



Research Paper

Incarceration history, antiretroviral therapy, and stigma: A cross-sectional study of people with HIV who inject drugs in St. Petersburg, Russia



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ABSTRACT

Background: The HIV epidemic is intertwined with substance use and incarceration in Russia. The relationships between incarceration history, HIV treatment history, and stigma experiences among people with HIV (PWH) who inject drugs in Russia have not been well described.

Methods: We conducted a cross-sectional study of a cohort of PWH with opioid use disorder who inject drugs ($n=201$) recruited at a narcology (substance use treatment) hospital in St. Petersburg, Russia from September 2018 to December 2020. The primary analysis evaluated the association between self-reported prior incarceration and prior antiretroviral therapy (ART) initiation using multivariable logistic regression to adjust for demographic, social, and clinical covariates. We used multivariable linear regression models to analyze associations between prior incarceration and two secondary outcomes: HIV stigma score (11-item abbreviated Berger scale) and substance use stigma score (21-item combination of Substance Abuse Self-Stigma Scale and Stigma-related Rejection Scale).

Results: Mean age was 37 (SD 5) years; 58.7% were male. Participants had been living with HIV for a mean of 13 (SD 6) years. Over two thirds (69.2%) of participants reported prior incarceration. One third (35.3%) of participants reported prior ART initiation. Prior incarceration was not significantly associated with prior ART initiation (AOR 1.76; 95% CI: 0.81, 3.83). Prior incarceration was associated with a lower HIV stigma score (adjusted mean difference in z-score: -0.50 ; 95%CI: -0.81 , -0.19) but was not significantly associated with substance use stigma score (adjusted mean difference in z-score: -0.10 ; 95%CI: -0.42 , 0.21).

Conclusion: Prior incarceration was common, and rates of prior ART initiation were low even though most participants had been living with HIV for at least a decade. We did not find an association between prior incarceration and prior ART initiation, which suggests a need to explore whether opportunities to initiate ART during or after incarceration are missed.

Clinical Trial Number: NCT03290391.

Abbreviations: ART, antiretroviral therapy; PWH, people with HIV; HIV, human immunodeficiency virus; AOR, adjusted odds ratio; PWID, people who inject drugs; AUDIT, Alcohol Use Disorder Identification Test; CES-D, Center for Epidemiologic Studies Depression scale; GAD-7, Generalized Anxiety Disorder scale; VR-12, Veterans RAND 12-Item Health Survey.

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Introduction

The HIV epidemic in the Russian Federation (“Russia”), which accounts for over half of all new HIV cases in the WHO Europe region (European Centre for Disease Prevention and Control & WHO Regional Office for Europe, 2021), has been fueled by mass incarceration, opioid use disorder, and injection drug use (Altice et al., 2016)—i.e., a syndemic (Singer et al., 2017) where multiple disease entities and social vulnerabilities coincide within a population and interact synergistically. Due to punitive drug policies and weak investments in HIV prevention and treatment for key populations, people who inject drugs (PWID) in Russia experience very high rates of HIV infection, high rates of incarceration, intense stigma and marginalization, and poor access to high-quality care for HIV and drug dependency (Altice et al., 2016; Golichenko & Sarang, 2013; Jolley et al., 2012; Yasaveev, 2020). As examples of these punitive national policies, possession of small amounts of an illicit substance (e.g. for personal use) is a criminal offense punishable by incarceration; opioid agonist therapies for the treatment of opioid use disorder remain legally banned; and people with a drug dependency who seek narcology care at governmental clinics are placed on a government registry which restricts their access to drivers’ licenses and other resources (and facilitates targeting by police) (Altice et al., 2016; Golichenko & Sarang, 2013; Jolley et al., 2012).

