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Contribution of Substance Use Disorders on HIV Treatment Outcomes and Antiretroviral Medication Adherence Among HIV-infected Persons Entering Jail

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Introduction

The interface between HIV and substance use is inextricably intertwined and is complicated by interactions with the criminal justice system (CJS).^{1,2} Approximately one in six of the estimated 1.1 million HIV-infected individuals in the United States passes through the CJS annually. Most pass through jails where there is routine health assessment.³ As such, jails represent an important opportunity not only to detect and treat HIV infection,⁴ but also to screen for substance use disorders (SUDs). Evidence-based treatments are now routinely available for the treatment of both conditions,² yet the availability of treatment for SUDs within criminal justice settings remains limited and the lack of treatment results in significant morbidity and mortality and recidivism to CJS.⁵⁻⁹

The CJS bears a considerable burden of individuals with SUDs, with up to 65% of prison inmates meeting DSM-IV criteria for drug or alcohol abuse or dependence.^{10,11} Drug use profiles by people entering prison have not appreciably changed since 1997.¹¹ SUDs have a profoundly negative impact on the health of people living with HIV/AIDS (PLWHA).² Not only are drug users less likely to be prescribed antiretroviral therapy (ART), but also, when they are, they are more likely to do so with advanced HIV infection and achieve less favorable treatment outcomes compared to non-drug users.^{12,13}

In community settings, HIV-infected persons who actively use drugs and are not receiving drug treatment have poor engagement in HIV care and adherence to ART,¹⁴ including released prisoners.^{7,15} Alcohol use disorders similarly are associated with poor HIV treatment outcomes¹⁶ especially for those within the CJS.¹⁷ Provision of evidence-based treatment for SUDs, however, markedly improves HIV treatment outcomes.^{18–20} Less than one-fifth of all PLWHA in the U.S. have achieved viral suppression, far lower than the estimated 60% needed to reduce the ~56,000 new HIV infections annually – a number that has not changed appreciably in the past 15 years.²¹ Understanding the types and severity of SUDs among PLWHA who enter jails provides insight into developing necessary strategies in order to better improve access to HIV care, prescription of ART and improve ART adherence, all of which are prerequisite to achieving viral suppression.

We therefore examined the correlates of three major components of the HIV treatment engagement cascade that are requisite for achieving HIV viral suppression in the largest sample of recruited HIV-infected jail detainees: 1) having a HIV care provider; 2) receiving ART; and 3) achieving high levels of ART adherence (≥ 95%) among those prescribed it in the 30 days prior to incarceration. Moreover, because SUDs are chronic and relapsing conditions that figure prominently into comorbidity among jail detainees, we sought to describe the types of drugs used and their severity in order to provide insight into post-release interventions necessary for this population.

Methods

Data for this cross-sectional study is from the baseline assessment of the EnhanceLink initiative that enrolled HIV-infected adults aged 18 or older from 10 diverse jail settings in the U.S.

Study Settings

The 10 study sites in 9 states (CT, GA, IL, MA, NY, OH, PA, RI, SC) and entry criteria for each site²² as well as the post-release substance abuse treatment outcomes²³ have previously been described elsewhere. Subjects were enrolled if they were HIV-infected and provided written consent for study participation. Subjects in New York City (NYC) who received case management for a serious DSM-IV mental disorder were excluded and only women were recruited in Chicago. Out of total 1270, baseline assessments for the 1,166 (91.8%) subjects who knew their HIV diagnosis before incarceration were included in the analysis; 80 of the 1,270 total subjects who reported to be diagnosed with HIV during their index incarceration as well as 24 individuals with incomplete baseline data were excluded.

Dependent Variables

To assess the extent to which detainees engaged in HIV care and treatment, we defined three dependent variables as the primary outcomes of interest: 1) Having an HIV care provider in the 30 days prior to incarceration; 2) Being prescribed ART in the 7 days prior to the index incarceration; and 3) Being highly adherent (defined by self-report of having taken ≥ 95% of prescribed ART) for the subset who received ART in the 7 days prior to incarceration.

