable of PrEP use. The values of the independent variables were cross tabulated with the dependent variables to find any correlations. These questions are directed toward the participant's sexual decision-making when it comes to PrEP use getting better, worse or is the participant sharing their sexual decision-making with others.

Survey Questions: Risk Taking

The six questions being ask under risk-taking also used nominal scale data and were coded with 0 = no and 1 = yes. These questions used descriptive statistics to calculate frequency distribution tables for the independent variable to show any affects that the dependent variable of risk-taking had on the independent variable of PrEP use. The values of the independent variables were cross tabulated with the dependent variables to find any correlations. These questions are directed toward the participant's risk-taking since they started using PrEP for HIV prevention. These questions are geared toward number of people the participants are sleeping with, drug and alcohol use.

Survey Questions: Condom Use

This section of the survey also used nominal scale data and will be coded with 0 = no and 1 = yes. These questions used descriptive statistics to calculate frequency distribution tables for the independent variable to show any affects that the dependent variable of condom use may have on the independent variable of PrEP use. The values of

the independent variables were cross tabulated with the dependent variables to find any correlations. When it comes to condom use for this study there is only two main questions has PrEP use increased or decreased the participant's condom use since being on PrEP.

Statistical Analysis

Using SPSS or PASW software from Walden University this study used a cross-sectional design which uses descriptive statistics including counts, averages, midpoints, means, medians, standard deviations, percentages, and proportions (Creswell, 2013). The data analysis will be conducted using the newest version (25) of SPSS which is now PASW through Walden University. In this study, there is one independent variable of PrEP use for the MSM participants and three dependent variables that may affect the MSM participant's these variables are sexual decision-making, risk-taking, and condom use.

Hypothesis 1

Ho1: There is no statistically significant relationship between PrEP use and sexual decision making within the MSM population.

Ha1: There is a statistically significant relationship between PrEP use and sexual decision making within the MSM population.

The independent variable for Hypothesis 1 is PrEP use and the dependent variable is sexual decision-making of the MSM participant. Descriptive statistics were used to generate the basic information for each variable within this hypothesis. Odds ratio which is EXP (B) with the significant (*p*-value) and 95% confidence internal (95% CI) were

used to assess the relationship between the independent variable and dependent variables. Binary logistic regression were done with the data to show the interactions between the independent and dependent variable to find any association between them.

Hypothesis 2

Ho2: There is no statistically significant relationship between PrEP use and risk-taking within the MSM population.

Ha2: There is a statistically significant relationship between PrEP use and risk-taking within the MSM population.

The independent variable for Hypothesis 2 is PrEP use and the dependent variable is risk-taking of the MSM participant. Descriptive statistics were used to generate the basic information for each variable within this hypothesis. Odds ratio which is EXP (B) with the significant (*p*-value) and 95% confidence internal (95% CI) were used to assess the relationship between the independent variable and dependent variables. Binary logistic regression were done with the data to show the interactions between the independent and dependent variable to find any association between them.

Hypothesis 3

Ho3: There is no statistically significant relationship between PrEP use and condom use within the MSM population.

Ha3: There is a statistically significant relationship between PrEP use and condom use within the MSM population.

The independent variable for Hypothesis 3 is PrEP use and the dependent variable is condom use of the MSM participant. Descriptive statistics were used to generate the

basic information for each variable within this hypothesis. Odds ratio which is EXP (B) with the significant (*p*-value) and 95% confidence internal (95% CI) were used to assess the relationship between the independent variable and dependent variables. Binary logistic regression were done with the data to show the interactions between the independent and dependent variable to find any association between them.

The frequencies and percentages of the independent variable were cross-tabulated with the dependent variables to help find if there was any statistically significant between each of the dependent variables of sexual-decision-making, risk-taking, and condom use and the independent variable of PrEP use. Multivariate logistic regression models were conducted to predict intention of PrEP use and perceptions that PrEP would affect the MSM's sexual decision-making, risk taking, and condom use, controlling for socioeconomic status, race, and age. Statistical significance will be set at $p < .05$ level so multivariate logistic regression analysis may be used to determine which of the variables identified in the analyses will be independently associated with sexual decision-making, risk-taking and condom use (decreased or increased).

Duplicate or suspicious surveys will be taken out along with any surveys that self-identify as HIV positive. Sample size for this study will by $n = 165$ and the statistical power for this study will be .80 (80%), the alpha $p = .05$, and using Cohen's index to find effect size. Cohen's *d* is one measure of effect size and is based on the t-statistic and is calculated as: $d = M1 – M2/SD$, Where M = mean and SD = standard deviation (Field, 2013).

Validity and Reliability

Validity is the basic sense of the word when it comes to measurement is what supposed to be measure being measured and is the test valid (Creswell, 2013). The three types of validity are content (face and sampling), empirical and construct. When dealing with content validity along with face and sampling it is simple as it sounds like, according to Frankfort-Nachmias et al. (2015) is the content/characteristic/face value of the variables relevant of the instruments the researcher will be using and the participant being sampled. To ensure content (face and sampling) validity for this study on Pre-exposure Prophylaxis (PrEP) antiretroviral medications as an HIV prevention method the survey being used will make sure the assessment content and structure are applicable on the topic of PrEP and that the sampling population is justified. According to Young, Li, and McDaid (2013) comparing data from other researchers work on attitudes and beliefs of PrEP using surveys along with getting stakeholders to review one's surveys or questionnaire to ensure that the questions relate to topic and population is one way of ensuring for content validity. Empirical validity is simple as are the results obtained the results the research wanted and construct validity is relating the measuring instruments to a theoretical framework (Frankfort-Nachmias et al., 2015). To ensure empirical validity for this research study once can look at other data on the MSM populations on PrEP using measurements made by other instruments (surveys, questionnaires', interviews, or observations; Frankfort-Nachmias et al., 2015). To ensure for construct validity did the study operationalize well the idea of cause and effect within the MSM population on PrEP as an HIV preventive method with the behavioral disinhibition and risk

compensation models (Hogben & Liddon, 2008). To test for convergent validity this study will use SPSS software to conduct the Average Variance Extracted Analysis (AVE) (Green & Salkind, 2014) of the data to ensure reliability within the items for PrEP use, sexual decision-making, risk-taking, and condom use of testing for discriminant construct.

Reliability according to Creswell (2013) is the reliability of an instrument at the time it was used to measure a participant or variable and was it constant. To ensure for reliability within this quantitative research study using the test-retest method which according to Frankfort-Nachmias et al. (2015) test-retest reliability measures reliability over time and a good test will take into account factors that may influence survey results over time and minimize them so that results show little variation. Using the parallel-forms technique and the split-half method where one would divide pieces on the survey like the ones being used in this study that measure the same construct into two tests, apply them to the same group of people, and calculate the correlation between the two scores (Frankfort-Nachmias et al., 2015).

When using surveys for data collection within a quantitative research study the strengths are that a large number of participants can be used within a wide range of setting from online, emails, in person, at home, and other various locations. Surveys also allow the participants to take them on their own time within the privacy of their own homes and have no time restrictions placed on taking these surveys. The limitations of surveys as a measurement instrument are due to the reliability of the data gathered by the participants own recall bias of information (Kimberlin & Winterstein, 2008). These

participants may be providing answers based on what they think the researcher wants or what they feel is the right answer and asking participants question about topics that they have no knowledge on can lead to validity within the survey and the response provided by the participants (Kimberlin & Winterstein, 2008).

Ethical Issues

To ensure the ethical integrity of this dissertation research this study used and follow all guidelines by The Institutional Review Board (IRB) which gave approval on May 3, 2019 with the approval #05-03-19-0337249 to ensure the safety and confidentiality of information for those individuals who participate in research studies (Walden University, n.d.-a) This study ensured that all MSM participants' surveys will meet the ethical standards of Walden University along with all feedback from the committee chair and other committee members along with all data will be placed within a spreadsheet in a computer with password protection and placed within a lockbox. This study received consent forms filled out for each MSM participant which will be provided to each participant with any and all the online surveys this consent will be in electronic form by asking each MSM participant to please select their choice (will have an agree and disagree box). The participants may print a copy of this consent form for their records and by clicking on the "Agree" button will indicate that:

- They have read the above information;
- They voluntarily agree to participate; and
- They are 18 years of age or older.

Due to the nature of this research study on the MSM population and the topic of sexual decision-making, risk taking, condom use, PrEP use, and HIV status this study used the Research Ethics Planning Worksheet Questions (Walden University, n.d.-b) provided by Walden University. The protection and privacy of all the MSM participants be used within this research study will be handled with the upmost care to ensure their privacy is keep safe at all times and each consent form will be collected and placed in a working spreadsheet and placed under lock and key. In the times that we live in when dealing with multiply websites data breaches can happen but by using numbers on each of this studies surveys along with numbers for each of the MSM participants this research study will use the Walden University and IRB standards to ensure the protection and privacy of the data collection of these MSM participants. To ensure further protection of all participants survey data this study used SurveyMonkey.com which is HIPAA approved along with having several layers of security and protection for transmission of all surveys, Database and Server Security, IRB approval and provides electronic consent forms for each survey (SurveyMonkey, 2018).

Summary

Chapter three for this dissertation has delivered detailed descriptions of this studies research method which is quantitative in nature using a cross-sectional survey design of primary data collection of the MSM population on their sexual decision-making, risk-taking and condom use once they start using PrEP as an HIV prevention method. This chapter provides procedures for the research design and rational, the research questions and hypothesis, the data collection of the target population

participants, the sampling stagey, instrumentation, procedures, statistical analyses, validity and reliability, and address the ethical issues related to the participants within this study design. Chapter three has also address which type of significance will need to meet the hypothesis along with other vital parameters as confidence interval will be need for the outcome of this study. Chapter 4 will address in more detail the results of the data collection and findings of this study once the data collection process has been completed. Chapter four will include SPSS output from the data collection along with output data such as graphs and tables once the data has been input into SPSS.

Chapter 4: Results

Introduction

The purpose of this online survey study was to explore the application of the behavioral disinhibition and risk compensation models (Hogben & Liddon, 2008) to relate PrEP use to sexual decision making, risk taking, and condom use for the MSM population 18-64 years of age. The purpose was to determine what, if any, variables and relationship there may be between the variables used in the studies survey of the MSM population. This survey will include variables such as; (age, demography, income, education, HIV status, relationship status, sexual risk behaviors, substance use [drug or alcohol], knowledge/education of PrEP and psychosocial [arousal barriers to condom use & risk perception motivations for condom use]) links of PrEP use is having an effect with their sexual decision-making, risk-taking, condom use, number of partners, drug or alcohol use while on PrEP.

The three research questions that steered this research analysis, along with each of their hypotheses, were as follows:

RQ1: Does PrEP have a relationship with sexual decision making in the MSM population, controlling for socioeconomic status, race, and age?

Ho1: There is no statistically significant relationship between PrEP use and sexual decision making within the MSM population.

Ha1: There is a statistically significant relationship between PrEP use and sexual decision making within the MSM population.

Significance level: Reject Ho1 if p-value < 0.05.

