



Discontinuation of opioid agonist treatment following release from prison in a cohort of men who injected drugs prior to imprisonment in Victoria, Australia: A discrete-time survival analysis

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ABSTRACT

Background: Retention in opioid agonist treatment (OAT) following release from prison is associated with improved outcomes, however factors associated with post-release OAT discontinuation in Australia are poorly understood. We examined post-release OAT discontinuation in a cohort of men who engaged in approximately monthly injecting drug use (IDU) prior to imprisonment in Victoria, Australia.

Methods: Longitudinal data were used to calculate incidence of first-event post-release OAT discontinuation among men released from prison receiving OAT, and single-event discrete-time survival methods were used to estimate associations with post-release OAT discontinuation.

Results: Among 110 participants, 55 OAT discontinuations were observed in the two years post-release, an overall crude incidence rate (IR) of 46 per 100 person-years (PY) (95 % confidence interval [95 %CI]: 36–60 per 100PY). Incidence was greatest between release from prison and first follow-up (IR: 84 per 100PY, 95 %CI: 62–116 per 100PY). Initiating OAT during index imprisonment (versus transitioning from community OAT; adjusted hazard rate [AHR]: 2.17, 95 %CI: 1.14–4.13) and identifying as Aboriginal and/or Torres Strait Islander (AHR: 4.95, 95 %CI: 2.00–12.25) were associated with an increased hazard of OAT discontinuation.

Conclusion: In a cohort of men with recent histories of IDU released from prison receiving OAT, half reported OAT discontinuation within two years of release from prison, with incidence of discontinuation greatest soon after prison-release. Targeted support for men who initiate OAT during episodes of imprisonment and Aboriginal and/or Torres Strait Islander peoples is necessary to reduce incidence of OAT discontinuation among people at greatest risk of discontinuation.

1. Introduction

People with substance use disorders are disproportionately imprisoned globally (Fazel et al., 2017). For people experiencing opioid use

disorder, access to opioid agonist treatment (OAT) during periods of imprisonment is associated with reduced drug-related harms, such as in-prison blood borne virus transmission and mortality (Larney, 2010; Larney et al., 2014). Similarly, post-release substance use (Kinlock et al.,

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2009; Mattick et al., 2009), opioid-related mortality (Bird et al., 2015; Degenhardt et al., 2014), and reimprisonment (Larney et al., 2012) are all lower among people retained in OAT post-release.

Discontinuation of OAT following release from prison is common. International studies of prison-initiated OAT have reported post-release retention rates of between 37 % and 59 % in the six to 12 months post-release (Brinkley-Rubinstein et al., 2018; Kinlock et al., 2005, 2009; Wickersham et al., 2013). Australian studies have reported a median post-release OAT duration of 63 days (Larney et al., 2012) and 80 % of people released from prison on OAT discontinuing treatment within four years (Dolan et al., 2005).

International studies have identified a number of factors associated with post-release OAT discontinuation. Macswain et al. (2013) and Magura et al. (1993) both found people on OAT prior to imprisonment were more likely to be retained on OAT compared to people who initiated OAT in prison. While Wickersham et al. (2013) found higher daily methadone doses were associated with improved post-release OAT retention. Randomised controlled trials of prison-initiated OAT in the United States of America reported continuous pre-imprisonment employment was associated with a reduced risk of OAT discontinuation (Kinlock et al., 2013) and older age was associated with a greater number of days in OAT in the first six months following release (Gordon et al., 2008). Factors associated with post-release OAT discontinuation among Australians in prison are poorly understood. We identified one Australian study, almost two decades old, which found brief periods of reimprisonment (i.e., less than one month) were associated with an increased risk of OAT discontinuation, while extended periods of reimprisonment (four or more months) protected against OAT discontinuation (Dolan et al., 2005), suggesting these sentences that result in rapid transitions in and out of prison destabilise OAT.

Given the importance of OAT retention post-release to supporting improved post-release outcomes, we used data from a cohort of men receiving OAT at the time of release from prison who injected drugs regularly prior to imprisonment in Victoria, Australia, to describe the incidence of OAT discontinuation at three time points within the first two years of release, and identify factors associated with OAT discontinuation.

