Distribution Agreement

In presenting this thesis or dissertation as a partial fulfillment of the requirements for an advanced degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis or dissertation in whole or in part in all forms of media, now or hereafter known, including display on the world wide web. I understand that I may select some access restrictions as part of the online submission of this thesis or dissertation. I retain all ownership rights to the copyright of the thesis or dissertation. I also retain the right to use in future works (such as articles or books) all or part of this thesis or dissertation.

Signature:

_____ _____

Marc A. Pitasi Date

Perceived Sexual Identity Stigma and Associated Factors among Black and White Men who have Sex with Men

By

Marc A. Pitasi
Master of Public Health

Epidemiology

_____

Travis H. Sanchez, DVM, MPH
Committee Chair

Perceived Sexual Identity Stigma and Associated Factors among Black and White Men who have Sex with Men

By

Marc A. Pitasi

Bachelor of Science
Bachelor of Music
University of Florida
2010

Thesis Committee Chair: Travis H. Sanchez, DVM, MPH

An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Epidemiology
2013

Abstract

Perceived Sexual Identity Stigma and Associated Factors among Black and White Men who have Sex with Men
By Marc A. Pitasi

Background: Sexual minority populations, including gay, bisexual, and other men who have sex with men (MSM), continue to face unique health disparities in the United States. Disparities in HIV infection and other adverse health outcomes are likely to be influenced by a complex, interrelated mix of biological, behavioral, and social processes. A small but growing body of research has explored the possible role of sexual identity stigma in shaping patterns of risk. However, few epidemiologic studies have attempted to identify factors associated with experiencing stigma.

Objectives: To assess the prevalence of perceived sexual identity stigma among black and white MSM and to identify and compare demographic and community factors associated with stigma in these subgroups.

Methods: Eligible participants completed a questionnaire assessing demographic, behavioral, clinical, and psychological information. Perceived sexual identity stigma was measured with a seven-item scale. Multiple linear regression was used to model participant and community characteristics in 454 black MSM, 349 white MSM, and a combined sample of 803 MSM.

Results: Compared with white MSM, black MSM reported significantly higher levels of sexual identity stigma ($p<0.01$), racial stigma ($p<0.01$), and resilience (0.01). Age ($p=0.02$), sexual identity ($p=0.03$), connectedness to the gay community ($p<0.01$), and racial stigma ($p<0.01$) were associated with sexual identity stigma among black MSM. The magnitude of the association between connectedness and sexual identity stigma was greater among non-gay-identified black MSM compared with gay-identified black MSM ($p<0.01$). Among white MSM, perceived neighborhood quality ($p=0.02$), connectedness to the gay community ($p<0.01$), and racial stigma ($p<0.01$) were independently associated with sexual identity stigma.

Discussion: These results suggest that black and white MSM may have very different experiences within both the gay community and their communities at large. Both individual and community characteristics appear to play an important role in experiences of sexual identity stigma among black MSM. Nearly a quarter of black MSM in our sample self-identified as bisexual, and this subgroup may face additional barriers in adapting to multiple minority statuses. Interventions attempting to reduce community stigma must address the unique needs of MSM subgroups.

Perceived Sexual Identity Stigma and Associated Factors among Black and White Men who have Sex with Men

By

Marc A. Pitasi

Bachelor of Science
Bachelor of Music
University of Florida
2010

Thesis Committee Chair: Travis H. Sanchez, DVM, MPH

A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Epidemiology
2013

Table of Contents

List of Tables

Background

Sexual minority populations, including gay, bisexual, and other men who have sex with men (MSM), continue to face unique health disparities in the United States (1). An extensive body of literature has documented elevated risks among various sexual minority subgroups for a myriad of adverse conditions including poorer mental health characterized by depression (2), anxiety (2), and suicide (3); structural inequities such as lower average income (1), homelessness (4,5), and reduced access to healthcare services (6); and abuse of tobacco (7), alcohol (8), and other drugs (9). In particular, MSM bear a disproportionate or increasing burden of many sexually-transmitted diseases (STDs) including chlamydia (10), gonorrhea (11), primary and secondary syphilis (12), and anal carcinoma resulting from human papilloma virus (HPV) infection (13). Notably, MSM represent the group most severely affected by the HIV/AIDS epidemic; in 2010, 63% of all new HIV infections in the United States were among MSM (14). Since 2000, MSM are the only risk group in the United States in which HIV incidence has been rising (15). HIV incidence and prevalence have been especially high among black MSM, a subgroup that comprised 36% of all new HIV infections among MSM in 2010 (14).

Although MSM populations may have substantially different sexual behavior patterns compared with those of their heterosexual counterparts (16), these differences likely do not fully explain the disproportionate burden of HIV infection in MSM. Disparities in HIV infection and other adverse health outcomes are likely to be influenced by a complex, interrelated mix of biological, behavioral, and social processes such that an emphasis on individual-level factors alone cannot explain many observed patterns. For example, theories focusing on individual risk behaviors have been unable to explain the

increased burden of HIV among black MSM compared to white MSM (17), and there has been a recent call for more attention on network- and community-level factors to better understand why black MSM face these disparities (17,18). Advancement in this area may hold valuable implications for the implementation of risk-reduction interventions. However, few such interventions have been specifically developed or adapted for black MSM (18). Furthermore, many interventions seek to change behavior while viewing it as the exclusive result of personal motivations or conscious decisions, but acknowledgment of the relevant social, political, or structural environment is more likely to successfully address the root causes and contexts of the behavior of interest (19). Despite the fact that HIV disparities have long been observed among MSM by race, there has been only a small amount of research on the effects of various social forces on the risk of adverse health outcomes including HIV (18). Certain social forces relevant to the disparities faced by MSM – as well as those that are unique or disproportional to black MSM – can be viewed through the lens of the minority stress model.

Minority Stress

Minority stress can be defined as the juxtaposition of values between dominant and minority groups and the subsequent conflict that occurs with the broader social environment among minority group members (20-22). Although minority group members are often exposed to negative life events as a result of their minority status, minority stress can stem not only from these negative events but also from experiences of incongruence between social structures and the minority person's culture or needs (20). Meyer's conceptualization of sexual minority stress (20,23) has become a prominent

framework underlying much of the study of minority stress among lesbian, gay, and bisexual populations. Under this framework, it is assumed that minority stress is additive to the general stressors faced by everyone. It is also assumed that minority stress arises from stable and long-term underlying social structures rather than individual-level conditions (23). Consistent with this framework is the idea that categories of sexual orientation are socially constructed and cemented through differentials in power and status (24). These differentials, experienced chronically throughout the life course, can then impact mental and physical health.

Minority stress and its antecedent inequalities of power can impact health through a process Krieger calls embodiment, which involves the biological incorporation of social experience from conception to death (25). Inequalities in exposure, susceptibility, and resistance are patterned according to two major factors: societal arrangements of power and individual manifestations of history, ecology, and development (25). Therefore, human beings' position as simultaneously biological and social organisms necessitates the holistic consideration of both individual- and societal-level conditions when studying patterns of health or disease; exposures, behaviors, and genes are not disembodied from one another but rather comprise the totality of experience at all stages of the life course (26). Krieger identifies five major pathways to embodiment which take the form of exposure, susceptibility, or responses to economic and social deprivation, toxic substances or hazardous conditions, socially inflicted trauma (whether verbal or violent), targeted marketing of illegal or potentially harmful commodities, and inadequate health care. The diversity of these pathways reflects the broad range of health disparities observed among and within sexual minority populations. For example, alcohol

advertising targeted to gay male audiences (27), denial of health insurance benefits to same-sex partners (1), and everyday exposures to heterosexist language (28) reflect the diverse ways in which minority stress can be embodied as negative health outcomes and, more broadly, population-level disparities.

Stigma

It is important to note that Krieger's embodiment pathways revolve around structural, institutional, and interpersonal discrimination, defined as the act of distinguishing certain individuals unfavorably from others (25). Inequalities of power are also manifested through stigma, the process of linking particular attributes of a group to a negative stereotype (29). First, characteristics deviating (or perceived to deviate) from culturally dominant norms are identified and labeled. Dominant belief systems or power structures can subsequently link these labeled attributes to negative stereotypes. Finally, individuals who have been labeled and linked to stereotypes can be separated from the dominant culture and placed in distinct categories, where they are subject to discrimination or loss of power, status, or resources (30). This conceptualization of stigma accounts for two important points: 1) stigma is split into dual concepts of "agent" and "object," implying that the stigmatized attribute is not intrinsic in the individual but rather socially assigned, and 2) execution of the stigma process requires access to social, economic, and/or political power (30). Like the concepts of minority stress and embodiment, this underscores the importance of addressing the interwoven nature of biological and social factors when seeking to understand patterns of health and disease at the population level.

Meyer's minority stress theory describes three major aspects of minority experience that are important to conceptualizing stigma (20). "Prejudice events" – experiences of overt discrimination at the structural, institutional, or interpersonal levels – collectively comprise what is known as enacted stigma and can be classified as distal minority stress processes (23). Felt stigma involves the expectation of experiencing rejection, discrimination, or other types of enacted stigma along with the heightened vigilance associated with these expectations (20). The internalization of negative values or attitudes directed toward the minority group is referred to as self-stigma (24). Perceived stigma and self-stigma are both considered proximal minority stress processes since they involve self-perceptions and other factors relating to the minority individual's perceived experiences (23).

In most parts of the world, including the United States, MSM have historically existed and continue to exist under the burden of enacted, felt, and self-stigmas surrounding nonconforming sexual identities and behaviors (31). The social construction of discrete, simplistic, mutually-exclusive categories of sexual orientation such as "heterosexual" and "homosexual" to describe complex human psychology and behavior has allowed MSM and other sexual minorities to be "othered" – distinguished and separated from dominant cultural norms – and assigned with negative stereotypes. The resultant animus held against sexual minority groups is often used to justify stigma at all levels of society, which may lead to minority stress processes and deleterious patterns of health-related exposures and outcomes that have been observed among MSM and other sexual minority populations.

A small but growing body of research suggests possible links between sexual identity stigma and a variety of adverse conditions among MSM. Diaz and colleagues found social oppression and experiences of homophobia to be associated with depression, suicidal ideation, and anxiety among Latino MSM (32). Other studies have confirmed the higher prevalence of various psychological disorders among MSM (23) and associations between sexual identity stigma and depression among Latino and black MSM (33). Furthermore, sexual identity stigma has been associated with a variety of sexual risk behaviors, including unprotected anal intercourse (UAI) (34), UAI with a partner of serodiscordant or unknown status (35), UAI with a casual partner (36), and participation in sexual situations in which it was difficult to practice safer sex (e.g., sex in partnerships of unequal power) (37). Additionally, sexual identity stigma has been shown to affect the quality and quantity of healthcare services received by MSM. Perceived stigma has been associated with non-disclosure of sexual identity to healthcare providers (38) and less utilization of healthcare services (39). Despite such evidence suggesting the potential deleterious health effects of sexual identity stigma, little is currently known about what makes MSM more likely to experience stigma, which subgroups of MSM are most affected, and what characteristics make certain MSM more vulnerable to the effects of stigma than others.

Stigma, discrimination, and minority stress processes are not unique to sexual minorities. In the United States, discrimination based on race or ethnicity is a prominent form of inequality with reported levels remaining high (25). Similar to the disparities observed among sexual minority populations, a wide body of research has documented poorer general health and receipt of healthcare services among racial minority

populations (40). Among African Americans specifically, investigators have found higher rates of obesity (41), diabetes (42), asthma (43), and incidence of certain cancers such as breast cancer (44) compared with non-Hispanic white counterparts, in addition to numerous other adverse conditions. Other studies have established causal links between experiences of race-based stigma or perceptions of stigma and depression (45), hypertension (46), and self-reported measures of general health (47). Individuals with multiple minority statuses may face a "double burden" of stigma arising from the simultaneous exposure to various forms of stigma. Racial/ethnic minority MSM, for example, may be especially vulnerable to poorer mental or physical health outcomes because of the burden of navigating oppression experienced within both the gay community and their own racial/ethnic minority community (48). Alternatively, some members of multiple minority groups may be more resilient to minority stress because they may be better equipped to reorient themselves to adaptive identities without disassociating from the identity that is not adaptive (49). Ultimately, however, the factors influencing how members of multiple minority groups adapt to concurrent stigmas are not clearly understood.

