University Library

MINERVA ACCESS

A gateway to Melbourne's research publications

Minerva Access is the Institutional Repository of The University of Melbourne

Author/s:
Coulter, DJ;Pearce, LA;Legge, M;Young, JT;Preen, DB;Heffernan, E;Jones, J;Kinner, SA

Title:
Prevalence of mental illness, substance use disorder, and dual diagnosis among adults in custody

Date:
2025

Citation:
Coulter, D. J., Pearce, L. A., Legge, M., Young, J. T., Preen, D. B., Heffernan, E., Jones, J. & Kinner, S. A. (2025). Prevalence of mental illness, substance use disorder, and dual diagnosis among adults in custody. Population Health Metrics, 23 (1), https://doi.org/10.1186/s12963-025-00408-7.

Persistent Link:
https://hdl.handle.net/11343/361029

License:
CC BY

Population Health Metrics

RESEARCH

Open Access

Prevalence of mental illness, substance use disorder, and dual diagnosis among adults in custody

Darcy J. Coulter[1,2,3*], Lindsay A. Pearce[1,2,4], Matthew Legge[1,2], Jesse T. Young[2,4,5,6,7,8], David B. Preen[8], Ed Heffernan[9,10,11], Jocelyn Jones[12†] and Stuart A. Kinner[1,2,4,5†]

Abstract

Background The prevalence of mental illness, substance use disorders, and their dual diagnosis is disproportionately high among people in prisons compared to the community. Accurate prevalence estimates are required to inform resourcing of prison health services and reduce the risk of harm to people experiencing these conditions. Existing estimates, where available, often rely on only one data source.

Method We used three data sources – self-reported history of diagnoses, in-prison medical records, and administrative data to estimate the prevalence of mental illness, substance use disorder, and dual diagnosis among two large cohorts of non-Indigenous and Aboriginal and Torres Strait Islander people in Australian prisons. We calculated population-weighted proportions of the samples with each condition. Inter-rater reliability metrics inform data source agreement.

Results The prevalence of mental illness only, substance use disorder only, and dual diagnosis was 17.0% (95%CI 12.0–24.5), 14.8% (95%CI 9.6–18.1), and 44.2% (95%CI 33.2–54.7), respectively, for incarcerated, non-Indigenous adults. For incarcerated Aboriginal and Torres Strait Islander adults, our corresponding estimates were 7.0% (95%CI 4.3–11.5), 26.8% (95%CI 18.9–33.5), and 40.9% (95%CI 30.1–48.2). These estimates differed significantly from those derived from singular data sources. Individual data sources' agreement was weakest for substance use disorder diagnoses and strongest for dual diagnoses.

Conclusions Individual data sources likely have high specificity and low sensitivity, thus under-ascertaining diagnoses. We recommend using multiple data sources to estimate prevalence to ensure adequate ascertainment of these conditions among people in prison and to ensure in-prison and transitional health services are appropriately resourced.

Keywords Dual diagnosis, Mental illness, Substance use, Prison, Prevalence, Indigenous, Justice health

†Jocelyn Jones and Stuart A. Kinner are joint senior authors.

*Correspondence:
Darcy J. Coulter
darcy.coulter@curtin.edu.au

Full list of author information is available at the end of the article

© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/.

Introduction

Internationally and in Australia, the prevalence of mental illness, substance use disorder, and their co-occurrence (referred to as dual diagnosis) is higher among people in contact with the criminal justice system than in the general population [1–4]. In a systematic review and meta-analysis of 50 studies, Baranyi et al. [1] reported that the prevalence of co-occurring serious mental illness and substance use disorders among people in prison ranged from 3.5 to 20.7%; these prevalence estimates were between 2 and 20 times higher than community estimates, depending on the type(s) of serious mental illness examined. The factors contributing to disproportionate prevalence of mental illness, substance use disorder, and dual diagnosis in custodial settings are complex but include various social, legal and health factors [5–7]. For people leaving prisons, mental illness, substance use disorders and dual diagnosis increase the risk of negative health outcomes (including premature death) [8, 9], homelessness [10], and reincarceration [11–13] when compared to people leaving prison without these diagnoses. People with dual diagnoses are a particularly vulnerable cohort with higher health needs and more extensive criminal justice system contact than people with mental illness or substance use disorders only [14–17].

Accurate and reliable estimates of mental illness, substance use disorder, and dual diagnosis prevalence in prison settings are required to inform healthcare planning, allocation of resources, healthcare delivery, and appropriate transitional healthcare for those released from prison. Prisons provide a unique setting that removes many of the barriers to healthcare access that incarcerated individuals may have encountered in the community [18]. Unfortunately, healthcare delivered in prisons is often inferior to community healthcare [19, 20] despite the high needs of this population demanding that even equivalent healthcare is not sufficient [21, 22]. Prisons are therefore important settings to identify and treat mental illness and substance use disorders. Despite this, data on health status and outcomes are often not routinely or adequately collected in prison settings [23–26]. Accordingly, accurate estimates of the prevalence of these disorders in prison settings are rare [27]. Further, because people with mental illness, substance use disorder, or dual diagnosis require services and treatments tailored to their specific diagnosis [27, 28], prevalence estimates should distinguish those with singular diagnoses and dual diagnoses.

Despite the importance of accurate and reliable prevalence estimates of mental illness, substance use disorder, and dual diagnosis, many existing estimates suffer from methodological limitations, and comparisons across studies are hindered by methodological differences. To identify previous diagnoses of mental illness and substance use disorder among people in prison, researchers commonly use self-reported data [2, 29–31], screening tools or diagnostic assessments [3, 4, 32–34], administrative data [35, 36], or (to a lesser extent) in-prison medical records [9, 37]. Although each type of data source has both strengths and limitations, very few studies have combined data from multiple sources to estimate the prevalence of mental illness, substance use disorder, and dual diagnosis. Comparisons of prevalence estimates between studies are often complicated by differences in type of data source used, differences in ascertainment period (e.g., 12 months or lifetime), and varying definitions of mental illness, notably whether it includes substance use disorders.