While prior research has explored the role of police brutality and incarceration in shaping the HIV risk environment of PWID in Russia and other Eastern European countries (Lunze et al., 2014, 2015, 2016; Sarang et al., 2006, 2010), the relationship between incarceration and HIV care engagement among people with HIV (PWH) who inject drugs is not well described. If HIV care is relatively available in carceral facilities, then an incarceration—despite its potential deleterious effects on health (Brinkley-Rubinstein, 2013; Massoglia & Pride-more, 2015; Wildeman & Wang, 2017)—might serve as a touchpoint for vulnerable populations that otherwise might not be able to access care (Westergaard et al., 2013). However, in most of Russia, ART coverage is low overall (Beyrer et al., 2017; Parfitt, 2011), especially for PWID, who comprise the majority of PWH (Jolley et al., 2012). Historically carceral institutions have often had poorly resourced medical facilities (Parfitt, 2010), although a recent study of HIV in the Russian penitentiary system reported substantial improvement in ART coverage from 21.7% in 2014 to 89.6% in 2020 (Ponomarev et al., 2022). Even after release, experiences of incarceration can have immediate and lasting effects which create ongoing barriers to HIV care (Iroh et al., 2015; Rich et al., 2016; Westergaard et al., 2011), such as mistrust of medical providers (Teoharov et al., 2018), disruptions in the social resources (e.g. employment, housing) that support care engagement (Brinkley-Rubinstein & Turner, 2013; Pecoraro et al., 2013; Taweh et al., 2021), and the risk of relapse during post-incarceration reentry (Cepeda, Nicolai, et al., 2015; Cepeda, Vetrova, et al., 2015; Joudrey et al., 2019). A better understanding of the link between incarceration experiences and HIV treatment history would help gauge how well public institutions are utilizing this critical touchpoint and could illuminate challenges and opportunities for community providers seeking to better engage this population.

Moreover, in combination with criminal-legal and health system policies and practices, stigma may also be a key barrier to care for PWH who inject drugs in Russia (Jolley et al., 2012; Lunze et al., 2015). Generally, stigma refers to the social process of labeling, stereotyping, separation, discrediting, devaluing, and discrimination of individuals with stigmatized identities in a setting where power is exercised (Link & Phelan, 2001). A variety of stigma manifestations can impact targeted individuals’ access to health care and health outcomes: experiences of discrimination (e.g., mistreatment by health care professionals, exclusion from housing), internalization of stigma (i.e., of negative views of self), and anticipated stigma (e.g., avoidance of settings where discrimination is expected) (Hatzenbuehler et al., 2013; Major et al., 2018; Stangl et al.,

2019). In societies around the world, the stigma attached to having HIV has been identified as a key driver of access to care and health outcomes for PWH (Earnshaw et al., 2013; Sayles et al., 2009; Smith et al., 2020), and similar dynamics have been described for those who face stigma related to substance use (Earnshaw, 2020; Hammarlund et al., 2018). Many individuals in the syndemic of HIV, poor mental health and incarceration due to drug criminalization in Russia face additional forms of stigma related to mental illness or criminal legal status (e.g. prior incarceration) (Howell et al., 2022). While this study focuses on HIV and substance use stigmas due to the limited scope of our data, their intersection with other forms of stigma may affect health care utilization and health outcomes. The relationships between drug use stigma, HIV stigma, and health care utilization have previously been studied among PWID in Russia (Calabrese et al., 2016; Sereda et al., 2020; Vetrova et al., 2021), but less is known about the role, potentially positive or negative, that prior incarceration (and related stigma) has on their experiences of stigma or on ART use. Research to better understand these relationships might inform new approaches for counteracting stigma in this population.

Using cross-sectional data from a cohort of PWH who inject drugs with opioid use disorder in St. Petersburg, Russia, we sought to characterize the association between prior incarceration and whether one had ever initiated ART. Secondarily, we evaluated the associations of incarceration with measures of HIV stigma and substance use stigma.

Methods

Data source and cohort selection

We conducted a cross-sectional analysis of baseline data from the *Linking Infectious and Narcology Care – Part II* (LINC-II) trial, a randomized controlled trial that tested the effectiveness of a multi-faceted clinical intervention for PWH who inject drugs which combined rapid access to ART, naltrexone for the treatment of opioid use disorder, and strengths-based case management (Gnatienko et al., 2020). From September 2018 to December 2020, LINC-II recruited patients who were admitted at a narcology hospital in St. Petersburg, Russia (i.e., a government-funded substance use treatment hospital) to participate in the study if they met eligibility criteria, which included being 18 years of age or older, fluency in Russian, HIV-positivity, current diagnosis of opioid use disorder, and history of injection drug use. Additionally, due to the nature of the trial intervention, individuals were ineligible if they had been on ART within the past 30 days or had a medical contraindication to treatment with naltrexone (e.g., pregnancy, liver failure). After receiving treatment as needed for initial withdrawal symptoms, each potentially eligible patient identified on pre-screening via medical record review met with a hospital clinician not involved in that patient’s care in a private room where the clinician described the study, screened for eligibility, offered enrollment, and, as appropriate, documented informed consent. Potentially eligible patients were informed that participation was voluntary and that their decision on whether to enroll would not affect the usual care that they would otherwise receive. All participants provided voluntary, written informed consent in Russian. Immediately following enrollment, participants were administered a baseline assessment questionnaire about sociodemographic information, HIV and substance use history, health service utilization, experiences of stigma, and measures of health status. Participants were compensated the equivalent of approximately 10 US dollars for completion of the baseline assessment, an amount that was deemed locally appropriate and not coercive by community members and the institutional review boards providing ethical oversight for this study (named below).

