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HIV Risk Factors, Enacted Stigma, and Testing Outcomes among Men Who Have Sex with Men in Florida

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FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

HIV RISK FACTORS, ENACTED STIGMA, AND TESTING OUTCOMES AMONG

MEN WHO HAVE SEX WITH MEN IN FLORIDA

A dissertation submitted in partial fulfillment of

the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

PUBLIC HEALTH

by

Sarah Suarez

2021

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

This dissertation, written by Sarah Suarez, and entitled HIV Risk Factors, Enacted Stigma, and Testing Outcomes among Men Who Have Sex with Men in Florida, having been approved in respect to style and intellectual content, is referred to you for judgment.

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

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Jessy G. Dévieux, Major Professor

Date of Defense: May 20, 2021

The dissertation of Sarah Suarez is approved.

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

Florida International University, 2021

DEDICATION

This work is dedicated to my husband, Douglas Suarez, and for Dean.

ACKNOWLEDGMENTS

ABSTRACT OF THE DISSERTATION

HIV RISK FACTORS, ENACTED STIGMA, AND TESTING OUTCOMES AMONG

MEN WHO HAVE SEX WITH MEN IN FLORIDA

by

Sarah Suarez

Florida International University, 2021

Miami, Florida

Professor Jessy G. Dévieux, Major Professor

Crucial to ending the HIV epidemic is the prompt identification of HIV through testing services. National recommendations suggest everyone should test for HIV at least annually, and those with higher risk test more often (for example, every 3 to 6 months). An estimated 66% of new HIV infections in 2018 occurred among men who have sex with men (MSM). Florida is third in the nation for HIV diagnoses among adults and adolescents (25.0 per 100,000 population) with an estimated 119,661 persons living with HIV and MSM accounting for 74% of the cases. This dissertation used the American Men's Internet Survey (AMIS) 2014-2018 surveillance dataset with Florida MSM. The purpose was to assess the annual behavioral trends, logistic regression to determine how enacted stigma would impact behaviors associated with HIV risk and apply latent class analysis (LCA) to classify HIV testing outcomes based on risk factors.

There were significant trends in HIV risk behaviors from AMIS-2014 to 2018 among MSM reporting marijuana use (20.6% to 27.7%, $p < 0.001$), illicit drug use (28.4%

to 33.0%, $p = 0.02$), and ever HIV tested (91.8% to 78.9%, $p < 0.001$). The second study found that MSM experienced enacted stigma due to sexual orientation, reporting verbal harassment (32.4%, n = 706), discrimination (26.0%, n=678), and physical assault (3.7%, n=78) in the preceding twelve months. LCA revealed four groups representing differences in HIV testing outcomes, whereby MSM who reported the lowest levels of HIV testing (Class 1 and 3) were more likely to report not seeing a healthcare provider, engaged in condomless anal intercourse, condomless anal intercourse with a serodiscordant partner, and drug use.

This dissertation adds to the literature about HIV risk and Florida's MSM, suggesting that some prevention strategies are still not reaching all including younger MSM, minorities, those with lower educational levels, and without health insurance. This is the first study that used the AMIS dataset to examine an MSM sample residing in Florida. The recommendations presented may be useful for researchers and Florida HIV providers to strengthen and target behavioral interventions for trends found in these studies.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
AMIS	American Men's Internet Survey
AOR	Adjusted Odds Ratio
BLRT	Bootstrap likelihood ratio test
CAI	Condomless Anal Intercourse
CI	Confidence Interval
CDC	Centers for Disease Control and Prevention
HIV	Human Immunodeficiency Virus
LCA	Latent Class Analysis
LGBT	Lesbian, Gay Bisexual, and Transgender
LMR	Lo Mendell Rubin likelihood ratio test
MSM	Men who have sex with men
NHBS	National HIV Behavioral Surveillance
PLWH	People Living with HIV
PrEP	Preexposure Prophylaxis
STI	Sexually Transmitted Infection
TaSP	Treatment as Prevention
US	United States

Chapter 1: Introduction

On June 5, 1981, the first diagnosed case of HIV occurred in the United States (Centers for Disease Control and Prevention, 1981). The HIV epidemic is now widespread, with an estimated 1.2 million persons aged 13 years or older living in the United States, including 161,800 (13.8%), whose infection remains undiagnosed (Centers for Disease Control and Prevention, 2019). Men who have sex with men (MSM) are highly affected by the HIV epidemic in the United States. In 2018, of the new HIV diagnoses (37,968) MSM accounted for 65.6% (24,933); MSM who inject drugs account for an additional 3.6% (1,372) (Centers for Disease Control and Prevention, 2018). The number of MSM living with HIV is highest among whites (241,800), subsequently blacks/African Americans (218,600), and Hispanics/Latinos (173,000; Centers for Disease Control and Prevention, 2019).

In the decades since first identifying AIDS cases in Los Angeles and New York City, the epicenter has shifted towards the southern United States, including Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Washington, D.C. (U.S. Census Bureau, 2020). In the United States and dependent areas, there is an uneven distribution of HIV case rates across the country with 15.6 in the South, 9.9 in the Northeast, 9.7 in the West, and 7.2 Midwest (Centers for Disease Control and Prevention, 2018). Compared to other US regions, fewer people in the South are aware that they have HIV and consequently delay receiving timely medical care or treatment (Centers for Disease Control and Prevention, 2019). Nearly half (47%) of all HIV-related deaths occur in the South (Centers for Disease Control and Prevention, 2018).

Florida is third in the nation for HIV diagnoses among adults and adolescents (25.0 per 100,000 population) with an estimated 119,661 persons living with HIV, and MSM accounting for 74% of the cases (Centers for Disease Control and Prevention, 2018; Florida Department of Health, 2018) Prior research suggests several factors are contributing to the disproportionate impact of HIV in the South, including stigma, higher levels of poverty, and limited access to care in rural areas (Reif, Safley, McAllaster, Wilson, & Whetten, 2017; U.S. Census Bureau, 2020; Williams et al., 2020).

HIV Testing

HIV testing is the basis and entry point of almost all prevention strategies and services. A pillar of the *Ending the HIV Epidemic: A Plan for America Strategy* is to diagnose all persons with HIV early (Office of Infectious Disease and HIV/AIDS Policy, HHS, 2020). The Centers for Disease Control and Prevention (CDC) recommends everyone between the ages of 13 and 64 test for HIV at least once as part of routine health care, and those at higher risk should get tested at least once a year (Branson B. M. et al., 2006). The purpose of HIV testing and counseling services is to determine a client's individual HIV status through self-reported behavioral risk, including injection drug use, unprotected intercourse, or self-disclosure of an STI diagnosis. The HIV counseling session provides HIV information, assist clients with ways to prevent and reduce risk behaviors, and promotes the importance of obtaining test results (Centers for Disease Control and Prevention, 2001). Since 1993, the CDC has recommended one interactive HIV testing and counseling model, focusing on helping the individual create personal prevention goals to reduce the chances of getting or spreading HIV (Centers for Disease Control and Prevention, 2001).

An individual's knowledge of HIV status is crucial for decision making about protective sexual behaviors and early access to treatment (Sullivan et al., 2012), but MSM still lack awareness of their serostatus (Centers for Disease Control and Prevention, 2018). There are still some MSM who report never having an HIV test. In a large ongoing national study of US MSM, the proportion of HIV-negative or unknown status individuals who had an HIV test in the past 12 months was between 49% and 64% (Sanchez et al. 2018). An analysis of national HIV testing data found that less than 40% of US adults have ever tested for HIV (Pitasi et al., 2019). There are nearly 6 of 10 MSM living with HIV, who thought they were at low risk for being infected (MacKellar et al., 2005). HIV screenings require tailoring to reach individuals who have not been touched by previous prevention efforts.

Theoretical Framework: Minority Stress Model

MSM's lack of awareness regarding their HIV status may be due to perceived lower risk or limited access to testing (Stephenson, White, Darbes, Hoff, & Sulliva, 2015; MacKellar et al., 2005). Other psychosocial factors, such as depression, suicidal thoughts, and substance use, may influence risky practices (Ryder et al., 2005). In society, the most vulnerable individuals are historically more marginalized (Ryder et al., 2005). MSM suffer from more mental health problems, substance use disorders, and higher suicide rates than heterosexual individuals (Stall, Friedman, & Catania, 2008).

Stresses are events or conditions that cause physiological change and require the individual to adapt (Pearlin, 1999a). Social stressors are conditions in the social environment that may lead to poor mental and physical outcomes (Meyer, 2003). Minority stress, an elaboration of the social stress theory, suggests that a minority person may be subject to discrimination due to the dominant culture, social structures, and norms

3

(Friedman, 1999). Individuals from marginalized groups are vulnerable and the exposure to stigma can affect internal coping mechanisms and lead to psychological, behavioral, and physical health issues (Meyer, 2003). Stigma, homophobia, and victimization put MSM at risk for poor health outcomes and can affect whether MSM initiate HIV health services (Levy et al., 2014; Peterson & Jones, 2009).

Research Objectives

The American Men's Internet Survey (AMIS) reaches 10,000 MSM each annual cycle using a large internet-based sample of MSM located throughout the United States. The AMIS dataset was selected for this dissertation because it is the largest representative sample of internet using MSM in the United States. It is a cross-sectional online questionnaire with the primary objective of monitoring trends in MSM's HIV risk behavior and the access and use of HIV prevention and testing services. The AMIS data set contains demographic questions about age, race, ethnicity, income, education level, employment, and housing and a core questionnaire focusing on: sexual behavior, HIV and STI testing and diagnosis history, drug and alcohol use, and HIV prevention services (PRISM Health Research Team, n.d.). The first annual cycle started in May 2013, and the last annual cycle was completed in 2018. This study will focus on Florida's MSM due to data sharing limitations.

The three proposed studies are a secondary data analysis of AMIS cycles 2014-2018. In the parent study, participants were recruited online after clicking on study recruitment ads. Individuals were eligible to participate if they were male at birth, lived in the US, reported any anal or oral sex encounters with a man, were 15 years of age or older, and could complete the survey in English. Participants who met the inclusion criteria and

provided consent immediately started the survey. An incentive for participation was not provided (PRISM Health Research Team, n.d.). This study received approval from Florida International University's Institutional Review Board.

The first study, *Temporal Behavioral Trends of Men Who Have Sex with Men in Florida, 2014-2018*, explores the annual trends of Florida's MSM utilizing the AMIS's core domains as the dependent variables with the hypothesis that HIV-negative MSM will report a significant increase in sexual behaviors, substance use, STI testing and diagnosis, and HIV testing over the five annual cycles compared to HIV-positive MSM. The second manuscript, *The Association of Enacted Stigma and HIV Risk Behaviors Among Men Who Have Sex with Men* estimates the prevalence of enacted stigma in MSM and the association with HIV risk behaviors. The final study, *Characteristics of Men Who Have Sex with Men Reporting Ever Receiving an HIV Test: A Latent Class Analysis,* uses latent class analysis (LCA) to classify MSM's HIV risk factors and identify specific subgroups by testing outcomes. These studies' overall objective was to characterize the risk behaviors, testing behaviors, and HIV class profiles among MSM in an online surveillance sample focusing on Florida, a state historically impacted by the HIV epidemic.

Innovation and Significance

There is no previous research using the AMIS dataset to examine Florida's MSM and HIV behaviors. The use of the AMIS dataset may also reach a group of internet-using MSM that may engage in different sexual risks and HIV testing behaviors compared to MSM recruited in-person (Sanchez et al., 2018), such as higher engagement in condomless anal intercourse (CAI) and use of illicit substances (Balaji, Bowles, Hess, Smith, & Paz-Bailey, 2017; Celentano et al., 2006). Each of these factors points towards the necessity of

targeted HIV prevention research for MSM. It is of interest to focus on MSM, who are primarily affected by the HIV epidemic, to effectively use resources to implement the US's *Ending the HIV Epidemic* strategies.

Few studies have also yielded data on the rates of anti-gay harassment, discrimination, or victimization (Huebner, Rebchook, & Kegeles, 2004). The association between stigma and increased risk behaviors among MSM inconsistently varies in the literature (Courtenay-Quirk, Wolitski, Parsons, & Gomez, 2006; Toth, York, & DePinto, 2016) and there is no published research assessing enacted stigma against multiple HIV risk behaviors in an MSM internet-sample.

HIV prevention research has a long tradition of focusing on behavior change, typically targeting sexual risk, substance use, or adherence to antiretroviral, but these efforts remain insufficient to reduce HIV transmission, as a result of not including multilevel factors (Coates, Richter, & Caceres, 2008). The preventative efficacy of the HIV counseling experience is questionable (Ryder et al., 2005), and without efforts to further HIV testing research, post-test counseling guidelines will not be revised, which may result in missed prevention opportunities. Studying individual risk factors and barriers to testing do not fully capture the mutually intertwined relationships of HIV risk.

A revision of HIV screening includes shifting from examining for singular or additive risk factors to screening for multiple and co-occurring conditions (Bourey, Stephenson, & Bautista-Arredondo, 2018). HIV programs need research on which MSM are at highest risk for undiagnosed infection, sites where MSM may seek a test, and influencing factors to test (Stephenson, White, Darbes, Hoff, & Sulliva, 2015).

Latent class analysis is a new, emerging method in social and behavioral science used to elucidate people's class profiles. There is minimal research using LCA to elucidate MSM classes in HIV testing outcomes.

Conclusion

HIV is a substantial public health issue affecting communities across the United States. Despite the extent of the epidemic's impact, targeted prevention and outreach efforts, and the intensity of research to understand the infection, many questions about HIV remain unanswered. This dissertation aims to contribute additional research findings to the fields of HIV and MSM living in Florida thus assisting practitioners and researchers to develop intervention strategies that effectively reach out to MSM residing in this state. The purpose of these studies was to identify the temporal behavioral trends of MSM, explore enacted stigma effects on HIV risk, and classify MSM into HIV testing groups based on multilevel HIV risk factors.

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Chapter 2: Manuscript 1: Temporal Behavioral Trends of Men Who Have Sex with Men in Florida, 2014-2018

Abstract

The Southern region of the United States consistently experiences the highest HIV diagnosis and death rates than any US region. Until 2018, Florida ranked first in the nation for new HIV cases with men who have sex with men (MSM) most affected by HIV in the state. This study's objective was to assess the temporal behavior trends (within the past 12 months) of an internet sample of MSM residing in Florida using American Men's Internet Survey (AMIS) 2014-2018 surveillance data. A linear-by-linear test was used, and results were stratified by age, race/ethnicity, and HIV status. The study's findings indicated significant increases in annual temporal trend for condomless anal intercourse, marijuana use, illicit drug use, and STI testing and diagnoses. There was a significant decline in MSM reporting ever having an HIV test over the AMIS annual cycles. The findings may be useful for Florida to strengthen and target behavioral interventions for worsening trends.

Keywords: HIV, Florida, MSM

Introduction

There are certain groups of individuals at higher risk of HIV transmission due to differing biological, behavioral, and socioeconomic factors (Mor & Dan, 2012). Men who have sex with men (MSM) carry the highest disproportionate burden of HIV infection in the United States (US) (Centers for Disease Control and Prevention, 2018). In 2017, adult and adolescent MSM comprise 70% (27,000) of the 38,739 new HIV diagnoses in the US and dependent areas (Centers for Disease Control and Prevention, 2018). There is much

already understood about the epidemiological, behavioral, and psychosocial factors that increase MSM risk (Fenton & Imrie, 2005). The most significant biological vulnerability to HIV and sexually transmitted infections (STIs) by MSM is engaging in unprotected anal sex, representing the highest risk of transmission along with concurrence of multiple sex partners (Chen et al., 2002; Koblin et al., 2006). Although tempting to attribute engagement in risk behaviors as the main contributor to the HIV epidemic, the prevalence of HIV among MSM is also characterized by changing sexual attitudes and social contexts, including early developmental influences as a sexual minority, self- concept of sexuality, and sexual relationships within and outside primary partnerships (Wolitski & Fenton, 2011).

In the US and dependent areas, HIV case rates are not evenly distributed across the country with 15.6 in the South, 9.9 in the Northeast, 9.7 in the West, and 7.2 in the Midwest (Centers for Disease Control and Prevention, 2018). The southern region of the United States is the epicenter of the virus, comprised of nine states[1] that are disproportionally affected by higher HIV diagnoses and death rates than any other US region. This area, commonly referred to as the "Deep South," is known for its shared history of active slavery and roots in agricultural trades (Birdsall & Florin, 2011). In 2017 only 38% of the US population resided in the South but comprised half of all new HIV cases (53%, 20,500) with MSM representing about 66% of those cases (2010-2016) (Centers for Disease Control and Prevention, 2018). The Deep South reports higher levels of STIs, individuals without health insurance, poverty, and worst health outcomes contributing to a higher

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[1] Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas

concentration of HIV and other chronic diseases, such as diabetes and heart disease (Befort, Nazir, & Perri, 2012; Reif et al., 2015; US Department of Commerce, 2018; Adimora, Ramirez, Schoenbach, & Cohen, 2014).

The Deep South's cultural conservatism likely plays a role in perception and experiences among MSM living in this region (Katz et al., 2013; Audet, McGowan, Wallston, & Kipp, 2013). US Southerners, in comparison to other US regions, are less likely to know their HIV status, creating challenges to early access to medical care or treatment (Centers for Disease Control and Prevention, 2019). Some of the Deep South states continue to use abstinence-based education and enforce HIV criminalizing laws, further marginalizing populations at risk for acquiring HIV (Reif et al., 2014). The HIV case rate in the South is striking and shows the need further to understand the impact of HIV in this region.

This study focuses on Florida, ranking first in the nation for HIV incidence cases through 2017, where MSM have accounted for more reported cases than any other risk group every year since case reporting began in 1982 (Centers for Disease Control and Prevention, 2018). The epidemic's intensity among Florida's MSM, across all races and ethnicities, is out of proportion to their representation in the state (Lieb et al., 2008). Approximately 4.6% of Florida's residents identify as lesbian, gay, bisexual, or transgender (The Williams Institute, 2019), and Florida's MSM accounted for 61% of new HIV cases in 2018 and 69.3% of males living with HIV. Hispanic/Latino MSM (41%) represented the highest proportion of new diagnoses (Florida Department of Health, 2019).