Coping and Social Support

Despite the widespread stigma, discrimination, and other forms of adversity faced by the majority of MSM, most MSM do not suffer from the health effects of their marginalized social status (50), suggesting that many MSM have developed ways to cope with minority stress. Meyer's minority stress model characterizes minority stress as a process situated within the context of general environmental characteristics, while coping

and social support are processes that occur at both the community and individual levels (23). Consistent with this theory are several coping responses and community characteristics that have been proposed as possible barriers or facilitators to MSM's adaptation to adversity.

Concealment of sexual identity, described by Meyer as a proximal minority stress process (23), may also be a voluntary coping mechanism used by MSM to protect themselves from stigma. Concealment has been associated with poorer physical and mental health among MSM (51) as well as with heightened vigilance, a manifestation of minority stress involving the expectation of negative regard from members of the dominant group (23). By increasing internal stress, concealment could be a significant barrier blocking successful positive adaptation to stigma.

Resilience can be described as an inner process involving the positive adaptation to adversity, risk, or personal or social loss (52). Although few studies have explored resilience in MSM populations, there is evidence to suggest that resilience and other naturally occurring strengths are common among MSM (50). Commonly cited examples of resilience in MSM include smoking cessation and recovery, avoidance of recreational drug use, and the decades-long persistence of the Gay Rights Movement despite the devastation of the AIDS epidemic (50,53). Resilience may represent an important individual-level process of positive adaptation to minority stress among MSM.

Community characteristics may also play a substantial role in the ability of MSM to cope with adversity and oppression. Social support and social network size have been associated with general health among sexual minority populations (54), and increased perception of neighborhood problems has been found to predict poorer health-related

quality of life (55), various psychosocial issues (56,57), and tobacco dependence (58). Among MSM, connectedness to the gay community in the form of social network size and participation in gay organizations or events, although highly variable across subgroups and individual MSM (59), may be an important determinant of social capital and perceived stigma.

Objectives

Despite a growing body of research exploring the effects of sexual identity stigma among MSM, few if any studies have identified correlates of sexual identity stigma in this population. This study aims to 1) describe the prevalence of perceived sexual identity and racial stigmas in an urban cohort of black and white MSM and 2) identify individual and community characteristics associated with perceived sexual identity stigma. The findings of this study could prove valuable in the development of stigma-reduction campaigns or other programs targeting MSM.

Manuscript Title: Perceived Sexual Identity Stigma and Associated Factors among Black and White Men who have Sex with Men

Introduction

Sexual minority populations, including gay, bisexual, and other men who have sex with men (MSM), continue to face unique health disparities in the United States (1). For example, MSM represent the group most severely affected by the HIV/AIDS epidemic; in 2010, 63% of all new HIV infections in the United States were among MSM (2). Since 2000, MSM are the only risk group in the United States in which HIV incidence has been rising (3). HIV incidence and prevalence have been especially high among black MSM, a subgroup that comprised 36% of all new HIV infections among MSM in 2010 (2).

Disparities in HIV infection and other adverse health outcomes are likely to be influenced by a complex, interrelated mix of biological, behavioral, and social processes such that an emphasis on individual-level factors alone cannot explain many observed patterns. For example, theories focusing on individual risk behaviors have been unable to explain the increased burden of HIV among black MSM compared to white MSM (4), and there has been a recent call for more attention on network- and community-level factors to better understand why black MSM face these disparities (4,5). Certain social forces relevant to the disparities faced by MSM – as well as those that are unique or disproportional to black MSM – can be viewed through the lens of Meyer's minority stress model and its conceptualization of stigma (6). This model distinguishes between 1)

enacted stigma, or the experiences of overt discrimination at the structural, institutional, or interpersonal levels (7), 2) perceived stigma, defined as the expectation of experiencing rejection, discrimination, or other types of enacted stigma along with the heightened vigilance associated with these expectations , and 3) self-stigma, the internalization of negative values or attitudes directed toward the minority group (8).

In most parts of the world, including the United States, MSM have historically existed and continue to exist under the burden of enacted, felt, and self-stigmas surrounding nonconforming sexual identities and behaviors (9). A small but growing body of research suggests possible links between sexual identity stigma and a variety of adverse conditions among MSM. Diaz and colleagues found social oppression and experiences of homophobia to be associated with depression, suicidal ideation, and anxiety among Latino MSM (10). Other studies have confirmed the higher prevalence of various psychological disorders among MSM (7) and associations between sexual identity stigma and depression among Latino and black MSM (11). Furthermore, sexual identity stigma has been associated with a variety of sexual risk behaviors, including unprotected anal intercourse (UAI) (12), UAI with a partner of serodiscordant or unknown status (13), UAI with a casual partner (14), and participation in sexual situations in which it was difficult to practice safer sex (e.g., sex in partnerships of unequal power) (15). Additionally, sexual identity stigma has been shown to affect the quality and quantity of healthcare services received by MSM. Perceived stigma has been associated with non-disclosure of sexual identity to healthcare providers (16) and less utilization of healthcare services (17).

Despite such evidence suggesting the potential deleterious health effects of sexual identity stigma, little is currently known about what makes MSM more likely to experience stigma, which subgroups of MSM are most affected, and what characteristics make certain MSM more vulnerable to the effects of stigma than others. Furthermore, racial minority MSM may face a "double burden" of stigma arising from the simultaneous exposure to stigma targeted against race and identity. However, it is not clear whether these MSM are more susceptible to adverse health outcomes or more resilient compared with their white MSM counterparts as a result of increased adaptive pressure stemming from multiple minority statuses (18). Furthermore, a variety of adaptive processes such as resilience and concealment of sexual identity, combined with characteristics and perceptions of the neighborhoods where MSM live, may play a substantial role in protecting against or promoting sexual identity stigma.

This study aims to 1) describe the prevalence of perceived sexual identity and racial stigmas in an urban cohort of black and white MSM and 2) identify individual and community characteristics associated with perceived sexual identity stigma. The findings of this study could prove valuable in the development of stigma-reduction campaigns or other programs targeting MSM.

Methods

Sampling

Trained study personnel recruited eligible participants from 1) public and private venues where men congregate in Atlanta, such as bars, clubs, retail stores, street corners, and parks and 2) internet venues including popular social networking sites. Sampling

frames were created by listing all eligible venues and 4-hour time periods during which at least 30 MSM were expected to pass through the venue; for internet venues, banner advertisements with recruitment text were uploaded for 4-hour periods. Ten recruitment events were randomly selected from this sampling frame each month. During recruitment events, men were systematically approached and asked a short series of questions to establish eligibility. To be eligible, men were required to have had sex with another man in the past 3 months, live in the Atlanta metropolitan statistical area, be at least 18 years of age, be able to complete the questionnaire in English, and self-report either white or black race. Men who reported being in mutually monogamous relationships with a male partner were excluded. Eligible, consenting men visited a designated data collection site where they completed a computer-administered questionnaire collecting demographic, behavioral, clinical, and psychological information. Consenting men also provided blood or oral specimens, urine samples, and self-administered rectal swabs to be used for HIV, STI, and drug testing. Rapid HIV antibody tests were used and results were returned at the time of the study visit by trained counselors. All laboratory tests were performed by the Caliendo Laboratory of Emory University. STI results were returned to participants via the participants' chosen means, and those testing positive received referrals to a local clinic. Study procedures were approved by the Emory University Institutional Review Board.

Measures

The questionnaire collected basic demographic data and information regarding sexual and substance-related risk behaviors, psychological factors, and community

perceptions. Demographic items included age, race, education, income, health insurance, and sexual identity. Psychological factors of interest include resilience, measured as the sum score of ten Likert items prompting participants to rate their agreement with statements such as, "I usually manage one way or another," and "I have enough energy to do what I have to do." Community perceptions included perceived neighborhood quality, measured as the sum score of 17 Likert items collecting information on the physical, social, and service environment of participants' neighborhoods. Participants were able to rate neighborhood characteristics such as affordable and comfortable housing, personal safety, and quality of schools as "poor," "below average," "average," "above average," or "excellent." Connectedness to the gay community was measured by asking participants to rate their agreement to seven statements regarding their visibility of and participation with gay people or events in their neighborhood, such as, "I feel that I am a member of my city/town gay community." Lastly, racial stigma and the study outcome - sexual identity stigma - were assessed by computing the sum scores of groups of eleven and seven questions, respectively, that attempted to measure both perceived and enacted racial stigma and perceived sexual identity stigma. Racial stigma questions included, "How often have your ideas or opinions been minimized, ignored, or devalued because of your race/ethnic group?" and "How often have others said or acted as if you are over-sensitive or paranoid about racism?" Sexual identity stigma items asked participants to rate their agreement with statements like, "Most people in my city/town believe that a gay man is just as trustworthy as the average heterosexual citizen," and "Most people in my city/town think less of a person who is gay." Standardized Cronbach's alpha values were 0.75 or above for all scale variables (Table 1).

Analysis

Sexual identity stigma was the outcome of interest in all analyses. First, in our creation of five scale variables – sexual identity stigma, racial stigma, perceived neighborhood quality, connectedness to the gay community, and resilience – we performed a mean imputation of missing scale items provided that at least half of the scale items were non-missing. In the event that responses to more than half of the scale's component questions were missing, we set the scale as missing. The proportions of respondents who had at least one missing item per scale are shown in Table 1. Next, we conducted chi-square and two-sample t-tests to compare frequencies of sexual identity stigma and selected covariates by race. We then built three separate multiple linear regression models to identify factors independently associated with sexual identity stigma in the total sample and stratified by race. Covariates were selected from a gold-standard list of potential variables identified *a priori* from the literature. We chose to keep certain variables that were important in our theoretical framework, such as sexual identity, regardless of statistical significance. Other variables were dropped from final models if this increased parsimony and goodness-of-fit, measured with adjusted R-square, Mallow's C_p, and Akaike's Information Criterion. To address potential interaction, we assessed separate bivariate models for each possible two-way interaction term. Interaction terms that were significant at $\alpha = 0.10$ were included in multivariate models; those that were insignificant at $\alpha = 0.05$ and/or not conceptually interpretable were dropped from final models. One interaction term was significant but caused severe collinearity issues (variance inflation factor > 10); to ameliorate this, we centered the

interaction term's components around their respective mean values. All analyses were performed with SAS 9.3 (Cary, NC).

Results

Participant Characteristics

A total of 811 participants were recruited between July 2010 and December 2012. Eight were excluded because of double-enrollment (n=6), disclosure of no male sex (n=1), and mental health issues (n=1), leaving a final analytic sample of 803 participants comprised of 454 (57%) black MSM and 349 (43%) white MSM. Participants' demographic characteristics and community perceptions are shown in Table 2. The mean age of the sample was 28 years; although ages ranged from 18 to 71 years, approximately 97% of the sample was under the age of 40 years. Over 80% of respondents had some amount of post-secondary education. More than half of the respondents had an annual income of $20,000 or more (53%) and had health insurance (58%). A large majority (84%) self-identified as gay, while 15% self-identified as heterosexual, bisexual, or some other identity. Nearly one-third of respondents (30%) tested positive for HIV. The mean score representing participants' perceptions of overall neighborhood quality was 60.2 (SD=12.0) with scores ranging from 17 to 85 and lower scores indicating poorer neighborhood quality. The mean score indicating degree of connectedness to the gay community was 33.0 (SD=6.1); scores ranged from 12 to 45, and higher scores indicated higher connectedness. Participants reported high levels of resilience (mean score=43.7 SD=6.2) with scores ranging from 10 to 50 and 50 representing the highest possible resilience.

There were significant differences between white and black MSM across most selected covariates. Compared with white MSM, black MSM were younger ($p<0.01$), more resilient ($p<0.01$), and less connected to the gay community ($p<0.01$). Significantly more black MSM lacked post-secondary education ($p<0.01$) and health insurance ($p<0.01$) and had an annual income below $20,000 ($p<0.01$) compared with white MSM. Furthermore, a greater proportion of black MSM was HIV-positive ($p<0.01$) and non-gay-identified ($p<0.01$).

