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HIV Testing and Black Men who have Sex with Men

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Walden University
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Abstract

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MS, Colorado Technical University, 2012

BS, Colorado Technical University, 2010

Dissertation Submitted in Partial Fulfillment

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Abstract

HIV incidence among Black men who have sex with men (BMSM) is extremely high in contrast to their estimated population size and compared to other racial groups. Researchers have established that a significant proportion of these new cases annually originate from HIV transmission by BMSM who are unaware of their HIV status. The purpose of the study was to assess the relationship between age, sexual behavior, social support, substance use, internalized homophobia, depression, and HIV test history in BMSM. Guided by the social ecological model (SEM) as the conceptual framework, a quantitative cross-sectional study was designed to analyze secondary data from the HIV Prevention Trials Network Study 061. Bivariate and multivariate logistic regression was used to estimate the association. The research goal was to identify strategies to engage BMSM with infrequent/nonexistent HIV testing history into testing services. While there was very little difference between the bivariate and multivariate models, the results indicated that BMSM who were younger in age, had lower levels of internalized homophobia, and were recruited at a particular study site were more likely to have tested for HIV in the past 12 months. The other variables did not show a significant relationship to HIV testing history. Implications for positive social change included informing HIV prevention and testing messages and strategies that will result in an increase in HIV testing among BMSM with infrequent/nonexistent HIV testing histories. This increase in HIV testing among BMSM with infrequent/nonexistent HIV testing histories will reduce the number of BMSM who are unaware of their HIV status and who may subsequently transmit HIV to their sexual partners unknowingly.

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Dedication

I dedicate this dissertation to the many Black same gender loving men who have come before me, the activists, community health workers, and trailblazers who started programs and organizations to save the lives of their community in the face of a global pandemic that continues to run rampant but have significant burden among key populations including BMSM. I further dedicate this dissertation to the many Black same gender loving men who will go on to contribute amazing scientific and programmatic advances to the field. I dedicate this dissertation to my professional mentors, including Damon Humes, Dr. Sheldon Fields, Dr. Michele Andrasik, Dr. David Malebranche, Steven Wakefield, Dr. Hyman Scott, and Dr. Steve Shoptaw. I further dedicate this dissertation to my mentees, family members, support system, and the many other colleagues and associates who have contributed to my understanding, expanded worldview, and journey. I've always sought to make my family proud, particularly my parents. I lost my father to cancer in 2010, and my mother to cancer in October 2018. I dedicate this dissertation and journey to them, and I hope that they are proud of me.

Acknowledgments

I want to acknowledge my dissertation committee who has been instrumental in doctoral journey, my chairperson Dr. Frederick Schulze and committee member Dr. Leslie Elliott. Your support and contributions to this process have been invaluable to my matriculation, as well as my development as a scholar-practitioner. I want to acknowledge the HIV Prevention Trials Network (HPTN) and the HPTN 061 Study Team for their support and encouragement through this process, as well as the collaboration over the years. I also want to acknowledge the HIV Vaccine Trials Network (HVTN) for their support and encouragement through this process and professionally. I also want to acknowledge my colleagues and friends who have supported my doctoral and professional journey since I started in public health in early 2000. The analysis and interpretation of the HPTN 061 study data is my own, and was not reviewed or approved by, and does not necessarily represent the views of, the HPTN 061 study team, the HIV Prevention Trials Network or the study sponsor.

Table of Contents

List of Tables

Chapter 1: Introduction to the Study

Introduction

Black men who have sex with men (BMSM) ages 13-34 continue to see new human immunodeficiency virus (HIV) incidence rise annually (Center for Disease Control and Prevention [CDC], 2016, 2017b). BMSM represent only about 0.2% of the United States population but experience HIV disparities three times higher than White men who have sex with men (MSM), 22 times higher than the larger Black population, and 72 times higher than the general U.S. population (Millett et al., 2012). BMSM have a one in three chance of acquiring HIV in their lifetime (CDC, 2017b; Hall, An, Hutchinson, & Sansom, 2008), and between 2005 and 2014, HIV incidence in this population saw a 22% increase (CDC, 2017b). Millett et al. (2012) reported that BMSM were nearly eight times more likely than other MSM to have undiagnosed HIV, more than 10 times more likely to have Black sexual partners, and about nine times more likely than other MSM to have a current sexually transmitted disease diagnosis. The CDC (2017b) also reported that BMSM are likely to have undiagnosed HIV compared to other MSM, which presents a challenge to HIV prevention efforts in this population. More than a decade of research has been conducted to understand how to prevent HIV infections among BMSM, yet there are limited HIV prevention strategies that are able to effectively engage BMSM in routine HIV testing services and programs (Maulsby et al., 2014). Given the annual increases in new HIV incidence among BMSM and lower rates of engagement and maintenance in HIV treatment and lower rates of viral suppression

compared to other MSM, it is imperative that effective strategies are developed that can link BMSM to routine HIV testing.

Background of the Study

For many years, researchers have inquired about the factors that influence HIV incidence among MSM, and more specifically BMSM. This has led to theorizing how the interplay of various behavioral, environmental, psychosocial, and structural forces that influence HIV incidence and prevalence in BMSM, which creates a unique intersection of contextualization of what is known and theory. HIV epidemiologic data, the factors that influence BMSM HIV incidence, and barriers to HIV testing among BMSM also represent topics that are illuminated to frame this study.

HIV Epidemiological Data

HIV is a viral pathogen that has affected millions of people globally across diverse gender, religion, race/ethnicity, age, and other demographic characteristics with more than 30 million people living with HIV at the end of 2014 (World Health Organization [WHO], 2014). Blacks, however, are the most severely impacted population by race in the United States and by the end of 2016; Blacks represented approximately 45% of new HIV infections though representing only approximately 12% of the U.S. population (CDC, 2017a). Also, at the end of 2014, about 40% (471,500) of the people living in the United States with HIV were Black and about 16% of those did not know they had seroconverted (CDC, 2017a).

Among behavioral HIV risk groups, BMSM are the most disparately impacted group by HIV in the United States and see more new HIV cases than any other subpopulation of record (CDC, 2017b). Nearly 75% of the BMSM that were living with HIV by the end of 2014 (198,100) were between the ages of 13-34, and nearly 25% of the BMSM who tested HIV positive in 2014 didn't know they had seroconverted (CDC, 2017b). This disparity is underscored by the points that both Blacks and BMSM had large numbers of members who were unaware they were living with HIV (CDC, 2017a; CDC, 2017b). Black Americans, and more specifically BMSM are disproportionately impacted by HIV, with a proportion of Blacks and BMSM who are living with HIV and are unaware (CDC, 2017a; CDC, 2017b).

Factors Influencing HIV among BMSM

Researchers have long sought to explain the high prevalence and incidence of HIV among BMSM, but little research has uncovered the exact causation. Many researchers have found correlations between various factors and the elevated prevalence and incidence among BMSM, such as behavioral (e.g., drug use, condom-less anal intercourse, undiagnosed/untreated sexually transmitted diseases (STDs), no or inconsistent HIV testing history), psychosocial (e.g., experiences with stigma, discrimination, depression, low social support, homophobia), and structural factors (e.g., racism, safe communities, healthcare access, socioeconomics, smaller social and sexual networks) (CDC, 2017b, Fields et al., 2015; Mausby et al., 2014; Millett et al, 2012; Millett, Peterson, Wolitski, & Stall, 2006; Singh et al., 2014). Previously, it was believed

that BMSM use drugs more and engage in condom-less anal sex more frequently than their White counterparts; however, much of understanding has been updated and shifted to note that BMSM engage in the same or less condom-less anal sex than their White counterparts and use drugs less frequently (Fields et al., 2015; Millett et al., 2006). STDs continue to see increases among MSM generally in the United States and BMSM continue to experience unprecedented increases in STD rates, particularly in syphilis (CDC, 2016; CDC, 2017b). In 2014, MSM represented nearly 83% of diagnosed syphilis cases where the sex of the sex partner was identified and by the end of 2016, BMSM represented nearly 30% of the national syphilis cases (CDC, 2016). Undiagnosed STDs increase the likelihood of HIV transmission, and no, to infrequent, HIV/STD screening can contribute to unknown HIV acquisition and subsequent transmission to other persons (CDC, 2016; CDC, 2017b). Behavioral factors such as sex and drug-use, psychosocial factors such as experiences with homophobia, stigma, discrimination, and depression, as well as a high prevalence of undiagnosed STDs increase the HIV risk for BMSM.

Fields et al. (2015) and Uwujaren (2014) noted that daily experiences with homophobia, discrimination, stigma, internalized oppression, trauma, abuse, and emotional and physical violence further compounded the negative effects of social isolation, depression, and discrimination among BMSM, significantly increasing HIV risk, threats to mental health, and other negative biological and social conditions. BMSM experience elevated levels of homelessness and transient behavior, decreased social support (fractured familial and social support relationships) and these conditions increase

susceptibility to commercial and survival sex behaviors that further increase HIV risk (Fields et al., 2015; Maulsby et al., 2014; Millett et al., 2006).

HIV Testing among BMSM

The continued increases in HIV incidence and prevalence among BMSM leave many unanswered questions about how to provide culturally relevant HIV prevention programming to this population, as well as what influence behavioral, environmental, and psychosocial forces have on HIV testing behaviors among this population. These forces are exacerbated by experiences of homophobia, stigma, and discrimination, as well as socioeconomic factors, which interrupt access to and trust of medical institutions and providers, and other health and human service programs, resulting in avoidance or poor recruitment and retention in HIV prevention programs and services, especially HIV testing (CDC, 2017b; Mausby et al., 2014; Millett et al., 2012; Nelson et al., 2016). Singh et al. (2014) indicated that these factors intersect at multiple levels and the disproportionate new HIV incidence and prevalence among BMSM are significantly correlated to the poor outcomes that BMSM experience on the HIV care continuum (p. 829-830). This position underscores the reality that there is limited published data that points to a clear direction or path to effectively respond to the HIV prevention needs of BMSM, and specifically how to increase HIV testing among BMSM especially those with no or infrequent testing histories.

Problem Statement

There is limited data that has illuminated the factors associated with BMSM seeking HIV testing services. This is a problem because if public health practitioners are unaware of these factors, then HIV testing messages and strategies focused on BMSM will be less effective. BMSM are a group disparately affected by HIV, and by the end of 2015, BMSM represented approximately 75% of all new HIV cases that year (CDC, 2017b; Hall, Song et al., 2017). While new HIV cases have declined in many groups, BMSM saw new cases increased nearly 88% between 2005 to 2014 (CDC, 2017b; Hall, Song et al., 2017). Unknown or undiagnosed HIV, engaging in condom-less anal intercourse, discrimination/homophobia, socioeconomics, and tighter sexual networks are among the established barriers to HIV prevention in this population (CDC, 2017b; Hall, Song et al., 2017; Maulsby et al., 2014). Though the HIV epidemic generally has been investigated in BMSM, limited data exists that frames how to deliver effective HIV prevention messaging and HIV testing services to this population that are both culturally competent and responsive, and that addresses the diverse behavioral, psychosocial, and structural needs of the population (CDC, 2017; Hall, Song et al., 2017; Hickson et al., 2015; Maulsby et al., 2014). There is insufficient data available that examines interactions specifically between demographics, HIV sexual risk behaviors, substance use behaviors, internalized homophobia, depression, social support, and HIV testing behaviors though many sources point to interactions of varying degrees between some of these factors (Hall, Song et al., 2017; Maulsby et al., 2014; Millett et al., 2012; Singh et

al., 2014). It is theorized that these factors can be viewed at the individual and sexual network levels (substance use behavior and sexual risk behavior), social network level (social support), and community (experiences with homophobia and racism) levels and converge to influence HIV testing behaviors based on the modified social ecological model (MSEM) focused on risk and risk contexts of HIV epidemics (Baral, Logie, Grosso, Wirtz, & Beyrer, 2013).

Purpose of the Study

The purpose of this study is to address the gap in the literature regarding how demographic, behavioral, and psychosocial factors may influence HIV testing among BMSM. An additional purpose of this study is to inform strategies and messages that may support a reduction of HIV incidence among BMSM and their partners through increased HIV testing, and a positive social change at the individual by informing HIV prevention and testing strategies to reduce the number of BMSM of unknown HIV status who may transmit HIV.

Theoretical Framework

Often described as an interrelated convergence of epidemics (Krieger, 1994), HIV bears unique properties when considering the differential individual, social/community, and structural risk factors that influence upstream and downstream infections. Originally developed by Bronfenbrenner (1994), the ecological model of human development focused on helping researchers and practitioners understand human development through the lens of environmental influences, in addition to human behavior, describing these

environmental influences using layers. Since the original ecological model was developed, many models have been developed from it but have suffered from the inability to effectively assess and characterize the various subepidemics within populations across the diverse domains of individual, social/community, and structural risk factors (Baral et al., 2013). McLeroy, Bibeu, Steckler, and Glanz (1988) posited that one of many significant limitations of traditional ecological models is the inherent lack of specificity to inform actualization of the phenomenon of interest or the identification of meaningful interventions. The MSEM was developed in response to this gap, building upon previous models and frameworks to specifically examine HIV risk at multiple levels and to situate individual level HIV risk in the context of social network, community, policy levels, and the overall epidemic (Baral et al., 2013). MSEM is uniquely applicable to contextualize HIV risk among vulnerable population, and because the factors of one level can span multiple levels, the boundaries between each of the levels should not be viewed as distinct, but rather porous (Baral et al., 2013). MSEM, like other ecological models, consists of five levels of HIV risk: individual, network (social and sexual), community, public policy, and HIV epidemic stage (Baral et al., 2013). At the individual level are behavioral and biologic characteristics that are associated with HIV vulnerability, and at the network level are the social and sexual network factors that are associated with HIV vulnerability, including relationships with family, friends, and others that influence health behaviors or decisions in varying ways (Baral et al., 2013). At the community level are the community-level norms and structures that are associated with

HIV vulnerability, including stigma, discrimination, and violence related to HIV status, sexual orientation, gender identity, or gender expression (Baral et al., 2013). At the public policy level are the policies and laws that are associated with HIV vulnerability, which include HIV criminalization laws, and incarceration policies norms that disparately affect certain populations (Baral et al., 2013). Additionally, health and other policies (at the state or national level) that disparately affect certain groups and that provide a framework for how HIV risk and vulnerability is shaped or characterized are situated at the public policy level (Baral et al., 2013). Social ecological models have been well researched and have supported examining factors influencing phenomenon, and more uniquely the MSEM has been developed to specifically examine phenomenon that influence and interact that result in HIV risk.