The primary purpose of HIV/AIDS surveillance is to understand epidemics, including the infection source and the behavioral and biological factors fueling HIV rates

(Magnani, Sabin, Saidel, & Heckathorn, 2005). Behavioral data inform the design and evaluation of interventions and contextualize HIV prevalence and incidence (Lansky, Sullivan, Gallagher, & Fleming, 2007; Family Health International, 2000). The American Men's Internet Survey (AMIS) is the largest ongoing online behavioral surveillance survey reaching approximately 10,000 MSM each year since 2013 (Sanchez et al., 2018). This study aims to enhance the critical understanding of Florida's MSM population using AMIS cycles 2014-2018 to examine the temporal behavioral trends of MSM by age, race/ethnicity, and HIV status. No study to date has examined Florida's MSM and HIV behaviors using this data set. It is hypothesized that HIV-negative MSM will report a significant increase in sexual behaviors, substance use, STI testing and diagnosis, and HIV testing over the five annual cycles compared to HIV-positive MSM.

Methods

Study Population

This study is a secondary data analysis of AMIS cycles 2014-2018 conducted by the Programs, Research, Innovation in Sexual Minority (PRISM) Health Research team at the Emory University Rollins School of Public Health. The AMIS is an annual online behavioral survey of MSM living in the United States using domains adapted from the CDC's National HIV Behavioral Surveillance (NHBS) (Sanchez, Sineath, Kahle, Tregear, & Sullivan, 2015). The NHBS selects items for each cycle based on review by subject matter experts and cognitive testing of previous NHBS questions (Centers for Disease Control and Prevention, 2010). The AMIS survey is self-administered through a electronic device and consists of a core questionnaire in the following areas: sexual behavior, HIV and STI testing and diagnosis history, and drug and alcohol use (PRISM Health Research

Team, n.d.). AMIS data collection mirrors NHBS to monitor MSM's behaviors that are crucial to understanding population-level trends, including sexual risk and HIV and STI prevention practices (Sanchez et al., 2018).

The parent study used a convenience sample with recruitment occurring through various websites using banner advertisements, email blasts, or emailing previous participants who consented for future contact. There is no incentive for participation in the parent study. The methods and previous AMIS cycle data (AMIS 2014-2016) are published elsewhere (Sanchez, Sineath, Kahle, Tregear, & Sullivan, 2015; Zlotorzynska, Sullivan, & Sanchez, 2017; Zlotorzynska, Sullivan, & Sanchez, 2019).

This secondary analysis uses five annual data collection cycles for analysis: October 2014-April 2015 (AMIS-2014), September 2015-April 2016 (AMIS-2015), September 2016-February 2017 (AMIS-2016), July 2017–November 2017 (AMIS-2017), September 2018-November 2018 (AMIS-2018). This study's data set includes exclusively participants born male and currently identifying as male, MSM, residing in Florida, and $\geq$ 15 years or older. The total sample size is *n*=3,131.

Measures

The key indicators and approach used in this study will mirror those used by AMIS with each of the core domains serving as a dependent variable: sexual behaviors, illicit substance use, STI testing and diagnosis, and HIV testing. The dependent measures presented in this trend analysis are self-reported behaviors during the 12 months preceding survey participation. See appendix 1 for sample questionnaire.

Demographic variables include race/ethnicity (non-Hispanic White, non-Hispanic Black; Hispanic; or Other) and age (15-24; 25-29; 30-39; 40+). *HIV Status* is defined as

positive, negative, or unknown and refers to participants who reported responses to ever having an HIV test, results of the most recent HIV test and reporting a positive HIV test. Unknown HIV status refers to individuals who have reported never receiving HIV test results or taking an HIV test. *Sexual Behaviors* are defined as condomless anal intercourse (CAI) and condomless anal intercourse with a serodiscordant partner. These two variables examine any participant who reported engaging in CAI with more than one male sexual partner in the past 12 months and CAI with any male partner of discordant status based on the participant's self-reported HIV status and the status of their male sex partner(s). *Illicit Substance Use* reflects the participant's self-reported use of marijuana, any drug use other than marijuana, any illicit drug use, and the use of methamphetamines in the past 12 months. Overall illicit substance use is a standard indicator in HIV behavioral surveillance projects. Methamphetamine use was included as a separate indicator because it is the only substance with a plausible direct biologic pathway to increased HIV susceptibility (Colfax et al., 2010). *STI testing* refers to any participant who reported STI testing in the past 12 months. *STI diagnosis* is defined as a participant who self-reported positive cases of syphilis, gonorrhea, or chlamydia in the past 12 months. *HIV Testing* is presented for participants with a reported HIV test and a result as positive, negative, or unknown.

Statistical Analyses

This study first describes the sample's characteristics and then applies a chi-squared linear-by-linear test to assess trends of sociodemographic and behavioral variables between each annual cycle (AMIS 2014, 2015, 2016, 2017, and 2018). Each outcome is also stratified by self-reported HIV-status (positive, negative, and unknown). The calculated percentage in each outcome from 2014–2018 is used to estimate linear trends over time in

each outcome, overall, and participant characteristics. Data were analyzed using SPSS 26.0, and p-values <0.05 were considered statistically significant.

Results

Table 1 presents the sociodemographic characteristics of the participants from AMIS 2014 to 2018. There were 3,293 MSM in the five cycles of AMIS 2014-2018. The mean age for the sample was 40 years old (range 15-71 years old). Participants identified as White, non-Hispanic (69.0%), Hispanic (20.1%). Black, non-Hispanic (5.8%), and Other (5.2%) with no statistically significant increase in race/ethnicity between the cycles ($p = 0.858$). There were 72.4% (2,268) individuals who identified as HIV-negative, 15.3% (479) reporting an unknown HIV status, and 12.3% (384) identified as HIV-positive. The percentage of younger MSM, ages 15-24, recruited for the study (9.1%, AMIS-2014 to 34.3%, AMIS-2018, $p < 0.001$) and the number of MSM reporting unknown HIV status increased between the cycles (8.7%, AMIS-2014 to 23.3%, AMIS-2018, $p < 0.001$). Table 2 displays the AMIS 2014 to 2018 behavioral risk factors by age and race/ethnicity, and Table 3 displays the behavioral risk factors stratified by HIV status.

Trends in Sexual Behaviors (CAI and CAI with a partner of discordant/unknown status): Most of the participants in each of the AMIS-2014-2018 cycles reported engaging in CAI (Figure 1). Among the proportion of MSM engaging in condomless anal intercourse in the past 12 months only MSM, who were ages 25-29, had a significant increase in CAI from 2015 to 2018 (AMIS-2015, 75.3% to AMIS-2018, 88.2%), *p*=0.02). Individuals ages 40 or older reported significant CAI engagement with a serodiscordant partner from AMIS-2015 to AMIS-2018 (20.2% to 27.8%, *p*=0.01). There were no significant trends among any other age group, race/ethnicity, or HIV status. Although not significant, in all AMIS

17

cycles, the proportion of MSM who engaged in any CAI or CAI with a discordant/unknown status male partner increased annually among HIV-negative/unknown status compared to those MSM who were HIV-positive.

Trends in Substance Use: The use of marijuana in the past 12 months increased over the five annual cycles from 20.6% (AMIS-2014) to 27.7% (AMIS-2018; $p < 0.001$) (Figure 2). Hispanic MSM reported an increase in marijuana use over the five cycles (AMIS 2014, 21.4% to AMIS-2018, 40.0%, $p = 0.002$). Compared to HIV positive individuals, HIV-negative (AMIS-2014, 19.0% to AMIS-2018, 26.2%, $p < 0.001$) and unknown-status participants (AMIS-2014, 23.2% to AMIS-2018, 30.3%, $p = 0.04$) were more likely to report the use of marijuana. Results also found an overall significant increase in any illicit drug use between AMIS 2015 to AMIS 2018 cycles (AMIS-2015, 28.4% to AMIS-2018, 33.0%; $p=0.027$), increase drug use among Black, non-Hispanic participants (AMIS-2014, 10.3% to AMIS-2018, 23.2%, $p=0.03$), and individuals with an unknown HIV status (AMIS-2014, 23.2% to AMIS-2018, 32.4%; $p = 0.04$). The most-reported illicit drug of choice was poppers (38.3%, n=377) and powder cocaine (21.5%, n=212). The use of methamphetamines was not a significant trend in this sample. Other drug use, excluding marijuana was the only behavior found to significantly decrease among MSM, ages 25-29 (AMIS-2014, 33.3% to AMIS-2018, 16.2%; $p = 0.02$).

Trends in Sexually Transmitted Infection Testing and Diagnosis: The analysis found evidence that the proportion of MSM tested for an STI increased overall from 38.3% (AMIS-2014) to 42.1% (AMIS-2018) (Figure 3), and particularly for individuals ages 40 and older (AMIS-2014, 33.9% to AMIS-2018, 40.5%, $p<0.02$). Compared to HIV-positive and unknown status participants, HIV negative MSM reported increased STI testing over

the five annual cycles from 35.0% (AMIS-2014) to 51.1% (AMIS-2018, $p<0.001$). A further finding yielded that STI diagnosis also increased in the overall sample from AMIS-2014 (5.9%) to AMIS-2018 (10.9%; $p=0.008$). The MSM who self-reported an STI diagnosis increased from 8.1% (AMIS-2014) to 10.3% (AMIS-2018), increases were also found for those 40 and older (AMIS-2014, 7.5% to AMIS-2018, 10.3%, $p = 0.03$), and among HIV-negative individuals (AMIS-2014, 5.9% to AMIS-2018, 10.9%, $p = 0.008$).

HIV Testing: The proportion of MSM who reported an HIV test decreased between AMIS-2014 to AMIS-2018 (91.8% to 78.9%; $p<0.001$) (Figure 4). This trend was significant among MSM ages, 15-24 (AMIS-2014, 76.3% to AMIS-2018, 53.3%; $p < 0.02$) and all races/ ethnicity groups (Black, non-Hispanic AMIS-2014, 93.1% to AMIS-2018, 80.0%; p = 0.02; Hispanic AMIS-2014, 92.0% to AMIS-2018, 73.0%, $p < 0.001$; White, non-Hispanic AMIS-2014, 91.1% to AMIS-2018, 80.6%, $p = 0.01$; Other AMIS-2014, 100% to AMIS-2018 75.8% $p < 0.001$).

Discussion

Surveillance data have a critical and evaluative function that allows for finding behavioral changes over time. This study aimed to identify significant behavioral trends over the five years (2014-2018) experienced by Florida's MSM and identify any differences by HIV status. HIV testing is a critical first step to improving early initiation of treatment for people living with HIV and prevent new infections. Nearly 40% of new HIV infections are transmitted by people who were not aware they were living with HIV (Centers for Disease Control and Prevention, 2020). This study found overall significant increases in HIV risk behaviors from AMIS-2014 to AMIS-2018 among MSM reporting marijuana use (20.6% to 27.7%, $p < 0.001$), illicit drug use (28.4% to 33.0%, $p = 0.02$), and ever HIV

tested (91.8% to 78.9%, $p < 0.001$). The findings also revealed racial/ethnic and age disparities, including MSM aged 25-29, who engaged in CAI (75.8% to 88.2%, $p = 0.02$), age 40 and older reporting CAI with a serodiscordant partner (20.25% to 27.8%, $p = 0.01$), Hispanic MSM reporting increased marijuana use (21.4% to 40.0%, $p < 0.01$), aged 40 years and older reporting an STI diagnosis (7.5% to 10.3%, $p = 0.03$).

The percentage of younger MSM, age 15-24, who reported an HIV test decreased between AMIS-2014 to AMIS-2018 (76.3% to 53.3%, $p = 0.02$). The results also showed that the number of MSM reporting an unknown HIV status increased between AMIS cycles 2016 to 2018 (12.8% to 23.35, $p < 0.001$). Finally, the only age group to increase survey participation over the annual cycles were younger MSM, who tripled response rates from AMIS-2014 to AMIS-2018 (9.1% to 34.3%). Consistent with other research findings, internet-using MSM exhibit lower rates of HIV testing compared to a national estimate of men sampled in venue-based settings (Centers for Disease Control and Prevention, 2014; Noble, Jones, Bowles, DiNenno, & Tregear, 2017; Reilly, Jenness, Wendel, Marshall, & Hagan, 2014; Conway et al., 2015; Pathela et al., 2006).

Rather than traditional in-person venues, MSM are turning towards the internet to find a partner online (Saxton, Dickson, & Hughes, 2013). Some MSM seeking partners online are less likely to identify as MSM, receive HIV prevention messaging, or seek sexual health information about sexually transmitted infections and engaging in sex with men (Wilkerson, Smolenski, Horvath, Danilenko, & Rosser, 2010). There is substantial evidence that online recruited MSM are less likely to agree that HIV is a severe threat and report higher numbers of sexual partners than MSM recruited in traditional venues (Saxton, Dickson, & Hughes, 2013; Paz-Bailey et al., 2017). This use of online surveys is

advantageous for researchers looking to find MSM not traditionally seen in community, clinical, or venue-based outreach approaches. Future behavioral surveillance research should consider expanding sampling and recruitment methods for inclusiveness of the internet using MSM to provide a complete picture of trends in HIV risk behaviors.

Sexually active MSM should seek testing at least annually for HIV; however, the number of participants who reported a status unknown increased from AMIS-2016 to AMIS-2018 (12.8% to 23.3%). This finding suggests that MSM in this sample, who were younger, or a minority were less likely to report an HIV test. Collectively, it appears that younger MSM in this sample are engaging in high-risk HIV behaviors consistent with national surveillance findings. In the United States, there are 14% of people living with HIV are unaware of their status with an estimated 44.9% of younger people, ages 13-24, who are also most likely unaware of their infection, a national trend that increased from 2014-2018 (Centers for Disease Control and Prevention, 2020). Younger MSM may not seek HIV testing for several reasons, including low perceived risk for HIV, inadequate sex education, and socioeconomic challenges (Centers for Disease Control and Prevention, 2020; Centers for Disease Control and Prevention, 2018).

The increased annual AMIS trends seen among younger MSM underscore the need to reach this population with proven prevention strategies such as biomedical interventions and condom distribution before they become infected. Another emerging strategy that may target and improve HIV testing rates is the provision of HIV self-testing kits. HIV self-testing is a potentially useful tool and early evidence suggests that acceptability is high, can improve HIV-related dialogue between partners, and raise self-awareness of risks (Figueroa, Johnson, Verster, & Baggaley, 2015; Carballo-Dieguez, Frasca, Ibtoye, &

Dolezal, 2012; Frasca et al., 2013). It will be important for future research and HIV prevention programs to explore the use of HIV self-testing kits among younger MSM and consider the use of randomized trials to assess comparativeness to the traditional HIV testing session.

As the HIV epidemic enters the fourth decade, both recreational drug use and HIV sexual risk behaviors continue among MSM and these behaviors remain well documented as contributing risk factors in numerous studies (Martins et al., 2016; Mauro et al., 2017; Carrico, Zepf, Meanley, Batchhelder, & Stall, 2016; Halkitis & Parsons, 2002; Stall et al., 2003). This analysis found evidence that MSM reported increased use of marijuana and illicit drugs over the period consistent with national findings (Sanchez et al., 2018). Other studies have found similar results, particularly for MSM living in states with some level of legalization reported increasing marijuana and drug use (Medley et al., 2016; Ohilbin, Mauro, Greene, & Martins, 2019). MSM that resided in a state with a medical marijuana law, such as Florida, engage in recreational marijuana use due to perceptions of increased access, lower perceived risks, and changing public sentiment (Sanchez et al., 2018; Martins et al., 2016). Morgan et al. (2016) found that marijuana use is related to increased participation in risk behaviors, especially MSM who use marijuana as a sex-drug.

The significant trends found in illicit substances and by MSM with an unknown HIV status observed in this study may reflect the opioid epidemic and methamphetamine use among MSM (Dart et al., 2015; Rivera, Harriman, Carrillo, & Braunstein, 2021). Previous research demonstrated a strong relationship between MSM's drug use and elevated sexual risk behavior and that it may reduce the success of HIV behavioral interventions (McCarty-Caplan, Jantz, & Swartz, 2014). This study suggests that MSM,

particularly black MSM and younger age MSM, who reported substance use (illicit and marijuana use) are likely to also to have reported an STI diagnosis and less likely to ever test for HIV. These results and the differences in HIV status show a need to understand the complex relationship between substance use patterns, sexual behaviors, and HIV risk among MSM. There is also limited research on the association between non-medical marijuana use and HIV risk behaviors. Understanding the distinct needs of these MSM could help improve their response to HIV prevention services.

This study also examined sexual health behaviors and identified a proportion of younger MSM who engaged in CAI, older MSM engaging in CAI with a serodiscordant partner, and significant increases in STI diagnoses in the past 12 months for older and minority MSM. Overall, these findings are in accordance with national AMIS surveillance data that also found significant increases in CAI and STI diagnoses among MSM (Sanchez et al., 2018). This behavior increase creates concerns for potential ongoing HIV and STI spread; however, CAI, including discordant sexual relationships, does not equivocate to increased sexual risk.

Other research has found that MSM are proactively reducing their risk of HIV acquisition, including sexual positioning, serosorting, using preexposure prophylaxis (PrEP), and Treatment as Prevention (TaSP), when one partner is virally suppressed and cannot transmit the virus (Snowden, Wei, McFarland, & Fisher Raymond, 2014; Khosropour et al., 2017). The use of PrEP requires that the individual receive an STI test every 3-6 months to continue receiving services, which may explain why this study found increasing STI testing rates (Centers for Disease Control and Prevention, 2017). MSM, who use serosorting, may hold the perception that sexual partners of the same HIV status

may reduce one's HIV transmission risk and negates apprehensions about having to use condoms (Eaton, West, Kenny, & Kalichman, 2009). Although MSM have adopted various strategies to minimize their HIV risk during sexual contact, this study was not able to assess the use or frequency of these various HIV prevention strategies during sexual encounters, which may explain some of the increasing trends of CAI and STI diagnosis.

Limitations

Findings from this study should be considered in light of its limitations. The purpose of this study was to examine key HIV behaviors between annual cycles, demographics, and HIV status. An internet-based study is subject to limitations, including sampling bias due to convenience sampling and misclassification bias from self-reported data. The convenience sampling method used in this study does not guarantee a representative sample and thus may not be generalizable to all MSM living in Florida. The participants in this study were predominantly white and may have different sexual risk factors, levels of outness, and testing behaviors compared to other MSM subgroups. Specifically, racial and ethnic minority MSM, which have disproportionately higher rates of HIV, were under-represented, which is common in internet-surveys (Centers for Disease and Prevention, 2018; Sullivan et al., 2011).

