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Associations of Childhood Sexual Abuse and HIV Prevalence:

Examination of Racial Differences

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Associations of Childhood Sexual Abuse and HIV Prevalence: Examination of Racial Differences

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A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
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Abstract

Associations of Childhood Sexual Abuse and HIV Prevalence:
Examination of Racial Differences

By Laura Gravens

Background: There is a known disparity in HIV rates among blacks and especially black MSM in the United States. Associations between history of childhood sexual abuse (CSA) and HIV prevalence have been found among at-risk populations. CSA is more prevalent among MSM than heterosexual men. However, not much is known about how race and CSA may interact to affect HIV risk.

Objective: To determine what relationships exist between CSA and HIV prevalence, and how race and other intermediate factors may play a role in that relationship.

Results: Respondents who experienced CSA differed significantly from those who did not: they were more likely to be black, more likely to be HIV-positive, have more unprotected anal intercourse (UAI) partners, be currently homeless and have a history of homelessness, have lower safe sex norms and lower resiliency. Respondents who were black differed significantly from respondents who were white: They were more likely to experience CSA, more likely to be HIV positive, have fewer UAI partners, be less likely to engage in UAI, more likely to be homeless and have a history of homelessness, less likely to have insurance, less likely to use injection and non injection drugs, more likely to be in poverty, and have higher resiliency scores. Race, CSA and the interaction of race and CSA was significantly associated with HIV prevalence while controlling for other factors.

Conclusions: CSA and race are associated with HIV infection, and race is predictor of CSA. This relationship may contribute to the racial disparities in HIV prevalence.

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CHAPTER 1: INTRODUCTION

Introduction

In the United States, Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) has developed into a story of inequality and racial differences. In a five U.S. city study, it was found that in the third decade of the epidemic, men who have sex with men (MSM) carried a disproportionately greater disease burden when it comes to HIV/AIDS in the United States than other subgroups of the population (1). Black Americans have disproportionately higher rates of HIV infection in the United States compared to white Americans. In the same 5 U.S. city study, 50% of new HIV infections were among black Americans (1). Although black Americans made up 13% of the US population in 2007, over half (51%) of the HIV cases were among black Americans (2). Overall, HIV prevalence rates for black Americans are about eight times as high as the prevalence rates for whites (2).In particular, black MSM are disproportionately burdened. In 2009, black MSM accounted for 37% of HIV infections among MSM (2-3).

There is evidence showing links between CSA and risk factors for HIV infection and the prevalence of HIV infection. A history of CSA has been correlated with increased reporting of unprotected anal sex (4-10), an increased number of sex partners (4, 6, 8-10), and serodiscordent unprotected anal sex (11). There are also correlations found between childhood sexual abuse history and poorer safe sex norms among MSM (5). These factors are likely important reasons why there is a higher rate of HIV infection among men who have sex with men who report childhood sexual abuse (5, 11).

There is also a disproportionate amount of childhood sexual abuse (CSA) history reported among MSM. It has been found that between 5-10% of all men have

experienced childhood sexual abuse (12). However, there have been much higher rates of CSA reported among MSM. Rates between 20% and 47% have been estimated among the MSM population in recent studies (4, 5, 13-15). There is some work that suggests that history of childhood sexual abuse may also be racially disproportionate. Among MSM, black/African American men report higher rates of childhood sexual abuse compared to white/Caucasian MSM. In the EXPLORE study conducted by Mimiaga and colleges (5), there was more reported childhood sexual abuse among black MSM (51%) compared to white MSM (35%) (OR=1.96, 95% CI 1.53, 2.50). This pattern is repeated in a number of studies, providing supporting evidence that a history of childhood sexual abuse differs by race as well as by sexual orientation (4, 11, 16).

Aims and Objectives

The objective of this thesis is to better understand the relationship between childhood sexual abuse and HIV risk behaviors and HIV prevalence, focusing how race might modify this relationship. The first aim is to describe the prevalence of CSA and HIV in Atlanta among black and white MSM, and to describe factors related to CSA. The second aim is to examine the relationship between CSA and prevalent HIV infection among black and white MSM. The third aim is to explore interactions between CSA and race on HIV prevalence or HIV risk factors. The findings of this thesis may be useful for designing interventions for MSM who have suffered childhood sexual abuse.

Study Background

The data for this thesis is from the Involve[MEN]t study, a longitudinal study targeting black and white MSM between the ages of 18 and 39, for which baseline data collection ended in December 2012. Data that will be analyzed for this thesis focus on

only the first visit of each participant, thus rendering these data cross-sectional in nature. A total of 803 participants were enrolled in the study from July 2012 to December 2012. All enrolled study participants are used in this data analysis.

Summary

This thesis seeks to provide information on black and white men who have sex with men in the United States. Specifically we provide details on the prevalence of self-reported childhood sexual abuse in this population and examine the possible correlations between childhood sexual abuse and HIV risk behavior and HIV prevalence, as well as the extent to which race modifies the relationship between HIV risk behaviors and HIV prevalence. Chapter Two will provide a review of the literature as well as background information on HIV/AIDS and childhood sexual abuse research. Chapter Three is a manuscript, which will be submitted for publication. In this chapter, there will be a detailed description of the analysis procedures. Chapter Four will provide public health implications, expanded conclusions, and suggestions for further research.

CHAPTER 2: LITERATURE REVIEW

According to UNAIDS, it is estimated that there are 34 million people who are currently living with HIV around the world, and only about 50% of these people know their HIV status. In 2011 there were 2.5 million new HIV infections worldwide. In the United States alone it is estimated that 1.3 million people are living with HIV (17). People of all ages, races, and walks of life are affected by HIV. However in the United States, men who have sex with men (MSM) carry a disproportionately higher amount of the HIV disease burden than other sexual groups and black American MSM carry an even greater disproportionate burden of HIV as compared to white MSM (2, 3). A history of childhood sexual abuse is a factor that is also disproportionate among black MSM (4, 11, 16). History of childhood sexual abuse and its interaction with other factors may explain some of the racial differences in HIV risk behavior.

MSM Disparities in HIV Prevalence

It is clear there is a disparity between MSM and other persons when it comes to HIV. MSM represent approximately 2-4% of the United States population but carried half of the HIV infection burden annually between the years of 2006 and 2009 (2, 3, 18). MSM accounted for approximately 52% of all persons living with HIV in the United States in 2009 and it is estimated that over 300,000 MSM with AIDS diagnoses in the United States have died since the epidemic began (2, 3). In 2012, there were 29,800 new HIV infections among MSM in the United States, which is a rise over the 2008 number of 26,700. Thus the focus of this thesis will be on the population of most risk – men who have sex with men.

Racial Disparities in HIV Prevalence

In the United States, Black/African Americans have disproportionately higher rates of HIV infection compared to other racial groups in the US. Although Black/African Americans made up only 13% of the US population in 2007, over half (51%) of the HIV cases that year were among African Americans (2, 3). Overall, HIV prevalence rates for African Americans are estimated to be about eight times as high as the prevalence rates for Whites/Caucasians (2, 3).