Stigma

On a scale from 7 to 35 with 35 representing the highest level of sexual identity stigma, the combined sample had a mean score of 17.8 (SD=5.5) (Table 2). Compared with white MSM, black MSM reported significantly higher levels of sexual identity stigma ($p<0.01$). The mean racial stigma score was 22.2 (SD=7.2), measured on a scale from 11 to 55 with 55 representing the highest possible level of stigma. Black MSM also reported significantly higher levels of racial stigma ($p<0.01$).

Factors independently associated with sexual identity stigma are shown in Table 3. Among all MSM, reporting higher sexual identity stigma was significantly associated with lower perceived neighborhood quality ($p=0.01$), less connectedness to the gay community ($p<0.01$), and higher levels of reported racial stigma ($p<0.01$). These three characteristics remained independently associated with sexual identity stigma among white MSM, although each association appeared to be slightly stronger in magnitude compared to the total sample as indicated by higher parameter values. Among black MSM, higher reported sexual identity stigma was associated with younger age ($p=0.02$),

self-identifying as gay ($p=0.03$), lower perceived neighborhood quality ($p<0.01$), and higher levels of reported racial stigma ($p<0.01$). The two-way interaction between sexual identity and connectedness to the gay community was statistically-significant ($p<0.01$) among black MSM only. Comparing gay-identified and non-gay-identified MSM, the direction of the association between connectedness to the gay community and sexual identity stigma was the same, but the magnitude of this association was significantly greater among non-gay-identified MSM.

Discussion

The present study is one of the first to identify demographic correlates of sexual identity stigma among black and white MSM. We also explored how experiences of sexual identity stigma might be shaped by individual perceptions of community and neighborhood, and how these experiences differ between white and black MSM. Sexual identity stigma was significantly higher among black MSM than white MSM. Although race was not independently associated with sexual identity stigma after controlling for multiple potential confounders, there were several distinct associations that varied by race. Most notably, among white MSM, associations with sexual identity tended to involve community-related factors like neighborhood quality. In addition to community-related factors, individual characteristics like age and sexual identity were also associated among black MSM. This suggests that sexual identity stigma and adaptive processes operate differently between the black and white MSM in our sample.

Concealment of sexual identity is a unique adaptive process related to sexual minority stigma. Although we did not directly assess the prevalence of concealment in

our sample, it did not appear to affect how MSM self-identified in the context of the study; of the 100 black MSM in our sample who did not identify as gay, 86 identified as bisexual and only one identified as heterosexual. Sexual identity was independently associated with sexual identity stigma among black MSM in our sample, and there was a statistically significant interaction between sexual identity and connectedness to the gay community among black MSM, indicating that the association between connectedness to the gay community and sexual identity stigma differed by identity. Specifically, the magnitude of the association between decreasing connectedness to the gay community and increasing sexual identity stigma was greater among non-gay-identified black MSM compared with gay-identified black MSM. Since connectedness to the gay community was also an important main effect, these findings highlight the unique barriers facing black MSM who self-identify as bisexual. This not only pertains to experiencing higher levels of sexual identity stigma, but also to interacting with the gay community, an important adaptive process that was associated with lower sexual identity stigma in our sample.

Higher perceived neighborhood quality was associated with lower levels of sexual identity stigma in white MSM and the total sample, but not in black MSM separately. This could indicate that certain neighborhood characteristics such as unsafe conditions might promote experiences of stigma or discrimination. Alternatively, this could represent an internalization of stigma – MSM who frequently perceive or experience stigma in their neighborhood may be more likely to notice additional social or other problems.

Resilience can also be conceptualized as an adaptive process that may hold the potential to help protect against the deleterious effects of sexual identity stigma. Our results indicate that resilience, as measured by self-report, is quite high among MSM (mean = 43.7 out of a maximum possible value of 50), which is consistent with previous findings (19). Furthermore, resilience was significantly higher in black MSM than white MSM, perhaps resulting from the need to adapt to a heavier burden of multiple minority statuses. Resilience was not significantly associated with sexual identity stigma in either black or white MSM. Nevertheless, public health programs targeted toward stigma reduction or those that attempt to intervene at the link between stigma and risk behavior should acknowledge the reservoir of resilient traits among MSM populations, as this may serve as a valuable resource that is not often drawn upon by researchers and practitioners in public health.

Previous research has suggested that sexual identity stigma is associated with several HIV risk behaviors among MSM, including UAI (12). However, HIV status was not associated with sexual identity stigma in any of our analyses. Our study did not directly assess sexual behaviors, but it is possible that other adaptive behaviors, such as serosorting, could have contributed to this finding.

Racial stigma, which included personal experiences of stigma as well as witnessing stigma directed toward others in the community, was independently associated with sexual identity stigma among both black and white MSM. Although racial stigma was significantly higher among black MSM, it was significantly associated with sexual identity stigma among both black and white MSM. The levels of racial stigma reported by the white MSM in our sample may be explained by the fact that our

measure included both direct (personally experienced) and indirect (vicarious) occurrences of racism. Among black MSM, racial stigma encountered within the gay community could hinder community connectedness or involvement. To the extent that gay venues, organizations, or events are predominantly white, it may be more difficult for black MSM to locate or create spaces that are simultaneously safe for multiple minority statuses. Among both black and white MSM, living in a neighborhood with prevalent racial hostility directed at people of any race or ethnicity may lower perceived neighborhood quality, discourage engagement, or increase isolation.

Our study has several limitations. First, our findings may not be generalizable to all MSM in Atlanta to the extent that MSM who do not attend the sampling venues differ substantially from those MSM who do frequent these venues. MSM who identify as heterosexual were probably less likely to be sampled. Since sexual identity stigma likely shows meaningful variation across sexual identities, we were not able to adequately explore the stigma experiences of MSM who do not identify as gay. Second, our analysis was limited to two types of stigma – sexual identity and racial stigmas – but there may be other forms of stigma that are salient to MSM that were not explored, such as HIV stigma. Moreover, the study questionnaire limited our exploration to perceived sexual identity stigma and perceived and enacted racial stigma, but other manifestations such as internalized stigma may also be an important facet of experiences with stigma. Finally, our study was limited to black and white MSM, but other racial/ethnic minority MSM might have substantially different experiences with sexual identity and racial stigmas.

In spite of these limitations, this analysis represents an important first step toward understanding what demographic and community factors place MSM at risk of

experiencing sexual identity stigma. Understanding of these factors hold valuable implications for the planning and implementation of public health interventions targeted toward MSM. Such interventions should take into account the many forms of stigma, their prevalence among MSM populations, and potential adaptive processes that may protect against stigma. Additionally, interventions should address the unique needs of various subgroups of MSM, such as black MSM and bisexual MSM. Strategies to reach these subgroups must be informed by the intersectional experiences of multiple minority statuses.

References

1. Institute of Medicine. *The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding*. Washington, DC: National Academies Press; 2011.

2. Centers for Disease Control and Prevention. Estimated HIV incidence in the United States, 2007-2010. *HIV Surveillance Supplemental Report.* 2012;17(4).

3. Hall H, Song R, Rhodes P, et al. Estimation of HIV Incidence in the United States. *J Am Med Assoc.* 2008;300(5):520-529.

4. Millett G, Flores S, Peterson J, Bakeman R. Explaining disparities in HIV infection among black and white men who have sex with men: a meta-analysis of HIV risk behaviors. *AIDS.* 2007;21(15):2083-2091.

5. Peterson J, Jones K. HIV prevention for black men who have sex with men in the United States. *Am J Public Health.* 2009;99(6):976-980.

6. Meyer I. Minority stress and mental health in gay men. *J Health Soc Behav.* 1995;36(1):38-56.

7. Meyer I. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol Bull.* 2003;129(5):674-697.

8. Herek G, Gillis J, Cogan J. Internalized stigma among sexual minority adults: insights from a social psychological perspective. *J Couns Psychol.* 2009;56(1):32-43.

9. Altman D, Aggleton P, Williams M, et al. Men who have sex with men: stigma and discrimination. *Lancet.* 2012;380:439-445.

10. Diaz R, Ayala G, Bein E, Henne J, Marin B. The impact of homophobia, poverty, and racism on the mental health of gay and bisexual latino men: findings from 3 US cities. *Am J Public Health.* 2001;91(6):927-932.

11. Wohl A, Galvan F, Carlos J, et al. A comparison of MSM stigma, HIV stigma and depression in HIV-positive Latino and African-American men who have sex with men (MSM). *AIDS Behav.* 2012;17:1454-1464.

12. Choi K, Hudes E, Steward W. Social discrimination, concurrent sexual partnerships, and HIV risk among men who have sex with men in Shanghai, China. *AIDS Behav.* 2008;12:S71-S77.

13. Ayala G, Bingham T, Kim J, Wheeler D, Millett G. Modeling the impact of social discrimination and financial hardship on the sexual risk of HIV among Latino and black men who have sex with men. *Am J Public Health.* 2012;102(S2):S242-S249.

14. Mizuno Y, Borkowf C, Millett G, Bingham T, Ayala G, Stueve A. Homophobia and racism experienced by Latino men who have sex with men in the United States: correlates of exposure and associations with HIV risk behaviors. *AIDS Behav.* 2012;16(3):724-735.

15. Diaz R, Ayala G, Bein E. Sexual risk as an outcome of social oppression: data from a probability sample of Latino gay men in three US cities. *Cultur Divers Ethnic Minor Psychol.* 2004;10(3):255-267.

16. Durso L, Meyer I. Patterns and predictors of disclosure of sexual orientation to healthcare providers among lesbians, gay men, and bisexuals. *Sexuality Research and Social Policy.* 2012;10(1):35-42.

17. Mayer K, Bekker L, Stall R, Grulich A, Colfax G, Lama J. Comprehensive clinical care for men who have sex with men: an integrated approach. *Lancet.* 2012;380:378-387.

18. Consolacion T, Russell S, Sue S. Sex, race/ethnicity, and romantic attractions: multiple minority status adolescents and mental health. *Cultur Divers Ethnic Minor Psychol.* 2004;10(3):200-214.

19. Herrick A, Lim S, Wei C, et al. Resilience as an untapped resource in behavioral intervention design for gay men. *AIDS Behav.* 2011;15:S25-S29.

Table 1. Standardized Cronbach's Alpha Values and Percent of Respondents Missing One or More Scale Items - Five Scale Variables in Total and Stratified Samples.

	Total		Black		White	
Scale	α	%[a]	α	%[a]	α	%[a]
Perceived Neighborhood Quality	0.93	9.3	0.94	12.3	0.91	5.4
Connectedness to Gay Community	0.80	9.1	0.75	9.7	0.86	8.3
Resilience Score	0.93	5.4	0.95	7.5	0.88	2.6
Racial Stigma	0.87	4.4	0.89	5.1	0.83	3.4
Sexual Identity Stigma	0.84	7.8	0.77	10.8	0.91	4.0

[a]Percent missing one or more scale items

Table 2. Demographic Characteristics and Community Perceptions of 803 Black and White Men who have Sex with Men.

Variable	**Total (n = 803)** [M(SD) or n(%)]	**Black (n = 454)** [M(SD) or n(%)]	**White (n = 349)** [M(SD) or n(%)]	**p value**[a]
Age	27.9 (6.7)	27.0 (6.1)	29.0 (7.3)	<0. 01[b]
Education				<0. 01[c]
High school or below	151 (18.8)	115 (25.3)	36 (10.3)	
Some college	325 (40.5)	201 (44.3)	124 (35.5)	
College graduate or above	323 (40.2)	135 (29.7)	188 (53.9)	
Annual Income				<0.01[c]
Less than $20,000	337 (42.0)	229 (50.4)	108 (31.0)	
$20,000 or more	429 (53.4)	195 (43.0)	234 (67.1)	
Sexual Identity				<0.01[c]
Gay-identified	675 (84.1)	350 (77.1)	325 (93.1)	
Not gay-identified	124 (15.4)	100 (22.0)	24 (6.9)	
Health Insurance				<0.01[c]
Yes	468 (58.3)	215 (47.4)	253 (72.5)	
No	319 (39.7)	225 (49.6)	94 (26.9)	

HIV Status				<0.01[c]
Positive	243 (30.3)	197 (43.4)	46 (13.2)	
Negative	560 (69.7)	257 (56.6)	303 (86.8)	
Perceived Neighborhood Quality	60.2 (12.0)	60.3 (13.1)	60.1 (10.2)	0.76[b]
Connectedness to Gay Community	33.0 (6.1)	32.3 (5.8)	33.9 (6.4)	<0.01[b]
Resilience Score	43.7 (6.2)	44.3 (6.8)	42.9 (5.3)	<0.01[b]
Racial Stigma	22.2 (7.2)	23.9 (8.0)	20.0 (5.2)	<0.01[b]
Sexual Identity Stigma	17.8 (5.5)	18.6 (5.1)	16.8 (5.9)	<0.01[b]

Abbreviations: M = mean, SD = standard deviation.

