Author’s response to reviews

**Title:** Offending, custody and opioid substitution therapy treatment utilisation among opioid-dependent people in contact with the criminal justice system: Comparison of Indigenous and non-Indigenous Australians

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**Version:** 2  
**Date:** 25 July 2014

**Author’s response to reviews:** see over
Dear Editor,

Thank you for the opportunity to revise our paper titled ‘Offending, custody and opioid substitution therapy treatment utilisation among opioid-dependent people in contact with the criminal justice system: Comparison of Indigenous and non-Indigenous Australians’ for publication in BMC Public Health. We thank the reviewers for their helpful comments on the paper and hope that we have satisfactorily addressed each of the comments. We look forward to hearing about the outcome of our submission.

Editors comments:
The reviewers were of mixed opinions about the manuscript. Two suggested major revisions; two suggested minor ones. I do not think you need to divide the manuscript into two papers as one of the reviewers who recommended major revisions suggests, but it is important that you address the concern that both raised about a more accurate description of the study population."

As suggested, we have now revised our description of the study population to provide greater clarity for readers:

“The population-level cohort was defined on the basis that individuals had a recorded history of opioid dependence (as evidenced by the receipt of OST), at least one criminal charge during the study period, and valid information regarding their Indigenous identity (n=34,962).”

Reviewer 1:
The authors are commended for the exceptionally well-written manuscript submitted for review. The topic and writing style was engaging and the research objectives and outcomes very easy to follow. The authors use simple statistical analyses, although across three very impressive administrative data sets, to address four well-written specific aims. I did appreciate the description on each of these data sets employed along with the authors identifying both the conceptual and data limitations found in the present study. It was a joy reviewing this manuscript.

We thank the reviewer for their positive comments on the paper.

Discretionary Revision:
The authors essentially end the manuscript with a "more needs to be done for indigenous opioid-dependent Australians..." However if there have been recent efforts at reaching this population should not this be introduced or are there ongoing efforts by the study team in doing so? If these efforts do exist perhaps it is not more should be done but rather more targeted efforts at working with indigenous opioid-dependent Australians. Perhaps the authors should consider emphasizing the fact that the needs of this special population warrant a specific culturally-sensitive intervention. While the authors do mention this in the form of a sentence or two perhaps they should consider a bit more narrative on this without violating the journal's page limitations, of course.
We agree with the reviewer that there is a need for more targeted and culturally-appropriate interventions. We have now emphasised this point in the discussion and conclusion:

**Discussion:**
“This highlights the need for the development and implementation of evidence-based and culturally tailored interventions to support the transition of Indigenous males from prison to the community.”

**Conclusion:**
“The underlying reasons for these differences need to be addressed, with a focus on the development, implementation and rigorous evaluation of more targeted and evidence-based culturally tailored interventions.”
Reviewer 2:
Overall, I think the information in this paper is interesting and relevant, offering data about the criminal justice experiences of individuals who have received OST in Australia and comparing trends between Indigenous and Non-Indigenous populations. The authors’ integrative analysis of several different large databases is innovative and adds to our knowledge about the impact of race/ethnicity on drug-users interactions with criminal justice systems.

My recommendations for revisions focus on improving the narrative quality and organization of the paper so that it is easier to understand and read.

a. Major Compulsory Revisions
None

b. Minor Essential Revisions
i. Decide on best language to describe your sample and stick with this throughout the paper. In the Abstract, the sample is referred to “heroin users” (line 43) and later as “opioid-dependent people.” (line 46). In my mind, these are two different groups as all opioid-dependent people are not heroin users. Reading further into the paper, the Data Sources section (line 141-151), it appears that the sample is people who have ever received publically funded OST in NSW. Later, in the Study Cohort section, the sample is described as individuals with “a recorded history of opioid dependence.” These various descriptors are confusing.

We have now revised our descriptions of the cohort to ensure that the descriptions adopted are consistent throughout the paper. In the abstract, the term “heroin users” refers to a survey of heroin injecting drug users as there is no published data relating specifically to opioid-dependent people.

We included only those people who had received maintenance OST in the PHDAS dataset, and therefore, a recorded history of opioid dependence. We have now included a definition of “opioid dependent” in the method section:

“Receipt of OST was used as a marker of opioid dependence, a clinical criterion for receiving treatment with OST in NSW. We assumed ongoing opioid dependence from first entry to OST to the end of follow-up, as it known that opioid dependence is a chronic relapsing disorder with low remission rates [29, 30].”

ii. Similarly, clear and consistent language is needed about the ROD database and what inclusion on this list indicates. I am not familiar with the term “finalized court appearances” (line 154), could that be described a bit more? My guess is that these are people who have been convicted of a crime, which is different from a list of people who have committed a criminal offense, as not all those who commit crimes are convicted and not all those who are convicted have committed crimes. This characteristic is alluded to differently throughout the paper as offending, charges, charge histories, convictions, etc. Picking the best word to describe this data and sticking with it would improve the readability of the paper and the interpretation of findings.

“Finalised court appearances” is the term adopted by the New South Bureau of Crime Statistics and Research to describe all court matters that have been completed and have an outcome, i.e. the date which the matter was heard in court and a penalty (if found guilty) was issued. We have now described this in the methods section of the paper:
“The ROD is a database maintained by the NSW Bureau of Crime Statistics and Research (BOCSAR) that contains records of all finalised court appearances (i.e. all court matters that are completed and have an outcome) in the Local, District and Supreme Courts of NSW since 1994...”

We have also standardised our terminology relating to offences and charges throughout the manuscript where possible.

iii. Comments by section

1. Abstract
   a. line 44, spell out OST the first time that it is used.

   We have now ensured that the full name and abbreviation of OST are listed the first time that they used in the abstract.

   b. line 51, first sentence of methods section is an incomplete sentence/phrase.

