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Past Year and Prior Incarceration and HIV Transmission Risk among HIV-positive Men who have Sex with Men in the US

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Abstract

Three quarters of new HIV infections in the US are among men who have sex with men (MSM). In other populations, incarceration is a social determinant of elevations in viral load and HIV-related substance use and sex risk behavior. There has been limited research on incarceration and these HIV transmission risk determinants in HIV-positive MSM.

We used the Veterans Aging Cohort Study (VACS) 2011-2012 follow-up survey to measure associations between past year and prior (more than one year ago) incarceration and HIV viral load and substance use and sex risk behavior among HIV-positive MSM (N=532).

Approximately 40% had ever been incarcerated, including 9.4% in the past year. In analyses adjusting for sociodemographic factors, past year and prior incarceration were strongly associated with detectable viral load (HIV-1 RNA >500 copies/mL) (past year adjusted odds ratio (AOR): 3.50 95% confidence interval (CI): 1.59, 7.71; prior AOR: 2.48 95% CI: 1.44, 4.29) and past 12 month injection drug use (AORs>6), multiple sex partnerships (AORs>1.8), and condomless sex in the context of substance use (AORs>3). Past year incarceration also was strongly associated with alcohol and non-injection drug use (AOR>2.5). Less than one in five HIV-positive MSM

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recently released from incarceration took advantage of a jail/prison re-entry health care program available to veterans.

We need to reach HIV-positive MSM leaving jails and prisons to improve linkage to care and clinical outcomes and reduce transmission risk upon release.

Keywords

incarceration; HIV; men who have sex with men

Introduction

Men who have sex with men (MSM) account for 75% of new HIV infections in the US.¹ Disproportionate rates are observed in minority MSM;^{2–6} it is projected that half of black MSM and one-quarter of Hispanic MSM will acquire HIV in their lifetime.⁷ HIV-positive minority MSM are less likely to achieve viral suppression than their white counterparts.⁸ Gay-related stigma, discrimination,^{9,10} and social isolation^{11,12} are thought to contribute to the elevated risk of HIV in MSM. Adverse social conditions may exacerbate social vulnerability and transmission risk in MSM groups.

Criminal justice involvement (CJI) may constitute an important social determinant of HIV transmission risk among MSM. CJI is strongly associated with HIV, with rates of HIV among inmates five times that of the general population.^{13,14} CJI is independently associated with unsuppressed viral load and drug and sex risk behavior, including among HIV-positive individuals.^{15–24} This may be the case in part because CJI is stressful and disempowering,²⁵ disrupts social networks and support,^{15,16} and exacerbates poverty and interruptions in health care.^{26,27} Further, evidence suggests MSM experience high rates of physical and sexual abuse during detainment²⁸ which may exacerbate stigma and discrimination in this population. CJI-related stress, social isolation, poverty, and stigma may increase psychopathology, substance use, and in turn HIV risk behavior among MSM. Syndemic theory has served as a useful construct for understanding HIV risk among MSM,^{29–31} given their disproportionate risk of multiple, co-occurring HIV risk factors including stress,^{32–36} depression,^{32,37–40} substance use,^{32,41–44} and intimate partner violence.^{32,45–48} CJI has been identified as an additional syndemic factor that works in tandem with other HIV determinants to drive risk in this group.⁴⁹ However, to date research on the association between CJI and HIV risk among MSM has been sparse.

We have limited understanding of the impact of incarceration on viral load and HIV-related drug and sex risk behavior among MSM, in part as a result of little data on incarceration in HIV studies among MSM.^{50–52} Improved understanding may hold particular relevance for minority MSM, given disproportionate HIV infection and incarceration in this group.^{53,54} This study sought to address this gap and measure cross-sectional associations between past year and prior history of incarceration and viral load and HIV-related substance use and sex risk behavior in a national sample of HIV-positive MSM.

Methods

Study Sample

The Veterans Aging Cohort Study (VACS) is an observational cohort of patients living with HIV and matched HIV-negative controls that began in 2002 and was designed to evaluate the role of alcohol and drug use in clinical outcomes.⁵⁵ VACS includes clinical, administrative, and survey data on patients from eight Veterans Health Administration (VHA) sites (Atlanta, GA; Baltimore, MD; Bronx, NY; New York City, NY; Houston, TX; Los Angeles, CA; Pittsburgh, PA; and Washington, DC). Institutional review boards at each site approved all study activities. Among 6819 VACS participants enrolled, 3515 (1908 HIV+; 1607 uninfected) responded to the VACS follow-up 2011 survey, the first VACS survey that assessed CJI. Among HIV-positive participants, 538 were male participants who reported a history of sex with men in the year prior to the survey and, of these, we restricted our analyses to those who had non-missing data on incarceration (N=532 of 538).

