scientific reports

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Mortality and return to custody of individuals with a history of drug use one year post-release from the New South Wales custodial system

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Use of illicit drugs is associated with various poor health and social harms. We aimed to describe the mortality and return to custody of people in prison with a history of drug use once they are released into the community. We analysed a cohort of 6600 individuals with a history of drug use who were released from prisons in New South Wales, Australia, between 2008 and 2015. Within 1 year of release, 76 individuals (1.2%) died, 3200 (48.5%) returned to custody, and 3324 (50.4%) remained in the community. Calculation of indirect age standardisation revealed a standard mortality ratio of 11.2 (95% CI 8.8–13.6) and that of the 76 observed deaths, 7 were expected and 69 were excess deaths. The most prevalent cause of death was poisoning which includes drug overdose (43.4%). Logistic regression analysis revealed that increased age was a positive predictor of mortality but a negative predictor of return to custody, while male sex and Aboriginality were associated with increased odds of return to custody. These findings highlight the high burden of mortality and return to custody in this particularly vulnerable population of prison releasees and points to the need for action to address this public health crisis.

Keywords Prison, Illicit drug use, Opioid agonist treatment, Medications for opioid use disorder, Medication treatment, Mortality, Recidivism, Australia

In 2022, the average daily number of adults in Australian prisons was 40,567 individuals (corresponding to an imprisonment rate of 201 per 100,000 adults, or 0.16% of the general population[1]) and one in seven of these were sentenced for illicit drug offences[2] People in prison suffer a greater burden of physical disease and mental health disorders than the general population, higher rates of at-risk alcohol consumption and illicit use of drugs, and greater social disadvantage associated with lower levels of educational attainment, unemployment, and homelessness[3–7] Such criminogenic factors also are associated with the high rates of reincarceration[8,9] and increased risk of mortality[10–12] that have been reported in people leaving prison. One recent Australian study estimated that of the approximately 50,405 people released from Australian prisons in the 2007–2008 financial year, between 449 (0.89%) and 472 (0.94%) died within 1 year of release[13].

The use of substances is associated with crime and recidivism. A representative survey of adults in prison in NSW correctional centres in 2015 reported that 60% of interviewees stated that they been drunk or under the influence of drugs at the time they committed the offence for which they were incarcerated[6] Moreover, a 2022 report from the Australian Institute of Health and Welfare indicated that almost 3 in 4 (73%) prison entrants in Australia reported that they used illicit drugs in the 12 months prior to incarceration.[7] This proportion is almost four times higher than the 18% of people in the general population of Australia who reported illicit drug use in the previous 12 months in 2022–2023.[14].

In 2007, an initiative was implemented in New South Wales (NSW), Australia to minimise poorer health outcomes, mortality and reoffending among people in prison with a history of drug use.[15] The 'Connections' program is a pre-to-post-release throughcare program offered by Justice Health and Forensic Mental Health

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Network (Justice Health NSW), a NSW Government state-wide Specialty Health Network that is responsible for the delivery of health care across all custodial settings in the State.[16] Connections facilitates access to, and engages and links patients with, appropriate drug and alcohol support services and social and health services. Pre-release, Connections staff complete a comprehensive needs assessment with the person referred to the program. They also facilitate engagement with health and welfare staff, within custody and community environments, to prepare participants for release. For four weeks post-release, participants are provided with support that reflects their individual needs (e.g., support to access health and welfare services, assistance in obtaining identification documents or a Medicare card, advice regarding housing, or accompaniment to an opioid agonist treatment (OAT) appointment).

We conducted an evaluation of the Connections program and recently reported on the effectiveness of the program in relation to improving health outcomes for people with a history of drug use on leaving prison.[16,17] However, no previous long-term, population-wide NSW studies have been reported that provide a comprehensive description of the mortality and return to custody rates of people with a history of drug use who have been released from prison. The aim of this post-hoc analysis of data used for the evaluation of the Connections program is to address this gap by describing the mortality and return to custody rates of people in prison with a history of drug use once they are released into the community.