Independent Variables and Behavioral Model for Vulnerable Populations

Independent variables were selected in accordance with the Behavioral Model for Vulnerable Populations. This model of health care utilization includes predisposing factors, enabling resources, and need factors as critical elements that influence health care utilization. In Figure 1, we adapt this model for this population as has been previously described for vulnerable populations²⁴ and HIV-infected jail detainees.²⁵

According to the model, predisposing factors are the individuals' intrinsic characteristics that impact health care utilization. Represented in our study, they include age, gender, race, education, relationship status, sexual orientation, perception of health status, and the presence of a number of psychiatric and substance use disorders. Individual's perception of their health status was dichotomized (good, very good, and excellent versus fair or poor). Enabling resources are those factors available to the individual by their community to facilitate access and health care utilization. They include having self-reported health insurance; food insecurity, defined as not having anything to eat for two days or more in the past 30 days; and housing status with homelessness defined as self-identifying as homeless or having spent at least one night in public venues over the past month. Need factors assess the extent to which a person may need care and is often determined by the severity of the diseases, the individual's perceptions of their health and their priorities and needs for receiving care. These often include extent to which a person has multiple medical comorbidities, severity of drug or alcohol use, and severity of their psychiatric illnesses.

Types of drug use in the 30 days pre-incarceration was ascertained using the Addiction Severity Index (ASI)²⁶ that includes opioids (heroin, other opioids / analgesics / painkillers), cocaine, cannabis, and amphetamines. Polysubstance use was defined if subjects used two or more substances per day (including alcohol). Pre-incarceration drug treatment was also reported from the ASI. Severity of substance use was determined by ASI Composite Scores²⁶ The ASI composite scores were reported two ways: 1) continuous variables, ranging from 0–1; and 2) dichotomized composite scores using pre-specified cut-offs. Cut offs of 0.12, 0.15, and 0.22 for drug, alcohol, and psychiatric composite scores have been shown to confer high levels of sensitivity and specificity at (85%, 86%), (86%, 80%), and (90%, 71%), respectively, for DSM-IV diagnoses.^{25,27}

Statistical Analysis

All independent variables that assessed predisposing factors, enabling resources, and need factors as described by Behavioral Model for Vulnerable Populations were assessed and the association between recent drug use and the aforementioned variables were studied. For continuous variables, the difference between the means was tested using independent-sample t-test. For the categorical variables, the Pearson's chi-square test was used. Significance level was defined at 0.05.

Also, we used regression models to examine the correlations between the three major outcomes and drug use. We fitted univariate and multivariate regression models with unadjusted and adjusted odds ratio as the measures of strength. Age, gender, race, and ASI composite scores for drug, alcohol, and psychiatric illnesses plus any variable significant at the $p < 0.10$ in the univariate assessment were then entered into the multivariate logistic regression models to study their association with the three dependent outcomes while controlling for potential confounders. The significance of the overall model was evaluated using the log likelihood ratio test as well as Hosmer & Lemeshow goodness-of-fit test. Individual coefficients in the model were tested using Wald statistic for statistical significance. Multi-collinearity was evaluated between the covariates in the model using tolerance and Variance Inflation Factor (VIF). None of the covariates showed significant multi-collinearity. All the analyses were performed with SPSS statistical software V.16 (SPSS Inc., Chicago IL).

Results

Demographic and drug use characteristics of the sample are presented in Table 1. The mean age of the subjects was 42.8 years, mostly male (72.3%), people of color (80.4%) and heterosexual (78%). Recent drug use over the 30-day pre-incarceration period was reported

for cocaine (53%), alcohol (51%), cannabis (31.4%), and heroin (26.8%). Lifetime use of drug treatment was high with 70.6% of all the detainees reported having received any treatment, while 55.7% were treated by drug detoxification only. Of note, 19.6% who received drug or alcohol treatment in the past 30 days reported concomitant recent substance use.

Using documented ASI composite score cutoffs for high levels of severity, 64.9%, 36.9%, and 52.3% of subjects had ASI composite scores higher than the selected cut-offs for drug, alcohol, and psychiatric co-morbidity, respectively, indicating the group had the highest severity with underlying substance use and psychiatric illnesses.