RQ2: Does PrEP use have a relationship with risk taking in the MSM population, controlling for socioeconomic status, race, and age?

Ho2: There is no statistically significant relationship between PrEP use and risk taking within the MSM population.

Ha2: There is a statistically significant relationship between PrEP use and risk taking within the MSM population.

Significance level: Reject Ho2 if p-value < 0.05.

RQ3: Does PrEP use have a relationship with condom use in the MSM population, controlling for socioeconomic status, race, and age?

Ho3: There is no statistically significant relationship between PrEP use and condom use within the MSM population.

Ha3: There is a statistically significant relationship between PrEP use and condom use within the MSM population.

Significance level: Reject Ho1, Ho2, and Ho3 if p-value < 0.05.

Chapter 4 provides information about the data collected from online surveys on SurveyMonkey.com. I state the data collection time frame, along with response rates of the MSM population that completed the online survey for this study. In this chapter, I report the findings of the statistical analysis for each research question, along with data from the research participants, to find what, if any, variables and relationship there may be between the variables used in the studies survey of the MSM population. I present statistical analysis data using tables to ensure simplification of the results. Finally, all

data and results are summarized for each of the three research questions and hypotheses, and the statistical significance of all results is discussed.

Recruitment and Response Rate

Participants for this study were asked to fill out online surveys using SurveyMonkey.com as a web-based collection site. I created a link (https://www.surveymonkey.com/r/PrEPUseSurvey) that was used exclusively for this study. This link was used within many different social media and gay-related sites in the United States, such as Facebook, Instagram, LinkedIn, Twitter, Scruff, Grindr, Grizzly, Daddyhunt, and Tumblr, to direct MSM participants to the survey and consent form for this study. This study had a 6-month recruitment period, which lasted from May 2019 to October 2019. The sample size for this study was $n = 165$, set at .80 or 80% due to the anticipated challenges of reaching MSM population participants. At the end of the 6-month study (with this period beginning at the opening of participant recruitment), there were $n = 193$ total responses, with $n = 167$ completed responses to the survey that were used for the data analysis.

Data Collection

The data collected from the participants for this study were downloaded from SurveyMonkey.com into a Microsoft Excel file, which I saved onto my computer hard drive. To ensure that the data were homogeneous, the data from the Excel file were verified manually by me, leaving $n = 167$ completed surveys to be used for this study. The survey for this study had 28 questions, with each question having multiple selections as answers representing 28 variables with nominal scale data such as 0, 1, 2, 3, and so

forth, and binary such as 0 = no and 1 = yes. For this study, there were descriptive statistics for each participant, and there was one independent variable of PrEP use for the MSM participants and three dependent variables that might affect the MSM participants (sexual decision making, risk taking, and condom use). Once all data had been verified for the 167 participants, these data were placed within SPSS, along with variable names, labels, and values and created in the SPSS variable view to gain output data for this study.

Descriptive Statistics

The 167 participants in this study were all MSM using PrEP as an HIV prevention method who volunteered to complete an online survey within the United States and who signed a consent form. Table 1 shows the distribution of the demographics of race, age, and education level for the participants in this study. The study found that a majority of the participants (n = 132, 79%) identified their race as White. The second-highest number of participants (n = 16, 9.6%) identified their race as Hispanic or Latino. The third-highest number of participants (n = 9, 5.4%) identified their race as Asian. Additionally, five participants (3%) identified as African American or Black, two (1.2%) identified as American Indian or Alaskan Native, and with three (1.8%) of the 167 participants preferred not to answer the question of how they identified their race.

Data on age indicated that 52 (31.1%) of the participants fell within the range of 35-44 years old. These age groups of 24-43 and 45-54 years showed very similar numbers, with 41 (24.6%) of the participants falling within the 24-43 years group and 40 (24%) falling within the 45-54 years group. The group of participants 55-64 years of age,

which was the oldest group, had the second-lowest participation numbers at 27 (16.2%). The lowest number of participants was in the youngest age group (18-24 years), for which there were six (3.6%) participants. One participant (0.6%) preferred not to answer the question about age.

Table 1 shows that of the 167 participants, the largest number had a bachelor's degree (n = 71, 42.5%), and the second-highest number of participants had a master's or postgraduate degree (n = 59, 35.5%). Thirty-one participants (18.6%) reported some college, either with an associate's or technical degree, and four (2.4%) stated that they were at least high school graduates or had a GED. The categories for individuals who had completed some high school or preferred not to answer received one response (0.6%) each.

Table 1

Descriptive Statistics: Participants' Race, Age Group, and Education Level Completed

Variable	Frequency *n*	Percentage %
Race		
American Indian or Alaskan Native	2	1.2
Asian	9	5.4
African American or Black	5	3.0
Hispanic or Latino	16	9.6
White	132	79.0
Prefer not to answer	3	1.8
Age		
18 to 24	6	3.6
25 to 34	41	24.6
35 to 44	52	31.1
45 to 54	40	24.0
55 to 64	27	16.2
Prefer not to answer	1	.6
Education level completed		
Completed high school	1	.6
High school graduate or GED	4	2.4
Some college—Associate's or technical degree	31	18.6
Bachelor's degree	71	42.5
Master's degree or postgraduate studies (PhD)	59	35.3
Prefer not to answer	1	.6

Note. $N = 167$.

Table 2 provides descriptive statistics for employment status and yearly income of the MSM participants for this study. This data indicate that more than 134 participants (80.2%) had a full-time job, while 14 (8.4%) of the participants were students. Additionally, the data show that seven participants (4.2%) were unemployed, and six (3.6%) had part-time employment. Data show four (2.4%) being retired along with two (1.2%) preferring not to answer.

The yearly income data in Table 2 for the MSM participants indicate that 63 (37.7%) of the participants made over $85,000, whereas 14 (8.4%) made under $21,000. The other income data displayed show that 23 (13.8%) made $22,000-$42,000, 30 (18%) made $43,000-$63,000, and 29 (17.4%) made $64,000-$84,000 yearly. In response to the question about income, eight (4.8%) preferred not to answer.

Table 2

Descriptive Statistics: Participants' Employment Status and Yearly Income

Variable	Frequency *n*	Percentage %
Employment status		
Full-time employment	134	80.2
Part-time employment	6	3.6
Student	14	8.4
Retired	4	2.4
Unemployed	7	4.2
Prefer not to answer	2	1.2
Yearly income		
Under $21,000	14	8.4
$22,000 to $42,000	23	13.8
$43,000 to $63,000	30	18.0
$63,000 to $84,000	29	17.4
Over $85,000	63	37.7
Prefer not to answer	8	4.8

Note. $N = 167$.

Table 3 provides data on whether the participants considered themselves to be gay, bisexual, or MSM. This table indicates that of the 167 participants, 164 (98.2%) considered themselves to be gay, bisexual, or MSM. Of the 167 participants, two (1.2%) answered no to this question, and one (0.6%) preferred not to answer.

Table 3

Do You Consider Yourself to Be Gay, Bisexual or an MSM (Man Who Has Sex With Men)?

Variable	Frequency *n*	Percentage %
No	2	1.2
Yes	164	98.2
Prefer not to answer	1	.6

Note. *N* = 167.

Pre-Exposure Prophylaxis Use

Table 4 shows descriptive statistics for the independent variable of PrEP use. Of the 167 participants, a majority (*n* = 163, 97.6%) were currently taking PrEP for HIV prevention. This table shows that three (1.8%) of the participants did not take PrEP for HIV prevention, with only one (0.6%) participant preferring not to answer. Table 4 also shows that 162 of the 167 participants (97%) received full instructions on how to use PrEP and how it works. The data indicated that 152 (91%) of the participants showed having health insurance or coverage, with 14 (8.4%) having no health insurance or coverage. Only one participant (0.6%) preferred not to answer.

Table 4

Descriptive Statistics: Participants Who Currently Take PrEP for HIV, Did They Receive Full Instructions on How to Use PrEP and Currently Have Health Insurance or Coverage?

Variable	Frequency *n*	Percentage %
Currently take PrEP for HIV prevention		
No	3	1.8
Yes	163	97.6
Prefer not to answer	1	.6
Receive full instruction on how to use PrEP		
No	4	2.4
Yes	162	97.0
Prefer not to answer	1	.6
Currently have health insurance or coverage		
No	14	8.4
Yes	152	91.0
Prefer not to answer	1	.6

Note. $N = 167$.

Table 5 shows that once on PrEP, a majority of the participants ($n = 165$, 98.8%) still received regular HIV testing, with one (0.6%) not getting tested regularly for HIV after starting PrEP and one (0.6%) preferring not to answer. Table 5 shows that all 167 participants in this study (100%) reported their HIV status as negative while on PrEP.

Table 5 also provides data on the subjects and what other STIs or STDs they may have tested positive for. The data show that 78 (46.7%) replied no to the question of whether they had been tested for other STIs or STDs, whereas 88 (52.7%) stated yes for being tested for other STIs or STDs. Only one participant (.6%) preferred not to answer. The data provide information about other STIs or STDs that the MSM participants using PrEP were dealing with. These data show that 80 of the 167 participants had no other

STIs or STDs. Gonorrhea had one of the highest rates for other STDs, at 35 (21%). Chlamydia had similar results, affecting 30 (18%) of the participants. The data indicate that syphilis may be on the rise within the MSM community, as 17 (10.2%) participants reported having the disease. Small numbers of participants reported genital/anal warts (*n* = 4, 2.4%) and Hepatitis C (*n* = 1, 0.6%).

Table 5

Descriptive Statistics: Participants Once on PrEP Still Get Regular HIV Testing, HIV Status, Tested Positive for Other STIs or STDs and What STIs or STDs Participants Tested Positive for

Variable	Frequency *n*	Percentage %
Once on PrEP get regular HIV test		
No	1	.6
Yes	165	98.8
Prefer not to answer	1	.6
HIV status		
Negative	167	100.0
Positive	0	0
Prefer not to answer	0	0
Tested positive for other STIs or STDs		
No	78	46.7
Yes	88	52.7
Prefer not to answer	1	.6
Syphilis	17	10.2
Chlamydia	30	18.0
Gonorrhea	35	21.0
Genital/anal warts	4	2.4
Hepatitis C	1	.6

Note. $N = 167$.

Sexual Decision Making

Table 6 provides descriptive statistics on the dependent variable of sexual decision-making since starting PrEP. The subjects data provides that 99 (59.3%) of the 167 subjects feel that their sexual decision-making has become better with PrEP use along with 65 (38.9) of the subjects feel that their sexual decision-making has not gotten better since using PrEP. While three (1.8%) of the subjects preferred not to answer this question on sexual decision-making and PrEP use. Table 6 data is on the subjects and sexual decision-making has become worse since starting PrEP with 25 (15.0%) of the subjects stating yes. Table 6 provides the data that 146 (87.4%) of the subjects are discussing their sexual decision-making with others and that only 19 (11.4%) are not discussing their sexual decision-making with others. Leaving only two (1.2%) of Subjects preferring not to answer.