Out of 953 potentially eligible participants identified in pre-screening, 75 (8%) did not successfully complete screening (e.g. previously enrolled, discharged early), 651 (68%) did not meet eligibility/inclusion criteria (mostly due to current ART treatment), 4 (<1%) declined to participate, and 223 (23%) were enrolled into the trial. Of

the 223 LINC-II trial participants, we included the 201 with complete data in the study sample for this secondary analysis: six participants were missing information about incarceration history, and an additional 16 participants were missing information for other covariates (CES-D was missing for 11; AUDIT, 2; VR-12 PCS and MCS, 3). All 201 participants had data for the primary outcome of prior ART initiation and the secondary outcome of substance use stigma. Of note, 15 participants were missing data for the other secondary outcome of HIV stigma, so analysis of that specific outcome used a sample size of $n=186$.

The institutional review boards of Boston University Medical Campus and Pavlov First St. Petersburg State Medical University approved this study. Reporting in this study followed all applicable *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE) guidelines for cross-sectional studies.

Measures

The primary outcome was prior ART initiation (i.e., whether a participant reported ever having initiated ART). The secondary outcomes were measures of HIV stigma and substance use stigma. HIV stigma was measured using a 10-item short form (Wright et al., 2007) of the Berger scale (Berger et al., 2001) with an eleventh question added: “I worry that the people I drink or do drugs with will act negatively toward me if I tell them that I am HIV positive.” Each item was scored on a Likert-type scale from 1 (less stigma) to 4 (more stigma). The summary HIV stigma score was the mean score across all 11 items. Substance use stigma was measured by combining the 12-item abbreviated Substance Abuse Self-Stigma Scale (Luoma et al., 2012) and the 9-item Stigma-related Rejection Scale (Luoma et al., 2007), both of which consisted of items scored on a Likert-type scale, from 1 (less stigma) to 5 (more stigma). The summary substance use stigma score was the mean score across all 21 items. If a participant refused or was missing any individual item(s) from a stigma measurement tool, the stigma score was counted as missing and that participant was excluded from analysis of that outcome.

The main exposure of interest was any history of prior incarceration. Participants were asked if they had been incarcerated in the past 12 months, and if so, for how many months total. They were then asked the same question(s) regarding all times prior to the past 12 months. Based on this information, our main exposure was a binary variable denoting whether a participant had ever been incarcerated. As part of an exploratory analysis of cumulative incarceration exposure (described below), we also calculated the total number of months that a participant had been incarcerated in their lifetime and classified participants into four levels: never, 1–47 months (<4 years), 48–95 months (4–7 years), or ≥ 96 months (≥ 8 years).

We included information on demographic, social, and clinical characteristics from the baseline questionnaire. We identified self-reported information about participants’ age, gender (binary: male or female), marital status (married or living with a partner vs. not), whether they had a stable living situation for the past 30 days, employment status for the majority of the past year (full-time employment, homemaker or student vs. other, which included employed part-time, unemployed, permanently or temporarily disabled, and retired), income ($\leq 20,000$ rubles per month [equivalent to approximately 300 US dollars at that time] (Russian Rouble to US Dollar Spot Exchange Rates for 2019, 2022) vs. more than that), whether they ever “ran out of money for basic necessities” in the past 12 months, and number of years since initial HIV diagnosis. Participants were asked if they had ever had a CD4 cell count test, and if so what their lowest CD4 cell count was. Health-related quality of life was measured using both the physical component score (PCS) and the mental component score (MCS) from the Veterans RAND 12-Item Health Survey (VR-12) (Kazis et al., 2006). Depressive symptoms severity in the past week was measured using the standard 20-item Center for Epidemiologic Studies Depression Scale (CES-D), which we dichotomized as high (sum score ≥ 16) vs. low (<16) (Weissman et al., 1977). Anxiety symptoms severity in the past two weeks was measured

using the 7-item Generalized Anxiety Disorder scale (GAD-7), which we dichotomized as high (sum score ≥ 10) vs. low (<10) (Spitzer et al., 2006). We assessed risky alcohol use in the past year using the Alcohol Use Disorder Identification Test (AUDIT) score, which we dichotomized as high (sum score ≥ 8) vs. low (<8) (Saunders et al., 1993). Opioid use disorder severity was measured by the number of DSM-5 criteria for opioid use disorder that a participant met (American Psychiatric Association, 2013; Hasin et al., 2013).