2. Methods

2.1. OAT in Victoria, Australia

In Australia, the operation of prisons, including healthcare, is the responsibility of state/territory governments. All states in Australia offer some level of prison-based OAT, however, not all prisons offer OAT. In Victoria, Australia's second most populous state with a population of approximately 6.6 million people (Australian Bureau of Statistics, 2021), the Department of Justice and Community Safety (DJCS) operate a prison-based OAT program that facilitates both OAT 'maintenance' and 'initiation' across all 14 prisons in the state (Justice Health, 2015). People receiving OAT at the time of their imprisonment can be maintained on OAT when entering custody (i.e., police cells and remand or sentenced imprisonment episodes). People who have entered custody and: (i) are assessed as experiencing opioid dependence and are not receiving OAT, (ii) continue to use opioids during imprisonment, or (iii) are at risk of opioid use either in prison or post-release, are eligible to initiate OAT following clinical assessment (Justice Health, 2015). At the time of data collection, methadone and sublingual buprenorphine/naloxone were available as OAT medicines, however DJCS preferred people initiating OAT in prison be prescribed methadone to minimise potential diversion of OAT medication (Justice Health, 2015). Long acting injectable buprenorphine was introduced as a medication option in 2020 (Australian Institute of Health and Welfare, 2021). There are no financial costs to people in prison for OAT.

People receiving OAT when released from prison are referred to community-based primary care for ongoing OAT prescribing and a

private pharmacy for dosing. Community-based OAT in Victoria is prescribed in primary care settings by general practitioners or nurse practitioners and medication is dispensed from pharmacies (Department of Health and Human Services, 2016). Visits to prescribers are subsidised under Medicare, Australia's universal healthcare access scheme, although some clinics may charge an additional out-of-pocket gap fee. OAT medicines are supplied to pharmacies free of charge under special arrangement (Section 100) through Australia's Pharmaceutical Benefits Scheme (PBS) (Department of Health, 2022). Pharmacies can elect to charge patients a daily medication dispensing fee, totalling approximately \$110AUD per month, (Tran et al., 2022; Zahra et al., 2022). For people released from prison on OAT, the DJCS subsidises these dispensing fees for the first 28 days post-release (Justice Health, 2015).

2.2. Data sources, participants and eligibility

Data are from the Prison and Transition Health Cohort Study (PATH), a prospective cohort study of 400 men recruited during a period of imprisonment in Victoria, Australia. Participants were aged at least 18 years, sentenced, male, and reported injecting drug use (IDU) at least monthly in the six months before imprisonment. Participants completed a baseline interview (index) in the weeks prior to prison release (median 39 days, interquartile range [IQR] 15–69) and follow-up interviews scheduled at three (median 3.6 months, IQR 3.0–4.9 months), 12 (median 13.1 months, IQR 12.0–15.8 months), and 24 months (median 26.1 months, IQR 24.3–30.3 months) after index release, either in prison if reincarcerated or in the community (Stewart et al., 2021b). In addition to self-report data, participants consented to data linkage to a range of health, social and correctional administrative datasets. Detailed PATH methods and cohort characteristics are described elsewhere (Kirwan et al., 2019; Stewart et al., 2021a, 2021b). Ethics oversight for PATH was provided by the Alfred Hospital Ethics Committee (79/12) and the Justice Health Human Research Ethics Committee (CF/14/10169).

Participants who completed at least one of three scheduled follow-up interviews, reported being released from prison on OAT at first follow-up interview, and who were not reimprisoned and released between index release and first follow-up were eligible for inclusion in this analysis (Fig. 1). Participants who were reimprisoned and released between index release and first follow-up were excluded ($n = 16$) as the survey question asked participants whether they were released from prison on OAT, but did not differentiate between index and subsequent releases.

2.3. Outcome

The outcome was first-event OAT discontinuation (no/yes). At each follow-up interview participants were asked "did you continue on [OAT] beyond the end of the post-release subsidy? (no/yes)", "are you currently on [OAT]? (no/yes)" and if yes, "how [many days] have you been on [OAT] for?". At first follow-up interview, participants were classified 'yes' to OAT discontinuation if they self-reported OAT discontinuation after the post-release subsidy period, reported no longer being on OAT, or reported a current OAT duration less than the time elapsed since prison release. At subsequent follow-up interviews for participants classified as OAT continued at first follow-up, participants were classified 'yes' to OAT discontinuation if they self-reported no longer being on OAT or reported a current OAT duration less than the time elapsed since last interview (see Fig. 2).