   We have now reworded the sentence so that it is complete:

   “This was a population-based, retrospective data linkage study using records of OST entrants in New South Wales, Australia (1985-2010), court appearances (1993-2011) and custody episodes (2000-2012).”

   c. line 54, substitute “gender” for “sex”?

   We are happy to seek editorial advice on the preferred terminology of the journal. Our preference is to use the term “sex” as opposed to “gender” as this is the term adopted in the datasets used in the study.

   d. line 72-73, indigenous people are charged with a greater number of XYZ than who? Complete sentence.

   We have now amended this sentence to clearly indicate that the comparison is being made to non-Indigenous opioid-dependent people:

   “Compared to non-Indigenous opioid-dependent people, Indigenous opioid-dependent people in contact with the criminal justice system are charged with a greater number of offences, spend longer in custody and commonly initiate OST in prison.”

2. Background
   a. This background section is thin and could be more complete and compelling by moving much of the information provided in the discussion section to this first section.

   We have now used some of the material in the discussion section to provide additional information in the background section, such as:

   “About one-quarter of the prisoner population in Australia are Indigenous [9]. The most common charges for Australian Indigenous prisoners are acts intended to cause injury (34%), unlawful entry with intent (16%) and offences against justice procedures (11%) [9].”
b. I would focus on research about Australian Aboriginal communities. Not sure about relevance of the Canadian experience.

There are very few studies that have focused on opioid-dependent people in Australian Aboriginal communities, and given that this journal has an international readership, we feel that it is useful to cite studies which have been conducted in other Indigenous communities to provide examples of previous research studies which are related to our study. This is also helpful in highlighting the gaps in the literature, the novelty of this study, and what this study adds to the current literature.

c. The aims listed in the Background (lines 122-129) don't match up to the aims stated in the Background Section of the Abstract. Consider adding titles to more clearly link these 4 aims to the analysis and results sections.

Due to word limit restrictions, we were unable to describe the aims in the abstract to the same level of detail as they have been described in the background section. We feel that the summarised version accurately describes the three main themes in the paper and also the intention to make comparisons between Indigenous and non-Indigenous Australians. Consistent with the methods, results and discussion sections of the paper, we have now indicated which of the three main themes in the paper that the aims relate to (offending, custody and treatment utilisation).

3. Data Sources: Whenever possible, I would encourage you to be as descriptive as possible about the data you are working with, taking out jargon and making clear statements that can be fully understood by people who are unfamiliar with Australian health and criminal justice systems.

We have revised our methods section to ensure that all the data sources are well described and that all statements are clear to people who are unfamiliar with the systems presented in the paper.

a. In the PHDAS description, reader may not know what NSW is, who the Director-General of Health is, etc. Consider this type of revision: “The PHDAS is a comprehensive record maintained by the public health department of the government of New South Wales (NSW), the most populous of Australia’s six states. It includes the name, date of birth, gender, and treatment dates and regime of all people who have received OST through the public health system since 1985. Etc.”

As above, we have now revised our description of the PHDAS for greater clarity:

“The PHDAS is a comprehensive record of all people in NSW to whom pharmaceutical drugs of addiction were dispensed by authorised clinicians through the NSW Opioid Treatment Program since 1985....”

b. In the ROD description, the following terms are unclear: “Finalised court appearances”, “full-time custody episodes”

As above, we have included extra information to provide clarity around the terms “finalised court appearances”. We have changed “full-time custody episodes” to “custody episodes”.

4. Definitions.
a. Last sentence of the first paragraph (line 172): Consider including the number of people with unknown/missing Indigenous identity (n=?)

We have now included the number of people with unknown/missing Indigenous identity:
“Records for people with an unknown/missing Indigenous identity were excluded from the cohort (n=13,107).”

b. In second paragraph, leave out ANZOC code numbers, unnecessary detail.

We have now removed the ANZSOC codes from the paragraph.

5. Statistical analyses:
   a. Not clear what the phrase “follow-up time” refers to.

   In this study, follow-up time refers to the entire period over which we were able to “follow” the cohort members in the dataset – that is, from the first recorded observation to the end of data coverage in each of the respective datasets, taking into account the date of death. We have now described this more clearly in the manuscript:

   “Due to the different date ranges available for each of the datasets, we defined distinct follow-up periods to determine the total observation period for each analysis, taking into account the date of death (if recorded).”

b. Why was time in custody analysis limited to 1/00-3/12?

The analysis focusing on time spent in custody is limited to period of time that data relating to custody episodes was available (1 January 2000 to 31 March 2012). We have now emphasised that this is the only data that was available to us.

“Specifically, the ROD was used to extract data relating to all offences occurring between 1 December 1993 and 31 December 2011 and custody episodes which occurred between 1 January 2000 and March 2012.”

c. Temporal relationship section: Where does this 2,815 sub-sample come from?

In order to examine the temporal relationship between age of first offence and first commencing OST treatment, we obtained the sub-set of participants who were below the age of criminal responsibility in New South Wales (10 years) at the commencement of data collection; that is, a cohort with complete criminal charge histories. In total, 2,815 people were identified to be 10 years or younger at 1 December 1993; 10 years is the age of criminal responsibility in the state of New South Wales. We have now re-worded this:

“In order to examine the temporal relationship between age of first charge and first commencing OST treatment, we identified a sub-set of individuals from the total study population who were below the age of criminal responsibility in NSW (10 years) at the beginning of the charges dataset (1 December 1993) (n=2,815). We therefore had their complete criminal charge histories and were able to analyse these in relation to their first OST commencement. “

6. Results
   a. Last sentence of first Offending paragraph: Not sure what is meant by the claim that a percent of these charges were “proven”.