Methods

Data used in this analysis were collated as part of a population-based, retrospective cohort study evaluating the Connections program. A comprehensive protocol for this study[16] and preliminary findings[17] have previously been reported. The study cohort comprised all people in NSW prisons who were eligible to participate in Connections and were released from prison between January 2008 and December 2015. People are eligible for Connections if they: (1) receive OAT in custody; or (2) cease having OAT in the 6 months before release; or (3) are pregnant or give birth during a period of incarceration (or in the 6 months before entering custody) and have a history of drug use; or (4) are not on OAT but have engaged with Drug and Alcohol Services via Justice Health NSW or Corrective Services NSW (CSNSW) for treatment of drug or alcohol concerns. The broad nature of these eligibility criteria ensured that a large proportion of people in NSW prisons with a history of drug use concerns are referred to the Connections program. Note that owing to staffing and other resources restrictions, not all people who were deemed eligible for Connections during the study period were offered a place within the program. Rather, they received "treatment-as-usual." Previous analysis revealed that for individuals who were eligible for Connections over the study period but were not offered a place, the reasons for this were that: (i) the program lacked capacity to enrol new patients (55%); (ii) referrals to the program were not timely or the individual was released from custody earlier than anticipated (35%); and (iii) for other reasons relating to service delivery capacity (10%)[16]. Furthermore, unpublished data from CSNSW indicated that there were dramatic increases in referrals at some points that exceeded program capacity (e.g., in 2011, 30% of patients eligible to be referred to Connections could not be accepted into the program owing to capacity issues). In the context of the present study, we were interested in mortality and reincarceration outcomes for all people in NSW prisons with a history of drug use. Hence the study cohort included all people who were eligible for the Connections program whether or not they were offered or accepted a place within the program.

Data collation involved identification of the study cohort via the Connections dataset (maintained by Justice Health NSW) followed by record linkage with ten health, mortality, and justice datasets maintained in NSW. Record linkage was performed by the Centre for Health Record Linkage (CHeReL) (for details see the published protocol[16]). Data relating to mortality and cause of death was derived from the NSW Registry of Birth Deaths and Marriages (NSW Ministry of Health) while that for return to custody was derived from the NSW Reoffending Dataset (ROD) (NSW Bureau of Crime Statistics and Research). Data from these repositories were accessed up until 30 June 2018 to enable follow-up of all people in the study cohort. Note that while the term "recidivism" includes any contact with the criminal legal system following incarceration (e.g., being arrested and released or being incarcerated in jail), this study focused on return to prison as a measure of recidivism.

Data analysis

Many eligible individuals received multiple custodial sentences over the study period. For each individual in the study cohort, we defined their first release from custody after becoming eligible for the Connections program as the "index case." This was to avoid potential overestimation of death rates or underestimation of return to custody rates that may have arisen if we had focused on an individual's last release during the study period.

For each eligible individual, we assessed the following: (1) mortality within 1 year post-release ("mortality" was defined as dying either in the community or in prison after a return to custody within a year of first release); (2) return to custody within 1 year post-release ("return to custody" was defined as surviving a year from first release but returning to prison at least once within that time frame); (3) survival in the community within one year of release ("community survivorship" was defined as remaining alive and in the community for year after first release).

For the entire study cohort, we calculated the mean age at first release and the mortality, return to custody and community survivorship rates. We next stratified the cohort by sex or Aboriginal and/or Torres Strait Islander (hereafter, respectfully referred to as Aboriginal) identity and calculated these descriptive statistics. We used the Student's t-test to compare age at first release and the Chi-square test to compare mortality and return to custody rates between groups. Finally, we stratified the entire cohort into age groups based on age at release and calculated mortality rates for each of these groups and compared them to mortality rates for each age group in the general NSW population in the year 2011 (the mid-way point of the study period). These latter mortality rates were calculated from Australian Bureau of Statistics (ABS) data with adjustments to reflect the male/female ratio observed in the study cohort[18,19] We calculated a mortality rate ratio (RR) for each age