[a]Comparing black and white MSM

[b]Two-sample t-test

[c]Chi-square test

Table 3. Characteristics Associated with Sexual Identity Stigma among Black and White Men who have Sex with Men.

Variable	Total			Black			White		
	β	SE	p	β	SE	p	β	SE	p
Black Race	0.64	0.40	0.11	---	---	---	---	---	---
Age	-0.02	0.03	0.36	-0.09	0.04	**0.02**	0.04	0.04	0.30
Gay Identity	-0.77	0.49	0.12	-1.26	0.57	**0.03**	0.17	1.04	0.87
Positive HIV Status	0.26	0.41	0.53	0.50	0.47	0.29	-0.60	0.78	0.45
Perceived Neighborhood Quality	-0.04	0.01	**0.01**	-0.03	0.02	0.07	-0.06	0.03	**0.02**
Connectedness to Gay Community	-0.36	0.03	**<0.01**	-0.20	0.05	**<0.01**	-0.46	0.04	**<0.01**
Resilience	-0.03	0.03	0.34	-0.06	0.04	0.08	0.02	0.05	0.63
Racial Stigma	0.14	0.03	**<0.01**	0.11	0.03	**<0.01**	0.23	0.05	**<0.01**
Sexual Identity X Connectedness to Gay Community	---	---	---	-0.29	0.11	**<0.01**	---	---	---

Abbreviations: β = Beta parameter, SE = standard error

Summary and Public Health Implications

This analysis highlighted several important points. First, sexual identity stigma was higher among black MSM than white MSM. Compared with white MSM, a much larger proportion of black MSM identified as bisexual; however, identifying as non-gay was independently associated with lower sexual identity stigma among black MSM. In addition, there was a statistically significant interaction among black MSM between sexual identity and connectedness to the gay community, indicating that higher sexual identity stigma was more strongly associated with less connectedness to the gay community among non-gay-identified black MSM compared with gay-identified black MSM. In contrast, sexual identity did not appear to be an important factor among white MSM. Similarly, decreasing age was associated with higher sexual identity stigma among black MSM, but no such association was observed in the other models. Among white MSM, community factors, including perceived neighborhood quality, connectedness to the gay community, and perceived racial stigma, comprised the significant associations with sexual identity stigma. Racial stigma was also positively associated with sexual identity stigma among black MSM and the total sample.

Ultimately, these findings serve as a reminder that black and bisexual MSM may have very different experiences within the gay community and in neighborhoods at large compared with the experiences of white, gay-identified MSM. In our sample, there were statistically significant differences between white and black MSM across nearly every covariate we examined, and some of these could plausibly contribute to these different experiences. For example, more black MSM than white MSM in our sample lacked post-secondary education and health insurance, had an annual income below $20,000, and

were HIV-positive. Income and education are factors that might play a large role in determining neighborhood of residence, and HIV-positive status would likely increase the burden of HIV stigma among these MSM. Black MSM also had a significantly lower mean gay community connectedness score and a higher mean racial stigma score, both of which were shown to be independently associated with higher sexual identity stigma. As members of multiple minority groups, black MSM, especially those identifying as bisexual, may have unique burdens and needs. For example, norms surrounding masculinity and sexuality may be different among different racial communities, while racial stigma within predominantly white gay spaces may simultaneously increase black MSM's burden of stigma while isolating them from the resources that engagement with the gay community could provide. Although black MSM in our sample had significantly higher resilience scores - perhaps as a result of adapting to this increased burden – public health programs must nevertheless address the varied experiences and needs of MSM subgroups according to race and sexual identity.

To reduce the potential impacts of stigma, interventions are needed at multiple levels. At the individual level, interventions should take advantage of the resilience of MSM. Resilience was not associated with sexual identity stigma in our analyses, but any potential effect may have been dampened by lack of variance; both black and white respondents reported consistently high levels of resilience. Whether this depicts an accurate portrait of resilience in this sample or whether reported levels of resilience were influenced by social desirability or other biases cannot be determined. Nevertheless, resilience remains an important adaptive process relevant to stigma, and interventions

that seek to build resilience processes as well as to acknowledge and utilize existing resilience may be more effective than those that do not incorporate this resource.

Interventions are also needed at the community, structural, and institutional levels. The narrowing of structural disparities such as income, education, health insurance coverage, and HIV incidence and prevalence is an important goal for a variety of outcomes, including stigma. Sexual identity stigma in particular must be targeted at the community level through education or community mobilization. In the context of both sexual identity and racial stigmas, increasing contact between affected groups and dominant groups may be an important way of facilitating changes in knowledge or attitudes. Therefore, it is important for affected groups, particularly those with multiple intersecting stigmas, to be visible in both the gay community and the community at large. Regardless of hierarchical level, interventions to reduce stigma must be intersectional in design and focus and tailored to the unique experiences and needs of subgroups of MSM, such as young MSM, HIV-positive MSM, or black, non-gay-identified MSM. In this way, interventions can simultaneously address the multiple stigmas facing these subgroups, such as sexual identity, racial, HIV-related, and other stigmas.

More research is needed to understand the risk factors and effects of various types of stigma often experienced by MSM. Much of the existing research is limited to a single type of stigma or does not consider internalized, perceived, and enacted stigma separately. Additionally, stigma and community factors can be conceptualized as either individual-level or community-level measures, and few if any studies make this distinction. For example, in our study, racial stigma was measured as both personally experiencing stigma and witnessing stigma directed toward others in the community.

Studies that attempt to measure stigma must define it carefully. The multitude of possible ways to define and measure stigma, combined with the lack of validated, standardized, and widely-accepted tools for measuring stigma, makes comparison of results across studies difficult. Furthermore, the measurement of stigma and community characteristics is generally limited to self-report, and the reliability of these types of measures has not been assessed.

Additionally, research on stigma is multidisciplinary, encompassing diverse disciplines from psychology, sociology, and public health. Although this multidisciplinary nature has the potential to be a strength, it is important for researchers to collaborate across disciplines to avoid inefficiency or duplication of resources. In particular, sexual identity stigma research is in its infancy within the context of public health; thus, it is important for public health researchers to draw on the expertise from other disciplines that may be more experienced in this and similar areas.

Future studies should explore the relative effects of different types of stigma and what types of intervention attributes are most effective in simultaneously combating multiple stigmas. Since the design of the present analysis precludes any assessment of causality, more needs to be understood about the mechanisms of stigma and factors that may have a causal effect. Without a better understanding of whether and how factors associated with stigma actually cause stigma and how stigma actually causes negative health outcomes, less can be done to intervene.

References

1. Institute of Medicine. *The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding.* Washington DC: National Academies Press; 2011.

2. Burgess D, Lee R, Tran A, van Ryn M. Effects of perceived discrimination on mental health and mental health services utilization among gay, lesbian, bisexual, and transgender persons. *J LGBT Health Res.* 2008;3(4):1-14.

3. Garofalo R, Wolf R, Wissow L, al e. Sexual orientation and risk of suicide attempts among a representative sample of youth. *Arch Pediatr Adolesc Med.* 1999;153(5):487-493.

4. Conron K, Mimiaga M, Landers S. A population-based study of sexual orientation identity and gender differences in adult health. *Am J Public Health.* 2010;100(10):1953-1960.

5. Kruks G. Gay and lesbian homeless/street youth: special issues and concerns. *J Adolesc Health.* 2010;12(7):515-518.

6. Buchmueller T, Carpenter C. Disparities in health insurance coverage, access, and outcomes for individuals in same-sex versus different-sex relationships, 2000-2007. *Am J Public Health.* 2010;100(3):489-495.

7. Lee G, Griffin G, Melvin C. Tobacco use among sexual minorities in the USA: 1987 to May 2007: a systematic review. *Tob Control.* 2009;18:275-282.

8. Hughes T. Chapter 9: Alcohol use and alcohol-related problems among lesbians and gay men. *Annu Rev Nurs Res.* 2005;23:283-325.

9. Lyons T, Chandra G, Goldstein J. Stimulant use and HIV risk behavior: the influence of peer support. *AIDS Educ Prev.* 2006;18(5):461-473.

10. Ciemins E, Flood J, Kent C, et al. Reexamining the prevalence of Chlamydia trachomatis infection among gay men with urethritis: implications for STD policy and HIV prevention activities. *Sex Transm Dis.* 2000;27(5):249-251.

11. Bauer H, Mark K, Samuel M, et al. Prevalence of and associated risk factors for Fluoroquinolone-resistant Neisseria gonorrhoeae in California, 2000-2003. *Clin Infect Dis.* 2005;41(6):795-803.

12. Purcell D, Johnson C, Lansky A, et al. Estimating the population size of men who have sex with men in the United States to obtain HIV and syphilis rates. *Open AIDS J.* 2012;6:98-107.

13. Mayer K. Sexually transmitted diseases in men who have sex with men. *Clin Infect Dis.* 2011;53(S3):S79-S83.

14. Centers for Disease Control and Prevention. Estimated HIV incidence in the United States, 2007-2010. *HIV Surveillance Supplemental Report.* 2012;17(4).

15. Hall H, Song R, Rhodes P, et al. Estimation of HIV Incidence in the United States. *J Am Med Assoc.* 2008;300(5):520-529.

16. Glick S, Morris M, Foxman B, et al. A comparison of sexual behavior patterns among men who have sex with men and heterosexual men and women. *J Acquir Immune Defic Syndr.* 2012;60(1):83-90.

17. Millett G, Flores S, Peterson J, Bakeman R. Explaining disparities in HIV infection among black and white men who have sex with men: a meta-analysis of HIV risk behaviors. *AIDS.* 2007;21(15):2083-2091.

18. Peterson J, Jones K. HIV prevention for black men who have sex with men in the United States. *Am J Public Health.* 2009;99(6):976-980.

19. Sumartojo E. Structural factors in HIV prevention: concepts, examples, and implications for research. *AIDS.* 2000;14(suppl 1):S3-S10.

20. Meyer I. Minority stress and mental health in gay men. *J Health Soc Behav.* 1995;36(1):38-56.

21. Mirowsky J, Ross C. *Social Causes of Psychological Distress*. Hawthorne, NY: Aldine de Gruyter; 1989.

22. Pearlin L. The sociological study of stress. *J Health Soc Behav.* 1989;30:241-256.

23. Meyer I. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol Bull.* 2003;129(5):674-697.

24. Herek G, Gillis J, Cogan J. Internalized stigma among sexual minority adults: insights from a social psychological perspective. *J Couns Psychol.* 2009;56(1):32-43.

25. Krieger N. Embodying inequality: a review of concepts, measures, and methods for studying health consequences of discrimination. *Int J Health Serv.* 1999;29(2):295-352.

26. Krieger N. Embodiment: a conceptual glossary for epidemiology. *J Epidemiol Community Health.* 2005;59:350-355.

27. Adams J, McCreanor T, Braun V. *Alcohol and gay men: consumption, promotion, and policy responses*. West Sussex, England: John Wiley & Sons, Ltd; 2007.

28. Woodford M, Howell M, Silverschanz P, Yu L. "That's so gay!": examining the covariates of hearing this expression among gay, lesbian, and bisexual college students. *J Am Coll Health.* 2012;60(6):429-434.