2.4. Covariates

Model covariates were selected a priori following a review of prison- (Dolan et al., 2005; Gisev et al., 2014; Gordon et al., 2008; Kinlock et al., 2013; Larney et al., 2012; Macswain et al., 2013; Magura et al., 1998; Wickersham et al., 2013) and community-based OAT research (Bharat et al., 2021; Burns et al., 2015; Geddes et al., 2021; Kerr et al., 2005; Lo

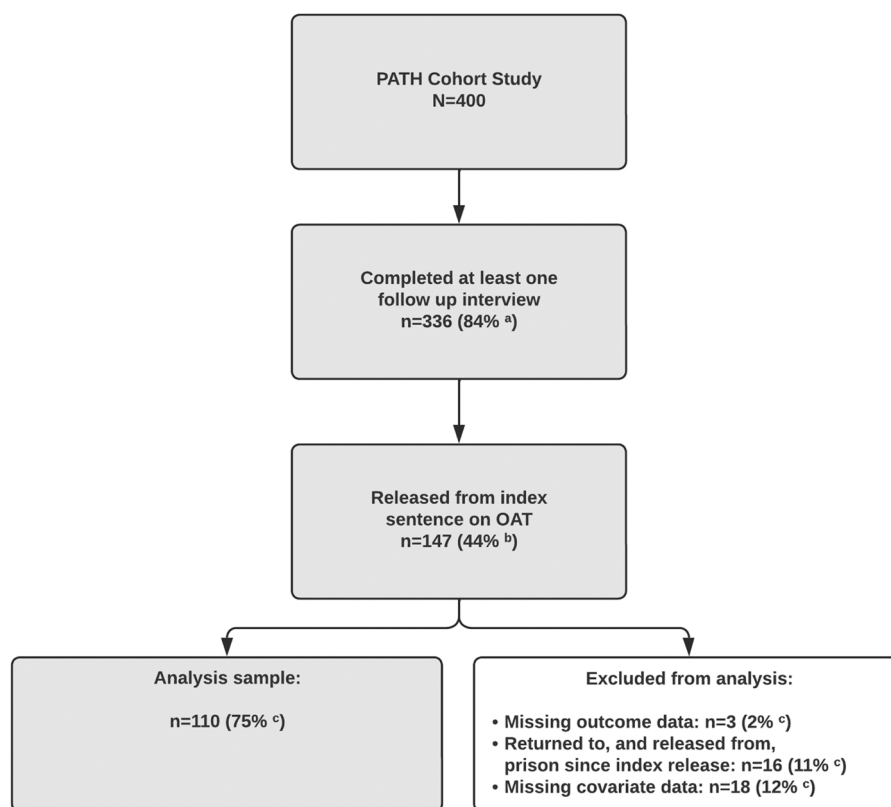


Fig. 1. PATH participant inclusion and exclusion.

et al., 2018; O'Connor et al., 2020). Time invariant covariates included age at baseline (years, continuous); identifying as Aboriginal and/or Torres Strait Islander (no/yes); IDU during index imprisonment (no/yes), determined from baseline interview questions asking about injection of 22 different drugs during index imprisonment; and initiation of OAT episode during index imprisonment (no/yes). Participants who responded 'yes' to "were you on [OAT] immediately before [index] imprisonment?" and responded 'at reception' to the question "when was the [OAT] program initiated? (at reception (<72h)/after reception (>=72h)" were assigned as maintaining community-based OAT during their episode of imprisonment. Participants who were either not on OAT immediately before index imprisonment episode, or were on OAT immediately before prison but reported receiving their first prison-based OAT dose "after reception" were assigned as initiating OAT in prison.

The observation period was included as an ordinal time-varying covariate (OP; index release to first follow-up [OP1]/first follow-up to second follow-up [OP2]/second follow-up to third follow-up [OP3]). If a participant missed the scheduled three-month follow-up, but completed 12- and 24-month follow-up interviews, the period from index release to 12-month follow-up interview was classified as OP1 and the period from 12-month to 24-month interview was OP2. Data were structured this way, rather than by three-, 12- or 24-month interview, to retain participants who did not complete consecutive interviews in analysis, as per Stewart et al. (2022). Other time-varying covariates also included opioid IDU since last interview (no/yes), determined from questions asked at each follow-up about injection of heroin and pharmaceutical opioids (i. e. buprenorphine, morphine, oxycodone); count of accommodation moves since last interview (discrete); and reimprisonment after release from index sentence (no/yes).

2.5. Data analysis

Among included participants, summary statistics were calculated for model covariates, disaggregated by OAT discontinuation.

For calculation of incidence rates of OAT discontinuation, person-years at-risk started at date of index release and stopped at OAT discontinuation (incident event) or last follow-up interview date for those that remained on OAT. OAT discontinuation was assumed to have occurred at the midpoint between interviews as it was unobserved. Time-at-risk continued through imprisonment, among those reimprisoned. Because current prison policy means OAT is not automatically discontinued (Justice Health, 2015), we assumed participants could remain at-risk of OAT discontinuation when reimprisoned, consistent with previous Australian research (Dolan et al., 2005). Crude incidence rates were calculated by dividing total OAT discontinuations by total person-years (PY) overall, and also within each OP, and were reported per 100PY along with 95 % confidence intervals (95 %CI).

