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HIV-Positive and in Jail: Race, Risk Factors, and Prior Access to Care

By

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Epidemiology

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ABSTRACT

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By Matthew S. Stein

Introduction: Black individuals represent 13% of the US population but 46% of HIV-positive persons and 40% of incarcerated persons. The national *EnhanceLink* project evaluated characteristics of jail entrants at ten sites and explored associations between race and HIV disease state.

Methods: Between 1/2008 -10/2011, 1,270 study participants provided demographic and clinical data. Adjusted odds ratios (aORs) were calculated for advanced HIV disease (CD4 < 200 cells/mm^3) and uncontrolled viremia (viral load > 400 copies/ml) for Black (n=807) versus non-Black (n=426) participants.

Results: Sixty-five percent of HIV-positive jail participants self-identified as Black. Among all participants, fewer than half had a high school diploma or GED, the mean number of lifetime arrests was over 20, and major mental illness and substance abuse were common. Black participants were more likely to be older than non-Black participants, and less likely to have health insurance (70% vs 83%) or an HIV provider (73% vs 81%) in the prior 30 days. Among all male study participants (n=870), 20% self-identified as homosexual or bisexual. Black male particpants were more likely to be homosexual or bisexual (22% vs 16%) and less likely to have a history of injection drug use (20% vs 50%) than non-Black male participants. Advanced HIV disease was associated with self-identification as Black (aOR = 1.84, 95% CI 1.16 - 2.93). Identifying as Black was not associated, however, with an increased likelihood of having uncontrolled viremia at entry, after controlling for other factors.

Conclusions: The racial disparities of HIV and incarceration among Blacks is underscored by the finding that 65% of HIV-positive jail participants self-identified as Black in this ten-site study. The finding that 22% of Black male participants also self-identified as men who have sex with men (MSM) supports jails as strategic venues to reach HIV-positive Black MSM. Among HIV-positive jail entrants, Black individuals had more advanced HIV disease. Self-identification as Black was associated with a lower likelihood of having health insurance or an HIV provider prior to incarceration. HIV care and linkage interventions are needed within jails to better treat HIV and to address these racial disparities.

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CHAPTER I: LITERATURE REVIEW

Correctional populations in the United States experience a greater burden of HIV and other physical and psychiatric diseases than the general population. In 2006, 1 in every 30 persons in the US spent time incarcerated in a correctional facility, while 1 in 6 of all HIV-positive persons in the US passed through a jail or prison (1). For both hepatitis C and tuberculosis, 1 in 3 of all infected persons spent time incarcerated in a correctional facility in 1997 (2). The prevalence of chronic conditions such as diabetes mellitus and hypertension has also been shown to be higher for correctional populations than the general population (3). Regarding differences in the burden of mental health disorders, one in every ten adults in the US met DSM-IV criteria for symptoms of a mental health disorder in 2002, while more than half of all US prison and jail inmates met these criteria for a mental health disorder in a similar period (4). In addition to the disparate disease burden borne by correctional populations relative to the general population, health inequities exist among certain population subsets, particularly by race.

Racial Disparities in the Overlapping Epidemics of HIV and Incarceration

Individuals identifying as Black are disproportionately affected by the overlapping epidemics of HIV and incarceration. In 2006, Blacks represented 13 percent of the US general population but accounted for 46 percent of all HIV-positive persons and 40 percent of the total correctional population (1, 5). Black men in particular suffer a greater burden of HIV incidence, with a rate of new infections that was 6.5 times the rate among White men in 2009 (6). Additionally, while HIV incidence did not change significantly among the overall US population between 2006 and 2009, there was a 48

percent increase in new infections among young Black men who have sex with men (MSM) (6).

Addressing the inequity of the burden of HIV among at-risk men identifying as Black and MSM is a public health priority (7). An opportunity may exist to reach a substantial portion of this population through expanded testing and treatment of correctional populations. In 2006, around 1 in 4 of all HIV-positive Black men in the US spent time in a jail or prison (1). The proportion of Black men in correctional populations who identify as MSM, however, has yet to be determined, so the potential impact of this opportunity is undefined.

The push for increased HIV testing and treatment of at-risk populations has ultimately been driven by advances in antiretroviral therapy (ART). These advances have led to significant reductions in HIV-associated mortality and HIV transmission. These gains are limited, however, by an HIV-positive person's ability to access and remain engaged in HIV care (8). In our study, we sought to gain a better understanding of the roots of the inequitable distribution of the HIV burden among correctional populations. To narrow the scope of this complex issue, we limited our examination to factors associated with disparate access to and engagement in HIV care.

Factors that have the potential to serve as obstacles to HIV care access and engagement include an individual's degree of involvement with the criminal justice system (CJS), mental health status and substance use, socio-economic status (SES), and race. Incarceration has been shown to disrupt engagement in HIV care in a dose-dependent manner among injection drug users, with an increasing burden of incarceration

associated with decreasing adherence (9). It has also been demonstrated that patients with untreated mental health or substance abuse problems are less likely to initiate HIV treatment (10). Although few studies have examined the degree to which a lower SES restricts HIV care access, several SES-dependent factors have been shown to impede care access and engagement, including a lack of insurance coverage, homelessness, food insecurity, and a lack of transportation (8, 11, 12). HIV-positive persons identifying as Black or non-White have been shown to experience reduced care access and engagement, but these and other racial disparities are rarely fully explained (11, 13). This is most likely due to the difficulty in defining the concept of race itself.