The MSEM is critical to this study because it provided a framework for assessing and conceptualizing the factors that influence HIV testing in the focus population. Since previous research notes that HIV testing is not widely accessed by BMSM, the MSEM is an appropriate framework as it allows a multilevel examination of the phenomenon and is aligned well with the research question, which includes variables at multiple levels within the model.

Research Questions & Hypotheses

This study includes the following research question and corresponding hypotheses:

Research Question: Is there an association between age, sexual behavior, social support, substance use, internalized homophobia, depression, and HIV test history in BMSM?

$H_0$1: There is no statistically significant association between age, sexual behavior, substance use, depression, internalized homophobia, and social support with HIV testing among BMSM.

H_a1: There is a statistically significant association between age, sexual behavior, substance use, depression, internalized homophobia, and social support with HIV testing among BMSM.

To test the associations in this study, I also examined the following hypotheses:

- $H_0$2: There is no statistically significant relationship between age and HIV test history in BMSM.
- H_a2: There is a statistically significant relationship between age and HIV test history in BMSM.
- $H_0$3: There is no statistically significant relationship between sexual behavior, defined as number of sexual partners, and HIV test history in BMSM.
- H_a3: There is a statistically significant relationship between sexual behavior, defined as number of sexual partners, and HIV test history in BMSM.
- $H_0$4: There is no statistically significant relationship between social support, as measured by a 6-item scale adapted from Berkman and Syme (1979), and HIV test history in BMSM.

- H_a4: There is a statistically significant relationship between social support, as measured by a 6-item scale adapted from Berkman and Syme (1979), and HIV test history in BMSM.
- $H_0$5: There is no statistically significant relationship between substance use, defined as have or have not used any illegal or nonprescribed substances in the past 6 months, and HIV test history in BMSM.
- H_a5: There is a statistically significant relationship between substance use, defined as have or have not used any illegal or nonprescribed substances in the past 6 months, and HIV test history in BMSM.
- $H_0$6: There is no statistically significant relationship between internalized homophobia, as measured by a 7-item scale adapted from Herek and Glunt (1995), and HIV test history in BMSM.
- H_a6: There is a statistically significant relationship between internalized homophobia, as measured by a 7-item scale adapted from Herek and Glunt (1995), and HIV test history in BMSM.
- $H_0$7: There is no statistically significant relationship between depression, as measured using the 20-item Center for Epidemiologic Studies Depression Scale (CES-D) (Reisner et al., 2009), and HIV test history in BMSM.
- H_a7: There is a statistically significant relationship between depression, as measured using the 20-item Center for Epidemiologic Studies Depression Scale (CES-D) (Reisner et al., 2009), and HIV test history in BMSM.

Nature of the Study

Study Design

The nature of this study is quantitative using a cross-sectional design and secondary data. Quantitative research is consistent with testing hypotheses and theories (Creswell, 2009), which is the focus of the study. Often, these studies involve computational processes, utilizing statistical methods, conducting experiments, using surveys, examining patient files and charts, and other steps to assess whether the proposed theory can advance (Creswell, 2009). In keeping in alignment with this foundation, previously collected study data was analyzed using statistical methods to answer the research questions and test the hypothesis to determine whether a relationship exist between demographic, behavioral, and psychosocial factors and HIV testing behaviors among BMSM. This quantitative study should aid in determining empirically whether a relationship between these factors and HIV testing exists to inform how to increase HIV testing behaviors among BMSM.

Study Variables

The independent variables for this study were age, sexual behavior, social support, substance use, internalized homophobia, and depression. Age was measured as a continuous variable. Sexual behavior was measured as a continuous variable and measured as number of sexual partners. Social support was measured using a 6-item scale adapted from Berkman and Syme (1979) with the sum of scale scores categorized as *low social support* (sum score ≤ 13), or *medium support* ($14 <$ sum ≤ 21), or *high support* (sum

≥22). Substance use was measured as a nominal variable: 0 = “have not used any illegal or nonprescribed substances in the past 6 months” or 1 = “have used one or more illegal or nonprescribed substances in the past 6 months”. Internalized homophobia was measured using a 7-item scale adapted from Herek and Glunt (1995), and depression was measured using the CES-D (see Reisner et al., 2009). The dependent variable was HIV testing history, measured as a dichotomous nominal variable: 0 = “have not been tested in the last 12 months” or 1 = “have been tested at least once in the last 12 months. The control variable was the city of residence.

Study Methodology

Using baseline data from HIV Prevention Trials Network (HPTN) 061 (funded by the National Institutes of Health), I sought to characterize the association between the variables noted. The data was collected during a multisite study assessing the feasibility of a community-level, multicomponent intervention for BMSM and transgender women to test the efficacy of the intervention in reducing HIV incidence among BMSM and transgender women. The original study was conducted from 2009 to 2011 and enrolled 1,553 MSM and transgender persons, regardless of HIV serostatus, who were at least 18 years of age and self-identified as Black who resided in Atlanta, GA; Boston, MA; New York, NY; Los Angeles, CA; San Francisco, CA; and Washington, DC (Koblin et al., 2013).

In this study, I used the baseline quantitative data, specifically the variables noted previously, to conduct a logistic regression analysis to test the research hypothesis.

Assumptions

In this study, I assumed that the sexual behaviors and HIV testing attitudes and experiences of BMSM in the study varied by city. I also assumed that the motivations and intentions of the BMSM participating in the original study also varied. I assumed that the recruitment strategies for the original study allowed for a diverse subset of BMSM in the cities where the original study was conducted.

Limitations

Some limitations in this study may impact internal and external validity. The limitations from the original study include how the sample was derived, such as the enrollment for HIV uninfected participants was capped at 200 at each site, and participants living with HIV who were recruited through participant referral was capped at 10 (Mayer et al., 2014). Another key limitation from the original study relating to sampling strategy was that although this was a community-recruited sample, the research sites in the study were able to use various methods and venues and sites who accessed STI clinics more than others, as an example, may have introduced selection bias into the sample (Scott et al., 2015). My study has the following limitations:

- Response bias: Study participants in original research self-reported information that may challenge the interpretation of results from this analysis
- The original sample included BMSM only from major cities, so generalizations to the all BMSM, or MSM generally, is limited.

- The study is cross-sectional, so conclusions about causality or direction of the relationship are limited.

Delimitations

This study had the following delimitations:

- The sample size of the original study (*n*=1,557) supports further analysis.
- The nature and purpose of the original study supported analysis of this topic area in BMSM.

Significance of the Study

Blacks continue to experience the most significant burden of HIV in the United States among all racial groups (CDC, 2017a), and BMSM continue to experience the experience the greatest burden among all risk categories (CDC, 2017b). BMSM engage in less risky sexual encounters, use drugs and substances less frequently, and engage in protective behaviors (e.g., condom use, HIV testing) more frequently than their White counterparts (Maulsby et al, 2014; Millett et al., 2012); however, HIV incidence in this population continues to rise. BMSM have tighter social and sexual networks than other MSM groups (Maulsby et al., 2014); therefore, engaging in scientific inquiry to examine how to decrease community viral load is critical. The original contribution of the study may answer the question about how these important factors influence HIV testing behaviors among BMSM, which may provide health service providers data to inform HIV prevention, and specifically, HIV testing programs focused on BMSM to increase

the number of BMSM who know their HIV status. With more BMSM who know their status, I theorize that the number of new HIV infections in this population will decrease. Additionally, this study supports three of the four goals of the U.S. National HIV/AIDS Strategy regarding reducing the HIV incidence, improving health outcomes, and reducing health inequities of BMSM (representing the intersection of a few priority populations) (U.S. Department of Health and Human Services [USDHHS], 2017).

Ethical Concerns

The proposed study received IRB review and approval for ethical consideration and compliance. All procedures performed in this study involved data previously collected that has been delimited and deidentified and no actual human participants were engaged or recruited. No animals were involved in this study. I had no conflicts of interest to disclose.

Summary of Chapter

As previously noted, BMSM ages 13-34 continue to see new HIV incidence rise annually (CDC, 2017b) and though this population represents only about 0.2% of the United States population, they experience HIV disparities three times higher than White MSM, 22 times higher than the larger Black population, and 72 times higher than the general United States population (Millett et al., 2012). Millett et al. (2012) reported that BMSM were nearly eight times more likely than other MSM to have undiagnosed HIV, more than 10 times more likely to have Black sexual partners, and about nine times more likely than other MSM to have a current sexually transmitted disease diagnosis. The CDC

(2017b) also reported that BMSM are likely to have undiagnosed HIV compared to other MSM, which presents a challenge to HIV prevention efforts in this population. Though more than a decade of research has been conducted to understand how to prevent HIV infections among BMSM, there are limited HIV prevention strategies that are able to effectively engage BMSM in routine HIV testing services and programs (Hussen et al., 2013; Mannheimer et al., 2014; Mausby et al., 2014). Given these challenges, the purpose of this study was to address the gap in the literature regarding how demographic, behavioral, and psychosocial factors may influence HIV testing among BMSM. By using the data from this study, I present proposals to create social change implications at the individual level by informing HIV prevention and testing strategies to reduce the number of BMSM of unknown HIV status who may transmit HIV. In the next chapter, the previous research that serves as both the theoretical framework and background for this study is presented.

Chapter 2: Literature Review

Introduction

Reviewing existing research and HIV/AIDS literature helped me develop the conceptual framework for examining the behavioral, environmental, and psychosocial factors that influence BMSM to be at elevated risk for HIV, and those factors that influence this group to engage in HIV testing. This review begins with the historical research associated with the origins and development of the social ecological model and the MSEM, then follows with a review of current HIV epidemiological data among BMSM, and finally concludes with an examination into the demographic, behavioral, and psychosocial factors that influence HIV and HIV testing behaviors among this population.

Search Strategies

The topic of BMSM and HIV has been greatly researched. Many researchers have sought to understand the factors that place BMSM at elevated risk for HIV and to develop interventions that will address the disparate impact of HIV in this population. In this literature review, I include retrospective and emerging research to characterize the depth and breadth of literature on this subject. I conducted a systematic review of peer-reviewed journal articles using various search engines and databases. I conducted a search of peer-reviewed journals for studies published from 2000 to 2017 with a focus on peer-reviewed journal articles from 2008-2017 on BMSM, specifically in relation to HIV and HIV testing. Journal articles that I included were in English and limited to studies

conducted in the United States. Search engines and databases used to locate peer-reviewed journal articles included PsychInfo, Medline, EBSCOhost, Social Sciences Citation Index, PubMed, and Google Scholar. Keywords and subject terms used included *sexual behavior, internalized homophobia, substance use, social support, depression, HIV testing, Black MSM, BMSM, social ecological model, stigma, socioeconomic factors, United States,* and *demographic characteristics*. These search terms were used together, in-between quotes, and separated by commas. Finally, I used reference lists from selected studies as a source of articles.

Theoretical Framework

For some time, researchers have sought to further their understanding of how differential individual, cultural, social, community, structural, and policy factors influence upstream and downstream health outcomes. One of the earlier attempts at understanding this phenomenon was led by Bronfenbrenner (1994), who developed and published an ecological model of human development to better understand how the interaction of environmental factors and human behavior can result in various health outcomes. Since this earlier development, ecological models have been refined and further developed but have not been successful in being able to examine and characterize unique and diverse subepidemics among populations across the different levels of the model (Baral et al., 2013). This limitation was further described by McLeroy et al. (1988) who reported that traditional ecological models also suffered from the inability to

specifically display or focus on the actualization of the phenomenon of interest or result in the identification of meaningful interventions.

One of the attempts at responding to this limitation, as well as to more narrowly focus on HIV risk, was led by Baral et al. (2013) who developed the MSEM. The MSEM builds upon the successes of previous ecological models, and focuses on exploring and characterizing HIV risk to identify meaningful intervention (Baral et al., 2013). As with the earlier models, the MSESM also presents multiple levels at which HIV risk can be situated, including the individual, social network, community, policy levels, and the overall epidemic (Baral et al., 2013). The MSEM is an appropriate model to contextualize HIV risk, because the levels of the model are not static and factors of one level can span multiple levels, indicative of the porous nature of the levels.