To determine associations between covariates and OAT discontinuation post-release, we undertook a discrete-time survival analysis, given OAT discontinuation data were interval censored. We used generalised linear models with a binomial distribution and complementary log-log link function. Results were reported as unadjusted (HR) and adjusted hazard ratios (AHR). Models included dummy variables for each OP to permit variation in the baseline hazard of discontinuation. Regarding the covariate 'Accommodation moves in the year preceding index imprisonment', two models were fit to compare its inclusion as a continuous function of 'accommodation moves in the year preceding index imprisonment' values (0/1-2/3+) or categorical covariate. Models were compared using a Likelihood Ratio test, and following a non-significant result, the model using a continuous function was retained. To account for different durations of time at risk, models were offset for the log days of observation periods. A complete case approach was used in regards to missing data. The proportional hazards assumption was assessed by fitting the *a-priori* model and additional interaction terms between follow-up periods and each statistically significant covariate. To examine the baseline hazard of OAT discontinuation in each OP conditional on other covariates, marginal predicted probabilities (PP) were calculated using the final model, and Wald tests used to

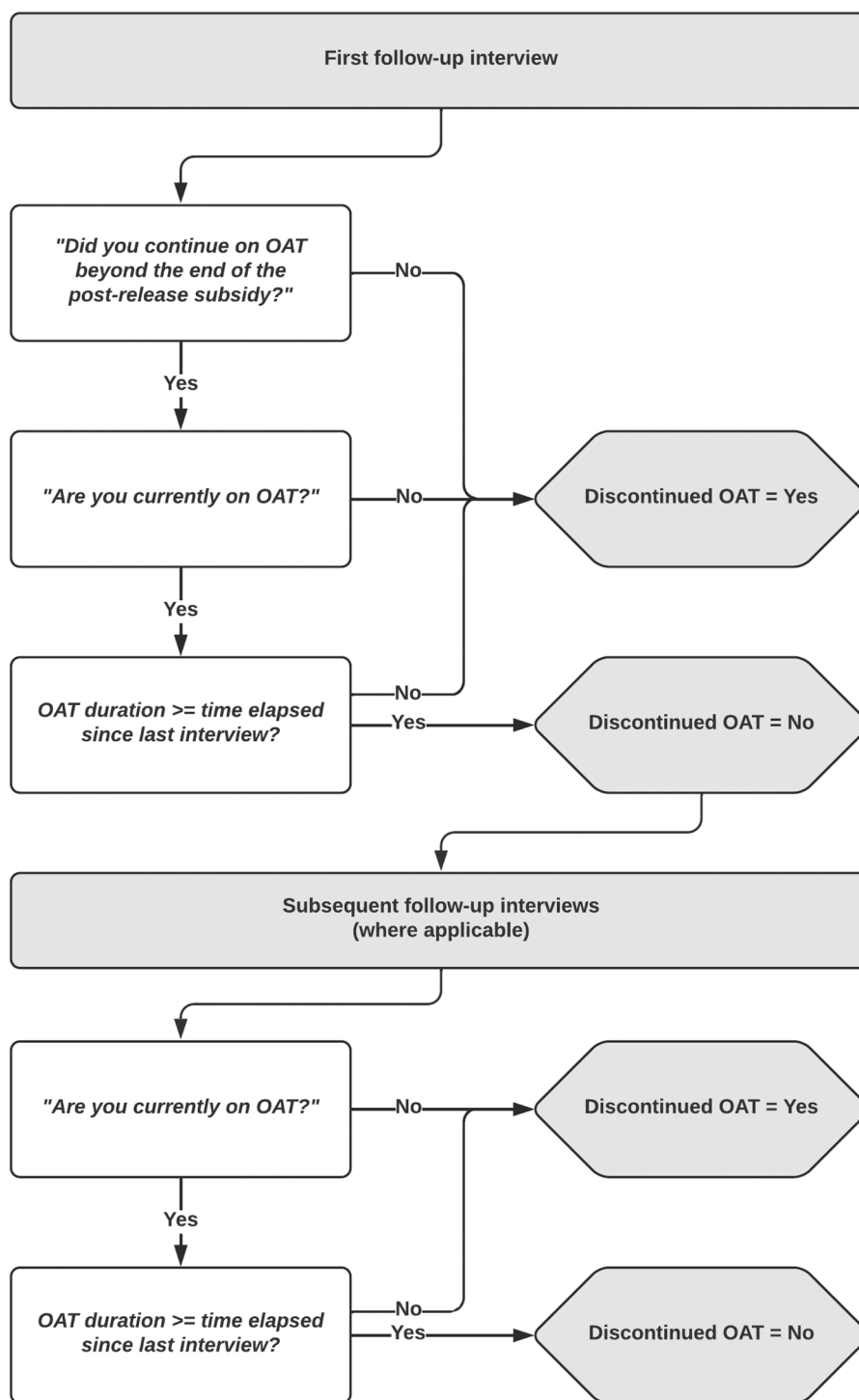


Fig. 2. Derivation of OAT Discontinuation outcome from self-report data.

determine whether differences between resulting PPs were statistically significant. Statistical significance was set at $p < 0.05$.

3. Results

3.1. Participant characteristics

Of the 336 (84 %) PATH participants who completed at least one follow-up interview, 147 (44 %) reported being released from prison on OAT. Of these, three (2 %) were excluded from this analysis due to missing outcome data and 16 (11 %) due to being reimprisoned and

released between index release and first follow-up. A further 18 (12 %) participants were excluded due to missing covariate data, resulting in a final sample of 110 participants.

Participants included in analysis contributed a total of 193 follow-up interviews; 56 contributed one follow-up interview, 25 contributed two follow-up interviews and 29 contributed three follow-up interviews. Participants contributed a median of 399 days of observation (interquartile range [IQR]: 151–739) overall; median OP durations were: OP1: 121 days (IQR: 93–241), OP2: 319.5 days (IQR: 264–401) and OP3: 365 days (IQR: 334–400). At baseline, participants' mean age was 36 (standard deviation [SD]: 7), 13 (12 %) identified as Aboriginal and