The Case Against a Biological Concept of Race

The debate over how to define the concept of race has spanned three centuries and all areas of social and biological science (14). The central question in this debate has been whether or not variability in human biology and health can be explained by inherent biological differences between races. Cooper and David argue in their classic 1986 work that the answer to this question is no and that race has no specific biological meaning (14).

Cooper and David draw on the works of Watt and Barnicott to assert that in order for a biological concept of race to be scientifically useful, it must both 1) give meaning to human variation and 2) identify important and consistent genetic differences (14-16). Race as a biological construct, however, fails this test on both counts (14). First, indistinct geographic borders between racial groups and the melding of populations result in the failure of racial classification to give meaning to human biological variation (14).

Second, human variation is primarily discordant, rather than concordant; this means that skin color may be similar between two groups, but other important characteristics will necessarily differ (14). Furthermore, no distinct genetic profile has ever been identified by race (14).

Cooper and David also argue that variation of a single trait or gene across populations is not a sufficient basis for describing diversity (14). The significance of any potential individual gene variation between racial populations is tempered by the fact that typical variation within any given population is estimated to be orders of magnitude greater (14, 17). Based on these arguments, Cooper and David conclude that race should not be considered a biological construct (14). It is important to note, however, that variations in the genetic coding for HIV coreceptor CCR5 may indeed vary by geographic ancestry, and these variations may play a role in HIV susceptibility and disease progression (18, 19). More research is needed to determine the extent and importance of these genetic variations across populations.

Race as a Measure of the Experience of Racism and Discrimination

Rather than representing inherent biological differences, the concept of race is best defined as a social construct representing differences in the experience of racism and discrimination (14, 20-22). Zierler and Krieger examine three possible interpretations in the literature of race as a social construct, with regard to HIV disparities: 1) that race represents differences in social class, 2) that race represents differences in culture and attitudes, and 3) that race represents inequalities rooted in racism and discrimination (20). Firstly, Zierler and Krieger find that although racial disparities in health outcomes may be

partially explained by socioeconomic conditions, racial disparities in HIV incidence continue to exist within class strata (20, 23). Cooper and David also contend that socioeconomic status alone does not fully explain racial health disparities, and furthermore, they argue that attempting to explain racial differences by socioeconomic conditions could be considered "over-control," as race precedes these measures in the causal pathway (14). Zierler and Krieger find, secondly, that explaining racial disparities by differences in culture is not useful, because doing so reduces the rich variety of cultures within a race to a single experience and risks conflating culture with a community's adaptive response to sociopolitical discrimination (20). Zierler and Krieger join others in concluding that racial disparities in HIV burden are best explained by considering race to be a social construct that captures the effects of exposure to racism and discrimination (20-22).

Further defining the concept of race as a measure of racism and discrimination, Jones lays out a theoretical framework describing three levels of racism: 1) institutionalized racism, 2) personally mediated racism, and 3) internalized racism (22). Institutionalized racism is defined as unequal access to material conditions (i.e., education, housing, employment, and medical facilities) and unequal access to power (i.e., information, wealth, and political voice) (22). Institutionalized racism is the result of the incorporation of racism and discrimination into social and political institutions (22). For this reason, institutionalized racism is both the greatest cause of racial disparities and the most difficult to address (22). Personally mediated racism is defined as prejudice and/or discrimination, as experienced in interactions at the individual level (22). Prejudice is racial differences in assumptions about an individual's abilities or intentions,

while discrimination is racial differences in actions towards an individual (22). Lastly, internalized racism is defined as acceptance and internalization of negative racial messages about one's abilities or worth (22).

For the purpose of this study, we considered the variable race to be a measure of exposure to racism and discrimination, with the caveat that further research is needed to determine the role of CCR5 genetic variation in population differences. The measures of advanced HIV disease and uncontrolled viremia at jail entry may be indicative of poor HIV care access and engagement, after controlling for age, time since HIV diagnosis, and use of antiretroviral therapy (ART). Few studies have examined access to HIV care or measured CD4 count and viral load among HIV-positive populations entering jail, especially the relationship between prior access to care and race (24-26).

CHAPTER II: MANUSCRIPT

HIV-Positive and in Jail: Race, Risk Factors, and Prior Access to Care

Matthew S. Stein

ABSTRACT

Introduction: Black individuals represent 13% of the US population but 46% of HIV-positive persons and 40% of incarcerated persons. The national *EnhanceLink* project evaluated characteristics of jail entrants at ten sites and explored associations between race and HIV disease state.

Methods: Between 1/2008 -10/2011, 1,270 study participants provided demographic and clinical data. Adjusted odds ratios (aORs) were calculated for advanced HIV disease (CD4 < 200 cells/mm^3) and uncontrolled viremia (viral load > 400 copies/ml) for Black (n=807) versus non-Black (n=426) participants.

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Conclusions: The racial disparities of HIV and incarceration among Blacks is underscored by the finding that 65% of HIV-positive jail participants self-identified as Black in this ten-site study. The finding that 22% of Black male participants also self-identified as men who have sex with men (MSM) supports jails as strategic venues to reach HIV-positive Black MSM. Among HIV-positive jail entrants, Black individuals had more advanced HIV disease. Self-identification as Black was associated with a lower likelihood of having health insurance or an HIV provider prior to incarceration. HIV care and linkage interventions are needed within jails to better treat HIV and to address these racial disparities.

