Drug and Alcohol Dependence Reports 7 (2023) 100159

Contents lists available at ScienceDirect

Drug and Alcohol Dependence Reports

journal homepage: www.elsevier.com/locate/dadr

The relationship between reincarceration and treatment of opioid use disorder with extended-release naltrexone among persons with HIV

Kaley Parchinski [a,b], Angela Di Paola [a], Allison P. Wilson [a,c], Sandra A. Springer [a,d,*]

[a] Department of Internal Medicine, Section of Infectious Diseases, AIDS Program, Yale School of Medicine, New Haven, CT, United States
[b] Medical College of Georgia, Augusta, Georgia, United States
[c] The Chicago Center for HIV Elimination, University of Chicago, Chicago, IL, United States
[d] Center for Interdisciplinary Research on AIDS, Yale University School of Public Health, New Haven, CT, United States

ARTICLE INFO

Keywords:
Reincarceration
Medication for opioid use disorder
Justice involvement
Opioid use disorder

ABSTRACT

Background: In the United States, a disproportionate number of persons with HIV (PWH) and opioid use disorder (OUD) are involved in the justice system. Medications for OUD (MOUD) can reduce convictions and incarceration time in persons with OUD. Extended-release naltrexone (XR-NTX) has been shown to reduce craving of opioids, recurrence of use, and overdose and help achieve or maintain HIV viral suppression in PWH with OUD involved with the justice system.

Objectives: This retrospective study aimed to describe factors associated with reincarceration and to evaluate if XR-NTX was associated with reduced reincarceration among PWH and OUD who were released to the community from incarceration.

Methods: Data from participants released to the community from incarceration from a completed randomized controlled trial was analyzed using a generalized linear model to estimate odds ratios associated with reincarceration and a Kaplan-Meier survival analysis to determine time to reincarceration and non-reincarcerated individuals were compared.

Results: Of the 77 participants, 41 (53.2%) were reincarcerated during the 12-month study period. The mean time to reincarceration was 190 days (SD=108.3). Compared with participants who remained in the community, reincarcerated participants were more likely to have major depressive disorder at study baseline, increased opioid cravings, longer mean lifetime incarceration, and a higher physical quality of life score. XR-NTX was not significantly associated statistically with reincarceration in this analysis.

Conclusion: Reducing reincarceration is a public health priority, given the high proportion of PWH and OUD in the U.S. justice system as well as high degrees of persons returning to the community and having care interrupted due to reincarceration. This analysis determined that potentially identifying depression in recently released individuals could improve HIV outcomes, decrease recurrence of opioid use, and reduce reincarceration.

1. Introduction

In the United States, a disproportionate number of persons with HIV (PWH)[1] and opioid use disorder (OUD) are involved in the justice system (Maruschak and Beavers, 2009). While in correctional settings, persons with HIV and OUD are able to achieve HIV viral suppression (VS) and improved health outcomes in parity with non-incarcerated populations (Maruschak and Beavers, 2009; Springer et al., 2004). However, once released to the community, individuals have an increased risk for opioid overdose and non-maintenance of HIV VS (Binswanger et al., 2007; Stone et al., 2001; Witteveen and van Ameijden, 2002; Wood et al., 2002).

People transitioning to the community from incarcerated settings face many challenges navigating the healthcare system. Such obstacles

* Corresponding author at: Department of Internal Medicine, Section of Infectious Disease, Yale, AIDS Program, 135 College Street, Suite 323, New Haven, CT 06510, United States.
E-mail address: sandra.springer@yale.edu (S.A. Springer).

[1] Acronyms: PWH, people with HIV; OUD, opioid use disorder; VS, viral suppression; ART, antiretroviral therapy; VL, viral load; XR-NTX, extended-release naltrexone; M.I.N.I., Mini International Neuropsychiatric Interview; SUD, substance use disorders; MOUD, medication for opioid use disorder; ITT, intention-to-treat.

https://doi.org/10.1016/j.dadr.2023.100159
Received 9 January 2023; Received in revised form 11 April 2023; Accepted 12 April 2023
Available online 14 April 2023

include: homelessness, lack of medical insurance, lack of access to pharmacies, and substance use that can contribute to poor adherence to medication treatment (Springer et al., 2004, 2011). A higher prevalence of mental health disorders, like major depressive disorder, have also been found in PWH transitioning to the community from incarceration (Di Paola, Altice, et al., 2014) and when left untreated are also thought to contribute to recurrence of opioid use, poor adherence to medication treatment, higher HIV RNA viral load (VL), and reincarceration (Baillargeon et al., 2009). Linkage to care programs upon release from carceral settings aim to address these barriers, yet loss to follow-up and significant delays in linkage to care can prevent individuals from benefiting from these programs (Beckwith et al., 2014; Iroh et al., 2015). PWH and OUD have a greater likelihood of being reincarcerated (Meyer et al., 2014; Springer et al., 2004). Reincarceration is disruptive to the care of people with chronic illnesses, especially HIV, and an inefficient use of public resources (Springer et al., 2011). Identifying individuals with the highest risk for reincarceration and loss of VS with OUD might mitigate the risk that repeated reincarceration poses to systems of public health and safety (Meyer et al., 2014).

People with substance use disorders (SUDs) are less likely to take ART regularly (Campbell et al., 2013). This can contribute to increased HIV VL and worsen the course of their illness (Campbell et al., 2013). For persons with OUD there are three forms of FDA-approved medications that have been shown to be effective in treating OUD: buprenorphine, methadone, and extended-release naltrexone (XR-NTX). Currently, access to and treatment with all of the three forms of medication for OUD (MOUD) is the recommended standard of care for detained or incarcerated persons ((ASAM) & (NADCP), 2022; Cunningham et al., 2020). In many parts of the country however, access to any of these treatments in correctional settings remains limited (Nunn et al., 2009; Scott et al., 2021). At the time of the parent study, access to MOUD in correctional settings was extremely limited where methadone was only available for persons who were pregnant with OUD. Oral naltrexone and XR-NTX, opioid receptor antagonists, were generally seen to be more acceptable by correctional settings because of lack of ability for diversion. Despite recommendations by medical organizations that agonist medications should be offered given their efficacy at preventing future opioid use, naltrexone was eventually one of the first medications to be offered to detained and incarcerated persons.

Given those with OUD have been linked to criminal activity such as acquisition crimes and parole violations (Scott et al., 2021; Zaller et al., 2013), decreasing an individual's opioid use could reduce reincarcerations in this population. There is evidence that MOUD has been associated with reduced justice involvement and convictions (Belenko et al., 2013; Cates and Brown, 2023; Keen et al., 2000; Oliver et al., 2010), yet data is limited for the relative efficacy of MOUD in decreasing reincarceration (Evans et al., 2022; Haas et al., 2021). A recent systematic review revealed inconsistent associations between XR-NTX and criminal activity among those transitioning to the community from incarceration (Cates and Brown, 2023). One study found that those who received two or more injections of XR-NTX post release from an incarcerated setting had fewer arrests than those with one or no injections (Lee et al., 2015), however, two other studies showed no significant differences among those who received XR-NTX and post release criminal activities (Cates and Brown, 2023). Thus, a need for additional research in this area.