Measures

Incarceration.—Participants were asked “Have you ever spent any time in a jail, prison, or juvenile correctional facility?” Those who affirmed prior incarceration were asked, “In the past year, how much time have you spent in a jail, prison, or juvenile correctional facility?” We used these measures to create a three-level categorical indicator of past year incarceration, prior incarceration (one year ago or more), and never incarcerated.

HIV Risk and Viral Load Outcomes.—HIV-related substance use outcomes included past year injection drug use (IDU); unhealthy alcohol use, defined as use consistent with risk or established harm,⁵⁶ was measured by the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C)⁵⁷ with a score of 4 considered to indicate unhealthy use⁵⁸; past year illicit drug use defined as use of cocaine, stimulants, heroin, non-medical use of prescription opioids, or injection drugs. HIV-related sex risk behavior in the past 12 months included multiple sex partners (two or more oral, vaginal, and/or anal partners); condomless oral, vaginal, and/or anal sex as a result of alcohol and/or drug use, indicated by participant self-reported perception that condomless sex occurred “because of” alcohol or drugs; oral, vaginal, or anal sex with non-monogamous partners; and vaginal or anal sex with partners who were HIV-negative or who did not know their HIV status. HIV RNA-1 viral load closest to the 2011 follow-up survey, taken before the survey among 62% and after the survey among 38% of participants, was used to measure unsuppressed viral load, defined as >500 copies/mL.

Covariates.—Covariates included age; race/ethnicity; married/cohabiting versus unmarried/not cohabiting; education, defined as some college education versus none; income, defined as <\$12,000/year versus \$12,000/year, given \$12,000 represents the median household income of the sample and the cut-point for the federal poverty level for a family of one,⁵⁹ and homelessness, defined as having spent at least one night in a shelter or on the street in the past 12 months.

Clinical Status.—Background clinical characteristics of the sample included median CD4, median log viral load, and hepatitis C virus infection (HCV). The VL and CD4 values used were those taken closest to the survey (before or after); 92% of values were within 3 months of the survey and 97% were within one year. HCV status as of November 2012 was used. Among those with a history of incarceration, we also evaluated levels of enrollment in the Health Care for Re-entry Veterans (HCRV), a program which helps veteran jail/prison releasees with pre-release planning, referrals and linkage to health, and social services upon release.^{60–62}

Analyses

All analyses were conducted using Stata Version 14.0. We conducted bivariate analyses to describe the prevalence of sociodemographic factors by incarceration history assessing differences in the distribution of untransformed continuous variables by incarceration using the t-test and of categorical variables by incarceration using the chi-square test. In the total sample, we estimated logistic regression models to calculate unadjusted and adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for associations between history of incarceration and unsuppressed viral load and HIV-related substance use and sex risk behavior. In adjusted analyses, we controlled for age, marital status, income, and homelessness in the past 12 months. For each adjusted model, we tested an incarceration by race/ethnicity interaction term to evaluate whether differences in the association between incarceration and HIV risk outcomes differed significantly for white versus non-white MSM ($p < 0.10$ level).

Results

The analytic sample of 532 HIV-positive MSM had a median age of 53 years, with ages ranging from 24–88 years (Inter-quartile Range: 46–59 years). Over half was African American, 20% were currently married, and the majority had some college education. Approximately 40% of participants had ever been incarcerated; 9% in the past year and an additional 31% more than one year ago (Table 1). Those with past year and prior incarceration were more likely than those with no history of incarceration to be African American (62.0% and 67.3% versus 54.3%; $p = 0.012$), less likely to have some college education (68.0% and 75.0% versus 84.8%; $p = 0.003$), more likely to report an annual household income of $< \$12,000$ (66.0% and 43.7% versus 29.5%; $p < 0.001$), and more likely to report homelessness in the past year (34.0% and 12.7% versus 1.3%; $p < 0.001$). Incarceration history was not associated with marital status. Those with past year and prior incarceration had a significantly lower median CD4 cell count versus those with no prior history of incarceration (459 cells/ μL and 479 cells/ μL versus 513 cells/ μL , $p = 0.025$). Those who had been incarcerated in the past year had a higher median log viral load (3.99 copies/mL) than those with prior or no incarceration (3.87 copies/mL, $p < 0.001$), a statistically significant though not clinically relevant difference. Over half (51.1%) of those with a past year incarceration were infected with HCV, followed by 38.2% of those with a prior incarceration and 27.3% of those never incarcerated ($p = 0.001$). Eighteen percent of veterans with a history of past year incarceration and 7% of those with a prior incarceration had participated in the HCRV.