INTRODUCTION

Correctional populations in the United States experience a greater burden of HIV and other physical and psychiatric diseases than the general population (1-4). In 2006, 1 in every 30 adults in the US spent time incarcerated in a correctional facility, and this figure was 1 in 6 among HIV-positive adults (1). In addition to the disparate disease burden borne by correctional populations relative to the general population, health inequities exist among correctional population subsets, particularly by race.

Individuals identifying as Black are disproportionately affected by the overlapping epidemics of HIV and incarceration. In 2006, Black individuals represented 13% of the US general population but constituted 46% of all HIV-positive persons and 40% of the total correctional population (1, 5). Black men in particular suffer a greater burden of HIV incidence, with a rate of new infections that was 6.5 times the rate among White men in 2009 (6). Additionally, while HIV incidence did not change significantly among the overall US population between 2006 and 2009, there was a 48% increase in new infections among young Black MSM (6).

Addressing the inequity of the burden of HIV among men identifying as Black MSM is a national public health priority (7). There is an opportunity to reach a substantial portion of this population through expanded testing and treatment of correctional populations. In 2006, around 1 in 4 of all HIV-positive Black men in the US spent time in a jail or prison (1). The proportion of Black men in correctional populations who identify as MSM, however, has yet to be determined, so the potential yield of expanded testing and treatment in jails and prisons is undefined.

Although advances in antiretroviral therapy (ART) have led to significant reductions in HIV-associated mortality and HIV transmission, these gains are limited by an HIV-positive person's ability to access and remain engaged in HIV care (8). Among correctional populations, factors that have the potential to serve as obstacles to care access and engagement include an individual's degree of involvement with the criminal justice system (CJS), mental health status and substance use, health insurance coverage, and socio-economic status (SES) (8-12). Additionally, HIV-positive persons identifying as Black or Non-White have been shown to have less access to care and engagement in care (11, 13), but these and other racial disparities are rarely fully explained, possibly due to differing methods of defining the concept of race itself. Many argue that racial disparities in HIV burden are best explained by considering race to be a measure of differing exposure to certain social and political forces, rather than as a measure of inherent biological differences (14, 20-22). This definition of race as a social construct underlies our analysis.

The measures of advanced HIV disease and uncontrolled viremia at jail entry may be indicative of poor HIV care access and engagement, after controlling for age, time since HIV diagnosis, and use of antiretroviral therapy (ART). Few studies have examined access to HIV care or measured CD4 count and viral load among HIV-positive populations entering jail, especially the relationship between prior access to care and race (24-26).

Objectives

Study aims included: 1) describing the *EnhanceLink* study population at baseline, including the proportion of Black men identifying as MSM, and 2) exploring the associations between advanced HIV disease and uncontrolled viremia at jail entry and the exposures of race, time since HIV diagnosis, and ART use.

METHODS

Setting, Participants, and Data Collection

EnhanceLink is a federally funded, 10-site demonstration project that is studying the feasibility of diverse models of HIV testing and linkage in jail settings. As previously described, the *EnhanceLink* project is comprised of ten jail demonstration programs, with sites located in Atlanta, GA; Chester, PA; Chicago, IL; Cleveland, OH; Columbia, SC; New Haven, CT; New York, NY; Philadelphia, PA; Providence, RI; and Springfield, MA (27). HIV-positive jail entrants were recruited to participate in a voluntary evaluation of their experience in the linkage programs. The criteria for enrollment in the client-level observational study varied across sites; e.g., the New York site did not enroll newly diagnosed persons because another program for this population was already in place. All sites limited participation to persons 18 years or older.

Between January 2008 and October 2011, *EnhanceLink* staff collected client-level data on a cohort of 1,270 men and women, entering the data into a multi-site data management system (DMS). Data included in the present analysis were collected using the following instruments: 1) a baseline interview of study participants with questions on

demographic characteristics, mental and physical health, substance use, and HIV care, and 2) a medical chart review of all clinical data recorded during the client's index incarceration. Additionally, a subset of the study population (n=410) answered questions about risk behavior in an optional risk-behavior module offered at the end of the baseline interview. Further discussion of *EnhanceLink's* study design and data management is included in a supplementary appendix. This multisite study was approved by the Institutional Review Boards of Emory University and Abt Associates, and individual site programs were reviewed by the responsible IRBs where appropriate. A certificate of confidentiality was obtained for the study.

Variables Used in Analysis

Outcomes of interest included advanced HIV disease and uncontrolled viremia at jail entry. Advanced disease was defined as a CD4 count of less than 200 cells/mm^3. Uncontrolled viremia was defined as a viral load of greater than 400 copies/ml, as recorded on the earliest viral load measurement after jail entry.

Exposures of interest included race, time since HIV diagnosis, and the use of ART. Race was defined as Black or non-Black. Time since HIV diagnosis was a dichotomous variable, defined as time from HIV diagnosis to jail entry of more than two years or less than or equal to two years. The use of ART was a categorical variable, defined as self-reported treatment with ART in the 7 days prior to index incarceration, treatment with ART at one time but not in the 7 days prior, and no prior treatment with ART ever.

Other variables analyzed included data on ethnicity, gender, sexual orientation, age at index incarceration, site of index incarceration, homelessness, education, employment, income, criminal justice involvement, mental health, substance use, medical status, and HIV diagnosis and care. Questions from the Addiction Severity Index (ASI) were used in the baseline interview to measure mental health and substance use status (28, 29). As optional questions on sexual risk behavior were administered to only a small proportion of the study population, homosexual or bisexual self-identification among male participants was considered to be the best available indicator of MSM behavior.