Ecological models have an overarching assumption that influence on the outcome of interest takes place on multiple levels and assumes that these levels all interact and reinforce each other (Golden & Earp, 2012). Additionally, Baral et al. (2013) posited that infectious disease is not created by behaviors, community factors, law or policy, network characteristics, or individual factors but that these indicators may only create the conditions which increase or decrease the likelihood of acquisition or transmission of an existing disease. Biological and behavioral factors associated with HIV risk are situated at the individual level, and sexual and social network factors associated with HIV risk are situated at the network level, including relationships with family, friends, and others that influence health behaviors or decisions in varying ways (Baral et al., 2013). Stigma,

discrimination, and violence associated with sexual orientation, HIV status, and gender identity and expression are situated at the community level (Baral et al., 2013). Laws and policies associated with HIV vulnerability, including incarceration and HIV criminalization laws that disproportionately impact key populations, and health policies are situated at the public policy level, and the epidemic characterization through incidence and prevalence is situated at the HIV epidemic level (Baral et al., 2013).

Since previous research (CDC, 2017b) noted that HIV testing is not widely accessed by BMSM, the MSEM is an appropriate framework as it allows a multilevel examination of the phenomenon and is aligned well with the research question, which includes variables at multiple levels within the model. Additionally, as Golden and Earp (2012) noted in their systematic review of the literature on health promotion interventions, most interventions used in health promotion focus on individual or group level factors and that requests for inclusion of social, network, policy, and institutional factors on behavior and behavior change have gone mostly unaddressed. The MSEM has been used in similar research studies focused on HIV prevention broadly, HIV testing, and in MSM generally, and Black MSM populations, including a study reported by Balaji et al. (2017) that used a MSEM, to assess the relationship between sexual behavior, stigma, and HIV vulnerability. Balaji et al. (2017) found that stigma and violence increased the likelihood of condom-less anal intercourse among their sample and suggested that additional studies examining the multilevel factors associated with MSM and HIV vulnerability should be conducted. I used the model not only as a framework for

the study, but also to describe the findings from the literature review which include the factors described in the literature review below. In another study by Jeffries , Marks, Lauby, Murrill, and Millett (2013), the model was used to assess whether, and to what degree, BMSM experiences with homophobia increased the likelihood of engaging in condom-less anal intercourse and whether social support buffered that association. Jeffries et al. (2013) indicated that experiences with homophobia was positively associated with condom-less anal intercourse among BMSM not already diagnosed with HIV, and increased HIV transmission risk among BMSM of unknown HIV status. In both studies by Jeffries et al. (2013) and Balaji et al. (2017), the model was applied to the framework of the study, how the study was conducted, and how the analysis was interpreted. These studies support the use of the model in my study.

Literature Review Related to Key Variables and Concepts

HIV Epidemiology among BMSM

By the end of 2014, more than 30 million people across diverse gender, religion, race/ethnicity, age, and other demographic characteristics have been infected (WHO, 2014). In the United States, and among all racial groups, Blacks are the most severely impacted population in terms of HIV (CDC, 2017a). At the end of 2016, Blacks represented nearly 45% of new HIV cases though representing only about 12% of the national population (CDC, 2017a). At the end of 2013, nearly 40% (498,400) of the people living in the United States with HIV were Black and nearly 13% of those did not know they had seroconverted (CDC, 2017a).

Among behavioral HIV risk groups, BMSM are one of the most disparately impacted groups by HIV in the United States and see more new HIV cases than any other subpopulation (CDC, 2017b). BMSM represent only about 0.2% of the U.S. population but experience HIV disparities approximately three times higher than White MSM, approximately 22 times higher than the larger Black population, and approximately 72 times higher than the general U.S. population (Millett et al., 2012). BMSM are estimated to have a one in three chance of acquiring HIV in their lifetime (Hall et al., 2008). Between 2005 and 2014, HIV incidence in this population saw a 22% increase (CDC, 2017b). Nearly 75% of the BMSM that seroconverted in 2015 were between the ages of 13-34, and nearly 20% of the BMSM who tested HIV positive in 2014 did not know they had seroconverted (CDC, 2017b). Millett et al. (2012) reported that BMSM were nearly eight times more likely than other MSM to have undiagnosed HIV, more than 10 times more likely to have Black sexual partners, and about nine times more likely than other MSM to have a current sexually transmitted disease diagnosis. With nearly a quarter of the BMSM who seroconverted in 2014 being unaware of their HIV status it increases the likelihood that these men will transmit HIV to their sexual partners unknowingly, furthering the spread of HIV and further exacerbating prevention efforts in this population (CDC, 2017b). This disparity persists across age groups, though among youth and young adult BMSM continue to see new HIV incidence increase annually (CDC, 2017b). According to the CDC (2017b), between 2011 and 2015 BMSM ages 25-34 saw a 40% increase in new HIV cases.

BMSM are 10 times more likely to partner with other BMSM than other MSM (Millett et al., 2012). Many BMSM are unaware of their status, which complicates the practice of serosorting, a practice used to minimize risk by engaging in sexual activity with partners who have matching HIV serostatus to decrease transmission risk (CDC, 2017b). Serosorting has been documented well in the literature, but some researchers have noted the limitations of this practice including the composition of social networks (race/ethnicity) (Choi, Ayala, Paul, Boylan, & Gregorich, 2013) and in another study with nearly 7,000 MSM in which serosorting was a protective factor for White MSM but not BMSM (Golden, Dombrowski, Kerani, & Stekler, 2012), further underscoring the importance of intraracial sexual networks, the prevalence of HIV in the community, undiagnosed HIV, and untreated STIs.

There is great disparity among BMSM in terms of the HIV care continuum with respect to lower rates in HIV testing, HIV diagnosis, linkage to HIV care, retention in HIV care, HIV medication adherence and HIV viral suppression (CDC, 2017b). It has been reported that for every 100 BMSM that are living with HIV since 2013 or earlier, 71 have received some HIV care, 54 were retained in care, and 52 were virally suppressed (CDC, 2017b). These numbers present a bleak outlook on ending the HIV epidemic among BMSM, and further underscore the urgent nature in increase HIV testing as well as other areas of the HIV care continuum to be responsive to the goals of the National HIV/AIDS Strategy relating to this population. The National HIV/AIDS Strategy (NHAS) is a 5-year federal plan to is designed to guide the collective response to

HIV/AIDS in the United States. This plan has several goals: (a) reduce new HIV infections, (b) increase access to care and to improve health outcomes for persons living with HIV/AIDS, (c) achieve an enhanced national coordinated response to HIV, and (d) reduce HIV-related health disparities and health inequities (DHHS, 2017). NHAS focuses on, several priority populations including BMSM. The significance of this federal plan is that it is the first time that a plan was developed to coordinate the response to HIV nationally and it focused on key populations that bear a disproportionate burden of the epidemic in contrast to population size estimates (DHHS, 2017). HIV disproportionately impacts BMSM, and BMSM who are unaware of their HIV status contribute to new HIV incidence.

HIV Testing Among BMSM

It was been reported (CDC, 2017b; Maulsby et al., 2014; Levy et al., 2014; Peterson et al., 2014; Young, Shoptaw, Weiss, Munjas, & Gorbach, 2011) that BMSM are likely to have undiagnosed HIV compared to other MSM, which presents a challenge to HIV prevention efforts in this population, and infrequent testing has been reported as a factor that increases susceptibility for HIV seroconversion (Mannheimer et al., 2014). BMSM, as a population, have very layered and nuanced characteristics, and so to should HIV testing strategies focused on this population. One-size-fit-all approaches have not worked effectively to engage marginalized groups in a positive health behavior, and a limitation of many HIV testing strategies is the lack of account of the diversity that exists within this population. In New York City, a study conducted to assess the effectiveness of

three HIV testing strategies of 558 BMSM found that the effectiveness of the three strategies: alternative venue testing (6.3% seropositivity), social networks strategy (19.3% seropositivity), and partner counseling and referral services (14.3% seropositivity) (Halkitis et al., 2011). The researchers concluded that social networks strategy found more undiagnosed HIV, but the BMSM that tested using social networks strategy tended to be older and have more sexual risk behaviors than the BMSM tested in alternative venue testing (which skewed younger and less sexual risk) (Halkitis et al., 2011). In another study, researchers sought to qualitatively explore HIV testing behaviors of BMSM using 29 in-depth interviews and four focus groups and found that HIV testing among BMSM is heterogeneous (Hussen et al., 2013). Findings from this study included recommendations that public health messages account for the diversity in experiences and characteristics among the population to maximize the reach of diverse BMSM (Hussen et al., 2013). Another study found that specific characteristics (having a gay identity, moderately higher income, having health insurance, fewer than 3 lifetime HIV tests, and high perceived risk of testing HIV positive) were positively associated with having an undiagnosed HIV positive serostatus (Millett, et al., 2012). These studies underscore that HIV testing strategies should be nuanced and have multiple approaches to maximize effectiveness and reach. These nuanced strategies should consider the spectrum of sexual and social identity, and include considerations of socioeconomics, age, and experiences with healthcare systems/providers.

Demographic and Behavioral Influences

MSM of different age groups have unique characteristics, including physical social spaces and online social network spaces, and these differences by age group have a direct relationship with how HIV testing strategies can be implemented successfully. As previously noted, about 75% of the BMSM that seroconverted in 2016 were between the ages of 13-34 (CDC, 2017b). In a New York City study found that younger BMSM (29 years and younger) tested more frequently at alternative venue-based testing than older BMSM (30 years and older) who tested more frequently using social networks strategy (Halkitis et al., 2011). The researchers in this study noted that the older BMSM who tested using social networks strategy tended to self-report higher risk behaviors and have sexual encounters with females in contrast to the younger BMSM. This study is limited in its generalizability due to it only being conducted in a major urban city (NYC), however, the study did support the understanding that different age groups require nuanced HIV prevention strategies.

BMSM and women (BMSMW) also have unique experiences that suggest HIV testing strategies should be uniquely tailored and disseminated, as their unique social and sexual characteristics and needs require focused attention as well. Jeffries (2014) and Dyer et al. (2013) noted that BMSMW might be at increased risk for STIs and are more likely to be infected with HIV, compared to men who have sex with women and MSM. Many of the factors related to this elevated risk include early sexual debut, forced sexual encounters, substance use, sex exchange, increased numbers of sex partners, antibisexual

attitudes, other socioeconomic and structural factors that also disparately impact BMSM, and condom-less sex which uniquely the risk profile and vulnerability of these BMSM(W) (Jeffries, 2014). Many researchers have noted that BMSM have less sexual partners than their white counterparts (Millett et al., 2006; Millett, et al., 2012; Maulsby et al., 2014), though this knowledge provides little understanding into the overall factors that place BMSM at elevated risk for HIV. BMSM are truly a unique and diverse population, not just in terms of age and HIV epidemiological profile (compared to MSM of other racial/ethnic groups), but also in terms of socialization, sexual behavior and sexual identity.

Many researchers have discussed the relationship between new HIV cases among MSM generally, including BMSM, and substance use. A meta-analysis conducted by Millett et al. (2012) revealed that older BMSM (aged 30 and older) who reported being HIV-positive were more likely to also report cocaine or crack use than other MSM, but younger BMSM (aged 29 and under) were less likely to report any substance use or abuse. These findings underscore previous findings suggesting that substance use was not a factor that contributed to higher HIV incidence among the population (Millett et al., 2012), though it is theorized that substance use in combination with other factors may have some confounding effect on HIV incidence (Maulsby et al., 2014; Mayer et al., 2014). Other studies have reported conflicting impacts on the relationship with substance use and HIV incidence among BMSM (Andrasik, Valentine, & Pantalone, 2013; Dyer et al., 2013; Hickson et al., 2015; Jeffries, 2014); however, it should be noted that HIV

testing was not the outcome variable in those studies and the majority of the studies found in this literature search sought to characterize the factors that result in HIV seropositive status in this population.

Psychosocial Influences

Stigma and discrimination in the forms of homophobia and racism are discussed often in the literature regarding BMSM, particularly in the context of engaging community spaces (e.g., barbershops), religious institutions, law enforcement, and social service and human service providers, including medical institutions and health care professionals (CDC, 2016; CDC, 2017b; Fields et al., 2015; Maulsby et al., 2014; Millett et al., 2006). The relationship between higher or more frequent experiences with discrimination or stigma and a lack of willingness to engage in those institutions, even when the service may be desired requires more study. Stigma and discrimination does not however only occur in the context of social service and medical providers, but also includes community and familial environments, as well as experiences with churches and other faith-based institutions (Fields et al., 2015; Maulsby et al., 2014; Millett et al., 2012; Nelson et al., 2017). BMSM experience heighted levels of homophobia in community settings, like schools, faith and religious institutions, neighborhoods, and other areas in and near their homes, and at home from family members and relatives who hold strong beliefs about sexual identity and gender expression. Social norms about masculinity and gender expression in the Black community also affect BMSM and inform their identity development as well as their sexual experiences (e.g., partner

selection, desirability to other MSM, self-esteem) (Fields et al., 2015; Jeffries et al., 2013; Maulsby et al., 2014). These experiences, particularly during the earlier developmental stages of a BMSM identity, present an internal conflict from the pressure to conform to expectations around masculinity and gender expression. This conflict often results in BMSM attempting to camouflage their sexuality or engage in behaviors to prove their masculinity and "manhood". This phenomenon also intersects with sexual identity and sexual behavior, specifically in terms of gay-identified BMSM vs non-gay identified BMSM, and whether insertive or receptive anal intercourse is preferred or desired from a partner (Fields et al., 2015; Maulsby et al., 2014). This results in conflicting beliefs and challenges navigating social and sexual networks where being "masculine" means being a "real man" and also means being a "top" or insertive sexual partner, and being "feminine" means being less than a "real man" (read: woman), which equals being a "bottom" or receptive partner (Fields et al., 2012). These associations create unhealthy beliefs about how BMSM partner, socialize, and engage in safer sex behaviors that are reinforced by social norms about masculinity, gender expression, and heterosexism. The convergence and internalization of these experiences of homophobia, racism, and stigma and discrimination, particularly during early development of identity, affect BMSM differentially: lower self-esteem, substance use, increased sexual partners, earlier sexual debut, increased experiences of homelessness and survival sex, as well as increased susceptibility to depression and often suicide, and increased HIV susceptibility

(Fields et al., 2015; Mannheimer et al., 2014; Maulsby et al., 2014; Millett et al., 2012; Nelson et al., 2017).