In our examination of the patterns of offending among the cohort, we evaluated ALL charges that are recorded in the dataset as well as those which carried a guilty verdict at the time of the court
hearing (and are therefore considered a proven offence). We have now included a definition of a ‘proven offence’ for greater clarity:

“The percentage of charges which were proven (those with a guilty verdict)…”

b. Paragraph following Table 1: Twice offenders are described as being “responsible” for certain charges/offenses. (Also used in Discussion section.) Is that the best word choice?

We have now changed the wording from “responsible for” to “contributed to” and “accounted for”.

c. Paragraph following Figure 1: What is “environmental pollution”?

“Property damage and environmental pollution” is the title for offences belonging to ASOC category 12. “Environmental pollution” offences include, for example, those that relate to actions leading to the polluting of air, water utilities, or lead to levels of noise that exceed government regulations. We have provided a reference to the ANZSOC system in the methods section of the paper should any reader seek further clarification.

“…environmental pollution such as noise, air or water pollution…”

d. Time in custody: Total sample includes 34,962 who are in PHDAS and ROD and have information about indigenous identity. Of these, only 17,758 who were incarcerated between 1/00-3/12 were included in Time in Custody analysis. Why?

The study cohort was defined on the basis that individuals had a recorded history of opioid dependence, at least one criminal charge during the study period, and valid information regarding their Indigenous identity (n=34,962). The ROD is split into two datasets: one for offences, and one for custody, and each cover different time periods. The cohort was defined using the offences sub-dataset and only 17,967 of these people appeared in the custody sub-dataset and therefore our analysis of time in custody was restricted to this group.

7. Discussion

a. Offending section, last sentence: In general, discussion addresses data already presented in the Results section. This information about 2001 is interesting and should be reported along with Appendix 3 in the Results section.

We have now described the figures included in Appendix 2 and 3 in the results section as suggested:

“The charge rates (number of charges/100 person-years) between non-Indigenous and Indigenous males and females across the 1993-2011 calendar years are shown in Appendices 2 and 3. For each group, charge rates were relatively consistent across all years, with the exception of a clear peak in overall charge rates in 2001, corresponding with the time that a heroin shortage was observed across Australia [33, 34]. “

b. I would move a lot of the background information presented in the Discussion to the Background section at the start of the paper. Presented earlier, this literature review would engage the reader and suggest hypothesis/rationale for the study analysis.

We have now provided additional background information as suggested.
Reviewer 3:
This study sought to compare types of offences, time in custody and opioid substitution therapy (OST) utilization between Indigenous and non-Indigenous Australians who had a history of accessing OST and a contact with the criminal justice system. This manuscript has important strengths, including the large datasets and the significance of the study objectives given the high rates of heroin use and incarceration among Indigenous people in this setting. The paper is also overall well written. However, there is a methodological concern that affects the robustness of the findings and the interpretation of key findings, as well as some minor errors/suggestions. These are listed below.

Major compulsory revisions
1. In the Methods section (line 184–185), the study inclusion criteria included individuals who had “a recorded history of opioid dependence and at least one charge during the study period.” This is not entirely wrong but seems misleading. It should be “individuals who had a history of OST utilization (according to the PHDAS dataset) and at least one charge during the study period.” The distinction between a history of opioid dependence and OST utilization is important because not all opioid-dependent people are recorded in the dataset, and the authors did not assess the time of initiating opioid use.

The key population in this study is opioid-dependent people, who were identified as having been recorded as receiving maintenance OST at least once during the study period. Opioid dependence is a clinical criterion for the receipt of OST in New South Wales. As per previous comments, we have now revised our description of the study cohort.

2. In relation to #1, it is concerning that the authors discuss their findings as if their study participants had been opioid-dependent throughout the study period. For example, in line 339–346, the authors state, “Acquisitive crime is known to be higher among people who use drugs as it has the potential to generate income to support their drug use, a key factor likely to be responsible for the higher rate of theft and related offences observed in our cohort.” They also attribute the observed increase in the rate of acquisitive crime in 2001 to the heroin shortage that occurred in that year. Such interpretations seem to go beyond the results, as one cannot know whether study participants were using opioids at the time of the offence. In fact, the authors found that the age of first offence is much earlier than the age of first OST entry, suggesting that some offences could have been laid before participants started to use opioids. Moreover, in line 355–357, the authors introduce a previous study reporting that Indigenous offenders were less likely than non-Indigenous offenders to self-report heroin use in the 30 days prior to being detained by police, and also in the 6 months prior to imprisonment. Similar characterization of their study cohort as being opioid-dependent from the beginning of the study period is found throughout the Discussion section, which should be corrected.

Both in New South Wales and across Australia the prescription of OST is highly regulated. Given that prior approval is required for individuals to be prescribed OST, we do know that individuals are opioid-dependent at the time of commencing OST. The term opioid dependent does not necessarily equate to actively using heroin or other opioids, by nature of receiving treatment as substitution for these opioids, individuals remain opioid-dependent throughout the study period, with the exception of those individuals successfully ceasing OST. We also know that opioid dependence is a chronic relapsing disorder with low remission rates. This has now been defined more clearly in the methods section:

“Receipt of OST was used as a marker of opioid dependence, a clinical criterion for receiving treatment with OST in NSW. We assumed ongoing opioid dependence from first entry to OST to the
end of follow-up, as it known that opioid dependence is a chronic relapsing disorder with low remission rates [29, 30].”

Also, an inability to assess a temporal relationship between the time of offence and initiation of opioid use should be noted as a limitation.

We have now included this as a limitation in the discussion as suggested:

“Also, given that we were unable to assess the temporal relationship between time of offence and initiation of opioid use, this presents another area for future research.”

Minor essential revisions
3. In the Methods section (line 214–216), the authors state, “The proportion of total follow-up time each individual spent in custody was compared using…the total length of follow up (start of treatment to 18 May 2012 or death).” The phrase in the parenthesis refers to the proportion of total follow-up time in OST, not in custody. This should be corrected.