The correlation between the alcohol and drug use was examined using the corresponding ASI composite scores. ASI drug and ASI alcohol composite scores were significantly correlated ($p<0.001$); however, the correlation was not strong (Pearson's correlation coefficient $r=0.22$, and Spearman's correlation coefficient $r=0.17$). Recent drug use was correlated with a number of demographic, social, and clinical factors. Independent correlates of recent drug use included being female ($p=0.008$), experiencing recent food insecurity ($p<0.001$), homelessness ($p<0.001$) and lower mean age at the time of first arrest compared to non-users ($p=0.004$).

Figure 2 examines the recent engagement in HIV care among pre-incarceration drug users and non-users. Though over 80% of the sample had ever received ART, there was no significant difference between the two groups for this outcome. For the three primary outcomes of interest, pre-incarceration drug users were significantly less likely than non-users to have had a HIV doctor (74.0% versus 81.0%; $p=0.011$), received ART (55.4% versus 76.3%; $p<0.001$; $N=950$) or been adherent to it (48.4% versus 68.0%; $p<0.001$; $N=581$) in the time immediately preceding incarceration.

After controlling for potential covariates, lower drug use severity remained significant for all three primary outcomes. Table 2 presents the univariate and multivariate regression for correlates of having an HIV care provider in the last 30 days. Having health insurance, increased psychiatric severity and being seen by a physician for a non-HIV related condition were independently correlated with having a HIV provider, while increasing drug addiction severity, being female, black, homeless and having a self-perception of poor overall health status were associated with not having a HIV physician.

With regard to the second outcome, receipt of ART just before incarceration (Table 3), having health insurance, receiving treatment for a condition not related to HIV and increasing psychiatric severity portended a 3.67-, 2.98- and 2.65-fold increased likelihood of receiving ART, respectively, while being Black, female, having younger age, experiencing food insecurity, having self-perception of poor health status and having increasing levels of drug addiction severity was negatively associated with this outcome.

Independent correlates for achieving optimal levels of ART adherence, however, yielded different results aside from increasing drug addiction severity being associated with an 82% reduced likelihood of achieving optimal adherence. For this outcome, none of the demographic, social or health utilization factors for other conditions were significant. Being employed and paid for work was associated with a two-fold increased likelihood of optimal adherence.

Discussion

Our findings illustrate that the prevalence of SUDs in the population of HIV-infected jail detainees is extremely high. Among all subjects, 72% had used drugs in the 30 days before

incarceration and is similar to findings from Arrestee Drug Abuse Monitoring (ADAM II) project, where 66% reported any recent drug use, with the most commonly used substances being marijuana (35–58%), cocaine (12–33%), and heroin (3–22%).^{28,29} While most national surveys only measure recent use, our study extends this approach by also measuring addiction severity, which was particularly high within our sample with nearly two thirds of subjects having scores exceeding the threshold for having DSM-IV criteria for SUDs. Moreover, 37% and 52% of inmates had composite scores above the cut-offs for alcohol dependence, and psychiatric illnesses, respectively. These figures document the syndemic nature of HIV, substance abuse, mental illness and its intersection with the criminal justice system.

Unlike the findings among arrestees from ADAM-II, HIV-infected jail detainees were more likely to use cocaine, heroin and alcohol, rather than marijuana. At least for those with opioid dependence and alcohol use disorders, there are a number of evidence-based treatments, primarily medication-assisted therapies, that would greatly benefit these individuals.² Specifically for opioid dependence, evidence-based treatments include methadone, buprenorphine and extended-release naltrexone (XR-NTX). In the case of alcohol dependence, naltrexone in either is oral or XR-NTX formulation is the preferred medication-assisted therapy, but acamprosate and disulfiram are also approved treatments.² In the case of cocaine abuse, some behavioral interventions, specifically cognitive behavioral therapy, have been shown to be effective, but there is no FDA-approved effective medical therapy for cocaine use.^{2,17,30}