group by computing the ratio of the mortality rate in the study cohort divided by the mortality rate in the NSW population. We also calculated the standardised mortality ratio (indirect age standardisation) of the study cohort using the 2011 NSW population, adjusted to reflect the male/female ratio observed in the study cohort, as the reference population. Binary logistic regression analysis was undertaken to test for predictors of mortality and return to custody. Models were adjusted for predictors which were significant ($p < 0.2$) in univariate analyses or identified from the literature as being associated with return to custody and/or mortality. These comprised age, sex, Aboriginal identity, whether an individual was offered a place in the Connections program, participation in an opioid agonist treatment program while in prison, time in prison, prison remoteness, and legal status upon discharge (remand vs. sentenced). Adjusted odds ratios (AORs) and 95% confidence intervals (95% CIs) of all variables included in the models are reported. We also examined the interaction between sex and Aboriginal identity on return to custody by rerunning the binary logistic regression models and replacing the variables "sex" and "Aboriginal identity" with "Aboriginal female", "Aboriginal male", "non-Aboriginal female", "non-Aboriginal male". We did not rerun the models for mortality as there were insufficient numbers of events in each subcategory. Data were analysed using SPSS software, version 28 (IBM Corporation, Somers, NY, USA) and a p-value < 0.05 was used to infer statistical significance.

Ethical approval

The study protocol for the Connections evaluation was approved by the Aboriginal Health and Medical Research Council of NSW (HREC/1187/16), NSW Population and Health Services Research Ethics Committee (HREC/16/CIPHS/17), Justice Health NSW Human Research Ethics Committee (HREC/16/JH/15), CSNSW Ethics Committee (D16/569,544), and University of Technology Sydney Human Research Ethics Committee (ETH18-2587). The University of Newcastle Human Research Ethics Committee ratified those approvals (H-2020-0074). As this was a retrospective data linkage study, the need to obtain informed consent was waived by the Aboriginal Health and Medical Research Council of NSW, NSW Population and Health Services Research Ethics Committee, Justice Health NSW Human Research Ethics Committee, CSNSW Ethics Committee, University of Technology Sydney Human Research Ethics Committee, and the University of Newcastle Human Research Ethics Committee. All research activities were conducted in accordance with relevant guidelines and regulations.

Results

The characteristics of the study cohort are presented in Table 1. Between 2008 and 2015, 6,600 individuals were identified as being eligible for Connections of whom 4697 (71.2%) were offered a place in the program while 1903 (28.8%) were not. Of the 6,600 eligible individuals, 1,176 (17.8%) were female and 1760 (26.7%) were Aboriginal Australians. The age at first release ranged from 18 to 66 years with a mean age of 34.2 years (SD, 8.2 years). The mean age at first release for females was lower than males (33.2 vs. 34.4 years, $p < 0.001$). Similarly, the mean age at first release of Aboriginal individuals was lower than non-Aboriginal individuals (31.8 vs. 35.3 years, $p < 0.001$).

Within one year of their first release, 76 individuals (1.2%) died either in the community or in custody, 3200 (48.5%) survived and had returned to custody at least once, and 3324 (50.4%) survived and remained in the community. Of the 76 individuals who died, 13 (17.1%) returned to custody at least once before they died. The timing of death post-release for these 76 individuals is presented in Fig. 1.

Similar percentages of men and women (1.2% vs. 0.8%) and Aboriginal and non-Aboriginal individuals (0.7% vs. 1.3%) died within one year of release (Table 2). However, men were significantly more likely to return to custody than women (50.2% vs. 40.5%) while Aboriginal individuals were significantly more likely to return to custody than non-Aboriginal individuals (60.7% vs. 44.8%) (Table 2).

Age specific death rates for those who were eligible for the Connections program are presented in Table 3 and compared to age specific death rates for the entire NSW population. For all age groups, the death rate in the Connections group was higher than that in the NSW population with the highest rate ratio being for the age group < 25 years (RR = 17.6).