Table 6

Descriptive Statistics, Sexual Decision Making: Participants, Since Starting PrEP as an HIV Prevention Method, Do You Feel Your Sexual Decision-Making Has Become Better, Do You Feel Your Sexual Decision-Making Has Become Worse, and Since Starting PrEP, Do You Discuss Your Sexual Decision Making With Others Like Sexual Partners, Healthcare Professionals, Family, or Friends?

Variable	Frequency *n*	Percentage %
Since starting PrEP, has sexual decision making become better?	65	38.9
No	99	59.3
Yes	3	1.8
Prefer not to answer		
Since starting PrEP, has sexual decision making become worse?	137	82.0
No	25	15.0
Yes	5	3.0
Prefer not to answer		
Since starting PrEP, have you discussed sexual decision making with others?		
No	19	11.4
Yes	146	87.4
Prefer not to answer	2	1.2

Note. $N = 167$.

Risk Taking

Table 7 and 8 data shows the six variables of risk-taking. The data shows that 78 (46.7%) of the subjects sexual decision-making did lead to more risk-taking, while over half of the subjects 87 (52.1%) sexual decision-making did not lead to more risk-taking once they started PrEP leaving two (1.2%) preferring not to answer. Table 7 provides data that 128 (76.6%) of the subjects said that since starting PrEP they have had sex with more than one person at different times within the last three months. Leaving 37 (22.2%)

subjects stating that they have not had sex with more than one person at different times within the last three months leaving two (1.2%) preferring not to answer. Table 7 data shows that 96 (57.5%) of the subjects have participated in sexual acts with more than one person or groups of people at the same time within the last three months, while 69 (41.3%) of subjects have not participated in sexual acts with more than one person or groups of people at the same time within the last three months. Leaving on two (1.2%) of the subjects preferring not to answer.

Table 8 provides data on the subjects' risk with drugs and their sexual activities. 147 (88%) of the subjects data provided no more risk-taking with drugs since on PrEP, while 16 (9.6%) of the subjects stated they have had more risk-taking with drugs since starting PrEP. Leaving four (2.4%) preferring not to answer. Table 8 provides data on the subjects' risk with alcohol since starting PrEP, showing that 153 (91.6%) of the subjects stated no they had not had more risk-taking with alcohol since starting PrEP and 12 (7.2%) have had more risk-taking with alcohol since starting PrEP. Leaving two (1.2%) preferring not to answer. Table 8 provides data on since starting PrEP have the subjects' risk-taking become more of an issue with their overall sexual activities and with 147 (88%) have stated no and 17 (10.2%) answered yes. Leaving three (1.8%) preferring not to answer.

Table 7

Descriptive Statistics, Risk Taking: For Participants Since Starting PrEP, Has Sexual Decision Making Led To More Risk Taking, Having Sex With More Than One Person at Different Times Within the Last 3 Months, or Participating in Sexual Acts With More Than One Person or a Group of People at the Same Time Within the Last 3 Months?

Variable	Frequency *n*	Percentage %
Since starting PrEP, has your sexual decision making led to more risk taking?		
No	87	52.1
Yes	78	46.7
Prefer not to answer	2	1.2
Since starting PrEP, have you had sex with more than one person at different times within the last 3 months?		
No	37	22.2
Yes	128	76.6
Prefer not to answer	2	1.2
Since starting PrEP, have you had sex with more than one person or a group within the last 3 months?		
No	69	41.3
Yes	96	57.5
Prefer not to answer	2	1.2

Note. $N = 167$.

Table 8

Descriptive Statistics, Risk Taking: Participants Taking More Risk With Any Drugs or Alcohol and Sexual Activities, and Since Starting PrEP, Has Risk Taking Become More of an Issue With Overall Sexual Activities?

Variable	Frequency *n*	Percentage %
Since starting PrEP, have you been taking more risk with drugs and sexual activities?		
No	147	88.0
Yes	16	9.6
Prefer not to answer	4	2.4
Since starting PrEP, have you been taking more risk with alcohol and sexual activities?		
No	153	91.6
Yes	12	7.2
Prefer not to answer	2	1.2
Since starting PrEP, has your risk taking become more of an issue with overall sexual activities?		
No	147	88.0
Yes	17	10.2
Prefer not to answer	3	1.8

Note. $N = 167$.

Condom Use

Table 9 provides data on subjects condom use decreasing and increasing since starting PrEP. The data found that 96 (57.5%) have decreased condom use and 69 (41.3%) have not had decreased condom use. Leaving two (1.2%) preferring not to answer. Table 9 provides data on subjects condom use increasing since starting PrEP. The data found that 9 (5.4%) of subjects condom use had increased with 156 (93.4) showing no increase in condom use. Leaving two (1.2%) preferring not to answer.

Table 9

Descriptive Statistics, Condom Use: Participants, Since Starting PrEP, Has Condom Use Decreased or Increased?

Variable	Frequency *n*	Percentage %
Since starting PrEP, has condom use decreased?		
No	69	41.3
Yes	96	57.5
Prefer not to answer	2	1.2
Since starting PrEP, has condom use increased?		
No	156	93.4
Yes	9	5.4
Prefer not to answer	2	1.2

Note. *N* = 167.

Sexual Behavior

Table 10 provides the subjects' descriptive statistics on sexual behavior. This data shows how PrEP use has changed their sexual decision-making when it comes to their overall sexual activities. The data shows that 112 (67.1) of the subjects answered yes and 52 (31.1) answered no to any change to their overall sexual activities. Leaving three (1.8%) preferring not to answer. Table 10 provides data on subject' risk-taking when it comes to their overall sexual activities. The data showed that 92 (55.1%) of the subjects answered yes with 72 (41.3%) of the subjects answered no, leaving three (1.8%) preferring not to answer. As displayed in Table 10, 95 (56.9%) of subjects reported yes that PrEP use had changed their condom use when it came to their overall sexual activities and 70 (41.9) of subjects reported 'no' that condom use had not changed with their overall sexual activities. Leaving two (1.2%) preferring not to answer. In the display of Table 10 found that 162 (97%) of all subjects had been taking PrEP as direct

(one pill daily) and that three (1.8%) of the subjects had not been taking the medication properly. Leaving two (1.2%) preferring not to answer.

Table 10

Descriptive Statistics, Sexual Behavior: Participants, Since Starting PrEP, Has It Changed Your Sexual Decision Making, Risk Taking, or Condom Use When It Comes to Overall Sexual Activities and Taking PrEP as Directed?

Variable	Frequency *n*	Percentage %
Has PrEP use changed your sexual decision making with overall sexual activities?		
No	52	31.1
Yes	112	67.1
Prefer not to answer	3	1.8
Has PrEP use changed your risk taking with overall sexual activities?		
No	72	43.1
Yes	92	55.1
Prefer not to answer	3	1.8
Has PrEP use changed your condom use with overall sexual activities?		
No	70	41.9
Yes	95	56.9
Prefer not to answer	2	1.2
Are you taking PrEP as directed?		
No	3	1.8
Yes	162	97.0
Prefer not to answer	2	1.2

Note. $N = 167$.

Statistical Assumptions

To assess the bivariate relationship between the dependent variables and independent variable this used Chi-Square along with multivariate logistic regression models to predict intention of PrEP use and perceptions that PrEP would decrease or

increase sexual decision-making, risk-taking and condom use. Statistical significance will be set at $p < .05$ level so multivariate logistic regression analysis may be used to determine which of the variables identified in the bivariate analyses will be independently associated with PrEP use and condom use (decreased or increased). The collected data used a nominal scale or dichotomous survey questions to score for the dependent variables of sexual decision-making, risk-taking and condom use (scored with 0 = no and 1 = yes; Frankfort-Nachmias et al., 2015).

Data Analysis and Outcomes

Sexual Decision Making

This study used the statistical Package for Social Sciences (SPSS) version 25 for the data collected and analyzed during this study. Using SPSS this study will use cross-tabulation with Chi-Square test to predict intention of PrEP use and perceptions that PrEP would decrease or increase sexual decision-making, risk-taking and condom use. Tables 11, 12, and 13 shows the Chi-Squares of the independent variable of PrEP use and the dependent variable of sexual decision-making of research question one, dose PrEP affect the relationship with sexual decision-making in the MSM population? Table 11 data shows the Chi-Square at .532, the Likelihood Ratio at .520, Fisher's Exact Test at .650 and for this study the p-value was set at $p < .05$ which allows for the study to accept the null hypothesis in lieu of the alternative.

Table 11

Sexual Decision Making Has Become Better

Chi-square tests

	Value	*df*	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	.390[a]	1	.532		
Continuity correction[b]	.012	1	.914		
Likelihood ratio	.414	1	.520		
Fisher's exact test				.650	.472
Linear-by-linear	.388	1	.534		
N of valid cases	167				

[a]Two cells (50.0%) have expected count less than 5. The minimum expected count is 1.60. [b]Computed only for a 2x2 table.

Table 12 shows the Chi-Square at .674 and the Likelihood Ratio at .489 and for this study the p-value was set at $p < .05$ which allows for the study to accept the null hypothesis in lieu of the alternative.

Table 12

Sexual Decision Making Has Become Worse

Chi-square tests

	Value	*df*	Asymptotic significance (2-sided)
Pearson chi-square	.790[a]	2	.674
Likelihood ratio	1.430	2	.489
Linear-by-linear association	.629	1	.428
N of valid cases	167		

[a]Four cells (66.7%) have expected count less than 5. The minimum expected count is .05.

Table 13 shows the Chi-Square data at .468, the Likelihood Ratio at .323 and the Fisher's Exact Test at 1.000 and for this study the p-value was set at $p < .05$ which allows for the study to accept the null hypothesis in lieu of the alternative.

Table 13

Discuss Sexual Decision Making With Other

Chi-square tests

	Value	*df*	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	.526[a]	1	.468		
Continuity correction[b]	.000	1	1.000		
Likelihood ratio	.979	1	.323		
Fisher's exact test				1.000	.614
Linear-by-linear	.523	1	.470		
N of valid cases	167				

[a]Two cells (50.0%) have expected count less than 5. The minimum expected count is .46. [b]Computed only for a 2x2 table.

Risk Taking

Tables 14 through 19 shows the Chi-Squares of the independent variable of PrEP use and the dependent variable of risk-taking of research question two, dose PrEP affect the relationship with risk-taking in the MSM population. Table 14 shows the Chi-Square at .913 and the Likelihood Ratio at .913 for this study and the *p*-value was set at $p < .05$ which allows for the study to accept the null hypothesis in lieu of the alternative.

Table 14

Sexual Decision Making Led to More Risk Taking

Chi-square tests

	Value	*df*	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	.012[a]	1	.913		
Continuity correction[b]	.000	1	1.000		
Likelihood ratio	.012	1	.913		
Fisher's exact test				1.000	.648
Linear-by-linear	.012	1	.913		
N of valid cases	167				

[a]Two cells (50.0%) have expected count less than 5. The minimum expected count is 1.89. [b]Computed only for a 2x2 table.

Table 15 shows the Chi-Square at .013, the Likelihood Ratio at .027 and the Fisher Exact Test at .040 and the *p*-value was set at $p < .05$ which allows for the study to reject the null hypothesis.