Statistical Analysis

Baseline characteristics of the *EnhanceLink* study population were compared among Blacks and non-Blacks using the Chi-square test for dichotomous variables and the Wilcoxon two-sample test for continuous variables, with a significance level of alpha = 0.05. For each of the two outcomes of interest (advanced HIV disease and uncontrolled viremia), univariate logistic regression was conducted to determine the unadjusted odds ratios for all categorical and continuous variables of interest. Multivariate logistic regression was performed for each outcome of interest to determine adjusted odds ratios, with the same exposures of interest and possible confounders included in both analyses. Models were assessed for collinearity and goodness of fit using the Hosmer-Lemeshow statistic. All statistical analyses were performed using SAS 9.2 (SAS Institute Inc., Cary, North Carolina).

RESULTS

Baseline Description

The major findings of the baseline characteristics of the 1,270 HIV-positive *EnhanceLink* study participants are displayed in Table 1. Among the 1,233 participants with data on race, 65% self-identified as Black on the baseline interview. Twenty-five percent of participants with data on ethnicity self-identified as Hispanic, and 6% self-identified as both Black and Hispanic. The mean age of the study population was 42 years. The population was 70% male, 28% female, and 2% transgender.

As seen in Table 1, 40% of study participants reported being homeless in the 30 days prior to jail entry. Fifty-one percent of participants did not complete high school or earn a GED, and only 22% reported any category of employment in the three years prior to index incarceration. Study participants reported substantial involvement with the criminal justice system—the mean number of lifetime arrests was 22, and 70% spent more than two years ever incarcerated.

EnhanceLink study participants also reported substantial mental health and drug use burdens. Fifty-four percent of participants had an ASI mental health score of 0.22 or greater in the 30 days prior to jail entry, and 59% of participants had an ASI drug use score of 0.16 or greater. Scores above these cutoffs were considered indicative of severe psychiatric illness and severe drug addiction, respectively (28, 29).

Seventy-five percent of study participants had health insurance in the 30 days prior to index incarceration; among insured participants, 82% were insured through

Medicaid. Fifty-eight participants were newly diagnosed with HIV during their index incarceration. Among previously diagnosed participants, 90% knew they were HIV-positive for more than two years prior to index incarceration, 81% reported ever having taken ART medications, and 49% reported having taken ART medications in the 7 days prior to jail entry. Additionally, 27% of previously diagnosed participants had advanced HIV disease (as indicated by a CD4 count of less than 200 cells/mm^3), and 66% had uncontrolled viremia at entry (as indicated by a viral load of greater than 400 copies/ml).

Baseline Differences by Race

Table 1 also compares *EnhanceLink* baseline characteristics between study participants identifying as Black (n=807) and non-Black (n=426). Black participants were more likely to have been older and to have spent two or more years ever incarcerated than non-Black participants. Black participants were also less likely to report having used injection drugs (ever or in the prior 30 days), having had severe psychiatric illness, or having had severe drug addiction. Black male participants were more likely to have self-identified as homosexual or bisexual, and they were more likely to have had an HIV risk profile of MSM and non-IDU (never used injection drugs) than non-Black participants. Additionally, Black participants were less likely to have had insurance or an HIV provider in the prior 30 days. Lastly, Black participants were more likely to have had advanced HIV disease and uncontrolled viremia at entry than non-Black participants.

Sexual Orientation

Twenty percent of male study participants self-identified as homosexual or bisexual, as seen in Table 1. Among Black male participants, this proportion was 22%. Additionally, 17% percent of all male participants (and 20% of Black male participants) were MSM and non-IDU.

The proportion of male participants self-identifying as homosexual or bisexual varied across *EnhanceLink* sites, with a range of 6 to 38% for all males and a range of 6 to 41% for Black males (Table 2). Among the 244 male participants that answered the optional questions on sexual risk behavior, five heterosexual participants reported sex with men in the 30 days prior to jail entry—four of these were Black.

Factors Associated with Advanced HIV Disease

Table 3 examines the associations between the outcome of advanced HIV disease and the exposures of race, time since HIV diagnosis, ART use, and other factors among *EnhanceLink* study participants at baseline. Black participants had an increased likelihood of having advanced HIV disease (aOR = 1.84, 95% CI 1.16 - 2.93). Other factors associated with an increased likelihood of advanced disease included: time since HIV diagnosis of more than two years prior to index incarceration (aOR = 3.55, 95% CI 1.52 - 8.31) and use of ART medications before or during the seven days prior to jail entry (aOR = 2.93, 95% CI 1.69 - 5.08 for ART use before, but not during, the prior seven days; aOR = 1.94, 95% CI 1.10 - 3.44 for ART use during the prior seven days).

Age of less than 38 years was associated with a decreased likelihood of advanced HIV disease (aOR = 0.41, 95% CI 0.24 - 0.70).

Factors Associated with Uncontrolled Viremia

Table 4 examines the associations between the outcome of uncontrolled viremia and the exposures of race, time since HIV diagnosis, ART use, and other factors among *EnhanceLink* study participants at baseline. Identifying as Black was not associated with an increased likelihood of having uncontrolled viremia at entry, after controlling for other factors. Use of ART medications in the seven days prior to index incarceration, having insurance in the prior 30 days and age of 49 years or greater were all associated with a decreased likelihood of having uncontrolled viremia. Additionally, the likelihood of uncontrolled viremia varied significantly by project site.