Social support systems for BMSM are critical, and many researchers noted in the literature reviewed that the absence of these systems to support BMSM through issues of income loss, housing loss, family loss/estrangement, stigma/discrimination, substance use, and sexuality/gender expression concerns is associated with increased HIV susceptibility (Ayala et al., 2012; Fields et al., 2015; Hussen et al., 2013; Maulsby et al., 2014; Millett et al., 2012). Social isolation in response to experiences of stigma, discrimination, homophobia, and concerns regarding sexuality and gender expression are common among BMSM and is associated with increased HIV risk and decreased engagement in health services including HIV testing (Maulsby et al., 2014; Nelson et al., 2016; Nelson et al., 2017). These factors also again converge to facilitate or create the necessity for survival sex activities, increased exposure and experiences with law enforcement officials and the criminal justice system due to race, gender expression, perceived sexual orientation (Nelson et al., 2016).

Summary of Chapter

A literature search was conducted to inform the development of this study, which included several databases spanning a decade. The modified social ecological model was developed in response to a gap in the literature regarding the association of health outcomes and their influences across several levels; building upon previous models and frameworks to specifically examine HIV risk at multiple levels, and to situate individual

level HIV risk in the context of social network, community, policy levels and the overall epidemic (Baral et al., 2013). MSEM is uniquely applicable to contextualize HIV risk among vulnerable population, and because the factors of one level can span multiple levels, the boundaries between each of the levels should not be viewed as distinct, but rather porous. MSEM, like other ecological models, consists of five levels of HIV risk: individual, network (social and sexual), community, public policy, and HIV epidemic stage Nearly 75% of the BMSM that seroconverted in 2016 were between the ages of 13-34, and nearly 20% of the BMSM who tested HIV positive in 2014 didn't know they had seroconverted (CDC, 2017b). With nearly a quarter of the BMSM who seroconverted in 2014 being unaware of their HIV status (CDC, 2017b), this increases the likelihood that these men will continue to transmit HIV to their BMSM sexual partners (and if they have partners of other races and women) unknowingly furthering the spread of HIV and further exacerbating prevention efforts in this population. BMSM experiences are unique across age and sexual behavior and sexual identity, and limited HIV prevention strategies have been identified to respond effectively to this phenomenon. BMSM experience stigma, discrimination, and homophobia in unique ways that place them at elevated risk for HIV, and no studies have identified methods and strategies to effectively engage BMSM in HIV testing that also consider age, sexual behavior and sexual identity. What is known is there is some association between age and willingness to test for HIV based on the venue, there is some association between sexual behavior and substance use, and willingness to test for HIV based perception of risk; and there is some association with

social support, depression, and experiences (internalization) with homophobia and willingness to test for HIV. What is unknown is how all these factors combined, may or may not associate with willingness to test for HIV among BMSM. Given these limitations, I sought to address the gap in the literature regarding how demographic, behavioral, and psychosocial factors may influence HIV testing among BMSM. From this study, the results of this study have social change implications at the individual level by informing HIV prevention and testing strategies to reduce the number of BMSM of unknown HIV status who may transmit HIV. In the next section, I will describe the methodology used for the study.

Chapter 3: Research Method

Introduction

In this chapter, I describe the methodology used for this study, including the research design, population, sampling procedures, data collection procedures, instrumentation, data analysis plan, original research study, limitations, delimitations, and ethical considerations. The purpose of this study was to test for an association between age, sexual behavior, social support, substance use, internalized homophobia, depression, and HIV test history among BMSM using a quantitative research design. Social support, substance use, internalized homophobia, and depression were measured using scaled items described below. For the purposes of this study, sexual behavior includes any sexual intercourse behavior within 6 months prior to participant enrollment in the original study. HIV test history is determined by whether the participant received an HIV test in the past 12 months.

Research Design and Rationale

In this quantitative cross-sectional study using secondary data, I tested for an association between age, sexual behavior, social support, substance use, internalized homophobia, and depression (independent variables), and HIV test history (dependent variable). Quantitative research is consistent with testing hypotheses and theories (Creswell, 2009), which is the focus of this study. Often, these studies involve computational processes, the use of statistical methods, conducting experiments, using surveys, examining patient files and charts, and other steps to assess whether the

proposed theory can advance (Creswell, 2009). Quantitative methodologies have advantages such as the clear identification of dependent and independent variables, a clearly defined and stated research problem, and the ability to attain higher levels of reliability due to the reduction of researcher bias and use of controlled observations (Creswell, 2009). In my study, no participants were engaged so the study is nonexperimental. In keeping in alignment with this foundation, previously collected study data was analyzed using statistical methods to answer the research questions and test the hypothesis to determine whether a relationship exists between demographic, behavioral, and psychosocial factors and HIV testing behaviors among BMSM. This quantitative study aided in determining whether a relationship between these factors and HIV testing exists to inform how to increase HIV testing behaviors among BMSM.

Methodology

Population

The original study, referred to as HIV Prevention Trials Network (HPTN)- 061, was a multisite research study conducted in Atlanta, Boston, Los Angeles, New York City, San Francisco, and Washington, D.C. to assess the acceptability and feasibility of a multicomponent HIV prevention intervention for 1,553 BMSM and transgender women (Koblin et al., 2013). Participants were eligible if they: self-identified as Black, African American, Caribbean Black, or multiethnic Black; a man or male at birth; were at least 18 years old; reported one or more condom-less anal intercourse activites with a male in the past 6 months; resided in one of the six cities where the study was conducted; had no

intentions to relocate out of the area during the study; and provided informed consent for the study (Koblin et al., 2013). Participants who were enrolled in any other HIV interventional research study, previously participated in an HIV vaccine study, or were a community-recruited participant in a category that had already reached its enrollment cap were not eligible (Koblin et al., 2013). Participants were prescreened via phone or in person to determine eligibility (Koblin et al., 2013).

Sampling and Sampling Procedures

Participants from the original study were recruited from July 2009 to October 2010 from the community directly, or through referrals from index participants (sexual network partners). Index participants were (a) living with HIV but unaware of their status; (b) had a prior HIV diagnosis but were not engaged in HIV care and were engaged in condom-less sex with partners of HIV negative or unknown HIV status; or (c) HIV negative (Koblin et al., 2013). Each study site developed their own recruitment methods, which included online strategies, print advertising, engagement of local community-based groups and key informants, and community outreach. For community-recruited participants at each study site, the enrollment of HIV negative participants was capped at 200; and enrollment of participants living with HIV and in HIV care, or those reporting only engaging in condom-less anal intercourse with partners who were also living with HIV was capped at 10 participants (Koblin et al., 2013).

A total of 1,553 records from the original study were reviewed in this study. All participant records from the original study were eligible for this study. G*Power 3.1 (see

Faul, Erdfelder, Buchner, & Lang, 2009) was used to calculate the sample size required for statistical significance. To calculate the sample size needed in this study, the following values were employed: two-tailed test, total number of tested predictors (n=6), the effect size (.10), power (.95), and α =.05. The sample size required based on this computation was 215 participants.

Recruitment, Participation, and Data Collection Procedures

The data collection procedures for the original study are described below. Eligibility was confirmed and written informed consent was obtained at the enrollment visit (Koblin et al., 2013). Participants provided an interviewer with locator and demographic information, then completed a behavioral assessment using audio computer-assisted self-interview (ACASI) technology, and then an interviewer-administered sexual and social network questionnaire was completed (Koblin et al., 2013). A medical provider conducted a circumcision status exam, and if the examination was refused by the participant, self-report of status was used (Koblin et al., 2013). The multicomponent intervention was comprised of the opportunity to partner with a peer health navigator to assess service needs and develop an action plan with the participant, HIV/STI counseling, testing, and referral for care, and sexual network member referral (Koblin et al., 2013). HIV/STI testing and counseling, the social and sexual network questionnaire, and the ACASI were repeated 6 and 12 months after enrollment (Koblin et al., 2013).

Interviewer-administered Questions

Interviewer collected demographic characteristics included sexual identity, employment, education, student status, household income, and age. Additional health care related data collected included usual place of care, unmet health care needs in the prior 6 months, visits to a health care facility in the prior 6 months, and health care coverage (Koblin et al., 2013).

ACASI-administered Questions

The ACASI interview collected data on various topics relating to sexual partners in the past 6 months and HIV testing history (Koblin et al., 2013). Additional questions were asked relating to experiences with substance use in the past 6 months and described examples of substances such as marijuana; inhaled nitrates; smoked and powder cocaine; methamphetamine; heroin; non-prescribed Vicodin, Oxycontin, or Xanax; Viagra, Cialis, or Levitra; hallucinogens and injection drug use (Koblin et al., 2013).

Internalized homophobia was also assessed using a 7-item, 5-point Likert-scale adapted from Herek and Glunt (1995), with responses ranging from “disagree strongly” to “agree strongly” (α=0.91) (Koblin et al., 2013). The scale included items such as “In the past 90 days, I have tried to stop being attracted to men” and “As a Black man, I try to act more masculine to hide my sexuality” (Koblin et al., 2013). The items were summed to produce a score for reach participant, and the scores were categorized as low internalized homophobia (score ≤16), medium internalized homophobia (score from 17–26), or high internalized homophobia (score ≥27) (Koblin et al., 2013).

Koblin et al. (2013) reported depression was assessed using the 20-item, 4-point CES-D scale. Items on the scale included prompts such as how many days in the past week "I was bothered by things that don't usually bother me" were answered with "less than 1 day (Rarely/none of the time)" to "5–7 days (Most of the time)" ($\alpha = 0.94$). The scores were summed and a score of 16 or higher was indicative of depressive symptoms (Koblin et al., 2013).

Social support was also measured using a 6-item, 5-point Likert scale adapted from Berkman and Syme (1979) with prompts such as "How often is there someone available to whom you can count on to listen to you when you need to talk?" (Koblin et al., 2013). Potential responses included "none of the time" to "all the time" ($\alpha=0.94$) (Koblin et al., 2013). The scores were summed, and a score less than or equal to 13 indicated low social support, a sum score of 14 to 21 indicated medium social support, and a sum score of 22 or greater indicated high social support (Koblin et al., 2013).

Access to HPTN 061 Data Set

Access to the HPTN 061 study data set was obtained by going to the HPTN website (www.hptn.org) and navigating to the HPTN 061 study page to gain access to the data. A data request application and data use agreement were completed and submitted along with human subject's protection training certificates to be reviewed by the HPTN 061 publications committee and HPTN 061 protocol leadership. All HPTN 061 data received has been de-identified using the safe harbor method, and all HIPAA identifiers have been removed. The data use agreement can be found in Appendix A.

Instrumentation and Operationalization of Constructs

The instruments and variables used in the previous study are described above. For this study, all variables were extracted from the HPTN 061 data set. Measures used within this study were previously tested for reliability and validity in other studies. The variables used in this study have been shown in various studies to be associated with HIV seropositivity. Age is an interval continuous variable. A variable for sexual behavior was created and is the sum of all sex acts in the past 6 months (regardless of gender identity of sexual partner) and an interval continuous variable. Social support and internalized homophobia are categorical nominal variables that represent three levels (low, medium, high) based on the sum of scores, depression and substance use are dichotomous nominal variables that represent “depression” or “nondepression”, or “used” or “not used”, respectively, based on the sum of scores. HIV test history is a dichotomous nominal variable. The covariate is city. All information was self-reported by participants using ACASI.

Data Analysis Plan

I used SPSS release 23 (IBM Corp, 2016) and Microsoft Excel (2010) software to conduct the analysis. The data set was pre-cleaned by the HPTN. From the theoretical framework and current literature of this study, I hypothesized that there is an association between age, sexual behavior, substance use, depression, internalized homophobia, and social support with HIV testing among BMSM. The primary null hypothesis was that there is no statistically significant association between age, sexual behavior, substance

use, depression, internalized homophobia, and social support with HIV testing among BMSM. The primary alternative hypothesis was that there is a statistically significant association between age, sexual behavior, substance use, depression, internalized homophobia, and social support with HIV testing among BMSM. To test the associations in this study, I also examined the following hypotheses:

$H_0$1: There is no statistically significant association between age, sexual behavior, substance use, depression, internalized homophobia, and social support with HIV testing among BMSM.

H_a1: There is a statistically significant association between age, sexual behavior, substance use, depression, internalized homophobia, and social support with HIV testing among BMSM.

To test the associations in this study, I also examined the following hypotheses:

- $H_0$2: There is no statistically significant relationship between age and HIV test history in BMSM.
- H_a2: There is a statistically significant relationship between age and HIV test history in BMSM.
- $H_0$3: There is no statistically significant relationship between sexual behavior, defined as number of sexual partners, and HIV test history in BMSM.
- H_a3: There is a statistically significant relationship between sexual behavior, defined as number of sexual partners, and HIV test history in BMSM.