Table 15

Sex With More Than One Person at Different Times Within Last 3 Months

Chi-square tests

	Value	*df*	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	6.107[a]	1	.013		
Continuity correction[b]	3.509	1	.061		
Likelihood ratio	4.908	1	.027		
Fisher's exact test				.040	.040
Linear-by-linear	6.070	1	.014		
N of valid cases	167				

[a]Two cells (50.0%) have expected count less than 5. The minimum expected count is .93. [b]Computed only for a 2x2 table.

Table 16 shows the Chi-Square at .183, the Likelihood Ratio at .182 and the Fisher's Exact Test at .313 and for this study the *p*-value was set at $p < .05$ which allows for the study to accept the null hypothesis in lieu of the alternative.

Table 16

Sexual Acts With More Than One Person or Groups at the Same Time Within Last 3 Months

Chi-square tests

	Value	*df*	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	1.770[a]	1	.183		
Continuity correction[b]	.670	1	.413		
Likelihood ratio	1.783	1	.182		
Fisher's exact test				.313	.207
Linear-by-linear	1.759	1	.185		
N of valid cases	167				

[a]Two cells (50.0%) have expected count less than 5. The minimum expected count is 1.70. [b]Computed only for a 2x2 table.

Table 17 shows the Chi-Square at .289, the Likelihood Ratio at .364 and the Fisher's Exact Test at .334 and for this study the *p*-value was set at $p < .05$ which allows for the study to accept the null hypothesis in lieu of the alternative.

Table 17

Taking More Risk With Any Types of Drugs and Your Sexual Activities

Chi-square tests

	Value	*df*	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	1.125[a]	1	.289		
Continuity correction[b]	.040	1	.841		
Likelihood ratio	.824	1	.364		
Fisher's exact test				.334	.334
Linear-by-linear	1.118	1	.290		
N of valid cases	167				

[a]Two cells (50.0%) have expected count less than 5. The minimum expected count is .38. [b]Computed only for a 2x2 table.

Table 18 shows the Chi-Square at .000, the Likelihood Ratio at .000 and for this study the *p*-value was set at $p < .05$ which allows for the study to reject the null hypothesis.

Table 18

Taking More Risk With Alcohol and Your Sexual Activities

Chi-square tests

	Value	*df*	Asymptotic significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	1.950[a]	1	.163		
Continuity correction[b]	.174	1	.677		
Likelihood ratio	1.263	1	.261		
Fisher's exact test				.260	.260
Linear-by-linear	1.938	1	.164		
N of valid cases	167				

[a]Two cells (50.0%) have expected count less than 5. The minimum expected count is .29. [b]Computed only for a 2x2 table.

Table 19 shows the Chi-Square at .321, the Likelihood Ratio at .390 and the Fisher's Exact Test at .352 and for this study the *p*-value was set at $p < .05$ which allows for the study to accept the null hypothesis in lieu of the alternative.

Table 19

Risk Taking Became More of an Issue With Your Overall Sexual Activities

Chi-square tests

	Value	*df*	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	.984[a]	1	.321		
Continuity correction[b]	.024	1	.877		
Likelihood ratio	.739	1	.390		
Fisher's exact test				.352	.352
Linear-by-linear	.979	1	.323		
N of valid cases	167				

[a]Two cells (50.0%) have expected count less than 5. The minimum expected count is .41. [b]Computed only for a 2x2 table.

Condom Use

Tables 20 and 21 shows the Chi-Squares of the independent variable of PrEP use and the dependent variable of condom use of research question three, dose PrEP affect the relationship with condom use within the MSM population so the null hypothesis is accepted. Table 20 shows the Chi-Square at .183, the Likelihood Ratio at .182 and the Fisher's Exact Test at .313 and for this study the *p*-value was set at $p < .05$ which allows for the study to accept the null hypothesis in lieu of the alternative.

Table 20

Condom Use Decreased

Chi-square tests

	Value	*df*	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	1.770[a]	1	.183		
Continuity correction[b]	.670	1	.413		
Likelihood ratio	1.783	1	.182		
Fisher's exact test				.313	.207
Linear-by-linear	1.759	1	.185		
N of valid cases	167				

[a]Two cells (50.0%) have expected count less than 5. The minimum expected count is 1.70. [b]Computed only for a 2x2 table.

Table 21 shows the Chi-Square at .629, the Likelihood Ratio at .503 and the Fisher's Exact Test at 1.000 and for this study the *p*-value was set at $p < .05$ which allows for the study to accept the null hypothesis in lieu of the alternative.

Table 21

Condom Use Increased

Chi-square tests

	Value	*df*	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	.233[a]	1	.629		
Continuity correction[b]	.000	1	1.000		
Likelihood ratio	.449	1	.503		
Fisher's exact test				1.000	.800
Linear-by-linear	.232	1	.630		
N of valid cases	167				

[a]Two cells (50.0%) have expected count less than 5. The minimum expected count is .22. [b]Computed only for a 2x2 table.

Sexual Behavior

There are four dependent variables of sexual behavior added to the end of this studies survey to gain extra data on the participants within the MSM population. Tables 22 shows that the Chi-Square at .070, the Likelihood Ratio at .081 and the Fisher's Exact Test at .105 and for this study the *p*-value was set at $p < .05$ which allows for the study to accept the null hypothesis in lieu of the alternative.

Table 22

Changed Sexual Decision Making When It Comes to Overall Sexual Activities

Chi-square tests

	Value	*df*	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	3.283[a]	1	.070		
Continuity correction[b]	1.622	1	.203		
Likelihood ratio	3.043	1	.081		
Fisher's exact test				.105	.105
Linear-by-linear	3.264	1	.071		
N of valid cases	167				

[a]Two cells (50.0%) have expected count less than 5. The minimum expected count is 1.32. [b]Computed only for a 2x2 table.

Tables 23 shows that the Chi-Square at .221, the Likelihood Ratio at .216 and the Fisher's Exact Test at .327 and for this study the *p*-value was set at $p < 0.05$ which allows for the study to accept the null hypothesis in lieu of the alternative.

Table 23

Changed Risk Taking When It Comes to Overall Sexual Activities

Chi-square tests

	Value	*df*	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	1.500[a]	1	.221		
Continuity correction[b]	.513	1	.474		
Likelihood ratio	1.533	1	.216		
Fisher's exact test				.327	.238
Linear-by-linear	1.491	1	.222		
of *N* valid cases	167				

[a]Two cells (50.0%) have expected count less than 5. The minimum expected count is 1.80. [b]Computed only for a 2x2 table.

Tables 24 shows that the Chi-Square at .192, the Likelihood Ratio at .190 and the Fisher's Exact Test at .316 and for this study the *p*-value was set at $p < 0.05$ which allows for the study to accept the null hypothesis in lieu of the alternative.

Table 24

Condom Use When It Comes to Overall Sexual Activities

Chi-square tests

	Value	*df*	Asymptotic Significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	1.699[a]	1	.192		
Continuity correction[b]	.628	1	.428		
Likelihood ratio	1.718	1	.190		
Fisher's exact test				.316	.214
Linear-by-linear	1.689	1	.194		
N of valid cases	167				

[a]Two cells (50.0%) have expected count less than 5. The minimum expected count is 1.72. [b]Computed only for a 2x2 table.

Tables 25 shows that the Chi-Square at .000, the Likelihood Ratio at .002 and the Fisher's Exact Test at .004 and for this study the *p*-value was set at $p < 0.05$ which allows for the study to reject the null hypothesis.

Table 25

Adherence to PrEP

Chi-square tests

	Value	*df*	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	31.178[a]	1	.000		
Continuity correction[b]	16.801	1	.000		
Likelihood ratio	9.474	1	.002		
Fisher's exact test				.004	.004
Linear-by-linear	30.991	1	.000		
N of valid cases	167				

[a]Three cells (75.0%) have expected count less than 5. The minimum expected count is .12. [b]Computed only for a 2x2 table.

The statistical significance for this study was set at $p < .05$ level and the output data of the bivariate relationship between the dependent variables and independent variable for this study using Chi-Square to predict intention of PrEP use and sexual decision-making, risk-taking, and condom use for this study has been accomplished. Since there was no statistically significant relationship between PrEP use and the participant's sexual decision-making and condom use, I will accept the null hypothesis for the two research questions on sexual decision-making and condom use. Subsequently there was a statistically significant relationship for research question two on risk-taking this allows for the study to reject the null hypothesis in lieu of the alternative for risk-taking. The next step for this study was using multivariate logistic regression analysis to determine which of the variables identified in the bivariate analyses will be independently

associated with PrEP use and the participant's sexual decision-making, risk-taking, and condom use.

Multivariate Logistic Regression Outcomes

Multivariate logistic regression models was conducted to predict intention of PrEP use and perceptions that PrEP would affect the MSM's sexual decision-making, risk taking, and condom use, controlling for socioeconomic status, race, and age, which will be used as covariates to adjust for confounding. Statistical significance will be set at $p < .05$ level so multivariate logistic regression analysis was used to determine which of the variables identified in the analyses will be independently associated with sexual decision-making, risk-taking and condom use (decreased or increased).

Sexual Decision Making

The data provided for this output is for research question one: Does PrEP affect the relationship with sexual decision-making in the MSM population controlling for socioeconomic status, race, and age? The independent variable of PrEP use and for the dependent variables of the participant's sexual decision-making with covariates of age, raced and income level being used. Table 26 output provides data on the participants being ask about their sexual decision-making has it become better since starting PrEP. This data found that for the Omnibus Test the value of $p = .521$ which is greater than the studies set value at $p < .05$ along with the Hosmer and Lemeshow Test with the value of $p = .246$ which is also greater than the studies set value at $p < .05$. The output data for the classification table provided that 100 of the participants stated yes and 67 participants stated no that their sexual decision-making had become better since starting PrEP which

provides the study with an overall percentage of 59.9. Table 26 output for variables in the equation provides this study with participant's data that for PrEP use the value of p = .551, for age the value of p = .222, for race the value of p = .677, for education level the value of p =.809 and for income level the value of p = .134.

Table 26

Sexual Decision Making Became Better Since Starting PrEP

Variables in the equation

							95% C.I. for EXP(B)	
		B	S.E.	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Do you currently take PrEP (pre-exposure prophylaxis) for HIV prevention?	-.705	1.183	.355	1	.551	.494	.049	5.024
	What is your age?	.193	.158	1.493	1	.222	1.212	.890	1.652
	Which of the following best describes your race?	.075	.181	.173	1	.677	1.078	.757	1.536
	Education level you completed?	-.053	.218	.059	1	.809	.949	.619	1.453
	Which of the following best describes your yearly income?	-.206	.137	2.243	1	.134	.814	.622	1.066
	Constant	1.115	1.776	.394	1	.530	3.048		

Note. N = 167.

