

BMJ Open Recidivism, health and social functioning following release to the community of NSW prisoners with problematic drug use: study protocol of the population-based retrospective cohort study on the evaluation of the Connections Program

Elizabeth Sullivan,^{1,2,3} Stephen Ward,³ Reem Zeki,² Sarah Wayland,⁴ Juanita Sherwood,⁵ Alex Wang,² Faye Worner,⁶ Sacha Kendall,⁷ James Brown,⁸ Sungwon Chang⁹

To cite: Sullivan E, Ward S, Zeki R, *et al.* Recidivism, health and social functioning following release to the community of NSW prisoners with problematic drug use: study protocol of the population-based retrospective cohort study on the evaluation of the Connections Program. *BMJ Open* 2019;**9**:e030546. doi:10.1136/bmjopen-2019-030546

► Prepublication history for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2019-030546>).

Received 19 March 2019
Revised 27 June 2019
Accepted 1 July 2019



© Author(s) (or their employer(s)) 2019. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

Correspondence to

Professor Elizabeth Sullivan;
e.sullivan@newcastle.edu.au

ABSTRACT

Introduction The rising rate of incarceration in Australia, driven by high reoffending, is a major public health problem. Problematic drug use is associated with increasing rates of reoffending and return to custody of individuals. Throughcare provides support to individuals during imprisonment through to post-release, improving both the transition to community and health outcomes post-incarceration. The aim of this study is to evaluate the Connections Programme (CP) that utilises a throughcare approach for release planning of people in prison with a history of problematic drug use. The study protocol is described.

Methods and analysis Population-based retrospective cohort study. The study will use record linkage of the Connections dataset with 10 other New South Wales (NSW) population datasets on offending, health service utilisation, opioid substitution therapy, pregnancy, birth and mortality. The study includes all patients who were eligible to participate in the CP between January 2008 and December 2015 stratified by patients who were offered CP and eligible patients who were not offered the programme (non-CP (NCP)). Propensity-score matching will be used to appropriately adjust for the observable differences between CP and NCP. The differences between two groups will be examined using appropriate univariate and multivariate analyses. A generalised estimating equation approach, which can deal with repeat outcomes for individuals will be used to examine recidivism, mortality and other health outcomes, including perinatal and infant outcomes. Survival analysis techniques will be used to examine the effect of the CP by sex and Indigenous status on the 'time-to' health-related outcomes after adjusting for potential confounders.

Ethics and dissemination Ethical approval was received from the NSW Population and Health Services Research Ethics Committee, the Justice Health and Forensic Mental Health Network Human Research Ethics Committee, the

Strengths and limitations of this study

- Population-based evaluation of a pre-release planning and a post-release support programme that utilises a throughcare model for people in prison with drug and alcohol problems.
- Comprehensive outcome assessments of justice, health and social functioning of people in prison in addition to maternal and infant outcomes for those who became mothers during the study period.
- Data linkages of 11 administrative population databases will be performed with a high degree of accuracy.
- There are objective measures of return to custody, mortality and contact with the health system but no measures of intention to engage on the programme or to reoffend.
- To minimise the effect of voluntary participation, we will undertake an intention-to-treat analysis of patients who were offered the programme and refused to participate. These patients are included in the study group.

Aboriginal Health and Medical Research Council Ethics Committee, the Corrective Services NSW Ethics Committee and the University of Technology Sydney Human Research Ethics Committee.

INTRODUCTION

The rising rate of adult incarceration is a major public health and societal problem worldwide. The number of adults in prison in Australia reached a 10-year high of 33 791 in the 2014 prison census, with men accounting for 92% of all people in prison.¹ Numbers have continued

to rise, exceeding 42 000 in 2018. While women are a small proportion of the total, their numbers increased by 85% from 2008 to 2018, in contrast to a 53% for men.² A major driver of the rising rate of imprisonment in Australia is the high rate of return to custody (RTC), with the latest Australian Bureau of Statistics figures showing 57% of sentenced people in 2018 had prior sentences.² Aboriginal and Torres Strait Islander (hereafter Aboriginal) people are over-represented in the prison population making up 28% of people in prison but only 2% of the Australian population. In addition, 75% of Aboriginal people in prison in this group have prior sentences.² Although men represented 9 out of 10 Aboriginal people in prison,² Aboriginal women are the most rapidly growing population of people in prison³ with double the incarceration rate of Aboriginal men from 2000 to 2015.⁴

These figures only partially represent the number of adults in Australia's prisons each year, not accounting for the significant number of people in prison on remand (unsentenced) and serving short sentences. Aboriginal people are similarly over-represented within these groups with incarcerated Aboriginal women specifically more likely to serve a short sentence than any other prison subpopulation.²