Central to this study is the negative contribution of active drug use and the level of severity on each of the three designated HIV treatment outcomes. To our knowledge, this is the first time that drug use severity has been associated with all three negative health consequences along the HIV continuum of care cascade. It would be reasonable to extrapolate that the significantly lower rates of treatment engagement, and specifically suboptimal adherence, would result in lower levels of viral suppression as well. In the U.S., as few as 19% of all PLWHA are currently virally suppressed.²¹ With one sixth of all PLWHA transitioning through the CJS annually, it stands to reason that this population needs significantly better interventions to keep them fully engaged in care. Moreover, PLWHA who transition through the CJS have been documented to have high rates of HIV risk behaviors upon release³¹ and in the absence of effective HIV risk reduction strategies such as consistent evidence-based drug treatment, condom use or syringe exchange programs, interventions that target viral suppression would greatly contribute to HIV transmission and ultimately lower the ~56,000 new infections that have remained unchanged for the past decade.

The findings show that every 0.1 incremental increase in level of addiction severity translates into a 12% reduction in likelihood of having a HIV provider, a 19% reduction in likelihood of receiving ART, and a 16% reduction in achieving optimal ART adherence. Alcohol use severity, on the other hand, did not correlate with these outcomes aside from trending towards significance for ART adherence, but alcohol use disorders (AUD), per se, have been associated with a number of poor HIV treatment outcomes,¹⁶ especially with CJS populations.¹⁷ Unfortunately, only alcohol use severity and not the presence of an AUD was assessed in this study, but future jail-release programs should systematically assess them among PLWHA and link them with evidence-based alcohol relapse prevention treatments in order to improve retention in care and adherence with ART.³²

Having health insurance was the strongest factor correlated with being engaged in HIV care and being prescribed ART. Similar findings have been found among the homeless.^{25,26} Similarly, being female and black were independently and negatively associated with these two outcomes. Therefore interventions that focus on PLWHA transitioning from jail should

be culturally and gender appropriate in order to reap the greatest benefits. Two comorbidities, individuals with high psychiatric severity and having been seen for a condition unrelated to HIV, were independently associated with having a HIV care provider and receiving ART. According to the Behavioral Model, these two factors would be consistent with need factors – having other conditions that require them to be engaged in care. Moreover, those with the highest psychiatric severity would also gain access to health insurance due to it being a disability and perhaps serve as a conduit to simultaneous HIV treatment.

Although this is the largest study of its size, a few limitations exist. First, the study is cross-sectional and only associations rather than causality can be inferred. Second, most data are self-reported and may introduce information biases, including reporting and recall bias. Third, using the 30-day pre-incarceration period may introduce bias in two directions. Those whose lives have become more chaotic and result in incarceration may over-represent the drug use information, while those who are on remanded while on probation or awaiting trial may reduce their drug use behaviors while trying avoiding jail. Moreover, though we used a number of psychometrically validated measures to assess the likelihood of being dependent on drugs or alcohol, we did not use standardized clinical screening measurements that would provide increased accuracy. Instead, we often relied on measures of drug and alcohol use severity. Notwithstanding these limitations, this is the largest sample of PLWHA who interface with jails and provide valuable insight into the healthcare disparities facing this vulnerable population during the period just prior to incarceration and give some insight into post-release needs.

Conclusions

Recent active drug use and addiction severity is extremely high among PLWHA as they enter jail, and is associated with a number of demographic and social instability characteristics, suggesting the need for multidisciplinary and gender-specific interventions for PLWHA. Although HIV-infected jail detainees had a number of community-based interactions with drug treatment services, most of them had been “detox” and may not have included many evidence-based treatments. The findings of increased drug use severity markedly reducing the engagement of PLWHA in the HIV treatment continuum of care suggests that evidence-based drug treatment interventions are urgently needed for this vulnerable and “challenging” population.

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Figure 1. Conceptual model of health behaviors among the HIV-infected persons during the pre-incarceration period – adapted from Chen N, et al. 2011 with permission.