Additionally, according to the Centers for Disease Control, black MSM carry a particularly disproportionally greater disease burden when it comes to HIV/AIDS in the United States (2, 3). In 2009, black MSM in the US accounted for approximately 37% of HIV infections among MSM (2, 3). There has been much research examining the risk factors contributing to these racial differences in terms of HIV prevalence among MSM, but no firm consensus has been reached (19). Considering that MSM carry the greatest burden of HIV in the United States, and that the racial disparities of HIV within this population are alarming, this study is focused on examining potential contributing factors to these racial differences within the MSM population.

Childhood Sexual Abuse and HIV Risk

Childhood sexual abuse has been found in previous studies to be correlated with increased incidence of HIV through its association with increased risk behaviors. Increased HIV-related risk behaviors have been found among MSM who experienced childhood sexual abuse as compared to MSM who have not experienced CSA. For example, history of childhood sexual abuse has been correlated with increased unprotected anal sex (4-10), an increased number of sex partners (4, 6, 8-10) as well as

serodiscordent unprotected anal sex (5). A history of childhood sexual abuse has also been associated with increased drug and alcohol abuse (6, 9, 18) and depression symptoms (6, 8, 19) among MSM. In addition, correlations have been found between childhood sexual abuse history and less positive safe sex norms among MSM (5). Together, these studies have cumulated data to indicate a higher rate of HIV infection among men who have sex with men and who report childhood sexual abuse (5, 11) (Figure 1).

MSM Disparities in Childhood Sexual Abuse

Research examining childhood sexual abuse (CSA) suggests that between 5-10% of all men have experienced childhood sexual abuse (20), with much higher rates found among MSM populations. For example, CSA rates between 20% and 47% have been estimated among the MSM populations in recent studies (4-5, 13-15).

Racial Disparities in Childhood Sexual Abuse

Rates of childhood sexual abuse may also vary by race. The research on racial differences among all children, regardless of sexual orientation, has been mixed with some studies finding no difference and others finding an increased risk among Latino and African American children (20-23). However, several articles in the literature have found that there is an increased prevalence of childhood sexual abuse among black MSM compared to white MSM in the United States. In the EXPLORE study (2009), there was more reported childhood sexual abuse among black MSM (51%) compared to white MSM (35%) (OR=1.96, 95% CI 1.53, 2.50) (5). This pattern of racial differences in childhood sexual abuse has been found in a number of studies, providing support

suggesting that a history of childhood sexual abuse differs by race as well as by sexual orientation (4, 11, 16).

Social Factors Leading to CSA

In 1983, Garbarino and Ebata noted that "the confounding of class and ethnicity cries out for further attention" in regards to childhood maltreatment and abuse (23). It is clear from the literature that black MSM not only carry the burden of disease when it comes to HIV/AIDS, but also the burden of one of the exposures that may lead to increased risk of HIV/AIDS, which is childhood sexual abuse. Therefore the next question is, what social factors lead to this racial difference in childhood sexual abuse? To understand racial differences at the end of the causal pathway, we must examine what causes these differences at the beginning of the causal pathway, where possible harmful exposures are happening.

Income and SES

Income, or socioeconomic status, may be an important factor if not the most important factor to consider when examining racial differences in childhood sexual abuse. The United States Department of Health and Human Services, National Center on Child Abuse and Neglect (NCCAN) reports find greater levels of childhood abuse among households that earn less than $15,000 a year (21). They stated that the rate of sexual abuse among these low income children was "more than 17 times the rate of children in families with incomes of $30,000 or more a year" (21). Some researchers argue that income and socioeconomic status may in fact be a more important predictor than race (O'Keefe, 1994), even though African Americans are over-represented among low income families (25). An analysis of the Second National Incidence and Prevalence

Study of Child Abuse and Neglect, which is a nationally representative sample, showed that household income was a significant predictor of childhood abuse (26). A study by Jones and McCurdy in 1992 found that regardless of race, low income was related to higher rates of physical childhood abuse (27). They also found that among different types of maltreatment (physical abuse, emotional maltreatment, physical neglect and sexual abuse), victims of sexual abuse had the lowest percentage of mothers not in the labor force (26%) (27). Families of these victims typically had incomes under $15,000 (27). In a study by Zielinski in 2009 it was found that "low socioeconomic status among parents has also been identified as a salient risk factor for the perpetration of maltreatment, and, as such, these results indicate a potential mechanism in the intergenerational transmission of violence" (28). However, there have been some studies that have found no relation between economic status and childhood sexual abuse (29, 30). This may be important to note, as lower income families may be overrepresented among the official data because mandated reporting practices may be higher (31). Thus, studies that do not rely on reporting statistics may be more valid. Regardless, there seems to be moderate evidence to suggest that income or socioeconomic status may predict incidences of childhood abuse, and even more specifically, childhood sexual abuse.

Neighborhood

Environment, in terms of neighborhood, may play a role in childhood sexual abuse as well. In a 2003 study by Menard and Ruback, it was found that rural counties have higher rates of child sexual abuse than do urban counties (31). This finding was rationalized by several criteria. First, in rural areas where people tend to be more scattered, social interactions often happen among people who know one another, which is

also a factor in most childhood sexual abuse cases. Secondly, in rural areas, social norms may often dictate that matters such as child abuse remain private which may lead to a feeling of security and secrecy among perpetrators of sexual abuse (32). Finally, rural areas versus urban areas may provide more private and secluded areas in which abuse can occur. This theory of the built environment contributing to the prevalence of childhood sexual abuse is intriguing, and in need of more research. However, the differences in rural and urban environment may be confounded with income, as single parent households are twice as likely to have low income compared to all families with children (25).

Family Structure

Social networks did not appear to be a significant predicator of childhood abuse in a study by Crittenden (1985) (34). However, family structure may play a part in racial differences in risk of childhood abuse. Differences between black and white victims of childhood sexual abuse have been found by looking at family structure. In a 1990 study by Tzeng and Schwarzin, black victims more often came from single parent households (35). Again, this may be linked to income and socioeconomic status, as single parent households may have lower incomes compared to two-parent households; nonetheless, being more likely to live in a single-parent household may be related to why black victims' perpetrators were often the parent's boyfriend or girlfriend, whereas among white victims, the perpetrators were more likely to be parents or baby sitters (35).

Gender Nonconformity

The only predictor found in the literature to explain higher rates of childhood sexual abuse among MSM was in a 2012 study that found that gender nonconformity at an early age was significantly correlated with higher rates of childhood sexual abuse experiences, and this finding was adjusted for race and age (36). The authors did not find any significant differences in rates of early age gender nonconformity by race. It is important to note that the authors classified race into white (non-Hispanic) and other race. Considering that research is sparse for determining why this difference exists between different groups this thesis will not attempt to speculate on the reasons for this increased self report of childhood sexual abuse among men who have sex with men.