Recidivism is defined as the proportion of released people who return to prison within 2 years of their release.⁵ The rates of recidivism differ by population subgroup. People with a history of substance dependence are highly vulnerable to reoffending with more than half returning to prison within 6 months post-release.⁶ Transition back to the community is characterised by inadequate social support, poor continuity of care, as well as limited financial resources often leading to poorer health outcomes and a return to crime-related activities.⁷ These risk factors are compounded by high levels of substance dependence, association with antisocial peers, chronic health problems, homelessness, parenting stress and mental illness, with the latter exacerbated by the stress of re-entry into the community.^{8–11}

Results from the Illicit Drug Reporting System survey of regular injecting drug users in Australia show that 40% of the survey participants had at least one criminal activity in the month before the survey.¹² This population also experiences high rates of homelessness, chronic illness and mental health comorbidities.^{8,12} These factors contribute to recidivism and poor access to coordinated health care.¹³ In Australia, more than 66% of prison entrants have used illicit drugs during the previous 12 months.¹⁴ Released people with problematic drug and alcohol use have a higher risk of death in the first week post-release, especially from drug overdose and suicide.⁷

Half of the people in New South Wales (NSW) prisons are parents.¹⁵ The majority of imprisoned women are of reproductive age; the 2015 Network Patient Health Survey published by the Justice Health and Forensic Mental Health Network (JH&FMHN) reported 45.6% of women having five or more previous pregnancies.¹⁶ For people who have experienced incarceration, parenthood has the potential to be a risk or protective factor in both prison and the community, adding additional complexities to the

post-release transition into the community.^{17–20} Further studies have found that people often report their children as motivators to desist from substance use and criminal activity.^{17,21}

The Connections Programme (CP), based in the most populous state of Australia, NSW, is a voluntary public sector, state-wide, intervention programme, providing comprehensive pre-release planning and post-release support for adults in prison (known as patients) with a history of problematic substance use, some of who are on opioid substitution therapy (OST). The CP has been in operation since 2007 and is available at all NSW Adult Correctional Centres. It has delivered more than 10 000 episodes of patient care to date. While anecdotal reports support its effectiveness, there is no reliable evaluation to date.

Both internationally and in Australia, there is limited evidence of approaches or models of release planning that are associated with reductions in recidivism and improved health of released people.²² However, there is growing evidence that people who have experienced multiple incarcerations have an increased risk of death on release from prison and are more likely to be admitted to hospital.²³ These findings highlight the importance of post-release models of care that reduce recidivism and improve health outcomes. This article describes the study protocol for the evaluation of the CP.

Aims

The aims of the study are to:

1. Determine whether engagement of patients with the CP is associated with a reduction in recidivism, mortality and poor health outcomes 2 years post-release.
2. Establish whether the reduction in recidivism, mortality and poor health outcomes 2 years post-release is similar for men and women, Aboriginal and non-Aboriginal patients, and new mothers and other women.
3. Determine whether engagement in the CP by women who were pregnant or gave birth in the 6 months prior to entering custody or while incarcerated is associated with improved maternal outcomes compared with similar women who did not engage in the programme.
4. Determine whether babies born to mothers with a history of problematic drug use who participated in the CP in the 6 months prior, during the period of incarceration or up to 24 months post-release experience better infant outcomes compared with babies born to eligible mothers who did not participate in the programme.

Conceptual framework

This study is informed by intersectional theory, and cumulative and compounding disadvantage theory. Intersectionality theory proposes that multiple social disadvantages worsen health.²⁴ Population groups with multiple disadvantages such as racism, class and gender discrimination experience poorer health outcomes.²⁵ However, as these factors are also social determinants of imprisonment and recidivism, this study looks further than the intersection of

multiple disadvantages to investigate how intersecting health and social disadvantages accumulate and compound.²⁶

Cumulative and compounding disadvantage theory highlights that people who experience multiple health and social risk factors are at an increasing risk of illness and social disadvantage over time.^{27 28} Studies have shown that childhood disadvantage impacts negatively on health and social outcomes in adulthood creating intergenerational health and social inequity.^{29 30} This is relevant for this study in terms of the multiple health and social disparities experienced by people in prison, particularly Aboriginal men and women.^{16 31}

METHODS AND ANALYSIS

Study start date and expected end date

The ethics approval for the study was granted in April 2018, the linked datasets were received in May 2019, and the study is currently in the stage of data preparation and preliminary analysis. The expected end date of the study is 31 December 2020.

Study design

This is a record linkage study (population-based retrospective cohort study) of all patients who were eligible to participate in the CP between 1 January 2008 and 31 December 2015. Identification of eligibility and population details are outlined below:

Eligibility of CP

Patients must meet one of the following clinical criteria to be eligible for CP: (1) currently on OST; (2) ceased OST in the 6 months prior to release; (3) is pregnant or gave birth during the current period of incarceration or in the 6 months prior to entering custody and have a history of problematic drug use and (4) not on OST, but has engaged with drug and alcohol services (either through JH&FMHN or Corrective Services) for treatment of drug and alcohol concerns.