Statistical analysis

For the primary analysis, we used a multivariable logistic regression model to analyze the association between any history of incarceration and prior ART initiation (primary outcome). As a secondary analysis, we used separate multivariable linear regression models to analyze the associations between prior incarceration and each of the secondary outcomes, HIV stigma score and substance use stigma score, respectively. Because the HIV and substance use stigma scores may be difficult to interpret on their original scales, we converted both stigma scores into standardized z-scores using the observed means and standard deviations of the study sample. All our models were adjusted for the following covariates: age, gender, marital status, employment status, income, lack of money for basic necessities, years since initial HIV diagnosis, VR-12 PCS and MCS, CES-D score, GAD-7 score, and AUDIT score (age, years since initial HIV diagnosis, and VR-12 PCS and MCS were continuous variables). We did not include stable living situation, CD4 cell count or opioid use disorder severity measures as covariates in our models due to low rates of CD4 testing and to homogeneous distributions of the variables for stable living situation and opioid use disorder severity. As an exploratory analysis, we replaced the binary incarceration exposure variable with a four-level categorical variable for lifetime cumulative months of incarceration (never, 1–47 months, 48–95 months, or ≥ 96 months) and repeated the above analyses.

Results

As shown in Table 1, the sample was young and mostly male, consistent with general demographics of PWID in Russia. A majority of participants reported lacking full-time employment for most of the past year (57.7%) and having run out of money for basic necessities at some point (56.7%). All participants met DSM-5 criteria for moderate or severe opioid use disorder (all but 2 participants were severe; data not shown). High-risk alcohol use (AUDIT) and moderate-to-severe depressive symptoms (CES-D) and anxiety symptoms (GAD-7) were common, affecting nearly half the sample or more. Participants had lived with an HIV diagnosis for a mean of 13 (standard deviation [SD] 6) years. Among the 117 (58.2%) who reported prior CD4 testing, participants’ lowest self-reported CD4 cell count was 362 cells/mm³ on average (SD 227).

Most participants (139 of 201, or 69.2%) had been incarcerated at least once in their lifetime, and, among those with this history, the median cumulative time that participants had been incarcerated during their lifetime was 54 months (interquartile range: 29, 102). While the group with a history of incarceration was comprised primarily of males and the never incarcerated group primarily of females, the two groups were similar in other characteristics, including a long period of time since initial HIV diagnosis (mean of 13 years) and a low proportion with any prior CD4 testing (little over half).

Prior ART initiation was more common among the previously incarcerated: among the participants with any history of prior incarceration, 35.3% (49 out of 139) reported prior ART initiation, compared to 30.6% (19 out of 62) among those with no incarceration history (unadjusted odds ratio 1.23). In the multivariable logistic regression analysis (Table 2) any history of prior incarceration was not significantly associated with prior ART initiation (AOR 1.76; 95% CI: 0.81, 3.83; $p=0.15$). Also, female gender, more years since HIV diagnosis, and lower (worse)

Table 1

Baseline characteristics of a cohort of PWH ($n=201$) who have opioid use disorder and inject drugs in Russia (2018–2020) - overall and stratified by incarceration history.