Protective Factors

Although some research has found a racial difference with CSA among MSM, more research needs to be done. Additionally, research that examines if there are factors that protect or buffer MSM from the effects of experiencing CSA needs to be conducted. Researchers suggest that upstream factors such as education, housing, and health-care access may be important in preventing downstream HIV infection, but research on the topic is sparse (37). Some research has indicated that family structure and level of parental involvement may be protective against engaging in unsafe risk behaviors in a sample of Urban American Indians (38). Research in the protective factors that are more directly along the causal pathway from CSA to HIV infection are also lacking. However, we suspect that other protective buffers may be income (when at-risk), housing (when at-risk), family structure, education, health insurance, and resiliency.

Definitions of Childhood Sexual Abuse

It is important to note that there are several different definitions of what qualifies as a history of childhood sexual abuse in the literature. Childhood sexual abuse has no set definition in the literature. However, researchers generally use one or a combination of three basic methods to define childhood sexual abuse. The focus of the definition either focuses on the age differential at the time of abuse, whether the abuse was forced or unforced, or leaves the definition up to the participant.

For example, childhood sexual abuse is defined by Mimiaga, Noonan, Donnell and colleagues (2009) as "(a) having had a sexual experience before the age of 13 years with someone who was 5 years older and/or (b) having had a sexual experience between 13 and 17 years old with someone who was 10 years older" (5). This definition is also used by other authors in the literature (10). However, Dilorio, Hartwell & Hansen (2002) used only the (a) portion of the definition. Many other studies have also used age differentials at first sex encounter as an important factor in the definition of childhood sexual abuse. However, these studies often use different cut-points (9). For example, Doll, Joy, Batholow and colleges (1992) defined exposure using four age differential categories (39). For abuse that occurred between the ages of 0-5, there needed to be an age differential of 3 years or more to be considered abuse. For years 6-11 there needed to be a 4 or more year age differential. For ages 12-15 there needed to be a 6 year difference, and for ages 16-18 there needed to be a 10 year age difference. Regardless of how sexual abuse is defined, similar results in terms of HIV-related risk behaviors and alcohol abuse have been found suggesting that these definitional differences may not be significant.

A few studies in the literature have focused on the forcible aspect of the abuse. Often these measures used a combination of being a minor when first abuse occurred, weighted by some measure of trauma, coercion or a measure of how upsetting the trauma was (8, 39). The theory was that if the childhood sexual abuse is viewed as traumatizing, then increased risk behaviors will be seen later in life, but this will not be true for non-traumatizing childhood experiences. This hypothesis was confirmed in the data (8). However, a large body of work simply leaves the definition of childhood sexual abuse up to the participant.

Many studies in this literature review have categorized a history of childhood sexual abuse by simply asking the participant if they were forced to have sex during childhood, which was often either left undefined, or defined as under the age of 18 years when the first incident of abuse occurred (4, 7, 11, 13, 14, 41, 42). Regardless of these definitional differences, there has been overwhelming research suggesting a strong link between history of childhood sexual abuse and an increased risk and incidence of HIV among MSM.

Hypotheses

Racial differences in HIV prevalence may be influenced by similar racial differences in traumatizing exposures early in life. These exposures, in turn, are influenced by social factors that are complicated and intertwined. This study hypothesizes that black men who have sex with men (MSM) will report higher levels of childhood sexual abuse and HIV compared to white MSM in our sample. We also hypothesize that childhood sexual abuse will be associated with HIV prevalence in our sample. Additionally, we hypothesize that childhood sexual abuse will be more strongly

associated with HIV prevalence among black MSM. Lastly we hypothesize that the protective/buffer variables in the model will differ by race such that the protective/buffer variables in the model with have a lesser effect among black MSM compared to white MSM.

CHAPTER 3: MANUSCRIPT

Associations of Childhood Sexual Abuse and HIV Prevalence:

Examination of Racial Differences

Laura C. Gravens, Laura Salazar, Patrick S. Sullivan

Background: There is a known disparity in HIV rates among blacks and especially black MSM in the United States. Associations between history of childhood sexual abuse (CSA) and HIV prevalence have been found among at-risk populations. CSA is more prevalent among MSM than heterosexual men. However, not much is known about how race and CSA may interact to affect HIV risk.

Objective: To determine what relationships exist between CSA and HIV prevalence, and how race and other intermediate factors may play a role in that relationship.

Results: Respondents who experienced CSA differed significantly from those who did not: they were more likely to be black, more likely to be HIV-positive, have more unprotected anal intercourse (UAI) partners, be currently homeless and have a history of homelessness, have lower safe sex norms and lower resiliency. Respondents who were black differed significantly from respondents who were white: They were more likely to experience CSA, more likely to be HIV positive, have fewer UAI partners, be less likely to engage in UAI, more likely to be homeless and have a history of homelessness, less likely to have insurance, less likely to use injection and non injection drugs, more likely to be in poverty, and have higher resiliency scores. Race, CSA and the interaction of race and CSA was significantly associated with HIV prevalence while controlling for other factors.

Conclusions: CSA and race are associated with HIV infection, and race is predictor of CSA. This relationship may contribute to the racial disparities in HIV prevalence.

Introduction

Black Americans have disproportionally higher rates of HIV infection in the United States. Although black Americans made up 13% of the US population in 2007, over half (51%) of the HIV cases that year were among African Americans (2, 3). Overall, HIV prevalence rates for blacks are about eight times as high as the prevalence rates for whites (2, 3). Additionally, according to the Centers for Disease Control men who have sex with men (MSM), and particularly black MSM, carry a disproportionately greater disease burden when it comes to HIV/AIDS in the United States(2, 3). MSM represent approximately 2% of the United States population but comprise half of the new HIV infections annually between 2006 and 2009(2, 3). In 2009, black MSM accounted for 37% of new HIV infections among MSM (2, 3). There has been much research examining the factors that contribute to these glaring racial differences, but no firm consensus has been reached. In a meta-analysis by Millett and colleagues, it was found that there were no significant differences by race when it came to unprotected anal intercourse, commercial sex work, sex with a known HIV positive partner or HIV testing history (19). They concluded that behavioral risk factors do not explain the racial differences found in HIV rates (19). Considering that MSM carry the greatest burden of HIV in the United States, and the racial disparities of HIV within this population are alarming, this study is focused on examining potential contributing factors to these racial differences within the MSM population.

Childhood sexual abuse has been found in previous studies to be correlated with increased incidence of HIV through its association with increased risk behaviors. Increased HIV-related risk behaviors have been found among MSM who experienced

childhood sexual abuse as compared to MSM who have not experienced CSA. For example, history of childhood sexual abuse has been correlated with increased unprotected anal sex (4-10), an increased number of sex partners (4, 6, 8-10), as well as serodiscordent unprotected anal sex (5). A history of childhood sexual abuse has also been associated with increased drug and alcohol abuse (6, 8, 9), and depression symptoms among MSM (5, 6, 8). In addition, correlations have been found between childhood sexual abuse history and norms unsupportive of safe sex among MSM (5). Together, these studies indicate a higher rate of HIV infection among men who have sex with men and who report childhood sexual abuse (5, 11).