Within the pool of eligible patients, not all are offered the programme due to staffing and other resource constraints. If offered, participation in the CP is voluntary; and it is offered to people in prison with self-reporting drug use and are due for release and are referred to the CP at least 4 weeks prior to expected release. Initially, unsentenced people in prison were eligible. The criteria was changed in 2011 to only include those who were sentenced. In early 2014, unsentenced pregnant women in prison were eligible to participate in the programme.

Referral to the CP can be done through multiple sources including correctional and health staff, friends, family and legal representatives.³² Following comprehensive assessment and planning for release, Connections Clinical Support Workers engage with health and welfare staff within both custody and the community to ensure that participants are prepared for release, and to address their needs.³²

Patient and public involvement

As this is a retrospective cohort study of already collected population data, study participants were not directly involved in the design of this study. We formed a multidisciplinary project advisory group of key stakeholders (eg, clinical addiction, forensic mental health, Aboriginal community, Aboriginal health, community and government services, JH&FMHN and Corrective Services, not for profits and prisoner advocacy groups) to advise the project team on the study design and effective data interpretation, dissemination and translation of results going forward. Research questions and outcome measures were determined in consultation with CP staff and other health and social support service providers working directly with patients. The project advisory group includes Indigenous-led guidance on the Aboriginal population component of the research. Aboriginal community participation, collaboration and control of the research are vital aspects of the research ethics of this project, ensuring the cultural safety and benefit of the research to Aboriginal patients and communities. Ongoing consultation with Aboriginal community experts will inform the data analysis so that interpretation is guided by Aboriginal concepts of health and well-being and responsive to community priorities for improving Aboriginal health and recidivism outcomes. Results will be disseminated to study participants via the project advisory group.

Study population

Records of all eligible patients identified by JH&FMHN, Drug and Alcohol Services are included in the CP database, which is also maintained by Drug and Alcohol Services, are included in the study. Eligible patients will be classified to those who were offered programme (CP) or those who were not offered the programme (non-CP (NCP)) between the time period specified to allow a 2-year follow-up for RTC, mortality and other health outcomes.

Patients who were offered CP

These patients are classified according to their level of engagement with the CP (table 1).

- ▶ Completers: participants who engaged with Connections Clinical Support Workers for 4 weeks after released and completed the follow-up questionnaire.
- ▶ Partial completers: participants who engage with Connections Clinical Support Workers for a period of time during the 4 weeks after release, but they did not complete the follow-up questionnaire.
- ▶ Pre-release engagement: participants who engaged with Connections staff pre-release only.
- ▶ Patients who were offered the programme but refused to participate.

All patients who engaged with the CP will all have completed a pre-release assessment form. This form includes three validated survey instruments: the Generalised Health Questionnaire³³; the Brief Treatment Outcome Measure-Concise³⁴ and the Short Form-12

Table 1 Connections groups according to participants' level of engagement

Connections group	Level of participation		
	Pre-release assessment interview	Follow-up in the community	Completed follow-up interview 4 weeks post-release
Completers	√	√	√
Partial completers	√	√	X
Pre-release engagement	√	X	X
Patients who were offered the programme but refused to participate	X	X	X

Health Survey.^{35 36} In addition to these instruments, the form includes questions on participants' demographics, release needs such as for identification documents and accommodation, their drug and alcohol use, physical and mental health and the participants' contact with friends and family. Patients on release will then engage with Connections workers on a continuum of zero (pre-release refusal to participate engagement only) to one to multiple times post-release (partial completers and completers). Completers will have completed follow-up questionnaires. People who RTC within 4 weeks after released will be ask to completed RTC questionnaires.

Eligible but not offered the programme (non-CP; comparison group)

The NCP are a subset of eligible patients who were not offered CP for the following reasons: priority and capacity of the service to see the patient (55%); late referral or release from custody earlier than expected (35%) and other reasons (10%). [Figure 1](#) shows the study population.

Sample size and power calculation

Between 1 January 2008 and 31 December 2015, we estimate a total of 8000 eligible (CP and NCP) patients will be available for comparison. From the literature, a 10% reduction in RTC for CP would be termed significant.⁵ With 5200 CP and 2800 NCP, we will have 98% power at 1% level of significance (two-sided) to detect a 5% reduction of RTC rates from 84% to 79.8%.³⁷ Even allowing for highly restrictive matching resulting in 2500 patients in each group, we will have 90% power. In addition, with the full data we will have 93% power to detect a 1.5 percentage point reduction in mortality rate from 4.0% to 2.5% at a 5% significance level,³⁸ and this still exceeds 80% power under a restrictive matching assumption.