29. Goffman E. *Stigma: Notes on the Management of Spoiled Identity*. Englewood Cliffs, NJ: Prentice Hall; 1963.

30. Link B, Phelan J. Conceptualizing stigma. *Annu Rev Sociol.* 2001;27:363-385.

31. Altman D, Aggleton P, Williams M, et al. Men who have sex with men: stigma and discrimination. *Lancet.* 2012;380:439-445.

32. Diaz R, Ayala G, Bein E, Henne J, Marin B. The impact of homophobia, poverty, and racism on the mental health of gay and bisexual latino men: findings from 3 US cities. *Am J Public Health.* 2001;91(6):927-932.

33. Wohl A, Galvan F, Carlos J, et al. A comparison of MSM stigma, HIV stigma and depression in HIV-positive Latino and African-American men who have sex with men (MSM). *AIDS Behav.* 2012;17:1454-1464.

34. Choi K, Hudes E, Steward W. Social discrimination, concurrent sexual partnerships, and HIV risk among men who have sex with men in Shanghai, China. *AIDS Behav.* 2008;12:S71-S77.

35. Ayala G, Bingham T, Kim J, Wheeler D, Millett G. Modeling the impact of social discrimination and financial hardship on the sexual risk of HIV among Latino and black men who have sex with men. *Am J Public Health.* 2012;102(S2):S242-S249.

36. Mizuno Y, Borkowf C, Millett G, Bingham T, Ayala G, Stueve A. Homophobia and racism experienced by Latino men who have sex with men in the United States: correlates of exposure and associations with HIV risk behaviors. *AIDS Behav.* 2012;16(3):724-735.

37. Diaz R, Ayala G, Bein E. Sexual risk as an outcome of social oppression: data from a probability sample of Latino gay men in three US cities. *Cultur Divers Ethnic Minor Psychol.* 2004;10(3):255-267.

38. Durso L, Meyer I. Patterns and predictors of disclosure of sexual orientation to healthcare providers among lesbians, gay men, and bisexuals. *Sexuality Research and Social Policy.* 2012;10(1):35-42.

39. Mayer K, Bekker L, Stall R, Grulich A, Colfax G, Lama J. Comprehensive clinical care for men who have sex with men: an integrated approach. *Lancet.* 2012;380:378-387.

40. Brach C, Fraser I. Can cultural competency reduce racial and ethnic health disparities? A review and conceptual model. *Med Care Res Rev.* 2000;57(Suppl 1):181-217.

41. Flegal K, Carroll M, Ogden C, Curtin L. Prevalence and trends in obesity among US adults, 1999-2008. *J Am Med Assoc.* 2010;303(3):235-241.

42. Centers for Disease Control and Prevention. *National diabetes fact sheet: national estimates and general information on diabetes and prediabetes in the United States, 2011* Atlanta, GA: U.S. Department of Health and Human Services; 2011.

43. Moorman J, Akinbami L, Bailey C, al e. National surveillance of asthma: United States, 2001-2010. *Vital Health Statistics.* 2012;3(35).

44. US Cancer Statistics Working Group. *United States Cancer Statistics: 1999-2009 Incidence and Mortality Web-based Report.* Atlanta, GA: Department of Health and Human Services, Centers for Disease Control and Prevention, and National Cancer Institute;2013.

45. Benjamins M. Comparing measures of racial/ethnic discrimination, coping, and associations with health-related outcomes in a diverse sample. *J Urban Health.* 2013.

46. Cuffee Y, Hargraves J, Allison J. Exploring the association between reported discrimination and hypertension among African Americans: a systematic review. *Ethn Dis.* 2012;22(4):422-431.

47. Borrell L, Kiefe C, Williams D, Diez-Roux A, Gordon-Larsen P. Self-reported health, perceived racial discrimination, and skin color in African Americans in the CARDIA study. *Soc Sci Med.* 2006;63(6):1415-1427.

48. Balsam K, Molina Y, Beadnell B, Simoni J, Walters K. Measuring multiple minority stress: the LGBT people of color microaggressions scale. *Cultur Divers Ethnic Minor Psychol.* 2011;17(2):163-174.

49. Consolacion T, Russell S, Sue S. Sex, race/ethnicity, and romantic attractions: multiple minority status adolescents and mental health. *Cultur Divers Ethnic Minor Psychol.* 2004;10(3):200-214.

50. Herrick A, Lim S, Wei C, et al. Resilience as an untapped resource in behavioral intervention design for gay men. *AIDS Behav.* 2011;15:S25-S29.

51. Cole S. Social threat, personal identity, and physical health in closeted gay men. In: Omoto A, Kurtzman H, eds. *Contemporary Perspectives on Lesbian, Gay, and Bisexual Psychology*. Washington, DC: American Psychological Association; 2006.

52. Herrick A, Stall R, Goldhammer H, Egan J, Mayer K. Resilience as a research framework and as a cornerstone of prevention research for gay and bisexual men: theory and evidence. *AIDS Behav.* 2013. DOI 10.1007/s10461-012-0384-x.

53. Kurtz S, Buttram M, Surratt H, Stall R. Resilience, syndemic factors, and serosorting behaviors among HIV-positive and HIV-negative substance-using MSM. *AIDS Educ Prev.* 2012;24(3):193-205.

54. Fredriksen-Goldsen K, Emlet C, Kim H, et al. The physical and mental health of lesbian, gay male, and bisexual (LGB) older adults: the role of key health indicators and risk and protective factors. *The Gerontologist.* 2012. doi:10.1093/geront/gns123.

55. Erin M, Shepherd D, Welch D, Dirks K, McBride D. Perceptions of neighborhood problems and health-related quality of life. *J Community Psychol.* 2012;40(7):814-827.

56. Brenner A, Zimmerman M, Bauermeister J, Caldwell C. Neighborhood context and perceptions of stress over time: an ecological model of neighborhood stressors and intrapersonal and interpersonal resources. *J Community Psychol.* 2013. DOI 10.1007/s10464-013-9571-9.

57. Snedker K, Hooven C. Neighborhood perceptions and emotional well-being in young adulthood. *J Child Adolesc Psychiatr Nurs.* 2013;26(1):62-73.

58. Reitzel L, Vidrine J, Businelle M, et al. Neighborhood perceptions are associated with tobacco dependence among African American smokers. *Nicotine Tobacco Res.* 2012;14(7):786-793.

59. Holt M. Gay men and ambivalence about "gay community": from gay community attachment to personal communities. *Culture, Health & Sexuality.* 2011;13(8):857-871.

Appendix A: Scale Items

Perceived Neighborhood Quality

Please rate your neighborhood's physical/social/service environment as it is now with regard to the following:
Affordable and comfortable housing Public parks or open spaces Noise Crowdedness Air Quality Friendliness/helpfulness of neighbors Residents' attachment to the neighborhood Self-esteem and morale of the residents Personal safety Opportunity to participate in local government Ability to have access to city councilman/alderman Quality of schools Policing Access to hospital/medical care Shopping Lighting Garbage pickup/snow removal
Possible Responses: Excellent, Above Average, Average, Below Average, Poor

Connectedness to Gay Community

I feel that I am a member of my city/town gay community I plan to stay in my city/town for a long time I have many gay male friends in my city/town I have many lesbian/bisexual women in my city/town I wish that I could live someplace with a stronger gay/bisexual community than the place I live I regularly attend gay events and meetings in my city/town My town/city is a bad place for me to live as a gay man I feel at home in my city/town's gay community As a gay man, I enjoy living in my city/town
Possible responses: Strongly disagree, Disagree, Neutral, Agree, Strongly Agree, Not Applicable

Resilience

I usually manage one way or another. I feel proud that I have accomplished things in my life. I usually take things in stride. I am friends with myself. I am determined. I keep interested in things. My belief in myself gets me through hard times. My life has meaning. When I am in a difficult situation, I can usually find my way out of it. I have enough energy to do what I have to do.
Possible responses: Strongly disagree, Disagree, Neutral, Agree, Strongly Agree, Not Applicable

Racial Stigma

In the past 12 months…
How often have your civil rights been violated (i.e., job or housing discrimination due to racism, racial discrimination, or racial prejudice)? How often have others said or acted as if you are over-sensitive or paranoid about racism? How often have you witnessed prejudice or discrimination directed at someone else because of their race/ethnic group? How often have you heard about someone else's experiences of racially-motivated discrimination or prejudice? How often have others reacted to you as if they were afraid or intimidated of you because of your race/ethnic group? How often have you been observed or followed while in public places because of your race/ethnic group? How often have you been treated as if you were "stupid" or "talked down to" because of your race/ethnic group? How often have your ideas or opinions been minimized, ignored, or devalued because of your race/ethnic group? How often have you heard (or been told) a racially offensive or insensitive comment or joke? How often have you been mistaken for someone who serves others (i.e., janitor, bellboy, maid) because of your race/ethnic group? How often have you been mistaken for someone else of your same race (who may not look like you at all)?
Possible responses: Never, Rarely, Sometimes, Fairly often, Very often

Sexual Identity Stigma

Most people in my city/town believe that a gay man is just as trustworthy as the average heterosexual citizen. Most employers in my city/town will hire a gay man if he is qualified for the job. Most people in my city/town feel that homosexuality is a sign of personal failure. Most people in my city/town would not hire a gay man to take care of their children. Most people in my city/town think less of a person who is gay. Most people in my city/town would treat a gay man just as they would treat anyone. Most people in my city/town will willingly accept a gay man as a close friend.
Possible responses: Strongly disagree, Disagree, Neutral, Agree, Strongly Agree, Not Applicable