- $H_0$4: There is no statistically significant relationship between social support, as measured by a 6-item scale adapted from Berkman and Syme (1979), and HIV test history in BMSM.
- H_a4: There is a statistically significant relationship between social support, as measured by a 6-item scale adapted from Berkman and Syme (1979), and HIV test history in BMSM.
- $H_0$5: There is no statistically significant relationship between substance use, defined as have or have not used any illegal or nonprescribed substances in the past 6 months, and HIV test history in BMSM.
- H_a5: There is a statistically significant relationship between substance use, defined as have or have not used any illegal or nonprescribed substances in the past 6 months, and HIV test history in BMSM.
- $H_0$6: There is no statistically significant relationship between internalized homophobia, as measured by a 7-item scale adapted from Herek and Glunt (1995), and HIV test history in BMSM.
- H_a6: There is a statistically significant relationship between internalized homophobia, as measured by a 7-item scale adapted from Herek and Glunt (1995), and HIV test history in BMSM.
- $H_0$7: There is no statistically significant relationship between depression, as measured using the 20-item Center for Epidemiologic Studies Depression Scale (CES-D) (Reisner et al., 2009), and HIV test history in BMSM.

- H_a7: There is a statistically significant relationship between depression, as measured using the 20-item Center for Epidemiologic Studies Depression Scale (CES-D) (Reisner et al., 2009), and HIV test history in BMSM.

Logistic regression was the appropriate statistical test for this study because the outcome variable is nominal and dichotomous, and I tested for an association between the dependent and independent variables. Using logistic regression allowed me to develop a log odds statistic to examine the predictive relationship between the dependent and independent variables. Another variable, "city", was treated as a confounder and controlled for in the main analysis using logistic regression. I assessed for a log odds ratio with a probability value of less than or equal to 0.05 and confidence intervals that do not include 1.0.

Logistic regression has a few assumptions, including a) dependent variable should be measured on a dichotomous scale; b) one or more independent variables measured on a continuous or categorical level; c) independence of observations, and mutually exclusive categories in the dependent variable; d) linearity of independent continuous variables and log odds (Creswell, 2009). The assumption of linearity of independent variables and log odds can be determined by the Box-Tidwell (1962) test. To examine the presence of an interaction effect between the independent variables, I created a model that includes age, sexual behavior, social support, substance use, internalized homophobia, depression, and HIV test history together. This model also included the

covariate city and allowed me to estimate any interaction between the independent variables.

Threats to Validity

In this study, I assumed that the sexual behaviors and HIV testing attitudes and experiences of BMSM in the study varied by city. I also assumed that the motivations and intentions of the BMSM participating in the original study also varied. I assumed that the recruitment strategies for the original study allowed for a diverse subset of BMSM in the cities where the original study was conducted. Some limitations in this study may impact internal and external validity. The limitations and strengths from the original study have been reported elsewhere (Mayer et al., 2014; Scott et al., 2015). The proposed study has the following limitations:

- Response bias: study participants in original research self-reported information that may challenge the interpretation of results from this analysis
- The original sample included BMSM only from major cities, so generalizations to the all BMSM, or MSM generally, is limited.
- The proposed study is cross-sectional, so conclusions about causality or direction of the relationship are limited.

This study had the following delimitations:

- The sample size of the original study (n=1,557) supports further analysis.
- The nature and purpose of the original study support analysis of this topic area in BMSM.

Ethical Considerations

This study was submitted to the Walden University Institutional Review Board and received approval (IRB # 10-12-18-0436805). All procedures performed in this study involved the use of secondary data that has been delimited and deidentified. No actual human participants were engaged or recruited. No animals were involved in this study. I had no conflicts of interest to disclose. The original study underwent an IRB review at all participating institutions approved the study: Emory University IRB #2 - Biomedical IRB (Committee A), Fenway Community Health IRB #1, University of California, Los Angeles - South General Campus IRB, Columbia University Medical Center IRB, New York Blood Center IRB, San Francisco General Hospital Committee IRB #2, and George Washington University Medical Center IRB. Written informed consent was obtained from all study participants.

Summary of Chapter

In summary, I conducted a secondary data analysis of the baseline HPTN 061 data. HPTN 061 was conducted from 2009 to 2010 in six U.S. cities and enrolled a total of 1,557 participants. HPTN 061 utilized audio computer-assisted self-interview (ACASI) technology to collect the behavioral data used for this analysis, comprised of several pre-validated scales. I used logistic regression to assess for statistically significant relationships in the dependent and independent variables. I designed this study to address the gap in the literature regarding how demographic, behavioral, and psychosocial factors may influence HIV testing among BMSM. The data from this study presents social

change implications at the individual level by informing HIV prevention and testing strategies to reduce the number of BMSM of unknown HIV status who may transmit HIV. In the next chapter, I describe the results from this study.

Chapter 4: Results

Introduction

In this chapter, I describe the results of the secondary data analysis conducted on the baseline cross-sectional HPTN 061 study data. The aim of the study was to assess whether associations existed between demographic, sexual behavior, and psychosocial factors, and HIV testing history. The research question for this study was "Is there an association between age, sexual behavior, substance use, depression, internalized homophobia, and social support with HIV testing among BMSM?"

In this chapter, I first describe the steps involved in acquiring, cleaning, and recoding of the secondary data used for my research. Next, I describe the demographic and descriptive characteristics of the study's sample. Finally, I will describe the results of the logistic regression analysis.

The data was obtained from the HIV Prevention Trials Network Statistical Data Management Center in an Excel format and then converted into SPSS. I recoded the variables provided to coincide with the variables included in my study, and all variables not related to my analysis were removed. A variable named "HIV_test_history" was created from the variable "ACVTSTN" (How many times have you been tested for HIV in the last year?), with "0" to indicate the participant has not tested for HIV in the past 12 months, and "1" to indicate the participant has tested for HIV in the past 12 months. Age was not transformed or recoded and was used as an interval continuous variable. For number of sexual partners in the past 6 months, I first combined two variables asking

about transgender sex partners who were perceived as female and transgender sex partners perceived as male into one variable labeled “transgender sex partners in past 6 months”. I then combined the data for number of male partners, number of female partners, and number of transgender partners into a new continuous variable called “sexual behavior”. Variables for other substances used in the past 6 months were already delineated by substance type, so I created another variable and used the compute function in SPSS to calculate if any of the listed substances had been used in the past 6 months, which collapsed all responses to all substance use questions, and the results returned either a “yes” or “no” data point accordingly. Many variables did not require recoding, such as social support, internalized homophobia, and depression, which were left as categorical variables. The variable city was left a nominal variable and already coded as “1” Atlanta, “2” New York, “3” Washington DC, “4” Boston, “5” Los Angeles, and “6” San Francisco. All variables that were used in the study, whether they were recoded or not, are listed in Table 1 including a level of measurement for each.

Table 1

Variables Description and Level of Measurement

Variable Name	Description	Level of Measurement
HIV Test History	Whether participant has tested for HIV in past 12 months	Nominal
Age Category Label	Age of participant	Interval
sexual_behavior	Number of sexual partners in past 6 months	Interval
SsScaleSum	Sum of scale scores indicating level of social support perceived by participant	Ordinal
substance_use	Whether participant has used illegal or nonprescription drugs in past 6 months	Nominal
IhScaleSum	Sum of scale scores indicating level of internalized homophobia perceived by participant	Ordinal
DepScale	Whether the participant's sum scores indicate "depression" or "non-depression"	Nominal
City	City of participant's residence	Interval

There were 1,553 participants in the original study. After applying the inclusion criteria, 31 participants were removed from the analysis because they identified as transgender, four participants were removed from the analysis due to not completing enrollment visit, 163 participants were removed from the analysis due to having a prior HIV diagnosis, and 208 cases were removed due to missing values for HIV testing in the past 12 months (outcome of interest) leaving 1,147 participants. Table 2 displays the descriptive statistics for the variables.

Table 2

Descriptive Statistics and Demographics (n=1,147)

	n	% or *M*(*SD*)
Age *M*(*SD*)		37.7 (11.75)
18-20	81	7.1%
21-30	**343**	**29.9%**
31-40	206	18%
41-50	**362**	**31.6%**
51-60	141	12.3%
>60	14	1.2%
Educational Attainment		
8th Grade or Less	16	1.4%
Some High School	169	14.7%
High School Graduate or Equivalent	**389**	**33.9%**
Vocational/Training/Technical	23	2%
Some College or 2-year Degree	**384**	**33.5%**
Finished College	120	10.5%
Masters or Advanced Degree	45	3.9%
Not Applicable	1	0.1%
Relationship Status (%)		
Has Primary/Main Partner, Not Living Together	45	3.9%
Living w/Primary/Main Partner	54	4.7%
Married/Civil Union	33	2.9%
Single/Divorced/Widowed	**1014**	**88.4%**
Not Applicable	1	0.1%
Currently Working (%)		
Full time	192	16.7%
Part time	216	18.8%
Unemployed	**601**	**52.4%**
Unable to Work	121	10.5%
Retired	16	1.4%
N/A	1	0.1%
Currently a Student (%)		
No	**908**	**79.2%**
Yes	239	20.3%

(*table continues*)

	n	% or *M*(*SD*)
Annual Household Income (%)		
≤$20,000	**645**	**56.2%**
$20,000-$29,999	158	13.8%
$30,000-$39,999	116	10.1%
$40,000-$49,999	71	6.2%
$50,000-$59,999	46	4%
$60,000-$69,999	25	2.2%
$70,000-$79,999	13	1.1%
$80,000+	65	5.7%
N/A	8	0.7%
Housing Status (%)		
I live by myself	**349**	**30.4%**
I live w/a partner	116	10.1%
I live w/a roommate	274	23.9%
I live w/ members of my house	2	0.2%
I live w/ relatives	242	21.1%
I don't have a stable home	104	9.1%
Other	60	5.2%
Has Healthcare (%)		
Yes	**682**	**59.5%**
No	465	40.5%
Site (%)		
Atlanta, GA	220	19.2%
Los Angeles, CA	181	15.8%
San Francisco, CA	148	12.9%
Washington, DC	177	15.4%
Boston, MA	187	16.3%
New York, NY	**234**	**20.4%**
Sexual Behavior		
No sex partners in past 6 months	5	0.4%
1 to 4 sex partners in past 6 months	**542**	**47.2%**
5 to 9 sex partners in past 6 months	339	29.5%
10 or more sex partners in past 6 months	261	22.9%

(*table continues*)

	n	% or *M*(*SD*)
Substance Use		
No- substance use in past 6 months	323	28.2%
Yes- substance use in past 6 months	**809**	**70.5%**
Missing	15	1.3%
Depression		
Depression (>=16)	482	42%
Nondepression (0-15)	**665**	**58%**
Internalized Homophobia		
High (27-35)	138	12%
Medium (17-26)	400	34.9%
Low (7-16)	**609**	**53.1%**
Social Support		
High (22-30)	**535**	**46.6%**
Moderate (14-21)	364	31.7%
Low (6-13)	248	21.6%

Many of the respondents were between the ages of 21-30 and 41-50, with varying degrees of education but many having completed high school or a GED and some college or a 2-year degree. Most participants identified as single, unemployed, not a student, with an income of less than $20,000 annually, and many resided by themselves or resided with a roommate, had healthcare, and were recruited at the site in New York.

Bivariate Analysis

Binominal logistic regression was conducted to examine potential associations between the dependent and individual independent variables. This step in the analysis process focused on understanding how the combination of independent variables may or may not influence the main logistic regression model by examining them individually.

Logistic regression requires several assumptions be considered; where the first four are related to the study design, and the last three are related to how the data fit the model (Field, 2013). The assumptions of logistic regression are noted below, and have been met in the analysis described below, unless otherwise stated:

- One dependent variable- categorical, dichotomous-: This assumption was met by viewing the data.
- One independent variable- categorical or continuous: This assumption was met by viewing the data.
- 15 cases minimum per independent variable: This assumption was met by viewing the data.
- A linear relationship between continuous independent variables and dependent variable: Natural log transformations were performed and analyzed.
- Independence of observations: This assumption was met by viewing the data. A participant could either have tested for HIV in the past 12 months or not, but not both.
- Data should not contain significant outliers: No significant outliers were present in the data.

Age and HIV Test History

The following hypotheses were considered during this study:

- $H_0$2: There is no statistically significant relationship between age and HIV test history in BMSM.

- H_a2: There is a statistically significant relationship between age and HIV test history in BMSM.

In Table 3, linearity of the continuous variables with respect to the logit of the dependent variable was assessed via the Box-Tidwell (1962) procedure and by reviewing the scatterplot output. Based on the Box-Tidwell procedure, the interaction term was not statistically significant and, as a result, the continuous variable was found to be linearly related to the logit of the dependent variable. From the scatterplot output, age has a linear relationship with HIV test history, thus from these two procedures, the assumption of linearity was met. The logistic regression model to determine the predictive relationship and odds ratio between age and HIV test history was statistically significant, $\chi^2(1) = 4.603$, $p < .05$. The model presented 0.8% (Nagelkerke R^2) of the variance in HIV test history. In Table 4, the results indicate age has a statistically significant relationship to HIV test history (p=0.032), and the results indicate that for each unit reduction in age (exp(B)=0.983), the odds of having taken an HIV test in the past 12 months increases by a factor of 1.02 (*CI*: 1.33-1.00). The odds were calculated based on inverting the Exp(B) figure as well as the confidence intervals. Based on the results, I rejected the null hypothesis and accept the alternative hypothesis there is a statistically significant relationship between age and HIV test history.

Table 3

Box-Tidwell Procedure to Test for Linearity between Age and HIV Test History

							95% *CI* for EXP(B)	
		B	*SE*	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Age at Enrollment (Years)	.143	2.975	.002	1	.962	1.154	.003	393.202
	ln_age	-6.064	18.911	.103	1	.748	.002	.000	290448401 30000.000
	Age at Enrollment (Years) by ln_age	.002	.532	.000	1	.997	1.002	.353	2.840
	Constant	18.113	29.327	.381	1	.537	73481356.920		

a. Variable(s) entered on Step 1: Age at Enrollment (Years), ln_age, Age at Enrollment (Years) * ln_age.