Since no significant incarceration by race/ethnicity interactions in associations between incarceration and outcomes were observed, we report associations between incarceration and HIV viral load and risk behaviors in the combined sample of white and non-white MSM (Figure 1). Having an unsuppressed viral load was more commonly observed among those with past year (33%) and prior (25%) incarceration than those never incarcerated (11%). In multivariable models, incarceration remained strongly associated with having a detectable viral load (past year incarceration adjusted OR (AOR): 3.50, 95% CI: 1.59, 7.71; prior incarceration AOR: 2.48, 95% CI: 1.44, 4.29). IDU was reported by 10% of individuals with past year incarceration versus 4% of individuals with prior incarceration and less than one percent with no prior history of incarceration. Associations between incarceration and IDU remained in adjusted models (past year incarceration AOR: 13.83, 95% CI: 2.21, 86.36; prior incarceration AOR: 6.61, 95% CI: 1.28, 34.12). Those with past year and prior incarceration had significantly greater odds of unhealthy alcohol use (past year incarceration: AOR: 2.79, 95% CI: 1.35, 5.76; prior incarceration: AOR: 1.69, 95% CI: 1.03-2.76) and past year illicit drug use (past year incarceration: AOR: 3.00, 95% CI: 1.44, 6.25; prior incarceration: AOR: 2.44, 95% CI: 1.53, 3.97) compared with those who were never incarcerated.

Incarceration also remained strongly associated with past 12 month sexual risk behaviors including multiple sex partners (past year incarceration AOR: 2.31, 95% CI: 1.14, 4.69; prior incarceration AOR: 1.75, 95% CI: 1.15, 2.64) and engaging in condomless sex linked to alcohol use (past year incarceration AOR: 15.65, 95% CI: 3.61, 67.92; prior incarceration AOR: 8.69, 95% CI: 2.38, 31.71), drug use (past year incarceration AOR: 6.53, 95% CI: 2.18, 19.52; prior incarceration AOR: 2.97, 95% CI: 1.17, 7.53), or with a non-monogamous partner (past year incarceration AOR: 3.19, 95% CI: 1.40, 7.27; prior incarceration AOR: 2.63, 95% CI: 1.49, 4.65). Incarceration was not significantly associated with condomless sex with an HIV-negative partner. Incarceration appeared to be moderately associated with condomless sex with a partner of unknown HIV status (past year incarceration AOR: 1.91, 95% CI: 0.96, 3.80; prior incarceration AOR: 1.70, 95% CI: 1.10, 2.62), however the association between past year incarceration and the outcome was not statistically significant at the 0.05 level.

Discussion

In this US national sample of HIV-positive MSM veterans in care, incarceration was common: 40% had ever been incarcerated, including nine percent who were incarcerated in the past year. One in three past year releasees and one-quarter with a prior incarceration had a detectable viral load compared with 11% of those with no incarceration history. These effect sizes are comparable to those observed in other studies indicating higher rates of detectable viral load among individuals recently released from incarceration compared with individuals not involved in the criminal justice system.^{20, 63, 64} Incarceration was linked with multiple transmission risk behaviors and substance use factors known to underlie HIV risk outcomes. These findings corroborate extant studies indicating the vulnerability of jail and prison releasees to transmission risk^{65–68} and the likely importance of CJI as one of multiple syndemic factors driving risk in this group.⁴⁹ They provide further evidence for the call for transitional programs to ensure HIV care and drug treatment is sustained during the

transition from jail/prison to the community.⁶⁹ Our multivariable findings suggest the disruptive effects of incarceration and re-entry may contribute to HIV transmission to uninfected drug and sex partners and highlight the need for studies using longitudinal data to rigorously test the impact of incarceration on HIV transmission risk and mediating paths.