	Overall ($n=201$)	Incarceration History	
		Ever Incarcerated ($n=139$)	Never Incarcerated ($n=62$)
Age, mean (SD)	37 (5)	37 (4)	36 (5)
Gender, no. (%)			
Male	118 (58.7%)	98 (70.5%)	20 (32.3%)
Female	83 (41.3%)	41 (29.5%)	42 (67.7%)
Married or Living with Partner, no. (%)	123 (61.2%)	84 (60.4%)	39 (62.9%)
Stable Living Situation for the Past 30 Days, no. (%)	188 (93.5%)	127 (91.4%)	61 (98.4%)
Employment over past year, no. (%)			
Full-time employment, student, or homemaker	85 (42.3%)	57 (41.0%)	28 (45.2%)
Other [†]	116 (57.7%)	82 (59.0%)	34 (54.8%)
Income, rubles/month, no. (%)			
0–20,000	62 (30.8%)	41 (29.5%)	21 (33.9%)
>20,000	139 (69.2%)	98 (70.5%)	41 (66.1%)
Ran out of money for necessities in past 12 months, no. (%)	114 (56.7%)	77 (55.4%)	37 (59.7%)
Years since initial HIV diagnosis, mean (SD)	13 (6)	13 (6)	12 (6)
Ever had CD4 test, self-reported, no. (%)			
Yes	117 (58.2%)	81 (58.3%)	36 (58.1%)
No	48 (23.9%)	30 (21.6%)	18 (29.0%)
Don't know	36 (17.9%)	28 (20.1%)	8 (12.9%)
Lowest self-reported CD4 cell count, mean (SD) [‡]	362 (227)	358 (235)	372 (209)
High risk alcohol use (AUDIT score ≥ 8), no. (%)	99 (49.3%)	67 (48.2%)	32 (51.6%)
Moderate/severe depression symptoms (CES-D ≥ 16), no. (%)	155 (77.1%)	106 (76.3%)	49 (79.0%)
Moderate/severe anxiety symptoms (GAD-7 ≥ 10), no. (%)	81 (40.3%)	51 (36.7%)	30 (48.4%)
Health-related quality of life (VR-12), mean (SD)			
Physical Component Score (PCS)	37.6 (12.3)	38.9 (11.8)	34.6 (13.0)
Mental Component Score (MCS)	44.4 (10.3)	45.1 (9.9)	42.8 (11.0)
Total time incarcerated in lifetime, median (25 th , 75 th percentiles)		54 (29,102)	

Abbreviations: PWID = people who inject drugs; AUDIT = Alcohol Use Disorder Identification Test; CES-D = Center for Epidemiologic Studies Depression scale (standard 20-item version); GAD-7 = Generalized Anxiety Disorder scale (standard 7-item); VR-12 = Veterans RAND 12-Item Health Survey.

[†] Employment status for most of the past year compared those who reported being full-time employed, homemaker, or student to those who reported part-time employment, unemployed, disabled, or retired.

[‡] Among those who affirmatively reported prior CD4 testing.

Table 2

Results of multivariable logistic regression model[†] for primary outcome, ever initiated ART. ($N=201$).

Variable	AOR [†]	(95% CI)	p-value
Prior Incarceration History	1.76	(0.81, 3.83)	0.15
Age (years)	0.99	(0.92, 1.07)	0.83
Gender			
Female	2.39	(1.04, 5.47)	0.04
Male	(ref.)		
Married or Living with Partner	0.61	(0.30, 1.21)	0.16
Employment over past year			
Full-time employment, student, or homemaker	1.41	(0.71, 2.78)	0.33
Other [†]	(ref.)		
Income, rubles/month			
0–20,000	1.19	(0.55, 2.56)	0.66
>20,000	(ref.)		
Ran out of money for necessities in past 12 months	0.83	(0.42, 1.65)	0.60
Years since HIV diagnosis	1.11	(1.05, 1.18)	0.0003
High risk alcohol use (AUDIT score ≥ 8)	0.58	(0.29, 1.16)	0.12
Moderate/severe depression symptoms (CES-D ≥ 16)	0.49	(0.20, 1.17)	0.11
Moderate/severe anxiety symptoms (GAD-7 ≥ 10)	0.46	(0.20, 1.05)	0.07
VR-12 Physical Component Score (PCS)	1.02	(0.99, 1.06)	0.21
VR-12 Mental Component Score (MCS)	0.95	(0.91, 0.98)	0.003

Abbreviations: ART = antiretroviral therapy; AOR = adjusted odds ratio; AUDIT = Alcohol Use Disorder Identification Test; CES-D = Center for Epidemiologic Studies Depression scale (standard 20-item version); GAD-7 = Generalized Anxiety Disorder scale (standard 7-item); VR-12 = Veterans RAND 12-Item Health Survey.

[†] Multivariable logistic regression model adjusted for all variables in the table: age, gender, marital status, employment status, income, lack of money for basic necessities, years since initial HIV diagnosis, alcohol use, depression, anxiety, and VR-12 PCS and MCS.[‡] Employment status for most of the past year compared those who reported being full-time employed, homemaker, or student to those who reported part-time employment, unemployed, disabled, or retired.