Another study limitation was the AMIS data were collected cross-sectionally for each cycle and, therefore, this study cannot draw any causal or longitudinal conclusions from the observed associations. There were also limitations in some of the ways the variables were measured across all the cycles, including analyzing the frequency of CAI, number of sexual partners, and drug use, which did not allow for further analysis to provide a comprehensive profile of HIV risk behaviors. Lastly, the earlier AMIS cycles did not ask

questions regarding PrEP and the use of TaSP for sexual encounters, which could explain some of the increased CAI proportions and STI diagnoses.

Conclusion

One of the US national goals is to lower the annual number of new HIV infections (Office of Infectious Disease and HIV/AIDS Policy, HHS, 2020). The use of behavioral surveillance data is essential for implementing prevention activities and especially beneficial in reaching individuals who are challenging to recruit through traditional survey methods. This study's findings add to the literature about HIV risk, MSM, and Florida's HIV epidemiologic profile, suggesting that some of the HIV prevention and care strategies are still not reaching all MSM. Public-health programs intended to prevent the transmission of HIV, therefore, must address these groups individually and build research and interventions based on a thorough understanding of Florida's social norms, cultural determinants, and other factors that determine disease risk among MSM.

The current HIV response must also adapt to the internet creatively through social media, apps, and mobile devices to meet MSM where they are. There are challenges reaching MSM in traditional HIV prevention strategies and web-based approaches provide alternative opportunities to improve health outcomes among diverse populations (Shrestha et al., 2020). This study supports mobile health interventions' potential use to promote HIV testing and HIV prevention services among MSM, normally provided in facility-based settings. In 2020, the State of Florida's health department launched an initiative that allows individuals to order an at-home HIV testing kit. Therefore, future research should evaluate the feasibility and acceptability among MSM for the use of mail-order HIV testing kits and electronic health approaches.

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Tables

Table 2.1: Demographic Characteristics of Florida's MSM in AMIS 2014-2018

	AMIS 2014		AMIS 2015		AMIS 2016		AMIS 2017		AMIS 2018		p-value[a]	Total	
	N	%	N	%	N	%	N	%	N	%		N	%
Total	**645**		**611**		**648**		**604**		**623**			3,131	
Age (years)											<0.001		
15-24	59	9.1%	139	22.7%	127	19.6%	152	25.2%	214	34.3%		691	23.9%
25-29	66	10.2%	77	12.6%	85	24.9%	46	7.6%	68	10.9%		342	10.8%
30-39	119	18.4%	86	14.1%	83	12.8%	100	16.6%	89	14.3%		477	14.8%
40 and older	401	62.2%	309	50.6%	353	54.5%	306	50.7%	252	40.4%		1,621	50.5%
Race/ethnicity											0.858		
Black, non-Hispanic	29	4.5%	43	7.0%	39	6.0%	39	6.6%	30	4.9%		180	5.8%
Hispanic	112	17.4%	137	22.4%	132	20.4%	127	21.5%	115	18.9%		623	20.1%
White, non-Hispanic	470	72.9%	406	66.4%	441	68.1%	393	66.4%	432	70.8%		2,142	69.0%
Other or multiple races[b]	34	5.3%	25	4.1%	36	5.6%	33	5.6%	33	5.4%		161	5.2%
Self-reported HIV Status											<0.001		
Positive	83	13.0%	77	12.6%	87	13.4%	82	13.6%	55	8.8%		384	12.3%
Negative	506	78.4%	436	71.4%	478	73.8%	425	70.4%	423	67.9%		2268	72.4%
Unknown	56	8.7%	98	16.0%	83	12.8%	97	16.1%	145	23.3%		479	15.3%

[a] Chi square test for difference in characteristics between AMIS cycles

[b] Includes persons who indicated American Indian/Alaska Native, Asian/Native Hawaiian, Other Pacific Islander, multiple races

Table 2.2: Trends in Sexual behavior, Illicit Substance Use, and HIV/STI Testing Among Florida MSM by AMIS 2014-2018

Behavior in the past 12 months	AMIS-2014		AMIS-2015		AMIS-2016		AMIS-2017		AMIS-2018		
	N	%	N	%	N	%	N	%	N	%	p-value[a]
Condomless Anal Intercourse	468	72.6%	412	67.4%	460	71.0%	432	73.0%	442	72.5%	0.38
Ages 15-24	45	76.3%	97	69.8%	100	78.7%	120	78.9%	145	67.8%	0.37
Ages 25-29	50	75.8%	58	75.3%	67	78.8%	40	87.0%	60	88.2%	0.02*
Ages 30-39	101	84.9%	65	75.6%	65	78.3%	73	73.0%	72	80.9%	0.29
Age 40+	272	67.8%	192	62.1%	228	64.6%	206	67.3%	174	69.0%	0.52
Black, non-Hispanic	21	72.4%	30	69.8%	29	74.4%	29	74.4%	14	46.7%	0.10
Hispanic	88	78.6%	91	66.4%	102	77.3%	94	74.0%	90	78.3%	0.50
White, non-Hispanic	334	71.1%	274	67.5%	305	69.2%	285	72.5%	90	78.3%	0.19
Other or multiple races	25	73.5%	17	68.0%	24	66.7%	24	72.7%	21	63.6%	0.54
Condomless Anal Intercourse with a partner of discordant/unknown HIV status	154	23.9%	104	17.0%	127	19.6%	130	22.0%	157	25.7%	0.12
Ages 15-24	15	25.4%	30	21.6%	23	18.1%	30	19.7%	45	21.0%	0.63
Ages 25-29	22	33.3%	19	24.7%	22	25.9%	11	23.9%	21	30.9%	0.83
Ages 30-39	36	30.3%	7	8.1%	24	28.9%	23	23.0%	23	25.8%	0.95
Age 40+	81	20.2%	48	15.5%	58	16.4%	67	21.9%	70	27.8%	0.01*
Black, non-Hispanic	8	27.6%	8	18.6%	12	30.8%	10	25.6%	6	20.0%	0.84
Hispanic	27	24.1%	23	16.8%	24	18.2%	26	20.5%	29	25.2%	0.57
White, non-Hispanic	111	23.6%	64	15.8%	90	20.4%	91	23.2%	112	25.9%	0.08
Other or multiple races	8	23.5%	9	36.0%	1	2.8%	3	9.1%	10	30.3%	0.66
Used marijuana	135	20.6%	143	22.4%	156	23.3%	170	25.8%	180	27.7%	0.001*
Ages 15-24	21	35.6%	47	33.8%	46	36.2%	60	39.5%	79	36.9%	0.53
Ages 25-29	22	33.3%	22	28.6%	24	28.2%	13	28.3%	18	26.5%	0.43
Ages 30-39	31	26.1%	20	23.3%	19	22.9%	26	26.0%	31	34.8%	0.20
Age 40+	59	14.7%	48	15.5%	62	17.6%	59	19.3%	43	17.1%	0.16
Black, non-Hispanic	3	10.3%	4	9.3%	6	15.4%	15	38.5%	4	13.3%	0.05
Hispanic	24	21.4%	36	26.3%	30	22.7%	39	30.7%	46	40.0%	0.002*
White, non-Hispanic	96	20.4%	91	22.4%	105	23.8%	95	24.2%	109	25.2%	0.07
Other or multiple races	10	29.4%	6	24.0%	10	27.8%	4	12.1%	10	30.3%	0.66

Used methamphetamines	23	12.6%	20	11.0%	23	12.6%	29	14.4%	20	10.0%	0.78
Ages 15-24	1	4.5%	7	12.1%	2	4.0%	3	4.6%	3	3.6%	0.15
Ages 25-29	2	7.7%	3	10.7%	3	10.3%	2	13.3%	1	5.6%	0.95
Ages 30-39	6	13.6%	3	10.0%	5	19.2%	6	17.1%	4	10.5%	0.99
Age 40+	14	15.6%	7	10.8%	13	16.7%	18	20.7%	12	19.7%	0.20
Black, non-Hispanic	1	33.3%	1	11.1%	2	22.2%	1	5.9%	0	0.0%	0.15
Hispanic	4	11.4%	6	13.0%	7	16.7%	4	8.5%	3	6.0%	0.25
White, non-Hispanic	18	13.8%	13	11.0%	13	10.7%	21	16.5%	15	11.6%	0.93
Other or multiple races	0	0.0%	0	0.0%	1	10.0%	2	40.0%	1	8.3%	0.13
Used any drug (other than marijuana)	124	19.2%	111	18.2%	127	19.6%	116	19.6%	122	20.0%	0.60
Ages 15-24	12	20.3%	33	23.7%	31	24.4%	34	22.4%	42	19.6%	0.49
Ages 25-29	22	33.3%	21	27.3%	24	28.2%	10	21.7%	11	16.2%	0.02*
Ages 30-39	28	23.5%	17	19.8%	20	24.1%	23	23.0%	27	30.3%	0.27
Age 40+	62	15.5%	40	12.9%	52	14.7%	51	16.7%	44	17.5%	0.30
Black, non-Hispanic	3	10.3%	2	4.7%	6	15.4%	10	25.6%	3	10.0%	0.17
Hispanic	20	17.9%	31	22.6%	33	25.0%	29	22.8%	25	21.7%	0.53
White, non-Hispanic	88	18.7%	74	18.2%	81	18.4%	73	18.6%	87	20.1%	0.59
Other or multiple races	13	38.2%	4	16.0%	7	19.4%	4	12.1%	7	21.2%	0.08
Used any illicit drugs	183	28.4%	181	29.6%	185	28.5%	198	33.4%	201	33.0%	0.027*
Ages 15-24	22	37.3%	58	41.7%	51	40.2%	65	42.8%	84	39.3%	0.10
Ages 25-29	26	39.4%	28	36.4%	29	34.1%	15	32.6%	18	26.5%	0.10
Ages 30-39	44	37.0%	30	34.9%	26	31.3%	35	35.0%	38	42.7%	0.53
Age 40+	91	22.7%	65	21.0%	79	22.4%	89	29.1%	63	25.0%	0.10
Black, non-Hispanic	3	10.3%	9	20.9%	9	23.1%	17	43.6%	7	23.3%	0.03*
Hispanic	35	31.3%	46	33.6%	42	31.8%	47	37.0%	50	43.5%	0.05
White, non-Hispanic	130	27.7%	118	29.1%	124	28.1%	129	32.8%	132	30.6%	0.17
Other or multiple races	15	44.1%	8	32.0%	10	27.8%	5	15.2%	12	36.4%	0.20

Diagnosed with any STI	52	8.1%	53	8.7%	70	10.8%	63	10.6%	63	10.3%	0.08
Ages 15-24	2	3.4%	20	14.4%	13	10.2%	11	7.2%	20	9.3%	0.71
Ages 25-29	5	7.6%	7	9.1%	13	15.3%	6	13.0%	9	13.2%	0.22
Ages 30-39	15	12.6%	10	11.6%	17	20.5%	12	12.0%	9	10.1%	0.72
Age 40+	30	7.5%	16	5.2%	27	7.6%	34	11.1%	26	10.3%	0.03*
Black, non-Hispanic	1	3.4%	5	11.6%	7	17.9%	9	23.1%	6	20.0%	0.03*
Hispanic	16	14.3%	19	13.9%	22	16.7%	11	8.7%	16	13.9%	0.52
White, non-Hispanic	30	6.4%	29	7.1%	38	8.6%	40	10.2%	34	7.9%	0.15
Other or multiple races	5	14.7%	0	0.0%	3	8.3%	3	9.1%	7	21.2%	0.27
Tested for any STI	247	38.3%	239	39.1%	274	42.3%	237	40.0%	257	42.1%	0.16
Ages 15-24	24	40.7%	54	38.8%	46	36.2%	51	33.6%	72	33.6%	0.18
Ages 25-29	30	45.5%	37	48.1%	48	56.5%	19	41.3%	37	54.4%	0.46
Ages 30-39	57	47.9%	41	47.7%	44	53.0%	44	44.0%	49	55.1%	0.54
Age 40+	136	33.9%	107	34.6%	136	38.5%	128	41.8%	102	40.5%	0.016*
Black, non-Hispanic	13	44.8%	18	41.9%	21	53.8%	23	59.0%	12	40.0%	0.65
Hispanic	46	41.1%	70	51.1%	80	60.6%	50	39.4%	50	43.5%	0.55
White, non-Hispanic	169	36.0%	145	35.7%	157	35.6%	151	38.4%	177	41.0%	0.08
Other or multiple races	19	55.9%	6	24.0%	16	44.4%	13	39.4%	18	54.5%	0.80
HIV Tested Ever	592	91.8%	525	85.9%	583	90.0%	508	85.8%	481	78.9%	<0.001*
Ages 15-24	45	76.3%	92	66.2%	93	73.2%	86	56.6%	114	53.3%	0.02*
Ages 25-29	63	95.5%	70	90.9%	79	92.9%	42	91.3%	56	82.4%	0.16
Ages 30-39	107	89.9%	82	95.3%	81	97.6%	97	97.0%	83	93.3%	0.59
Age 40+	377	94.0%	281	90.9%	330	93.5%	295	96.4%	233	92.5%	0.78
Black, non-Hispanic	27	93.1%	41	95.3%	34	87.2%	32	82.1%	24	80.0%	0.024*
Hispanic	103	92.0%	119	86.9%	121	91.7%	92	72.4%	84	73.0%	<0.001*
White, non-Hispanic	428	91.1%	344	84.7%	393	89.1%	355	90.3%	348	80.6%	0.01*
Other or multiple races	34	100.0%	21	84.0%	35	97.2%	29	87.9%	25	75.8%	<0.001*

[a.] Significant at <0.05

Table 2.3: Trends in Sexual behaviors, Illicit Substance Use, and HIV/STI Testing Among Florida MSM by AMIS 2014-2018

and HIV Status

Behavior in the past 12 months	AMIS-2014		AMIS-2015		AMIS-2016		AMIS-2017		AMIS-2018		
	N	%	N	%	N	%	N	%	N	%	p-value
HIV Positive											
Condomless Anal Intercourse	69	83.1%	63	81.8%	63	72.4%	64	78.0%	43	78.2%	0.32
Condomless Anal Intercourse with a partner of discordant/unknown HIV status	34	41.0%	19	24.7%	28	32.2%	31	37.8%	24	43.6%	0.43
Used marijuana	24	28.9%	23	29.9%	23	26.4%	21	25.6%	16	29.1%	0.75
Used methamphetamines	10	31.3%	8	25.8%	9	28.1%	15	48.4%	4	21.1%	0.67
Used any illict drugs	32	38.6%	31	40.3%	34	39.1%	32	39.0%	21	38.2%	0.93
Used any drug (other than marijuana)	27	32.5%	22	28.6%	29	33.3%	23	28.0%	17	30.9%	0.79
Diagnosed with any STI	18	21.7%	12	15.6%	17	19.5%	20	24.4%	10	18.2%	0.83
Tested for any STI	61	73.5%	46	59.7%	61	70.1%	53	64.6%	30	54.5%	0.08
HIV Negative											
Condomless Anal Intercourse	358	70.8%	293	67.2%	340	71.1%	303	71.3%	318	75.2%	0.07
Condomless Anal Intercourse with a partner of discordant/unknown HIV status	109	21.5%	73	16.7%	77	16.1%	74	17.4%	103	24.3%	0.39
Used marijuana	96	19.0%	95	21.8%	113	23.6%	108	25.4%	111	26.2%	<.001*
Used methamphetamines	11	8.0%	9	7.2%	12	8.9%	14	10.4%	14	10.4%	0.32
Used any illict drugs	138	27.3%	125	28.7%	135	28.2%	136	32.0%	135	31.9%	0.06
Used any drug (other than marijuana)	90	17.8%	77	17.7%	89	18.6%	78	18.4%	80	18.9%	0.61
Diagnosed with any STI	30	5.9%	34	7.8%	49	10.3%	37	8.7%	46	10.9%	.008*
Tested for any STI	177	35.0%	177	40.6%	199	41.6%	174	40.9%	216	51.1%	<.001*
HIV Status Unknown											
Condomless Anal Intercourse	41	73.2%	56	57.1%	57	68.7%	72	74.2%	90	62.1%	0.85
Condomless Anal Intercourse with a partner of discordant/unknown HIV status	11	19.6%	12	12.2%	22	26.5%	26	26.8%	32	22.1%	0.14
Used marijuana	13	23.2%	19	19.4%	15	18.1%	29	29.9%	44	30.3%	0.04*
Used methamphetamines	2	15.4%	3	12.0%	2	12.5%	0	0.0%	2	4.3%	0.04*
Used any illict drugs	13	23.2%	25	25.5%	16	19.3%	36	37.1%	47	32.4%	0.04*
Used any drug (other than marijuana)	7	12.5%	12	12.2%	9	10.8%	17	17.5%	27	18.6%	0.09
Diagnosed with any STI	4	7.1%	7	7.1%	4	4.8%	6	6.2%	8	5.5%	0.61
Tested for any STI	9	16.1%	16	16.3%	14	16.9%	15	15.5%	14	9.7%	0.13

* Significant at p <0.05

36

Figures

Figure 2.1. Proportion of Florida's AMIS MSM participants reporting condomless anal intercourse and condomless anal intercourse with a serodiscordant partner in the past 12 months for each AMIS cycle.
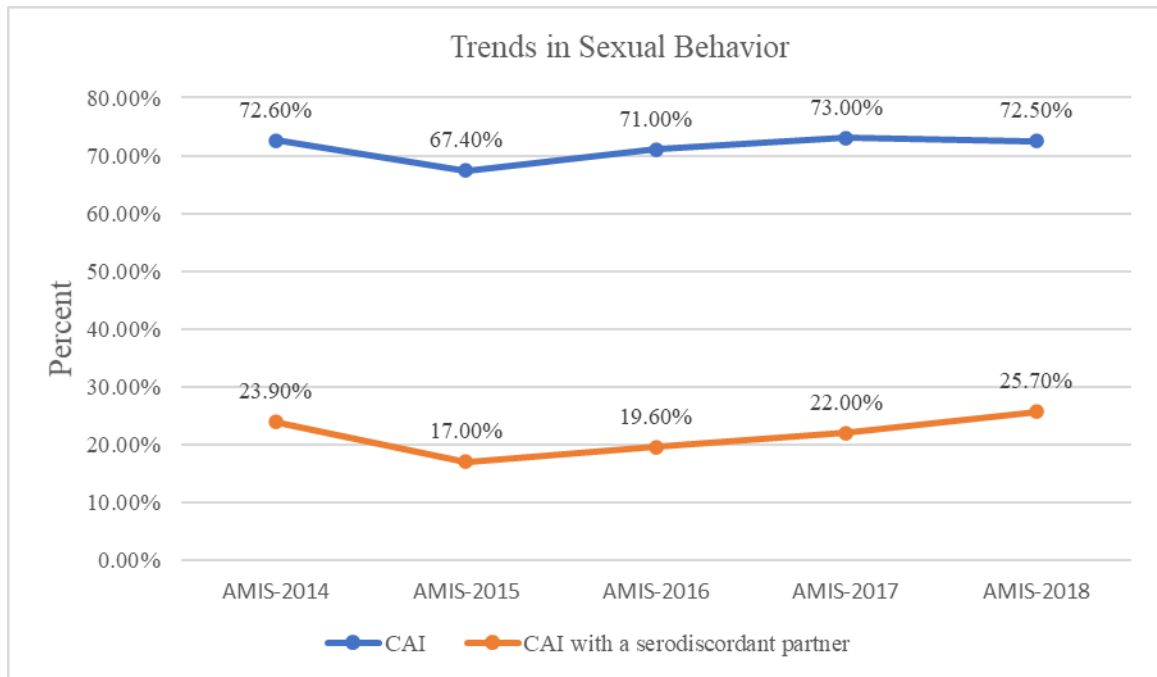
Figure 2.2. Proportion of Florida's AMIS MSM participants reporting use of marijuana, methamphetamines, any drug other than marijuana, and any illicit drugs in the past 12 months for each AMIS cycle.