Data linkage process

Data sources

The Connections dataset, which is maintained by the JH&FMHN, is the primary dataset to identify the study cohort: patients who were eligible to participate in CP between 1 January 2008 and 31 December 2015. The Centre for Health Record Linkage (CHeReL) is a public sector state-wide linkage facility that will link the Connections dataset to 10 other population datasets. [Table 2](#)

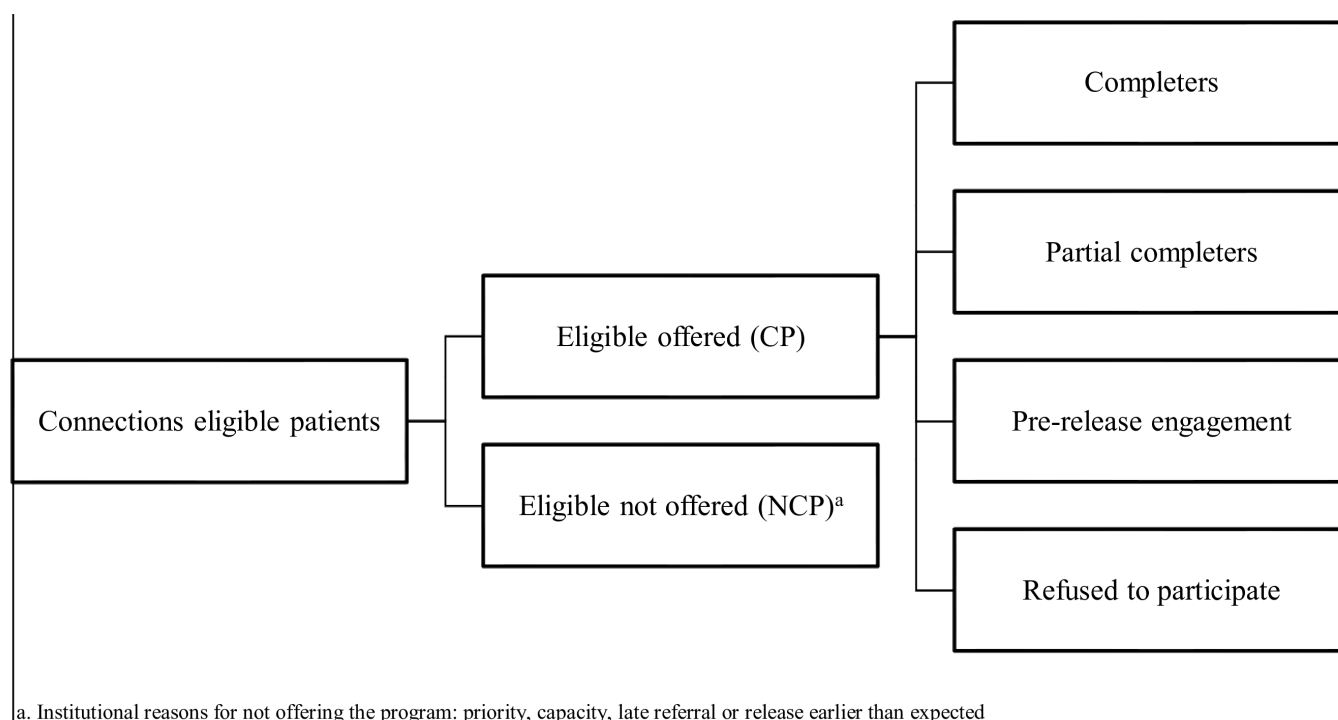
**Figure 1** Study population. CP, Connections Programme; NCP, non-CP.

Table 2 Datasets will be included in the linkage for patients eligible for the Connections Programme

Data custodian	Dataset	Years of data extraction
NSW Ministry of Health	NSW Registry of Birth Deaths and Marriages - birth registrations (RBDM Births)	01 July 2007–31 December 2017
	NSW Registry of Birth Deaths and Marriages - death registrations (RBDM Deaths)	1 January 2008–30 June 2018
	NSW Admitted Patient Data Collection (APDC)	1 July 2007–30 June 2018
	NSW Cause of Death Unit Record File (COD URF)	1 January 2008–31 December 2016
	NSW Emergency Department Data Collection (EDDC)	1 July 2007–30 June 2018
	NSW Mental Health Ambulatory Data Collection (MHAMB)	1 January 2008–31 December 2017
	NSW Perinatal Data Collection (PDC)	1 July 2007–31 December 2017
	NSW Perinatal Death Reviews (PDR)	1 July 2007–31 December 2015
	The Electronic Recording and Reporting of Controlled Drugs System-Methadone Subsystem (ERRCD)	1 January 2008–19 September 2018
NSW Bureau of Crime Statistics	Bureau of Crime Statistics (BOCSAR Custody)	1 January 2003–31 December 2017
	Research Reoffending Database (BOCSAR ROD)	1 January 2003–31 December 2017
NSW Justice Health and Forensic Mental Health Network	Connections Database: Initial Assessment dataset Return to Custody dataset Follow-up assessment dataset	1 January 2008–31 December 2015

provides the details of the public sector datasets and time period of the linkage.