Table 3

Results of multivariable linear regression models[†] for secondary outcomes, HIV stigma z-score (N=186) and substance use stigma z-score (N=201).

Variable	HIV Stigma z-score(n=186)			Substance Use Stigma z-score(n=201)		
	β	(95% CI)	p-value	β	(95%CI)	p-value
Prior Incarceration History	-0.50	(-0.81,-0.19)	0.002	-0.10	(-0.42,0.21)	0.52
Age (years)	-0.02	(-0.05,0.01)	0.13	0.01	(-0.02,0.04)	0.59
Gender						
Female	0.03	(-0.30,0.37)	0.84	0.03	(-0.31,0.37)	0.87
Male	(ref.)			(ref.)		
Married or Living with Partner	0.09	(-0.20,0.37)	0.54	-0.12	(-0.41,0.16)	0.40
Employment over past year						
Full-time employment, student, or homemaker	0.16	(-0.13,0.44)	0.28	0.06	(-0.22,0.33)	0.69
Other [‡]	(ref.)			(ref.)		
Income, rubles/month						
0-20,000	-0.18	(-0.50,0.13)	0.25	0.14	(-0.17,0.45)	0.39
>20,000	(ref.)			(ref.)		
Ran out of money for necessities in past 12 months	-0.01	(-0.29,0.27)	0.97	-0.17	(-0.45,0.11)	0.23
Years since HIV diagnosis	0.01	(-0.01,0.03)	0.34	-0.01	(-0.04,0.01)	0.22
High risk alcohol use (AUDIT score ≥ 8)	-0.03	(-0.31,0.26)	0.86	-0.14	(-0.42,0.14)	0.31
Moderate/severe depression symptoms (CES-D ≥ 16)	0.41	(0.03,0.78)	0.03	0.08	(-0.28,0.45)	0.66
Moderate/severe anxiety symptoms (GAD-7 ≥ 10)	-0.02	(-0.35,0.31)	0.90	0.24	(-0.08,0.56)	0.15
VR-12 Physical Component Score (PCS)	0.0004	(-0.01,0.01)	0.95	-0.01	(-0.02,0.01)	0.25
VR-12 Mental Component Score (MCS)	-0.02	(-0.03,-0.01)	0.007	-0.01	(-0.03,0.00)	0.07

Abbreviations: ART = antiretroviral therapy; AUDIT = Alcohol Use Disorder Identification Test; CES-D = Center for Epidemiologic Studies Depression scale (standard 20-item version); GAD-7 = Generalized Anxiety Disorder scale (standard 7-item); VR-12 = Veterans RAND 12-Item Health Survey.

[†] Multivariable linear regression models adjusted for all variables in the table: age, gender, marital status, employment status, income, lack of money for basic necessities, years since initial HIV diagnosis, alcohol use, depression, anxiety, and VR-12 PCS and MCS.

[‡] Employment status for most of the past year compared those who reported being full-time employed, homemaker, or student to those who reported part-time employment, unemployed, disabled, or retired.

Table 4

Exploratory analysis of the association between cumulative lifetime exposure to incarceration and the primary and secondary outcomes.*

	N	Prior ART Treatment AOR (95% CI)	HIV Stigma z-score Adjusted Mean Difference (95% CI)	Substance Use Stigma z-score Adjusted Mean Difference (95% CI)
Never Incarcerated	62	(ref.)	(ref.)	(ref.)
Cumulative Incarceration				
1-47 months (<4 years)	64	1.69 (0.69, 4.11)	-0.38 (-0.74, -0.02)	-0.04 (-0.40, 0.32)
48-95 months (4-7 years)	35	1.54 (0.55, 4.31)	-0.64 (-1.06, -0.23)	-0.19 (-0.60, 0.23)
≥ 96 months (≥ 8 years)	40	2.19 (0.80, 6.06)	-0.55 (-0.98, -0.12)	-0.13 (-0.56, 0.29)

* Estimates (adjusted odds ratios and adjusted mean differences) for the cumulative lifetime incarceration exposure variable were from multivariable regression models that adjusted for age, gender, marital status, employment status, income, lack of money for basic necessities, years since initial HIV diagnosis, VR-12 PCS and MCS, depression, anxiety, and alcohol use.