For PWH recently released from incarceration, Project New Hope, has provided evidence that those with OUD treated with XR-NTX prior to release and for an additional 5 months post release, were able to reduce intravenous opioid use and maintain HIV VS (Di Paola, Lincoln, et al., 2014; Lier et al., 2022; Springer et al., 2018). Given XR-NTX has been shown to reduce opioid use and help PWH achieve or maintain HIV VS, it is possible that it may also have an effect on reincarceration. This analysis hypothesized that XR-NTX may indirectly reduce reincarceration due to the reduction of opioid use and therefore opioid related offences such as possession charges or parole violations due to substance use. This analysis aimed to evaluate if treatment with XR-NTX was associated with reduced reincarceration. This analysis also aimed to describe other risk factors for reincarceration and time to first reincarceration event in persons transitioning to the community with HIV and OUD.

2. Methods

2.1. Study design and population

The study team performed a retrospective data analysis from the parent study, Project New Hope (NIDA R01DA030762). Project New Hope, was a two-site (all prisons and jails within the Connecticut Department of Correction and the Hampden County Correctional Center in Springfield, Massachusetts), prospective randomized double-blind, placebo-controlled trial evaluating the impact of XR-NTX on the primary outcome of HIV VS at 6 months (end of intervention period) (Di Paola, Lincoln, et al., 2014). Connecticut is one of six unified correctional systems in the United States, while Massachusetts is not. Eligible participants were over the age of 18 years, met criteria for opioid dependance, able to provide informed consent in English or Spanish, returning to study catchment areas, were not currently prescribed any form of MOUD, and did not have a contraindication to XR-NTX. It was conducted among persons ($N = 93$) who were transitioning to the community from prison or jail with HIV and OUD from September 2010 through March 2016. Study participants were randomized 2:1 to receive either XR-NTX or placebo (provided in-kind by Alkermes, Inc.) within 1 week before or on the day of release and then monthly for 5 additional months (6 potential injections). Each study participant was then followed for an additional 7 months for a 12-month total study time.

All protocols and study procedures were approved by the institutions internal review boards and the Office of Human Research Protections at the Department of Health and Human Services, and the research committees at Connecticut Department of Correction, and the Hampden County Correctional Centers. A Certificate of Confidentiality was obtained for additional participant protections. The study was registered at www.clinicaltrials.gov (NCT01246401). More detailed descriptions of New Hope's methods and results have been previously published elsewhere (Springer et al., 2018; Di Paola, Lincoln, et al., 2014). Of the 93 people who were enrolled in Project New Hope, 16 were excluded from this analysis due to missing reincarceration data from the Hampden County Correctional Center site. For this analysis, data was included from the 77 participants with full reincarceration data.

2.2. Study measures

Baseline characteristics collected from the study included age, sex, race, ethnicity, educational background, mean lifetime incarceration, mean incarceration time during study, housing status, chronic hepatitis C status, mental health comorbidities (Mini International Neuropsychiatric Interview [M.I.N.I.] (Lecrubier et al., 1997; D. D. Sheehan et al., 1997; D. V. D.V. Sheehan et al., 1997)), quality of life (12-item Short Form Health Survey version 1.0 [SF-12] (Farivar et al., 2007)), opioid craving (scale 0–10), co-occurring SUDs (via M.I.N.I. for alcohol, cannabis, and cocaine use disorders), previous experience with medication for opioid use disorder (MOUD), prescription of psychiatric medications, and percentage of psychiatric medication taken in the past 30 days. No statistical difference existed in baseline characteristics, including co-occurring SUDs between the treatment and placebo groups, as described in a previously published manuscript (Springer et al., 2018).

Other biological characteristics included from project New Hope were HIV VL and CD4 count at baselines, 6 and 12 months, as well as the number of study medication injections received.

Reincarceration data was collected from the Connecticut Department of Correction. Reincarceration within the 6-month intervention period was defined as a participant returning to prison or jail due to a violation

of parole or probation or a new conviction before 183 days (6 months) from the day of their release from their study index incarceration. Reincarceration within 12 months was defined as a participant returning to prison or jail because of a violation of parole or probation or a new conviction before day 365 (12-months) of the study period, beginning at the day of their release from prison or jail at the time of enrollment in the study. Reincarceration within 6 months was used for analyses to understand how XR-NTX treatment affected reincarceration and other characteristics. Reincarceration within 12 months was used to evaluate the long-term effects of XR-NTX treatment.

For this analysis, injections received were analyzed in two different ways: intention-to-treat (ITT) and "as treated." ITT was defined as those assigned to either the treatment or placebo arm of the study. "As treated" was defined as either a low dose of XR-NTX (0–2 injections XR-NTX received or assigned to placebo group) or a therapeutic dose of XR-NTX (3–6 injections received). The ITT and "as treated" have been previously described elsewhere (Springer et al., 2018).

2.3. Statistical analysis

To determine if XR-NTX was significantly associated with reincarceration, a chi-squared test was performed. To determine if other secondary factors were associated with reincarceration, baseline characteristics of study participants who were reincarcerated within 6

Table 1
Bivariate analysis of baseline participant characteristics for those with reincarceration events before 6 and 12 month post release from index incarceration.