Research on childhood sexual abuse (CSA) suggests that between 5-10% of all men have experienced childhood sexual abuse (12), but with rates much higher among MSM populations. For example, CSA rates between 20% and 47% have been estimated among MSM in recent studies (4, 5, 13-15).

In addition, a racial disparity has been found in terms of CSA. The research on racial differences among all children, regardless of sexual orientation, has been mixed with some studies finding no difference and others finding an increased risk among Latino and African American children (20-23). However, several articles in the literature have found that there is an increased prevalence of childhood sexual abuse among black/African American MSM compared to white MSM in the United States. In the EXPLORE study (2009), there was more reported childhood sexual abuse among black MSM (51%) compared to white MSM (35%) (OR=1.96, 95% CI 1.53, 2.50). This pattern of racial differences in childhood sexual abuse has been found in a number of studies,

providing support suggesting that history of childhood sexual abuse differs by race as well as by sexual orientation (4, 11, 16).

Although some research has found a racial difference with regards to CSA among MSM, more research needs to be done. Additionally, research that examines if there are factors that protect or buffer MSM from the effects of experiencing CSA should be conducted. Some of these protective buffers may be income (when at-risk), family structure, housing (when at-risk) education, health insurance, and resiliency. Researchers suggest that upstream factors such as education, housing, and health-care access may be important in preventing downstream HIV infection, but research on the topic is sparse (37). Some research has indicated that family structure and involvement may be protective against engaging in unsafe risk behaviors in a sample of Urban American Indians (38). Research in the protective factors that are more directly along the causal pathway from CSA to HIV infection are also lacking. However, we suspect that other protective buffers may be income (when at-risk), housing (when at-risk), family structure, education, health insurance, and resiliency.

We hypothesize that black men who have sex with men (MSM) will report higher levels of childhood sexual abuse than white MSM in our sample. We also hypothesize that black MSM will have higher prevalence rates of HIV compared to white MSM in our sample. Additionally, we hypothesize that childhood sexual abuse will be more strongly associated with HIV prevalence among black MSM. Lastly, we hypothesize that the protective/buffer variables in the model will differ by race such that the protective/buffer variables in the model with have a lesser effect among black MSM compared to white MSM.

Data and Methods

803 Black and White MSM between the ages of 18-39 years were recruited, regardless of HIV status, for a, HIV/STI cohort study through Emory University between July 2010 and December 2012. The purpose of the study was to examine community and individual level factors that may lead to found disparities in HIV and STI prevalence and incidence between black and white MSM. Sampling was conducted within the Atlanta community using time-space venue sampling, which was the sampling methodology used at the Atlanta site for the second MSM cycle of the National HIV Behavioral Surveillance System. Facebook was also included as virtual venue. Eligible participants were those who self identified as white- or black-non Hispanic, reported oral or anal intercourse with another man within 3 months, were not in a mutually monogamous relationship, were able to complete a survey in English and lived in the Atlanta metropolitan area without plans of moving out of the area within two years. All men underwent written informed consent. All men, regardless of self reported HIV status were tested for HIV using a rapid test and a confirmatory ELISA and western-blot test in rapid test was preliminary positive. All HIV-positive men, regardless of self-reported HIV status underwent viral load testing (Quest Diagnostics; TaqMan quantitative real-time PCR) and those not already in care for HIV were linked with care for evaluation and treatment. All participants were also tested for Syphilis with a blood test, and Gonorrhea and Chlamydia with urine. Rectal testing for rectal Gonorrhea and Chlamydia began after baseline enrollment. Therefore, 314 participants were tested for rectal Gonorrhea and Chlamydia. All participants completed a detailed computer survey questionnaire to assess demographic, individual, community, and dyadic HIV risk.

The outcome variable of interest for this analysis is HIV prevalence. The predictor variables of interest for this analysis are age, race, number of unprotected anal intercourse (UAI) partners, number of sex partners, condom attitudes, alcohol and drug use, and history of childhood sexual abuse. Variables that we will look at to be protective moderators are income, housing history, education, health insurance status, and resiliency (Figure 2). Childhood sexual abuse was asked with a yes/no question "As a child, were you ever sexually attacked, raped, or sexually abused?" per past research (11). Measures of interest regarding HIV risk and protective factors were gathered via a series of questions shown in Table 1.

Results

803 individuals consented and participated in the study. Of those, 799 answered the question '*As a child, were you ever sexually attacked, raped, or sexually abused?*'; 228 (29%) answered yes, and 571 answered no (71%). In our study sample, 454 (57%) of the participants enrolled were black and 349(43%) of the participants enrolled were white. Of the participants who experienced CSA, 152 (67%) are black (Table 2). Table 2 shows the differences in characteristics between those who did, and those who did not report CSA. Table 3 shows the differences in characteristics between black and white participants. We found that black MSM in our sample reported higher rates of CSA than white MSM in our sample (OR = 1.5, Cl 1.2, 1.9). We also found that black MSM in our sample had higher HIV prevalence compared to white MSM in our sample (OR = 2.9, Cl 2.2, 3.8). Additionally, there was a higher HIV prevalence for MSM in our sample who experienced childhood sexual abuse (OR = 1.3, Cl 1.1, 1.4).

Individuals who reported CSA tended to be black, were more likely to be HIV positive, were more likely to have engaged in unprotected anal intercourse in the last six months, and reported more unprotected anal sex partners in the last 12 months and the last 6 months compared to those who did not report CSA. Individuals who reported CSA also tended to have lower resiliency scores and lower safe sex norms (Table 2).

In our sample, black MSM were more likely to have reported experiencing CSA, were more likely to be HIV positive, were less likely to participate in unprotected anal intercourse in the past 12 months and the past 6 months, reported fewer unprotected anal sex partners in the past 6 months, were less likely to use injection or non-injection drugs, more likely to be in poverty, and have higher resiliency scores compared to white MSM (Table 3).

We constructed two models, with prevalence HIV as the outcome, and a number of exposure variables. In both models, race and CSA were forced to remain in the model. In the first (data criterion) model, the inclusion of other exposure variables was based on p values of bivariate associations of HIV prevalence and the factors; those factors with a bivariate p value of 0.1 were included in the full model. On this basis, the full data criterion model before backwards elimination included CSA, race, education, income, poverty, injection drug use, non-injection drug use, alcohol use in past 12 months, history of homelessness, current homelessness, any UAI in past 12 months, any UAI in past 6 months resiliency and a race*CSA interaction term. Backwards model selection resulted in a model with CSA, race, income, injection drug use, UAI in past 6 months, and the race*CSA interaction term. We performed a second (literature criterion) model, with all variables of interest from the literature review, regardless of significance testing from our

data. The full literature criterion model before backwards elimination included CSA, race, education, income, poverty, injection drug use, non-injection drug use, alcohol use in part 12 months, UAI in past 12 months, UAI in past 6 months, resiliency, safe sex norms, depression, housing status (rent, own, or stay), history of homelessness, current homelessness, and insurance status. Backwards model selection resulted in a model with CSA, race, income, injection drug use, UAI in past 6 months, and the race*CSA interaction term. Backwards elimination results in a model identical to that developed using the data criterion approach.