DISCUSSION

The majority of HIV-positive jail inmates in this ten-site study were Blacks. Efforts to address the racial disparity of HIV in America, particularly among men, are inadequate if they do not address the HIV epidemic in jails. The *EnhanceLink* study demonstrates that the challenges of working within jails to address HV can be overcome. Jail inmates experience a greater burden of HIV and other chronic illness than the general population, and the HIV-positive jail inmates in our study were also found to experience high levels of unemployment, criminal justice involvement, mental illness, and substance abuse. Although the burden of medical and social ills is enormous and cyclic reincarceration is common, many inmates successfully receive care both within jails and upon release.

The HIV epidemic among correctional populations has long been characterized as largely an epidemic among injection drug users. This study found that a substantial number of jail detainees reported a homosexual or bisexual orientation and were not IDU. After examining HIV risk factors among the study population, it was found that 17% of male study participants were MSM and non-IDU, while 28% were IDU and non-MSM. Among Black male participants, there was also a divide between the epidemics among MSM and IDU; 20% reported as MSM and non-IDU and 18% reported as IDU and non-MSM. Some overlap did exist between IDU and MSM in this study, as 3% of all male participants were both IDU and MSM.

There is an opportunity to reach a substantial portion of HIV-positive Black MSM through expanded testing and treatment of correctional populations, but the proportion of

HIV-positive Black men in correctional populations who identify as MSM has, to our knowledge, not been previously explored. Our finding that 22% of Black male participants self-identified as bisexual or homosexual highlights the potential of expanded jail testing to reach this underserved population. The fact that some men identifying as heterosexual reported recent sex with men further suggests that correctional populations may contain a large number of men with a history of anal intercourse. CD4 count and uncontrolled viremia did not vary significantly by orientation. Nonetheless, the finding that a substantial portion of the HIV–positive men reached by grantee organizations were MSM suggests that some jail entrants whose HIV status was never tested may also be HIV-infected MSM.

In addition to being more likely to be MSM, Black participants were more likely to be older than non-Black participants, and less likely to have health insurance or an HIV provider in the 30 days prior to jail entry. Our multivariate analysis also suggests that Black jail detainees are more likely to experience advanced HIV disease at jail entry than their non-Black peers. The association with Black race and more advanced HIV disease at entry persisted in our model, even when controlling for age, time since HIV diagnosis, and other potential confounders. In contrast, the trend towards a higher likelihood of uncontrolled viremia among Black participants was not significant upon multivariate analysis.

Multiple factors can account for low CD4 count, including longer standing disease and persistently poorer access to care. When CD4 count varies by race, the latter of these explanations is a disturbing possibility. Potential socio-political obstacles to HIV care access that may differ by race include social class, culture and attitudes, and

exposure to racism and discrimination (20). Our analytical model controlled for measures of SES by including education, employment, and income variables, but the association between race and more advanced HIV disease remained, suggesting that racial differences in long-term access to HIV care continued to exist within class strata among this population. Previous studies have also found that racial disparities in HIV burden are not fully explained by SES differences, although these studies did not address HIV care access specifically (20, 23). Direct measures of culture/attitudes and exposure to racism/discrimination were not collected as part of this study, but differences in exposure to racism and discrimination are believed to provide the best explanation of racial disparities in HIV burden and care access (20-22). Uncontrolled viremia among persons with HIV can develop soon after stopping ART and may be a marker of more recent hindrances to access. While Blacks had higher odds of uncontrolled viremia at jail entry than non-Blacks, this trend was not significant in the full, multivariate model. More research is needed to determine the effects of racism and discrimination on long- and short-term barriers to HIV care among populations prior to entering jails.

Limitations

The analysis of baseline characteristics among the study population was limited by the self-reported nature of much of the data and by a moderate amount of missing data. Additionally, the study was structured in a way that led to the enrollment of a population with a median length of stay greater than the typical jail median of two to seven days (30, 31). Also, newly diagnosed persons may be underrepresented in this cohort, as they were not aggressively recruited by all project sites.

The underlying causes of the inequitable distribution of HIV burden among correctional populations in general, and among Black individuals in jail in particular, are complex and difficult to fully examine. Study of these issues was limited by the available variables; measures of CD4 and viral load likely made for imperfect proxies of HIV care access and engagement. This analysis was also limited by our data on time since HIV diagnosis, which did not capture any variation beyond having a diagnosis of more than two years.

Examination of the proportion of MSM among the study population was limited by a lack of sexual risk behavior data for most clients, since these data were contained within the optional data collection module. MSM participants were identified by self-report of sexual orientation, and this may have been too crude a measure; the limited data available on actual behavior suggest that this failed to capture the scope of the full MSM population, especially among Blacks.

Conclusions

The racial disparities of HIV and incarceration among Blacks is underscored by the finding that 65% of HIV-positive jail participants self-identified as Black in this ten-site study. The finding that 22% of Black male participants also self-identified as homosexual or bisexual supports jails as strategic venues to reach HIV-positive Black MSM. Since 59% of Black MSM are unaware of their HIV infection, HIV testing in jails is a priority (32). Through an expansion of HIV testing and linkage to care in jails, health inequities among Black MSM can be confronted.