Torres Strait Islander and 47 (43 %) reported initiating OAT during their index imprisonment (see Table 1).

3.2. Incidence of OAT discontinuation post-release

We observed 55 first-event OAT discontinuations over 118.7 PY (overall incidence = 46 per 100 PY; 95 %CI: 36–60). Incidence of OAT discontinuation was greatest in OP1 and decreased over time (see Table 2).

3.3. Associations with OAT discontinuation post-release

In multivariable analysis, identifying as an Aboriginal and/or Torres Strait Islander person (AHR: 4.95 95 %CI: 2.00–12.25) and initiation of OAT episode during index imprisonment (AHR: 2.17, 95 %CI: 1.14–4.13) were associated with an increased hazard of OAT discontinuation (see Table 3). There was no evidence of violation of the proportional hazards assumption (Aboriginal and/or Torres Strait Islander: Wald χ^2 [1] = 0.24, p = 0.621; initiated OAT during index imprisonment: Wald χ^2 [1] = 0.63, p = 0.730).

Marginal predicted probabilities derived from the final model indicated that the hazard of OAT discontinuation decreased between OP1 (PP=0.36) and OP2 (PP=0.23) (Wald χ^2 (1) = 4.05, p = 0.044) and between OP2 (PP=0.23) and OP3 (PP=0.07) (Wald χ^2 (1) = 5.52, p = 0.019).

4. Discussion

In a cohort of men released from prison on OAT who engaged in regular IDU before a period of imprisonment in Victoria, Australia, we found half of participants discontinued OAT during a median of 13 months of observation. We also found incidence of OAT discontinuation was greatest between release from prison and first follow-up, during which 74 % of observed OAT discontinuations occurred. Among participants who completed three-month follow-up interviews, 33 % had discontinued OAT (data not shown), a proportion similar to Bharat et al. (2021), who found 37 % of people who initiated OAT in NSW in 2015 discontinued treatment within three-months of treatment initiation.

Table 1

Baseline characteristics of a cohort of men with recent histories of IDU released from prison in Victoria, Australia, between September 2014–May 2016, receiving OAT at time of release, stratified by post-release OAT discontinuation (N = 110).

	Retained (n = 55) n (%)	Discontinued (n = 55) n (%)	p-value
Age (mean, SD) ^a	37 (6)	35 (6)	0.059 ^b
Aboriginal and/or Torres Strait Islander	np ^c	np ^c	np ^c
Initiated OAT ^d during index imprisonment	16 (34)	31 (66)	0.004 ^e
IDU ^f during index imprisonment	10 (26)	28 (74)	<0.001 ^e
Accommodation moves in the year preceding index imprisonment			
0	22 (50)	22 (50)	
1–2	16 (53)	14 (47)	0.885 ^e
3+	17 (47)	19 (53)	
Previous adult imprisonment episodes ^g (median, IQR)	3 (1–7)	5 (2–8)	0.211 ^h
Opioid IDU ^f in month before index imprisonment	39 (51)	37 (49)	0.658 ^e

^a Standard deviation.