Figure 2.
Comparison of HIV Treatment Outcomes Among HIV-infected Drug Users Entering Jail
(N=1166)

Table 1

Demographic characteristics, substance use pattern, substance use treatment history, and their associations with recent drug use - stratified based on any drug use in the 30 days pre-incarceration

	Total	Any Drug Use –30 days pre-incarceration		P-value
		User N=841	Non-user N=322	
Mean Age, years (S.D.)	42.8 (8.8)	42.4 (8.8)	44.1 (8.7)	0.004
Gender	Male	842 (72.3%)	256 (30.4%)	0.008
	Female	322 (27.7%)	73 (22.7%)	
Race/ethnicity	White	159 (13.9%)	41 (25.8%)	0.779
	Hispanic	292 (25.5%)	79 (27.1%)	
	Black	628 (54.9%)	178 (28.4%)	
	Other	65 (5.7%)	22 (33.8%)	
Education	< High school	586 (50.6%)	152 (26.0%)	0.107
	High school diploma	572 (49.4%)	173 (30.2%)	
Relationship Status	Married or in a relationship	358 (30.7%)	106 (29.7%)	0.507
	Not in relationship	807 (69.3%)	224 (27.8%)	
Sexual Orientation	Homo/bisexual	255 (22.0%)	72 (28.2%)	0.944
	Heterosexual	904 (78.0%)	257 (28.5%)	
Patient's self-perception of his/her health status	Good	634 (54.6%)	194 (30.6%)	0.056
	Poor	528 (45.4%)	135 (25.6%)	
Health Insurance	Yes	911 (78.7%)	261 (28.7%)	0.630
	No	247 (21.3%)	67 (27.1%)	
Food Insecurity	Yes	431 (37.2%)	78 (18.1%)	<0.001
	No	727 (62.8%)	252 (34.8%)	
Homelessness	Yes	454 (39.2%)	93 (20.5%)	<0.001
	No	705 (60.8%)	233 (33.1%)	
Employment – Past 3 years	Employed	246 (21.3%)	81 (32.9%)	0.058
	Unemployed	911 (78.7%)	244 (26.8%)	
Paid Work –30 days pre-incarceration	Yes	223 (19.6%)	57 (25.6%)	0.372

	Total	Any Drug Use –30 days pre-incarceration **		P-value
		User N=841	Non-user N=322	
	No	653 (71.4%)	261 (28.6%)	
Age at First Arrest	13 yrs	100 (76.9%)	30 (23.1%)	0.192
	>13 yrs	706 (71.5%)	282 (28.5%)	
Mean age at first arrest, years (SD)	19.8 (7.1)	19.5 (6.8)	20.6 (7.7)	0.035
Medical Illnesses & Comorbidities				
Medical Comorbidities	Yes	632 (72.2%)	243 (27.8%)	0.303
	No	194 (69.0%)	87 (31.0%)	
Receiving treatment for a medical illness other than HIV	Yes	593 (71.1%)	241 (28.9%)	0.321
	No	243 (27.5%)	82 (25.9%)	
Mean number of times treated for Psychiatric illness (Inpatient)	1.2	1.2	1.2	0.827
Mean number of times treated for Psychiatric illness (Outpatient)	1.3	1.5	1.2	0.186
Substance Use Disorders – Last 30 days				
Alcohol				
Any Use	51.0%	59.5%	29.0%	<0.001
To Intoxication	27.8%	33.7%	12.7%	<0.001
Opioids				
Any Opioid	31.8%	44.1%	----	----
Heroin	26.8%	37.1%	----	----
Other	9.2%	12.7%	----	----
Cocaine	53.0%	73.5%	----	----
Cannabis	31.4%	43.7%	----	----
Amphetamine	1.7%	2.4%	----	----
Polysubstance Use *	56.4%	73.9%	----	----
Drug Treatment				
Treated for “alcohol” or “drug” use –30 days pre-incarceration	19.9%	19.6%	20.7%	0.691
Treated for alcohol use -lifetime	27.8%	28.4%	26.5%	0.505
Treated for drug use - lifetime	70.6%	76.4	55.4%	<0.001