The Reoffending Database will provide data on patients' personal and offence information. Electronic Recording and Reporting of Controlled Drugs (ERRCD) will provide OST information. The Admitted Patient Data Collection (APDC), Emergency Department Data Collection (EDDC), Mental Health Ambulatory Data Collection, and Registry of Births, Deaths and Marriages (RBDM) death registration in addition to Causes of Death Unit Record File will be used as core datasets to identify health outcomes of Connections patients.

Mothers on connections

To facilitate a substudy of parents, linkage of the Connections database with RBDM birth registration will be used to identify babies born to mothers on the Connections database. To ensure all births are captured, birth registration from 1 July 2007 will be requested to 31 December 2017. Given more than 90% of people in prison with substance use problems spent less than a year in prison,³⁹ this additional two and a half years of birth registration data will ensure births in the 6 months prior to entering custody, births during the period of incarceration and births in the 2-year follow-up for all patients in the Connections database will be captured.

RBDM birth registration data are unique in that each record relates to two individuals—the mother and the baby. The CHeReL will link the mother's information from RBDM birth registration records to the Connections database. This will flag mothers in the Connection database. By linking all births to the same mother from the Connections database between 1 July 2007 and 31 December 2017, the number of total births will be

determined. In addition, using the mother's age at the start and end of incarceration with the date of birth of the child, the number of births either during the period of incarceration or in the 6 months prior to entering custody or 2-year post-release period will be determined.

The Perinatal Data Collection (PDC) provides information about maternal and infant outcomes. The CHeReL will link extracted RBDM birth registration of all babies born to a mother in the Connections database with PDC using the mother's personal identifiers (as a female patient on the Connections database). Additional data from the Perinatal Death Review Database, APDC and EDDC will be linked about each baby born to a mother in the Connections database. The Unicef defines infant mortality as the probability of death occurring between birth and exactly 1 year of age.⁴⁰ Thus, an additional year of data, 1 July 2007 to 31 December 2018, is requested from this data set to meet the study aims and include babies born to female participants in 2017. These will enable examination of maternal and infant outcomes for all mothers in the Connections database.

Statistical analyses

While participation in the CP is voluntary; being offered participation is not. Therefore, we will use an 'intention-to-treat' approach, comparing CP to NCP, to mitigate against the influence of unobservable characteristics such as individual motivation. However, the decision to offer is driven by programme capacity and focus, and the priorities of the CP can influence who is offered the programme. Therefore, the study will use propensity score matching whereby each CP is matched with a NCP with similar characteristics to mitigate against potential selection bias due to selection of who is offered. The two groups will be matched to control

for several characteristics including socio-demographic factors such as age, gender and Indigenous status, criminogenic factors such as number of previous offences and current offence type, treatment factors such as history of involvement with the CP, and institutional factors relating to the changing emphasis of the programme across time. The differences in primary and secondary outcomes will then be compared between the two groups utilising a range of statistical modelling techniques. Analyses have been identified in relation to the aims of the study:

Aims 1 and 2

Differences in being offered CP and NCP will be assessed by identifying the main reason to be a NCP and whether there are differences in the socio-demographics (gender, cultural status, parenthood), problematic drug use, criminality (number of incarcerations and length of each incarceration) and legal status (sentenced, unsentenced) between CP and NCP. All patients will be observed for a maximum of 2 years following each release from prison. The difference in characteristics between CP and NCP will be examined using X^2 test and Student's t-test to determine covariates to be included in propensity score matching.

Primary outcome

RTC for CP and NCP will be examined longitudinally on the matched data to assess any variation over time. A binary logistic regression will be used to estimate the likelihood of RTC at 1, 3, 6 and 24 months post-release.

Secondary outcomes

- Analysis of the secondary outcomes will include examining health-related outcomes such as all-cause mortality, all-cause hospitalisation, episodes of mental health, drug and alcohol or emergency care and retention/initiation on OST at 1, 3, 6 and 24 months post-release. The likelihood of the health-related outcomes at certain points in time will be estimated

using a binary logistic regression. The number of health-related outcomes within a specified time frame (eg, up to 2 years exposure after release censored if they RTC) will be investigated using a model for counts with the negative binomial distribution.

- Survival analysis techniques will be used to examine the effect of the CP by sex, Indigenous status and new mothers on the 'time-to' health-related outcomes after adjusting for the potential confounding variables and effects of age.

Variables significantly ($p < 0.05$) associated with outcomes on univariate analysis and other factors identified in the literature as predictive of selected outcomes will be entered into multivariate models. Final models will be determined by taking into account the likely causal pathway, collinearity, statistical significance (at $p < 0.01$) and overall goodness of fit.