CSA, race, and the interaction of race and CSA significantly predicted HIV prevalence controlling for factors of income, injection drug use, and UAI in past 6 months. The odds ratios are calculated in Table 4. . We stratified the interaction term of race and CSA by race to better understand the interaction. Both stratified terms were significant, with no overlap of confidence intervals at the 95% significance level when adjusting for other variables in the model (Table 4). The interaction term and significance testing tell us that the effect of CSA on HIV prevalence is greater for black MSM in our sample then is it for white MSM. None of the protective factors hypothesized in the model associated HIV prevalence with CSA and race in the model, except for income, which had no clear pattern of association.

Discussion

This study not only highlights a significant relationship between CSA and higher rates of HIV prevalence, but also demonstrates this relationship varies by race such that the relationship is stronger among black MSM in our sample than among white MSM in our sample. This study demonstrates that CSA and race are both associated with HIV

infection, but also that race is a predictor of CSA, which may contribute to the racial disparity found in HIV prevalence. This finding is both supported by past literature and expands upon it. Like past literature, we found links from CSA and race to increased HIV prevalence, increased risky sex behavior, and increased drug use (4-11). In expanding upon the literature we additionally found that among MSM, race and CSA interact in their relationship HIV prevalence. This is suggested by the literature in that black MSM carry a higher burden of CSA, a higher burden of HIV, and that a history of CSA makes one at higher risk of contracting HIV through various pathways (4, 5 11, 16, 20-23).

We hypothesized that income, housing history, education, health insurance status and resiliency would serve as protective factors, given past literature that has suggested that these upstream factors to HIV infection may serve to limit the effect of the risk factor of CSA. We did not find any association between the variables we hypothesized to be protective in the relationships between CSA and HIV. However, that may be because the values of these variables may not have been collected at the time of risk of HIV infection. Additionally, research on these protective factors is sparse, and these variables may not serve to adequately protect against HIV infection in this model. Future research should examine these factors in relation to HIV incidence to better understand this relationship.

The limitations of this study are that the participants, recruited through venue-based time sampling, are not representative of all MSM in the Atlanta area. Measures of self report, importantly including childhood sexual abuse, might be misclassified because of desirability bias. We would expect that participants would be less likely to self-report childhood sexual abuse. Assuming no differential differences between races on self-report bias, this would not impact the results beyond a loss of power. Additionally, there

were 45 HIV negative men who came to the first baseline visit, but not to the follow-up 3 month visit who may be misclassified as HIV negative at baseline, which are the data used for this analysis.

Given the racial and MSM disparities in HIV prevalence in the United States, the racial and MSM disparities in CSA, and the links between CSA and HIV prevalence, this key exposure may be important in understanding the HIV epidemic in the United States. Public health researchers and workers should take this variable into account when designing studies, and public health programs. Future research should examine what contributes to this relationship between CSA and HIV, and what measures can be taken to prevent increased HIV risk among those who experienced CSA. Public health workers may want to add CSA counseling and awareness to their programs to help to stem this relationship.

Figure 1. Directed acyclic graph of literature review findings

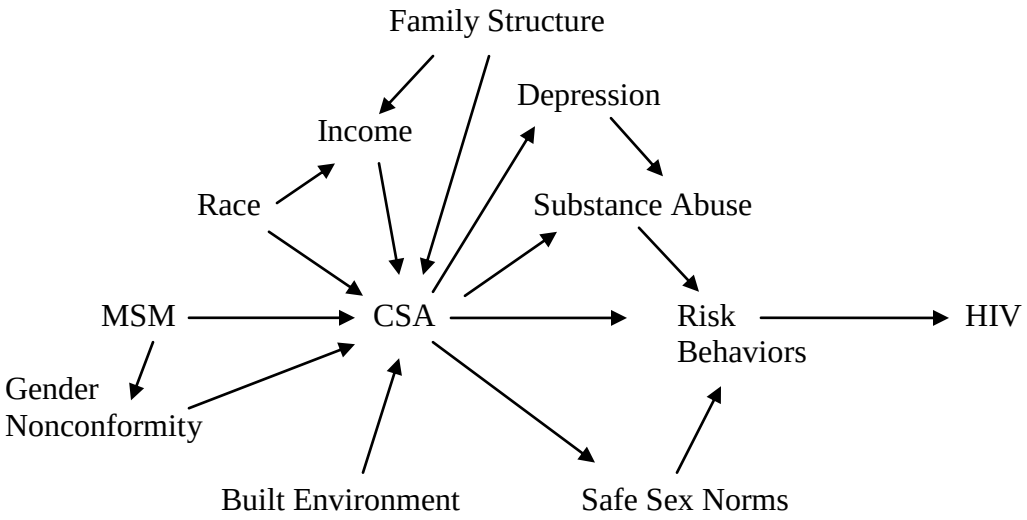

Figure 2. Directed acyclic graph of proposed research model

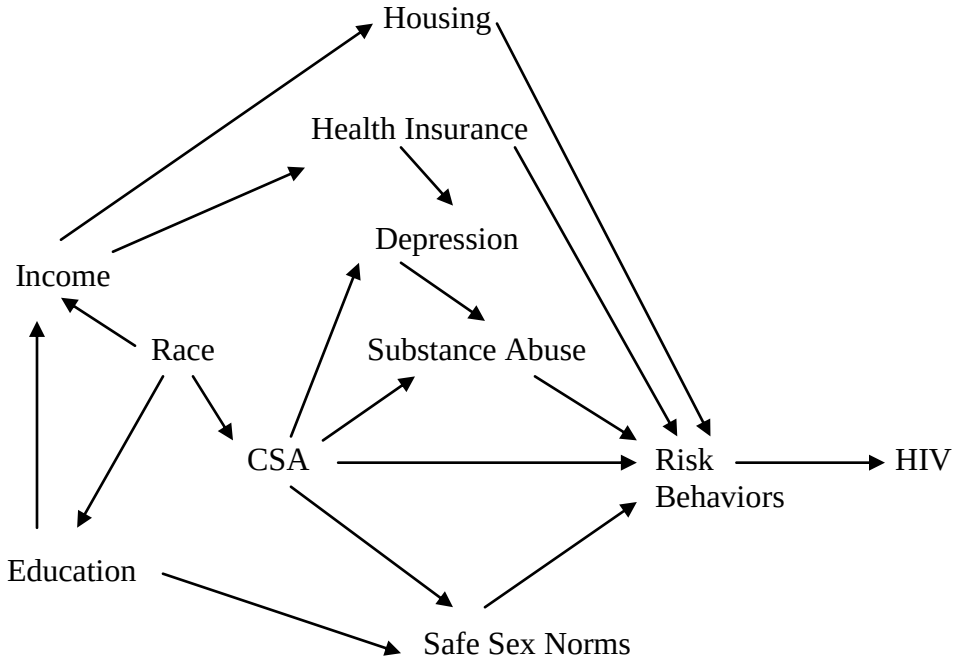

Table 1. Wording of baseline survey for factors of interest in research model – InvolveMENt Project, July 2010 – December 2012