Trends in Susbtance Use
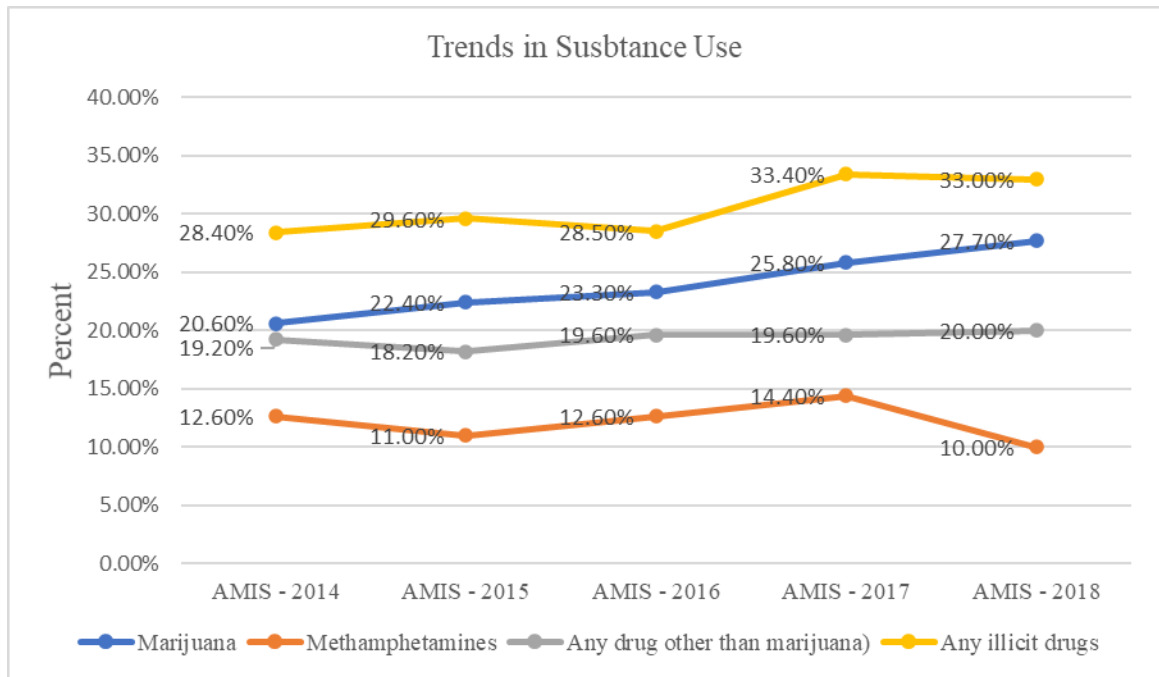
Figure 2.3. Proportion of Florida's AMIS MSM participants reporting Sexually Transmitted Infection (STI) testing and diagnosis in the past 12 months for each AMIS cycle.

Trends in Sexually Transmitted Infection Testing & Diagnosis

STI Testing: 38.30% (AMIS - 2014), 39.10% (AMIS - 2015), 42.30% (AMIS - 2016), 40.00% (AMIS - 2017), 42.10% (AMIS - 2018)

STI Diagnosis: 8.10% (AMIS - 2014), 8.70% (AMIS - 2015), 10.80% (AMIS - 2016), 10.60% (AMIS - 2017), 10.30% (AMIS - 2018)

Figure 2.4. Proportion of Florida's AMIS MSM participants reporting HIV testing in the

past 12 months for each AMIS cycle.

Figure showing a line chart titled "HIV Testing". Y-axis labeled "Percent" ranging from 70.00% to 95.00%. X-axis shows AMIS - 2014 (91.80%), AMIS - 2015 (85.90%), AMIS - 2016 (90.00%), AMIS - 2017 (85.50%), AMIS - 2018 (78.90%).

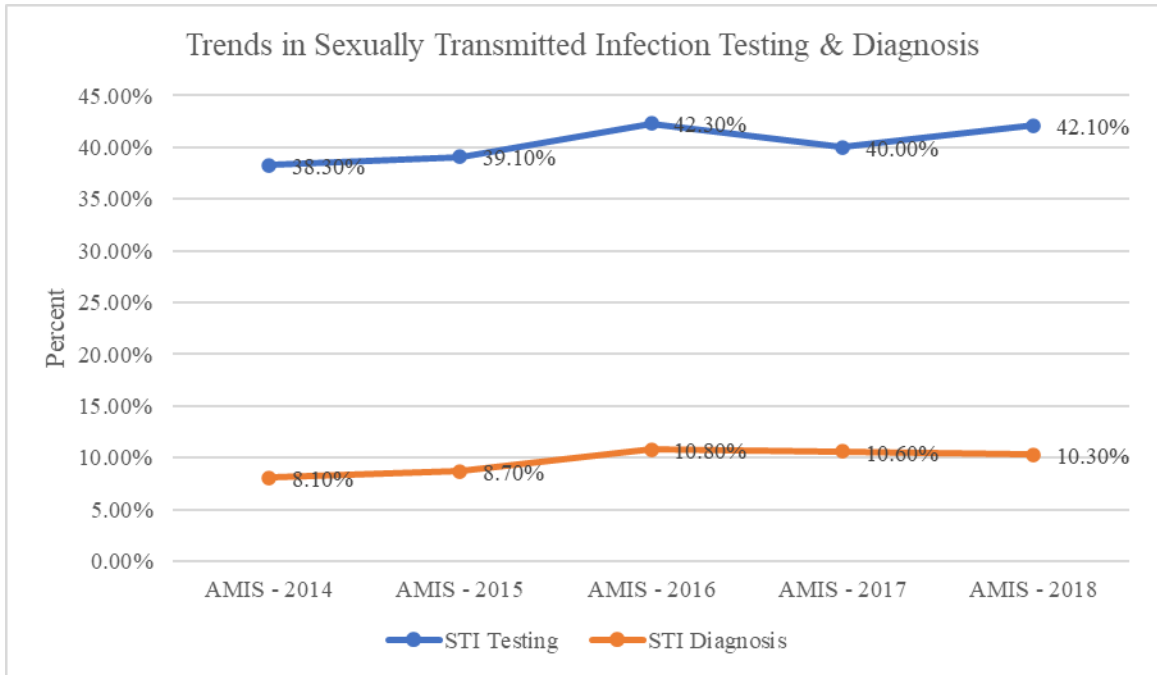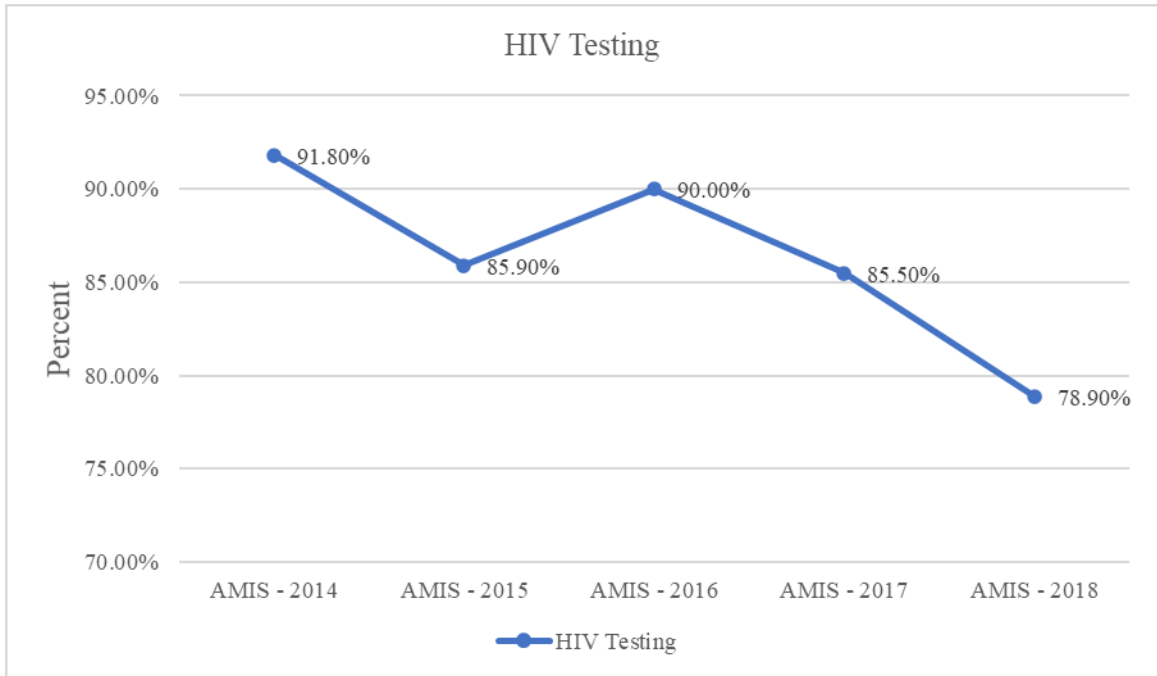# Chapter 3, Manuscript 2: The Association of Enacted Stigma and HIV Risk Behaviors Among Men Who Have Sex with Men

Abstract

HIV-associated stigma is well recognized, but there is limited information on the impact of enacted stigma among men who have sex with men (MSM) and the outcomes on HIV risk behaviors. Enacted stigma is the unfair treatment by others due to a marginalized status in society. This study is a secondary data analysis of MSM from a cross-sectional internet sample using logistic regression to determine which form of enacted stigma would negatively impact behavioral outcomes commonly associated with increased HIV risk (sexual behaviors, substance use, no STI testing, and no HIV testing). Approximately 32.4% (confidence interval [CI]: 0.32-0.36, n=706) of MSM reported verbal harassment, 26.0% reported discrimination (CI: 0.13-0.16, n=678), and 3.7% reported physical assault (CI: 0.03-0.04, n=78) in the preceding twelve months due to their sexual orientation. Compared to those who had not experienced enacted stigma, MSM who experienced victimization were more likely younger, hold a high school diploma or equivalent, and less likely to report HIV or STI testing. This study provides valuable information to understand the experience of enacted stigma in MSM, highlighting the need to provide coping skills against all forms of stigma to the gay community and improve the current community and policy-level HIV prevention interventions.

Keywords: MSM, Enacted Stigma, HIV, Risk Behavior

Introduction

Over the last twenty years, there is a dramatic rise of community and scientific awareness on the issues affecting lesbian, gay, bisexual, and transgender (LGBT)

individuals (Russell & Fish, 2016). Early findings about the LGBT experience found substantially disproportionate rates of mental health conditions, including depression, anxiety, and suicide attempts compared to heterosexuals (Cochran, 2001; King et al., 2008). This finding represents a disparity primarily explained by stigma-related stress and marginalized-group identity affecting sexual minority individuals, who lack societal power compared to the dominant group identity (Meyers, 1984). Sexual minority stigma includes perceived, anticipated, or enacted stigma. This study will examine enacted stigma, due to limitations in assessing the other forms of sexual minority stigma, which is defined as the experience of unfair treatment by others and categorized as physical, verbal, or discrimination (Scambler, 1998) among men who have sex with men (MSM), a subset of the LGBT community. According to the minority stress theory, enacted stigma is an external type of stigma because it transpires outside of the stigmatized individual (i.e., sexual minority status → stress → psychopathology; Meyer, 2003b).

Minority stress theory proposes that minority group members experience stressors due to sociocultural status, bias, and judgment, explicitly related to group membership (Meyer, 1995) that can harmfully impact mental well-being and adaptation (Lewis, Derlega, Griffin, & Krowinski, 2003). Minority stress comes from the traumatic events as a result of sexual minority status and navigating everyday life (Veale, Peter, Travers, & Saewyc, 2017). Commonly reported enacted stigma experiences among MSM include verbal harassment, the subject of family gossip, and feeling fearful in public places because of sexual minority relationship behaviors (Zlotorzynska, Sullivan, & Sanchez, 2017). One study found that 28% of men and 19% of women reported violence or were victims of crimes due to their sexual orientation (Herek, Gillis, & Cogan, 1999). Another study

utilized dyads of heterosexual and sexual minority siblings and found higher victimization for the sexual minority sibling (Balsam, Rothblum, & Beauchaine, 2005). These findings are consistent with other research that mistreatment among marginalized groups is connected to adverse health outcomes (Kessler, Mickelson, & Williams, 1999; Landrine, Klonoff, Gibbs, Manning, & Lund, 1995; Fisher & Shaw, 1999).

There is increased attention to reduce stigma related to sexual behaviors and MSM for holistic HIV prevention and treatment programming (White House Office of National AIDS Policy, 2015). In this context, MSM are among the populations at highest risk for HIV infection nationally (Centers for Disease Control and Prevention, 2018). The projected lifetime risk of an HIV diagnosis in the United States is 1 in 6 MSM, including 1 in 2 Black MSM, 1 in 4 Latino MSM, and 1 in 11 White MSM (Hess, Hu, Lansky, Mermin, & Hall, 2017). The minority stress theory does not fully examine the pathway through which stigma-related trauma contributes to psychopathology and factors unique to sexual minorities (Hatzenbuehler, 2009); however, there is a continued understanding of the role that stigma, prejudice, and heteronormativity play with risk-taking behaviors in association with greater physical and mental health outcomes in comparison to the general population (Hatzenbuehler, Nolen-Hoeksema, & Erickson, 2008; Cochran, Greer, & Mays, 2003).

The Meyer (2003) minority stress model emphasizes that different stressors (e.g. homophobia), coping mechanisms, and stress processes, such as the experience of enacted stigma require the individual to adapt, but also cause significant stress which translates to poor health outcomes. Typically, MSM have a greater likelihood than heterosexuals for risk-taking behaviors including substance use (Lelutiu-Weinberger et al., 2013), tobacco use (Grusin, Greenwood, Matevia, Pollack, & Bye, 2007), and HIV/AIDS (Centers for

Disease Control and Prevention, 2018). There is still investigative research needed to further understand the role of stigma in sexual minorities (Hatzenbuehler, 2009).

Previous studies have examined components of minority stress among minority sexual individuals supporting an association between sexual minority stigma and psychological distress (Alvy et al., 2011). A large amount of stigma research among MSM focuses on the impact of living with HIV or discrimination, rather than the specific types of stigma experienced by MSM (Reilly et al., 2016; Balaji, Bowles, Hess, Smith, & Paz-Bailey, 2017). Few studies have yielded information regarding the rates of verbal harassment, discrimination, or physical assault (Huebner, Rebchook, & Kegeles, 2004). Furthermore, the association between stigma and increased risk behaviors among MSM is inconsistent in the literature (Courtenay-Quirk, Wolitski, Parsons, & Gomez, 2006; Toth, York, & DePinto, 2016).

One of the main barriers to HIV screening, prevention, and care is stigma (Parker & Aggleton, 2003). A crucial next step is to 1) estimate the prevalence of enacted stigma in this sample of MSM and 2) examine the association of enacted stigma with condomless anal intercourse (CAI), substance use, STI testing, and HIV testing. The study's hypothesis, informed by the minority stress theory, is that enacted stigma increases the odds of engaging in HIV risk behavior. There are no currently available published studies assessing the effect of enacted stigma against multiple HIV risk behaviors in an MSM internet-sample.

Methods

Procedures

This study is a secondary data analysis of the American Men's Internet Survey (AMIS) cycles 2014-2018. The AMIS is an annual online behavioral survey of MSM living in the United States and is self-administered through a computer or mobile device. The survey consists of a core questionnaire in the following domains: sexual behavior, HIV and STI testing and diagnosis history, and drug and alcohol use (PRISM Health Research Team, n.d.).

This study used a convenience sample with recruitment occurring through various websites using banner advertisements, email blasts, or emailing previous participants who consented for future contact. There is no incentive for participation in the parent study; following consent to participate in the study, the online survey starts immediately. The methods and previous AMIS cycle data are published elsewhere (Zlotorzynska, Sullivan, & Sanchez, 2017; Zlotorzynska, Sullivan, & Sanchez, 2019).

This research uses four annual data collection cycles for analysis: September 2015-April 2016 (AMIS-2015), September 2016-February 2017 (AMIS-2016), July 2017–November 2017 (AMIS-2017), September 2018-November 2018 (AMIS-2018). This study's data set consist exclusively of participants born male and currently identifying as male, MSM, and $\geq$ 15 years or older. The total sample size is n=2,486.