The crude mortality rate (CMR) for the cohort was 11.5 (95% CI 9.1–14.4) per 1000 person-years (PY). Calculation of indirect age standardisation against the 2011 NSW general population, adjusted to reflect the male/female ratio of our study cohort, revealed a standard mortality ratio (SMR) of 11.2 (95% CI 8.8–13.6) suggesting that over eleven times as many deaths were observed among individuals in the Connections cohort

		Sex		Aboriginal identity		
	All	Female	Male	Aboriginal	Non-Aboriginal	Not recorded
Eligible for Connections (n,%)	6600 (100)	1176 (17.8)	5424 (82.2)	1760 (26.7)	4492 (68.0)	348 (5.3)
Offered Connections (n,%)						
Yes	4697 (100.0)	848 (18.1)	3849 (81.9)	1229 (26.2)	3218 (68.5)	250 (5.3)
No	1903 (100.0)	328 (17.2)	1575 (82.8)	531 (27.9)	1274 (66.9)	98 (5.1)
Age at first release (mean yrs, SD*)	34.2 (8.2)	33.2 (7.9)	34.4 (8.2)	31.8 (7.7)	35.3 (8.1)	31.7 (8.6)

Table 1. Characteristics of the study cohort. *SD = standard deviation.

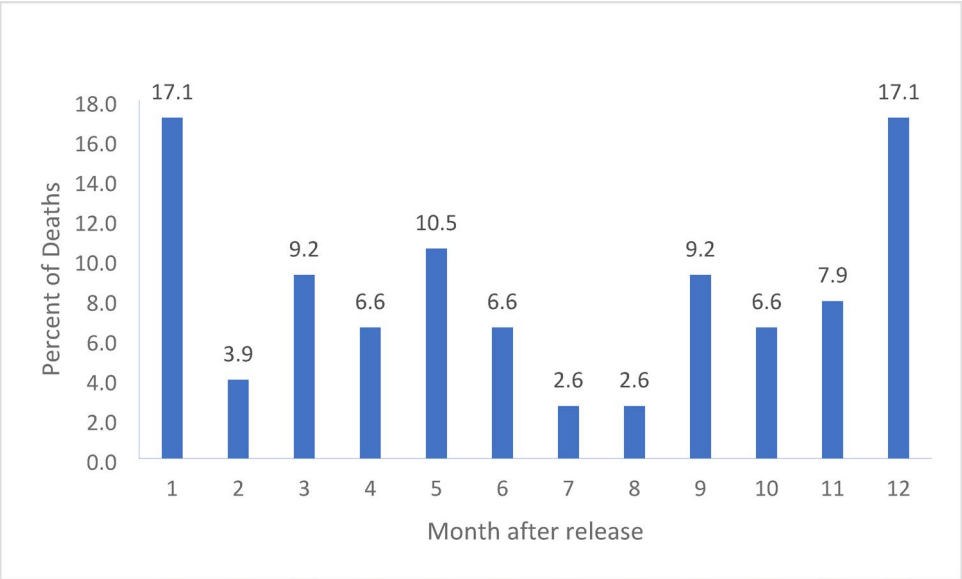

Fig. 1. Distribution of deaths (n = 76) by time after first release from custody.

N (%)	Died (n = 76)	Returned to custody (n = 3200)	Survived in the community (n = 3324)	All (n = 6600)	P-value*
Female	9 (0.8)	476 (40.5)	691 (58.8)	1176 (100)	< 0.001
Male	67 (1.2)	2724 (50.2)	2633 (48.5)	5424 (100)	
Aboriginal	13 (0.7)	1068 (60.7)	679 (38.6)	1760 (100)	< 0.001
Non-Aboriginal	58 (1.3)	2013 (44.8)	2421 (53.9)	4492 (100)	
Aboriginal Identity Not Stated	5 (1.4)	119 (34.2)	224 (64.4)	348 (100)	

Table 2. Survival status one year after release by sex and by Aboriginal identity. Note: Based on first release in connections data. *The presented p-values are the results from Chi-square tests (that excluded "not stated" values).