Aims 3 and 4

Based on the specific outcomes, an appropriate model from the generalised linear modelling framework will be used to estimate the likelihood of perinatal and infant outcomes. Variables significantly ($p < 0.05$) associated with outcomes on univariate analysis and other factors identified in the literature as predictive of selected outcomes will be entered as covariates. Final models will be determined by taking into account the likely causal pathway, collinearity, statistical significance (at $p < 0.01$) and overall goodness of fit.

For all aims, a generalised estimating equation model will be used to overcome the repeated episodes of the CP care of each patient and/or repeated births. [Table 3](#) summarises the analysis plan.

DISCUSSION AND IMPLICATIONS

NSW has the highest reported rate of re-imprisonment in Australia with 44% of people returning to prison within

Table 3 Summary of the analysis plan

Aims	Outcomes	Type of analysis	Population
Aims 1 and 2	Primary outcome: Returning to custody at 1, 3, 6 and 24 months post-release	Binary logistic regression*	CP and NCP
	Secondary outcomes Health-related outcomes at 1, 3, 6 and 24 months post-release	Binary logistic regression* for the likelihood of health-related outcomes Negative binomial Poisson regression for the number of health-related outcomes within a specified time frame Survival analysis techniques for 'time-to' health-related outcomes	CP and NCP
Aim 3	Perinatal outcomes	Generalised linear model with link function appropriate for specific outcome*	Mothers CP and Mothers NCP
Aim 4	Infants outcomes	Generalised linear model with link function appropriate for specific outcome*	Infants to mothers CP and infants to mothers NCP

*A generalised estimating equation model will be used to overcome the repeated episodes of the Connections Programme and/or repeated births.

2 years.⁵ This is a conservative estimate and evidence that the post-release needs of people leaving prison particularly those with drug use are not being met by under-resourced community services. In addition, given that about half of the women in prison are mothers,¹⁵ transition back to community for mothers with new infants may be different. This is a neglected but critically important area of public health research to prevent adverse health and social outcomes of maternal incarceration⁴¹ and intergenerational contact with the criminal justice system.⁴²

Recidivism remains a major public health and societal problem with a lack of evidence on pre-release programmes that successfully address reoffending. This study will determine whether the CP is associated with a reduction in recidivism, higher rates of survival and improved health outcomes for a highly marginalised and disadvantaged group of patients. The study will quantify the impact on social and health outcomes, significantly demonstrating whether the outcomes are equitable for men and women, Aboriginal and non-Aboriginal patients, and new mothers. It will determine whether the CP is associated with enhanced perinatal outcomes in addition to a reduction in recidivism and mortality for women (who were pregnant or gave birth in the 6 months prior to entering custody or during the period of incarceration). The study will determine whether babies born to mothers with a history of problematic drug use who participated in the CP in the 6 months prior, during the period of incarceration or up to 24 months post-release experience better perinatal and infant outcomes compared with babies born to eligible new mothers who did not participate in the programme.

The research has public health significance as release from prison is associated with a spectrum of individual, family, community and structural stressors that must be addressed alongside long-term disadvantage and the impacts of incarceration. Public health sector interventions are required to be evidence based to effectively support the long-term health and well-being of people in prison and disrupt cycles of community disadvantage and criminality. This study will develop a methodology for ongoing monitoring of the CP and provide evidence as to whether the CP should be trialled within other populations in the prison and the post-incarceration support sector.

ETHICS AND DISSEMINATION

The outputs disseminating from this project include peer-review publications and conference presentations. Findings will also be presented to JH&FMHN and Corrective Services NSW. All publications disseminating from the project will be submitted to the Aboriginal Health and Medical Research Council for review and approval prior to publication.

Author affiliations

¹Faculty of Health and Medicine, The University of Newcastle, Callaghan, New South Wales, Australia

²Faculty of Health, University of Technology Sydney, Sydney, New South Wales, Australia

³Clinical Business Unit, Justice Health and Forensic Mental Health Network, Matraville, New South Wales, Australia

⁴Faculty of Health Sciences, The University of Sydney, Camperdown, New South Wales, Australia

⁵Faculty of Medicine and Health, The University of Sydney, Camperdown, New South Wales, Australia

⁶WAMINDA South Coast Women's Health & Welfare Aboriginal Corporation, Nowra, New South Wales, Australia

⁷Australian Centre for Public and Population Health Research, Faculty of Health, University of Technology Sydney, Sydney, New South Wales, Australia

⁸School of Mathematical and Physical Sciences, University of Technology Sydney, Sydney, New South Wales, Australia

⁹Improving Palliative, Aged and Chronic Care through Clinical Research and Translation (IMPACCT), Faculty of Health, University of Technology Sydney, Sydney, New South Wales, Australia

Acknowledgements The authors gratefully acknowledge the support of the Connections Project Advisory Group and partner health organisations. The study was funded by the National Health and Medical Research Council of Australia (NHMRC, Project Grant #APP1109009). Funding bodies had no role in the study design, in the collection, analysis or interpretation of data, in the writing of the manuscript or the decision to submit the manuscript for publication.