We thank the reviewer for identifying our error, we have now made the necessary correction.

4. In the Results section (line 297), the authors state, “The number of people in treatment at three, six, nine and 12 months was lower…” To be consistent with the statistical test the authors used, “the number” should be replaced with “proportions.”

The word “number” has been changed to “proportions” as suggested.

5. Table 3: Note for superscript #2 is missing.

We have now corrected this – the superscript #2 was incorrectly labelled as #1.

Discretionary revisions
6. Ethical approval of the study (line 234–239): While the authors state that they obtained ethical approvals from several research ethics committees, including the NSW Aboriginal Health and Medical Research Council, the authors are encouraged to briefly explain what kind of measures they took for ethical consideration given the very sensitive nature of the study findings.

As part of gaining ethics approval from the NSW Aboriginal Health and Medical Research Council, we established an Indigenous Reference Group to review and provide guidance on the design, analysis, interpretation and dissemination of the study findings. Several members of the Reference Group are also authors on the paper, ensuring that we have appropriately interpreted the findings and also that our use of language is culturally appropriate. With respect to linkage of data, all requisite privacy measures were adhered to, both with respect to the linkage process and the presentation of results.
Reviewer 4:
This manuscript offers comparative descriptive analyses of population-level data of Indigenous and non-Indigenous individuals receiving opioid substitution therapy (OST), violent and property-related criminal charges brought against them and their experiences in custody. This paper presents comprehensive long-term data on key outcomes of interest using novel data linkages across population-level databases, and the comparative focus on Indigenous vs. non-Indigenous outcomes represents a significant contribution to the literature in this area. Its aims are clearly stated and the manuscript is well-organized. While the data and analyses presented are limited by their descriptive nature, the data presented nevertheless constitute an important identification of inequalities between Indigenous and non-Indigenous individuals across key outcomes related to OST and criminal justice outcomes. However, the manuscript possesses a number of shortcomings, some of which are significant, that would need to be addressed before it would be appropriate for publication in BMC Public Health.

Major Compulsory Revisions
One of the key shortcomings includes the rationale for looking at both criminal justice and OST outcomes in the same paper. While it has been shown elsewhere and can reasonably be expected that OST may reduce criminal activity related to drug use, the linkage between the two distinct areas examined in the manuscript is not well developed and the result is a manuscript that at times feels like a series of distinct analyses with insufficient connection between them to justify inclusion in the same paper. While they two types of outcomes converge in the 4th aim that looks at OST treatment and the age of first charge, this linkage seems haphazard. In the absence of more robust rationale and explicit conclusions that flow from this rationale, it seems that the manuscript would be more appropriately divided into two papers, one on criminal justice activity, one on OST related outcomes.

Given that the population being studied is opioid-dependent people (who have entered OST treatment), we feel that the inclusion of this aspect in the paper serves to highlight the relationship between contact with the criminal justice system (both offending and incarceration) and being in OST. In line with the Editor’s recommendation, we will keep the paper in its current form.

Another shortcoming lies in the description of the study sample. The datasets linked for the purposes of the study represent an incredibly rich source of data, but it is described in such a way that it is not clear until quite late in the methods section exactly who is included in analyses. To remedy this it would be important to be clear in the abstract and early in the methods sections that all individuals included in the study (1) were in receipt of OST and (2) had at least one criminal charge resulting in court appearance; and (3) had valid information regarding their Indigenous identity. That is, the current description identifies these criteria somewhat late and it is not clear from the abstract or the data linkage sections that all individuals in the study appear in the PHDAS database and the ROD/BOCSAR databases.

We have now moved the section describing the study cohort earlier in the methods section and revised our study description to improve clarity:

“The population-level cohort was defined on the basis that individuals had a recorded history of opioid dependence (as evidenced by the receipt of OST), at least one criminal charge during the study period, and valid information regarding their Indigenous identity (n=34,962). “

Along the same lines, the authors refer to the study as a cohort, which implies a much smaller sample than the population level data that the manuscript is based on. Referring to the study sample as a population-level cohort throughout would do well to clarify this ambiguity.
Where appropriate, we have now described the study cohort as a “population-level cohort” as suggested. For example:

“Using a population-level cohort of opioid-dependent people in contact with the criminal justice system...”

While the manuscripts aims are clearly outlined, it would also benefit from a clear statement of the hypotheses guiding these analyses based on the background information.

Upon review of other papers published in BMC Public Health, the majority of articles do not appear to include hypotheses. Given the descriptive nature of this study, we do not feel that hypotheses are necessary and elected not to include any hypotheses in the paper. This also served to keep the paper as succinct as possible while ensuring adequate coverage of the three main themes of the paper. Given the multiple aims of the paper, describing hypotheses in the introduction and also in the discussion sections of the paper will also serve to add unnecessary length.

Another key concern relates to the accuracy of the language referring to what is actually being examined through the analyses provided. That is, rather than referring to individuals as opioid dependent, it would be more accurate to describe the study population as individuals engaged in OST therapy (or something similar), as the use of the term opioid dependent implies a broader population of people who use drugs than is included in the study. There are also no criteria presented for what constitutes “opioid dependent” such as the DSM-IV/V or similar. Similarly, there is some ambiguity between what is being measure in the criminal justice outcomes – rather than referring to “offending” it would be more accurate to refer to “individuals charged with offences” (or something similar”) as the relationship between being charged and actually offending is neither iron clad nor inclusive of individuals who commit criminal offences that are not charged for their offences.

In response the comments made by Reviewers 2 and 3, we have now revised our terminology for opioid dependence and offending for accuracy and consistency.

While a number of findings are statistically significant – specifically comparisons between Indigenous and non-Indigenous individuals, it is not clear whether some of the statistically significant differences constitute differences of substantive import, especially given the large sample size which is bound to produce significant results. Some commentary as to these differences would provide some interesting perspectives in the discussion.