Our findings also suggest that among HIV-positive persons entering jails, individuals self-identifying as Black have more advanced HIV disease at entry, which may be indicative of poorer access to care and less engagement in care among Black individuals prior to jail entry. More research is needed to determine the effects of racism and discrimination on prior HIV care access and engagement among correctional populations. An expansion of testing and linkage among jail populations has the potential to mitigate these inequities and result in better access to HIV care.

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TABLES

Table 1 Baseline characteristics of HIV-positive jail entrants and analysis for significant variation by race

	Among all entrants		Among entrants with data on race (n=1233)			
	n=1270 (%)	missing	Non-Black n=426 (%)	Black n=807 (%)	p-value	missing
Demographics						
Black	807 (65.5%)	37	--	--	--	--
Hispanic	306 (24.9%)	43	**220 (52.4%)**	**70 (8.9%)**	**<0.001**	23
Gender:						
Female	350 (28.0%)	20	125 (29.3%)	222 (27.5%)	0.50	1
Male	874 (69.9%)		292 (68.5%)	567 (70.3%)	0.51	
Transgender	26 (2.1%)		9 (2.1%)	17 (2.1%)	0.997	
Homosexual or Bisexual, among males	175 (20.1%)	4	**47 (16.2%)**	**126 (22.3%)**	**0.03**	4
Mean age at index incarceration [SD]	42.3 [9.1]	21	**41.3 [8.8]**	**42.8 [9.2]**	**0.002**	6
Homeless in the 30 days prior	496 (39.6%)	18	169 (40.0%)	318 (39.4%)	0.85	3
Education, Employment, and Income						
Education < high school diploma or GED	633 (50.9%)	26	228 (53.9%)	391 (48.7%)	0.08	7
Employed for most of the prior 3 years	276 (22.2%)	28	88 (21.0%)	184 (22.9%)	0.44	9
Money received < $1,000 in prior 30 days	959 (77.2%)		312 (74.3%)	632 (78.6%)	0.09	
Criminal Justice Involvement						
Mean number of lifetime arrests [SD]	21.9 [25.6]	109	20.6 [20.2]	22.8 [28.2]	0.66	90
Incarcerated for < 2 years in lifetime	366 (29.8%)	43	**139 (33.4%)**	**221 (27.9%)**	**0.05**	24
Spent time incarcerated in prior 30 days	224 (18.1%)	30	87 (20.7%)	134 (16.8%)	0.09	15
Mental Health						
Experienced serious depression in lifetime	828 (67.0%)	35	**307 (73.6%)**	**506 (63.1%)**	**<0.001**	14
Depression, schizophrenia, bipolar or PTSD	320 (30.3%)	215	118 (33.2%)	193 (28.4%)	0.11	198
Perceived mental health: Mean SF-12 [SD]	40.1 [12.8]	28	**37.7 [12.5]**	**41.5 [12.7]**	**<0.001**	11
ASI mental health score ≥ 0.22 cutoff	636 (53.6%)	83	**247 (62.2%)**	**376 (48.6%)**	**<0.001**	62
Substance Use						
Any drug use in lifetime	1199 (96.3%)	25	404 (96.0%)	776 (96.5%)	0.62	8
Any IV drug use in lifetime	355 (28.6%)	29	**210 (50.0%)**	**137 (17.1%)**	**<0.001**	12
Alcohol use (to intoxication) in lifetime	581 (47.0%)	34	210 (50.1%)	360 (45.2%)	0.10	17
ASI drug use score ≥ 0.16 cutoff	682 (58.5%)	104	**251 (64.4%)**	**425 (56.1%)**	**0.007**	86
ASI alcohol use score ≥ 0.17 cutoff	426 (39.5%)	191	128 (35.5%)	292 (41.7%)	0.05	171
HIV Risk Factor						
Among male entrants (n=874)						
Non-IDU and non-MSM	449 (52.2%)	13	**109 (38.0%)**	**333 (59.6%)**	**<0.001**	13
IDU and non-MSM	237 (27.5%)		**131 (45.6%)**	**100 (17.9%)**	**<0.001**	
MSM and non-IDU	149 (17.3%)		**34 (11.9%)**	**113 (20.2%)**	**0.002**	
IDU and MSM	26 (3.0%)		13 (4.5%)	13 (2.3%)	0.08	
HIV Care and Treatment						
Had insurance in the prior 30 days	928 (74.7%)	27	**353 (83.1%)**	**559 (70.1%)**	**<0.001**	10
Among non-newly diagnosed (n=1212)						
Time since HIV diagnosis of > 2 years	899 (90.2%)	215	304 (90.7%)	580 (89.6%)	0.59	194
Had an HIV provider in prior 30 days	886 (75.5%)	38	**322 (80.7%)**	**547 (72.6%)**	**0.003**	24
Treated with ART - ever	960 (81.4%)	32	336 (83.6%)	606 (80.2%)	0.15	18
Treated with ART - in prior 7 days	566 (48.5%)	45	209 (52.9%)	344 (45.8%)	0.07	30

Table 1 continued

	Among all entrants		Among entrants with data on race (n=1233)			
	n=1270 (%)	missing	Non-Black n=426 (%)	Black n=807 (%)	p-value	missing
Control of HIV						
Among non-newly diagnosed (n=1212)						
Advanced HIV disease (CD4 < 200)	268 (27.4%)	233	**66 (20.6%)**	**199 (30.9%)**	**<0.001**	211
Uncontrolled viremia (VL > 400)	605 (65.8%)	292	**184 (59.9%)**	**414 (69.0%)**	**0.006**	269

For baseline characteristics that vary significantly by race, the relevant results appear in bold. For groups of variables with the same number of participants with missing data, only the first variable lists the number missing. For continuous variables, the standard deviation appears in brackets [SD] instead of the percentage. P-values comparing dichotomous variables were determined by a Chi-square test, and p-values comparing continuous variables were determined by a Wilcoxon two-sample test.