		6 months			12 months		
	Total sample	Non-reincarceration	Reincarceration	*p* value	Non-reincarceration	Reincarceration	*p* value
	N = 77 N,%	*N* = 55 N,%	*N* = 22 N,%		*N* = 36 N,%	*N* = 41 N,%	
Study Treatment				0.257			0.545
XR-NTX	56 (72.7)	42 (76.4)	14 (63.6)		25 (69.4)	31 (75.6)	
Placebo	21 (27.3)	13 (23.6)	8 (36.4)		11 (30.6)	10 (24.4)	
Sex				0.124			0.511
Male	64 (83.1)	48 (87.3)	16 (72.7)		31 (86.1)	33 (80.5)	
Female	13 (16.9)	7 (12.7)	6 (27.3)		5 (13.9)	8 (19.5)	
Race/Ethnicity				0.621			0.563
White	7 (9.1)	5 (9.1)	2 (9.1)		2 (5.6)	5 (12.2)	
Black	22 (28.6)	14 (25.5)	8 (36.4)		10 (27.8)	12 (29.3)	
Hispanic	48 (62.3)	36 (65.5)	12 (54.6)		24 (66.7)	24 (58.5)	
Age in years, mean (SD)	46.6 (7.9)	47.8 (7.5)	43.6 (8.4)	**0.048**	47.7 (8.0)	45.7 (7.8)	0.276
Completed GED or high school	37 (48.1)	29 (52.7)	8 (36.4)	0.194	16 (44.4)	21 (51.2)	0.553
Mean incarceration, study period (months; SD)	9.3 (11.2)	9.6 (12.3)	8.5 (8.1)	0.638	10.2 (12.5)	8.6 (10.1)	0.541
Mean incarceration, life (months; SD) (*N* = 76)	128.3 (96.0)	109.7 (93.1)	174.2 (89.1)	**0.007**	100.5 (86.9)	153.4 (97.9)	**0.015**
Housing Status				0.841			0.439
Homeless	31 (40.3)	21 (38.2)	10 (45.5)		12 (33.3)	19 (46.3)	
Unstable	19 (24.7)	14 (25.5)	5 (22.7)		9 (25.0)	10 (24.4)	
Stable	27 (35.1)	20 (36.4)	7 (31.8)		15 (41.7)	12 (29.3)	
Chronic hepatitis C (*N* = 69)	57 (74.0)	42 (84)	15 (79)	0.621	25 (78.1)	32 (86.5)	0.361
Mental Health Diagnosis, via M.I.N.I. *N* = 69							
Bipolar disorder	8 (11.6)	5 (10.2)	3 (15)	0.572	4 (12.9)	4 (10.5)	0.759
Major depressive disorder	19 (27.5)	13 (26.5)	6 (30)	0.770	4 (12.9)	15 (39.5)	**0.014**
Posttramatic Stress disorder	10 (14.5)	7 (14.3)	3 (14.3)	1.000	3 (9.7)	7 (18.0)	0.326
Generalized anxiety disorder	12 (17.4)	8 (16.7)	4 (19.1)	0.782	6 (19.4)	6 (15.8)	0.619
Quality of life, SF-12, median (range)							
Physical composite scores	51.7 (23.5–62.7)	53 (23.5–62.7)	48.8 (34–62.2)	0.902	50.6 (23.5–62.7)	52.8 (26.1–62.6)	**0.074**
Mental composite scores	42.7 (15.3–66.3)	43.4 (15.3–66.3)	38.7 (18–58.6)	0.318	42.7 (17.5–66.3)	43.4 (15.3–60.8)	0.546
Opioid craving (scale of 0–10), mean (SD)	3.3 (3.7)	2.8 (3.7)	4.6 (3.4)	**0.052**	2.4 (3.4)	4.1 (3.8)	**0.047**
Substance use disorder via M.I.N.I.							
Alcohol use disorder	18 (26.1)	14 (28.6)	4 (19.1)	0.404	8 (25.8)	10 (25.6)	0.987
Canabis use disorder	18 (26.1)	10 (20.8)	8 (38.1)	0.133	6 (19.4)	12 (31.6)	0.25
Cocaine use disorder	56 (81.2)	39 (81.3)	17 (81)	0.977	25 (80.7)	31 (81.6)	0.921
Previous experience with MOUD							
Methadone lifetime	48 (62.3)	34 (61.8)	14 (63.6)	0.882	22 (61.1)	26 (63.4)	0.835
Methadone past 30 days	18 (23.4)	14 (25.5)	4 (18.2)	0.496	9 (25)	9 (22)	0.753
Buprenorphine lifetime	36 (46.8)	23 (41.8)	13 (59.1)	0.170	14 (38.9)	22 (53.7)	0.195
Buprenorphine past 30 days	16 (20.8)	13 (23.6)	2 (9.1)	0.145	9 (25)	6 (14.6)	0.252
Injections received							
0–2	54 (70.1)	38 (69.1)	16 (72.7)	0.753	26 (72.2)	28 (68.3)	0.707
3–6	23 (29.9)	17 (30.9)	6 (27.3)		10 (27.8)	13 (31.7)	
HIV-RNA VL (copies/mL)							
< 200, baseline	44 (57.1)	33 (60)	11 (50)	0.423	20 (55.6)	24 (58.5)	0.792
< 200, 6 months	49 (63.6)	31 (63.3)	18 (90)	**0.026**	20 (64.5)	29 (76.3)	0.283
Mean CD4 baseline count (SD)	514.6 (306.9)	502.8 (315.7)	544.1 (288.7)	0.584	548.6 (333.5)	484.8 (282.4)	0.371
Prescribed psychiatric medications of those told they should be (*n* = 39)							
Yes	21 (27.3)	13 (52)	8 (57.1)	0.757	8 (50)	13 (56.5)	0.688
No	18 (40.9)	12 (48)	6 (42.9)		8 (50)	10 (43.5)	
Mean percent of psych. meds. taken in 30 days prior to incarceration (SD)	56.0 (46.5)	63.6 (44.9)	43.8 (50)	0.371	72.8 (43.6)	45.8 (46.9)	0.200

*AUDIT score ≤ 3 for women, ≤ 8 for men

Abbreviations: M.I.N.I (Mini-International Neuropsychiatric Interview); ASI (addiction severity index); Quality of life, SF-12 (Quality of life, 12-item Short Form Health Survey); AUDIT score (Alcohol Use Disorder Identification test); MOUD (mediation for opioid use disorder); VL (viral load).

and 12 months were compared to those who remained in the community using a chi-squared test or an independent two sample *t*-test. Baseline characteristics that were found to be significant at $p<0.10$, were included in a multivariate analysis (Ranganathan et al., 2017). A multivariate model was used to identify factors associated with reincarceration before 12 months. Factors in the multivariate model were considered significant at $p<0.05$. A 6-month multivariate analysis was not conducted due to the limited number of persons with a reincarceration event in that timeframe.

To determine time to first reincarceration, a Kaplan-Meier test was performed in those receiving XR-NTX versus those receiving placebo. Participants who had not been reincarcerated by the end of the 12-month study period were right censored. All statistical analyses were performed using RStudio 2022.02.2 (RStudio, Inc., Boston, MA, USA).

3. Results

Of the 77 participants, 64 (83.1%) identified as male, 48 (62.3%) were Hispanic, the mean age was 46.6, and had a mean lifetime incarceration of 128.3 months. Twenty-two (28.6%) were reincarcerated during the 6-month intervention time, and 41 (53.2%) were reincarcerated during the full 12-month study period. Of the 77 participants, 36 (46.8%) were never reincarcerated, 31 (40.3%) were reincarcerated one time, 8 (10.4%) were reincarcerated two times, and 2 (2.6%) were reincarcerated three times during the 12-month study period.

3.1. Results at 6 months

Demographic and clinical characteristics were compared between those who were reincarcerated before 6 months and those who remained in the community (Table 1). The mean time to reincarceration for those with a reincarcerated event was 99.6 days (standard deviation [SD] = 43.2). Compared with participants who remained in the community, reincarcerated participants were more likely to be younger (43.6 vs. 47.8, $p = 0.048$), have increased opioid craving (4.6 vs. 2.8, $p = 0.052$), have a longer mean incarceration time at study baseline (in months) (174.2 vs. 109.7, $p = 0.007$), and more likely to be virally suppressed at 6 months (90% vs. 63.3%, $p = 0.026$). There was no association between participants who remained in the community compared to those who were reincarcerated among those assigned XR-NTX (76.4% vs. 63.6%, $p = 0.257$). All other demographic characteristics were found to have no significant differences between participants who were reincarcerated and those who remained in the community.

3.2. Results at 12 months

Demographic and clinical characteristics were compared between those who were reincarcerated within the 12-month study period and those who remained in the community (Table 1). The mean time to reincarceration was 190 days (SD = 108.3) for those with a reincarceration event. Compared with participants who remained in the community, reincarcerated participants were more likely to have major depressive disorder at study baseline (39.5% vs. 12.9%, $p = 0.014$), increased opioid craving (4.1 vs. 2.4, $p = 0.047$), and longer mean incarceration time at study baseline (in months) (153.4 vs. 100.5, $p = 0.015$). Reincarcerated participants were also more likely to have a higher quality of life, SF-12 physical composite score (median = 52.8 [range, 26.1–62.6] vs. 50.6 [range, 23.5–62.7], $p = 0.074$). No statistical association was found among based on treatment assigned XR-NTX for participants who remained in the community compared to those who experienced reincarceration (69.4% vs. 75.6%, $p = 0.545$). No other significant differences were found between participants who were reincarcerated and those who remained in the community.