Outcome Measure	Survey Question
Number of Male Partners	During the last 12 months, with how many men did you have anal or oral sex?
Number of Male Unprotected Anal Sex Partners	Of the men you had anal sex with in the last 6 months, how many did you have unprotected anal sex with? (This means that you or your partner did not use a condom at any point during sex, at least one time that you had anal sex).
Condom Attitudes	7-Point Likert Scale 1) The use of condoms can make sex more stimulating 2) Condoms can be pleasurable 3) Condoms go against my values or religious beliefs
Alcohol Use	During the past 12 months, have you had at least one drink of any alcoholic beverage such as beer, wine, a malt beverage or liquor?
Drug Use (Non-Injection)	In the past 12 months have you used any non-injection drugs, other than those prescribed for you?
Drug Use (Injection)	In the past 12 months have you used any drugs that you injected with a needle, other than those prescribed for you?
Income	What was your household income last year from all sources before taxes?
Housing History	• Do you rent, own or stay for a monthly or nightly rate, or stay for free at the place you rest at night? • Are you currently homeless? • Have you been homeless in the past 12 months?
Education	What is the highest level in school that you completed?
Health Insurance Status	Do you currently have health insurance? (This includes Medicare or Medicaid)
Resiliency	Reduced Gail M. 14-point Resiliency Scale (Wagnild & Heather M. Young 1987)

Table 2. Respondent characteristics for those reporting childhood sexual abuse – InvolveMENt Project, July 2010 – December 2012

Variable	Childhood Sexual Abuse		
	Yes	No	p
N (%)	228 (29)	571 (71)	
Race			<0.001
White	76 (22)	269 (78)	
Black	152 (33)	302 (67)	
HIV Status			<0.001
Positive	96 (40)	146 (60)	
Negative	133 (24)	424 (76)	
Unprotected anal intercourse past 12 months			0.2
Yes	175 (30)	408 (70)	
No	52 (25)	153 (75)	
Unprotected anal intercourse past 6 months			0.09
Yes	100 (37)	172 (63)	
No	49 (29)	121 (71)	
Number of unprotected anal partners past 12 months	Mean - 6.2 SD - 32.2	Mean - 3.3 SD - 9.2	0.05
Number of unprotected anal partners past 6 months	Mean - 2.8 SD - 6.5	Mean - 1.8 SD - 3.6	0.009
History of homelessness			0.008
Yes	38 (42)	53 (58)	
No	190 (27)	513 (73)	
Don't Know	0 (0)	3 (100)	
Current homelessness			0.02
Yes	10 (53)	9 (47)	
No	215 (28)	558 (72)	
Don't Know	2 (67)	1 (33)	
Current housing situation			0.2
Rent	167 (29)	402 (71)	
Own	24 (23)	81 (77)	
Stay for a nightly or monthly rate	3 (27)	8 (73)	
Stay for free	30 (28)	77 (72)	
Don't know	4 (67)	2 (33)	
Currently have insurance			0.1
Yes	119 (26)	347 (74)	
No	102 (32)	215 (68)	
Prefer not to answer	4 (36)	7 (64)	

Table 2. Continued: Respondent characteristics for those reporting childhood sexual abuse – InvolveMENt Project, July 2010 – December 2012

Variable	Childhood Sexual Abuse		
	Yes (%)	No (%)	p
Education			0.2
College, post graduate or professional school	243 (75)	79 (25)	
Some College, Associate's degree and/or technical school	220 (68)	102 (32)	
High school of GED	91 (68)	42 (32)	
Some high school	13 (72)	5 (28)	
Drug Use (Injecting)			0.9
Yes	4 (37)	11 (73)	
No	223 (29)	559 (71)	
Drug Use (Non-Injecting)			0.8
Yes	87 (71)	223 (29)	
No	140 (71)	346 (29)	
Alcohol Use - Past 12 Months			0.9
Yes	212 (29)	531 (71)	
No	15 (29)	36 (71)	
Income Level			0.2
$0 - $4999 (yearly)	23 (34)	45 (66)	
$5000 - $9,999 (yearly)	27 (29)	66 (71)	
$10,000 – 14,999 (yearly)	33 (32)	70 (68)	
$15,000 - $19,999 (yearly)	23 (32)	47 (67)	
$20,000 – 29,999 (yearly)	33 (31)	74 (69)	
$30,000 – 39,999 (yearly)	35 (32)	73 (68)	
$40,000 – 49,999 (yearly)	13 (20)	53 (80)	
$50,000 – 74,999 (yearly)	16 (21)	62 (79)	
$75,000 – more (yearly)	14 (20)	55 (80)	
Don't Know	10 (43)	13 (56)	
Poverty			0.4
Yes	43 (30)	96 (70)	
No	148 (27)	398 (73)	
Depression	Mean - 2.9	Mean - 2.5	0.8
	SD - 4.1	SD - 4.0	
Safe Sex Norms	Mean - 14.3	Mean - 14.9	0.01
	SD - 3.2	SD- 3.1	
Resiliency	Mean - 4.3	Mean - 4.4	0.02
	SD - 0.6	SD- 0.6	

Note: p values generated by two-sided t-tests and chi-square tests of significance. Groups may not sum to the total number of participants because of missing data.

Table 3. Respondent characteristics by race of participant – InvolveMENt Project, July 2010 – December 2012

Characteristic	Race		
	Black	White	p
N (%)	454 (57)	349 (43)	
Childhood Sexual Abuse			< 0.001
Yes	152 (67)	76 (33)	
No	302 (53)	269 (47)	
HIV Status			< 0.001
Positive	197 (81)	46 (19)	
Negative	257 (46)	303 (54)	
Unprotected anal intercourse past 12 months			< 0.001
Yes	309 (53)	276 (47)	
No	138 (67)	68 (33)	
Unprotected anal intercourse past 6 months			< 0.001
Yes	272 (51)	250 (43)	
No	170 (63)	88 (36)	
Number of unprotected anal partners past 12 months	Mean - 3.7 SD – 23.0	Mean - 4.5 SD - 11.5	0.6
Number of unprotected anal partners past 6 months	Mean - 1.6 SD - 3.2	Mean - 2.5 SD - 5.3	0.004
History of homelessness			0.002
Yes	67 (74)	24 (26)	
No	384 (54)	323 (46)	
Don't Know	2 (67)	1 (33)	
Current homelessness			0.01
Yes	17 (89)	2 (11)	
No	432 (56)	345 (44)	
Don't Know	2 (67)	1 (33)	
Current housing situation			< 0.001
Rent	334 (58)	239 (42)	
Own	38 (36)	67 (64)	
Stay for a nightly or monthly rate	8 (73)	3 (27)	
Stay for free	68 (64)	39 (36)	
Don't know	5 (83)	1 (17)	
Currently have insurance			< 0.001
Yes	215 (46)	253 (54)	
No	225 (71)	94 (29)	
Prefer not to answer	9 (82)	2 (18)	