Measures

The enacted stigma questions are an adaptation from several previously published surveys (Williams, Yu, & Jackson, 1997; Bray Preston et al., 2007; Huebner, Rebchook, & Kegeles, 2004). The questionnaire asks participants if they had experienced any of five

situations in the past twelve months because an individual knew or assumed, they were attracted to men *(yes/no/do not know/ refuse to answer).* Three enacted stigma variables were created based on previous research (Huebner, Rebchook, & Kegeles, 2004): 1) *verbal harassment:* measured by whether the participant was called names or insulted, 2) *discrimination:* assessed by whether the participant received poor services in restaurants, stores, or other businesses or agencies, was mistreated at work or school, or denied or given lower-quality health care, and 3) *physical assault:* measured by whether the participant was physically attacked or injured. Answer responses were coded as binary variables (0 and 1). See appendix for sample questionnaire.

 Demographic variables include race/ethnicity, age, education, self-reported HIV status, and being "out," which is whether the participant ever told anyone they were attracted to or have sex with men. These demographic variables were selected as controls because there is evidence of significant association to high-risk sexual activity (Preston D. B. et al., 2004). *HIV Status,* defined as positive, negative, or unknown refers to participants who reported responses to ever having an HIV test, results of the most recent HIV test, and reporting a positive HIV test. *HIV status unknown* are individuals who have reported never receiving HIV test results or taking an HIV test. *Sexual Behaviors* are defined as any participant reporting engaging in condomless anal intercourse (CAI) with more than one male sexual partner in the past 12 months and with any male partner of discordant status, based on the participant's self-reported HIV status and the status of their male sex partner(s). *Illicit Substance Use* is the participant's self-reported use of marijuana, any drug use (other than marijuana), and any illicit drug use in the past 12 months. *STI testing* is

self-reported testing for syphilis, gonorrhea, or chlamydia in the past 12 months. *HIV Testing* is for participants who reported seeking an HIV test in the past 12 months.

Data Analysis

All data analyses were conducted using SPSS version 26.0. Descriptive tests examined demographic and HIV-related risk characteristics stratified by the three enacted stigma variables. The logistic regression analysis was performed applying a significance level of less than 0.05 to determine which enacted stigma variable might negatively impact behavioral outcomes (sexual behaviors, substance use, STI testing and diagnosis, and HIV testing). All the models were adjusted for demographic and behavioral characteristics associated with the enacted stigma variables. The adjusted models did not include race/ethnicity because it was not significant. All variables were recoded into a categorical binary response (0,1) to enable the analyses.

Results

The study's findings show there were 32.4% (confidence interval [CI]: 0.32-0.36, n=675) of participants who reported verbal harassment, 26.0% reported discrimination (CI: 0.13-0.16, n=309), and 3.7% reported physical assault (CI: 0.03-0.04, n=77) in the preceding twelve months due to their sexual orientation. Table 1 presents demographic characteristics. The mean age was 40.9 years. A total of 67.3% identified as White, non-Hispanic, 20.6% as Hispanic, 6.1% Black, non-Hispanic, and 5.1% reported other multiple race groups. Most participants identified as HIV-negative (70.9%), 12.1% as HIV-positive, and 17.0% reported an unknown HIV status. Almost half of the participants (49.9%) reported a college degree or postgraduate education. Among the participants, 91.9% had disclosed their sexual orientation.

Table 2 presents the associations between MSM characteristics and reported verbal harassment, discrimination, and physical assault. In multivariable analysis, younger MSM were more likely to experience verbal harassment compared to MSM, who were 40 years and older (ages 15-24, adjusted odds ratio [aOR] 3.05, CI: 2.33-3.97; ages 25-29 aOR 2.59, CI: 1.88-3.55; aOR 1.75, CI: 1.31-2.36). MSM with a high school diploma or equivalent were more than one and half times more likely to experience verbal harassment compared to MSM with a college degree or postgraduate education (aOR 1.74, CI: 1.25-2.43). In addition, MSM, who had disclosed their sexual minority status, were 63% less likely to report verbal harassment compared to MSM who did not disclose their sexual minority status (aOR 0.63, CI: (0.43-0.93). Race/ethnicity and self-reported HIV status were not significant variables associated with reporting verbal harassment.

MSM who had a high school diploma or equivalent, were more one and half times more likely to report discrimination compared to MSM with a college degree or postgraduate education (aOR: 1.52, CI: 1.02-2.26). Age, race/ethnicity, HIV status, and disclosing sexual minority status were not associated with reporting experiences of discrimination. MSM with less than a high school diploma (aOR 6.99, CI: 3.00-16.28) or a high school diploma or equivalent (aOR 2.89, CI: 1.41-5.93) were more likely to report physical assault compared to those with a college degree or postgraduate education. Age, self-reported HIV status, and disclosing sexual minority status were not associated with reporting experiences of physical assault.

Table 3 presents the association of enacted stigma and each HIV behavior. MSM, who reported experiencing discrimination, were more likely to report condomless anal intercourse compared to MSM, who did not report discrimination (aOR: 1.38, CI: 1.03-

2.36). MSM who reported experiencing verbal harassment, were more likely to report CAI with a serodiscordant partner (aOR: 1.34, CI: 1.06-1.69), use marijuana (aOR: 1.26, CI: (1.022-1.554), used any drug (other than marijuana) (aOR:1.38, CI: 1.08-1.76), and no STI testing in the past twelve months (aOR:1.38, CI: 1.12-1.71) compared to MSM who did not report verbal harassment. There were no risk behaviors associated with reporting physical assault.

Discussion

The study's purpose was to examine the extent to which enacted stigma impacts HIV behavioral outcomes among MSM. The study's hypothesis is that enacted stigma increases the odds of MSM engaging in some HIV risk behaviors and lack of HIV testing. Key findings suggest that MSM experienced some form of victimization related to their sexual minority status with variation by demographics and is significantly associated with some sexual risk. The associations found between enacted stigma and education, HIV status, and age likely reflect the broader vulnerability of disadvantaged populations (Arnold, Rebchook, & Kegeles, 2014). hese findings align with the minority stress theory that experiencing enacted stigma is associated with poor outcomes (Huebner, Rebchook, & Kegeles, 2004).

Age, particularly for MSM 15-24, was significantly associated with experiencing victimization and in line with previous studies, younger MSM in this sample were more susceptible to enacted stigma, with 51.6% reporting verbal harassment, 13.9% experiencing discrimination, and 4.9% being physical assault victims (Russell & Fish, 2016; Russell, Russell, Caitilin, & Diaz, 2014; Poteat & Espelage, 2007; Heck, Flentje, & Cochran, 2011; Mayberry, 2013). Today's sexual minority youth may be vulnerable to

social isolation as they typically come out during a developmental period defined by peer acceptance (Brechwald & Prinstein, 2011; Steinberg & Monahan, 2007). Undoubtedly, individuals' attitudes about sexual minorities have improved; however, a portion of the population still view the behavior of gay persons as immoral (Valdiserri, Holtgrave, Poteat, & Beyrer, 2018).

Another national study of LGBT youth found that 87.3% experienced some form of enacted stigma, particularly with verbal harassment (Kosciw, Greytak, Zongrone, Clark, & Truong, 2018). These findings are potentially explained by the institutions that guide youth's lives, the schooling culture, less inclusive school policies, and lack of family acceptance that perpetuates and sustains anti-gay attitudes and behaviors (Day, Ioverno, & Russell, 2019). Multiple studies found detrimental behaviors and policies that contribute to sexual minority youth's experiencing stigma, including curriculum silencing regarding LGBT issues (Thornton, 2003), attitudes of school personnel (Swanson & Gettinger, 2016), and only discussing sexual minorities in the context of HIV/AIDS (Snapp, Burdge, Licona, Moody, & Russell, 2015).

The traditional approach to reducing HIV incidence focuses on testing, linkage to care, and viral suppression and depends on individuals, who may not feel comfortable or empowered, to access HIV prevention and treatment services. The focus on the individual does not account for the larger social controls that fuel the epidemic, such as stigma (van Doorn, 2012). It is possible that the rejection felt by younger MSM sometimes may lead individuals to seek acceptance, comfort, and connections through unsafe unprotected sex and as a possible coping mechanism to manage the alienation experienced as a sexual minority (Arnold, Rebchook, and Kegeles, 2014). Interventions are needed that improve

younger MSM's psychological coping mechanisms and instill pride to balance some of the social rejection, stigmatization, and consequent engagement in HIV risk behaviors.

There is a wide range of health disparities linked to the stigma and discrimination experienced by sexual minorities (Parker, Hirsch, Philbin, & Parker, 2018). There are deleterious consequences of prejudice and stigma, with some individuals being at increased risk through behaviors associated with a sexual minority identity. This study's findings indicated that MSM who reported experiencing enacted stigma were more likely to report no STI testing in the previous 12 months or ever HIV tested. MSM may feel compelled to seek comfort in behaviors that may put them at risk, such as illicit drug use and unprotected sex. Previous studies have also shown a relationship between stigma and sexual risk-taking as a coping mechanism to reduce stress (Preston, D'Augelli, Kassab, & Starks, 2007; Smit et al., 2012; Ha, Risser, Ross, Huynh, & Nguyen, 2015).

This analysis found evidence for using substances, with 30.3% reporting marijuana use and 22.9% reporting other drug use. These results tie well with previous studies wherein sexual minority individuals, who experience victimization, also report higher engagement in substance use (Huebner, Thoma, & Neilands, 2015). There is also documented evidence that enacted stigma significantly impacts MSM seeking HIV/AIDS prevention and care services, possibly due to previous stigma exposures (Kingori et al., 2012; Whitehead, Shaver, & Stephenson, 2016; Arnold, Rebchook, & Kegeles, 2014). In this study 56.5% of MSM, who reported verbal harassment, were more likely to report not having an STI test in the last twelve months and 21.8% of MSM who reported physical assault reported never having an HIV test. MSM who experience enacted stigma may have lesser self-efficacy to practice safer behaviors (Mansergh, Spikes, & Flores, 2015).

Limitations

It is important to note several limitations of the current study. First, this sample lacked racial and ethnic diversity, which may be due to internet users' demographics. An internet-based study is subject to limitations, including sampling bias due to convenience sampling and misclassification bias from self-reported data. The convenience sampling method used in this study does not guarantee a representative sample and thus may not be generalizable to all MSM living in Florida. The participants in this study were predominantly white and may have different sexual risk factors, levels of outness, and testing behaviors compared to other MSM subgroups. Specifically, racial and ethnic minority MSM, which have disproportionately higher rates of HIV, were under-represented, which is common in internet-surveys (Centers for Disease and Prevention, 2018; Sullivan et al., 2011). Another study limitation was the AMIS data were collected cross-sectionally for each cycle and, therefore, this study cannot draw any causal or longitudinal conclusions from the observed associations. The survey also did not ask MSM about their about gender expression and not conforming to traditional gender roles, which may contribute to experiencing greater levels stigma (Mosack, Brouwer, & Petroll, 2013).

This study also did not evaluate any psychosocial factors, such as self-efficacy or self-esteem, which previous literature has documented to affect stigma and risk behaviors (Alvy et al., 2011). This study cannot establish incidence rates, and discrimination is likely underreported rather than overreported, meaning the lifetime prevalence of enacted stigma is much higher (Balaji, Bowles, Hess, Smith, & Paz-Bailey, 2017). The study also did not evaluate the causal pathway of stigma and only showed an association with behaviors.

Conclusion

Overall, these results provide evidence of a relationship between enacted stigma and risk behaviors. Stigma is a potent stressor, and HIV remains a highly stigmatized illness. These results affect HIV prevention efforts in the United States, underscoring the importance of addressing sources of stigma at multiple levels to improve sexual minority health. Overall, the study findings depict how stigma is associated with behaviors and demographic disparities. Widespread stigma, perpetuated by centuries of ignorance, and in an environment of institutionalized and legalized discrimination requires understanding the forces that foster—or inhibit—health and confronting the persistently disproportionate burden of disease, disability, and death that attends several minority groups (Centers for Disease Control and Prevention, 2013). Therefore, future research should examine enacted stigma and distinctions between sexual orientation, gender identity, and gender conformity. Overall, the study findings depict how stigma is associated with behaviors and future research could examine how an individual's psychological and social responses may mediate health outcomes (Stangl et al., 2019). It is also crucial that future studies focus on measuring the various forms of stigma and the situations in which stigma exists.

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Tables

Table 3.1: Demographic Characteristics of Florida's MSM in AMIS 2015-2018

	N	**%**
Age (years)		
15-24	632	25.4%
25-29	276	11.1%
30-39	358	14.4%
40 and older	1,220	49.1%
Race/ethnicity		
Black, non-Hispanic	151	6.1%
Hispanic	511	20.6%
White, non-Hispanic	1,672	67.3%
Other or multiple races[a]	127	5.1%
Self-reported HIV Status		
Positive	301	12.1%
Negative	1,762	70.9%
Unknown	423	17.0%
Education		
Less than High School Diploma	96	3.9%
High School diploma or equivalent	252	10.3%
Some college or technical degree	881	35.9%
College degree or postgraduate education	1,226	49.9%
Out[b]		
Yes	2,284	91.9%
No	202	8.1%

Numbers might not add to total because of missing data, which were excluded from denominators before calculating percentages for that characteristic

[a] Includes persons who indicated American Indian/Alaska Native, Asian/NativeHawaiian, Other Pacific Islander, multiple races

[b] Have you ever told anyone that you are attracted to or have sex with men?

Table 3.2: Multivariable association between sociodemographic characteristics of Florida's MSM and enacted stigma, AMIS 2015-2018

	Verbal Harrasment (n=675, 27.2%)				Discrimination[a] (n=309, 12.4%)				Physical Assault (n=77, 3.1%)			
	%[c]	aOR[b]	95% CI	P value	%[c]	aOR[b]	95% CI	P value	%[c]	aOR[b]	95% CI	P value
Age (years)												
15-24	51.6%	3.05	(233-3.97)	<0.0001	13.9%	1.30	(0.94-1.82)	0.12	4.9%	1.699	(0.88-3.25)	0.11
25-29	42.7%	2.59	(1.88-3.55)	<0.0001	10.8%	1.31	(0.88 - 1.95)	0.17	1.2%	0.745	(0.25-2.16)	0.59
30-39	34.0%	1.75	(1.31-2.36)	<0.0001	9.2%	1.22	(0.84-1.76)	0.29	2.3%	1.56	(0.76-3.21)	0.23
40 and older	23.4%	REF			8.1%	REF			1.7%	REF		
Self-reported HIV Status												
Positive	31.6%	1.18	(0.79-1.76)	0.41	9.9%	0.84	(0.52-1.34)	0.47	3.6%	2.25	(0.946-5.39)	0.07
Negative	32.4%	0.95	(0.72-1.26)	0.75	8.9%	0.73	(0.52-1.01)	0.06	1.9%	1.13	(0.58-2.17)	0.71
Unknown	44.7%	REF			14.4%	REF			4.0%	REF		
Education												
Less than High School Diploma	50.0%	1.41	(0.85-2.34)	0.17	3.9%	0.88	(0.45-1.74)	0.72	12.7%	6.99	(3.00-16.28)	<0.0001
High School diploma or equivalent	47.1%	1.74	(1.25-2.43)	<0.01	14.1%	1.52	(1.02-2.26)	0.04	4.8%	2.89	(1.41-5.93)	<0.01
Some college or technical degree	36.7%	1.25	(1.00-1.56)	0.04	10.6%	1.16	(0.88-1.52)	0.29	2.1%	1.31	(0.71-2.41)	0.38
College degree or postgraduate education	28.0%	REF			8.3%	REF			1.4%	REF		
Out												
Yes	35.2%	0.63	(0.43-0.93)	0.02	10.0%	0.75	(0.46-1.22)	0.26	2.3%	1.32	(0.61-2.84)	0.47
No	25.5%	REF			5.4%	REF			1.8%	REF		

[a] Includes received poorer services

[b.] Adjusted for age, HIV status, outness, and education level

[c.] Row percent

Table 3.3: Associations between HIV risk behaviors of Florida's MSM and enacted stigma, AMIS 2015-2018

	CAI			CAI with serodiscordant partner			Used marijuana			Used any illict drugs		
	aOR[a]	95% CI	P value	aOR[a]	95% CI	P value	aOR[a]	95% CI	P value	aOR[a]	95% CI	P value
Verbal harassment												
Yes	1.18	(0.94-1.47)	0.15	1.34	(1.06 - 1.69)	0.02	1.32	(1.06 - 1.65)	0.01	1.26	(1.022-1.554)	0.03
No	REF			REF			REF			REF		
Discrimination												
Yes	1.38	(1.03-2.36)	0.03	1.24	(0.94-1.65)	0.13	1.23	(0.94-1.61)	0.14	1.177	(0.91-1.524)	0.22
No	REF			REF			REF			REF		
Physical Assault												
Yes	1.13	(0.65-1.95)	0.66	1.051	(0.57-1.85)	0.86	1.18	(0.70 - 2.00)	0.52	1.22	(0.74-2.01)	0.42
No	REF			REF			REF			REF		

	Used any drug (other than marijuana)			Diagnosed with any STI			No STI Testing			Ever HIV Tested		
	aOR[a]	95% CI	P value	aOR[a]	95% CI	P value	aOR[a]	95% CI	P value	aOR[a]	95% CI	P value
Verbal harassment												
Yes	1.38	(1.08-1.76)	<0.01	1.25	(0.91-1.73)	0.16	1.38	(1.12-1.71)	<0.01	2.12	(0.92-4.83)	0.07
No	REF			REF			REF					
Discrimination												
Yes	1.21	(0.90-1.63)	0.20	1.34	(0.92-1.95)	0.12	1.22	(0.94-1.58)	0.13	2.11	(0.93-4.83)	0.07
No	REF			REF			REF					
Physical Assault												
Yes	1.62	(0.95-2.78)	0.75	1.39	(0.68-2.81)	0.36	1.07	(0.64-1.80)	0.80	2.16	(0.48-9.60)	0.31
No	REF			REF			REF					

[a.] Adjusted for age, HIV status, outness, and education level

[b.] Condomless Anal Intercourse

**Chapter 4, Manuscript 3: Characteristics of men who have sex with men reporting
ever receiving an HIV test: A latent class analysis**

Abstract

Men who have sex with men (MSM) bear a disproportionate burden of HIV infection in the United States. Diagnosing individuals with HIV is an essential step towards decreasing transmission. The present study applied latent class analysis (LCA) using negative HIV status MSM from an online surveillance sample to identify HIV testing outcomes using eight classification variables. Multivariate logistic regression analyses compared classes on demographics and risk behaviors. LCA analysis revealed four groups representing differences in HIV testing outcomes, whereby MSM who reported the lowest levels of HIV testing (Class 1 and 3) were more likely to report not seeing a healthcare provider, engage in condomless anal intercourse, condomless anal intercourse with a serodiscrodant partner, and drug use. Class 2 exhibited high testing rates concurrently with high engagement in HIV risk behaviors. A comparison across all classes found that older age MSM (40 years or older) and having health insurance were significant factors for taking an HIV test. This study also found class variance in of MSM reported seeing a healthcare provider (63.4% to 100%) and the frequency of an individual receiving an offer of an HIV test (<1% to 83.2%) was not consistent across the groups. A healthcare provider, who offers an HIV test, is significantly associated with receiving a test. Together the study findings argue for implementing interventions strategies that represent the best fit for the subgroup of MSM within a population, including and allocating more resources for normalizing and routinizing HIV testing, training healthcare providers, and empowering MSM to emphasize patient-provider sexual health conversations.