Table 4

Logistic Regression Predicting Likelihood of HIV Testing based on Age

							95% *CI* for EXP(B)	
		B	*SE*	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Age at Enrollment	-.017	.008	4.577	1	.032	.983	.968	.999
	Constant	2.693	.318	71.534	1	.000	14.775		

a. Variable(s) entered on Step 1: Age at Enrollment.

Sexual Behavior and HIV Test History

The following hypotheses were considered:

- $H_0$3: There is no statistically significant relationship between sexual behavior, defined as number of sexual partners, and HIV test history in BMSM.

- H_a3: There is a statistically significant relationship between sexual behavior, defined as number of sexual partners, and HIV test history in BMSM.

In Table 5, linearity of the continuous variables with respect to the logit of the dependent variable was assessed via the Box-Tidwell (1962) procedure and by reviewing the scatterplot output. Based on the Box-Tidwell procedure, the interaction term was not statistically significant, and as a result the continuous variable was found to be linearly related to the logit of the dependent variable. From the scatterplot output, sexual behavior has a linear relationship with HIV test history, thus from these two procedures, the assumption of linearity was met. The logistic regression model to determine the predictive relationship and odds ratio between sexual behavior and HIV test history was not statistically significant, $\chi^2(1) = 1.340$, $p > .05$. The model presented 0.2% (Nagelkerke R^2) of the variance in HIV test history. In Table 6, the results indicate sexual behavior did not have a statistically significant relationship to HIV test history (p=0.470), and the results indicate that for each unit increase in sexual partner (exp(B)=1.006), the odds of having taken an HIV test in the past 12 months increases by a factor of 1.01 (*CI* 0.989-1.023). Based on the results, I failed to reject the null hypothesis that there is no statistically significant relationship between sexual behavior and HIV test history.

Table 5

Box-Tidwell Procedure to Test for Linearity between Sexual Behavior and HIV Test History

								95% *CI* for EXP(B)	
		B	*SE*	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	sexual behavior	-.219	.231	.895	1	.344	.804	.511	1.264
	Ln_sexualbehavior	.397	.465	.726	1	.394	1.487	.597	3.702
	Ln_sexualbehavior by sexual behavior	.049	.051	.932	1	.334	1.051	.950	1.161
	Constant	2.150	.235	83.408	1	.000	8.581		

a. Variable(s) entered on Step 1: sexual behavior, Ln_sexualbehavior, Ln_sexualbehavior * sexual behavior.

Table 6

Logistic Regression Predicting Likelihood of HIV Testing based on Sexual Behavior

								95% *CI* for EXP(B)	
		B	*SE*	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	sexual behavior	.006	.009	.522	1	.470	1.006	.989	1.023
	Constant	2.006	.113	315.645	1	.000	7.432		

a. Variable(s) entered on Step 1: sexual behavior.

Substance Use and HIV Test History

The following hypotheses were considered:

- $H_0$4: There is no statistically significant relationship between substance use, defined as have or have not used any illegal or nonprescribed substances in the past 6 months, and HIV test history in BMSM.
- H_a4: There is a statistically significant relationship between substance use, defined as have or have not used any illegal or nonprescribed substances in the past 6 months, and HIV test history in BMSM.

The logistic regression model to determine the predictive relationship and odds ratio between substance use and HIV test history was not statistically significant, $\chi^2(1) = 0.028$, $p > .05$. The model presented 0% (Nagelkerke R^2) of the variance in HIV test history. In Table 7, the results indicate substance use did not have a statistically significant relationship to HIV test history (p=0.867) and compared to those who have not used substances in the past 6 months, those who do have 1.04 times higher odds of having tested for HIV in the past 12 months. Based on the results, I failed to reject the null hypothesis that there is no statistically significant relationship between substance use and HIV test history.

Table 7

Logistic Regression Predicting Likelihood of HIV Testing based on Substance Use

							95% *CI* for EXP(B)	
		B	*SE*	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	substance_use (1)	.035	.208	.028	1	.867	1.035	.688	1.558
	Constant	2.041	.110	342.900	1	.000	7.699		

a. Variable(s) entered on Step 1: substance_use.

Depression and HIV Test History

The following hypotheses were considered:

- $H_0$5: There is no statistically significant relationship between depression, as measured using the 20-item Center for Epidemiologic Studies Depression Scale (CES-D) (Reisner et al., 2009), and HIV test history in BMSM.
- H_a5: There is a statistically significant relationship between depression, as measured using the 20-item Center for Epidemiologic Studies Depression Scale (CES-D) (Reisner et al., 2009), and HIV test history in BMSM.

The logistic regression model to determine the predictive relationship and odds ratio between depression and HIV test history was not statistically significant, $\chi^2(1) = 0.005$, $p > .05$. The model presented 0% (Nagelkerke R^2) of the variance in HIV test history. In Table 8, the results indicate depression did not have a statistically significant relationship to HIV test history (p=0.943) and compared to those who are not depressed, those who are depressed have 1.01 times lower odds of having tested for HIV in the past

12 months. Based on the results, I failed to reject the null hypothesis that there is no statistically significant relationship between depression and HIV test history.

Table 8

Logistic Regression Predicting Likelihood of HIV Testing based on Depression

							95% *CI* for EXP(B)	
		B	*SE*	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	DepressionScale(1)	-.014	.194	.005	1	.943	.986	.674	1.443
	Constant	2.037	.149	187.179	1	.000	7.667		

a. Variable(s) entered on Step 1: DepressionScale.

Internalized Homophobia and HIV Test History

The following hypotheses were considered:

- $H_0$6: There is no statistically significant relationship between internalized homophobia, as measured by a 7-item scale adapted from Herek and Glunt (1995), and HIV test history in BMSM.
- H_a6: There is a statistically significant relationship between internalized homophobia, as measured by a 7-item scale adapted from Herek and Glunt (1995), and HIV test history in BMSM.

The logistic regression model to determine the predictive relationship and odds ratio between internalized homophobia and HIV test history was not statistically

significant, $\chi^2(2) = 4.516$, $p > .05$. The model presented 0.8% (Nagelkerke R^2) of the variance in HIV test history. In Table 9, the results indicate internalized homophobia overall does not have a statistically significant relationship to HIV test history (p=0.089), and that compared to those with high levels of internalized homophobia, those with low levels of internalized homophobia did have a statistically significant relationship to HIV test history (p=0.031), and those with medium levels of internalized homophobia did not have a statistically significant relationship to HIV test history (p=0.145). Compared to those who experience high levels of internalized homophobia, those with low levels of internalized homophobia have 1.97 times greater odds of having tested for HIV in the past 12 months, and those with medium levels of internalized homophobia have 1.60 greater odds of having tested for HIV in the past 12 months. Based on the results, I rejected the null hypothesis and accept the alternative hypothesis there is a statistically significant relationship between internalized homophobia and HIV test history.

Table 9

Logistic Regression Predicting Likelihood of HIV Testing based on Internalized Homophobia

								95% *CI* for EXP(B)	
		B	*SE*	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	InternalHom			4.847	2	.089			
	InternalHom(1)	.681	.316	4.654	1	.031	1.975	1.064	3.666
	InternalHom(2)	.472	.324	2.128	1	.145	1.604	.850	3.025
	Constant	1.497	.286	27.453	1	.000	4.467		

a. Variable(s) entered on Step 1: InternalHom.

Social Support and HIV Test History

The following hypotheses were considered:

- $H_0$7: There is no statistically significant relationship between social support, as measured by a 6-item scale adapted from Berkman and Syme (1979), and HIV test history in BMSM.
- H_a7: There is a statistically significant relationship between social support, as measured by a 6-item scale adapted from Berkman and Syme (1979), and HIV test history in BMSM.

The logistic regression model to determine the predictive relationship and odds ratio between social support and HIV test history was not statistically significant, $\chi^2(2) = 0.664$, $p > .05$. The model presented 0.1% (Nagelkerke R^2) of the variance in HIV test history. In Table 10, the results indicate that overall social support does not have a statistically significant relationship with HIV test history (p=0.666), and that compared to persons with high levels of social support, neither those with low (p=0.475) or moderate (p=0.426) social support had a statistically significant relationship with HIV test history. Compared to those who experience high levels of social support, those with low levels of social support have 1.19 times less odds of having tested for HIV in the past 12 months, and those with moderate levels of social support have 1.19 times less odds of having tested for HIV in the past 12 months. Based on the results, I failed to reject the null

hypothesis there is no statistically significant relationship between social support and HIV test history.

Table 10

Logistic Regression Predicting Likelihood of HIV Testing based on Social Support

								95% *CI* for EXP(B)	
		B	*SE*	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	SocialSupportScale			.812	2	.666			
	SocialSupportScale (1)	-.175	.245	.511	1	.475	.839	.519	1.357
	SocialSupportScale (2)	-.175	.219	.633	1	.426	.840	.546	1.291
	Constant	2.159	.149	208.882	1	.000	8.660		

a. Variable(s) entered on Step 1: SocialSupportScale.

Multivariate Analysis

I conducted multiple logistic regression to examine potential associations between the dependent and all independent variables. The assumptions were met in previous analyses with these variables and are described above. The primary null hypothesis was that there is no statistically significant association between age, sexual behavior, substance use, depression, internalized homophobia, and social support with HIV testing among BMSM. The primary alternative hypothesis was that there is a statistically significant association between age, sexual behavior, substance use, depression,

internalized homophobia, and social support with HIV testing among BMSM. This analysis included the control variable site.

The logistic regression model to determine the predictive relationship and odds ratio between age, sexual behavior, substance use, depression, internalized homophobia, and social support and HIV test history when controlling for site was not statistically significant, $\chi^2(13) = 19.437$, $p > .05$. The model presented 3.7% (Nagelkerke R^2) of the variance in HIV test history. In Table 11, the results indicated overall social support (p=0.720) did not have a statistically significant relationship to HIV test history, and when compared to high levels of social support that low (p=0.419) and moderate (p=0.686) levels of social support also did not have a statistically significant relationship. Age (p=0.038) had a statistically significant relationship with HIV test history, and the results indicated that for each one unit decrease in age, the odds of having taken an HIV test in the past 12 months increase by a factor of 1.02 (CI: 1.04-1.00). Table 11 also presents that sexual behavior (p=0.521) doesn't have a statistically significant relationship to HIV test history. Substance use (p=0.971) does not have a statistically significant relationship to HIV test history, and the results indicated that compared to those who have not used substances in the past 6 months, those who do had 1.01 times higher odds of having tested for HIV in the past 12 months. Table 11 presented depression (p=0.597) and overall internalized homophobia (p=0.197) do not have a statistically significant relationship to HIV test history, and that compared to those who experience high levels of internalized

homophobia had 1.83 times greater odds of having tested for HIV in the past 12 months, and those with medium levels of internalized homophobia had 1.61 greater odds of having tested for HIV in the past 12 months. Recruitment site did not have a statistically significant relationship to HIV test history, though recruitment through the Atlanta site (p=0.034) had a statistically significant relationship to HIV test history and participants recruited at that site had 2.16 greater odds of having an HIV test in the past 12 months than other sites.

Table 11

Logistic Regression Predicting Likelihood of HIV Testing based on Age, Sexual Behavior, Substance Use, Depression, Internalized Homophobia, and Social Support Controlling for Recruitment Site

							95% *CI* for EXP(B)	
		B	*SE*	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	SocialSupportScale			.657	2	.720			
	SocialSupportScale (1)	-.216	.267	.654	1	.419	.806	.478	1.359
	SocialSupportScale (2)	-.095	.235	.164	1	.686	.909	.574	1.441
	Age at Enrollment	-.018	.009	4.293	1	.038	.982	.965	.999
	sexual behavior	.006	.009	.413	1	.521	1.006	.989	1.023
	substance_use (1)	-.008	.225	.001	1	.971	.992	.638	1.542
	Depression(1)	-.114	.216	.279	1	.597	.892	.584	1.362
	InternalHom			3.251	2	.197			
	InternalHom(1)	.603	.334	3.250	1	.071	1.827	.949	3.517
	InternalHom(2)	.477	.336	2.017	1	.156	1.611	.834	3.109
	Site Categories			7.763	5	.170			

(*table continues*)

	B	*SE*	Wald	*df*	Sig.	Exp(B)	95% *CI* for EXP(B) Lower	Upper
Site Categories(1)	-.772	.364	4.499	1	.034	.462	.226	.943
Site Categories(2)	-.222	.381	.339	1	.561	.801	.380	1.690
Site Categories(3)	-.214	.425	.253	1	.615	.808	.351	1.856
Site Categories(4)	-.104	.401	.067	1	.796	.902	.411	1.978
Site Categories(5)	-.236	.400	.349	1	.555	.790	.361	1.728
Constant	2.601	.614	17.966	1	.000	13.482		

a. Variable(s) entered on Step 1: SocialSupportScale, Age at Enrollment, sexual behavior, substance_use, Depression, InternalizedHomophobia, Site Categories.

Summary

The results of this study are, individually, age and having low levels of internalized homophobia were significantly associated with HIV test history, and sexual behavior, substance use, depression and social support were not significantly associated with HIV test history. Including age and internalized homophobia into the full logistic regression model resulted in significant associations as well, though some associations changed slightly in value. The individual models overall were weaker than the combined model, which displayed an explanatory variance greater than the individual models. Accordingly, age, internalized homophobia, and recruitment site do affect the HIV test history of the sample population. In the next chapter, I will elaborate on the results and discuss social and practical implications derived from the results.