Table 2 Selected baseline characteristics of HIV-positive jail entrants by site of incarceration

Site	Total	Among black entrants		Among male entrants		Among black male entrants	Advanced HIV disease (CD4 < 200)	Uncontrolled viremia (VL > 400)
		All	Male	All	Gay or Bi	Gay or Bi		
New York, NY	488	331(68%)	256(77%)	366(75%)	65 (18%)	50 (20%)	130 (29%)	348 (76%)
Atlanta, GA	62	56 (90%)	49 (88%)	55 (89%)	15 (28%)	12 (25%)	15 (38%)	22 (63%)
Chester, PA	80	43 (54%)	32 (74%)	57 (72%)	12 (21%)	6 (18%)	14 (23%)	38 (72%)
Springfield, MA	70	9 (13%)	8 (89%)	47 (67%)	*	*	7 (12%)	29 (53%)
Cleveland, OH	132	98 (75%)	71 (72%)	97 (75%)	37 (38%)	29 (41%)	16 (20%)	31 (50%)
Chicago, IL	82	72 (88%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	23 (32%)	44 (62%)
Providence, RI	96	20 (27%)	16 (80%)	66 (80%)	14 (21%)	*	7 (18%)	12 (33%)
Philadelphia,PA	46	26 (58%)	16 (64%)	29 (64%)	6 (21%)	*	14 (37%)	26 (84%)
Columbia, SC	101	94 (93%)	75 (80%)	78 (77%)	18 (23%)	18 (24%)	30 (36%)	44 (66%)
New Haven, CT	113	58 (55%)	44 (76%)	79 (71%)	*	*	19 (20%)	44 (48%)

*These values were too small to show; displaying exact values would risk identification of study participants.

Table 3 Factors associated with advanced HIV disease at jail entry (CD4 < 200 cells/mm^3) among HIV-positive jail entrants with CD4 data and not newly diagnosed (n=979)

	Unadjusted OR	(95% CI)	Adjusted OR	(95% CI)
Exposures of Interest				
Race				
Non-Black	Referent		Referent	
Black	1.73	(1.26, 2.38)	**1.84**	**(1.16, 2.93)**
Time since HIV diagnosis				
HIV diagnosis known for ≤ 2 years	Referent		Referent	
HIV diagnosis known for > 2 years	4.53	(2.06, 9.96)	**3.55**	**(1.52, 8.31)**
Time since HIV diagnosis unknown	5.35	(2.15, 13.34)	2.09	(0.68, 6.42)
ART use				
Has never taken ART	Referent		Referent	
Has taken ART, but not in prior 7 days	3.09	(1.93, 4.94)	**2.93**	**(1.69, 5.08)**
Has taken ART in prior 7 days	2.06	(1.30, 3.25)	**1.94**	**(1.10, 3.44)**
Additional Factors				
Age at index incarceration (in quartiles)				
Age < 38	0.44	(0.28, 0.68)	**0.41**	**(0.24, 0.70)**
Age 38-43	0.92	(0.63, 1.35)	0.67	(0.43, 1.05)
Age 44-48	Referent		Referent	
Age ≥ 49	0.76	(0.51, 1.12)	0.64	(0.40, 1.002)
Site of index incarceration				
New York, NY	Referent		Referent	
Atlanta, GA	1.71	(0.86, 3.40)	2.20	(0.90, 5.33)
Chester, PA	0.67	(0.34, 1.31)	1.11	(0.49, 2.51)
Springfield, MA	0.33	(0.14, 0.80)	0.38	(0.13, 1.11)
Cleveland, OH	0.74	(0.41, 1.35)	0.87	(0.39, 1.93)
Chicago, IL	1.12	(0.64, 1.95)	1.49	(0.70, 3.18)
Providence, RI	0.55	(0.24, 1.27)	0.69	(0.21, 2.24)
Philadelphia, PA	1.67	(0.83, 3.39)	**3.00**	**(1.01, 8.92)**
Columbia, SC	1.56	(0.93, 2.61)	**2.12**	**(1.01, 4.43)**
New Haven, CT	0.64	(0.37, 1.11)	0.78	(0.39, 1.57)
Employed as usual status in prior 3 years				
No	Referent		Referent	
Yes	0.68	(0.47, 0.99)	0.67	(0.42, 1.06)
Ever experienced serious depression				
No	Referent		Referent	
Yes	0.72	(0.54, 0.96)	0.93	(0.61, 1.43)
Had insurance in prior 30 days				
No	Referent		Referent	
Yes	0.64	(0.46, 0.89)	0.72	(0.44, 1.18)

In addition to controlling for all of the variables listed in the table, the final multivariate model for this outcome also controlled for measures of ethnicity, gender, sexual orientation, homelessness, education, total money received in the prior 30 days, time spent incarcerated in lifetime and prior 30 days, ASI mental health composite score, lifetime use of injection drugs, ASI drug use composite score, lifetime use of alcohol to intoxication, ASI alcohol use composite score, chronic disease, and access to an HIV provider in the 30 days prior to index incarceration. None of these additional variables were significant on univariate or multivariate analyses; they were included in the final model to control for confounding.