Table 3. Continued: Respondent characteristics by race of participant – InvolveMENt Project, July 2010 – December 2012

Variable	Race		
	Black (%)	White (%)	p
Education			< 0.001
College, post graduate or professional school	135 (42)	188 (58)	
Some College, Associate's degree and/or technical school	201 (62)	124 (38)	
High school of GED	99 (74)	34 (26)	
Some high school	16 (89)	2 (11)	
Drug Use (Injecting)			0.004
Yes	3 (20)	12 (80)	
No	450 (57)	336 (43)	
Drug Use (Non-Injecting)			< 0.001
Yes	139 (44)	175 (56)	
No	313 (64)	173 (36)	
Alcohol Use - Past 12 Months			0.9
Yes	420 (56)	327 (44)	
No	29 (57)	22 (43)	
Income Level			<0.001
$0 - $4999 (yearly)	55 (81)	13 (19)	
$5000 - $9,999 (yearly)	59 (63)	34 (37)	
$10,000 – 14,999 (yearly)	73 (70)	32 (31)	
$15,000 - $19,999 (yearly)	42 (59)	29 (41)	
$20,000 – 29,999 (yearly)	68 (63)	40 (37)	
$30,000 – 39,999 (yearly)	64 (59)	44 (41)	
$40,000 – 49,999 (yearly)	29 (44)	37 (56)	
$50,000 – 74,999 (yearly)	24 (31)	54 (69)	
$75,000 – more (yearly)	10 (14)	59 (86)	
Don't Know	19 (83)	4 (17)	
Poverty			< 0.001
Yes	97 (70)	41 (30)	
No	270 (49)	280 (51)	
Depression	Mean - 2.5 SD - 3.9	Mean - 2.9 SD - 4.3	0.2
Safe Sex Norms	Mean - 14.8 SD - 3.1	Mean - 14.6 SD - 3.3	0.3
Resiliency	Mean - 4.4 SD - 0.7	Mean - 4.3 SD - 0.5	< 0.001

Note: p values generated by two-sided t-tests and chi-square tests of significance. Groups may not sum to the total number of participants because of missing data.

Table 4. Associations Between Selected Factors and HIV prevalence – InvolveMENt Project, July 2010 – December 2012

Variable	HIV Yes	HIV No	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Childhood Sexual Abuse				
No	147	424	Referent	See interaction
Yes	96	132	2.1	See interaction
Race				
White	46	303	Referent	See interaction
Black	197	257	5.0 (3.5 to 7.2)	See interaction
Income				
$0 – 4,999/year	21	47	Referent	Referent
$5,000 - $9,999/year	30	63	1.1 (0.5 to 2.1)	1.6 (0.7 to 3.8)
$10,000 - $15,999/year	55	50	2.4 (1.3 to 4.7)	4.5 (2.0 to 10.4)
$15,000 - $19,999/year	20	51	0.9 (0.4 to 1.8)	1.3 (0.5 to 3.2)
$20,000 - $29,999/year	34	74	1.0 (0.5 to 2.0)	1.9 (0.8 to 4.3)
$30,000 - $39,999/year	36	72	1.1 (0.6 to 2.1)	1.8 (0.8 to 4.3)
$40,000 - $49,999/year	11	55	0.4 (0.2 to 1.0)	0.8 (0.3 to 2.3)
$50,000 - $74,999/year	17	61	0.6 (0.3 to 1.3)	1.9 (0.8 to 4.9)
$75,000 - more/year	7	62	0.3 (0.1 to 0.6)	07 (0.2 to 2.4)
Injection drug use				
No	231	555	Referent	Referent
Yes	11	5	6.6 (2.1 to 21.0)	15.8 (3.8 to 65.8)
UAI in past 6 months				
No	231	555	Referent	Referent
Yes	11	4	1.3 (0.9 to 1.8)	1.5 (1.0 to 2.3)
2-way interactions				
Race * History of CSA			1.2 (0.9 to 1.5)	1.3 (1.0 to 1.8)
White				
No History of CSA	28	241	Referent	Referent
History of CSA	18	58	2.7 (1.3 to 5.4)	1.1 (1.0 to 1.2)
Black				
No History of CSA	119	183	Referent	Referent
History of CSA	78	74	1.6 (1.1 to 2.4)	1.7 (1.3 to 3.2)

Note: Groups may not sum to the total number of participants because of missing data.

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/*********************************
*                Laura Gravens              *
*                  Thesis Code              *
*                  Spring 2013              *
*********************************/


LIBNAME thesis 'H:\THESIS\InvolveMENt\Baseline Lock\derived\';
libname library "H:\THESIS\InvolveMENt\Baseline Lock\baseline questionnaire\";
libname library "T:\EpiProjs\Sullivan_Data_deident\Baseline freeze - 02_18_2013";

options nofmterr;


/*Datasets need to be sorted prior to merging. */

* copy datasets to local computer and remove write-password protection;
data status;
	set library.status;
run;

data participants_survey_baseline;
	set library.participants_survey_baseline;
run;

* Sort datasets prior to merging;
proc sort data = status ;
	by study_id;
run;

proc sort data = participants_survey_baseline;
	by study_id;
run;

* Prepare your analysis dataset ;
data my_data;
	merge  status
		participants_survey_baseline  ;
	by study_id;
	if (met_behav_crit = 1 and double_enroll=0) then output;
		* want to include only those who met behavioral criteria and were not
double enrolled;
run;
```

```
*------------------------------------------------------------
                Start Data Analysis
------------------------------------------------------------;
data thesis.data;
        set my_data;
run;

proc contents;
run;

*------------------------------------------------------------
                Score Scales
------------------------------------------------------------;
*Score CESD Scale;
data thesis.data;
        set thesis.data;
        cesd_total=(cesd_bother + cesd_concentrate + cesd_depressed +
                        cesd_effort + cesd_fearful + cesd_badsleep + (-cesd_happy)
                        +(-cesd_hopeful) + cesd_lonely + cesd_getgoing);
run;

data thesis.data;
        set thesis.data;
                if cesd_total le 0 then cesd_total=0;
run;

*Score Safe Sex Norms;
data thesis.data;
        set thesis.data;
        sex_norms=(norms_condom + norms_avoid + +norms_onlysafe +
                norms_yousafe);
run;