3.3. Multivariate analysis of independent predictors of reincarceration

A multivariate analysis (Table 2) was conducted, exploring factors associated with a reincarceration event in the 12 months post release. Variables with a $p<0.10$ were included in the model and were as follows: the mean study incarceration period in months, meeting criteria for major depressive disorder, opioid craving, and quality of life physical composite score. Major depressive disorder (adjusted odds ratio [aOR], 6.176 [95% CI, 1.531–33.843]) remained statistically significantly associated with reincarceration in the 12 months post release from the index incarceration for the study.

3.4. Time to first reincarceration

The median time to reincarceration for those who experienced a reincarceration event in the entire study population was 335 days. The ITT and "as treated" analyses revealed no statistically significant differences between time to first reincarceration and XR-NTX. In the ITT, time to first reincarceration event was 335 days for those in the XR-NTX group and 365 to those in the placebo group. In the "as treated" analysis, those who received 0–2 injections of XR-NTX or any number of placebo injections, the median time to reincarceration was 340 days. For those who received 3–6 XR-NTX injections, the median time to reincarceration was 325 days.

4. Discussion

In this secondary analysis of persons enrolled in a randomized double-blind placebo-controlled trial of XR-NTX among PWH and OUD, 28.6% were reincarcerated before 6 months, and over half (53.2%) were reincarcerated before 12 months. Reincarceration before 6 and 12 months was associated with a longer baseline history of incarceration, and reincarceration before 6 months was associated with younger age. Both history of incarceration and younger age have been documented in the literature as risk factors for reincarceration (Antenangeli and Durose, 2021; Winter et al., 2019).

While the reincarceration rates in this analysis are comparable to other published studies (Meyer et al., 2014) that included incarcerated PWH, our results are higher than the overall proportion reported by the state of Connecticut and nationally. This perhaps may be due to our inclusion criteria of OUD which has been linked to criminal activity, including acquisition crimes that could put someone at increased risk of reincarceration (Scott et al., 2021). In the most recent report on recidivism in Connecticut, 19% were reincarcerated at 6 months and 30% at 12 months (Criminal Justice Policy and Planning Division Brief: Recidivism, 2018-release cohort, 2022). Nationally, about 49% of persons in prisons released across 18 states in 2008 had a parole or probation violation or an arrest that led to a new sentence within 3 years. This rate increased to about 61% within 10 years. For those released with a drug offense, nearly two-thirds (65%) were arrested within 3 years, about three-quarters (74%) within 5 years, and 81% within 10 years (Antenangeli and Durose, 2021).

This analysis found the median time to reincarceration event to be

Table 2
Muliple regression results for 12 month reincarceration predictors.

Variables	Adjusted Odds Ratio (95% Confidence Interval)	*p* value
Mean lifetime incarceration (months)	1.008 (1.002–1.014)	**0.016**
M.I.N.I., Major depressive disorder	6.176 (1.531–33.843)	**0.018**
Opioid craving (scale of 0–10)	1.164 (0.993–1.391)	0.073
Quality of life, SF-12, physical composite	1.089 (1.028–1.165)	**0.007**

Abbreviations: M.I.N.I (Mini-International Neuropsychiatric Interview).

335 days. Other studies have found a similar median time to reincarceration (Meyer et al., 2014a; Springer et al., 2004). While this study was not powered to detect differences in those reincarcerated and those who remained in the community, it is still imperative to examine risk factors for reincarceration in populations with HIV and SUDs as reincarceration is disruptive to medication adherence (Springer et al., 2011). Therefore, additional research is needed to investigate factors associated with reincarceration in this population.

Having increased craving for opioids was associated with reincarceration before 6 and 12 months in this analysis. Untreated OUD is known to contribute to reincarceration (Zaller et al., 2013). For general populations, agonists may be better than antagonists at reducing certain negative outcomes. In one observational study buprenorphine and methadone maintenance were associated with reduced all-cause and opioid-related mortality (Larochelle et al., 2018). When comparted to antagonists, data did not conclude that agonists have superior outcomes to antagonists (Larochelle et al., 2018). Mortality data was not directly compared among antagonists and agonists, and there was not enough data to conclude that naltrexone had an effect on mortality (Larochelle et al., 2018). Another study from Australia found that the overdose death rate on treatment discontinuation was 8 times higher for oral naltrexone than for opioid agonist treatments (methadone maintenance and buprenorphine) (Digiusto et al., 2004). In a recent study comparing XR-NTX to buprenorphine-naloxone, those receiving XR-NTX had a higher rate of recurrence of use (65% v. 57%) and induction failure (28% v. 6%) while there was no difference in retention on the two forms of treatment in the per protocol analysis (Lee et al., 2018). For those transitioning to the community from justice settings MOUD programs have been shown to reduce mortality due to overdoses. Overall buprenorphine and methadone maintenance have shown decreased rates of overdose, in studies of XR-NTX overdose risk was due to discontinuation of the medication (Cates and Brown, 2023). A current NIDA funded randomized controlled trial comparing XR-NTX to extended-release buprenorphine among persons in jail and prison in 5 states evaluating the primary outcome of retention on treatment post-release and secondary outcomes include recurrence of opioid use and overdose (Waddell et al., 2021). This study will help understand the differences in mediations effectiveness.

For certain populations and outcomes, antagonists have been found to be the most efficacious. For example, in one study comparing sublingual buprenorphine-naloxone with XR-NTX, it was found that patients who reported being unhoused had a lower rate of recurrence of use if they were assigned to receive XR-NTX (51.6%) compared with buprenorphine-naloxone (70.4%) (Nunes et al., 2021).

While there is evidence that MOUD reduces justice involvement (Belenko et al., 2013; Cates and Brown, 2023; Keen et al., 2000; Oliver et al., 2010), it is unknown if it decreases reincarceration (Evans et al., 2022; Haas et al., 2021). Some studies focused on OUD treatment have found a decrease in the risk of recidivism for those offered buprenorphine after release (Evans et al., 2022). Methadone programs have also been shown to reduce criminal conviction rates and time spent in prison (Keen et al., 2000). Although the parent study of this analysis showed that treatment with XR-NTX reduced opioid use in general and specifically intravenous opioid use (Di Paola, Lincoln, et al., 2014; Lier et al., 2022; Springer et al., 2018), no association was found with reincarceration. This analysis was not powered to detect this outcome, a larger study sample with longer follow-up time would be needed. It may also be that XR-NTX is not as effective as other forms of MOUD at decreasing reincarceration rates. In a study looking at persons with OUD leaving smaller jails and returning to rural areas, buprenorphine substantially reduced the risk of recidivism (Evans et al., 2022). Other studies done in more urban settings, however, did not find that buprenorphine had an effect on criminal activity post release (Gordon et al., 2017; Perry et al., 2015). A study, conducted in Connecticut around the same time as our parent study, investigating the effect of methadone on post release outcomes, identified that reincarceration rates were comparable to this analysis and also that there was no difference in reincarceration between those who did and did not receive methadone (Haas et al., 2021). Still, other studies have found methadone programs to reduce criminal conviction rates and time spent in prison (Keen et al., 2000). Evidence on the direct and indirect effect of XR-NTX on reincarceration in persons transitioning to the community from incarceration is inconsistent (Cates and Brown, 2023). These studies were not direct comparisons to XR-NTX, however, Lobmaier et al. (2010) compared methadone maintenance to implantable naltrexone, and found no statistical difference in criminal activity between the two groups.