The data provided for this output is for the independent variable of PrEP use and for the dependent variables of the participant's sexual decision-making with covariates of age, raced and income level being used. Table 27 output provides data on the

participants being ask about their sexual decision-making has it become worse since starting PrEP. This data found that for the Omnibus Test the value of $p = .060$ which is greater than the studies set value at $p < .05$ along with the Hosmer and Lemeshow Test with the value of $p = .196$ which is also greater than the studies set value at $p < .05$. The output data for the classification table provided that 25 of the participants stated yes and 142 participants stated no that their sexual decision-making had become better since starting PrEP which provides the study with an overall percentage of 85. Table 27 output for variables in the equation provides this study with participant's data that for PrEP use the value of $p = .999$, for age the value of $p = .017$, for race the value of $p = .417$, for education level the value of $p = .958$ and for income level the value of $p = .059$.

Table 27

Sexual Decision Making Became Worse Since Starting PrEP

Variables in the equation

								95% C.I. for EXP(B)	
		B	S.E.	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Do you currently take PrEP (pre-exposure prophylaxis) for HIV prevention?	19.339	19921.164	.000	1	.999	250500323.899	.000	.
	What is your age?	-.573	.241	5.658	1	.017	.564	.351	.904
	Which of the following best describes your race?	.253	.311	.660	1	.417	1.288	.700	2.369
	Education level you completed?	.017	.318	.003	1	.958	1.017	.545	1.898
	Which of the following best describes your yearly income?	.380	.201	3.578	1	.059	1.463	.986	2.169
	Constant	22.023	19921.164	.000	1	.999	.000		

Note. $N = 167$.

The data provided for this output is for the independent variable of PrEP use and for the dependent variables of the participant's sexual decision-making with covariates of age, race and income level being used. Table 28 output provides data on the participants being ask about discussing their sexual decision-making with others since starting PrEP. This data found for the Omnibus Test value of $p = .790$ along with the Hosmer and Lemeshow Test with the value of $p = .915$ which are both greater than the studies set value at $p < .05$. Output data for the classification table provided that 148 of the participants stated yes and 19 participants stated no to discussing their sexual decision-making with others since starting PrEP which provides the study with an overall percentage of 88.6. Table 28 output for variables in the equation provides this study with participant's data that for PrEP use the value of $p = .999$, for age the value of $p = .405$, for race the value of $p = .782$, for education level the value of $p = .550$ and for income level the value of $p = .785$.

Table 28

Discussing Sexual Decision Making With Others

Variables in the equation

								95% C.I. for EXP(B)	
		B	S.E.	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Do you currently take PrEP (pre-exposure prophylaxis) for HIV prevention?	-19.120	20091.181	.000	1	.999	.000	.000	.
	What is your age?	-.194	.233	.695	1	.405	.823	.521	1.300
	Which of the following best describes your race?	.074	.266	.077	1	.782	1.076	.639	1.813
	Education level you completed?	.188	.316	.356	1	.550	1.207	.650	2.241
	Which of the following best describes your yearly income?	.055	.203	.074	1	.785	1.057	.710	1.575
	Constant	20.484	20091.181	.000	1	.999	787449279.082		

Note. $N = 167$.

Risk Taking

The data provided for this output is for the research question two: Does PrEP affect the relationship with risk-taking in the MSM population controlling for socioeconomic status, race, and age? The independent variable of PrEP use and for the dependent variables of the participant's risk-taking with covariates of age, raced and income level being used. Table 29 output provides data on the participants being ask has your sexual decision-making lead to more risk-taking. This data found that for the Omnibus Test the value of $p = .005$ which is less than the studies set value at $p < .05$ along with the Hosmer and Lemeshow Test with the value of $p = .937$ which is greater than the studies set value at $p < .05$. The output data for the classification table provided that 79 of the participants stated yes and 88 participants stated no that their sexual decision-making had led to more risk-taking which provides the study with an overall percentage of 67.1. Table 29 output for variables in the equation provides this study with participant's data that for PrEP use the value of $p = .912$, for age the value of $p = .016$, for race the value of $p = .128$, for education level the value of $p = .661$ and for income level the value of $p = .006$.

Table 29

Sexual Decision Making Led to More Risk Taking

Variables in the equation

								95% C.I. for EXP(B)	
		B	S.E.	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Do you currently take PrEP (pre-exposure prophylaxis) for HIV prevention?	.115	1.037	.012	1	.912	1.122	.147	8.562
	What is your age?	-.399	.166	5.797	1	.016	.671	.485	.929
	Which of the following best describes your race?	.302	.198	2.318	1	.128	1.352	.917	1.993
	Education level you completed?	.097	.221	.192	1	.661	1.102	.714	1.699
	Which of the following best describes your yearly income?	.399	.144	7.642	1	.006	1.490	1.123	1.977
	Constant	-2.244	1.743	1.657	1	.198	.106		

Note. $N = 167$.

Table 30 output provides data on the participants being asked have you had sex with more than one person at different times within the last three months. This data found that for the Omnibus Test the value of $p = .002$ which is less than the studies set value at $p < .05$ along with the Hosmer and Lemeshow Test with the value of $p = .863$ which is greater than the studies set value at $p < .05$. The output data for the classification table provided that 128 of the participants stated yes and 39 participants stated no they had sex with more than one person at different times within last three months which provides the study with an overall percentage of 77.8. Table 30 output for variables in the equation provides this study with participant's data that for PrEP use the value of $p = .036$, for age the value of $p = .004$, for race the value of $p = .026$, for education level the value of $p = .842$ and for income level the value of $p = .051$.

Table 30

Sex With More Than One Person at Different Times Within Last 3 Months

Variables in the equation

								95% C.I. for EXP(B)	
		B	S.E.	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Do you currently take PrEP (pre-exposure prophylaxis) for HIV prevention?	2.532	1.205	4.417	1	.036	12.581	1.186	133.451
	What is your age?	-.553	.194	8.150	1	.004	.575	.394	.841
	Which of the following best describes your race?	.435	.195	4.971	1	.026	1.544	1.054	2.263
	Education level you completed?	-.051	.254	.040	1	.842	.950	.577	1.565
	Which of the following best describes your yearly income?	.323	.166	3.810	1	.051	1.382	.999	1.911
	Constant	-2.360	1.893	1.555	1	.212	.094		

Note. $N = 167$.

Table 31 output provides data on the participants being asked have you participated in sexual acts with more than one person or groups of people at the same time within the last three months. This data found that for the Omnibus Test the value of $p = .002$ which is less than the studies set value at $p < .05$ along with the Hosmer and Lemeshow Test with the value of $p = .935$ which is greater than the studies set value at $p < .05$. The output data for the classification table provided that 96 of the participants stated yes and 71 participants stated no that they participated in sexual acts with more than one person or groups of people at the same time within the last three months which provides the study with an overall percentage of 67.1. Table 31 output for variables in the equation provides this study with participant's data that for PrEP use the value of $p = .232$, for age the value of $p = .001$, for race the value of $p = .107$, for education level the value of $p = .916$ and for income level the value of $p = .037$.

Table 31

Sexual Acts With More Than One Person or Groups Within The Last 3 Months

Variables in the equation

								95% C.I. for EXP(B)	
		B	S.E.	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Do you currently take PrEP (pre-exposure prophylaxis) for HIV prevention?	1.427	1.195	1.427	1	.232	4.168	.401	43.349
	What is your age?	-.567	.170	11.173	1	.001	.567	.407	.791
	Which of the following best describes your race?	.301	.187	2.594	1	.107	1.351	.937	1.947
	Education level you completed?	.023	.222	.011	1	.916	1.024	.663	1.580
	Which of the following best describes your yearly income?	.298	.143	4.348	1	.037	1.347	1.018	1.783
	Constant	-1.832	1.784	1.055	1	.304	.160		

Note. N = 167.

Table 32 output provides data on the participants being asked have you taking more risk with any types of drugs and your sexual activities. This data found that for the Omnibus Test the value of $p = .455$ which is more than the studies set value at $p < .05$ along with the Hosmer and Lemeshow Test with the value of $p = .136$ which is greater than the studies set value at $p < .05$. The output data for the classification table provided that 16 of the participants stated yes and 151 participants stated no that they have been taking more risk with any types of drugs and their sexual activities with an overall percentage of 67.1. Table 32 output for variables in the equation provides this study with participant's data that for PrEP use the value of $p = .191$, for age the value of $p = .454$, for race the value of $p = .996$, for education level the value of $p = .501$ and for income level the value of $p = .168$.

Table 32

Taking More Risk With Any Types of Drugs and Sexual Activities

Variables in the equation

								95% C.I. for EXP(B)	
		B	S.E.	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Do you currently take PrEP (pre-exposure prophylaxis) for HIV prevention?	-1.632	1.247	1.714	1	.191	.196	.017	2.251
	What is your age?	-.197	.263	.560	1	.454	.821	.491	1.375
	Which of the following best describes your race?	-.001	.299	.000	1	.996	.999	.555	1.795
	Education level you completed?	.244	.363	.452	1	.501	1.276	.627	2.599
	Which of the following best describes your yearly income?	-.311	.226	1.899	1	.168	.733	.471	1.140
	Constant	.039	2.418	.000	1	.987	1.039		

Note. $N = 167$.

Table 33 output provides data on the participants being asked have you taking more risk with alcohol and their sexual activities. The Omnibus Test the value of p = .353 along with the Hosmer and Lemeshow Test with the value of p = .524 which are both greater than the studies set value at $p < .05$. The output data for the classification table provided that 12 of the participants stated yes and 155 participants stated no that they have been taking more risk with alcohol and their sexual activities with an overall percentage of 92.8. Table 33 output for variables in the equation provides this study with participant's data that for PrEP use the value of p = .108, for age the value of p = .497, for race the value of p = .570, for education level the value of p = .213 and for income level the value of p = .604.

Table 33

More Risk With Alcohol and Sexual Activities

Variables in the equation

		B	S.E.	Wald	*df*	Sig.	Exp(B)	95% C.I. for EXP(B) Lower	Upper
Step 1[a]	Do you currently take PrEP (pre-exposure prophylaxis) for HIV prevention?	-2.073	1.289	2.583	1	.108	.126	.010	1.576
	What is your age?	-.198	.291	.461	1	.497	.821	.464	1.452
	Which of the following best describes your race?	.242	.427	.323	1	.570	1.274	.552	2.941
	Education level you completed?	-.486	.390	1.550	1	.213	.615	.286	1.322
	Which of the following best describes your yearly income?	-.135	.261	.268	1	.604	.873	.523	1.458
	Constant	1.302	2.892	.203	1	.652	3.678		

Note. $N = 167$.

Table 34 output provides data on the participants being ask has their risk-taking become more of an issue with their overall sexual activities. This data found that for the Omnibus Test the value of $p = .449$ which is more than the studies set value at $p < .05$ along with the Hosmer and Lemeshow Test with the value of $p = .441$ which is greater than the studies set value at $p < .05$. The output data for the classification table provided that 17 of the participants stated yes and 150 participants stated no that has their risk-taking become more of an issue with their overall sexual activities with an overall percentage of 89.8. Table 34 output for variables in the equation provides this study with participant's data that for PrEP use the value of $p = .657$, for age the value of $p = .400$, for race the value of $p = .881$, for education level the value of $p = .851$ and for income level the value of $p = .237$.