*Resiliency;
data thesis.data;
        set thesis.data;
        resil = (res_manage + res_proud + res_stride + res_selflove + res_determined
+res_interest
        + res_persevere + res_meaning + res_getout + res_energy);
run;

data thesis.data;
        set thesis.data;
        resilience=resil/10;
run;
```

```
data thesis.data;
	set thesis.data;
	if resilience le 1 then resilience_cat=1;
	else if resilience le 2 then resilience_cat=2;
	else if resilience le 3 then resilience_cat=3;
	else if resilience le 4 then resilience_cat=4;
	else if resilience le 5 then resilience_cat=5;
	else if resilience le 6 then resilience_cat=6;
	else if resilience le 7 then resilience_cat=7;
run;

*------------------------------------------------------------
		Descriptive Statistics
------------------------------------------------------------;
proc freq; *Frequency of CSA;
	table abuse_child_sexabuse;
run;

proc freq;
	table race_inc;
run;

*Race x CSA;
proc freq;
	table race_inc*abuse_child_sexabuse;
		exact pchi or;
run;

*Substance abuse;
*Alchohol use past 12 months x CSA;
proc freq;
	table drink_p12m*abuse_child_sexabuse;
		exact pchi or;
run;

proc freq; * x Race;
	table drink_p12m*race_inc;
	exact pchi or;
run;

*non-Injection Drug Use Past 12 months x CSA;
proc freq;
	table noninjection*abuse_child_sexabuse;
		exact pchi or;
run;
```

```
proc freq; *x Race;
        table noninjection*race_inc;
        exact pchi or;
run;

*Injection Drug Use Past 12 months x CSA;
proc freq;
        table inject*abuse_child_sexabuse;
                exact pchi or;
run;

proc freq; *x Race;
        table inject*race_inc;
        exact pchi or;
run;

*Education x CSA;
proc freq;
        table educ*abuse_child_sexabuse;
                exact pchi or;
run;

proc freq; *x Race;
        table educ*race_inc;
        exact pchi or;
run;

*Depression x CSA;
proc ttest;
        var cesd_total;
        class abuse_child_sexabuse;
run;

proc ttest ; *x Race;
        var cesd_total;
        class race_inc;
run;

*Poverty x CSA;
proc freq;
        table poverty*abuse_child_sexabuse;
                exact pchi or;
run;
```

```
proc freq; *x Race;
        table poverty*race_inc;
                exact pchi or;
run;

*Sex Norms x CSA;
proc ttest;
        var sex_norms;
        class abuse_child_sexabuse;
run;

proc ttest; *x Race;
        var sex_norms;
        class race_inc;
run;

*Resiliency x CSA;
proc ttest;
        var resilience;
        class abuse_child_sexabuse;
run;

proc ttest; *x Race;
        var resilience;
        class race_inc;
run;

*Income x CSA;
proc freq;
        table income*abuse_child_sexabuse;
        exact pchi or;
run;

proc freq; *x Race;
        table income*race_inc;
        exact pchi or;
run;

*Baseline HIV x CSA;
proc freq;
        table baseline_hiv*abuse_child_sexabuse;
        exact pchi or;
run;
```

```
proc freq; *x Race;
        table baseline_hiv*race_inc;
        exact pchi or;
run;

*Any male anal partners, past 12 months x CSA;
proc freq;
        table male_AIp12m_bin*abuse_child_sexabuse;
        exact pchi or;
run;

proc freq; *x Race;
        table male_AIp12m_bin*race_inc;
        exact pchi or;
run;

*Any male unprotected anal partners, past 12 months x CSA;
proc freq;
        table male_UAIp12m_bin*abuse_child_sexabuse;
        exact pchi or;
run;

proc freq; *Race;
        table male_UAIp12m_bin*race_inc;
        exact pchi or;
run;

*Any male anal partners, past 6 months x CSA;
proc freq;
        table male_AIp6m_bin*abuse_child_sexabuse;
        exact pchi or;
run;

proc freq; *x Race;
        table male_AIp6m_bin*race_inc;
        exact pchi or;
run;

*Any male unprotected anal partners, past 6 months x CSA;
proc freq;
        table male_UAIp6m_bin*abuse_child_sexabuse;
                exact pchi or;
run;
```

```
proc freq; *x Race;
	table male_UAIp6m_bin*Race_inc;
	exact pchi or;
run;

*History of homelessness x CSA;
proc freq;
	table homeless*abuse_child_sexabuse;
		exact pchi or;
run;

proc freq; *x Race;
	table homeless*Race_inc;
	exact pchi or;
run;

*Current Homelessness x CSA;
proc freq;
	table homeless_now*abuse_child_sexabuse;
		exact pchi or;
run;

proc freq; *x Race;
	table homeless_now*Race_inc;
	exact pchi or;
run;

*Living Situation x CSA;
proc freq;
	table living*abuse_child_sexabuse;
		exact pchi or;
run;

proc freq; *x Race;
	table living*Race_inc;
	exact pchi or;
run;

*Have Insurance x CSA;
proc freq;
	table insurance*abuse_child_sexabuse;
		exact pchi or;
run;
```

```
proc freq; *x Race;
        table insurance*Race_inc;
        exact pchi or;
run;

*Male partners past 12 months  CSA;
proc ttest;
        var male_howmanyp12m_total;
        class abuse_child_sexabuse;
run;

proc ttest; *x Race;
        var male_howmanyp12m_total;
        class race_inc;
run;

*Number of UAI past 12 months x CSA;
proc ttest;
        var male_UAIp12m_total;
        class abuse_child_sexabuse;
run;

proc ttest; *x Race;
        var male_UAIp12m_total;
        class race_inc;
run;

*Number of UAI past 6 months x CSA;
proc ttest;
        var male_UAIp6m_total;
        class abuse_child_sexabuse;
run;

proc ttest; *Black;
        var male_UAIp6m_total;
        class race_inc;
run;

*Race x CSA x HIV at Baseline;

proc freq data=thesis.data;
        table race_inc*abuse_child_sexabuse*baseline_hiv;
        exact pchi or;
run;
```

```
*------------------------------------------------------------
                    Modeling
------------------------------------------------------------;
*risk factors model;
proc logistic decending data=thesis.data outest=covout simple;
        class educ income resilience_cat;
        model baseline_hiv= abuse_child_sexabuse race_inc educ
        income poverty inject noninjection drink_p12m
        male_UAIp6m_total male_UAIp12m_total resilience_cat
        homeless homeless_now race_inc*abuse_child_sexabuse/
        cl selection=backward sls=0.1 include=2;
run;

*all variables model;
proc logistic decending data=thesis.data outest=covout simple;
        class educ income resilience_cat living;
        model baseline_hiv= abuse_child_sexabuse race_inc educ
        income poverty inject noninjection drink_p12m
        male_UAIp6m_total male_UAIp12m_total resilience_cat
        insurance homeless_now homeless living cesd_total
        race_inc*abuse_child_sexabuse/
        cl selection=backward sls=0.1 include=2;
run;

*Predictors of CSA;
proc logistic decending data=thesis.data outest=covout simple;
        class educ income resilience_cat living;
        model abuse_child_sexabuse= race_inc educ resilience_cat/
        cl selection=backward sls=0.1;
run;
```