VR-12 MCS were statistically significantly associated with greater odds of prior ART initiation.

For our secondary outcomes, the mean unadjusted HIV stigma scores (on the original scale) of those with vs. without a history of incarceration were 2.1 (SD 0.6) vs. 2.5 (SD 0.5), and mean unadjusted substance use stigma scores (on the original scale) of those with vs. without a history of incarceration were 3.2 (SD 0.5) vs. 3.3 (SD 0.5). In the multivariable linear regression analysis (Table 3), those with any history of incarceration had a significantly lower mean HIV stigma z-score compared to those without a history of incarceration (adjusted mean difference in z-scores: -0.50 [95% CI: -0.81, -0.19], $p=.002$), and we did not detect an association between prior incarceration and substance use stigma z-score (adjusted mean difference in z-scores: -0.10; 95% CI: -0.42, 0.21; $p=.52$). Adjusted mean HIV stigma z-scores for those with vs. without a history of incarceration were -0.26 (95%CI: -0.49, -0.04) vs. 0.24 (95%CI: -0.04, 0.51). Also, moderate-to-severe depression symptoms and lower (worse) VR-12 MCS were statistically significantly associated with higher HIV stigma score; for substance use stigma score, however, none of the covariates had statistically significant associations.

In the exploratory analyses (shown in Table 4), cumulative lifetime exposure to incarceration did not appear to have a relationship with

any of our outcomes. For the binary outcome of prior ART initiation, the adjusted odds ratio point estimate was highest for those with the greatest lifetime exposure to incarceration, however the confidence intervals for all three groups were wide and mostly overlapped with each other. For the analyses of both HIV and substance use stigma scores, we also did not observe substantial differences across exposure categories.

Discussion

In this cohort of PWH who inject drugs in St. Petersburg, Russia, approximately 70% of participants had been previously incarcerated, and even though most of them had been living with HIV for over a decade, only a third of participants had ever initiated ART. We found no statistically significant association between incarceration history and prior ART initiation. Although most participants reported substantial degrees of HIV-related and substance use-related stigmas, prior incarceration was associated with reporting a lower degree of HIV stigma and was not significantly associated with substance use stigma. Our study adds to a very limited literature on the relationship between incarceration and access to HIV care in the context of stigma in Russia.

The fact that so many individuals with longstanding HIV (most having been diagnosed for at least a decade) had spent so much time in state custody and never received ART is a denial of individual human rights (Rubenstein et al., 2016) and a public health failure (Kamarulzaman et al., 2016; Rich et al., 2016). Every PWH who is incarcerated should have access to the standard of care for HIV which includes ART, if they so wish, and management of medication side effects and co-occurring chronic infections (e.g. viral hepatitis), which could lead to gaps in treatment or negative outcomes if unaddressed. Providing effective treatment to the great number of PWH who are incarcerated in Russia would also protect the public by reducing transmission (Kamarulzaman et al., 2016; Rich et al., 2016). The high incarceration rates of PWH who inject drugs in Russia are consistent with a concerning global trend of the ‘hyperincarceration’ (Wacquant, 2010) of marginalized groups (Csete et al., 2016). While incarceration could provide a chance to engage vulnerable populations in medical care (indeed many new HIV diagnoses among PWID are identified via routine testing in Russian prisons (Dolan et al., 2004; Ruiz et al., 2018)) significant improvements in carceral health care are still needed in Russia (as in many other countries) in order to seize this opportunity (Ponomarev et al., 2022; Rich et al., 2016). As it stands, the many deleterious health effects associated with incarceration (Brinkley-Rubinstein, 2013; Massoglia & Pridemore, 2015; Wildeman & Wang, 2017) prevail—another good reason to revise the policies that harshly criminalize substance use (Csete et al., 2016; Rubenstein et al., 2016).

Because incarceration is commonly experienced by PWH who inject drugs in Russia, research on the impact of incarceration on ART access is of interest even though our study did not find an association. One of the only prior studies on this topic was a retrospective cohort study of PWH recently released from incarceration in St. Petersburg, which found that up to half of these individuals did not seek HIV care after release and only a third of those who sought care received ART (Ruiz et al., 2018). Education about ART is limited or non-existent in many carceral facilities; incarcerated individuals harbor a deep mistrust towards medical providers in Russian prisons and have disclosure concerns about being seen taking daily medications (Teoharov et al., 2018). Additional studies with higher quality longitudinal data are needed to better characterize the relationship between incarceration and HIV care engagement in this key population. Officials in Russia might want to consider a more comprehensive, population-level assessment using administrative and public health data sources which could be linked and analyzed through cross-sector collaborations. Such an approach would not require the immense resources of *de novo* data collection, but it would require robust data security protections and could prove challenging in the setting of siloed institutions with paper-based recordkeeping.