Given the range of results when looking at MOUD for reducing reincarceration rates, more investigation is needed into the relative efficacy of these medications specifically for the outcome of reincarceration. Attention should also be given to the demographics of the populations (i.e., being unhoused) and location of release (i.e., urban vs. rural).

In this analysis, those with major depressive disorder were much more likely to return to the justice system. This finding is also consistent with other studies of reincarceration (Baillargeon et al., 2009; Kopak et al., 2019; Proctor et al., 2017). Major depressive disorder is common in the justice system. In one report, 23.5% of persons in state prisons reported symptoms of major depressive disorder, nearly threefold that of the general population (James and Glaze, 2006). For PWH and mental health disorders, reincarceration and poor treatment outcomes can be consequences of undiagnosed and under-treated mental health disorders (Baillargeon et al., 2009; Springer et al., 2012). While common, the significantly increased risk of reincarceration for a person in prison with major depressive disorder is concerning.

There are significant barriers to receipt of mental health treatment in the community (Christiana et al., 2000; Holden et al., 2012). Those involved in the justice system face barriers that make it even more difficult to receive treatment for mental health disorders. For men, who are disproportionately involved in the justice system, gender norms often require them to be self-sufficient, and receiving mental health services is seen as demasculinizing (Scholz et al., 2022).

In a national study on mental health problems in U.S. prisons and jails, a larger percentage of women than men met the criteria for serious psychological distress (Bronson, 2017). Women often experience domestic, physical, emotional, and sexual abuse prior to imprisonment that may lead to complex and unresolved trauma that can lead to incarceration (Alves et al., 2016; Gunter et al., 2012). While there is an increased call for gender specific and trauma-informed care within the justice system (Rittenberg, 2018; *United Nations Rules for the Treatment of Women Prisoners and Non-Custodial Measures for Women Offenders with Their Commentary: The Bangkok Rules*, 2012), there is limited evidence regarding mental health treatment once released to the community.

This sample consisted of a large proportion of Hispanic men. In Connecticut between 2016 and 2020 those who acquired HIV through injection drug use were more likely to be white or Hispanic over the age of 30 (Health, 2021). Given, Black and Hispanic persons, are disproportionately represented in the U.S. justice system due to structural racism (Carson, 2021) and the increased risk of HIV through injection drug use and incarceration of Hispanic men, this sample is representative of PWH and OUD in the CT DOC. Due to experiencing racial micro-aggressions, exacerbated mental illness discrimination, interconnected systems of oppression, and the underrepresentation of culturally alike mental health clinicians (Alang, 2019; Masson et al., 2013) Black and Hispanic persons are less likely to be engaged in mental health treatment services (Alang, 2019; Holden et al., 2012).

Other common barriers to seeking treatment include unavailability of health insurance, lack of transportation, unemployment, and lack of social support (Masson et al., 2013; Sung et al., 2011; van Olphen et al., 2009) Given the high risk of reincarceration to recently released persons with major depressive disorder, efforts to minimize the barriers to mental healthcare in the community should be further studied.

HIV viral suppression in this study was associated with

reincarceration before 6 months. The relationship between HIV VS and reincarceration are complex. Many studies have found that HIV VLs are lower while individuals are in the justice system (Meyer et al., 2014; Springer et al., 2004) due to increased access to healthcare, whereas those in the community face many social and structural barriers preventing individuals from obtaining HIV care (Bhatt and Bathija, 2018). It should also be noted however that the primary outcome of the parent study was HIV VS. Those randomized to receive XR-NTX in the parent study were able to achieve this outcome, thus HIV VS in this study population and analysis may not be representative of most justice populations with HIV and OUD (Springer et al., 2018). The association between HIV VS and reincarceration in this analysis though may also be an artifact due to those who were reincarcerated being able to access justice system healthcare resources on return.

Reincarceration within 12 months was also associated with better in-prison physical health on the SF-12 Quality of Life assessment. Other studies with this finding have proposed this effect to be due to the healthy incarcerated person hypothesis (Wallace and Wang, 2020). This theory suggests that in order to commit crimes, individuals are more likely to be in good health. Still other studies have found evidence to refute this hypothesis (Baćak and Wildeman, 2015). Many previous studies have also found that PWH who are incarcerated, once released to the community, have lower proportions of HIV VS than those in the justice system and those on ART nationally (Baillargeon et al., 2010; Fu et al., 2013; Meyer et al., 2014; Springer et al., 2004; Stephenson et al., 2005). Untreated OUD is also known to contribute to higher risk behaviors that can spread HIV (Biondi et al., 2019; Zaller et al., 2013), therefore affecting physical health and quality of life. Project New Hope found that MOUD can help maintain aspects of physical health, like HIV VS, once released to the community in the parent study (Springer et al., 2018).

Despite the important findings of this research, some limitations remain. First, this was a small study that was not powered to detect independent risk factors for reincarceration. The parent trial was powered to detect difference in rates of HIV VS at 6 months. Concerns about the small sample size of the original New Hope study have been addressed elsewhere but are related to the introduction of methadone in Connecticut and alternatives to incarceration strategies resulting in fewer numbers of people living with HIV in prison in Connecticut (Di Paola, Lincoln, et al., 2014; Springer et al., 2015). Attrition from the study was high, but similar to other studies of persons who were released from incarcerated settings with OUD (Springer et al., 2004; Woody et al., 2021; Zelenev et al., 2013). The reasons for reincarceration were also unclear. This study found that higher opioid craving scores were associated with reincarceration. However, it is unknown if opioid use or a drug related crime was the cause of reincarceration. Reincarceration data obtained from the Connecticut Department of Correction only specified reincarceration dates and if individuals violated parole or probation or were convicted for another crime. Despite these limitations, to the best of our knowledge this is the first evaluation of reincarceration among prison and jail detainees with HIV and OUD.

4. Conclusion

Given the high proportion of PWH and SUDs in the U.S. justice system, reincarceration is a public health concern. Novel efforts to prevent reincarceration in this population should be undertaken. While it was found that XR-NTX did not significantly impact reincarceration, this analysis did reveal that treating depression in recently released individuals could benefit both HIV VS and reincarceration efforts. More studies of the treatment of depression in justice involved PWH and SUDs are needed.

Authors' contributions

KP, AD, and SAS were responsible for the conceptualization, methodology, and visualization. KP and AD were responsible for data curation and writing- original draft. KP conducted the formal analysis. SAS and AD provided supervision. AW and SAS provided writing- review and editing. All authors read and approved the final manuscript.

Funding

This research was funded by the National Institutes on Drug Abuse (NIDA; R01DA030762 and DP1DA056106, Springer). The funders were not involved in the research design, analysis or interpretation of the data or the decision to publish the manuscript.

Ethics approval and consent to participate

All protocols and study procedures were approved by the institutions internal review boards and the Office of Human Research Protections at the Department of Health and Human Services, and the research committees at Connecticut Department of Correction, and the Hampden County Correctional Centers. A Certificate of Confidentiality was obtained for additional participant protections. The study was registered at www.clinicaltrials.gov (NCT01246401).

Declaration of Competing Interest

Author Sandra Springer, MD has provided paid scientific consultation to Alkermes Inc. Sandra Springer, MD has received in-kind study drug donations from Alkermes Inc and Indivior Pharmaceutical Company for NIH-funded research. The authors alone are responsible for the content and writing of this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.dadr.2023.100159.