We acknowledge that the large sample might result in more statistically significant differences to be observed in comparison to studies of smaller samples. While many comparisons did highlight statistically significant differences, it is important to note that not all differences were statistically significant.

The paper would benefit from a more robust description of the potential biases introduced by the exclusion criteria for a number of the components of the analysis. For example, for the time in custody analyses, due to the exclusion of any custody episode not yet completed at the end of the observation period for the study, any long term custody episodes would not be a part of these analyses, and their exclusion seems likely to introduce significant biases that could be worked around (by including them and specifying episodes of “at least” a certain length, or by conducting sensitivity analyses that looks at how their inclusion impacts outcomes). These analyses also exclude custody episodes where individual was retained and released on the same day which
could introduce the opposite bias as above, and could be an interesting sources of evidence for selective or discriminatory retention practices if these short term episodes were found to be disproportionate among Indigenous individuals.

Consistent with recommendations by the New South Wales Bureau of Crime Statistics and Reporting (the data custodian), we excluded all custody episodes where individuals entered and exited on the same day as the actual length of time that individuals were in custody is unknown and it is also unlikely that episodes of this length occurred in prison.

The description in the methods section is incorrectly described as including only “complete” custody episodes. It was our intention to include people who also had “incomplete” custody episodes in our analysis as described in Table 3: days in the follow-up period spent in custody for episodes that had started prior to 2000, and/or which had not ended by March 2012. Unfortunately upon checking these figures, we have realised that the results in the table relate to complete episodes. We have now updated the results in Table 3 and corresponding descriptions in-text to include incomplete episodes.

An additional issue is related to the analyses related to OST treatment utilization and resulting conclusions. The circumstances of OST cessation are not explored and while longer engagement in OST is generally associated with greater stabilization of opiate addiction, long treatment does not necessarily mean that individuals have better treatment outcomes as cessation could also be the result of successful tapering off of OST. Some discussion of the assumption of time in OST and treatment as being indicative of greater success would help flesh out the discussion of these analyses.

Please see our previous response to comments made by Reviewer 3. Although it is true that some individuals will successfully cease treatment, in reality, opioid dependence is chronic, and individuals frequently cycle in and out of treatment. Long-term treatment with OST is associated with the best outcomes. In particular, treatment retention has been associated with improved social functioning and mortality outcomes. We have described this in the introduction and discussion as suggested.

Introduction

“However, maintaining retention in treatment is necessary in order to maximise OST treatment outcomes [19]. Higher legal severity (corresponding with more complex and severe criminal justice histories) have been associated with shorter retention in methadone treatment [20].”

Discussion

“This is important because maintaining retention in OST is necessary to achieve optimal OST treatment outcomes [19].”

Lastly, while the conclusion that custody episodes are opportunities for OST initiation, multiple results in the study point to the underutilization of OST outside of custody among Indigenous individuals and the failure of out-of-custody OST treatment to engage and retain this population, as well as shortcomings in the continuity of OST provision following release from custody. As such, there is a significant foregone opportunity to identify and call for culturally appropriate OST that specifically accommodates the needs and cultural values of Indigenous individuals and promotes continuity of care.
We have now included some discussion relating to aspects of continuity of care and also the need for culturally appropriate OST:

“Given that Indigenous males more frequently commenced OST treatment in prison, poor treatment continuity at the time of release is likely to have resulted in shorter treatment episodes. This highlights the need for the development and implementation of evidence-based and culturally tailored interventions to support the transition of Indigenous males from prison to the community.”

**Minor Essential Revisions**

In addition to these points there are a number of minor concerns, which are listed according to manuscript section below:

**Abstract**

- Line 48 - All of the individuals in the study are engaged in OST and so the statement that the study examines OST utilization among opioid-dependent individuals is somewhat misleading (i.e. the sample is not all opioid-dependent individuals but only those engaged in OST at some point during the observation period)

We have now amended this to reinforce the fact that opioid dependence was established through receipt of OST:

“...data linkage study using records of OST entrants in New South Wales, Australia (1985-2010)...”

- Please include percentages of the number of Indigenous and non-indigenous individuals in the sample to facilitate comparison with other figures in the results given as percentages (line 59)

We have now included the proportion of Indigenous (19.5%) and non-Indigenous people (80.5%) in the cohort:

“Of the 34,962 people in the cohort, 6,830 (19.5%) were Indigenous and 28,132 (80.5%) were non-Indigenous”.

- Line 61 - The scale of median number of charges is not clear (i.e., is this per 100 person years, per person?)

This statistic refers to the median number of charges per person; we have reworded this sentence for greater clarity:

“The median number of charges per person against Indigenous people...”

**Background**

- The section in the background about the disease burden of illicit drug use (line 86) is unclear – is the disease burden referring to substance use disorders (clinically defined) or use, or diseases resulting from these?

The disease burden is measured in disability-adjusted life years (DALYs). We have now described this in the background section:

“...20% of the disease burden (in disability adjusted life years) experienced by...”
The discussion of the Royal Commission seems to draw false contrast between the recommendations of the Commission and other potential explanations of over-representation of Indigenous people in prisons – i.e. the Commission pointed to much more than discrimination and racial bias, and so other findings reinforce, rather than contradict, its findings.

Since the Royal Commission into Aboriginal Deaths in Custody published its findings in the early 1990’s, several studies have been published which explore this issue in great depth. While it is true that other factors are likely to have contributed, “there is little evidence that bias in the treatment of Indigenous Australians by police and courts is a significant contributor to Indigenous over-representation in prison” (Weatherburn & Holmes, 2010). We have reworded this section in the introduction to draw greater emphasis to this point:

“Currently, there is little evidence to support the idea that discrimination and racial bias in policing and court decisions explain the over-representation of Indigenous people in prison [10, 13]. After adjusting for sentence-related factors such as current and past offending, Indigenous people are no more likely to be issued longer sentences than non-Indigenous people in New South Wales courts [14].”