Table 4 Factors associated with uncontrolled viremia at jail entry (VL > 400 copies/ml) among HIV-positive jail entrants with VL data and not newly diagnosed (n=920)

	Unadjusted OR	(95% CI)	Adjusted OR	(95% CI)
Exposures of Interest				
Race				
Non-Black	Referent		Referent	
Black	1.49	(1.12, 1.98)	1.08	(0.68, 1.70)
Time since HIV diagnosis				
HIV diagnosis known for ≤ 2 years	Referent		Referent	
HIV diagnosis known for > 2 years	0.60	(0.34, 1.03)	0.92	(0.47, 1.79)
Time since HIV diagnosis unknown	0.57	(0.27, 1.20)	0.48	(0.17, 1.35)
ART use				
Has never taken ART	Referent		Referent	
Has taken ART, but not in prior 7 days	0.82	(0.51, 1.33)	0.90	(0.52, 1.57)
Has taken ART in prior 7 days	0.24	(0.16, 0.37)	**0.25**	**(0.15, 0.43)**
Additional Factors				
Age at index incarceration (in quartiles)				
Age < 38	1.14	(0.76, 1.70)	0.80	(0.48, 1.35)
Age 38-43	Referent		Referent	
Age 44-48	0.97	(0.65, 1.43)	0.88	(0.54, 1.42)
Age ≥ 49	0.61	(0.42, 0.88)	**0.57**	**(0.36, 0.92)**
Site of index incarceration				
New York, NY	Referent		Referent	
Atlanta, GA	0.54	(0.26, 1.13)	**0.24**	**(0.09, 0.66)**
Chester, PA	0.68	(0.35, 1.29)	0.63	(0.28, 1.44)
Springfield, MA	0.28	(0.16, 0.52)	**0.26**	**(0.12, 0.56)**
Cleveland, OH	0.24	(0.13, 0.42)	**0.24**	**(0.11, 0.50)**
Chicago, IL	0.47	(0.28, 0.81)	**0.25**	**(0.12, 0.54)**
Providence, RI	0.14	(0.07, 0.30)	**0.16**	**(0.06, 0.45)**
Philadelphia, PA	1.41	(0.53, 3.81)	1.03	(0.25, 4.21)
Columbia, SC	0.56	(0.31, 0.99)	**0.34**	**(0.15, 0.76)**
New Haven, CT	0.28	(0.17, 0.44)	**0.25**	**(0.13, 0.46)**
Education < high school diploma or GED				
No	Referent		Referent	
Yes	0.71	(0.54, 0.93)	0.78	(0.55, 1.10)
Ever experienced serious depression				
No	Referent		Referent	
Yes	0.56	(0.41, 0.75)	0.80	(0.51, 1.26)
ASI mental health score ≥ 0.22 cutoff				
No	Referent		Referent	
Yes	0.58	(0.44, 0.77)	0.94	(0.59, 1.49)
Unknown	0.85	(0.41, 1.73)	1.52	(0.59, 3.90)
Had insurance in prior 30 days				
No	Referent		Referent	
Yes	0.41	(0.28, 0.61)	**0.46**	**(0.26, 0.81)**

Table 4 continued

	Unadjusted OR	(95% CI)	Adjusted OR	(95% CI)
Additional Factors (continued)				
Had an HIV provider in prior 30 days				
No	Referent		Referent	
Yes	0.39	(0.27, 0.56)	0.71	(0.43, 1.17)

In addition to controlling for all of the variables listed in the table, the final multivariate model for this outcome also controlled for measures of ethnicity, gender, sexual orientation, homelessness, employment in the prior 3 years, total money received in the prior 30 days, time spent incarcerated in lifetime and prior 30 days, lifetime use of injection drugs, ASI drug use composite score, lifetime use of alcohol to intoxication, ASI alcohol use composite score, and chronic disease. None of these additional variables were significant on univariate or multivariate analyses; they were included in the final model to control for confounding.

CHAPTER III: PUBLIC HEALTH IMPLICATIONS

The finding that 22% of Black male participants also self-identified as homosexual or bisexual supports jails as strategic venues to reach HIV-positive Black MSM. The proportion of HIV-positive Black MSM who are in correctional populations, however, has yet to be determined, so the potential yield of expanded testing and treatment in jails and prisons is undefined. Through the application of our findings to previously-derived HIV prevalence estimates, though, we are able to estimate the proportion of HIV-positive Black MSM ever in a correctional facility during a given year.

In 2009, Spaulding et al. estimated the total number of HIV+ Black men ever in a correctional facility in 2006 to be 83,000 individuals (1), and the HIV Surveillance Report published by the CDC in 2011 estimated that 167,000 Black MSM were living with HIV/AIDS in 2009 (33). By applying our findings (that MSM represented 22.3% of HIV+ Black male jail detainees) to these previously-derived national estimates, we estimate that approximately 11% of the 167,000 HIV-positive Black MSM in the US spend some time in a correctional facility in a given year.

This estimate suggests that expanded interventions targeting correctional populations could reach a substantial number of HIV-positive Black MSM. Reaching this under-served population is a priority, as 59% of Black MSM in the US are unaware of their HIV infection (32). This vulnerable population might not be reached without expanded testing and treatment in jails and prisons and linkage to care post-release.