	Study cohort		NSW population	
Age groups (years)*	Number of deaths	Death rate**	NSW population death rate***	RR
Less than 25	5	6.9	0.4	17.6
25 to 29	11	7.9	0.5	14.5
30 to 34	18	12.0	0.8	14.8
35 to 39	15	11.4	0.9	12.1
40 to 44	5	5.6	1.3	4.2
45 to 49	6	12.2	2.1	5.9
50 to 54	10	50.0	3.2	15.7
55 or more	6	70.6	6.4	11.1

Table 3. Age specific death rate compared to NSW population. *Based on the first release in Connections data and age of individual at that time. **Death rate per 1000 population. ***Calculated from ABS population and death data for NSW in 2011 (adjusted to reflect the male/female ratio of our study cohort)—https://www.abs.gov.au/census/find-census-data/quickstats/2011/1https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3302.02011?OpenDocument. Crude death rate in Connections cohort = 11.5 per 1,000. Crude death rate in NSW = 1.9 per 1,000 (calculated for age groups 15–64 years that covers range of ages of Connections cohort).

than was expected based on the age- and time-period-specific mortality rates in the NSW population. Based on these calculations, of the 76 observed deaths, 7 were expected and 69 were excess deaths.

The cause of death for the 76 individuals who died is presented in Table 4. Poisoning (that includes drug overdose) was the most common cause of death (n = 33, 43.4%). Of these 33 poisonings, 30 were classified as unintentional and 3 were of undetermined intent. When we stratified the study cohort into broad age categories (< 30 years old, 30–44 years old, ≥ 45 years old) some differences in cause of death were observed. The highest

Cause of death	Number	Percent
Poisoning	33	43.4
Suicide	8	10.5
Infectious and parasitic diseases	5	6.6
Neoplasms	6	7.9
Diseases of circulatory system	9	11.8
Other*	13	17.1
Not stated	2	2.6
Total	**76**	**100.0**

Table 4. Counts and frequencies of death for those individuals who died within one year of first release from custody. *Assault (n = 4); Land transport accidents (n = 3); Diseases of the respiratory system (n = 2); Diseases of the digestive system (n = 1); Diseases of the musculoskeletal system and connective tissue (n = 1); Accidental fall/drowning/fire (n = 1); Other (undetermined intent) (n = 1).

proportion of deaths by poisoning was observed in the 30–44 year old group (57.5%) compared to 30.8% in the < 30 years group and 26.1% in the ≥ 45 years group, while the highest proportion of deaths by suicide was observed in the < 30 years group (23.1%) compared to 10.0% in the 30–44 years group and 4.3% in the ≥ 45 years group. The ≥ 45 years group had the highest proportion of deaths by disease or other causes (65.2%) compared to 38.5% in the < 30 years group and 30.0% in the 31–44 years group.

Logistic regression modelling reported that the only significant predictor of mortality within one year of release was age; people in the 50 to 54 years age group and those in the 55 years or older group at time of release had significantly increased odds of mortality than those aged less than 25 years at release (AOR (95% CI) = 7.51 (2.22–25.4) and 5.61 (1.19–26.5) respectively) (see Supplementary Table 1).

Logistic regression modelling in respect of return to custody revealed that increased age was protective against return to custody with people in all age groups aged 25 years or greater at release having significantly decreased odds of returning to custody than those in the reference age group of less than 25 years at release (see Supplementary Table 2 for AORs for all age groups). Furthermore, individuals with no prior episodes of custody had reduced odds of returning to custody (AOR (95% CI) = 0.36 (0.31–0.43)) as did those who were held in custody at a remote/very remote centre (AOR (95% CI) = 0.52 (0.88–0.82)). In contrast, three factors included in the model were significant predictors of return to custody: time in custody—individuals who had been in custody for greater than 3 years were at increased odds of return to custody compared to those who had been in custody for 6 months or less (AOR (95% CI) = 1.34 (1.11–1.62)); being male (AOR (95% CI) = 1.61 (1.38–1.88)); and being Aboriginal (AOR (95% CI) = 1.63 (1.44–1.84)).

Individuals who had been offered a place within the Connections program and those who had participated in an OAT program while in prison did not have significantly different odds of mortality or returning to custody within 1 year of release than individuals who were not offered a place within Connections or those who had not participated in an OTP program (see Supplementary Tables 1 and 2). Furthermore, our examination of the interaction between sex and Aboriginal identity on return to custody revealed that Aboriginal women were not at increased odds of return to custody compared to non-Aboriginal women (AOR 1.20, 95% CI 0.93–1.56). In contrast, Aboriginal men were at increased odds of return to custody compared to non-Aboriginal men (AOR 1.77, 95% CI 1.55–2.03).