There is a significantly missed opportunity to draw the links between OST and reductions in crime (and the gap in knowledge among the target population) in the introduction (Line 108).

We thank the reviewer for their suggestion however, as we did not directly examine the relationship between OST use and reductions in crime in this study, we feel that its inclusion might lead readers to expect some analysis of this type in the paper. However, we have mentioned this issue briefly in the introduction and have also identified this as an important area for future research in the strengths and limitations section and also provided some information our discussion.

**Introduction**

“However, maintaining retention in treatment is necessary in order to maximise OST treatment outcomes [19]. Higher legal severity (corresponding with more complex and severe criminal justice histories) have been associated with shorter retention in methadone treatment [20].”

**Discussion**

“Although not directly evaluated in our study, there is evidence that OST treatment is associated with reduced offending [51-53].”

**Strengths and limitations:**

“Indigenous people in an opioid-dependent population, we did not examine whether time in OST directly affects either offending or time in custody, but is an important area for future research.”

- Line 111 - “OST use among Indigenous” should read “OST use between Indigenous and non-Indigenous people”.

We have now revised this sentence as suggested.

**Methods**

- Line 164 - Censoring follow up time using the date of death is not completely accurate – censoring occurs when an individual’s observation period or outcome is not completely known
(i.e. individuals still under observation at the end of the observation period would be right censored, but not those who had died, whose end of observation period is fully known)

We have amended our wording to avoid confusion. Given that mortality was not the primary outcome of this study, we used the term ‘censor’ to describe instances where an individual “experienced a different event that made further follow-up impossible” (Clark TJ et al, 2003).

“Date of death was used to terminate the follow-up period for individuals who died prior to the end of coverage in the datasets.”

- Lines 167-169 - How were Australian Aboriginal/Torres Strait Islander People identified? Was this externally verified by some administrative criteria, self-identification, interviewer identified, etc.?

Indigenous identity is reliant on self-identification in both datasets; we have now mentioned this in the paper:

“...if they were ever-identified as an Aboriginal and/or Torres Strait Islander person in either the ROD or PHDAS datasets (determined by self-report).”

- Lines 171-172 - How many records for people with unknown/missing Indigenous identity excluded?

As per Reviewer 2, we have now included the number of people with unknown/missing Indigenous identity.

- The definition of the study cohort does not seem to accurately reflect the study inclusion criteria – rather than ‘recorded history of opioid dependence’ should this not be ‘reported enrollment in OST’ (Lines 184-185)?

We have now revised our definition for greater clarity in line with the comments by Reviewer 2, emphasising that opioid dependence is a clinical criterion for entry into OST in New South Wales.

- In the statistical analyses, there is an opportunity to draw attention to the rich data by talking about how it is only possible to conduct these comprehensive, long-term population level analyses because of the data linkages utilized in the study.

We thank the reviewer for their suggestion. We have now highlighted the unique opportunity that our data provides in being able to evaluate the question studied:

“Through the linkage of the datasets described, this study provided a unique opportunity to conduct longitudinal population-level analyses.”

- Line 216 - should ‘treatment’ not be ‘custody’?

We have corrected this to treatment and thank the reviewer for bringing the error to our attention.

- Lines 225-226 - to be more clear about how the follow up time is calculated, should this sentence not state “The percentage of total follow-up time each individual spent in treatment was compared by dividing the cumulative time spent in treatment by the total length of follow up...and multiplying by 100.”
We have changed the wording and description from proportion to percentage as suggested.

- It isn't clear in the “Temporal Relationship’ section what the outcome being examined was – whether it was the time of first offence to OST (which is what is reported in the results) and why this was examined and not whether OST initiation decreased the frequency of charges.

The purpose of this analysis was to examine the relationship between the two rather than focus on a specific outcome.

Results
- Lines 242-243 Please report sample sizes were reported in a consistent manner (i.e. n, followed by percentage). Including an ‘of these’ after Indigenous and before 4,615. It would also be helpful to know whether the gender breakdown was consistent between Indigenous and non-Indigenous groups.

We have now ensured that the sample sizes and percentages are reported consistently. The distribution of males and females between those who were Indigenous and non-Indigenous is provided in Table 1. We have now described this in the results section:

“Among the 28,132 individuals in the cohort who were non-Indigenous, 20,179 (71.7%) were male and 7,953 (28.3%) were female (p<0.001).”

- Line 253 - It would be very helpful if the number of offences which were proven was also provided for non-Indigenous individuals charged with offences. It would also be important to differentiate between a charge being “proven” and a conviction being received, which may be different.

We have now included the description of the percentage of offences which were proven for non-Indigenous individuals listed in Appendix 1 as suggested and defined what a “proven offence” means:

“The percentage of charges which were proven (those with a guilty verdict) was similar between Indigenous and non-Indigenous males (83.5% vs. 85.6%) and females (87.3 vs. 88.4%) (Appendix 1).”

- Lines 255-259 - The language is somewhat ambiguous and conflates offending with being charged. In the last sentence of this paragraph, the language would be more accurate if it stated that “Considering all charges for violent offences, Indigenous people received 44.0% of all violent offence charges laid against the cohort (Lines 258-259).

We have reworded this sentence as suggested.

- The statement that charge rates were highest in two age categories among Indigenous females is not entirely accurate, given that they are, as in the non-Indigenous group, higher among the 20-24 year old age group (this should also be reflected in the conclusions). It may be more fruitful to compare the 15-19 year old age categories of Indigenous and non-Indigenous groups if the authors wish to highlight that charge rates are high among teenage females.