Contributors EAS and SC conceptualised and designed the study. S Wayland, SC and EAS prepared the first draft of the manuscript. EAS, SC, RZ and JB critically revised drafts with SK, S Ward, S Wayland, JS, AW and FW providing expert review and revisions of the manuscript. All authors have approved the final version prior to submission.

Funding This project was funded by an NHMRC grant (NHMRC, Project Grant #APP1109009) via the University of Technology Sydney.

Competing interests SW was previously the manager of the Connections Program and worked within the JH&FMHN Drug and Alcohol Directorate until November 2017. ES became the part time Custodial Research Lead, JH&FMHN in August 2018.

Patient consent for publication All patients engaged in the Connections Program provided informed consent for their de-identified data to be used for research and evaluation purposes, including data-linkage. A waiver of consent was approved by the above-named ethics committees for persons referred to the Connections Program but who did not go on to participate in the Connections Program (NCP). The waiver of consent was approved under the provision that the research is of benefit to the public good. The minimum required information was sought from the Connections database for the non-participants, such as Master Index Number and referral date to the program, to allow linkage by the Centre for Health Record Linkage (CHeReL) to the NSW population datasets.

Ethics approval The study has ethics approval from NSW Population and Health Services Research Ethics Committee (HREC/16/CIPHS/17), the JH&FMHN Research Ethics committee (HREC/16/JH/15), the Aboriginal Health and Medical Research Council Ethics Committee (HREC Reference number: 1187/16), Corrective Services Ethics Committee (D16/569544) and the University of Technology Sydney Human Research Ethics Committee (ETH18-2587). The Justice Health & Forensic Mental Health Network Research Ethics Committee approval includes review and approval by the JH & FMHN Aboriginal Reference Group.

Provenance and peer review Not commissioned; externally peer reviewed.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

REFERENCES

1. Australian Bureau of Statistics (ABS). *Prisoners in Australia, 2014 cat. no. 4517.0*. Canberra: ABS, 2014.
2. Australian Bureau of Statistics (ABS). *Prisoners in Australia, 2018 cat. no. 4517.0*. Canberra: ABS, 2018.
3. Walters A, Longhurst S. *Overrepresented and overlooked: the crisis of Aboriginal and Torres Strait Islander women's growing*