Interestingly, we found that a history of incarceration was associated with lower experiences of HIV stigma. Historically, carceral facilities in Russia required universal HIV testing on admission and residential segregation of PWH, and this may still occur in some facilities (Csete & Human Rights Watch, 2004). Such practices seemingly reflect an environment that would further stigmatize those with HIV, but it is also conceivable that a setting with universal disclosure of HIV status (albeit coerced and unethical) could prompt a coping process among some PWH. One caveat for interpreting this finding is that experiences of HIV stigma (like any stigma) are dynamic, changing over time, so our cross-sectional data on people seeking substance use treatment at a particular moment may not be broadly representative of this population’s stigma experiences. It is also possible that the observed association of incarceration with lower HIV stigma was spurious: potentially driven by unmeasured confounders (e.g. trauma) or due to potential mediating relationships that our model did not account for. For example, we controlled for depressive symptoms and anxiety symptoms, which could be potential mediators of the relationship between incarceration and stigma manifestations, so controlling for them could have masked that relationship.

We did not find an association between incarceration and substance use stigma in this cohort. Given Russia’s punitive drug policies and soci-

etal norms around substance use, it may be that substance use stigma in this context is already so closely associated with criminality (Newman & Crowell, 2021) that a participant’s actual history of incarceration had minimal additional impact on their substance use stigma manifestations (Golichenko & Sarang, 2013). As mentioned above, it is possible that many study participants simultaneously experienced “criminal legal stigma,” i.e. the stigma attached to having a criminal record or a prior incarceration (Howell et al., 2022), which, we might expect to correlate with substance use stigma. Our study did not measure criminal legal stigma (unfortunately no consensus measure exists), but an emerging literature describes it as an important determinant of health care access and health outcomes (Howell et al., 2022; Martin et al., 2020). Future studies should measure and analyze the intersections of the various stigmas affecting this population and possible strategies to mitigate them (Luoma et al., 2022).

Limitations

Our study has several limitations. The cross-sectional study design does not allow for causal inferences. Because LINC-II trial participants were recruited from patients admitted at a narcology hospital in a single city, our study sample might not be representative of the broader population of PWH who inject drugs in Russia. On average, narcology hospital patients might be more likely to seek care, yet they might also have more severe drug dependencies and be more likely to have prior incarceration. Meanwhile, the LINC-II eligibility criterion of not having taken ART in the past 30 days might have selected for those less likely to have any ART experience. Additionally, this secondary data analysis was likely underpowered to detect the relationships between incarceration and care engagement or stigma. All data were self-reported which can introduce certain biases, such as underreporting of stigmatized behaviors or history, i.e. social desirability bias. Some survey measures have not been validated in the Russian language in this population: namely, HIV and substance use stigma scores, VR-12, CES-D, GAD-7, and AUDIT. Nevertheless, we note that Russian versions of GAD-7 (Zinchuk et al., 2021) & AUDIT (Neufeld et al., 2021; *The RUS-AUDIT Project Report*, 2021) have recently been validated, albeit not in this specific population. As mentioned above, we could not identify the temporal relationship between the measures of prior incarceration and prior ART initiation. Further, our measure of incarceration could not identify the number or duration of respective episodes of incarceration, which may be important aspects of incarceration history vis-à-vis HIV care engagement.

Conclusions

Among a cohort of PWH who inject drugs in Russia, this study found a high prevalence of incarceration histories and a low rate of prior ART initiation—even though most participants had been living with HIV for over a decade. We did not detect an association between prior incarceration and prior ART initiation, possibly due to this study’s limited statistical power. To explore potential missed opportunities to initiate ART during or after incarcerations, additional research is needed on the link between incarceration and ART access and the role in this relationship of the various types of stigma faced by PWH who inject drugs in Russia.

Ethics approval

The authors declare that they have obtained ethics approval from an appropriately constituted ethics committee/institutional review board where the research entailed animal or human participation.

Declarations of Interests

The authors have no potential conflicts of interest to report.

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