	Total	Any Drug Use –30 days pre-incarceration**		P-value
		User N=841	Non-user N=322	
“Detox” only for alcohol -lifetime	22.1%	23.6%	18.0%	0.052
“Detox” only for drug -lifetime	55.7%	60%	43.8%	<0.001
Addiction Severity Index (ASID)- Composite Scores – Continuous (Mean + SD)				
Drugs	0.20 + 0.16	0.26 + 0.14	0.05 + 0.07	<0.001
Alcohol	0.18 + 0.25	0.22 + 0.27	0.10 + 0.19	<0.001
Psychiatric	0.28 + 0.26	0.29 + 0.26	0.25 + 0.25	0.021
Addiction Severity Index - Composite Scores – Dichotomous (using standard cut offs)				
Drugs (score 0.12)	64.9%	81.6%	20.5%	<0.001
Alcohol (score 0.15)	36.9%	43.5%	20.0%	<0.001
Psychiatric (score 0.22)	52.3%	54.2%	47.5%	0.042

* defined as using more than one type of drug in the same day during the 30-day period prior to index incarceration.

** Numbers may not add up exactly to 100% due to missing data

Legend: ART: antiretroviral therapy; SD=standard deviation

Table 2
Significant correlates of having a HIV care provider within the 30-day period prior to incarceration

Variable		Unadjusted OR [%95 CI]	p-value	Adjusted OR [%95 CI]	p-value
Gender					
	Male	Referent			
	Female	0.61 [0.46 – 0.81]	0.001	0.54 [0.38 – 0.78]	0.001
Age, years – continuous					
		1.04 [1.03–1.06]	<0.001	1.02 [1.00–1.04]	0.091
Race/ethnicity					
	White	Referent			
	Black	0.58 [0.37–0.90]	0.014	0.48 [0.27–0.86]	0.013
	Hispanic	1.03 [0.63 – 1.71]	0.898	0.65 [0.34 – 1.24]	0.190
	Other	0.58[0.29 – 1.31]	0.109	0.40 [0.17 – 0.94]	0.035
Food Insecurity					
	No	Referent			
	Yes	0.60 [0.46 – 0.79]	<0.001	0.80 [0.53–1.21]	0.289
Homelessness					
	No	Referent			
	Yes	0.35 [0.27 – 0.46]	<0.001	0.61 [0.41–0.92]	0.017
Paid work in 30 days pre-incarceration					
	No	Referent			
	Yes	0.71 [0.51 – 0.99]	0.043	0.92 [0.60–1.40]	0.688
Health Insurance					
	No	Referent			
	Yes	7.49 [5.48 – 10.23]	<0.001	5.26 [3.58– 7.71]	<0.001
Medical Comorbidities					
	No	Referent			
	Yes	1.96 [1.45 – 2.63]	<0.001	1.02 [0.66–1.52]	0.955
Receiving treatment for medical illnesses other than HIV					
	No	Referent			
	Yes	2.59 [1.94 – 3.45]	<0.001	2.28 [1.57–3.32]	<0.001
Patient's self-perception of his/her health					
	Good	Referent			
	Poor	0.73 [0.56–0.96]	0.022	0.67 [0.47–0.95]	0.024
Addiction Severity - Drug Composite Score (continuous)					
		0.34 [0.14 – 0.82]	0.017	0.28 [0.09–0.89]	0.031
Addiction Severity - Alcohol Composite Score (continuous)					
		0.51 [0.31–0.86]	0.011	0.67 [0.34–1.31]	0.238
Addiction Severity - Psychiatric Composite Score (continuous)					
		1.27 [0.75 – 2.15]	0.381	2.89 [1.36– 6.13]	0.006

Legend: OR=Odds Ratio; CI=confidence interval

The following were not found to be significant correlates at p<0.10 on bivariate analysis and not included in the final model: education, relationship status, sexual orientation, employment (last 3 years), age at first arrest.