This section of the results describes the age group with the peak charge rate for non-Indigenous and Indigenous males and females, examined in Figures 2 and 3. Whereas the other groups have one distinct peak, the peak charge rate for Indigenous females is identical across two age groups: 15-19 years and 20-24 years.
- Line 283, the statement of “at least one day” should be “greater than one day” based on the inclusion criteria. It would also be interesting to include comparisons of the number of episodes and length of episodes in order to flesh out the data in this section.

We excluded people who spent less than one full day in custody (that is, those who entered and were released on the same day) and therefore the description we have provided is correct. We have now reworded this to ‘at least one full day” in order to eliminate any ambiguity. We have also described the comparisons in the number and length of episodes:

“This was both the result of Indigenous people having more custody episodes (median of 5 episodes for males and 4 for females), and episodes being of a longer duration (median 75 days for males and 30 days for females). In comparison, the median number of custody episodes for non-Indigenous people was 3 episodes for males and 2 episodes for females; the median duration of custody episodes was 68 days for males and 22 days for females.”

- Line 311 – 316 - shouldn’t this be date of first charge rather than age of first offence? It isn’t clear the value of looking at the relationship of OST entry following the date of first charge since this may be more usefully examined by looking at the time following the initiation of use, unless there is a significant rationale for the relationship between offending and OST initiation.

Figures 2 and 3 illustrate that offending rates are highest among younger age groups. In the absence of data relating to initiation of heroin (or opioid) use, we opted to examine the relationship between the age of first offence (or charge) and the age of OST entry in order to gain an understanding of what might be driving the increased rate of offending among younger age groups. We feel that this comparison helps to supplement and understand the context of the offending patterns observed.

Discussion

- While the discussion refers to repeat offending, there is little information in the results on repeat offending in the data (Lines 332-333).

We have now highlighted more findings related to recidivism in the results section:

“The median number of charges for Indigenous offenders (25, IQR 31) was almost three times that of non-Indigenous offenders (9, IQR 16) (p<0.001), indicating that repeat offending was common.”

- Lines 332-333 - The argument that recidivism is common among Indigenous offenders and has been attributed to the over-representation of indigenous people in contact with the criminal justice system is quite tautological and warrants additional explanation.

We have now revised and shortened this sentence:

“…indicating that disproportionately more charges were laid against Indigenous people in the cohort, and that repeat offending was common; a finding consistent with previous studies [10, 35, 36].”

- The attribution of increases in charges/offending in 2001 to a heroin shortage is not fully explained – i.e. did the shortage increase prices?

The heroin shortage resulted in a subsequent increase in heroin prices, which is likely to explain the increase in charge rates during that year – heroin users were driven to commit more crimes in order
to acquire additional funds to maintain their heroin use. We have now explained this further in the paper:

“The shortage lead to an increase in the price of heroin, which subsequently resulted in an increase in the rate of acquisitive crime [33].”

- Line 350 – it is doubtful that Indigenous violent offenders frequently make further contact with the criminal justice system, but rather come into contact owing to recidivism or re-offending.

We have changed the wording of this sentence as suggested:

“In addition, compared to non-Indigenous violent offenders, Indigenous violent offenders are more likely to be reincarcerated for a violent offence, and within shorter periods of time [41].”

- Line 354 – should this not read, z “the relationship between illicit drug use and violent crime is less clear”?

We have changed the wording as suggested:

- Lines 358-9 – the construction that “violence was reported to have a strong presence among drug markets” is an awkward grammatical construction and unclear.

We have reworded this sentence for greater clarity:

“...drug markets were identified as being associated with high levels of violence [44], with the highest being among those whose preferred drug of choice was heroin - 29% of respondents reported using force or threats of violence and 17% reported using weapons to obtain heroin.”

- Lines 386-7 extrapolate outside the results of analyses. That is, in order to make the claim that over-representation of Indigenous people in custody may be due to greater contact among people who are opioid dependent it would be necessary to compare incarceration rates between opioid dependent vs. non-dependent individuals, which the current study does not do.

While it is true that our study was not designed to compare rates of incarceration between opioid dependent and non-opioid dependent individuals as such data are not available, we do not feel that we have extrapolated our findings outside the results of our analyses. Given the we have data at the New South Wales population-level (which we have now included instead of national estimates), through comparison of data to state-wide sources, we are able to make comparisons between our cohort and New South Wales as a whole:

“Indigenous people represented 30% of all of people who were incarcerated among our cohort, whereas the point-prevalent estimate of the percentage of Indigenous people in prison is New South Wales in 2013 is 23% [9]. Given that Indigenous people comprise 2.9% of the general population in New South Wales [2], our findings suggest that much of the over-representation of Indigenous people in custody may be due to greater contact among people who are opioid dependent.”

- Lines 394-5 that highly the extent of complexity of disadvantage does not really follow the description of simple rates of imprisonment rather than the contributors to these rates.

We have now reworded this sentence to “highlighting the extent of disadvantage” rather than “highlighting the extent and complexity of disadvantage”.

18
- Line 403 - It isn’t clear why OST initiation in custody may contribute to higher levels of imprisonment for acquisitive crime – this seems more to point to the fact that Aboriginal individuals may be less likely to initiate OST outside of custody.

We have now reworded this sentence:

“We found that Indigenous people more frequently commenced OST in custody, which suggests under-treatment in the community.”

- Line 430 – it isn’t clear what is meant by “rates of participation in the community are proportional in Australia and worldwide), which suggests that results are consistent with other populations.

We have now reworded this sentence:

“...rates of participation in the community are not consistent across Australia [60].”

Conclusions

- Line 457 – rather than a “history of opioid dependence”, this should be more accurately described as people with a history of both OST and criminal justice system involvement.

We have reworded this sentence to reinforce the fact that individuals in the cohort have a history of both OST and criminal justice system involvement:

“There are clear differences in the nature and levels of offending, as well as time spent in custody among Indigenous and non-Indigenous people with a history of opioid dependence and contact with the criminal justice system.”