Keywords: Latent Class Analysis, MSM, HIV, HIV testing

Introduction

Approximately 1.2 million Americans live with HIV, with 61% of cases among men who have sex with men (MSM) (Centers for Disease Control and Prevention, 2018). Crucial to ending the HIV epidemic is the timely identification of HIV infection through accessible screening services. The US Preventive Services Task Force (2019) recommends that all adults between the ages of 13 and 64 get tested for HIV at least once annually as part of routine healthcare. Individuals with higher risk factors, such as sexually active MSM, would benefit from more frequent HIV testing (for example, every 3 to 6 months; Branson et al., 2006). In 2018, among all adults and adolescents, the diagnosis of HIV infections attributed to men who have sex with men was approximately 70%, including 4% MSM who are intravenous drug users (Centers for Disease Control and Prevention, 2018). Nationwide, 14% of people living with HIV (PLWH) are unaware of their infection contributing to 38% of new HIV infections (Harris et al., 2019).

The US Department of Health and Human Services *Ending the HIV Epidemic: A Plan for America* aims to reduce 90% of new HIV infections by 2030 (Office of Infectious Disease and HIV/AIDS Policy, HHS, 2020). One of the pillars critical to reaching this goal is diagnosing all people with HIV as early as possible. Knowledge of HIV status is vital for deciding about sexual prevention behaviors and early access to antiretroviral treatment (Sullivan et al., 2012), but adults still lack awareness of their HIV status (Centers for Disease Control and Prevention, 2018). National surveillance findings indicate that 60% of adults reported never having an HIV test, and in the past 12 months only 8% reported an HIV test (Centers for Disease Control and Prevention, 2017).

There are still MSM who report never having an HIV test. In a large ongoing national study of US MSM, the proportion of HIV-seronegative individuals or those of unknown status who had an HIV test in the past 12 months was between 49% and 64% (Sanchez et al., 2018). Relatively few MSM are regularly testing, as is often advised by national screening recommendations. The most reported reasons individuals do not seek HIV testing is low perceived risk, the inconvenience and impracticality of visiting testing sites during working hours, procrastination about seeking a test, stigma, not knowing where to get tested, the doctor not bringing it up, and worry about the cost (Hamel et al., 2014; MacKellar et al., 2011; Bilardi et al., 2013; Mikolajczak, Hospers, & Kok, 2006).

HIV testing is operationalized as a risk-factor-based strategy, but this demonstrates the limits of detecting people with HIV when most individuals do not view themselves as at risk. Healthcare providers are another gateway for individuals to access an HIV test and seek treatment. A national study found that 84.3% of adults had an encounter with a healthcare professional in the past year (Centers for Disease Control and Prevention, 2018). Previous research has found that over half of MSM said a healthcare provider did not suggest getting tested (Hamel et al., 2014). Other MSM indicated declining HIV testing in the past, because the healthcare provider did not explain the importance of testing (Dowson, Kober, Perry, Fisher, & Richardson, 2011).

Social, behavioral research, and prevention and intervention programs tend to target groups as a whole without accounting for individual characteristics that predict a response (Lanza & Rhoades, 2013). Latent Class Analysis (LCA) is a powerful statistical technique that uncovers subgroups, referred to as class membership, based on an individual's pattern of response to multiple observed variables (McCutcheon, 1987; Lanza & Rhoades, 2013).

Previous studies using LCA demonstrated that this method is successful among multiple demographic groups, disease subtypes, and contextual risks, including substance use (Shin, McDonald, & Conley, 2018), HIV risk factors (Brantley, Kerrigan, German, Lim, & Sherman, 2017), and antiretroviral adherence (Carter et al., 2018). There is minimal research on LCA, HIV testing, and classification of different MSM groups in studying HIV testing outcomes (Dangerfield, Craddocl, Bruce, & Gilreath, 2017; Turpin et al., 2019).

This study uses LCA to characterize MSM's HIV risk factors and identify specific subgroups by testing outcomes. The use of LCA allows for the discovery of subgroups with similar risk response profiles to identify which classes would be most likely to either access or not access HIV testing. This analysis identifies MSM with distinct patterns of behaviors, which can then inform high-impact HIV prevention strategies.

Methods
Procedure & Sample

This study is a cross-sectional design using secondary data from the American Men's Internet Survey (AMIS) cycles 2014-2018, a national annual online behavioral survey of MSM living in the United States using domains adapted from the CDC's National HIV Behavioral Surveillance (NHBS) (Sanchez, Sineath, Kahle, Tregear, & Sullivan, 2015). The AMIS survey is self-administered through a computer or mobile device and consists of a core questionnaire in the following domains: sexual behavior, HIV and STI testing and diagnosis history, and drug and alcohol use (PRISM Health Research Team, n.d.).

The AMIS uses a convenience sample with recruitment occurring through various websites using banner advertisements, email blasts, or emailing previous participants who

consented for future contact. There was no incentive for participation in the parent study. Previous research on AMIS cycles' methods and data (AMIS 2014-2016) have been published (Sanchez, Sineath, Kahle, Tregear, & Sullivan, 2015; Zlotorzynska, Sullivan, & Sanchez, 2017; Zlotorzynska, Sullivan, & Sanchez, 2019). This secondary analysis uses, exclusively, participants born male and currently identifying as male, reported ever engaging in oral or anal sex with a male, HIV status as negative or unknown, and 15 years or older. Individuals with unknown HIV status are defined as those individuals who have reported never receiving HIV test results or who have never taken an HIV test. The total sample size for this study was *n*=2,906.

Measures

Participant demographic covariates included race/ethnicity (non-Hispanic White, non-Hispanic Black; Hispanic; or Other), age groups (15-24; 25-29; 30-39; 40+), health insurance coverage (yes or no), and level of education (less than a high school degree, high school diploma or equivalent, some college or technical degree, and college degree or postgraduate degree).

The LCA included a total of eight variables, referred to as the classification variables. These classification variables represent a variety of recognized HIV risk factors and were selected based on previous research and are associated with other adverse HIV-related outcomes (Kuhns et al., 2016). The classification variables are 1. condomless anal intercourse (CAI), 2. CAI with a serodiscordant partner, 3. STI diagnosis, 4. seeing a healthcare provider (HCP), 5. HCP offering an HIV test, 6. drug use, 7. sex in exchange for goods, and 8. ever HIV tested. HIV testing is the variable of interest (HIV tested, Never HIV tested) and presented for participants with a reported HIV test and a negative or

unknown result. The advantage of using the ever HIV tested variable allows for easier participant recall compared to a frequency-based measure of HIV testing and will not vary within subjects over time (Merchant et al., 2010; Card et al., 2017).

The classification variables presented in this analysis are self-reported behaviors during the 12 months preceding survey participation, except for the variable ever HIV tested. Sexual behaviors are defined as CAI and CAI with a serodiscordant partner, an intimate partnership in which one person is HIV-seropositive, and the other is HIV-seronegative. These two variables examine any participant who reported engaging in CAI with more than one male sexual partner in the past 12 months and CAI with any male partner of discordant status based on the participant's self-reported HIV status and the status of their male sex partner(s). The healthcare variables are seeing an HCP and whether an HCP offered the participant an HIV test. Drug use reflects the participant's self-reported use of marijuana, any drug use other than marijuana, any illicit drug use, and the use of methamphetamines. STI diagnosis is defined by a participant who self-reported positive cases of syphilis, gonorrhea, or chlamydia. Sex in exchange for goods or transactional sex represents any participant who engages in giving or receiving any gifts, money, or other services. See appendix for sample questionnaire.

Data Analysis

Descriptive data analysis was first conducted, including the chi-square test to compare demographics and behaviors. Pearson's Chi-square test was used to explore statistically significant associations between HIV testing, demographics, and the classification variables. The significance level was defined as alpha less than 0.05. This study used PROC LCA to model latent class based on the classification variables (Lanza,

Collins, Lemmon, & Schafer, 2007; Lanza, Dziak, Huang, Wagner, & Collins, 2015). The 1-class solution was tested first, and incrementally the number of classes was increased up to a 5-class solution, until the best fitting model was identified using model-fit statistics.

The following model fit statistics were used: Akaike information criteria (AIC) (Akaike, 1987), Bayesian information criterion (BIC) (Schwarz, 1978), sample size adjusted BIC, the bootstrap likelihood ratio test (BLRT), and Lo Mendell Rubin (LMR) likelihood ratio test (Lo, Mendell, & Rubin, 2001). The smallest AIC and BIC values were considered to indicate the best model fit and the BLRT p-values comparing the less parsimonious class model to the larger class model. Additionally, the classes' theoretical meaningfulness and the proportion of participants represented in the classes were considered (Hipp & Bauer, 2006).

After identifying the LCA model, demographic covariates were added (age, level of education, health insurance, and race/ethnicity). Any of the covariate variables with missing values were eliminated from the latent class analysis, concluding with a total sample size of 2,726 persons. Multivariate logistic regression was used to test for significant differences between classes and the classification variables and covariate prevalence rates and 95% confidence intervals were calculated for each latent class. The SAS (version 9.4) statistical program was used for LCA, and descriptive statistics were performed in SPSS 24.0

Results

In the sample, overall, 67.7% identified as White, 20.3% as Hispanic, 5.7% as Black, non-Hispanic, and 5.3% as other. Among the individuals included in the study, the mean age was 40.36 (range 15-86 years old). Half of the respondents reported a college

degree (50%); the overwhelming majority had health insurance (83.4%), and more than three quarters (77.8%) reported seeing a healthcare provider in the past 12 months. Table 1 displays the demographic and psychosocial characteristics of the sample stratified by ever having an HIV test. Participants who had no HIV test were significantly more likely to have the equivalent of a high school diploma or less (32.1% compared to 9.9%), be between 15-24 years of age (66.5% compared to 16.5%), identify as Hispanic (26.7% compared to 19.3%), were less likely to have seen a healthcare provider (29.0% compared to 10.2%), and have no health insurance (14.2% compared to 12.5%).

For LCA, this study examined model fit indices one through five latent classes to identify the optimal fit and selected a four-class solution, with considerations for interpretability and class separation (Table 2). The four-class solution provided the lowest BIC and AIC values with a significant improvement in BLRT compared to one through three and five-class solutions. The posterior probabilities represent reporting a behavior given that membership class and a probability greater than 50% for a specific classification variable indicates that members of that class are more likely to engage in that behavior or risk factor (Table 3). Figure 1 shows the unadjusted percentages of participants in each class for the classification variables.

For post estimation analysis, each respondent was assigned to a class (Table 4). In Class 1 (n=105), 46.6% of MSM had some college or technical education, were between the ages of 15-24 (45.7%), identified as White, non-Hispanic (53.3%), and had health insurance (63.8%). Class 1 MSM had the lowest likelihood of having ever tested for HIV (52.24%) or seeing a healthcare provider (63.45%). Of the Class 1 MSM that saw a healthcare provider in the past 12 months, less than 1% were offered an HIV test. Although

this class was less likely to report an HIV test, there was also minimal engagement in HIV risk behaviors. In this class, the only reported risk behaviors Class 1 MSM reported were engaging in condomless anal intercourse (18.91%) and drug use (24.79%).

Class 2 (n=1,484) contained the highest probability of MSM reporting an HIV test (97.28%), which consisted of 52.4% of males with a college degree, 43.2% were age 40 or older, 73.7% identified as white non-Hispanic, and 93.0% had health insurance. This group was also more likely to engage in higher-risk behaviors, including condomless anal intercourse (99.99%), condomless anal intercourse with a serodiscordant partner (50.76%), STI diagnosis (27.18%), transactional sex (12.48%), and drug use (44.91%). This group was also more likely to see a healthcare provider (100%) and receive an offer of an HIV test from the HCP (83.21%).

In Class 3 (n=225), 44.4% of MSM had some college or technical degree, 31.1% were between the ages of 15-24, 58.2% identified as White non-Hispanic, and 67.1% had health insurance. Class 3 MSM were also less likely to report ever having an HIV test (74.59%) or seeing a healthcare provider (65.79%). This class had a similar profile to Class 1 with a difference in that MSM in this class were more likely to report higher engagement in condomless anal intercourse (99.98% compared to 18.91%) and have CAI with a serodiscordant partner (37.07%). Of the MSM that saw a healthcare provider in this class, less than 1% reported that the healthcare provider offered an HIV test.

Class 4 (n=912) MSM demographics showed that 50.3% had a college degree or postgraduate education, 42.1% were 40 years or older, 66.3% identified as White non-Hispanic, and 86.4% had health insurance. Class 4 MSM were also more likely to report ever testing for HIV (95.30%), seeing a healthcare provider (100.0%), and the healthcare

provider offering an HIV test (56.56%). Half of the Class 4 MSM reported condomless anal intercourse (49.36%) and some drug use (18.9%). A comparison across all classes finds that older age MSM and having health insurance are significant factors for taking an HIV test.

Discussion

HIV testing is the starting point of nearly all prevention and care services and requires tailoring to reach individuals who have not been touched by previous outreach efforts. The LCA analysis identified MSM subgroups with differential prevalence of HIV risk behaviors who may benefit from HIV testing. LCA revealed four groups showing Class 1 had the lowest HIV testing rate, while Class 2 exhibited high testing rates concurrently with high engagement in HIV risk behaviors. These trends mask more complex latent classes and are consistent with prior studies suggesting that a combination of individual risk factors can result in higher risk factors and show that individuals with similar profiles may run in the same community or sexual networks that enable HIV spread (Chan et al., 2015).

The analysis also found evidence that not having a healthcare provider, engaging in CAI, drug use, and transactional sex were independent predictors of HIV testing outcomes. This study provides essential data about the best approach to target HIV testing and prevention according to the detailed profiles of each latent class. For example, 51% of MSM, ages 15-24, were in Class 2, which also reported higher levels of HIV risk factors. This finding suggests the potential for collaboration with youth service organizations and educational settings on interventions that promote and engage younger MSM in HIV testing. Similarly, Classes 1 and 3 reported fewer encounters with a healthcare provider but

reported recreational drug use and transactional sex highlighting an opportunity to implement HIV interventions and messaging at substance abuse programs, hospitals, or additional community entry points where uninsured and underinsured individuals may seek healthcare.

When developing health promotion and intervention strategies relevant to the class membership, the overall context in which HIV risk behaviors occurs must also be considered. This study not only found a demonstrated need for developing HIV testing strategies but also to focus on improving reduction interventions of HIV-related risk behaviors. Although, Class 2 had the highest HIV testing rates, which is a favorable outcome and in alignment with the national HIV testing recommendation, this class also showed a high concurrence of risk behaviors. This finding's implication suggests that there is a subset of high-risk MSM that are inclined to seek HIV testing. Individuals in this group may also have alternative health intervention needs, including the development of specific messaging, including the promotion of biomedical resources or the use of viral suppression strategies to explicitly address these behaviors and mitigate transmission risk.

Earlier research found that individuals with higher testing engagement were also more likely to exhibit high-risk sexual practices or poor health outcomes, such as having a CAI with a serodiscordant partner, CAI, and higher rates of an STI diagnosis (Fernyak et al., 2002; Norton, et al., 1997; Kalichman & Cain, 2008). The HIV testing session is intended to provide HIV information, help clients prevent and reduce risk behaviors, and discuss the importance of obtaining test results (Centers for Disease Control and Prevention, 2001). Alternatively, individuals may view repeated HIV testing as a risk reduction practice or a method to monitor one's status with continued risk behaviors

between tests. This also suggests that the general education delivered to these individuals during HIV testing may not resonate with the recipient. It is critical to identify the optimal HIV prevention messaging for those class members with high risk behaviors (Class 2 and 4) in comparison to classes with minimal HIV testing history (Class 1 and 3). Earlier research recommends that modifying and strengthened the HIV testing session for different groups may be necessary, particularly if revamping this information enables improved understanding of the risk-taking behavior and the impact of HIV test counseling messages (Hoenigl et al., 2015).

There also continues to occur missed opportunities for HIV testing under the current CDC HIV screening recommendations. This study also found there was variance in the classes of MSM reporting seeing a healthcare provider (63.4% to 100%) and the frequency of offering an HIV test was not consistent across the groups (<1.0% to 83.2%). This finding argues for improving screening risk assessments in all healthcare facilities. Finding individuals living with HIV is critical to early initiation of treatment and viral suppression.

Once individuals know their HIV status, they may reduce risky sexual behaviors, including one study that found a 68% reduction in CAI (Marks, Crepaz, Senterfitt, & Janssen, 2005). This study highlights that increasing HIV testing requires a layered approach. In this study, most MSM reported receiving an HIV test at a private doctor's office (43.4%, 1,139), followed by at an HIV counseling and testing site (17.8%, 467), or a Public Health Clinic/ Community Health Center (17.0%, 446). Individuals prefer HIV testing in medical settings, and healthcare providers can influence the decision to test (Petroll et al., 2009; Dorell, Sutton, Oster, & Hardnett, 2011). This study found evidence

that having a healthcare provider offer an HIV test is significantly associated with receiving a test. Therefore, expanding routinize HIV testing in healthcare facilities, syringe service programs, and community health centers may increase testing rates and catch individuals not actively seeking a test.