Table 34

Has Risk Taking Become More of an Issue With Overall Sexual Activities

Variables in the equation

								95% C.I. for EXP(B)	
		B	S.E.	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Do you currently take PrEP (pre-exposure prophylaxis) for HIV prevention?	-.571	1.287	.197	1	.657	.565	.045	7.034
	What is your age?	.215	.256	.707	1	.400	1.240	.751	2.048
	Which of the following best describes your race?	.049	.326	.022	1	.881	1.050	.554	1.991
	Education level you completed?	.068	.361	.035	1	.851	1.070	.527	2.173
	Which of the following best describes your yearly income?	.288	.244	1.399	1	.237	1.334	.827	2.151
	Constant	-4.045	2.781	2.116	1	.146	.018		

Note. $N = 167$.

Condom Use

The data provided for this output is for research question three: Does PrEP affect the relationship with condom use in the MSM population controlling for socioeconomic status, race, and age? The independent variable of PrEP use and for the dependent variables of the participant's condom use with covariates of age, raced and income level being used. Table 35 output provides data on the participants being ask has their condom use decreased. This data found that for the Omnibus Test the value of $p = .030$ which is less than the studies set value at $p < .05$ along with the Hosmer and Lemeshow Test with the value of $p = .429$ which is greater than the studies set value at $p < .05$. The output data for the classification table provided that 96 of the participants stated yes and 71 participants stated 'no' their condom use decreased with an overall percentage of 89.8. Table 35 output for variables in the equation provides this study with participant's data that for PrEP use the value of $p = .256$, for age the value of $p = .025$, for race the value of $p = .801$, for education level the value of $p = .147$ and for income level the value of $p = .004$.

Table 35

Condom Use Decreased

Variables in the equation

		B	S.E.	Wald	*df*	Sig.	Exp(B)	95% C.I. for EXP(B) Lower	Upper
Step 1[a]	Do you currently take PrEP (pre-exposure prophylaxis) for HIV prevention?	1.354	1.193	1.289	1	.256	3.873	.374	40.122
	What is your age?	-.362	.161	5.050	1	.025	.696	.508	.955
	Which of the following best describes your race?	.046	.183	.064	1	.801	1.047	.732	1.499
	Education level you completed?	-.319	.220	2.105	1	.147	.727	.472	1.118
	Which of the following best describes your yearly income?	.407	.143	8.102	1	.004	1.502	1.135	1.987
	Constant	-.256	1.771	.021	1	.885	.774		

Note. $N = 167$.

Table 36 output provides data on the participants being ask has their condom use increased. This data found that for the Omnibus Test the value of $p = .016$ which is less than the studies set value at $p < .05$ along with the Hosmer and Lemeshow Test with the value of $p = .913$ which is greater than the studies set value at $p < .05$. The output data for the classification table provided that 9 of the participants stated yes and 158 participants stated 'no' their condom use increased with an overall percentage of 89.8. Table 36 output for variables in the equation provides this study with participant's data that for PrEP use the value of $p = .999$, for age the value of $p = .002$, for race the value of $p = .967$, for education level the value of $p = .469$ and for income level the value of $p = .071$.

Table 36

Condom Use Increased

Variables in the equation

								95% C.I. for EXP(B)	
		B	S.E.	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Do you currently take PrEP (pre-exposure prophylaxis) for HIV prevention?	19.295	18371.471	.000	1	.999	23969598.571	.000	.
	What is your age?	1.266	.412	9.430	1	.002	3.548	1.581	7.963
	Which of the following best describes your race?	.021	.499	.002	1	.967	1.021	.384	2.714
	Education level you completed?	.325	.449	.524	1	.469	1.384	.574	3.333
	Which of the following best describes your yearly income?	-.547	.303	3.249	1	.071	.579	.320	1.049
	Constant	-26.38	18371.5	.000	1	.999	.000		

Note. N = 167.

Sexual Behavior

The data provided for this output is for the independent variable of PrEP use and for the dependent variables from the sexual behavior section of this studies survey with covariates of age, raced and income level being used. Table 37 output provides data on the participants being ask since using PrEP has changed their sexual decision-making

when it comes to their overall sexual activities. This data found that for the Omnibus Test the value of $p = .220$ which is more than the studies set value at $p < .05$ along with the Hosmer and Lemeshow Test with the value of $p = .181$ which is greater than the studies set value at $p < .05$. The output data for the classification table provided that 112 of the participants stated yes and 55 participants stated no since using PrEP has changed their sexual decision-making when it comes to their overall sexual activities with an overall percentage of 68.3. Table 37 output for variables in the equation provides this study with participant's data that for PrEP use the value of $p = .080$, for age the value of $p = .601$, for race the value of $p = .626$, for education level the value of $p = .989$ and for income level the value of $p = .097$.

Table 37

PrEP Changed Sexual Decision Making With Overall Sexual Activities

Variables in the equation

		B	S.E.	Wald	*df*	Sig.	Exp(B)	95% C.I. for EXP(B) Lower	Upper
Step 1[a]	Do you currently take PrEP (Pre-Exposure Prophylaxis) for HIV prevention?	2.085	1.192	3.057	1	.080	8.044	.777	83.266
	What is your age?	-.085	.162	.274	1	.601	.919	.670	1.261
	Which of the following best describes your Race?	.091	.186	.237	1	.626	1.095	.760	1.577
	Education level you completed?	-.003	.223	.000	1	.989	.997	.645	1.542
	Which of the following best describes your yearly income?	.235	.142	2.757	1	.097	1.265	.958	1.670
	Constant	-2.323	1.818	1.633	1	.201	.098		

Note. $N = 167$.

Table 38 output provides data on the participants being ask since using PrEP has changed their risk-taking when it comes to their overall sexual activities. This data found that for the Omnibus Test the value of $p = .325$ which is more than the studies set value at $p < .05$ along with the Hosmer and Lemeshow Test with the value of $p = .668$ which is greater than the studies set value at $p < .05$. The output data for the classification table provided that 92 of the participants stated yes and 75 participants stated no since using

PrEP has changed their risk-taking when it comes to their overall sexual activities with an overall percentage of 62.3. Table 38 output for variables in the equation provides this study with participant's data that for PrEP use the value of $p = .219$, for age the value of $p = .750$, for race the value of $p = .750$, for education level the value of $p = .643$ and for income level the value of $p = .051$.

Table 38

PrEP Changed Risk Taking With Overall Sexual Activities

Variables in the equation

								95% C.I. for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Do you currently take PrEP (pre-exposure prophylaxis) for HIV prevention?	1.455	1.185	1.509	1	.219	4.286	.420	43.724
	What is your age?	-.049	.153	.102	1	.750	.952	.706	1.285
	Which of the following best describes your race?	-.058	.182	.102	1	.750	.943	.660	1.349
	Education level you completed?	-.099	.212	.215	1	.643	.906	.598	1.374
	Which of the following best describes your yearly income?	.264	.135	3.806	1	.051	1.302	.999	1.697
	Constant	-1.372	1.772	.599	1	.439	.254		

Note. $N = 167$.

Table 39 output provides data on the participants being ask since using PrEP has changed their condom use when it comes to their overall sexual activities. This data found that for the Omnibus Test the value of $p = .283$ which is more than the studies set value at $p < .05$ along with the Hosmer and Lemeshow Test with the value of $p = .914$ which is greater than the studies set value at $p < .05$. The output data for the classification table provided that 95 of the participants stated yes and 72 participants stated no since using PrEP has changed their condom use when it comes to their overall sexual activities with an overall percentage of 62.3. Table 39 output for variables in the equation provides this study with participant's data that for PrEP use the value of $p = .278$, for age the value of $p = .056$, for race the value of $p = .809$, for education level the value of $p = .744$ and for income level the value of $p = .310$.

Table 39

PrEP Changed Condom Use With Overall Sexual Activities

Variables in the equation

		B	S.E.	Wald	*df*	Sig.	Exp(B)	95% C.I. for EXP(B) Lower	Upper
Step 1[a]	Do you currently take PrEP (pre-exposure prophylaxis) for HIV prevention?	1.285	1.185	1.176	1	.278	3.614	.354	36.863
	What is your age?	-.297	.156	3.639	1	.056	.743	.548	1.008
	Which of the following best describes your race?	-.044	.183	.058	1	.809	.957	.668	1.371
	Education level you completed?	.070	.213	.107	1	.744	1.072	.706	1.629
	Which of the following best describes your yearly income?	.137	.135	1.032	1	.310	1.147	.880	1.494
	Constant	-.599	1.763	.116	1	.734	.549		

Note. N = 167.

Table 40 output provides data on the participants being ask since using PrEP how has their adherence been for PrEP. This data found that for the Omnibus Test the value of $p = .006$ which is less than the studies set value at $p < .05$ along with the Hosmer and Lemeshow Test with the value of $p = .952$ which is greater than the studies set value at $p < .05$. The output data for the classification table provided that 162 of the participants stated yes and 5 participants stated no since using PrEP how has their adherence been to

PrEP with an overall percentage of 97.6. Table 40 output for variables in the equation provides this study with participant's data that for PrEP use the value of $p = .004$, for age the value of $p = .097$, for race the value of $p = .178$, for education level the value of $p = .106$ and for income level the value of $p = .573$.

Table 40

PrEP Adherence

Variables in the equation

								95% C.I. for EXP(B)	
		B	S.E.	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Do you currently take PrEP (pre-exposure prophylaxis) for HIV prevention?	5.748	1.972	8.493	1	.004	313.616	6.569	14973.610
	What is your age?	1.265	.761	2.760	1	.097	3.542	.797	15.749
	Which of the following best describes your race?	.685	.509	1.813	1	.178	1.984	.732	5.380
	Education level you completed?	-2.066	1.279	2.611	1	.106	.127	.010	1.553
	Which of the following best describes your yearly income?	-.318	.565	.318	1	.573	.727	.240	2.201
	Constant	2.354	4.628	.259	1	.611	10.524		

Note. $N = 167$.