- The conclusion lacks a description of how the underlying reasons for differences in under-utilization of treatment among Indigenous people in the community and the compound disadvantage of Indigenous people with opioid use disorders can be addressed.

We thank the reviewer for their suggestion. However given the nature of the analyses and data presented, we do not feel that we are able to draw any conclusions about the underlying reasons for the patterns examined in our study.

Discretionary Revisions

- The conclusion of contact with the criminal justice system providing an important opportunity to engage Indigenous people in OST seems to gloss over the apparent shortcomings of the out-of-custody system (lines 73-74).

We have now extended on this to make reference to the need for enhancing continuity of care:

“Although the prison setting appears to be an important access point for OST among Indigenous people, the under-treatment of Indigenous people in the community is also apparent, and there appears to be a lack of continuity between the prison and community OST systems.”

- It would be helpful to have a parallel example of specific disease burden statistics/health inequalities among Indigenous people who use drugs in Australia to complement the Canadian example (lines 91-92).
We have now found an Australian reference which supports the Canadian example and have included this citation:

The Kirby Institute: Bloodborne viral and sexually transmitted infections in Aboriginal and Torres Strait Islander people: Annual surveillance report 2013. Sydney, Australia: The Kirby Institute, UNSW; 2013.

- The first paragraph on page six would benefit from an additional statement about the need to resolve the ambiguity in results from previous studies of OST retention rates among Indigenous Australians (line 116).

We have now included an additional sentence highlighting that the ambiguity in the findings across populations requires further investigation:

“There is therefore a clear need for further research to resolve these differences in study findings, given the potential benefits of treatment in this population.”

- It isn’t clear that there is much added by breaking down theft and related offences (which are not outlined in the definitions section) from property offences (which are clearly outlined in the definitions section) given the similarity in their rates (Lines 248-250).

We have presented our findings from the analysis focusing on offences in a format consistent with the approach used by the New South Wales Bureau of Crime Statistics. There are 16 standard categories of offences in the ASOC system, with theft and related offences recorded separately from property offences. Although these offences contribute to a large proportion of property offences, they do not capture the full range of all property offences which is a composite category of a several offence types. The similar values of proportions serve to highlight the high rates of acquisitive crime among our cohort. We have highlighted this point further in the results section.

- It isn’t clear why the year of charge patterns might be relevant or why it is examined here – only in the conclusions does this become apparent. It may therefore warrant a rationale for examining charges by year earlier in the paper.

We have now introduced the rationale for examining charge rates across different years earlier in the paper:

“...rates of charges per 100 person years (PY) were also calculated for Indigenous and non-Indigenous males and females, by age group, and calendar year to determine if rates varied across age groups and over time.”

- In the OST treatment utilization section, how might treatment be related to being released from custody? Is it possible to look at the dates of custody release and see if they correspond to dates of treatment discontinuation (Lines 297-301)

We thank the reviewer for their suggestion and agree that it would be interesting to examine the point of treatment discontinuation in the dataset and to see if this is related to treatment continuity. Although continuity of care is a theme important to this paper, it is also complex and we do not feel that we can adequately address the issue of continuity of care or treatment retention in this paper. It is an important issue that warrants future study but the investigation of this is beyond the scope of this paper.
On line 341/2, another reason why individuals resort to acquisitive crime is due to exclusion from licit forms of income generation.

We have now included this as a further reason explaining the increase in acquisitive crimes among our cohort and included a reference which estimates that 15% of the difference in employment rates between Indigenous and non-Indigenous Australians can be accounted for by differences in arrest rates between the two groups (Borland J & Hunter B, 2000).

“It has previously been estimated that about 15% of the difference in employment-population rates between Indigenous and non-Indigenous Australians is due to the difference in arrest rates [39].”

It would be helpful to have references to support the claim that the risks for needle sharing and transmission of blood borne viruses are higher among Indigenous people (line 398).

This sentence attempts to draw on the fact that Indigenous people have poorer health and increased morbidity in general, and that the consequences of needle sharing and transmission of blood borne viruses potentiate the risk of chronic diseases such as hepatitis C and HIV. We have now reworded this and provided a reference which highlights this point.

“Periods of imprisonment carry many health risks for people who inject drugs due to needle sharing and transmission of blood borne viruses [49, 50], potentiating risks which are already greater among Indigenous people [5].”

For the paragraph beginning on line 411, rather than conclude that short sentences do not provide enough time to achieve stabilization (a statement whose implications of longer sentences being more beneficial is highly problematic) this more points to the lack of continuity of care for OST following release from prison and the need for culturally appropriate addition treatment.

We thank the reviewer for their comment and as mentioned above, agree that there is a need to reinforce the importance for continuity of OST treatment and also culturally appropriate treatment. We have now discussed these aspects in the paper:

“Given that Indigenous males more frequently commenced OST treatment in prison, poor treatment continuity at the time of release is likely to have resulted in shorter treatment episodes. This highlights the need for the development and implementation of evidence-based and culturally tailored interventions to support the transition of Indigenous males from prison to the community.”

The limitations section would benefit from some discussion of accounting for loss-to-follow up because of migration outside NSW or other reasons why individuals may no longer appear in the data sets.

We have now included this as a possible limitation as suggested:

“...the other datasets used in this study are NSW specific and therefore we are not able to capture events that occurred outside NSW or follow those individuals who might have migrated to other States or outside Australia.”

The strengths and limitations section also misses an opportunity to draw attention to the population level, long-term data used in the study.
We have now added an additional strength to the discussion highlighting the unique opportunity we have to evaluate longitudinal population-level data:

“Using state-wide administrative datasets, this study presented a unique opportunity to evaluate longitudinal population-level data.”

REFERENCES