The healthcare provider plays a significant role in HIV testing, but alternative ways to increase access to routine HIV counseling and testing needs to be considered. Condomless anal intercourse, drug use, and transactional sex were predictors of HIV testing outcomes and are known risk factors for HIV infection (Mgbako, et al., 2020). These behaviors warrant strengthening prevention messaging regarding condom use (Nunn et al., 2011) and raising awareness of the availability of HIV testing in nontraditional HIV testing settings, including nonclinical and outreach venues. The LCA classes suggest that in addition to universal HIV testing, prevention programs should focus on social networks, such as illicit drug users or MSM, since individuals with similar demographic and behavioral patterns may influence individual HIV/STI behaviors that facilitate transmission (Friedman et al., 1997).

Limitations

This study is subject to several limitations, including data collected using a self-administered, cross-sectional survey tool, and the outcomes may not be generalizable to all of Florida's MSM; however, the LCA procedure can be replicated in other groups. An internet-based study is subject to limitations, including sampling bias due to convenience sampling and misclassification bias from self-reported data.. The participants in this study were predominantly white and may have different sexual risk factors, levels of outness, and testing behaviors compared to other MSM subgroups. Specifically, racial and ethnic

minority MSM, which have disproportionately higher rates of HIV, were under-represented, which is common in internet-surveys (Centers for Disease and Prevention, 2018; Sullivan et al., 2011).

Another study limitation was the AMIS data were collected cross-sectionally for each cycle and, therefore, this study cannot draw any causal or longitudinal conclusions from the observed associations. Also, some survey items involved activities that may be viewed as stigmatizing and may be under-reported, such as drug use. This study did not include additional risk factors, such as alcohol use or incarceration history; it did not capture sexual orientation disclosure and the type of healthcare visit setting, since these variables were not routinely collected in the study. The survey did not include items assessing HIV-related knowledge, previous or future testing intentions, or motivation to seek an HIV test. Recall bias may have decreased the response accuracy since participants were asked to recall behaviors in the past twelve months.

Conclusion

In summary, the present study used LCA to classify MSM groups with differential HIV risk profiles. Most MSM seen at doctor's offices tested for HIV, but a proportion of healthcare visits resulted in MSM not receiving an HIV test. This study suggests that the HIV testing rates could be increased by nationally routinizing and normalizing HIV testing. There is also further need to train providers and empower MSM to emphasize patient-provider sexual health conversations, encourage HIV screenings, linkage to care, and reduction of viral spread. Future work should also consider system and policy-level interventions for universal HIV testing at medical facilities with high patient prevalence rates of HIV.

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Tables

Table 4.1: Demographic and psychosocial characteristics of Florida's MSM, stratified by

HIV testing history, AMIS 2014-2018

	HIV Tested		Never HIV Tested	
	n	%	n	%
Education Level				
High School diploma or less	240	9.9%	175	32.1%
Some college or technical degree	841	34.8%	157	34.8%
College degree or postgraduate education	1335	55.3%	119	26.4%
Age Group				
15-24	402	16.5%	309	66.5%
25-29	282	11.6%	35	7.5%
30-39	396	16.2%	23	4.9%
40 and older	1,361	55.8%	98	21.1%
Race/ethnicity				
Black, non-Hispanic	145	6.0%	22	4.8%
Hispanic	468	19.3%	122	26.7%
White, non-Hispanic	1,681	69.4%	287	62.8%
Other or multiple races[a]	129	5.3%	26	5.7%
Health Insurance				
Yes	2,091	87.5%	333	85.8%
No	299	12.5%	55	14.2%
Healthcare Provider				
Yes	1,964	89.8%	298	71.0%
No	223	10.2%	122	29.0%
HCP Offer HIV test P12 months				
Yes	902	52.8%	35	14.5%
No	806	47.2%	206	85.5%
Unprotected condomless anal intercourse P12 months				
Yes	1,726	70.7%	254	54.6%
No	715	29.3%	211	45.4%
Unprotected condomless anal intercourse with serodiscordant partner P12 months				
Yes	516	21.1%	80	17.2%
No	1,925	78.9%	385	82.8%
Any Drug Use				
Yes	736	30.2%	141	30.3%
No	1,705	69.8%	324	69.7%
Any STI Diagnosis P 12 months				
Yes	252	10.3%	18	3.9%
No	2,189	89.7%	447	96.1%
Transactional Sex				
Yes	161	6.6%	19	4.1%
No	2,280	93.4%	446	95.9%

*Other includes persons who indicated American Indian/Alaska Native, Asian/NativeHawaiian, Other Pacific Islander, multiple races

Table 4.2: Latent classes predicting ever having an HIV test of Florida's MSM and log-likelihood, AMIS 2014-2018

	5 class	4 class	3 class	2 class	1 class
Log-Likelihood	-18593	-18616	-18827	-19270	-20059
G2	197.96	243.01	664.49	1551.63	3128.53
AIC	285.96	313.01	716.49	1585.63	3144.54
BIC	577.34	544.79	888.67	1698.21	3197.52
Sample Size Adjusted BIC	437.53	433.57	914.67	1715.21	3172.1
BLRT p-value	0.05	0.01	0.01	0.01	N/A

Table 4.3: Latent classes of HIV testing probabilities for classification variables of

Florida's MSM, AMIS 2014-2018

	Class 1 15.67%	Class 2 23.88%	Class 3 22.28%	Class 4 38.17%
Classification variable				
Saw a healthcare provider	**0.6345**	**1.0000**	**0.6579**	**1.0000**
Healthcare provider offered an HIV	0.0004	**0.8321**	0.0003	**0.5656**
Ever tested for HIV	**0.5224**	**0.9728**	**0.7459**	**0.9530**
Condomless Anal Intercourse	0.1891	**0.9999**	**0.9998**	0.4936
Condomless Anal Intercourse with serodiscordant partner	0.0001	**0.5076**	0.3707	0.0001
Any drug use	0.2479	0.4491	0.3808	0.1898
Any STI Diagnosis	0.0059	0.2718	0.0495	0.0449
Transactional Sex	0.0373	0.1248	0.0674	0.0281

A probability greater than 50% for a certain item is generally thought to indicate
that members of that latent class are more likely to report that risk factor or
behavior. Probabilities greater than 50% are marked in bold.

Table 4.4: Latent class prevalence rates for demographics and odds ratio for differences between classes of Florida's MSM, AMIS 2014-2018

	Class 1 n, % 105, 3.85%	Class 2 n, % 1,484, 54.44%	Class 3 n, % 225, 8.25%	Class 4 n, % 912, 33.46%	Class 2 compared to Class 1 OR/95% CI	Class 3 compared to class 1 OR/95% CI	Class 4 compared to Class 1 OR/95% CI	Class 3 compared to class 2 OR/95% CI	Class 4 compared to Class 2 OR/95% CI	Class 4 compared to Class 3 OR/95% CI
Education Level										
High School diploma or less	21, 20.0%	171, 11.5%	39, 17.3%	108, 11.8%	0.69 (0.39-1.21)	1.01 (0.5-1.88)	0.73 (0.41-1.27)	1.46 (0.95-2.26)	1.05 (0.76-1.46)	0.71 (0.45-1.13)
Some college or technical degree	49, 45.7%	534, 35.9%	100, 44.4%	345, 37.8%	0.90 (0.57 - 1.41)	1.04 (0.63 - 1.72)	0.93 (0.60 - 1.45)	1.16 (0.83-1.61)	1.04 (0.82-1.31)	0.89 (0.63-1.26)
College degree or postgraduate education	35, 33.3%	779, 52.4%	86, 38.2%	459, 50.3%	REF	--	--	--	--	--
Age*										
15-24	48, 45.7%	304, 51.01%	70, 31.1%	174, 19.1%	**20.41 (8.70-47.88)**	0.91 (0.48-1.73)	**0.34 (0.20-0.60)**	**3.11 (1.98-4.89)**	1.18 (0.86-1.63)	**0.38 (0.23-0.62)**
25-29	21, 30.0%	92, 20.4%	52, 23.1%	144, 15.8%	**0.23 (0.12-0.43)**	1.58 (0.78-3.16)	0.56 (0.30-1.03)	**6.85 (4.19 -11.20)**	**2.43 (1.67 - 3.54)**	**0.35 (0.21-0.57)**
30-39	8, 7.6%	133, 8.9%	52, 23.1%	210, 23.0%	0.63 (0.29-1.21)	**3.01 (1.33-6.81)**	1.47 (0.70-3.07)	**4.78 (2.98-7.66)**	**2.33 (1.69-3.22)**	**0.48 (0.30-0.77)**
40 and older	28, 26.6%	955, 64.3%	51, 22.7%	384, 42.1%	REF	--	--	--	--	--
Race/ethnicity										
Black, non-Hispanic	11, 10.5%	77, 5.1%	15, 6.7%	58, 6.4%	1.07 (0.41-2.76)	0.64 (0.23-1.79)	1.05 (0.41-2.68)	0.59 (0.27-1.30)	0.98 (0.52-1.82)	1.64 (0.73-3.66)
Hispanic	29, 27.6%	241, 16.2%	59, 26.2%	209, 22.9%	1.23 (0.55-2.75)	0.98 (0.41 - 2.34)	1.50 (0.68-3.33)	0.79 (0.42-1.51)	1.22 (0.72-2.06)	1.52 (0.79-2.95)
White, non-Hispanic	56, 53.3%	1,096, 73.8%	131, 58.2%	605, 66.3%	1.74 (0.81 - 3.70)	1.15 (0.50 - 2.65)	1.82 (0.86-3.87)	0.66 (0.36-1.22)	1.04 (0.64-1.70)	1.57 (0.82-3.01)
Other or multiple races[a]	9, 8.6%	70, 4.7%	20, 8.9%	40, 4.3%						
Health Insurance*										
Yes	67, 63.8%	1,381, 93.0%	151, 67.1%	788, 86.4%	**0.12 (0.07 - 0.21)**	0.73 (0.42-1.24)	**0.22 (0.14-0.35)**	**5.77 (3.68-9.05)**	**1.77 (1.22 - 2.58)**	**0.30 (0.20-0.46)**
No	38, 36.2%	103, 6.9%	74, 32.9%	124, 13.5%	REF	--	--	--	--	--

OR, odds ratio; REF, reference

* Estimates where P<0.05 are bolded to facilitate interpretation

Figures

Figure 4.1: Probabilities of classification variables across latent classes of Florida's

MSM, AMIS 2014-2018
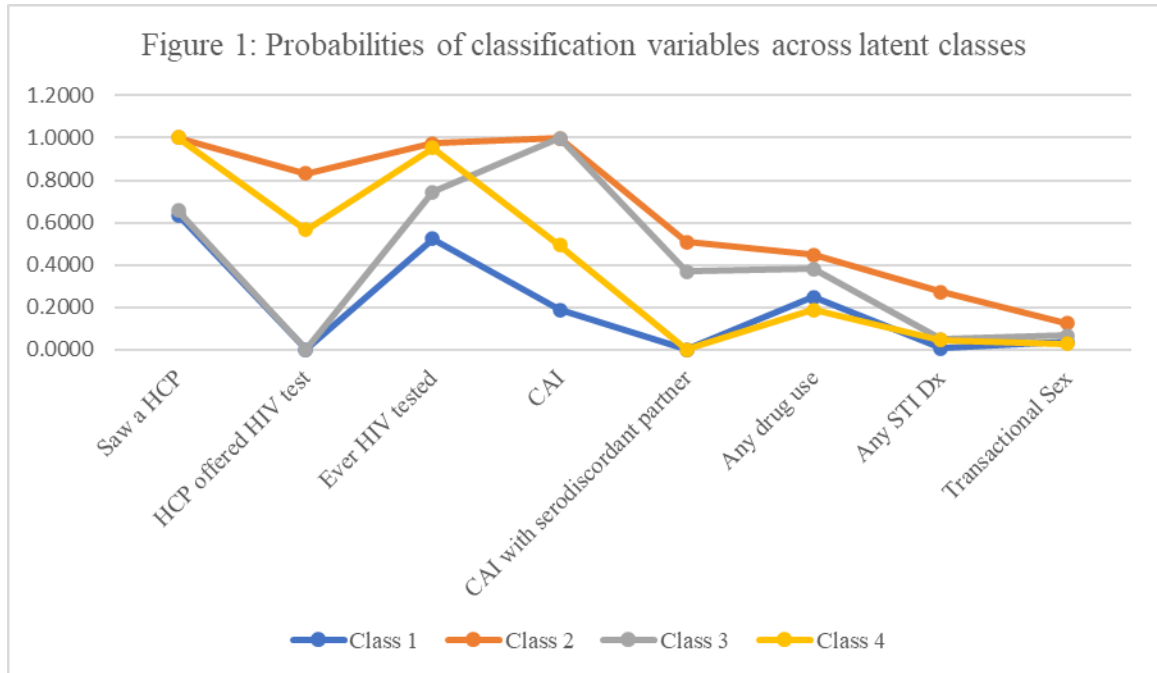
Chapter 5: Conclusion

This dissertation used a large surveillance dataset representing a sample of internet using MSM residing in Florida. The purpose of these studies was to identify the temporal behavioral trends of MSM, explore enacted stigma effects on HIV risk, and classify MSM into HIV testing groups based on multilevel HIV risk factors. An extensive literature review helped to identify the selection of three studies with probable impact on the field of HIV, MSM, and prevention strategies in the State of Florida. This dissertation aimed to fill gaps that existed in the scientific understanding of MSM, enacted stigma experiences, and HIV risk behaviors, while also utilizing a dataset never analyzed for this purpose.

Manuscript 1: Temporal Behavioral Trends of Men Who Have Sex with Men in Florida, 2014-2018

Implications

The use of behavioral surveillance data is essential for implementing prevention activities and regular evaluation of such data is valuable in the appraisal of effective HIV prevention, testing, and care provided to MSM. This study found overall significant increases in HIV risk behaviors from AMIS-2014 to AMIS-2018 among MSM reporting marijuana use (20.6% to 27.7%, $p < 0.001$), illicit drug use (28.4% to 33.0%, $p = 0.02$), and ever HIV tested (91.8% to 78.9%, $p < 0.001$). The findings also revealed racial and age disparities, including MSM aged 25-29, who engaged in CAI (75.8% to 88.2%, $p = 0.02$), aged 40 and older reporting CAI with a serodiscordant partner (20.25% to 27.8%, $p = 0.01$), Hispanic MSM reporting increased marijuana use (21.4% to 40.0%, $p < 0.01$), aged 40 years and older reporting an STI diagnosis (7.5% to 10.3%, $p = 0.03$). The percentage of younger MSM, age 15-24, who reported an HIV test decreased between

AMIS-2014 to AMIS-2018 (76.3% to 53.3%, $p = 0.02$). The results also showed that the number of MSM reporting an unknown HIV status increased between AMIS cycles 2016 to 2018 (12.8% to 23.35, $p < 0.001$). Finally, the only age group to increase survey participation over the annual cycles were younger MSM, who tripled response rates from AMIS-2014 to AMIS-2018 (9.1% to 34.3%).

Collectively, it appears that younger MSM in Florida are engaging in high-risk HIV behaviors consistent with national surveillance findings. In the United States, there are 14% of people living with HIV who are unaware of their status with an estimated 44.9% of younger people, ages 13-24, who are also most likely unaware of their infection, a national trend that increased from 2014-2018 (Centers for Disease Control and Prevention, 2020). This study also mirrored national data that found the number of younger MSM reporting an unknown HIV status doubled from AMIS-2014 to AMIS-2018. Similar to previous research, MSM samples from the internet report lower rates of HIV testing compared to MSM sampled in venues (Holt et al., 2012). This dissertation study suggests that MSM who were younger, or a minority were less likely to report an HIV test.

Studies of MSM reveal high rates of substance use, including illegal drug use (Lauby et al., 2017). This study found increasing recreational marijuana use among HIV-negative and unknown HIV status MSM. This conclusion follows from the fact that MSM residing in states with some level of marijuana legalization are more likely to report increased marijuana and drug use (Montgomery, Bagot, Brown, & Haeny, 2019). Importantly, this study's finding provides further evidence that MSM are continuing to report increasing annual trends of substance use and indicative of the need for Florida to strengthen substance use interventions for this population.

Recommendations

The internet has gained popularity among MSM in seeking romantic partners and social connections. This is advantageous for researchers looking to find MSM not traditionally seen in community, clinical, or venue-based outreach approaches, who may also exhibit a higher risk of HIV infection (Saxton, Dickson, & Hughes, 2013; Sanchez, Smith, Denson, Dinenno, & Lansky, 2012). Previous research has also found that online surveys attract higher proportions of younger MSM (Marcus, Schmidt, Hamouda, & Bochow, 2009). Future behavioral surveillance research should consider expanding sampling and recruitment methods for inclusiveness of the internet using MSM to provide a complete picture of trends in HIV risk behaviors.

The increased annual AMIS trends seen among younger MSM underscore the need to reach this population with proven prevention strategies such as pre-exposure prophylaxis (PrEP) and condom distribution before they become infected. Another emerging strategy that may target and improve HIV testing rates is the provision of HIV self-testing kits. HIV self-testing is a potentially useful tool and early evidence suggests that acceptability is high, can improve HIV-related communication between partners, and raise self-awareness of risks (Figueroa, Johnson, Verster, & Baggaley, 2015; Carballo-Dieguez, Frasca, Ibtoye, & Dolezal, 2012; Frasca et al., 2013). It will be important for future research and HIV prevention programs to explore the use of HIV self-testing kits among younger MSM and consider the use of randomized trials to assess comparativeness to the traditional HIV testing session.

Further research expanding on non-medical marijuana use in medicinally legalized states and HIV risk among HIV-negative MSM is warranted. Longitudinal data is needed

on substance use patterns for specific MSM groups, including minorities and younger MSM. Investigators should develop a community-level intervention focusing on reducing substance use, recreational marijuana use, and HIV risk behaviors among MSM.

Manuscript 2: The Association of Enacted Stigma and HIV Risk Behaviors Among Men Who Have Sex with Men

Implications

The second study of this dissertation found that MSM experienced some level of enacted stigma, reporting encounters of verbal harassment (32.4%) of participants who reported verbal harassment, 26.0% reported discrimination, and 3.7% reported physical assault in the preceding twelve months due to their sexual orientation. The findings of this study showed that younger MSM and MSM with a high school diploma or equivalent were more likely to experience verbal harassment. MSM, who experienced verbal harassment were also more likely to report CAI with a serodiscordant partner, used marijuana, used any drug (other than marijuana), and no STI testing in the past twelve months compared to MSM who did not report verbal harassment.