^b independent samples t-test.

^c not provided due to a small cell size (n < 5).

^d opioid agonist treatment.

^e Chi-square test.

^f injecting drug use

^g determined via linkage to Department of Justice and Community Safety.

^h Kruskal-Wallis test.

Table 2

Crude incidence rates and 95 % confidence intervals (95 %CI) of OAT discontinuation after release from index imprisonment among a cohort of men with recent histories of IDU released from prison in Victoria, Australia, between September 2014–May 2016, receiving OAT at time of release (N = 110).

Observation Period ^a	Participants	Person-years	OAT discontinuations	Rate per 100 PY (95 %CI)
1	110	46.2	39	84 (62–116)
2	54	44.3	14	32 (19–53)
3	29	28.2	2	7 (2–28)
Total	110	118.7	55	46 (36–60)

^a Observation period (OP) 1: index release to first follow-up; OP2: first follow-up to second follow-up; OP3: second follow-up to third follow-up.

Table 3

Associations with first-event OAT discontinuation post-release among a cohort of men with recent histories of IDU released from prison in Victoria, Australia, between September 2014–May 2016, who were receiving OAT at time of release: discrete-time survival model showing unadjusted (HR) and adjusted hazard ratios (AHR) with 95 % confidence interval (95 %CI).

	HR (95 %CI)	p-value	AHR (95 %CI) ^a	p-value
<i>Time invariant</i>				
Age at baseline	0.96 (0.92–1.01)	0.091	1.00 (0.94–1.06)	0.985
Aboriginal and/or Torres Strait Islander	2.93 (1.43–6.02)	0.003	4.95 (2.00–12.25)	0.001
Initiated OAT ^b during index imprisonment	2.41 (1.39–4.20)	0.002	2.17 (1.14–4.13)	0.019
IDU ^c during index imprisonment	2.46 (1.41–4.30)	0.002	1.95 (0.98–3.87)	0.058
<i>Time varying</i>				
Accommodation moves (0/1–2/3+) ^d	1.48 (1.03–2.14)	0.034	1.33 (0.84–2.10)	0.221
Opioid IDU ^e	1.41 (0.77–2.56)	0.262	1.99 (0.92–4.31)	0.082
Reimprisoned	1.40 (0.80–2.45)	0.245	1.55 (0.82–2.95)	0.178

^a Adjusted for observation period and all listed covariates.

^b opioid agonist treatment.

^c injecting drug use.

^d modelled as continuous function of levels of accommodation moves.

Notwithstanding differences between cohorts, our incidence estimates of OAT discontinuation post-release were approximately seven-fold greater than those reported in a recent Australian study among people receiving community-based OAT (Geddes et al., 2021), underscoring the risk of OAT discontinuation among people transitioning from prison to the community.

Previous studies have also documented high rates of OAT discontinuation in the immediate post-release period. For instance, a prospective cohort study among 27 men with HIV released from prison on OAT found 37 % of participants discontinued OAT within one month of release (Wickersham et al., 2013); while a prospective data-linkage study of 375 men with histories of heroin use who were recruited to a prison-based OAT trial found half of participants discontinued OAT within two months of release (Larney et al., 2012). Among people recently released from prison with IDU histories, resumption of IDU is common (Curtis et al., 2022; Winter et al., 2016). For people with opioid dependence, retention in OAT after release from prison is associated with reduced IDU frequency (Curtis et al., 2022), supporting decreased risk of needle-sharing and blood borne virus acquisition (MacArthur et al., 2014; Platt et al., 2018), as well as non-fatal (Keen et al., 2021) and fatal opioid-overdose (Bird et al., 2015; Degenhardt et al., 2014). The high rate of OAT discontinuation we observed in the immediate post-release period, combined with evidence of elevated drug-related and mortality risk during periods of OAT initiation and

discontinuation (Santo et al., 2021), underscores the need for additional supports to promote OAT retention among people released from prison on OAT.