Chapter 5: Discussion, Conclusions, Recommendations

Overview

There is limited data that has illuminated the factors associated with BMSM seeking HIV testing services. This is a problem because if public health practitioners are unaware of these factors, then HIV testing messages and strategies focused on BMSM will be less effective. There is insufficient data available that examines interactions specifically between demographics, HIV sexual risk behaviors, substance use behaviors, internalized homophobia, depression, social support, and HIV testing behaviors though many sources point to interactions of varying degrees between some of these factors (Hall, Song et al., 2017; Maulsby et al., 2014; Millett et al., 2012; Singh et al., 2014).

My aim with this study was to assess the association of age, sexual behavior, substance use, depression, internalized homophobia, and social support with HIV testing history among BMSM. To accomplish this, I tested the following research question:

- Is there an association between age, sexual behavior, social support, substance use, internalized homophobia, depression, and HIV test history in BMSM?

I conducted a secondary analysis of HPTN 061 study baseline enrollment data collected from 2009 to 2011 among BMSM who were recruited at several clinical research sites in the United States. Age, internalized homophobia, and recruitment site had a statistically significant relationship with having an HIV test history. Next, I discuss the interpretation of the findings for each of the individual bivariate models and then the multivariate model, study limitations, implications for social change, and provide

recommendations for action and for further research. Finally, I summarize this dissertation with closing statements.

Interpretation of the Findings

In Chapter 4, I described the analysis and results for this study. Predictive associations between age, sexual behavior, substance use, depression, internalized homophobia, and social support with HIV testing history were explored with bivariate and multivariate logistic regression models. Age, lower levels of internalized homophobia, and the study site participants were recruited from were significantly associated with having an HIV test history, which is defined by having taken an HIV test in the prior 12 months before enrollment. The significant association between these variables was observed in the individual bivariate logistic regression models, as well as the larger multivariate logistic regression model. The results showed that having a lower age was significantly associated with having an HIV test history, in contrast to having an older age, which was not significant. The results also showed that having lower levels of internalized homophobia was significantly associated with having an HIV test history, and that being recruited at the Atlanta study site was significantly associated with an HIV test history. The results show that sexual behavior, substance use, depression, and social support were not significantly associated with an HIV test history.

Age and HIV Test History

Including race in the bivariate and multivariate models contributed to the model fit. According to the Nagelkerke Pseudo R^2, age alone explained 0.8% of the variance

between the independent and dependent variables. The results of this study indicate that for each decrease in year in age the odds of having taken an HIV test in the past 12 months increases by a factor of 1.02 (*CI*: 1.33-1.00). Based on the literature, I expected age to have a significant association to HIV test history in this study, and more specifically, I expected having a younger age would be more significant. This result supports findings from other studies (Halkitis et al., 2011; Koblin et al., 2013; Mayer et al., 2014) that younger BMSM are more inclined to seek HIV testing opportunities because they engage in behaviors that place them at elevated risk for HIV.

This result is primarily situated on the MSEM at the individual level, which identifies the behavioral and biologic characteristics that are associated with HIV vulnerability, including age, education, and income among others (Baral et al., 2013). As previously stated, nearly 75% of the BMSM that seroconverted in 2015 were between the ages of 13-34 (CDC, 2017b); younger BMSM are at elevated risk for HIV and it is important that efforts are made to reduce this burden in this age group. However, this may not be enough to reduce the number of BMSM who are unaware of their HIV status broadly, because if younger BMSM go on without being aware of their HIV status, they may age out of youth-focused HIV prevention efforts and maintain this lack of awareness into their older age.

Sexual Behavior and HIV Test History

Including sexual behavior in the bivariate and multivariate models did not contribute to the model fit. According to the Nagelkerke Pseudo R^2, sexual behavior

alone explained 0.2% of the variance between the independent and dependent variables. The results indicate that sexual behavior did not have a significant relationship to HIV test history. Based on the literature, I did not expect sexual behavior to have a significant association to HIV test history in this study, but I hypothesized that it may have some interaction when combined with other factors. This result supports findings from other studies (Millett et al., 2006; Millett et al., 2012; Maulsby et al., 2014) that sexual behavior (as defined by the number of sex partners) is not a significant factor that places BMSM at elevated risk for HIV.

This result is primarily situated on the MSEM at the individual level which identifies the behavioral and biologic characteristics that are associated with HIV vulnerability, including age, education, and income among others; the network level which identifies the social and sexual network factors that are associated with HIV vulnerability, including relationships with sexual partners, family, friends, and others that influence health behaviors or decisions, and the community level which identifies the community-level norms and structures that are associated with HIV vulnerability, including stigma, discrimination, and violence related to HIV status, sexual orientation, gender identity, or gender expression (Baral et al., 2013). Though sexual behavior was not a significant factor in HIV test history in this study, its relationship to overall sexual health including HIV and STI outcomes cannot be overstated. Among behavioral HIV risk groups, BMSM are one of the most disparately impacted groups by HIV in the United States and see more new HIV cases than any other subpopulation of record

(citation). BMSM represent only about 0.2% of the U.S. population but experience HIV disparities approximately three times higher than White MSM, approximately 22 times higher than the larger Black population, and approximately 72 times higher than the general United States population (Millett et al., 2012). BMSM are estimated to have a one in three chance of acquiring HIV in their lifetime (Hall et al., 2008). BMSM are a unique and diverse population, not just in terms of HIV epidemiological profile (compared to MSM of other racial/ethnic groups), but also in terms of socialization, sexual behavior and sexual identity (Hall et al., 2008).

Substance Use and HIV Test History

Including substance use in the bivariate and multivariate models did not contribute to the model fit. According to the Nagelkerke Pseudo R^2, substance use alone explained 0% of the variance between the independent and dependent variables. The results indicate that substance use did not have a significant relationship to HIV test history. Based on the literature, I did not expect substance use to have a significant association to HIV test history in this study, but I hypothesized that it may have some interaction when combined with other factors (Maulsby et al., 2014; Mayer et al., 2014). The literature has conflicting results on the impact of substance use on HIV incidence (Andrasik et al., 2013; Dyer et al., 2013; Hickson et al., 2015; Jeffries, 2014), though HIV testing history was not the outcome variable in those studies. This result supports findings from other studies (Koblin et al., 2013; Dyer et al., 2013; Millett et al., 2006;

Millett, et al., 2012) that substance use is not a significant factor that places BMSM at elevated risk for HIV.

This result is primarily situated on the MSEM at the individual level, which identifies the behavioral and biologic characteristics that are associated with HIV vulnerability, including age, education, and income among others (Baral et al., 2013). Though substance use was not a significant factor in HIV test history in this study, its relationship to overall sexual health including HIV and STI outcomes cannot be overstated.

Depression and HIV Test History

Including depression in the bivariate and multivariate models did not contribute to the model fit. According to the Nagelkerke Pseudo R^2, depression alone explained 0.2% of the variance between the independent and dependent variables. The results indicated that depression did not have a significant relationship to HIV test history. Based on the literature, I did not expect depression to have a significant association to HIV test history in this study, but I hypothesized that it may have some interaction when combined with other factors (Maulsby et al., 2014; Mayer et al., 2014). This result supports findings from other studies (Koblin et al., 2013; Millett et al., 2006; Millett, et al., 2012) that depression is not associated with being tested for HIV.

This result is primarily situated on the MSEM at the individual level, which identifies the behavioral and biologic characteristics that are associated with HIV vulnerability, including age, education, and income among others, as well as the

community-level which identifies the community-level norms and structures that are associated with HIV vulnerability, including stigma, discrimination, and violence related to HIV status, sexual orientation, gender identity, or gender expression (Baral et al., 2013). Though depression was not a significant factor in HIV test history in this study, its relationship to overall sexual health including HIV and STI outcomes should not be ignored. BMSM experience elevated levels of stigma and discrimination in their homes, among family, in religious settings and spaces, in educational and employment settings, and in medical and healthcare settings (CDC, 2017b; CDC, 2016; Fields et al., 2015; Maulsby et al., 2014; Millett et al., 2006; Nelson et al., 2017), that contribute to experiences with depression, negative self-concept, and other mental health issues. These experiences and conditions interact with other social constructs about masculinity, Black identity, and gender expression to create unhealthy associations between these concepts and the conditions, circumstances, and beliefs in how BMSM should partner and socialize that result in the performance of higher risk sexual practices (Fields et al., 2015; Nelson et al., 2017). These conditions and factors, coupled with the extreme experiences of stigma and discrimination, contribute to susceptibility to depression, suicide ideation/suicide attempts, and increased HIV susceptibility (Fields et al., 2015; Mannheimer et al., 2014; Maulsby et al., 2014; Millett et al., 2012; Nelson et al., 2017).

Internalized Homophobia and HIV Test History

Including internalized homophobia in the bivariate and multivariate models did contribute to the model fit. According to the Nagelkerke Pseudo R^2, internalized

homophobia alone explained 0.8% of the variance between the independent and dependent variables. The results indicate that internalized homophobia did have a significant relationship to HIV test history. While internalized homophobia alone did not directly account for all HIV testing history, I affirm that internalized homophobia is a significant factor this sample. The results of this study show that BMSM who experience low levels of internalized homophobia were 1.97 times more likely to have an HIV test history, than those who had medium and high levels of internalized homophobia. Based on the literature, I did expect internalized homophobia to have a significant association to HIV test history in this study. This result supports findings from other studies (Fields et al., 2012, 2015; Millett et al., 2006; Millett, et al., 2012) that internalized homophobia is a significant factor that places BMSM at elevated risk for HIV.

This result is primarily situated on the MSEM at the individual level, which identified the behavioral and biologic characteristics that are associated with HIV vulnerability, including age, education, and income among others, as well as the community-level which identifies the community-level norms and structures that are associated with HIV vulnerability, including stigma, discrimination, and violence related to HIV status, sexual orientation, gender identity, or gender expression (Baral et al., 2013).

Social Support and HIV Test History

Including social support in the bivariate and multivariate models did not contributed to the model fit. According to the Nagelkerke Pseudo R^2, social support alone

explained 0.1% of the variance between the independent and dependent variables. The results indicated that social support did not have a significant relationship to HIV test history. Based on the literature, I did expect social support to have a significant association to HIV test history in this study, and I hypothesized that it may have some interaction when combined with other factors. This result conflicted with many findings from other studies that described the significance of social support systems and their relationship to mitigating negative health outcomes for BMSM (Fields et al., 2015; Hall et al, 2017a; Hickson et al., 2015; Maulsby et al., 2014).

This result is primarily situated on the MSEM at the individual level, which identified the behavioral and biologic characteristics that are associated with HIV vulnerability, including age, education, and income among others; the community-level, which identified the community-level norms and structures that are associated with HIV vulnerability, including stigma, discrimination, and violence related to HIV status, sexual orientation, gender identity, or gender expression; and the network level which identified the social and sexual network factors that are associated with HIV vulnerability, including relationships with sexual partners, family, friends, and others that influence health behaviors or decisions (Baral et al., 2013).

Age, Sexual Behavior, Substance Use, Depression, Internalized Homophobia, and Social Support, Recruitment Site, and HIV Test History

Including age, sexual behavior, substance use, depression, internalized homophobia, social support, and recruitment site in the multivariate model did contribute

to the model fit. According to the Nagelkerke Pseudo R^2, the combination of all independent variables in the model explained 3.7% of the variance between the independent and dependent variables. The results indicated that age, internalized homophobia, and recruitment site did have a significant relationship to HIV test history, whereas sexual behavior, substance use, depression, and social support did not have a significant relationship to HIV test history. Based on the literature, I expected age, internalized homophobia, and social support to have a significant association to HIV test history in this study, and I hypothesized that it may have some interaction when combined with other factors. There are no literature sources that examine all of these factors in combination to assess the relationship between them and HIV test history among BMSM, so these results extend knowledge in the discipline.

This result is primarily situated on the MSEM at the individual level, which identifies the behavioral and biologic characteristics that are associated with HIV vulnerability, including age, education, and income among others; the community-level which identifies the community-level norms and structures that are associated with HIV vulnerability, including stigma, discrimination, and violence related to HIV status, sexual orientation, gender identity, or gender expression; and the network level which identifies the social and sexual network factors that are associated with HIV vulnerability, including relationships with sexual partners, family, friends, and others that influence health behaviors or decisions (Baral et al., 2013).

Application of the MSEM to the Study

The MSEM was utilized to frame this study and the results. As previously stated, the MSEM levels are not static, and the boundaries of them should not be viewed as distinct, but as porous, allowing factors that are situated on one level to span multiple levels (Baral et al., 2013). Age and substance use are primarily individual level factors, as they involve the biological and behavioral factors of the person, but these two factors may also span multiple levels due to their interaction with other behavioral and psycho-social factors (Maulsby et al., 2014; Mayer et al., 2014). Sexual behavior is primarily viewed as unique personal factor (individual level), but it also spans other levels due to the interaction with social norms in how BMSM partner and their actual partners (network level), and the stigmatic and discrimination experiences that BMSM are subjective to that influence their self-identity and mental health (community level) (Maulsby et al., 2014; Mayer et al., 2014). Depression and internalized homophobia are primarily viewed as individual behavioral factors (individual level), but they too also spans other levels due to the interaction with social and sexual norms during experiences family, friends, and partners (network level); experiences with stigma, discrimination, and violence related to their actual or perceived sexual orientation, gender identity, gender expression, and race (community level); high levels of incarceration of Black men in the U.S., societal norms about Black people, especially Black men, and societal attitudes and norms about sexuality (public policy level) (Fields et al., 2015; Maulsby et al., 2014; Millett et al., 2012; Nelson et al., 2017).