Discussion

This study addresses a previous gap in our understanding of the outcomes of people with a history of drug use released from NSW prisons. It provides comprehensive, accurate, population-wide, long-term data for this population in terms of mortality and return to custody outcomes. Our findings highlight that formerly incarcerated individuals who have a history of drug use experience a substantial risk of mortality or return to custody once they are released to the community. Thus, our analysis of 6600 individuals released from NSW prisons who had a history of drug use revealed that within 1 year of release, almost half (3200) returned to custody while 76 (1.2%) died. Indirect age standardisation calculations revealed that eleven times as many deaths were observed among individuals in our cohort than was expected based on the age- and time-period-specific mortality rates in the NSW population and that of the 76 observed deaths, 69 were excess deaths. These findings highlight the high burden of mortality and recidivism in this particularly vulnerable population of formerly incarcerated individuals and raise questions about what can be done to address what can only be described as a public health crisis.

Mortality

The Australia Institute of Health reported that in 2022, there were 1,693 drug-induced deaths in Australia corresponding to an age-standardised rate of 6.5 per 100,000 people.[20] Furthermore, a prospective cohort study of 1209 people in Melbourne, Victoria who self-reported as injecting drugs found that between 2008 and 2019 there were 76 deaths corresponding to an all-cause mortality rate of 1.1 per 100 person-years and an estimated SMR of 16.64.[21] These latter findings are commensurate with our finding that 1.2% of our cohort died within 1 year of release from NSW prisons corresponding to an SMR of 11.2.

No previous NSW studies have been reported that describe the mortality of people with a history of drug use who have been released from prison. However, a number of studies from other jurisdictions in Australia have been reported that examine mortality for all people newly released from prison without stratification of their study cohorts by prior substance-use status. For example, Forsyth and colleagues followed a cohort of 1320 adults released from Queensland prisons between August 2008 and July 2010 for up to 4.7 years.[22] They reported that the rate of all-cause mortality in the cohort was significantly higher than in the age- and sex-matched general population of Queensland (SMR = 4.0, 95% CI = 2.9–5.4). Another larger mortality linkage study reported by Van Dooren and colleagues followed adults released from prisons in Queensland between 1994 and 2007 and reported that at 12 months post-release, the all-cause CMR for the 42,015 person cohort was 9.4 deaths per 1,000 PY (95% CI 8.5–10.4).[23] They also reported that the crude incidence rate of all-cause mortality was significantly lower among young (< 25 years old) formerly incarcerated individuals (CMR = 6.8 per 1,000 PY, 95% CI 5.5–8.7) than among older (> = 25 years old) formerly incarcerated individuals (CMR = 10.6 per 1,000 PY, 95% CI 9.4- 11.9). However, the all-cause SMR was significantly higher for young formerly incarcerated individuals (SMR = 6.5, 95% CI 5.3–8.1) than for older formerly incarcerated individuals (SMR = 4.0, 95% CI 3.5–4.5). Interestingly, the SMR we calculated for our study cohort (11.2) was almost three times as high as that reported by Forsyth and colleagues and that reported by Van Dooren for older formerly incarcerated individuals, and almost double that reported by Van Dooren for younger formerly incarcerated individuals. Given this apparent higher rate of mortality observed in our cohort, this highlights an important area for future research that explicitly compares the mortality of people released from prison who have a history of drug use to those who do not have a history of drug use.

One study reported by Degenhardt and colleagues examined post-release mortality in people with a history of opioid-dependence who had been released from NSW prisons.[24] They reported that 1050 deaths occurred amongst 16 453 people who had a history of opioid dependence and who had been released from prison at least once between January 2000 and March 2012. This corresponded to a CMR of 10.4 per 1000 PY (95% CI = 9.8–11.0). This is similar to the CMR we observed in our study cohort (11.5 per 1000 PY). As our study cohort included individuals with histories of substance use, including illicit drugs other than opioids, these findings suggest that problematic use of illicit substances in general, not exclusive to opioids only, may be associated with a comparable increased risk of mortality.