Table 3
Significant correlates of receiving antiretroviral therapy (ART) in 7 days prior to incarceration

Variable		Unadjusted OR [95% CI]	p-value	Adjusted OR [95% CI]	p-value
Gender	Male	Referent			
	Female	0.44 [0.33–0.59]	<0.001	0.46 [0.32–0.67]	<0.001
Age – continuous		1.04 [1.02–1.06]	<0.001	1.03 [1.01–1.05]	0.003
Education	Less than High School Diploma	Referent			
	High School diploma or higher	1.32 [1.02–1.72]	0.038	1.19[0.86–1.65]	0.304
Race/ethnicity	White	Referent			
	Black	0.74 [0.50–1.11]	0.148	0.54 [0.32–0.91]	0.021
	Hispanic	1.15 [0.74–1.80]	0.541	0.82 [0.46–1.46]	0.494
	Other	0.78 [0.40– 1.52]	0.468	0.49 [0.21– 1.14]	0.097
Food Insecurity	No	Referent			
	Yes	0.44 [0.34–0.58]	<0.001	0.58 [0.40–0.84]	0.004
Homelessness	No	Referent			
	Yes	0.43 [0.33–0.57]	<0.001	0.79[0.55–1.13]	0.187
Health Insurance	No	Referent			
	Yes	3.66 [2.57–5.19]	<0.001	2.58 [1.68– 3.94]	<0.001
Medical Comorbidities	No	Referent			
	Yes	1.40 [1.03–1.91]	0.033	1.03 [0.68–1.56]	0.902
Receiving treatment for medical illnesses other than HIV	No	Referent			
	Yes	2.69 [1.94–3.73]	<0.001	2.98 [2.00–4.44]	<0.001
Patient's self-perception of his/her health	Good	Referent			
	Poor	0.59 [0.45–0.77]	<0.001	0.55[0.40–0.76]	<0.001
Addiction Severity - Drug Composite Score (continuous)		0.13 [0.05–0.31]	<0.001	0.12[0.04–0.35]	<0.001
Addiction Severity - Alcohol Composite Score (continuous)		0.44 [0.26–0.75]	0.003	0.63[0.33–1.22]	0.170
Psychiatric Composite Score (continuous)		0.73 [0.43–1.21]	0.218	2.65 [1.33–5.28]	0.006

Legend: OR=odds ratio; CI=confidence intervals

The following were not found to be significant correlates at $p<0.10$ on bivariate analysis and not included in the final model: relationship status, sexual orientation, employment (last 3 years), paid work (30 days pre-incarceration), age at first arrest.

Significant correlates of high levels of adherence to antiretroviral therapy (95%) among subjects who received antiretroviral therapy in the 7 days prior to incarceration

Table 4

Variable	Unadjusted OR [95% CI]	p-value	Adjusted OR [95% CI]	p-value
Gender				
Male	Referent			
Female	1.04 [0.69–1.58]	0.847	0.96[0.60–1.54]	0.861
Age – continuous	1.00 [0.98–1.02]	0.814	1.00 [0.98–1.02]	0.969
Race/ethnicity				
White	Referent			
Black	1.08 [0.66–1.76]	0.771	1.02 [0.59–1.76]	0.955
Hispanic	1.06 [0.62–1.80]	0.831	1.24 [0.68–2.26]	0.485
Other	0.86 [0.37–1.99]	0.731	0.83 [0.34–2.05]	0.686
Food Insecurity				
No	Referent			
Yes	0.68 [0.47–0.98]	0.039	0.97[0.62–1.54]	0.908
Homelessness				
No	Referent			
Yes	0.61 [0.42–0.87]	0.007	0.72 [0.47–1.10]	0.129
Paid work-30 days pre-incarceration				
No	Referent			
Yes	2.03 [1.27–3.24]	0.003	2.02 [1.21–3.36]	0.007
Patient's self-perception of his/her health				
Good	Referent			
Poor	0.68 [0.49–0.96]	0.026	0.70 [0.48–1.02]	0.062
Addiction Severity - Drug Composite Score (continuous)	0.14 [0.05–0.45]	0.001	0.18 [0.05–0.62]	0.007
Addiction Severity - Alcohol Composite Score (continuous)	0.41 [0.20–0.85]	0.017	0.49 [0.22–1.13]	0.094
Psychiatric Composite Score (continuous)	0.91 [0.47–1.76]	0.784	1.45 [0.64–3.29]	0.371

Legend: OR=odds ratio; CI=confidence interval

The following were not found to be significant correlates at $p < 0.10$ on bivariate analysis and not included in the final model: education, relationship status, sexual orientation, health insurance, age at first arrest, medical comorbidities, receiving treatment for medical illnesses other than HIV.