Summary of Interpretations

According to the results, age, lower levels of internalized homophobia, and which study site participants were recruited from were significantly associated with having an HIV test history, which is defined by having taken an HIV test in the prior 12 months before enrollment. The results also show that sexual behavior, substance use, depression, and social support were not significantly associated with an HIV test history. The significant association between age and internalized homophobia was observed in the individual bivariate logistic regression models, as well as the larger multivariate logistic regression model. The results showed that for every year decrease in age, the likelihood of testing for HIV increases. The results also showed that having lower levels of internalized homophobia was significantly associated with having an HIV test history, and that being recruited at the Atlanta study site was significantly associated with an HIV test history. The MSEM provided an appropriate framework to contextualize this study's methods, results, and the interpretation of the results.

Limitations

Some limitations in this study may impact internal and external validity. The limitations from the original study include how the sample was derived, such as the enrollment for HIV uninfected participants was capped at 200 at each site, and participants living with HIV who were recruited through participant referral was capped at 10 (Mayer et al., 2014). Another key limitation from the original study relating to

sampling strategy was that though this was a community-recruited sample, the research sites in the study were able to utilize various methods and venues and sites who accessed STI clinics more than others, as an example, may have introduced selection bias into the sample (Scott et al., 2015).

Limitations in this study included the use of secondary data, response bias, recruitment sites were only in major cities, the use of a cross-sectional study design. This study utilized data collected previously through a government-funded research network, with research sites around the world, and the use of secondary data causes some limitations to the types of questions that were included in this study and the number of respondents to each question since I could not control the construction and application of the instruments used in the original study or the inclusion and exclusion criteria of the original study. Response bias occurs when participants do not accurately recall previous experiences or events or omit information, and is a common limitation whenever participants provide information through self-report measures, such as through a survey or questionnaire. This self-reported information may interact with the interpretation of the results from this study. The original sample was recruited from several research sites that are in major U.S.-based cities that have larger estimated Black and BMSM populations, so generalizations of these findings to all BMSM is limited. This study uses a cross-sectional design, so any inference to causality or direction of the relationship between variables is limited.

Implications for Social Change

The purpose of this study was to address the gap in the literature regarding how demographic, behavioral, and psychosocial factors may influence HIV testing among BMSM. The MSEM provided the theoretical framework for this study and was developed to build upon previous ecological models and frameworks to specifically examine HIV risk at multiple levels, and to situate individual level HIV risk in the context of social network, community, policy levels and the overall epidemic (Baral et al., 2013). One of the social change implications of this study was understanding the relationship between age, sexual behavior, substance use, depression, internalized homophobia, and social support with HIV test history may enhance or inform new HIV prevention and testing strategies to reduce the number of BMSM of unknown HIV status who may transmit HIV.

The results from this study, and others, indicate that age and internalized homophobia are strongly associated with having an HIV test history (CDC, 2017b; Fields et al., 2015; Millett et al., 2012; Maulsby et al., 2014). Young BMSM are at elevated risk for HIV and continue to see increases in HIV incidence compared to BMSM of other age groups (CDC, 2017b). BMSM experience heighted levels of homophobia in community settings, like schools, faith and religious institutions, and their neighborhoods and homes from family members and relatives who hold strong beliefs about sexual identity and gender expression. Social norms about masculinity and gender expression in the Black community also affect BMSM and inform their identity development as well as their

sexual experiences (e.g., partner selection, desirability to other MSM, self-esteem) (Fields et al., 2015; Jeffries et al., 2013; Maulsby et al., 2014). These experiences, particularly during the earlier developmental stages of a BMSM identity, present an internal conflict from the pressure to conform to expectations around masculinity and gender expression. This conflict often results in BMSM attempting to camouflage their sexuality or engage in behaviors to prove their masculinity and "manhood". This phenomenon also intersects with sexual identity and sexual behavior, specifically in terms of gay-identified BMSM vs non-gay identified BMSM, and whether insertive or receptive anal intercourse is preferred or desired from a partner (Fields et al., 2015; Maulsby et al., 2014). This results in conflicting beliefs and challenges navigating social and sexual networks where being "masculine" means being a "real man" and also means being a "top" or insertive sexual partner, and being "feminine" means being less than a "real man" (read: woman), which equals being a "bottom" or receptive partner (Fields et al., 2012).

The findings from this study support the idea that HIV prevention messages that are focused on engaging BMSM in testing should be nuanced to the diversity in the lived experiences of BMSM, and should strongly consider age-nuanced approaches, and approaches that factor experiences with, and levels of, internalized homophobia to make HIV prevention and testing messages and strategies more effective.

Recommendations for Action

Fields et al. (2015) stated that BMSM experience increased risk for HIV due to the psychosocial effects of performing "masculine" due to social and structural norms and expectations regarding gender, masculinity, and sexuality that result in an internal conflict. These associations create unhealthy beliefs about how BMSM partner, socialize, and engage in safer sex behaviors that are reinforced by social norms about masculinity, gender expression, and heterosexism. This conflict and the strain it places on the physical and mental health of BMSM results in reduced access to HIV prevention messages, diminished self-esteem, increased social isolation, and limited family involvement in identity and sexual development and early sexual decision-making (Fields et al., 2015; Fields et al., 2012). The convergence and internalization of repeated experiences of homophobia, racism, and stigma and discrimination, particularly during early development of identity, affect BMSM differentially: lower self-esteem, substance use, increased sexual partners, earlier sexual debut, increased experiences of homelessness and survival sex, as well as increased susceptibility to depression and often suicide, and increased HIV susceptibility (Fields et al., 2015; Mannheimer et al., 2014; Maulsby et al., 2014; Millett et al., 2012; Nelson et al., 2017). The results of this study underscore these previous findings. HIV prevention messages focused on BMSM should consider the importance that masculinity and expectations on gender norms in the Black community have on BMSM, particularly younger BMSM. Cultural identity is critical to BMSM, and in particular younger BMSM, as they are developing their sense of self and identity, and

maintain a connection to their culture through family, relatives, and religious institutions is paramount, even when faced with experiences of extreme homophobia. Therefore, future efforts to engage BMSM should consider the influence and importance of socialization and cultural identity experienced in Black communities. Recommendations for addressing the individual level of the MSEM, which is age for this study, include strategies that promote attitudes, beliefs, and behaviors that encourage BMSM to know their HIV status, and could include education, life skills training, or motivational interviewing.

Recommendations for Further Study

This study was unique in that it utilized one of the largest datasets available on BMSM in the United States to examine potential associations in factors that have reportedly placed BMSM at elevated risk for HIV, to assess their relationship to HIV testing. This study can serve as a baseline for future studies. Though this sample is one of the largest available on BMSM in the United States, I recommend including urban, rural, and suburban BMSM in future studies. This may give a clearer picture of not only the diversity in the identities and experiences of BMSM but may increase the power and generalizability of those findings to BMSM broadly.

Research into the extent that age and internalized homophobia is associated with HIV testing among BMSM is necessary, especially studies that examine causality and direction of relationship among these two variables and HIV testing among BMSM.

Research that examines the resiliency factors associated with BMSM who engage health seeking behaviors (e.g., HIV testing), and develop healthier identities despite the social norms and expectations they experience around masculinity, gender, and sexuality may inform the development of innovative HIV prevention strategies and interventions. Research that examines the conflicting ways that social support reportedly mitigates negative health outcomes among BMSM, with larger and broader sample sizes would help to contextualize this and may lead to more empirical evidence about this relationship and illuminate why previous studies have conflicted. This could lead to studies that provide pathways for future study into the development of more effective HIV prevention and intervention strategies focused on HIV testing among BMSM. Lastly, other research methods such as mixed methods or qualitative research would be helpful to further investigate this area of study more thoroughly among BMSM.

Conclusion

This study was unique in that it utilized one of the largest datasets available on BMSM in the United States to examine potential associations in factors that have reportedly placed BMSM at elevated risk for HIV, to assess their relationship to HIV testing and adds information to the field. If left unchallenged, HIV will continue to decimate the health of BMSM. Results from this study show that having a younger age, having lower levels of internalized homophobia, and being recruited at the Atlanta research site are significant related to having an HIV test history. The largest Nagelkerke

Pseudo R^2 in this study was 3.7%. This indicates that the combination of age, sexual behavior, substance use, depression, internalized homophobia, and social support play a role in whether BMSM have an HIV test history, but that there are other factors that may be more strongly associated that were not assessed in this study. Ongoing research on the relationship of demographic, behavioral, psycho-social, and other factors with HIV testing can aid in increasing HIV testing among BMSM, especially those with no or infrequent testing histories.

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Appendix A: HPTN 061 Data Request Form

HPTN 061 Data Request Application Form

A. GENERAL INFORMATION

1. Proposed project title: Differences in Demographic, Behavioral, and Psycho-social Factors and HIV Testing History among Black Men who have Sex with Men

2. Lead Investigator(s): Stephaun E. Wallace
Institution: Walden University
Address:
Telephone Number:
Email:

3. Co-investigator(s):

4. Type of data access being requested:

☒ Baseline only ☐ Longitudinal

6. Purpose of data request:

☐ Local community use	☐ Website/blog
☐ Grant preparation	☐ Presentation
☐ Basis for grant proposal	☐ Webinar
☐ Manuscript (peer-review)	☒ Other, specify Dissertation_____
☐ Manuscript (non-peer review)	☐ Other, specify_____
☐ Local report	☐ Other, specify_____

8. Summary of Changes: If submission is a revision (to a previously rejected) or an amendment (to a previously approved) existing application, please summarize all changes. (NOTE: In addition, please highlight all changes to previously submitted concept sheet.)

9. If are requesting baseline data, do you plan to work with someone from a HPTN 061 study team or HPTN Black Caucus throughout your project? (*Note*: Longitudinal data requires working with a study team or Black Caucus member).

☒ Yes ☐ No

If yes, and you already have a collaborator in mind, provide the following information:
Name: Sheldon D. Fields, PhD
Institution: NY Institute of Technology
E-mail Address:

11. IRB & Human Subjects Protections:
Does this project have IRB approval? ☐ No ☐ Exempt ☐ Expedited ☐ Full
If no, was another status given? ☐ Non-human subjects determination ☒ Pending
Local IRB reference #: Letter attached? ☐
Have all the investigators obtained human subjects protections training?
☒ Yes
Training certifications are attached for the following investigators: Stephaun E. Wallace

14. Review the list of completed and proposed manuscripts for HPTN 061 at https://www.hptn.org/research/studies/hptn061/dataset.
Identify any completed or proposed manuscripts that have the potential to overlap with what you are proposing:
If you do not see any overlap or potential overlap with what you are proposing, read the following statement and tick the check box if it applies:
I have reviewed the completed and proposed manuscripts for HPTN 061 and see no potential of overlap with the project I am proposing: ☒

15. Will the investigators adhere to the data use agreement? ☒ Yes ☐ No

B. STUDY DESIGN (*Use the following organization to present your study plan. Take whatever space is necessary to respond completely to each section.*)
For all data requests:

1. Lay Language Summary (*Provide a one paragraph summary of the study and its impact on participants, written for a 10th grade reading level.*)

In the proposed study, I seek to primarily assess the relationship between demographic, psycho-social, and behavioral variables to determine their influence on HIV testing behaviors in Black MSM to characterize the factors that influence HIV testing behaviors among this population. Using a cross-sectional design and secondary data, the goal is to determine how age, sexual behavior, substance use, depression, internalized homophobia, and social support influence HIV testing history among the study population. It is theorized that characterizing this information in such a large cohort of Black MSM will aid in developing better messaging and programming that is more responsive to the nuanced needs of Black MSM.

Work Will Be Completed by (*Anticipated month and year in which the work will be completed.*)

Month: June Year: 2018

For longitudinal data requests only:

1. Background (*Provide a brief description of the rationale for the study, including key references.*)

2. Specific Aims and Hypotheses

3 Relevance to HPTN 061 and/or BMSM HIV prevention research or community engagement

4. Study Design and Analysis (include data analysis plan and/or table shells as appropriate)

_____ _____

Signature Date

_____

Printed Name

Appendix B: HPTN 061 Additional Funding Sources

Sources of Funding:

HPTN 061 grant support was provided by the National Institute of Allergy and Infectious Disease (NIAID), National Institute on Drug Abuse (NIDA) and National Institute of Mental Health (NIMH): Cooperative Agreements UM1 AI068619, UM1 AI068617, and UM1 AI068613. Additional site funding –**Fenway Institute CRS:** Harvard University CFAR (P30 AI060354) and CTU for HIV Prevention and Microbicide Research (UM1 AI069480); **George Washington University CRS:** District of Columbia Developmental CFAR (P30 AI087714); **Harlem Prevention Center CRS and NY Blood Center/Union Square CRS:** Columbia University CTU (5U01 AI069466) and ARRA funding (3U01 AI069466-03S1); **Hope Clinic of the Emory Vaccine Center CRS and The Ponce de Leon Center CRS:** Emory University HIV/AIDS CTU (5U01 AI069418), CFAR (P30 AI050409) and CTSA (UL1 RR025008); **San Francisco Vaccine and Prevention CRS:** ARRA funding (3U01 AI069496-03S1, 3U01 AI069496-03S2); **UCLA Vine Street CRS**: UCLA Department of Medicine, Division of Infectious Diseases CTU (U01 AI069424).