Appendix B: SAS Code

```
libname involve "h:\\Thesis\Data";
libname library "h:\\Thesis\Data";
options nofmterr;

proc format;
value education
      1 = 'High school or below'
      2 = 'Some college/technical school'
      3 = 'z College';

value ref
      0 = 'reference category'
      1 = 'case';

run;

proc contents data = involve.status;
                  *811 observations;
run;
proc contents data = involve.participants_survey_baseline;
      *810 observations;
run;
proc contents data = involve.partners_survey_baseline;
            *2928 observations;
run;
proc contents data = involve.participant_dyad_summary;
            *807 observations;
run;
proc contents data = involve.sti_baseline;
                  *810 observations;
run;


*Duplicate study_id 451 in STI Baseline dataset!;
proc freq data = involve.sti_baseline;
      tables study_id / noprint out = keylist;
proc print data = keylist;
      where count ge 2;
run;


*But they have identical values for every variable so I assume they are
same person, just entered twice;
proc print data = involve.sti_baseline;
      where study_id = 451;
run;


*Create temporary sti_baseline dataset excluding duplicate 451;
proc sort data = involve.sti_baseline nodupkey
      out = work.sti_baseline;
      by study_id;
run;
```

```
*Merge datasets;
data work.thesis;
      merge       involve.status
                  involve.participants_survey_baseline
                  involve.participant_dyad_summary
                  work.sti_baseline
                  ;
      by study_id;
      if (met_behav_crit =1) & (double_enroll=0) then output;


run;



data final;
set thesis;
*Reverse some stigma variables for consistent, ascending, summated
scale;
      if comm_trust = 5 then comm_trust2 = 1;
      else if comm_trust = 4 then comm_trust2 = 2;
      else if comm_trust = 3 then comm_trust2 = 3;
      else if comm_trust = 2 then comm_trust2 = 4;
      else if comm_trust = 1 then comm_trust2 = 5;
      else if comm_trust = 8 then comm_trust2 = .;

      if comm_hire = 5 then comm_hire2 = 1;
      else if comm_hire = 4 then comm_hire2 = 2;
      else if comm_hire = 3 then comm_hire2 = 3;
      else if comm_hire = 2 then comm_hire2 = 4;
      else if comm_hire = 1 then comm_hire2 = 5;
      else if comm_hire = 8 then comm_hire2 = .;

      if comm_treat = 5 then comm_treat2 = 1;
      else if comm_treat = 4 then comm_treat2 = 2;
      else if comm_treat = 3 then comm_treat2 = 3;
      else if comm_treat = 2 then comm_treat2 = 4;
      else if comm_treat = 1 then comm_treat2 = 5;
      else if comm_treat = 8 then comm_treat2 = .;

      if comm_friend = 5 then comm_friend2 = 1;
      else if comm_friend = 4 then comm_friend2 = 2;
      else if comm_friend = 3 then comm_friend2 = 3;
      else if comm_friend = 2 then comm_friend2 = 4;
      else if comm_friend = 1 then comm_friend2 = 5;
      else if comm_friend = 8 then comm_friend2 = .;

      *Recode "Not applicable" to missing for other stigma variables;
      if comm_failure = 8 then comm_failure = .;
      if comm_child = 8 then comm_child = .;
      if comm_opinion = 8 then comm_opinion = .;
```

```
*Mean imputation for sum;
      if n(comm_trust2, comm_hire2, comm_failure, comm_child,
      comm_opinion, comm_treat2, comm_friend2) > 2 then do;
            if comm_trust2 = . then comm_trust2 = 2.5689;
            if comm_hire2 = . then comm_hire2 = 2.096203;
            if comm_failure = . then comm_failure = 2.437179;
            if comm_child = . then comm_child = 2.92426187;
            if comm_opinion = . then comm_opinion = 2.797436;
            if comm_treat2 = . then comm_treat2 = 2.611392;
            if comm_friend2 = . then comm_friend2 = 2.35069886;
      end;

      *Create sum stigma variable (any missing value --> missing value
for sum);
      if n(comm_trust2, comm_hire2, comm_failure, comm_child,
comm_opinion, comm_treat2, comm_friend2) = 7 then
      sumstigma = sum(comm_trust2, comm_hire2, comm_failure,
comm_child, comm_opinion, comm_treat2, comm_friend2);
      else sumstigma = .;



      *Recode age;
      if 18 <= age_baseline < 25 then age = 1;
      else if 25 <= age_baseline < 30 then age = 2;
      else if 30 <= age_baseline < 40 then age = 3;
      else if age_baseline >= 40 then age = 4;
      else age = .;

      *Recode education variable;
      if educ in (3,4) then educ_final = 1;     *High school or below;
      else if educ = 2 then educ_final = 2;     *Some college;
      else if educ = 1 then educ_final = 3;     *College or above;
      else educ_final = .;

      if educ in (3,4) then educ_binary = 0;    *High school or below;
      else if educ in (1,2) then educ_binary = 1;*Some college/above
      else educ_binary = .;

      *Recode income variable;
      if 00 <= income < 4 then inc_final = 0;         *less than 20k;
      else if 4 <= income < 99 then inc_final = 1;    *20k or more;
      else inc_final = .;

      *Recode sexual identity variable;
      if orient = 2 then identity = 0;                *gay;
      else if orient in (1,3,4) then identity = 1;    *non-gay;
      else identity = .;



      *Mean imputation for physical environment variables;
      if n(hood_housing, hood_parks, hood_noise, hood_crowd, hood_air)
      > 1 then do;
            if hood_housing = . then hood_housing = 2.222222;
            if hood_parks = . then hood_parks = 2.239950;
            if hood_noise = . then hood_noise = 2.647799;
```

```
      if hood_crowd = . then hood_crowd = 2.69861286;
      if hood_air = . then hood_air = 2.574144;
end;

*Reverse physical environment scale items;
hood_housing2 = 6 - hood_housing;
hood_parks2 = 6 - hood_parks;
hood_noise2 = 6 - hood_noise;
hood_crowd2 = 6 - hood_crowd;
hood_air2 = 6 - hood_air;


*Physical environment scale (sum);
if n(hood_housing2, hood_parks2, hood_noise2, hood_crowd2,
hood_air2) = 5 then
      sumphysenv = sum(hood_housing2, hood_parks2, hood_noise2,
hood_crowd2, hood_air2);
else sumphysenv = .;


*Mean imputation for social environment variables;
if n(hood_friendly, hood_attach, hood_morale, hood_safety,
hood_citizenship, hood_govaccess) > 2 then do;
      if hood_friendly = . then hood_friendly = 2.414053;
      if hood_attach = . then hood_attach = 2.493671;
      if hood_morale = . then hood_morale = 2.415929;
      if hood_safety = . then hood_safety = 2.40503145;
      if hood_citizenship = . then hood_citizenship = 2.74524715;
      if hood_govaccess = . then hood_govaccess = 2.80730479;
end;

*Reverse social environment scale items;
hood_friendly2 = 6 - hood_friendly;
hood_attach2 = 6 - hood_attach;
hood_morale2 = 6 - hood_morale;
hood_safety2 = 6 - hood_safety;
hood_citizenship2 = 6 - hood_citizenship;
hood_govaccess2 = 6 - hood_govaccess;

*Social environment score (sum);
if n(hood_friendly2, hood_attach2, hood_morale2, hood_safety2,
hood_citizenship2, hood_govaccess2) = 6 then
      sumsocenv = sum(hood_friendly2, hood_attach2, hood_morale2,
hood_safety2, hood_citizenship2, hood_govaccess2);
else sumsocenv = .;


*Mean imputation for service environment variables;
if n(hood_school, hood_police, hood_healthcare, hood_shopping,
hood_light, hood_garbage) > 2 then do;
      if hood_school = . then hood_school = 2.532746;
      if hood_police = . then hood_police = 2.44931164;
      if hood_healthcare = . then hood_healthcare = 2.23839398;
      if hood_shopping = . then hood_shopping = 2.2446675;
      if hood_light = . then hood_light = 2.29886507;
      if hood_garbage = . then hood_garbage = 2.33626098;
end;
```

```
*Reverse service environment scale items;
hood_school2 = 6 - hood_school;
hood_police2 = 6 - hood_police;
hood_healthcare2 = 6 - hood_healthcare;
hood_shopping2 = 6 - hood_shopping;
hood_light2 = 6 - hood_light;
hood_garbage2 = 6 - hood_garbage;



*Service environment score (sum);
if n(hood_school2, hood_police2, hood_healthcare2,
hood_shopping2, hood_light2, hood_garbage2) = 6 then
      sumservenv = sum(hood_school2, hood_police2,
hood_healthcare2, hood_shopping2, hood_light2, hood_garbage2);
else sumservenv = .;


*Create overall neighborhood perceptions score (sum);
if n(sumphysenv, sumsocenv, sumservenv) = 3 then sumhood =
sum(sumphysenv, sumsocenv, sumservenv);
else sumhood = .;

*Reverse some gay community variables for consistent ascending
scale;
if comm_bettercom = 1 then comm_bettercom2 = 5;
else if comm_bettercom = 2 then comm_bettercom2 = 4;
else if comm_bettercom = 3 then comm_bettercom2 = 3;
else if comm_bettercom = 4 then comm_bettercom2 = 2;
else if comm_bettercom = 5 then comm_bettercom2 = 1;
else if comm_bettercom = 8 then comm_bettercom2 = .;

if comm_badplace = 1 then comm_badplace2 = 5;
else if comm_badplace = 2 then comm_badplace2 = 4;
else if comm_badplace = 3 then comm_badplace2 = 3;
else if comm_badplace = 4 then comm_badplace2 = 2;
else if comm_badplace = 5 then comm_badplace2 = 1;
else if comm_badplace = 8 then comm_badplace2 = .;

*Recode "Not applicable" to missing for other gay community
variables;
if comm_member = 8 then comm_member = .;
if comm_stay = 8 then comm_stay = .;
if comm_gayfriends = 8 then comm_gayfriends = .;
if comm_lesbian = 8 then comm_lesbian = .;
if comm_events = 8 then comm_events = .;
if comm_athome = 8 then comm_athome = .;
if comm_enjoy = 8 then comm_enjoy = .;
```

```
*Mean imputation;
if n(comm_member, comm_stay, comm_gayfriends, comm_lesbian,
comm_bettercom2, comm_events,
      comm_badplace2, comm_athome, comm_enjoy) > 3 then do;
      if comm_member = . then comm_member = 3.693774;
      if comm_stay = . then comm_stay = 3.84137056;
      if comm_gayfriends = . then comm_gayfriends = 3.92395437;
      if comm_lesbian = . then comm_lesbian = 3.34012739;
      if comm_bettercom2 = . then comm_bettercom2 = 3.121059;
      if comm_events = . then comm_events = 3.236641;
      if comm_badplace2 = . then comm_badplace2 = 4.021384;
      if comm_athome = . then comm_athome = 3.768448;
      if comm_enjoy = . then comm_enjoy = 4.04539723;
end;

*Gay community score (sum);
if n(comm_member, comm_stay, comm_gayfriends, comm_lesbian,
comm_bettercom2, comm_events,
      comm_badplace2, comm_athome, comm_enjoy) = 9 then
      sumgaycomm = sum(comm_member, comm_stay, comm_gayfriends,
comm_lesbian, comm_bettercom2, comm_events,
      comm_badplace2, comm_athome, comm_enjoy);
else sumgaycomm = .;

*Recode "Not applicable" to missing for resilience variables;
if res_manage = 8 then res_manage = .;
if res_proud = 8 then res_proud = .;
if res_stride = 8 then res_stride = .;
if res_selflove = 8 then res_selflove = .;
if res_determined = 8 then res_determined = .;
if res_interest = 8 then res_interest = .;
if res_persevere = 8 then res_persevere = .;
if res_meaning = 8 then res_meaning = .;
if res_getout = 8 then res_getout = .;
if res_energy = 8 then res_energy = .;


*Mean imputation for resilience variables;
if n(res_manage, res_proud, res_stride, res_selflove,
res_determined, res_interest, res_persevere,
res_meaning, res_getout, res_energy) > 4 then do;
      if res_manage = . then res_manage = 4.418663;
      if res_proud = . then res_proud = 4.388191;
      if res_stride = . then res_stride = 4.18181818;
      if res_selflove = . then res_selflove = 4.342604;
      if res_determined = . then res_determined = 4.446701;
      if res_interest = . then res_interest = 4.302267;
      if res_persevere = . then res_persevere = 4.355696;
      if res_meaning = . then res_meaning = 4.458599;
      if res_getout = . then res_getout = 4.488636;
      if res_energy = . then res_energy = 4.312977;
end;
```

```
*Resilience score (sum);
      if n(res_manage, res_proud, res_stride, res_selflove,
      res_determined, res_interest, res_persevere, res_meaning,
            res_getout, res_energy) = 10 then
      sumres = sum(res_manage, res_proud, res_stride, res_selflove,
      res_determined, res_interest, res_persevere, res_meaning,
            res_getout, res_energy);
      else sumres = .;

      *Recode "Prefer not to answer" to missing for some racism
      variables;
      if racism_stared = 7 then racism_stared = .;
      if racism_stupid = 7 then racism_stupid = .;
      if racism_ignored = 7 then racism_ignored = .;
      if racism_insensitive = 7 then racism_insensitive = .;
      if racism_service = 7 then racism_service = .;
      if racism_mistaken = 7 then racism_mistaken = .;



      *Mean imputation for racism variables;
      if n(racism_rights, racism_paranoid, racism_witness,
      racism_another, racism_fear, racism_stared,
            racism_stupid, racism_ignored, racism_insensitive,
      racism_service, racism_mistaken) > 4 then do;
            if racism_rights = . then racism_rights = 1.663329;