References

(ASAM), A.S.o.A.M., & (NADCP), N.A.o.D.C.P. (2022). *A treatment court clinician's guide to treating participants prescribed or considering medication to treat opioid use disorder*. https://nadcp-moud-clinician-guide.onrender.com/downloads/MOUD%20Clinician%20guide%20(digital).pdf.

Alang, S.M., 2019. Mental health care among blacks in America: confronting racism and constructing solutions. Health Serv. Res. 54 (2), 346–355. https://doi.org/10.1111/1475-6773.13115.

Alves, J., Maia, Â., Teixeira, F., 2016. Health Conditions prior to imprisonment and the impact of prison on health: views of detained women. Qual. Health Res. 26 (6), 782–792. https://doi.org/10.1177/1049732315617217.

Antenangeli, L., Durose, M.R., 2021. Recidivism of Prisoners Released in 24 States in 2008: a 10-year Follow-Up Period (2008–2018). Beureau of Justice Statistics.

Baćak, V., Wildeman, C., 2015. An empirical assessment of the "healthy prisoner hypothesis". Soc. Sci. Med. 138, 187–191. https://doi.org/10.1016/j.socscimed.2015.05.039.

Baillargeon, J., Binswanger, I.A., Penn, J.V., Williams, B.A., Murray, O.J., 2009a. Psychiatric disorders and repeat incarcerations: the revolving prison door. Am. J. Psychiatry 166 (1), 103–109. https://doi.org/10.1176/appi.ajp.2008.08030416.

Baillargeon, J., Giordano, T.P., Harzke, A.J., Spaulding, A.C., Wu, Z.H., Grady, J.J., Baillargeon, G., Paar, D.P., 2010. Predictors of reincarceration and disease progression among released HIV-infected inmates. AIDS Patient Care STDs 24 (6), 389–394. https://doi.org/10.1089/apc.2009.0303.

Baillargeon, J., Penn, J.V., Thomas, C.R., Temple, J.R., Baillargeon, G., & Murray, O.J. (2009). Psychiatric disorders and suicide in the nation's largest state prison system. *J. Am. Acad. Psychiatry Law*, 37(2), 188–193. https://doi.org/37/2/188 [pii].

Beckwith, C., Bazerman, L., Gillani, F., Tran, L., Larson, B., Rivard, S., Flanigan, T., Rich, J., 2014. The feasibility of implementing the HIV seek, test, and treat strategy in jails. AIDS Patient Care STDs 28 (4), 183–187. https://doi.org/10.1089/apc.2013.0357.

Belenko, S., Hiller, M., Hamilton, L., 2013. Treating substance use disorders in the criminal justice system. Curr. Psychiatry Rep. 15 (11), 414. https://doi.org/10.1007/s11920-013-0414-z.

Bhatt, J., Bathija, P., 2018. Ensuring access to quality health care in vulnerable communities. Acad. Med. 93 (9), 1271–1275. https://doi.org/10.1097/acm.0000000000002254.

Binswanger, I.A., Stern, M.F., Deyo, R.A., Heagerty, P.J., Cheadle, A., Elmore, J.G., Koepsell, T.D., 2007. Release from prison–a high risk of death for former inmates. N. Engl. J. Med. 356 (2), 157–165. https://doi.org/10.1056/NEJMsa064115.

Biondi, B.E., Frank, C., Horn, B.P., Springer, S.A., 2019. Reduced sexual risk behaviors among persons with HIV after release from the criminal justice system. Open Forum Infect. Dis. 6 (10) https://doi.org/10.1093/ofid/ofz411 ofz411.

Bronson, J. (2017). *Indicators of mental health problems reported by prisoners and jail inmates, 2011-12*.

Campbell, A.N., Tross, S., Calsyn, D.A., 2013. Substance use disorders and HIV/AIDS prevention and treatment intervention: research and practice considerations. Soc, Work Public Health 28 (3–4), 333–348. https://doi.org/10.1080/19371918.2013.774665.

Carson, E.A., 2021. Prisoners in 2020–Statistical tables. NCJ 302776, 1–50.

Cates, L., Brown, A.R., 2023. Medications for opioid use disorder during incarceration and post-release outcomes. Health Justice 11 (1), 4. https://doi.org/10.1186/s40352-023-00209-w.

Christiana, J.M., Gilman, S.E., Guardino, M., Mickelson, K., Morselli, P.L., Olfson, M., Kessler, R.C., 2000. Duration between onset and time of obtaining initial treatment among people with anxiety and mood disorders: an international survey of members of mental health patient advocate groups. Psychol. Med. 30 (3), 693–703. https://www.ncbi.nlm.nih.gov/pubmed/10883723.

Criminal Justice Policy & Planning Division Brief: Recidivism, 2018-release cohort. (2022). Retrieved from https://portal.ct.gov/-/media/OPM/CJPPD/CjResearch/RecidivismStudy/2022/2022-Recidivism-Brief.pdf.

Cunningham, C., Edlund, M.J., Fishman, M., Gordon, A.J., Jones, H.E., Langleben, D., Femino, J., 2020. The ASAM national practice guideline for the treatment of opioid use disorder: 2020 focused update. J. Addict. Med. 14 (2S Suppl 1), 1–91.

Di Paola, A., Altice, F.L., Powell, M.L., Trestman, R.L., Springer, S.A., 2014a. A comparison of psychiatric diagnoses among HIV-infected prisoners receiving combination antiretroviral therapy and transitioning to the community. Health Justice 2 (11). https://doi.org/10.1186/s40352-014-0011-1.

Di Paola, A., Lincoln, T., Skiest, D.J., Desabrais, M., Altice, F.L., Springer, S.A., 2014b. Design and methods of a double blind randomized placebo-controlled trial of extended-release naltrexone for HIV-infected, opioid dependent prisoners and jail detainees who are transitioning to the community. Contemp. Clin. Trials 39 (2), 256–268. https://doi.org/10.1016/j.cct.2014.09.002.

Digiusto, E., Shakeshaft, A., Ritter, A., O'Brien, S., Mattick, R.P., Group, N.R., 2004. Serious adverse events in the Australian National Evaluation of Pharmacotherapies for Opioid Dependence (NEPOD) [Multicenter Study Research Support, Non-U.S. Gov't]. Addiction 99 (4), 450–460. https://doi.org/10.1111/j.1360-0443.2004.00654.x.

Evans, E.A., Wilson, D., Friedmann, P.D., 2022. Recidivism and mortality after in-jail buprenorphine treatment for opioid use disorder. Drug Alcohol Depend. 231, 109254 https://doi.org/10.1016/j.drugalcdep.2021.109254.

Farivar, S.S., Cunningham, W.E., Hays, R.D., 2007. Correlated physical and mental health summary scores for the SF-36 and SF-12 Health Survey, V. 1. Health Qual. Life Outcomes 5 (1), 1–8.

Fu, J.J., Herme, M., Wickersham, J.A., Zelenev, A., Althoff, A., Zaller, N.D., Bazazi, A.R., Avery, A.K., Porterfield, J., Jordan, A.O., Simon-Levine, D., Lyman, M., Altice, F.L., 2013. Understanding the revolving door: individual and structural-level predictors of recidivism among individuals with HIV leaving jail. AIDS Behav. 17 (Suppl 2(0 2)), S145–S155. https://doi.org/10.1007/s10461-013-0590-1.