Internationally, a number of studies have investigated the mortality risk of people leaving prison although, as with the Australian studies cited above, few focus on the population of those with a history of drug use. Nonetheless, these studies confirm the increased risk of mortality in people leaving prison that we observed in the specific subgroup people exiting prisons in NSW who had a history of drug use. For example, Cunnigham and colleagues tracked 90,195 individuals released from incarceration between 1998 and 2016 in New Zealand for up to 9.4 years.[25] They recorded 4,764 deaths over that time corresponding to an SMR of 3.3 (95% CI 3.2, 3.4) compared to the general population. Elevated rates of mortality were also observed among a representative sample of adults released from prison between 2015 and 2017 in British Colombia, Canada.[26] The author reported that the rate of all-cause mortality in this cohort was 16.1 (95% CI 13.7–18.8) per 1000 PY while for overdose deaths it was 11.2 (95% CI 9.2–13.5) per 1000 PY, although no comparison was made with the general population. A study of people released from prison in the Brazilian state of Mato Grosso do Sul between 2009 and 2018 revealed an age-standardized incidence rate ratio of 3.0 (95% CI 2.8 to 3.1) for men and 2.4 (95% CI: 2.1 to 2.9) for women relative to the non-incarcerated population.[27] The lack of international evidence relating to the mortality risk of people with a history of drug use leaving prison further reinforces the need for greater research specific to this population group and how their mortality and health outcomes compare to people in prison who do not have a history of drug use.

Results from logistic regression modelling of our study cohort indicated that age was a predictor of mortality in our cohort. However, while this overall finding was consistent with some literature reporting the association between increased age and risk of mortality in people released from prison[22], our findings indicate that it is the younger releasees in our cohort who had the greatest relative risk of mortality compared to their peers in the general population. Logistic regression modelling also revealed that neither participation within the Connections program nor participation in an opioid treatment program while in prison were associated with reduced odds of mortality. This finding was unexpected but given the relatively small number of deaths (n = 76) within a large cohort (n = 6660), results from logistic regression modelling in relation to mortality for our cohort should be interpreted with contextual caution. It should be noted that our previous evaluation of the Connections program revealed that people within Connections were more likely to access OAT and had a lower risk of death within 28 days of release.[17] Given that the program is only offered up to 4 weeks after release, these findings suggest that longer-term support for people released from prison should be explored. Furthermore, given that the vast majority of people in our study cohort survived one-year post-release, future research studies and evaluations should include follow up periods beyond this period of time in order to better understand longer term outcomes.

A recent systematic review and meta-analysis of interventions aimed at reducing drug-related harms among people who experience incarceration reported that there was a scarcity of evidence on the effectiveness of such interventions.[28] However, the authors of this review reported that there is good evidence that OAT reduces mortality both in prison and after release and hence argue that high coverage should be maintained.

Recidivism

People who enter prison in Australia for the first time are at high risk of recidivism once released back to the community.[29] In 2022, 60.2% of people in Australian prisons had a prior episode of imprisonment.[2] We report that almost half (48.7%) of people in our study cohort returned to custody within one year of release, including those that subsequently died within the one year follow-up period. This rate of reimprisonment is higher than that reported in a recent review of Australian studies that reported approximately 25% of prisoners are

reconvicted within three months of release while between 35 and 41% percent are reimprisoned within two years.[30] The higher rate of recidivism observed in our study cohort likely reflects the impact of drug use on offending as it has previously been reported that drug use is a correlate of recidivism.[30] For example, Thomas and colleagues followed a cohort of 1,325 adult ex-prisoners in Queensland, Australia and reported that in Cox proportional hazards regression, having a drug-related sentence was strongly associated with an increase in the hazard of reincarceration relative to a non-drug-related sentence (adjusted hazard ratio = 1.38 (95% confidence interval, 1.15, 1.66)).[31].

We report that a number of factors were associated with the risk of return to custody in our study cohort. Specifically, increased age was protective against return to custody with people aged 25 years or older on release having significantly lower odds of returning to custody while a longer custodial sentence (greater than 3 years), prior episodes of being in custody, male sex and Aboriginality were all associated with increased odds of return to custody. This finding was consistent with an earlier NSW study that also reported younger age, density of custodial episodes over time, and Indigenous cultural background as significant predictors of return to custody.[32] Interestingly, a recent systematic review by Macdonald and colleagues of interventions for people who have been incarcerated found some evidence that therapeutic community interventions (i.e., a group-based and participative approach to drug use) may be effective in reducing re-arrest and reincarceration[28].