            if racism_paranoid = . then racism_paranoid = 1.620301;
            if racism_witness = . then racism_witness = 2.615770;
            if racism_another = . then racism_another = 2.748428;
            if racism_fear = . then racism_fear = 1.924528;
            if racism_stared = . then racism_stared = 1.842500;
            if racism_stupid = . then racism_stupid = 1.780549;
            if racism_ignored = . then racism_ignored = 1.745592;
            if racism_insensitive = . then racism_insensitive =
            2.711418;
            if racism_service = . then racism_service = 1.508750;
            if racism_mistaken = . then racism_mistaken = 2.067669;
      end;

      *Racism score (sum);
      if n(racism_rights, racism_paranoid, racism_witness,
      racism_another, racism_fear, racism_stared,
            racism_stupid, racism_ignored, racism_insensitive,
      racism_service, racism_mistaken) = 11
            then sumracism = sum(racism_rights, racism_paranoid,
      racism_witness, racism_another, racism_fear, racism_stared,
            racism_stupid, racism_ignored, racism_insensitive,
      racism_service, racism_mistaken);
      else sumracism = .;
```

```
        *Dummy variables for regression;

        *race;
        if race_inc = 1 then race = 1;
        else race = 0;


        *education;
        if educ_final = 1 then highschool = 1;
        else if educ_final in (2,3) then highschool = 0;
        else if educ_final = . then highschool = .;
        if educ_final = 2 then somecollege = 1;
        else if educ_final in (1,3) then somecollege = 0;
        else if educ_final = . then somecollege = .;
        if educ_final = 3 then college = 1;
        else if educ_final in (1,2) then college = 0;
        else if educ_final = . then college = .;

        *baseline hiv;
        if baseline_hiv = 1 then hivstatus = 0;   *negative;
        else if baseline_hiv = 2 then hivstatus = 1;    *positive;

        *insurance;
        if insurance = 1 then insure_final = 0;               *Yes;
        else if insurance = 0 then insure_final = 1;    *No;
        else insure_final = .;


        *Dichotomizing sumgaycomm for interaction;
        if sumgaycomm < 33 then bin_sumgaycomm = 0;     *low score
        else if sumgaycomm >= 33 then bin_sumgaycomm = 1;     *high score

        cent_racism = (sumracism - 22.2288332);

        *Interaction terms;
        agexrace = age_baseline*race;
        racismxrace = sumracism*race;
        hivxrace = hivstatus*race;
        hivxage = hivstatus*age_baseline;
        cent_racismxrace = (sumracism - 22.2288332)*race;
        hoodxracism = sumhood*sumracism;
        cent_hoodxracism = (sumhood - 41.9273070)*(sumracism-20.0129415);
        *Centered around mean for white men only;
        identityxsumgaycomm = identity*sumgaycomm;
        cent_idxsumgaycomm = (identity)*(sumgaycomm-32.2755294);
        *Centered around mean for black men only;


run;
```

```
*Cross-check age variables;
proc freq data = final;
tables age_baseline*age/list missing;
run;

*Cross-check education variables;
proc freq data = final;
tables educ*educ_final/ list missing;
run;

*Cross-check income variables;
proc freq data = final;
tables income*inc_final/list missing;
run;

*Cross-check sexual identity variables;
proc freq data = final;
tables orient*identity/list missing;
run;

*Cross-check reversal stigma items and original stigma variables;
proc freq data = final;
      tables comm_trust*comm_trust2 comm_hire*comm_hire2
comm_treat*comm_treat2 comm_friend*comm_friend2
      comm_failure comm_child comm_opinion/list missing;
run;



*T-test comparing mean sum stigma scores, white vs black;
proc ttest data = final;
      class race_inc;
      var sumstigma;
run;


*Cronbach's alpha for 7 sexual identity stigma questions;
proc corr data = final nomiss alpha;
      var comm_trust2 comm_hire2 comm_failure comm_child comm_opinion
comm_treat2 comm_friend2;
where race = 0;
run;

*Cronbach's alpha for all 11 racism questions;
proc corr data = final nomiss alpha;
      var racism_rights racism_paranoid racism_witness racism_another
racism_fear racism_stared racism_stupid
            racism_ignored racism_insensitive racism_service
racism_mistaken;
      *where race = 0;
run;

*Cronbach's alpha for 5 physical environment questions;
proc corr data = final nomiss alpha;
      var hood_housing hood_parks hood_noise hood_crowd hood_air;
run;
```

```
*Cronbach's alpha for 6 social environment questions;
proc corr data = final nomiss alpha;
      var hood_friendly hood_attach hood_morale hood_safety
hood_citizenship hood_govaccess;
run;

*Cronbach's alpha for 17 neighborhood questions;
proc corr data = final nomiss alpha;
      var hood_friendly hood_attach hood_morale hood_safety
hood_citizenship hood_govaccess
            hood_school hood_police hood_healthcare hood_shopping
hood_light hood_garbage
            hood_housing hood_parks hood_noise hood_crowd hood_air;
      where race = 0;
run;

*Cronbach's alpha for 6 service environment questions;
proc corr data = final nomiss alpha;
      var hood_school hood_police hood_healthcare hood_shopping
hood_light hood_garbage;
run;


*Cronbach's alpha for 9 gay community questions;
proc corr data = final nomiss alpha;
      var comm_member comm_stay comm_gayfriends comm_lesbian
comm_bettercom2 comm_events comm_badplace2 comm_athome comm_enjoy;
      where race = 0;
run;

*Cronbach's alpha for 10 resilience questions;
proc corr data = final nomiss alpha;
      var res_manage res_proud res_stride res_selflove res_determined
res_interest res_persevere res_meaning res_getout
            res_energy;
      where race = 0;
run;

*Look at sum score variables;
proc freq data = final;
tables sumstigma sumhood*sumphysenv*sumsocenv*sumservenv sumgaycomm
sumres sumracism/list missing;
run;

proc univariate data = final;
var sumstigma sumhood sumgaycomm sumres sumracism;
histogram;
where race_inc = 1;
run;
```

```
proc univariate data = final normal;
var sumstigma age_baseline sumhood sumgaycomm sumres sumracism;
histogram sumstigma age_baseline sumhood sumgaycomm sumres sumracism;
run;


**********************************************TABLE
1**************************************************;
proc univariate data = final;
var sumstigma;
where race = 0;
run;

proc ttest data = final;
class race;
var sumstigma;
run;

*Age;
proc univariate data = final;
var age_baseline;
where race = 0;
run;

proc ttest data = final;
class race;
var age_baseline;
run;

*Education;
proc freq data = final;
tables race*educ_final/missing chisq;
run;

*Income;
proc freq data = final;
tables race*inc_final/missing chisq;
run;

*Insurance;
proc freq data = final;
tables race*insurance/missing chisq;
run;

*Ever test HIV;
proc freq data = final;
tables hivtest_ever*mstigscale;
where race_inc = 1;
run;

*HIV baseline;
proc freq data = final;
tables race*hivstatus/missing chisq;
run;

*Sexual identity;
```

```
proc freq data = final;
tables race*identity/missing chisq;
run;

*Neighborhood characteristics;
proc univariate data = final;
var sumhood;
*where race = 0;
run;

proc ttest data = final;
class race;
var sumhood;
run;

*Gay community;
proc univariate data = final;
var sumgaycomm;
*where race = 0;
run;

proc ttest data = final;
class race;
var sumgaycomm;
run;

*Resilience;
proc univariate data = final;
var sumres;
*where race = 1;
run;

proc ttest data = final;
class race;
var sumres;
run;

*racism;
proc univariate data = final;
var sumracism;
where race = 0;
run;

proc ttest data = final;
class race;
var sumracism;
run;



**********************************Univariate analyses;


*Race - SIGNIFICANT & POSITIVE BETA;
proc reg data = final;
model sumstigma = race;
run;
```

```
*Age - SIGNIFICANT FOR TOTAL, BLACK - INVERSE;
proc reg data = final;
model sumstigma = age_baseline;
where race = 1;
run;

*Education - NOT SIGNIFICANT;
proc reg data = final;
model sumstigma = educ_binary;
where race = 1;
run;

*Income - SIGNIFICANT IN TOTAL ONLY - INVERSE;
proc reg data = final;
model sumstigma = inc_final;
*where race = 0;
run;

*Health insurance - NOT SIGNIFICANT;
proc reg data = final;
model sumstigma = insurance;
where race = 0;
run;

*Ever tested HIV - NOT SIGNIFICANT;
proc reg data = final;
model sumstigma = hivtest_ever;
*where race = 0;
run;

*HIV Status - SIGNIFICANT IN TOTAL ONLY - POSITIVE BETA;
proc reg data = final;
model sumstigma = hivstatus;
where race = 1;
run;

*Sexual identity - NOT SIGNIFICANT;
proc reg data = final;
model sumstigma = identity;
*where race = 0;
run;

*Ever incarcerated - NOT SIGNIFICANT;
proc reg data = final;
model sumstigma = arrested_ever;
*where race = 0;
run;

*Neighborhood - SIGNIFICANT IN ALL 3 - POSITIVE BETA;
proc reg data = final;
model sumstigma = sumhood;
*where race = 1;
run;

*Gay community - SIGNIFICANT IN ALL 3 - NEGATIVE BETA;
proc reg data = final;
```

```
model sumstigma = sumgaycomm;
*where race = 0;
run;

*Resilience - SIGNIFICANT IN ALL 3 - NEGATIVE BETA;
proc reg data = final;
model sumstigma = sumres;
*where race = 0;
run;

*Racism - SIGNIFICANT IN ALL 3 - POSITIVE BETA;
proc reg data = final;
model sumstigma = sumracism;
*where race = 0;
run;



**************************Interaction terms in univariate analyses;
*Effects modifying race;
proc glm data = final order = formatted;
      *SIGNIFICANT;
class race;
format race ref.;
model sumstigma = race sumracism race*sumracism;
run;

*Effects modifying age;
proc glm data = final order = formatted;
class educ_binary;
format educ_binary ref.;
model sumstigma = age_baseline educ_binary
age_baseline*educ_binary/solution;
*where race = 0;
run;

proc glm data = final order = formatted;
class inc_final;
format inc_final ref.;
model sumstigma = age_baseline inc_final
age_baseline*inc_final/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format insure_final ref.;
class insure_final;
model sumstigma = age_baseline insure_final
age_baseline*insure_final/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format hivtest_ever ref.;
class hivtest_ever;
```

```
model sumstigma = age_baseline hivtest_ever
age_baseline*hivtest_ever/solution;
*where race = 1;
run;

proc glm data = final order = formatted;
      *SIGNIFICANT ONLY FOR TOTAL;
format hivstatus ref.;
class hivstatus;
model sumstigma = age_baseline hivstatus
age_baseline*hivstatus/solution;
where race = 0;
run;

proc glm data = final order = formatted;

format identity ref.;
class identity;
model sumstigma = age_baseline identity age_baseline*identity/solution;
*where race = 1;
run;

proc glm data = final order = formatted;

format arrested_ever ref.;
class arrested_ever;
model sumstigma = age_baseline arrested_ever
age_baseline*arrested_ever/solution;
*where race = 1;
run;

proc glm data = final order = formatted;

model sumstigma = age_baseline sumhood age_baseline*sumhood/solution;
where race = 0;
run;

proc glm data = final order = formatted;

model sumstigma = age_baseline sumgaycomm
age_baseline*sumgaycomm/solution;
*where race = 1;
run;

proc glm data = final order = formatted;

model sumstigma = age_baseline sumres age_baseline*sumres/solution;
*where race = 1;
run;

proc glm data = final order = formatted;

model sumstigma = age_baseline sumracism
age_baseline*sumracism/solution;
*where race = 1;
run;
```

```
*Effects modifying education;
proc glm data = final order = formatted;

format educ_binary inc_final ref.;
class educ_binary inc_final;
model sumstigma = educ_binary inc_final educ_binary*inc_final/solution;
where race = 1;
run;

proc glm data = final order = formatted;

format educ_binary insure_final ref.;
class educ_binary insure_final;
model sumstigma = educ_binary insure_final
educ_binary*insure_final/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format educ_binary hivtest_ever ref.;
class educ_binary hivtest_ever;
model sumstigma = educ_binary hivtest_ever
educ_binary*hivtest_ever/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format educ_binary hivstatus ref.;
class educ_binary hivstatus;
model sumstigma = educ_binary hivstatus educ_binary*hivstatus/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format educ_binary identity ref.;
class educ_binary identity;
model sumstigma = educ_binary identity educ_binary*identity/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format educ_binary arrested_ever ref.;
class educ_binary arrested_ever;
model sumstigma = educ_binary arrested_ever
educ_binary*arrested_ever/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format educ_binary ref.;
class educ_binary;
model sumstigma = educ_binary sumhood educ_binary*sumhood/solution;
```

```
*where race = 0;
run;

proc glm data = final order = formatted;

format educ_binary ref.;
class educ_binary;