The observed associations are striking given the sample of veterans in care. While the quality of HIV care during incarceration is variable,⁷⁰ HIV care in many prison settings achieves excellent viral suppression during incarceration⁷¹ that is often lost after release.⁷² Pre-release discharge planning and post-release case management and support is linked to improved retention in care and viral suppression.^{66,73,74} Veterans have access to additional re-entry resources not available to all releasees, including HCRV programming and primary care following release.⁶⁰ HCRV programs link currently incarcerated, soon-to-be released veterans to an outreach specialist who assesses post-release service needs and develops a plan for linkage to VHA medical, psychiatric, and other social services. In addition, the program provides post-release case management to support engagement in services and substance use treatment. Unfortunately, we observed a minority of veteran releasees use this benefit. Delays in care upon release are particularly troubling given extant evidence indicating the high rates -- nearly 70% -- of mental and/or substance use disorders among releasees seeking HCRV services.⁶² Further research is needed to better understand barriers to accessing care among HIV-positive MSM, including whether stigma associated with sexual minority status may serve as an additional barrier to timely care.

Our study's cross-sectional design limits interpretation of the degree to which incarceration contributes to HIV risk outcomes. An additional limitation includes self-report of drug and sex risk behaviors that are susceptible to recall/social desirability bias and hence may result in misclassification. Finally, the sample of veterans in care limits the generalizability. It is estimated that of the 1.1 million HIV-infected individuals in the US, approximately 50% are virally suppressed and 50% have a detectable viral load, with comparable levels observed among MSM, of whom 51% are virally suppressed.⁷⁵ The finding of lower levels of a detectable viral load including among VACS participants recently released from incarceration highlights the difference between the study population of individuals engaged in care and the general population. However, the strong associations we observed in this sample are comparable those we have observed in other samples.

Despite the limitations, the study points to the continued need to support HIV-positive individuals during the stressful period of release from incarceration in accessing HIV care and highlights the need to further evaluate incarceration as a social determinant of HIV risk.

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Figure 1.
 Percentage with HIV Transmission Risk Outcome by Past Year, Prior, and Never Incarceration Status (Above Bar Chart) and Unadjusted and Adjusted Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Associations between Incarceration and HIV Transmission Risk (Below Table) among HIV-positive MSM*

Table 1.Sociodemographic Factors and Clinical Status by Incarceration History among HIV-positive MSM (N=532)^a

	No Incarceration History N=317	Prior Incarceration (More than One Year Ago) N=165	Past Year Incarceration N=50	p-value
Sociodemographic Factors				
Years of Age (Mean, SD)	53.1	52.5	51.7	0.567
	N (%)	N (%)	N (%)	
Race/Ethnicity				0.012
White	102 (32.2)	31 (18.8)	9 (18.0)	
African American	172 (54.3)	111 (67.3)	31 (62.0)	
Hispanic	28 (8.8)	16 (9.7)	9 (18.0)	
Other	15 (4.7)	7 (4.2)	1 (2.0)	
Marital Status/Living with Partner				0.778
Yes	69 (21.9)	33 (20.1)	9 (18.0)	
No	246 (78.1)	131 (79.9)	41 (82.0)	
Education				0.003
<College	48 (15.2)	41 (25.0)	16 (32.0)	
Some College	268 (84.8)	123 (75.0)	34 (68.0)	
Income <\$12,000/Year				<0.001
Yes	93 (29.5)	69 (43.7)	33 (66.0)	
No	222 (70.5)	89 (56.3)	17 (34.0)	
Homelessness in Past 12 Months ^b				<0.001
Yes	4 (1.3)	21 (12.7)	17 (34.0)	
No	313 (98.7)	144 (87.3)	33 (66.0)	
Clinical Status [‡]				
Median CD4 Lymphocytes (cells/μL)	513 (361-733)	479 (320-679)	459 (320-558)	0.025
CD4 <350 cells/μL	68 (22.4%)	50 (32.9%)	15 (33.3%)	0.031
Median Log HIV-1 RNA (copies/mL)	3.87 (3.87-4.32)	3.87 (3.87-6.20)	3.99 (3.87-6.79)	<0.001
Current Hepatitis C Infection	83 (27.3%)	58 (38.2%)	23 (51.1%)	0.001
Ever Participated in Health Care for Re-entry Veterans Program	Not applicable	12 (7.3%)	9 (18.0%)	<0.001 ^c

^aIn the entire MSM sample, 40.4% had ever been incarcerated: 50 (9.4%) had been incarcerated in the past year and additional 165 (31.0%) had an incarceration prior to the past year. Levels of past year and prior incarceration were more common among non-white (10.5% and 34.4%) than white participants (6.3% and 21.8%).

^bSpent night in shelter or on street

^cCompares levels of HCRV involvement among those with recent versus prior incarceration

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