Policy and practice implications

The high rates of mortality and return to custody observed in individuals with a history of drug use released from the NSW custodial system represent an intransigent public health problem for a complex population. This population is characterised by longstanding, intersecting social and medical co-morbidities which greatly contribute to these poorer outcomes post release. These co-morbidities may include complex histories of drug use, mental health issues, and trauma prior to incarceration. Many of these factors may be exacerbated while in custody by a lack of agency, and limitations in access to resources and services all of which may result in delays to treatment. This is further overlaid by the challenges and constraints of addressing complex health issues for people with short custodial sentences or who are on remand. Given these limitations, there is a need to strengthen continuity of care from community to custody and back to community so that the healthcare of people with a history of drug use exiting prison is better integrated between the community and correctional healthcare providers. There remains a need for innovative, public sector, scalable models that ensure continuity of care. This can be achieved through strengthening partnerships between correctional and community health care providers and other wrap around services to provide more comprehensive, long-term services for people exiting prison. A key aspect of this approach would be implementing comprehensive public health surveillance program to better monitor life expectancy of people who use substances and to evaluate initiatives aimed at reducing mortality and recidivism in this population.

Limitations

Age of all individuals within the Connections cohort was calculated from date of first release from prison. Hence, some of the individuals who died may have been placed in the incorrect age category at death and this may have affected age-specific mortality rates, rate ratios and calculation of the standard mortality ratio.

Calculation of death rate ratios and the standard mortality ratio were undertaken using population numbers and deaths from the entire NSW population in 2011 (the cross-sectional midpoint of the period of enrolling individuals into the study cohort). This does not account for the influence of the longitudinal structure of the data. In addition, as we collapsed data across 7 years, we were unable to account for fluctuations in enrolments in Connections over the years and how those yearly differences could influence outcomes. While we adjusted for the differences in the male–female ratios within the Connections cohort and the NSW general population, we did not adjust for differences in the proportion of Aboriginal individuals in these groups.

While we included OAT as a predictor in our binary logistic regression models, we had no data relating to other important considerations such as an individual's adherence to OAT following their release or the existence of other wrap around services extending beyond only a month post-release; such factors would likely influence mortality and return-to-custody outcomes.

While the data used for this analysis is not contemporary (spanning the years 2008 until end of June 2018), the population of interest has remained stable in terms of their risk profile. The data utilised in this study represented a unique opportunity to undertake an analysis of comprehensive, real-world data relating to a high-risk population with a population-wide representation of people in all prisons in NSW.

Conclusion

Findings from this comprehensive, population-wide study of people with a history of drug use released from NSW prisons highlight the high burden of mortality and return to custody in this particularly vulnerable population of prison releasees. Improving these outcomes requires innovative, public sector, scalable models that ensure continuity of care as people transition from prison to the community.

Data availability

The authors are not authorised to share project data as ethical approvals require that the linked data used in this analysis not be shared to protect privacy and confidentiality. Please contact the corresponding author, Professor Elizabeth Sullivan, with any inquiries.

Received: 15 May 2025; Accepted: 7 October 2025
Published online: 27 November 2025

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Author contributions

ES led the conceptualisation, design, and funding for the project. RZ led the curation and analysis of study data and was supported in the analysis by JB and MR. JS and CC assisted in the interpretation of findings. MR wrote the first draft of the main manuscript text. All authors reviewed the first draft of the manuscript and substantively revised the text.

Funding

This project was supported by the National Health and Medical Research Council, Grant/Award Number: APP1109009 [project grant]. The funding body played no role in the conceptualization, design, data collection, analysis, decision to publish, or preparation of the manuscript.

Declarations

Competing interests

ES, RZ and CC are employees of Justice Health and Forensic Mental Health Network which delivers the Connections program. However, no authors are involved in the day-to-day functioning of the Connections program. JS, JB, and MR declare no competing interests.

Additional information

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1038/s41598-025-23552-4.

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