Consistent with previous research (Macswain et al., 2013; Magura et al., 1993), we found men who initiated OAT during imprisonment discontinued treatment at a higher rate than men who transitioned from community OAT to a prison program. While approximately one in three men who initiated OAT during imprisonment were retained in treatment during our observation periods, our findings suggest additional support to remain on post-release OAT should be targeted at those who initiate OAT in prison. Although, it is unclear what is driving the greater rates of discontinuation among those initiating OAT in prison, one possible explanation is limited familiarity with community OAT systems and locations for prescribing and dispensing. Retention could be facilitated by ensuring people who initiate OAT in prison are aware of community prescribing and dispensing processes and pre-release efforts are made to establish supportive referral pathways in an area a person is likely to reside after release. Additionally, prioritising referrals of people who initiate OAT during imprisonment to experienced community-based OAT prescribers may also support retention (Bharat et al., 2021). However, to avoid excessive demands on experienced prescribers (Jones et al., 2021; Longman et al., 2011) initiatives to build a broad base of OAT expertise among general practitioners, such as integration of OAT prescriber-accreditation into standard general practitioner training (Prathivadi and Sturgiss, 2021), are needed.

In our sample, Aboriginal and/or Torres Strait Islander peoples were at increased risk of post-release OAT discontinuation. Similarly, in a sample of people in contact with the criminal justice system, Gisev et al. (2014) found reduced OAT retention among Aboriginal and/or Torres Strait Islander peoples. Factors associated with OAT discontinuation among Aboriginal and/or Torres Strait Islander peoples are unclear. However, an array of social determinants, including inequitable access to transportation, employment, secure and affordable housing and education, as well as limited access to culturally-sensitive services and experiences of personal and structural racism can present significant barriers for Aboriginal and/or Torres Strait Islander peoples to access primary healthcare (Australian Institute of Health and Welfare, 2020; Davy et al., 2016; Gatwiri et al., 2021; Larson et al., 2007; Wilson et al., 2020) and may have contributed to the increased rates of OAT discontinuation we observed. Aboriginal and/or Torres Strait Islander Community Controlled Health Organisations (ACCHOS) provide self-determined holistic primary healthcare which combines mainstream healthcare with cultural approaches to health and healing (Campbell et al., 2018; Freeburn et al., 2022; Pearson et al., 2020). ACCHOS have supported improved service access and health outcomes among Aboriginal and/or Torres Strait Islander peoples (Campbell et al., 2018; Pearson et al., 2020), including improved access to, and retention in, OAT (Freeburn et al., 2022; Williams et al., 2006). However, OAT prescribing within ACCHOS is uncommon (Freeburn et al., 2022). Aboriginal and/or Torres Strait Islander-led research which examines barriers to OAT retention among Aboriginal and/or Torres Strait Islander peoples and the broader integration of OAT into ACCHOS is needed. Additionally, the integration of ACCHOS into prison health systems may support improved post-release continuity of care and, in turn, increased OAT retention (Pettit et al., 2019; Shukralla et al., 2020). Recognising that Aboriginal and/or Torres Strait Islander people may choose not to access ACCHOS, particularly for stigmatised conditions such as drug dependence, culturally-informed OAT prescribing among mainstream services may also reduce OAT discontinuation among Aboriginal and/or Torres Strait Islander peoples (Halacas et al., 2015).

There are a number of additional strategies which may reduce the incidence of post-release OAT discontinuation. OAT cost is a significant barrier to initiation and retention in community cohorts of people receiving OAT in Australia (Shepherd et al., 2014; Tran et al., 2022; Zahra et al., 2022). Extension of the 28-day post-release subsidy of OAT dispensing costs currently available to people being released on OAT in

Victoria is likely to support improved retention, given the high proportion of people recently released from prison who experience unemployment and financial insecurity (Stewart et al., 2021b; Visher et al., 2010). Additionally, current OAT costs are grossly inequitable when compared to other PBS-funded medicines. As noted earlier, pharmacies charge patients a medication dispensing fee of approximately \$110AUD per month, (Tran et al., 2022; Zahra et al., 2022). By contrast, medicines funded under standard PBS arrangements cost patients on low incomes \$6.80AUD per month. Subsidising OAT in line with other PBS medications would permanently improve OAT affordability, supporting improved retention (Chalmers and Ritter, 2012; Tran et al., 2022). Ensuring adequate coverage of community-based OAT prescribers and dispensing pharmacies in proximity to post-release housing, support services, and community corrections sites, particularly in regional and remote areas, may also support retention and avoid people recently released from prison being placed on OAT-waitlists (Harlow et al., 2013). The use of novel technologies such as safe-storage containers and biometric authentication could enable safe increases in the frequency of unsupervised (self-administered) dosing, further reducing financial barriers to OAT while also reducing logistical barriers through reduced pharmacy attendance (Tran et al., 2022). Alternative medications to oral methadone- and buprenorphine-based OAT, such as long-acting injectable buprenorphine (Dunlop et al., 2022; Lee et al., 2021; Lintzeris et al., 2021), injectable heroin-assisted treatment (Blanken et al., 2010; Fischer et al., 2007; Haasen et al., 2007) and slow-release oral morphine (Beck et al., 2014; Eder et al., 2005) are safe OAT alternatives, and may support improved post-release retention among people who discontinue OAT.