Gordon, M.S., Kinlock, T.W., Schwartz, R.P., O'Grady, K.E., Fitzgerald, T.T., Vocci, F.J, 2017. A randomized clinical trial of buprenorphine for prisoners: findings at 12-months post-release. Drug Alcohol Depend. 172, 34–42.

Gunter, T.D., Chibnall, J.T., Antoniak, S.K., McCormick, B., Black, D.W., 2012. Relative contributions of gender and traumatic life experience to the prediction of mental disorders in a sample of incarcerated offenders. Behav. Sci. Law 30 (5), 615–630. https://doi.org/10.1002/bsl.2037.

Haas, A., Viera, A., Doernberg, M., Barbour, R., Tong, G., Grau, L.E., Heimer, R., 2021. Post-incarceration outcomes for individuals who continued methadone treatment while in Connecticut jails, 2014–2018. Drug Alcohol Depend. 227, 108937.

Health, C.S.D.o.P. (2021). *Connecticut HIV Statitistics* https://portal.ct.gov/DPH/AIDS–Chronic-Diseases/Surveillance/Connecticut-HIV-Statistics.

Holden, K.B., McGregor, B.S., Blanks, S.H., Mahaffey, C., 2012. Psychosocial, socio-cultural, and environmental influences on mental health help-seeking among African-American men. J. Mens Health 9 (2), 63–69. https://doi.org/10.1016/j.jomh.2012.03.002.

Iroh, P.A., Mayo, H., Nijhawan, A.E., 2015. The HIV care cascade before, during, and after incarceration: a systematic review and data synthesis. Am. J. Public Health 105 (7), e5–e16.

James, D.J., & Glaze, L.E. (2006). Mental health problems of prison and jail inmates.

Keen, J., Rowse, G., Mathers, N., Campbell, M., Seivewright, N., 2000. Can methadone maintenance for heroin-dependent patients retained in general practice reduce criminal conviction rates and time spent in prison? Br. J. Gen. Pract. 50 (450), 48–49. https://bjgp.org/content/bjgp/50/450/48.full.pdf.

Kopak, A.M., Guston, K., Maness, L., Hoffmann, N.G., 2019. A prospective study of behavioral health indicators and repeat jail admissions among rural inmates. Health Justice 7 (1), 5. https://doi.org/10.1186/s40352-019-0087-8.

Larochelle, M.R., Bernson, D., Land, T., Stopka, T.J., Wang, N., Xuan, Z., Bagley, S.M., Liebschutz, J.M., Walley, A.Y., 2018. Medication for opioid use disorder after nonfatal opioid overdose and association with mortality: a cohort study. Ann. Intern. Med. 169 (3), 137–145.

Lecrubier, Y., Sheehan, D.V., Weiller, E., Amorim, P., Bonora, I., Harnett Sheehan, K., Janavs, J., Dunbar, G.C., 1997. The Mini International Neuropsychiatric Interview (MINI). A short diagnostic structured interview: reliability and validity according to the CIDI. Eur. Psychiatry 12 (5), 224–231. https://doi.org/10.1016/s0924-9338(97)83296-8.

Lee, J.D., McDonald, R., Grossman, E., McNeely, J., Laska, E., Rotrosen, J., Gourevitch, M.N., 2015. Opioid treatment at release from jail using extended-release naltrexone: a pilot proof-of-concept randomized effectiveness trial. Addiction 110 (6), 1008–1014. https://doi.org/10.1111/add.12894.

Lee, J.D., Nunes, E.V., Novo, P., Bachrach, K., Bailey, G.L., Bhatt, S., Farkas, S., Fishman, M., Gauthier, P., Hodgkins, C.C., 2018. Comparative effectiveness of extended-release naltrexone versus buprenorphine-naloxone for opioid relapse prevention (X: BOT): a multicentre, open-label, randomised controlled trial. Lancet North Am. Ed. 391 (10118), 309–318.

Lier, A.J., Seval, N., Vander Wyk, B., Di Paola, A., Springer, S.A., 2022. Maintenance on extended-release naltrexone is associated with reduced injection opioid use among justice-involved persons with opioid use disorder. J. Subst. Abuse Treat. 142, 108852 https://doi.org/10.1016/j.jsat.2022.108852.

Lobmaier, P.P., Kunøe, N., Gossop, M., Katevoll, T., Waal, H., 2010. Naltrexone implants compared to methadone: outcomes six months after prison release. Eur. Addict. Res. 16 (3), 139–145.

Maruschak, L.M., Beavers, R., 2009. HIV in Prisons, 2007–08. US Department of Justice, Bureau of Justice Statistics, Washington, DC.

Masson, C.L., Shopshire, M.S., Sen, S., Hoffman, K.A., Hengl, N.S., Bartolome, J., McCarty, D., Sorensen, J.L., Iguchi, M.Y., 2013. Possible barriers to enrollment in substance abuse treatment among a diverse sample of Asian Americans and Pacific Islanders: opinions of treatment clients. J. Subst. Abuse Treat. 44 (3), 309–315. https://doi.org/10.1016/j.jsat.2012.08.005.

Meyer, J.P., Cepeda, J., Springer, S.A., Wu, J., Trestman, R.L., Altice, F.L., 2014a. HIV in people reincarcerated in Connecticut prisons and jails: an observational cohort study. Lancet HIV 1 (2), e77–e84. https://doi.org/10.1016/S2352-3018(14)70022-0.

Meyer, J.P., Cepeda, J., Wu, J., Trestman, R.L., Altice, F.L., Springer, S.A., 2014b. Optimization of human immunodeficiency virus treatment during incarceration: viral suppression at the prison gate. JAMA Intern. Med. 174 (5), 721–729. https://doi.org/10.1001/jamainternmed.2014.601.

Nunes Jr, E.V., Scodes, J.M., Pavlicova, M., Lee, J.D., Novo, P., Campbell, A.N., Rotrosen, J, 2021. Sublingual buprenorphine-naloxone compared with injection naltrexone for opioid use disorder: potential utility of patient characteristics in guiding choice of treatment. Am. J. Psychiatry 178 (7), 660–671.

Nunn, A., Zaller, N., Dickman, S., Trimbur, C., Nijhawan, A., & Rich, J.D. (2009). Methadone and buprenorphine prescribing and referral practices in US prison systems: results from a Nationwide Survey. *Drug Alcohol Depend.*, 105(1), 83–88. 10.1016/j.drugalcdep.2009.06.015.

Oliver, P., Keen, J., Rowse, G., Ewins, E., Griffiths, L., Mathers, N., 2010. The effect of time spent in treatment and dropout status on rates of convictions, cautions and imprisonment over 5 years in a primary care-led methadone maintenance service. Addiction 105 (4), 732–739. https://doi.org/10.1111/j.1360-0443.2009.02856.x.

Perry, A.E., Neilson, M., Martyn-St James, M., Glanville, J.M., Woodhouse, R., Godfrey, C., Hewitt, C, 2015. Pharmacological interventions for drug-using offenders. Cochrane Database Syst. Rev. (6).

Proctor, S.L., Alvarez de la Campa, G.J., Medina-Reyes, L., Hoffmann, N.G., 2017. Clinical and demographic correlates of the type and frequency of criminal behavior among jail inmates with a substance use disorder. Am. J. Crim. Justice 42 (4), 746–758. https://doi.org/10.1007/s12103-016-9381-3.