MSM who had a high school diploma or equivalent, were more one and half times more likely to report discrimination compared to MSM with a college degree or postgraduate education MSM and to report condomless anal intercourse compared to MSM, who did not report discrimination. MSM with less than a high school diploma or a high school diploma or equivalent were more likely to report physical assault compared to those with a college degree or postgraduate education.

The associations found between enacted stigma and education, HIV status, and age likely reflect the broader vulnerability of disadvantaged populations (Arnold, Rebchook,

& Kegeles, 2014). The traditional approach to reducing HIV incidence focuses on testing, linkage to care, and viral suppression and relies on individuals who may not feel comfortable accessing HIV-related services. This individual-level approach fails to account for the greater social influencers, like stigma, that drive HIV spread (van Doorn, 2012).

The findings of this study showed increased engagement in HIV risk behaviors among those who experienced stigma. It is possible that the rejection felt by younger MSM sometimes may lead individuals to seek acceptance, comfort, and connections through unsafe unprotected sex and as a possible coping mechanism to manage the alienation experienced as a sexual minority. The results of this study cast a new light on enacted stigma's effects on Florida's MSM.

Recommendations

Research does not look at how stigma can intensify the deleterious effects on the those with marginalized characteristics. Traditional public health interventions combat the HIV epidemic by focusing efforts on linkage to care, retainment, viral suppression, and expansion of biomedical interventions. Further work must disentangle these complexities, including community mobilization efforts to confront the stigmatization of sexual minorities and HIV. It is also critical to alter the social-level factors that create stigma and vulnerability to HIV. Interventions are needed that improve younger MSM's psychological coping mechanisms and instill pride to counteract some of the rejection, stigmatization, and consequent engagement in HIV risk behaviors.

Manuscript 3: Characteristics of Men Who Have Sex with Men ever reporting receiving

an HIV test: A Latent Class Analysis

Implications

Latent Class Analysis (LCA) revealed four groups representing differences in HIV testing outcomes, whereby MSM who reported the lowest levels of HIV testing (Class 1 and 3) were more likely to report not seeing a healthcare provider, engaging in condomless anal intercourse, having condomless anal intercourse with a serodiscordant partner, and drug use. The analysis found evidence that not having a healthcare provider, engaging in condomless anal intercourse, drug use, and transactional sex were independent predictors of HIV testing outcomes. This study also found variance in the classes of MSM reporting seeing a healthcare provider (63.4% to 100%) and the frequency of receiving an offer of an HIV test (<1% to 83.2%) was not consistent across the groups.

HIV testing is operationalized as a risk-factor-based strategy, but this study shows the limits of detecting people with HIV when most individuals do not view themselves as at risk. The findings argue in favor of improving risk assessments in all healthcare facilities. Finding individuals living with HIV is critical to the early initiation of treatment and viral suppression. Therefore, expanding routinized HIV testing in healthcare facilities, syringe exchange service programs, and community health centers may increase the likelihood of testing, even among individuals not actively seeking a test. The results also suggest that individuals with similar profiles may run in the same groups that facilitate HIV transmission (Chan et al., 2016).

Recommendations

The cornerstone of effective HIV programming is HIV testing. If testing rates are relatively high, this may result in noticeable reductions in HIV incidence (Wilson, Hoare, Regan, & Law, 2009). This study provides essential data about how the best approach for targeted HIV testing and prevention according to the detailed characteristics connected with each latent class. Future HIV testing programs should incorporate a comprehensive risk assessment that incorporates a multitude of factors that serve as barriers to HIV testing. Current policies hinge on the successful and timely testing of HIV-positive individuals; populations most impacted by these complex barriers may be ideal for targeting HIV testing interventions. The failure to incorporate a multi-layered approach to HIV testing will translate to failures in HIV policies.

Increasing HIV testing should also complement other HIV interventions to maximize population effects, such as treatment as prevention, serosorting of sexual partners, and treating sexually transmitted infections. A combination of HIV interventions is especially important as the benefit of HIV prevention counseling during an HIV testing session is less clear and inefficient (MacKellar et al., 2002). In a randomized controlled trial, an HIV testing and counseling session was not effective for reducing new STI rates and HIV incidence (Metsch et al., 2013; Pinkerton, Chesson, & Layde, 2002; Peterman et al., 2000; Fishbein & Jarvis, 2000).

The World Health Organization (2015) released updated testing guidelines recommending against individualized HIV counseling sessions and stated counseling session for HIV-negative persons was not helpful and may detract from other HIV prevention and treatment services. Future HIV testing research should continue to explore

the adaptability and acceptability of HIV home testing kits, revision of the HIV testing and counseling session guidelines, and enhancing clinical screening procedures for healthcare providers. The LCA groups suggest that in addition to universal HIV testing, prevention programs should focus on social networks, such as illicit drug users or subgroups of MSM, since individuals with similar backgrounds may influence individual HIV/STI behaviors that facilitate transmission (Friedman, et al., 1997).

Conclusion

This dissertation's implications and recommendations add to the literature about HIV risk, MSM, and Florida's HIV epidemiologic profile, suggesting that some of the HIV prevention and care strategies are still not reaching all MSM including younger MSM, and those with lower educational levels, who lack health insurance and identify as Hispanic and Black MSM. This is the first study that utilized the AMIS data set to examine a sample of MSM residing in Florida. The recommendations presented may be useful for researchers and Florida HIV providers to strengthen and target behavioral interventions for trends found in this body of work.

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Appendix: Questions used from American Men's Internet Survey for data analysis.

Sample questions represented here are from American Men's Internet Survey, Cycle 2018.

Eligibility Screener

Questions marked with * are required.

> **Page exit logic:** Skip / Disqualify Logic**IF:** "How old are you?" is less than "15"
> **THEN:** Disqualify and display: "Sorry, you do not qualify to take this survey. Thank you for your time!"

How old are you?*

{AGE}

Do you consider yourself to be Hispanic or Latino?*

{HISPANIC}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Which racial group or groups do you consider yourself to be in? Check all that apply.*

[ ] American Indian or Alaska Native	**{RACEA}**
[ ] Asian	**{RACEB}**
[ ] Black or African American	**{RACEC}**
[ ] Native Hawaiian or Other Pacific Islander	**{RACED}**
[ ] White	**{RACEE}**
[ ] I prefer not to answer	**{RACEF}**
[ ] Does not apply	**{RACEG}**
[ ] Don't know	**{RACEH}**

How do you describe your current gender identity? You can choose more than one answer.*

[ ] Male   **{GENDER_MALE}**
[ ] Female   **{GENDER_FEMALE}**
[ ] Transgender woman (male-to-female transgender)   **{GENDER_MTF}**
[ ] Transgender man (female-to-male transgender)   **{GENDER_FTM}**
[ ] Other gender identity   **{GENDER_OTH}**
[ ] I prefer not to answer   **{GENDER_REF}**
[ ] Don't know   **{GENDER_DK}**

What sex were you assigned at birth?*

{BIRTHSEX}

(1) Male
(2) Female
(3) Intersex/ambiguous
(7) I prefer not to answer
(9) Don't know

Have you <u>ever</u> had vaginal sex (penis in the vagina) or anal sex (penis in the butt) with a woman?*

{EVERMSW}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Have you <u>ever</u> had oral sex (mouth on the penis) with a man?*

{E_EVRMSM_ORAL}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Have you <u>ever</u> had anal sex (penis in the butt) with a man?*

{E_EVRMSM_ANAL}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Do you consider yourself to be:*

{IDENTITY_SCREEN}

(1) Homosexual, Gay or Lesbian
(2) Heterosexual or Straight
(3) Bisexual
(7) I prefer not to answer
(9) Don't know

Thank you for your interest in our survey! The video below will give you more information. Please watch it and indicate below whether you agree to participate.*

{CONSENT}

(1) I agree to participate in the survey.
(0) I do not agree to participate in the survey.

Demographics

What is the highest level of education you completed?

{HLEDUCAT}

(00) Never attended school
(01) Less than high school
(02) Some high school
(03) High school diploma or GED
(04) Some college, Associate's Degree, or Technical Degree
(05) College, post graduate or professional school
(77) I prefer not to answer
(99) Don't know

Healthcare

What kind of health insurance or health care coverage do you currently have? Choose all that apply.

[ ] A private health plan purchased through an employer   **{TYP_INSA}**
[ ] A private health plan purchased through an exchange (i.e. Obamacare)
{TYP_INSA2}
[ ] Medicaid or Medicare   **{TYP_INSG}**
[ ] Some other Medical Assistance program   **{TYP_INSH}**
[ ] TRICARE (CHAMPUS)   **{TYP_INSD}**

[ ] Veterans Administration coverage   **{TYP_INSE}**
[ ] Some other health care plan   **{TYP_INSF}**
[ ] I don't currently have any health insurance   **{TYP_INSI}**
[ ] I prefer not to answer   **{TYP_INSB}**
[ ] Don't know   **{TYP_INSC}**

In the past 12 months, have you seen a doctor, nurse, or other health care provider about your own health?

{SEEHCP}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "In the past 12 months, have you seen a doctor, nurse, or other health care provider about your own health?" is one of the following answers ("Yes")

At any of those times you were seen by a doctor or health care provider, were you offered an HIV test? An HIV test checks whether someone has the virus that causes AIDS.

{RECCHIV}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

In the past 12 months, where did you go to get routine preventative care such as a physical examination or checkup? Please select up to 2 of the most common places.

[ ] I did not have a regular place or doctor to go to for healthcare   **{HCP_NOREG}**
[ ] Private doctor's office   **{HCP_PRIVATE}**
[ ] HIV counseling and testing site   **{HCP_HIV}**
[ ] Public health clinic/community health clinic   **{HCP_CHC}**
[ ] Sexually transmitted disease clinic   **{HCP_STD}**
[ ] Family planning clinic (like Planned Parenthood)   **{HCP_FAM}**
[ ] Urgent Care or Emergency Room   **{HCP_ER}**
[ ] Hospital (outpatient department)   **{HCP_HOSPITAL}**
[ ] Correctional facility (jail or prison)   **{HCP_CORR}**

[ ] Other (please specify)   {HCP_OTHER}
{HCP_OTHERSPEC}

Demographics: Outness

Do you consider yourself to be:

{IDENTITY}

(1) Heterosexual or Straight
(2) Homosexual or Gay
(3) Bisexual
(4) Other sexual identity
(7) I prefer not to answer
(9) Don't know

Have you ever told anyone that you are attracted to or have sex with men?

{OUT_GI}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Substance Use: Injection Drug Use

The next questions are about injection drug use. This means injecting drugs yourself or having someone who isn't a health care provider inject you.

Have you ever in your life shot up or injected any drugs other than those prescribed for you? By shooting up, we mean anytime you might have used drugs with a needle, either by mainlining, skin popping, or muscling.

{EVR_INJ}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Which drug do you inject most often?

{DCHOICE}

(1) Speedball - Heroin and cocaine together
(2) Heroin, by itself
(3) Cocaine, by itself
(4) Crack
(5) Crystal, meth, tina, crank, ice
(6) Something else (Specify):

_____
(7) I prefer not to answer
(9) Don't know

Substance Use: Non-Injection Drug Use

In the past 12 months, have you used any non-injection drugs (drugs you did not inject), <u>other than those prescribed for you</u>.

{NIUSE12}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

> **Logic: "In the past 12 months, have you used any non-injection drugs (drugs you did not inject), <u>other than those prescribed for you</u>." is one of the following answers ("Yes")**

In the past 12 months, which drugs that were not prescribed to you did you use? (Check all that apply.)

[ ] Marijuana	**{NIUSEA}**
[ ] Powdered cocaine (smoked or snorted)	**{NIUSEB}**
[ ] Poppers (amyl nitrate)	**{NIUSEC}**
[ ] X or Ecstasy	**{NIUSED}**
[ ] Painkillers (Oxycontin, Vicodin, Percocet)	**{NIUSEE}**
[ ] Downers (Valium, Ativan, Xanax)	**{NIUSEF}**
[ ] Crystal meth (tina, crank, ice)	**{NIUSEG}**
[ ] Hallucinogens (LSD, mushrooms)	**{NIUSEH}**
[ ] Special K (ketamine)	**{NIUSEI}**
[ ] GHB	**{NIUSEJ}**

[ ] Crack cocaine   **{NIUSEK}**
[ ] Other drug: _____   **{NIUSEN}**
{NIUSEN_OTHR}
[ ] Heroin (smoked or snorted)   **{NIUSEL}**
[ ] I prefer not to answer   **{NIUSEM}**
[ ] Don't know   **{NIUSEO}**

Substance Use: Legal Marijuana

In the past 12 months, have you been prescribed marijuana and had it filled at a legal dispensary?

{MJ_MED}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Sexual Behavior: Condom Use

In the past 12 months (since in [MONTH/YEAR]), did you have anal sex <u>without using a condom</u>?

{M_M1UAS}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Sexual Behavior: Male Sex Partners (1 Partner)

You mentioned that in the past 12 months, you had sex with one male partner.

Did you know his HIV status?

{M_MM1HSK}

(0) No
(1) Yes
(7) I prefer not to answer

Sexual Behavior: Male Sex Partners (>1)

In the past 12 months (since [MONTH/YEAR]) , did you have anal sex <u>without using a condom</u> with a man who was HIV positive?

{M_MUAHP}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

In the past 12 months (since [MONTH/YEAR]), did you have anal sex <u>without using a condom</u> with a man who was HIV negative?

{M_MUAHN}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "Did you know his HIV status?" is one of the following answers ("Yes") Dynamically shown if "Did you know his HIV status?" = Yes

What was his HIV status?

{M_M1HST}

(1) HIV-negative
(2) HIV-positive
(3) Indeterminate
(7) I prefer not to answer

Sexual Behavior: Social Habits

In the past 12 months, have you exchanged things like money or drugs for sex with a male partner? Check all that apply.

[ ] No **{M_MEXCHANGEP12_1}**
[ ] Yes, I gave a sex partner things like drugs or money for sex
    {M_MEXCHANGEP12_2}

[ ] Yes, a sex partner gave me things like drugs or money for sex
        {M_MEXCHANGEP12_3}
[ ] I prefer not to answer**{M_MEXCHANGEP12_4}**
[ ] Don't know **{M_MEXCHANGEP12_5}**

HIV Testing

Have you <u>ever</u> been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS.

{EVERTEST}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

When you most recently got tested in [MONTH/YEAR], where did you get tested?

{LOCHIV_T}

(01) Private doctor's office
(02) HIV counseling and testing site
(03) Public health clinic/community health clinic
(04) Street outreach program/mobile unit
(05) Sexually transmitted disease clinic
(06) Hospital (inpatient)
(07) Correctional facility (jail or prison)
(08) Emergency room
(09) At home
(10) Other
(77) I prefer not to answer
(99) Don't know

HIV Status

Logic: "Have you <u>ever</u> been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("Yes")

What was the result of your most recent HIV test in [MONTH/YEAR]?

{RCNTRSLT}

(1) Negative
(2) Positive
(3) Never obtained results
(4) Indeterminate
(7) I prefer not to answer
(9) Don't know

Before your most recent test in [MONTH/YEAR], did you <u>ever</u> test positive for HIV?

{EVRPOS}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Stigma - NHBS Measure

In the past 12 months, have any of the following things happened to you because someone knew or assumed you were attracted to men?

	Yes	No	I prefer not to answer	Don't know	Does not apply
{STIGMA_NAMES} You were called names or insulted	(1)	(0)	(7)	(9)	(8)
{STIGMA_SERV} You received poorer services than other people in restaurants, stores, other businesses or agencies	(1)	(0)	(7)	(9)	(8)
{STIGMA_WORK} You were treated unfairly at work or school	(1)	(0)	(7)	(9)	(8)
{STIGMA_HEALTH} You were denied or given lower quality health care	(1)	(0)	(7)	(9)	(8)

{STIGMA_ATTACK} You were physically attacked or injured	(1)	(0)	(7)	(9)	(8)

STD Testing

Have you <u>ever</u> been tested for the sexually transmitted infections gonorrhea, chlamydia, or syphilis?

{EVERSTI_TEST}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

> **Logic: "Have you <u>ever</u> been tested for the sexually transmitted infections gonorrhea, chlamydia, or syphilis?" is one of the following answers ("Yes")**

In the <u>past 12 months</u>, that is, since [MONTH/YEAR], were you tested by a doctor or other health care provider for a sexually transmitted infection like gonorrhea, chlamydia, or syphilis?

{ANYSTI_TEST}

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Bacterial STI Diagnoses

In the past 12 months (since in [MONTH/YEAR]), has a doctor, nurse or other health care provider told you that you had any of the following? Check all that apply.

[ ] Gonorrhea   **{BSTIA}**
[ ] Chlamydia   **{BSTIB}**
[ ] Syphilis   **{BSTIC}**
[ ] None of the above   **{BSTID}**
[ ] I prefer not to answer   **{BSTIE}**
[ ] Don't know   **{BSTIF}**

VITA

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PUBLICATIONS AND PRESENTATIONS

Suarez, S. (2019). PrEPLink: An Active PrEP Referral System in Miami-Dade County. NACCHO Exchange, 18(4), 18-20.

Escudero, D. J., Bennett, B., Suarez, S., Darrow, W. W., Mayer, K. H., & Seage III, G. R. (2019). Progress and Challenges in "Getting to Zero" New HIV Infections in Miami, Florida. Journal of the International Association of Providers of AIDS Care, 18, 1-9.

Sarah Suarez, Vicky Vazquez, Jessy G. Dévieux. Outcomes of a Community Mobilization Partnership to measure PrEP Awareness, 2019 *American Public Health Association*. Annual Meeting and Expo. November 2019. Philadelphia, PA.

Sarah Suarez. Creating a PrEP Monitoring and Evaluation Program in Miami-Dade County. *National HIV Prevention Conference*. March 2019. Atlanta, GA.

Sarah Suarez. PrEPLink: An Active Referral System in Miami-Dade County. *United States Conference on AIDS*. July 2018. Orlando, FL.