model sumstigma = educ_binary sumgaycomm
educ_binary*sumgaycomm/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format educ_binary ref.;
class educ_binary;
model sumstigma = educ_binary sumres educ_binary*sumres/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format educ_binary ref.;
class educ_binary;
model sumstigma = educ_binary sumracism educ_binary*sumracism/solution;
*where race = 0;
run;

*Effects modifying income;
proc glm data = final order = formatted;

format inc_final insure_final ref.;
class inc_final insure_final;
model sumstigma = inc_final insure_final
inc_final*insure_final/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format inc_final hivtest_ever ref.;
class inc_final hivtest_ever;
model sumstigma = inc_final hivtest_ever
inc_final*hivtest_ever/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format inc_final hivstatus ref.;
class inc_final hivstatus;
model sumstigma = inc_final hivstatus inc_final*hivstatus/solution;
*where race = 0;
run;
```

```
proc glm data = final order = formatted;
                  *SIGNIFICANT IN WHITE MEN;

format inc_final identity ref.;
class inc_final identity;
model sumstigma = inc_final identity inc_final*identity/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format inc_final arrested_ever ref.;
class inc_final arrested_ever;
model sumstigma = inc_final arrested_ever
inc_final*arrested_ever/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format inc_final ref.;
class inc_final;
model sumstigma = inc_final sumhood inc_final*sumhood/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format inc_final ref.;
class inc_final;
model sumstigma = inc_final sumgaycomm inc_final*sumgaycomm/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format inc_final ref.;
class inc_final;
model sumstigma = inc_final sumres inc_final*sumres/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format inc_final ref.;
class inc_final;
model sumstigma = inc_final sumracism inc_final*sumracism/solution;
*where race = 0;
run;

*Effects modifying health insurance;
proc glm data = final order = formatted;

format insure_final hivtest_ever ref.;
class insure_final hivtest_ever;
model sumstigma = insure_final hivtest_ever
insure_final*hivtest_ever/solution;
```

```
*where race = 0;
run;

proc glm data = final order = formatted;

format insure_final hivstatus ref.;
class insure_final hivstatus;
model sumstigma = insure_final hivstatus
insure_final*hivstatus/solution;
where race = 1;
run;

proc glm data = final order = formatted;

format insure_final identity ref.;
class insure_final identity;
model sumstigma = insure_final identity insure_final*identity/solution;
where race = 1;
run;

proc glm data = final order = formatted;

format insure_final arrested_ever ref.;
class insure_final arrested_ever;
model sumstigma = insure_final arrested_ever
insure_final*arrested_ever/solution;
where race = 1;
run;

proc glm data = final order = formatted;

format insure_final ref.;
class insure_final;
model sumstigma = insure_final sumhood insure_final*sumhood/solution;
where race = 1;
run;

proc glm data = final order = formatted;

format insure_final ref.;
class insure_final;
model sumstigma = insure_final sumgaycomm
insure_final*sumgaycomm/solution;
*where race = 0;
run;

proc glm data = final order = formatted;
            *SIGNIFICANT IN WHITE MEN;

format insure_final ref.;
class insure_final;
model sumstigma = insure_final sumres insure_final*sumres/solution;
*where race = 0;
run;

proc glm data = final order = formatted;
```

```
format insure_final ref.;
class insure_final;
model sumstigma = insure_final sumracism
insure_final*sumracism/solution;
*where race = 0;
run;

*Effects modifying HIV testing;
proc glm data = final order = formatted;

format hivtest_ever hivstatus ref.;
class hivtest_ever hivstatus;
model sumstigma = hivtest_ever hivstatus
hivtest_ever*hivstatus/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format hivtest_ever identity ref.;
class hivtest_ever identity;
model sumstigma = hivtest_ever identity hivtest_ever*identity/solution;
where race = 1;
run;

proc glm data = final order = formatted;

format hivtest_ever arrested_ever ref.;
class hivtest_ever arrested_ever;
model sumstigma = hivtest_ever arrested_ever
hivtest_ever*arrested_ever/solution;
where race = 1;
run;

proc glm data = final order = formatted;

format hivtest_ever ref.;
class hivtest_ever;
model sumstigma = hivtest_ever sumhood hivtest_ever*sumhood/solution;
where race = 1;
run;

proc glm data = final order = formatted;

format hivtest_ever ref.;
class hivtest_ever;
model sumstigma = hivtest_ever sumgaycomm
hivtest_ever*sumgaycomm/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format hivtest_ever ref.;
class hivtest_ever;
model sumstigma = hivtest_ever sumres hivtest_ever*sumres/solution;
*where race = 0;
```

```
run;

proc glm data = final order = formatted;

format hivtest_ever ref.;
class hivtest_ever;
model sumstigma = hivtest_ever sumracism
hivtest_ever*sumracism/solution;
*where race = 0;
run;

*Effects modifying HIV status;
proc glm data = final order = formatted;

format hivstatus identity ref.;
class hivstatus identity;
model sumstigma = hivstatus identity hivstatus*identity/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format hivstatus arrested_ever ref.;
class hivstatus arrested_ever;
model sumstigma = hivstatus arrested_ever
hivstatus*arrested_ever/solution;
where race = 1;
run;

proc glm data = final order = formatted;

format hivstatus ref.;
class hivstatus;
model sumstigma = hivstatus sumhood hivstatus*sumhood/solution;
where race = 1;
run;

proc glm data = final order = formatted;

format hivstatus ref.;
class hivstatus;
model sumstigma = hivstatus sumgaycomm hivstatus*sumgaycomm/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format hivstatus ref.;
class hivstatus;
model sumstigma = hivstatus sumres hivstatus*sumres/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format hivstatus ref.;
class hivstatus;
```

```
model sumstigma = hivstatus sumracism hivstatus*sumracism/solution;
*where race = 0;
run;

*Effects modifying sexual identity;
proc glm data = final order = formatted;

format identity arrested_ever ref.;
class identity arrested_ever;
model sumstigma = identity arrested_ever
identity*arrested_ever/solution;
*where race = 0;
run;

proc glm data = final order = formatted;              *SIGNIFICANT IN
BLACK, TOTAL;
format identity ref.;
class identity;
model sumstigma = identity sumhood identity*sumhood/solution;
*where race = 0;
run;

proc glm data = final order = formatted;              *SIGNIFICANT IN
BLACK;
format identity ref.;
class identity;
model sumstigma = identity sumgaycomm identity*sumgaycomm/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format identity ref.;
class identity;
model sumstigma = identity sumres identity*sumres/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format identity ref.;
class identity;
model sumstigma = identity sumracism identity*sumracism/solution;
*where race = 0;
run;

*Effects modifying incarceration;
proc glm data = final order = formatted;

format arrested_ever ref.;
class arrested_ever;
model sumstigma = arrested_ever sumhood arrested_ever*sumhood/solution;
*where race = 0;
run;

proc glm data = final order = formatted;
```

```
format arrested_ever ref.;
class arrested_ever;
model sumstigma = arrested_ever sumgaycomm
arrested_ever*sumgaycomm/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format arrested_ever ref.;
class arrested_ever;
model sumstigma = arrested_ever sumres arrested_ever*sumres/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

format arrested_ever ref.;
class arrested_ever;
model sumstigma = arrested_ever sumracism
arrested_ever*sumracism/solution;
*where race = 0;
run;

*Effects modifying sumhood;
proc glm data = final order = formatted;
model sumstigma = sumhood sumgaycomm sumhood*sumgaycomm/solution;
*where race = 0;
run;

proc glm data = final order = formatted;

model sumstigma = sumhood sumres sumhood*sumres/solution;
where race = 1;
run;

proc glm data = final order = formatted;
      *SIGNIFICANT IN WHITE;

model sumstigma = sumhood sumracism sumhood*sumracism/solution;
where race = 1;
run;

*Effects modifying sumgaycomm;
proc glm data = final order = formatted;

model sumstigma = sumgaycomm sumres sumgaycomm*sumres/solution;
where race = 1;
run;

proc glm data = final order = formatted;

model sumstigma = sumgaycomm sumracism sumgaycomm*sumracism/solution;
*where race = 1;
run;

*Effects modifying sumres;
```

```
proc glm data = final order = formatted;

model sumstigma = sumres sumracism sumres*sumracism/solution;
where race = 1;
run;




**************************************************************Models;
ods graphics on;

*No interaction;
*Total sample;
proc reg data = final;
model sumstigma = race age_baseline educ_binary inc_final insure_final
hivtest_ever
      hivstatus identity arrested_ever sumhood sumgaycomm sumres
sumracism
/partial vif tol influence r selection = adjrsq aic cp;
run;

*Black;
proc reg data = final;
model sumstigma = age_baseline highschool somecollege inc_final
insure_final
      hivstatus identity sumhood sumgaycomm sumres sumracism/partial
vif tol selection = adjrsq aic cp;
test highschool=somecollege = 0;
*where race = 1;
run;

*White;
proc reg data = final;
model sumstigma = age_baseline highschool somecollege inc_final
insure_final
      hivstatus identity sumhood sumgaycomm sumres sumracism/partial
vif tol selection = adjrsq aic cp;
test highschool=somecollege = 0;
where race = 0;
run;

*Interaction;
*Total sample;
proc reg data = final;
model sumstigma = race age_baseline educ_binary inc_final insure_final
      hivstatus identity sumhood sumgaycomm sumres sumracism
racismxrace
/partial vif tol selection = adjrsq aic cp;
run;

*Black;
proc reg data = final;
model sumstigma = age_baseline highschool somecollege inc_final
insure_final
      hivstatus identity sumhood sumgaycomm sumres sumracism hivxage
```

```
/partial tol vif aic cp;
test highschool=somecollege = 0;
where race = 1;
run;

*White;
proc reg data = final;
model sumstigma = age_baseline highschool somecollege inc_final
insure_final
      hivstatus identity sumhood sumgaycomm sumres sumracism hivxage
/partial;
test highschool=somecollege = 0;
where race = 0;
run;

*Ref categories: white, college or above, 20k or more, HIV-negative,
gay-identified;
proc glm data = final order = formatted;
format hivstatus identity insure_final ref. educ_final education.;
class educ_final inc_final insure_final hivstatus identity;
model sumstigma = age_baseline educ_final inc_final insure_final
      hivstatus identity sumhood sumgaycomm sumres sumracism
sumstigma*sumracism sumstigma*age sumstigma*hivstatus/solution;
where race = 1;
run;

proc reg data = final;
model sumstigma = age_baseline
      hivstatus identity sumhood sumgaycomm sumres sumracism
cent_idxsumgaycomm
/partial vif tol adjrsq aic cp;
where race = 1;
run;



**********************************FINAL MODELS;
proc reg data = final;
model sumstigma = race age_baseline hivstatus identity sumhood
sumgaycomm sumres sumracism
/partial vif tol influence r adjrsq aic cp;
output out = resid (keep = sumstigma race age_baseline hivstatus
identity sumhood sumgaycomm sumres sumracism r p)
      residual = r predicted = p;
run;

proc univariate data = resid normal;
var r;
qqplot r / normal (mu = est sigma = est);
run;

proc reg data = final;
model sumstigma = age_baseline hivstatus identity sumhood sumgaycomm
sumres sumracism cent_idxsumgaycomm
/partial vif tol influence r adjrsq aic cp;
where race = 1;
run;
```

```
proc reg data = final;
model sumstigma = age_baseline hivstatus identity sumhood sumgaycomm
sumres sumracism
/partial vif tol influence r adjrsq aic cp;
where race = 0;
run;


ods graphics on;
proc glm data = final data = formatted;
format hivstatus identity ref.;
class hivstatus identity;
model sumstigma = age_baseline hivstatus identity sumhood
bin_sumgaycomm sumres sumracism identity*bin_sumgaycomm/solution;
where race = 1;
run;
ods graphics off;


*Interaction plot;
proc glm data = final;
  class identity bin_sumgaycomm;
  model sumstigma = identity | bin_sumgaycomm /ss3;
  lsmeans identity*bin_sumgaycomm;
  output out = pred p = pred;
run;
quit;

proc sort data = pred;
by bin_sumgaycomm;
run;

symbol1 v=circle i=join ci=blue  h= 2;
symbol2 v=triangle i=join ci=red h =2;


proc gplot data = pred;
plot pred*bin_sumgaycomm=identity ;
run;
quit;


ods graphics on;
   proc glm plot=meanplot(cl);
      class bin_sumgaycomm identity;
      model sumstigma=identity bin_sumgaycomm bin_sumgaycomm*identity;
      lsmeans bin_sumgaycomm / pdiff=all adjust=tukey;
   run;
   ods graphics off;
```