Summary

The purpose of this quantitative cross-sectional survey study, conducted with167 MSMs aged 18 to 64, was to determine what if any variables and relationship there may

be between the variables used in the survey of this populations age, demography, income, education, HIV status, relationship status, sexual risk behaviors, substance use (drug or alcohol), knowledge/education of PrEP and psychosocial (arousal barriers to condom use & risk perception motivations for condom use) links of PrEP use is having an effect with their sexual decision-making, risk-taking, condom use, number of partners, drug or alcohol use while on PrEP. To assess the bivariate relationship between the dependent variables and independent variable this study used Chi-Square along with multivariate logistic regression models to predict intention of PrEP use and perceptions that PrEP would decrease or increase sexual decision-making, risk-taking, and condom use. Statistical significance was set at $p < .05$ level so multivariate logistic regression analysis may be used to determine which of the variables identified in the bivariate analyses will be independently associated with PrEP use and condom use (decreased or increased). This study found that with the Chi-Square data that only research question two on risk-taking showed that there is a statistically significant relationship between PrEP use and risk-taking within the MSMs population. The only other data provided from the Chi-Square was that under the survey section on sexual behaviors there was a statistically significant relationship between the MSM PrEP use and PrEP adherence. The outcome data for multivariate logistic regression provided much more in-depth data for this studies three research questions on the relationship between PrEP use and the MSMs sexual decision-making, risk-taking and condom use. For the survey data used for RQ1, on the MSMs PrEP use and sexual decision-making the logistic regression only found that age was statistically significant relationship for the participant's sexual decision-making

becoming worse since starting PrEP, which allows this study to reject the null hypothesis and accept the alternative. For the survey data used for RQ2, on the MSMs PrEP use and risk-taking the logistic regression only found that age and income level was statistically significant relationship for the participant's sexual decision-making leading to more risk-taking, having sex with more than one person within last three month and having sex with more than one person or groups of people within last three month along with race being a factor in having sex with more than one person within last three months since starting PrEP, which allows this study to reject the null hypothesis and accept the alternative. The survey data used for RQ3, on the MSMs PrEP use and condom use the logistic regression found there was a statistically significant relationship with age for both decreased and increased condom use and race played a factor in only decreased condom use which allows for this study to reject the null hypothesis and accept the alternative. Chapter 5 will provide more detailed discussions on all three research questions findings along with more in-depth detail of the multivariate logistic regression data. Chapter 5 will also provide more details of the studies finding, results, limitations, and recommendations for any future research that may be needed for PrEP use within the MSM population. In addition, any positive social change knowledge or implications based on the findings of this study have been discussed in chapter 5.

Chapter 5: Discussion of the Findings

Introduction

The purpose of this online survey study was to apply the behavioral disinhibition and risk compensation Models (Hogben & Liddon, 2008) to relate PrEP use to sexual decision making, risk taking, and condom use for the MSM population 18-64 years of age. MSM population of all ages and races still account for the highest rate of new HIV infections (CDC, 2015a). PrEP has been shown to be effective if used correctly, but it also seems that PrEP is shifting attitudes and beliefs about HIV and condom use within MSM populations. For this study, I examined what, if any, variables and relationship there may be between the variables used in the studies survey of the MSM population controlling for socioeconomic status, race, and age having an effect with their sexual decision making, risk taking, and condom use while on PrEP.

The theoretical framework used in this study to help in answering the research questions consisted of the behavioral disinhibition and risk compensation Models (Hogben & Liddon, 2008). The behavioral disinhibition model indicates that PrEP expediency will increase risk taking by MSM taking PrEP for HIV prevention by decreasing their voluntary limitations of high-risk behaviors. This concentration on the MSMs pleasure-driven and emotional aspects of risk taking when an individual who desires condomless sex will see PrEP as a reason for not using condoms in social sexual setting (Golub et al., 2010; Hogben & Liddon, 2008).

The risk compensation model indicates that PrEP availability will decrease condom use by reducing individuals' perception of transmission risk, meaning that

individuals will change their intellectual thoughts on how dangerous their sexual encounters can be with others within the MSM population during sexual encounters if on PrEP making unprotected sex more acceptable (Golub et al., 2010; Hogben & Liddon, 2008).

Interpretation of Findings

My interpretations of the results for each of the three research questions are presented here.

Research Question 1

Research Question 1: Does PrEP (IV) have a relationship with sexual decision-making (DV) in the MSM population, after controlling for socioeconomic status, race, and age?

The chi-square outcome data indicated that there was no statistically significant association between PrEP use and sexual decision making by MSM. The data indicated that for the omnibus test, the value of $p = .060$, which was greater than the study's set value of .05 and was not significant. For the questionnaire items used for RQ1, which pertained to PrEP use and sexual decision making by MSM, the logistic regression only found that age, $p = .017$, had a statistically significant association with the participants' sexual decision making, in that sexual decision making was worse since starting PrEP in the older age groups. This finding allowed me to reject the null hypothesis and accept the alternative only for age for RQ1. These data show that more research will be needed in the future on PrEP use within the MSM population in relation to age to further the discussion on sexual decision making and PrEP use.

Research Question 2

Research Question 2: Does PrEP (IV) have a relationship with risk-taking (DV) in the MSM population, after controlling for socioeconomic status, race, and age?

Six questions were directed toward the participants' risk taking since they started using PrEP for HIV prevention. These questions addressed engagement in more risk taking, number of people whom the participants were sleeping with, and drug and alcohol use. Data from using the chi-square test on risk-taking data indicated that there was a statistically significant relationship between PrEP use and risk taking within the MSM population. These data indicated the value of $p = .005$ for the omnibus test (Table 29), which was statistically significant.

For the survey data used for RQ2, results from the logistic regression only indicated that age, $p = .016$, and income level, $p = .006$, were statistically significant, which made it possible to reject the null hypothesis and accept the alternative hypothesis only for age and income level for sexual decision making having led to more risk taking. Data for the omnibus test (Table 30) indicated a value of $p = .002$, which was less than the study's set value of $p < .05$ and was significant. For the questionnaire items used for RQ2, which pertained to having sex with more than one person at different times within the last three months, the logistic regression indicated that only age, $p = .004$, and race, $p = .026$, affected risk taking by MSM, which made it possible to reject the null hypothesis and accept the alternative. On the omnibus test (Table 31), the value of $p = .002$ was less than the study's set value at $p < .05$. In relation to survey data on MSM participating in sexual acts with more than one person or groups of people at the same time within the

last 3 months, the logistic regression indicated that only age, $p = .001$, and income level, $p = .037$, affected risk taking, which made it possible to reject the null hypothesis and accept the alternative for these three variables for RQ2. These data show that more research will be needed in the future on PrEP use within the MSM population in relation to age to further the discussion on risk taking and PrEP use.

Research Question 3

Research Question 3: Does PrEP (IV) have a relationship with condom use (DV) in the MSM population, after controlling for socioeconomic status, race, and age?

The data from the omnibus test (Table 35) indicated a value of $p = .030$, which was less than the study's set value at $p < .05$, then I have a significant model that allows for further interpretation. In relation to the questionnaire items used for RQ3, in multiple logistic regression indicated that only age, $p = .025$, and income level, $p = .004$, were significantly associated with decreased condom use, which made it possible to reject the null hypothesis and accept the alternative for these two variables for RQ3, but not PREP use. Data from the omnibus test (Table 36) indicated a value of $p = .016$, which was less than the study's set value at $p < .05$, then I have a significant model that allows for further interpretation. In relation to the survey data on condom use having decreased or increased that were used for RQ3, found that the MSMs condom use increased with logistic regression which found that only age, $p = .002$, affect increased condom use, which made it possible to reject the null hypothesis and accept the alternative for this one variable for RQ3. These data indicate that more research will be needed in the future on

PrEP use within the MSM population in relation to age and income level to further the discussion on condom use and PrEP use.

In summary, the study indicated that for RQ1, RQ2, and RQ3, the main independent variable of PrEP use was not associated with the dependent variables used within this study (i.e., sexual decision making, risk taking, and condom use). This study indicated that after the confounders were adjusted, only age, income level, and race had any association with the main outcomes on the dependent variables of sexual decision making, risk taking, and condom use by MSM.

Theoretical Framework and Outcomes of Study

The conceptual framework, which consisted of the behavioral disinhibition and risk compensation models, helped in answering the question concerning the relationship between PrEP use, sexual decision making, risk taking, and condom use among the MSM population. Golub et al. (2010) put forth these two models, which are helpful in describing the mechanism through which PrEP may increase risk behaviors of members of the MSM population who use PrEP. In 2014, Taylor et al. (2014) stated that the evidence was lacking on decision making in the context of PrEP use, risk taking, and condom use. Earlier studies had not shown evidence that using PrEP is related to changes in sexual decision making, risk taking, and condom use.

The behavioral disinhibition model indicates that PrEP expediency will increase risk taking by MSM taking PrEP for HIV prevention by decreasing their voluntary limitations of their high-risk behaviors. This concentration on the MSMs pleasure-driven and emotional aspects of risk taking when an individual who desires condomless sex will

see PrEP as a reason for not using condoms in social sexual setting (Golub et al., 2010; Hogben & Liddon, 2008).

Risk compensation contends that PrEP convenience will decrease condom use by reducing an individuals' insight of transmission risk. Meaning that one will concentrations on the intellectual facets of dangerous resolution production and with the MSM population will base choices about condom use on the superficial risk that during sexual encounters if on PrEP unprotected sex is acceptable (Golub et al., 2010; Hogben, & Liddon, 2008). I found that both models fit the outcome data for this study for the variable of income level for only research question two on risk-taking and research question three for condom use.

I found that during this study that both the behavioral disinhibition and the risk compensation models fit the outcome data for this study only for the covariates of age for sexual decision-making, risk-taking and condom use of all three research questions. I only found that both theoretical models work for the variable of race for research question two on risk-taking. With the omnibus tests results for the three research questions I found that the behavioral disinhibition and risk compensation models (Hogben & Liddon, 2008) have shown that this studies outcome data have a significant model that should be further interpreted with future research with better data on PrEP use on sexual decision-making, risk-taking, and condom use in the MSM population.

Limitations of Study

There are several limitations due to this studies type. Firstly, one big limitation for this study was due to some procedural problems that were not diverse enough for this

type of study. Since more than 95% of the participants were on PrEP and this is the main independent variable, this may cause problems for the studies analytic results. If the study have had a much higher proportion of subjects reporting not on PrEP (such as 40%, or even 50%), the study may have a much stronger dataset, and thus may have seen statistically significant association between PrEP use and the three dependent variables of sexual decision-making, risk-taking and condom use. This limitation made the outcome data all insignificant for all three research questions for this study.

Secondly, using Raosoft (2004) sample size online calculator software shows a sample size with a small effect size of .05, $\alpha = .05$, statistical power at 80% at $n = 165$, a sample size of $n = 271$ at 90% and a sample size of $n = 384$ at 95%. . The sample size of $N = 165$ set at .80 or 80% was set(for this study due to the anticipated challenges to reach the MSM population across the US (using the many social media sites and outlets such as; SurveyMonkey, Facebook, Grinder, Scruff, and other outreach sources over a six month recruitment period). At the end I ended up with a sample size of $N = 167$. These 167 participants may not represent the MSM population in general: of the 167 participants $N = 132$ (79%) answered that they were white with the second highest number of participants $N = 16$ (9.6%) answered that they were Hispanic or Latino, which can lead to self-selection bias. Thus, this studies sample size did not replicate the racial composition of the U.S. MSM population and the results of this study might not be generalized to the US general population of MSM.

Thirdly, since this survey gathered data from MSM using self-reporting this could lead to recall bias (Creswell, 2013). Participants could have provided answered to the

survey that may not have been true or representative of themselves. Since this survey study involved questions about sensitive personal information about their sex lives, sexual acts, sexual partners, and HIV status this could lead to the participants being judged or feeling unsure of themselves and their answered to the survey could lead them to feel socially unaccepted. This survey proved a consent form for participants to complete to grant permission to use their data. Other information was provided in the consent if they had questions about the research and their participation in the research study.