- imprisonment*. Melbourne: Human Rights Law Centre and Change the Record Coalition, 2017.
4. Commission P. *Overcoming Indigenous Disadvantage: Key Indicators*. Canberra: Australian Government, 2016.
 5. Payne J. Recidivism in Australia: findings and future research: Australian Institute of Criminology. 2007.
 6. Garnett M, Sandra L, Michael L. The effect of a jail methadone maintenance therapy (MMT) program on inmate recidivism. *Addiction* 2008;103(12):2017–23.
 7. Binswanger IA, Stern MF, Deyo RA, *et al*. Release from Prison — A High Risk of Death for Former Inmates. *N Engl J Med Overseas Ed* 2007;356:157–65.
 8. Luther JB, Reichert ES, Holloway ED, *et al*. An Exploration of Community Reentry Needs and Services for Prisoners: A Focus on Care to Limit Return to High-Risk Behavior. *AIDS Patient Care STDS* 2011;25:475–81.
 9. Davis LM, Pacchiana S. Health Profile of the State Prison Population and Returning Offenders: Public Health Challenges. *J Correct Health Care* 2004;10:303–31.
 10. Levitt AJ, Culhane DP, DeGenova J, *et al*. Health and social characteristics of homeless adults in Manhattan who were chronically or not chronically unsheltered. *Psychiatr Serv* 2009;60:978–81.
 11. Osher F, Steadman HJ, Barr H. A Best Practice Approach to Community Reentry From Jails for Inmates With Co-Occurring Disorders: The Apic Model. *Crime & Delinquency* 2003;49:79–96.
 12. Australian Institute of Health and Welfare (AIHW). Alcohol, tobacco & other drugs in Australia. Cat. no:PHE 221. AIHW. 2018.
 13. Kariminia A, Law MG, Butler TG, *et al*. Suicide risk among recently released prisoners in New South Wales, Australia. *Med J Aust* 2007;187:387–90.
 14. Australian Institute of Health and Welfare (AIHW). The Health of Australia's Prisoners 2009. Canberra: AIHW 2010.
 15. Brown CP, O'Sullivan K. somebody's dad: Parents as offenders and offenders as parents in New South Wales. *AJCS* 2013.
 16. Justice Health & Forensic Mental Health Network. *Network Patient Health Survey Report*. Sydney: Justice Health & Forensic Mental Health Network, 2017.
 17. Davis C, Bahr SJ, Ward C. The process of offender reintegration: Perceptions of what helps prisoners reenter society. *Criminal Justice* 2013;13:446–69.
 18. Arditti J, Smock S, Parkman T. "It's Been Hard to Be a Father": A Qualitative Exploration of Incarcerated Fatherhood. *Fathering* 2005;3:267–.
 19. O'Brien M, Day RD, Godwin H, *et al*. Fathering behind bars in English prisons: Imprisoned fathers' identity and contact with their children. *Fathering* 2005;3:221.
 20. Magaletta PR, Herbst DP. Fathering from prison: Common struggles and successful solutions. *Psychotherapy: (Chic)* 2001;38:88–96.
 21. Buchanan M, Murphy K, Martin MS, *et al*. Understanding Incarcerated Women's Perspectives on Substance Use: Catalysts, Reasons for Use, Consequences, and Desire for Change. *J Offender Rehabil* 2011;50:81–100.
 22. Kendall S, Redshaw S, Ward S, *et al*. Systematic review of qualitative evaluations of reentry programs addressing problematic drug use and mental health disorders amongst people transitioning from prison to communities. *Health Justice* 2018;6:4.
 23. Hobbs M, Krazlan K, Ridout S, *et al*. *Mortality and morbidity in prisoners after release from prison in Western Australia 1995-2003*. Trends & issues in crime and criminal justice No. 320. Canberra: Australian Institute of Criminology, 2006.
 24. Bowleg L. The Problem With the Phrase *Women and Minorities*: Intersectionality—an Important Theoretical Framework for Public Health. *Am J Public Health* 2012;102:1267–73.
 25. Bastos JL, Harnois CE, Paradies YC. Health care barriers, racism, and intersectionality in Australia. *Soc Sci Med* 2018;199:209–18.
 26. Baldry E. People with multiple and complex support needs, disadvantage and criminal justice systems: 40 years after the Sackville Report. In: Edgeworth B, Durbach A, Sentas V, eds. *Law and Poverty in Australia: 40 years after the Poverty Commission*. Sydney: The Federation Press, 2017.
 27. Dupre ME. Educational differences in health risks and illness over the life course: A test of cumulative disadvantage theory. *Soc Sci Res* 2008;37:1253–66.
 28. Marmot MG. *The status syndrome: How social standing affects our health and longevity*. New York: Owl Books, Henry Holt, 2005.
 29. Ferraro KF, Schafer MH, Wilkinson LR. Childhood Disadvantage and Health Problems in Middle and Later Life: Early Imprints on Physical Health? *Am Sociol Rev* 2015;81:107–33.
 30. Lopes JL, Bastos LA, da Silva RM. Working Children and Adolescents and the Vicious Circle of Poverty from the Perspective of Gunnar Myrdal's Theory of Circular Cumulative Causation: Analysis and Implementation of a Probit Model to Brazil. *IJSRIT* 2016;10:1908–13.
 31. McKendrick J, Brookes R, Hudson J, *et al*. Aboriginal and Torres Strait Islander Healing Programs. *A literature Review*. Canberra 2018.
 32. Martire KA, Howard MV, Sayle MA. Connections program patients: a descriptive analysis of the reintegration needs of incarcerated substance users. *J Alcohol Drug Depend* 2013.
 33. Goldberg DP, Hillier VF. A scaled version of the General Health Questionnaire. *Psychol Med* 1979;9:139–45.
 34. Lawrinson P, Copeland J, Indig D. Development and validation of a brief instrument for routine outcome monitoring in opioid maintenance pharmacotherapy services: The brief treatment outcome measure (BTOM). *Drug Alcohol Depend* 2005;80:125–33.
 35. Ware JE, Kosinski M, Keller SD. A 12-Item Short-Form Health Survey: Construction of Scales and Preliminary Tests of Reliability and Validity. *Med Care* 1996;34:220–33.
 36. Jenkinson C, Layte R. Development and Testing of the UK SF-12. *J Health Serv Res Policy* 1997;2:14–18.
 37. Steering Committee for the Review of Government Service Provision (SCRGSP). *Report on government services* 2010.
 38. Dolan KA, Shearer J, White B, *et al*. Four-year follow-up of imprisoned male heroin users and methadone treatment: mortality, re-incarceration and hepatitis C infection. *Addiction* 2005;100(6):820–8.
 39. Degenhardt L, Larney S, Gisev N, *et al*. Imprisonment of opioid-dependent people in New South Wales, Australia, 2000–2012: a retrospective linkage study. *Aust N Z J Public Health* 2014;38:165–70.
 40. United Nations Population Division and United Nations Statistics Division. 2016. United Nations International Children's Emergency Fund (UNICEF) Basic Indicators Definitions: UNICEF.
 41. Dowell CM, Mejia GC, Preen DB, *et al*. Maternal incarceration, child protection, and infant mortality: a descriptive study of infant children of women prisoners in Western Australia. *Health Justice* 2018;6:2.
 42. Huebner BM, Gustafson R. The effect of maternal incarceration on adult offspring involvement in the criminal justice system. *J Crim Justice* 2007;35:283–96.