Ranganathan, P., Pramesh, C.S., Aggarwal, R., 2017. Common pitfalls in statistical analysis: logistic regression. Perspect. Clin. Res. 8 (3), 148–151. https://doi.org/10.4103/picr.PICR_87_17.

Rittenberg, E., 2018. Trauma-Informed Care - Reflections of a Primary Care Doctor in the Week of the Kavanaugh Hearing. N. Engl. J. Med. 379 (22), 2094–2095. https://doi.org/10.1056/NEJMp1813497.

Scholz, B., Lu, V.N., Conduit, J., Szantyr, D., Crabb, S., Happell, B., 2022. An exploratory study of men's access to mental health services. Psychol. Men Masculinities.

Scott, C.K., Dennis, M.L., Grella, C.E., Mischel, A.F., Carnevale, J., 2021. The impact of the opioid crisis on US state prison systems. Health Justice 9, 1–16.

Sheehan, D., Lecrubier, Y., Harnett-Sheehan, K., Janavs, J., Weiller, E., Bonors, L., Keskiner, A., Schinka, J., Knapp, E., Sheehan, M., Dunbar, G., 1997a. Reliability and Validity of the MINI International Neuropsychiatric Interview (M.I.N.I.): according to the SCID-P. Eur. Psychiatry 12, 232–241.

Sheehan, D.V., Lecrubier, Y., Harnett Sheehan, K., Janavs, J., Weiller, E., Keskiner, A., Schinka, J., Knapp, E., Sheehan, M.F., Dunbar, G.C., 1997b. The validity of the Mini International Neuropsychiatric Interview (MINI) according to the SCID-P and its reliability. Eur. Psychiatry 12 (5), 232–241. https://doi.org/10.1016/s0924-9338(97)83297-x.

Springer, S.A., Brown, S.E., Di Paola, A., Altice, F.L., 2015. Correlates of retention on extended-release naltrexone among persons living with HIV infection transitioning to the community from the criminal justice system. Drug Alcohol Depend. 157, 158–165. https://doi.org/10.1016/j.drugalcdep.2015.10.023.

Springer, S.A., Di Paola, A., Azar, M.M., Barbour, R., Biondi, B.E., Desabrais, M., Lincoln, T., Skiest, D.J., Altice, F.L., 2018. Extended-Release Naltrexone Improves Viral Suppression Among Incarcerated Persons Living With HIV With Opioid Use Disorders Transitioning to the Community: results of a Double-Blind, Placebo-Controlled Randomized Trial. J. Acquir. Immune Defic. Syndr. 78 (1), 43–53. https://doi.org/10.1097/QAI.0000000000001634.

Springer, S.A., Dushaj, A., Azar, M.M., 2012. The impact of DSM-IV mental disorders on adherence to combination antiretroviral therapy among adult persons living with HIV/AIDS: a systematic review. AIDS Behav. 16 (8), 2119–2143. https://doi.org/10.1007/s10461-012-0212-3.

Springer, S.A., Pesanti, E., Hodges, J., Macura, T., Doros, G., Altice, F.L., 2004. Effectiveness of antiretroviral therapy among HIV-infected prisoners: reincarceration

and the lack of sustained benefit after release to the community. Clin. Infect. Dis. 38 (12), 1754–1760. https://doi.org/10.1086/421392.

Springer, S.A., Spaulding, A.C., Meyer, J.P., Altice, F.L., 2011. Public health implications for adequate transitional care for HIV-infected prisoners: five essential components. Clin. Infect. Dis. 53 (5), 469–479. https://doi.org/10.1093/cid/cir446.

Stephenson, B.L., Wohl, D.A., Golin, C.E., Tien, H.C., Stewart, P., Kaplan, A.H., 2005. Effect of release from prison and re-incarceration on the viral loads of HIV-infected individuals. Public Health Rep. 120 (1), 84–88. https://doi.org/10.1177/003335490512000114.

Stone, V.E., Mansourati, F.F., Poses, R.M., Mayer, K.H., 2001. Relation of physician specialty and HIV/AIDS experience to choice of guideline-recommended antiretroviral therapy. J. Gen. Intern. Med. 16 (6), 360–368. https://doi.org/10.1046/j.1525-1497.2001.016006360.x.

Sung, H.-E., Mahoney, A.M., Mellow, J., 2011. Substance abuse treatment gap among adult parolees: prevalence, correlates, and barriers. Crim. Justice Rev. 36 (1), 40–57.

United Nations Rules for the Treatment of Women Prisoners and Non-Custodial Measures for Women Offenders with Their Commentary: The Bangkok Rules. (2012).

van Olphen, J., Eliason, M.J., Freudenberg, N., Barnes, M., 2009. Nowhere to go: how stigma limits the options of female drug users after release from jail. Subst Abuse Treat. Prev. Policy 4, 10. https://doi.org/10.1186/1747-597x-4-10.

Waddell, E.N., Springer, S.A., Marsch, L.A., Farabee, D., Schwartz, R.P., Nyaku, A., Reeves, R., Goldfeld, K., McDonald, R.D., Malone, M., 2021. Long-acting buprenorphine vs. naltrexone opioid treatments in CJS-involved adults (EXIT-CJS). J. Subst. Abuse Treat. 128, 108389.

Wallace, D., Wang, X., 2020. Does in-prison physical and mental health impact recidivism? SSM Popul. Health 11, 100569. https://doi.org/10.1016/j.ssmph.2020.100569.

Winter, R.J., Stoové, M., Agius, P.A., Hellard, M.E., Kinner, S.A., 2019. Injecting drug use is an independent risk factor for reincarceration after release from prison: a prospective cohort study. Drug Alcohol Rev. 38 (3), 254–263. https://doi.org/10.1111/dar.12881.

Witteveen, E., van Ameijden, E.J., 2002. Drug users and HIV-combination therapy (HAART): factors which impede or facilitate adherence. Subst. Use Misuse 37 (14), 1905–1925. https://doi.org/10.1081/ja-120016224.

Wood, E., Montaner, J.S., Chan, K., Tyndall, M.W., Schechter, M.T., Bangsberg, D., O'Shaughnessy, M.V., Hogg, R.S., 2002. Socioeconomic status, access to triple therapy, and survival from HIV-disease since 1996. AIDS 16 (15), 2065–2072. https://doi.org/10.1097/00002030-200210180-00012.

Woody, G.E., Poole, S., Yu, E., Carroll, J., Lynch, K.G., 2021. Extended release injectable naltrexone before vs. after release: a randomized trial of opioid addicted persons who are in prison. J. Subst. Abuse Treat. 127, 108355 https://doi.org/10.1016/j.jsat.2021.108355.

Zaller, N., McKenzie, M., Friedmann, P.D., Green, T.C., McGowan, S., Rich, J.D., 2013. Initiation of buprenorphine during incarceration and retention in treatment upon release. J. Subst. Abuse Treat. 45 (2), 222–226. https://doi.org/10.1016/j.jsat.2013.02.005.

Zelenev, A., Marcus, R., Kopelev, A., Cruzado-Quinones, J., Spaulding, A., Desabrais, M., Lincoln, T., Altice, F.L., 2013. Patterns of homelessness and implications for HIV health after release from jail. AIDS Behav. 17 (Suppl 2(0 2)), S181–S194. https://doi.org/10.1007/s10461-013-0472-6.