Fourthly, the use of a cross-sectional online survey could have issues with reliability due to a subjects' responses to the online survey, it might be limited in the responses provided by participants to gain the exact type or geographic scope of the subjects needed for this study. The subjects who do complete and take the online survey may not truly be a random sample and since this cross-sectional online survey design is a common test for data inferences the results could be limited by the reliability of the test being used. When dealing with a cross-sectional survey design which is conducted during a certain time period the results are affected by the operations of society at that particular point in time and when using the cross-sectional design which is the most used quantitative statistical models can only determine correlation, but not causation. The biggest issue on cross-sectional study (compared to prospective) is that is cannot confirm the temporal sequence and causality. Thus, the main limitations is lack of causality as a cross-sectional study.

Recommendations

The results of this study did not show any association between PrEP use and sexual decision-making, risk-taking and condom use possibly due to the homogeneity of the data (with more than 95% participants on PrEP). With problems and issues of this study, there is a need for more future research on association between PrEP use and sexual decision-making, risk-taking and condom use in MSM, with bigger sample and better designed data collecting methods. Within the MSM populations of all ages and races who still account for the highest rate of new HIV infections (CDC, 2015a), PrEP has shown to be effective if used correctly but also seems that PrEP is shifting the attitudes and beliefs of HIV and condom use within the MSM populations of all ages and races. I found that the effective message being communicated about PrEP to various MSM-related audiences is not the same across the board and this could be due to a lack of education and knowledge of both the healthcare professionals and the MSM populations and the healthcare professional just not caring due to the content being HIV. Within the MSM populations PrEP is seen as a cure or reason to stop using safe sex practices like using condoms and this shifting attitude and beliefs have to be addressed within the MSM communities.

According to the results of the IPrEx trial (Marcus et al., 2013) and the Centers for Disease Control and Prevention (2015a) when used with proper adherence PrEP only has a 96% effective rate of protection against HIV without other forms of protection like condoms. Adherence is vital when using PrEP as an HIV prevention tool. This data provides that along with how these MSM conduct their sexual decision-making, risk-

taking, and condom use that PrEP still only protects against HIV and no other sexual transmitted diseases (STDs) or sexually transmitted infections (STIs) (Centers for Disease Control & Prevention, 2015a) along with ensuring that the MSM understand that PrEP is only one tool in HIV prevention.

There are still many myths and untruths about PrEP within the MSM population. Future research will need to be conducted to ensure that all MSM understand the importance of adherence to PrEP along with these healthcare professionals, HIV clinics and any other person providing these MSM with PrEP for an HIV prevention tool. Though there is no significant results from this study, more research needs to be done, especially in minority communities such as: African Americans, Hispanic and Latino, and other communities with high rates of new HIV infections within the U.S. Future research will be recommended to ensure proper training by healthcare professionals needs to be changed along with public health polices to ensure that the MSM population is gaining proper information about PrEP once they start using this HIV prevention method medication.

Questions used for this survey study were adapted from the CDC (2018) existing research from the National HIV Behavioral Surveillance (NHBS) and The Behavioral Risk Factor Surveillance System (BRFSS) to gain data on how PrEP use may be affected by the three dependent variables of sexual decision-making, risk-taking and condom use within the MSM population. Since the NHBS (CDC, 2018b) and BRFSS data was collected by a federal agency it has been made public on the CDC's website for review (CDC, 2018a). Future recommendations are that each new MSM placed on PrEP and

yearly for those MSM already on PrEP for HIV prevention should have to fill out a questionnaire or survey like that provided by the CDC. This will ensure that each MSM has the full facts and details of how and what PrEP is along with having to complete a new questionnaire or survey once a year if any new data has been made through research concerning PrEP use within the MSM population.

Implications for Social Change

It is hoped that awareness can be brought by better preparing HIV clinics, manufacturers of PrEP, healthcare professionals and other clinical workers in ensuring that they are providing the correct information about PrEP use and the facts of this type of HIV prevention medication to the MSM population. It is also hoped that when dealing with PrEP, adherence is vital for the success of PrEP as an HIV prevention method for the MSM population and that there is proper awareness and strategies put into place for PrEP use adherence. To help create positive social change proper training by healthcare professionals needs to be changed along with public health polices to ensure that the MSM population is gaining proper information about PrEP once they start using this HIV prevention method medication.

Some studies have shown significant connection between PrEP and increased risky sexual behavior and some studies like this study I conducted did not show a significant connection between PrEP use and increased risky sexual behaviors. Thus, more research are still needed and there should be long-term follow-up of the patterns of risky sexual behaviors, or even “hard data” like newly reported STI (like syphilis or gonorrhea) among MSM to the effects of PrEP in MSM population.

The hope with this study will also be to help make improvements to the CDCs National HIV Behavioral Surveillance (NHBS) and The Behavioral Risk Factor Surveillance System (BRFSS) by integrating the questions used from this studies survey into their future data collection, which is made public on the CDC's website for review by others that may allow for further research on HIV, PrEP use and the MSM population (CDC, 2018a).

Conclusion

The purpose of this online quantitative survey study was to explore the behavioral disinhibition and risk compensation models (Hogben & Liddon, 2008) that relates PrEP use to sexual decision-making, risk-taking, and condom use for the MSM population 18-64 years of age. The purpose of this study quantitatively examined what, if any, variables and relationship there may be between the variables used in the studies survey of the MSM population. This survey will include variables such as;9 age, demography, income, education, HIV status, relationship status, sexual risk behaviors, substance use [drug or alcohol], knowledge/education of PrEP and psychosocial [arousal barriers to condom use & risk perception motivations for condom use]) links of PrEP use is having an effect with their sexual decision-making, risk-taking, condom use, number of partners, drug or alcohol use while on PrEP.

The overall finding for this study that I conducted did not see the association between the main independent variable of PrEP use and the three main clusters of the dependent variable: sexual decision-making, risk-taking, and condom use, after the sociodemographic factors (and potential confounders) were adjusted. These finding are

from the first limitation for this study due to some procedural problems that were not diverse enough for this type of study. Since more than 95% of the participants were on PrEP and this is the main independent variable, this caused problems for the studies analytic results. If the study have had a much higher proportion of subjects reporting not on PrEP (such as 40%, or even 50%), the study may have a much stronger dataset, and thus may have seen statistically significant association between PrEP use and the three dependent variables of sexual decision-making, risk-taking and condom use. This main issues caused by the data and the procedural problems for this study made the outcome data show that the potential effect on making these association all insignificant.

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Appendix: Survey

"Pre-exposure prophylaxis (or PrEP) is when people at very high risk for HIV take HIV medicines daily to lower their chances of getting infected" (CDC, 2015b, para. 1).

Demographics

1. Which of the following best describes your race?

   American Indian or Alaska Native.....1

   Asian.....2

   African American or Black.....3

   Hispanic or Latino.....4

   White.....5

   Prefer not to answer.....6

2. What is your age?

   18 to 24.....1

   25 to 34.....2

   35 to 44.....3

   45 to 54.....4

   55 to 64.....5

   Prefer not to answer.....6

3. Education level you completed?

   Completed some high school.....01

   High school graduate or GED.....02

   Some college, Associates or Technical Degree.....03

   Bachelor's Degree.....04

   Master's Degree or post graduate studies (PhD).....05

   Prefer not to answer.....06

4. What is your employment status?

   Full-time employment.....01

   Part-time employment.....02

   Student.....03

   Retired.....04

   Unemployed.....05

   Prefer not to answer.....06

5. Which of the following best describes your yearly income?

   Under $21,000.....01

   $22,000 to $42,000.....02

   $43,000 to $63,000.....03

   $63,000 to $84,000.....04

   Over $85,000.....05

Prefer not to answer.....06

6. Do you consider yourself to be gay, bisexual or a MSM (men who have sex with men)

   No.....0

   Yes.....1

   Prefer not to answer.....6

PrEP Use

7. Do you currently take PrEP (Pre-Exposure Prophylaxis) for HIV prevention?

   No.....0

   Yes.....1

   Prefer not to answer.....6

8. Did you receive full instructions on how to use PrEP and how it works?

   No.....0

   Yes.....1

   Prefer not to answer.....6

9. Currently do you have health insurance or coverage?

   No.....0

   Yes.....1

Prefer not to answer.....6

10. Once on PrEP do you still get regular HIV test?

    No.....0

    Yes.....1

    Prefer not to answer.....6

11. What is your HIV status?

    Negative.....0

    Positive.....1

    Prefer not to answer.....6

12. Have you ever tested positive for other STIs (sexually transmitted infections) or STDs (sexually transmitted diseases)?

    No.....0

    Yes.....1

    Prefer not to answer.....6

13. If you answered yes to the above question, which type of other STIs (sexually transmitted infections) or STDs (sexually transmitted diseases) did you have?

    Syphilis.....01

    Chlamydia.....02

Gonorrhea.....03

Genital/anal warts.....04

Hepatitis B.....05

Hepatitis C.....06

Sexual Decision Making

14. Since starting PrEP as an HIV prevention method do you feel your sexual decision-making has become better?

    No.....0

    Yes.....1

    Prefer not to answer.....6

15. Since starting PrEP as an HIV prevention method do you feel your sexual decision-making has become worse?

    No.....0

    Yes.....1

    Prefer not to answer.....6

16. Since starting PrEP do you discuss your sexual decision-making with other like sexual partners, healthcare professional, family or friends?

    No.....0

    Yes.....1

Prefer not to answer.....6

Risk Taking

17. Since starting PrEP as an HIV prevention method has your sexual decision-making lead to more risk-taking?

    No.....0

    Yes.....1

    Prefer not to answer.....6

18. Since starting PrEP have you had sex with more than one person at different times within the last three months?

    No.....0

    Yes.....1

    Prefer not to answer.....6

19. Since starting PrEP have you participated in sexual acts with more than one person or groups of people at the same time within the last three months?

    No.....0

    Yes.....1

    Prefer not to answer.....6

20. Since starting PrEP have you taking more risk with any types of drugs and your sexual activities?

    No.....0

    Yes.....1

    Prefer not to answer.....6

21. Since starting PrEP have you taking more risk with alcohol and your sexual activities?

    No.....0

    Yes.....1

    Prefer not to answer.....6

22. Since starting PrEP has your risk-taking become more of an issue with your overall sexual activities?

    No.....0

    Yes.....1

    Prefer not to answer.....6

Condom Use

23. Since starting PrEP has your condom use decreased?

    No.....0

    Yes.....1

Prefer not to answer.....6

24. Since starting PrEP has your condom use increased?

No.....0

Yes.....1

Prefer not to answer.....6

Sexual Behavior

25. PrEP use as an HIV prevention method has changed your sexual decision-making when it comes to your overall sexual activities?

No.....0

Yes.....1

Prefer not to answer.....6

26. PrEP use as an HIV prevention method has changed your risk-taking when it comes to your overall sexual activities?

No.....0

Yes.....1

Prefer not to answer.....6

27. PrEP use as an HIV prevention method has changed your condom use when it comes to your overall sexual activities?

No.....0

Yes.....1

Prefer not to answer.....6

28. Since starting PrEP as an HIV prevention method, how has your adherence to PrEP been, have you been taking this medication as directed (one pill daily everyday)?

No.....0

Yes.....1

Prefer not to answer.....6