4.1. Limitations

The small sample size precluded adjustment for additional covariates which may relate to post-release OAT discontinuation and also reduced modelling precision, likely limiting the utility of our findings for policy and practice. In particular, the precision of estimates relating to the hazard of discontinuation among Aboriginal and/or Torres Strait Islander peoples was impacted by a small sample; however, given previous research has consistently reported an increased risk of OAT discontinuation among Aboriginal and/or Torres Strait Islander peoples in community- (Bharat et al., 2021; Burns et al., 2015; Geddes et al., 2021) and justice-recruited cohorts of people accessing OAT (Gisev et al., 2014), we considered inclusion of Aboriginal and/or Torres Strait Islander identity essential for inclusion in analysis. Additionally, sample size prevented comparison of discontinuation between OAT medicines. The absence of women, people under the age of 18 years, and people on remand prevents the generalisability of our findings to these groups. Additionally, differences in the delivery of OAT between jurisdictions may limit generalisability of these findings outside of Victoria. That the date of OAT discontinuation was unknown and therefore assumed to occur at midpoint of person-periods may have resulted in under- or over-estimation of the incidence rates of OAT discontinuation. Relatedly, calculating incidence according to OP, where first observation could have occurred at three-, 12- or 24months post-release, may have introduced misclassification. However, 78 % and 76 % of participants who were retained in or discontinued OAT, respectively, were followed up in accordance with the study protocol (i.e. OP1 was a three-month follow-up interview, OP2 was a 12-month follow-up interview etc.), suggesting misclassification was modest and occurred at random. Further, while incidence calculations according to days since index release (1–90 days, 91–365 days, 366+ days; see Supplementary Table 1) were between 11 and 15 per 100PY higher than corresponding incidence rates calculated according to OP, the overall pattern of incidence of OAT discontinuation was similar, with incidence greatest in the period closest to release and decreasing thereafter. Of the 16 participants who were excluded due to being reimprisoned and released before first follow-up interview, 14 reported OAT discontinuation; suggesting

that our estimate of the association between OAT discontinuation and reimprisonment is likely an underestimate. Analysis did not account for specific reasons for OAT discontinuation, data which could inform responses to reduce post-release OAT discontinuation. Finally, the reliance on self-report for OAT retention may have resulted in recall bias. Future work should seek to replicate these findings with larger samples which include women, young people, and people on remand, consider specific reasons for OAT discontinuation, and seek to confirm OAT status via linked administrative data.

5. Conclusion

Post-release OAT retention is associated with a number of improved outcomes, including substantial reductions in opioid-related mortality. In a cohort of men with recent histories of IDU who were released from prison receiving OAT, we found that half reported OAT discontinuation within two years of release, and incidence of OAT discontinuation was greatest between prison-release and first follow up interview. Broad initiatives such as reducing costs associated with OAT discontinuation and expanded OAT medicine options may reduce OAT discontinuation. Targeted support for people who initiated OAT in prison, including ensuring that post-release prescribers and dispensers are proximal to post-release accommodation, exploration of barriers to integration of OAT in ACCHOS, and ensuring culturally-sensitive OAT prescription and dispensation within mainstream services, may support increased retention among groups at heightened risk of post-release OAT discontinuation.

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CRedit authorship contribution statement

MC, with assistance from PD, ALW, PAA and MS developed the framework for paper, undertook statistical analysis and produced the initial draft. PD, ALK, PAA, ACS, RDC, TB, SW, AK, RJW and MS provided substantial comments and edits. MS is the chief investigator of the PATH study and provided guidance for paper development and editorial support throughout the duration of planning and writing. All authors read and approved the final manuscript.

Conflict of interest

PD has received investigator-driven funding from Gilead Sciences for work related to hepatitis C treatment and an untied educational grant from Indivior for work related to the introduction of buprenorphine/naloxone into Australia. He has also served as an unpaid member of an Advisory Board for an intranasal naloxone product. MS has received investigator-initiated funding from Gilead Sciences, AbbVie and Bristol Myers Squibb, and consultant fees from Gilead Sciences for activities unrelated to this work. The remaining authors declare that they have no conflicts of interest.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.drugalcdep.2022.109730.

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