This methodological heterogeneity has contributed to substantial variation in prevalence estimates, even within the same country. For example, in Australia, using diagnostic interviews and screening assessments, Butler et al. [3] estimated the 12-month prevalence of any mental illness among people in prison, inclusive of substance use disorders, to be 80%. Another Australian study using inpatient administrative data for a birth cohort [36] estimated lifetime prevalence of any mental illness, inclusive of substance use disorders, to be 34% among those who had experienced incarceration. In an Australian survey of 371 prison entrants [29] 51% self-reported a lifetime history of any mental illness, inclusive of substance use disorder. Although this marked variation in prevalence estimates may to some extent reflect real variation between settings and cohorts, it is almost certainly in part due to avoidable heterogeneity in ascertainment/measurement methods.

It is unlikely that any singular data source will adequately capture diagnoses to allow for accurate prevalence estimates among people in prisons. Prisons in particular present challenges for accurate ascertainment of mental health conditions due system-level access barriers such as under-resourcing of mental health services [38] and lack of culturally capable staff [39] likely leading to underdiagnosis while incarcerated. Different data sources such as self-report, screening tools, diagnostic tools, medical records, and administrative data each have their own advantages and disadvantages. Self-report can be an efficient way of estimating lifetime prevalence of mental disorder, particularly in circumstances where it is not feasible to obtain diagnostic information from clinical or administrative records. However, self-report is vulnerable to recall bias [40, 41], and studies have demonstrated under-reporting of stigmatised health conditions [42, 43]. Further, surveys of incarcerated populations require significant resources, often resulting in sub-optimal sample sizes. Similarly, screening measures and diagnostic tools are resource-intensive, and as such are rarely used routinely in prison settings. This is particularly the case for

diagnostic tools which require highly-trained staff to administer. While screening and diagnostic tools have the advantage of potentially identifying previously undiagnosed conditions, screening tools in particular usually have high sensitivity and low specificity, such that they tend to over-estimate prevalence [27, 44]. Further, information on the cultural validity of many diagnostic measures for Aboriginal and Torres Strait Islander people is unknown [45] meaning the accuracy of diagnoses ascertained through these measures is uncertain. Conversely, prison medical records typically under-estimate lifetime prevalence as current diagnoses are considered more clinically relevant than historical diagnoses. Within Australia (and likely elsewhere), prison medical records will also under-estimate prevalence due to a lack of routine screening for many health conditions, including mental disorder, a lack of culturally competent health services [25, 46, 47], and a reliance on paper-based records which present additional challenges for researchers. Administrative data are collected on whole populations but are limited to the agencies that routinely collect information and may therefore not include many diagnoses occurring in non-acute settings or provided by private practitioners. Administrative data often exclude periods spent in prison which can contribute to under-estimates of prevalence of health conditions for people who have spent time in prison. Under-estimates of lifetime diagnoses may also occur by relying solely on administrative data as they will not capture diagnoses that are outside of the collection timeframe, or diagnoses made in jurisdictions that are not covered by the administrative data source [48].

While using multiple data sources to ascertain health diagnoses is relatively common in other settings [49–51], few studies have estimated the prevalence of mental illness and substance use disorder for people in prison using multiple data sources. We are aware of only two studies that assessed the agreement between self-report and clinical records in the context of anxiety and depression, and alcohol and drug dependence or use in prison settings. Using common interpretations of inter-rater reliability coefficients [52], these studies observed fair agreement across data sources for ever having used illicit drugs [37] and alcohol dependence, moderate agreement for drug dependence, and substantial agreement for anxiety and depression [53]. Neither of these studies statistically compared prevalence estimates.

A further important consideration in estimating prevalence of mental illness and substance use disorders in Australian prisons is the specific health needs of Aboriginal and Torres Strait Islander people. Despite Aboriginal and Torres Strait Islander adults accounting for one third of people in Australian prisons [54], and requiring holistic, culturally-appropriate healthcare services in prison [46, 47, 55–57], prison health services have typically failed to meet their health needs in a culturally capable manner [25, 34, 58]. To ensure that culturally secure and competent healthcare services in prison are adequately funded and resourced for Aboriginal and Torres Strait Islander people, prevalence estimates specific to Aboriginal and Torres Strait Islander people must be available.

In the present study, we aimed to (1) estimate the lifetime prevalence of mental illness, substance use disorder, and dual diagnosis among people in prisons, (2) examine differences in these estimates using different data sources (self-reported history of diagnoses, prison medical records, and linked administrative health data), and (3) quantify the concordance between prevalence estimates generated from these three data sources. We report all results separately for non-Indigenous and Aboriginal and Torres Strait Islander samples.

Materials and methods

Study population

We used data from the Health After Release from Prison study, a prospective cohort study of adults recruited prior to release from prisons in Australia. A detailed description of the cohort study methodology is available elsewhere [59]. Due to uncertainty regarding release date, we excluded people held in pre-trial detention (remand). We analysed data from 2,698 adults (18 + years old) incarcerated in Queensland or Western Australia (WA); 1,325 adults recruited from seven prisons in Queensland between August 2008 and July 2010, and 1,373 adults recruited from five prisons in WA between May 2013 and August 2016.

The study aimed to recruit a representative sample of incarcerated adults but we deliberately oversampled females to allow sufficient numbers for sex-stratified analyses for other studies [9]. In Queensland, 21.1% ($n = 280$) of the sample was female and in WA 18.2% ($n = 250$) was female, while the proportion of women in each jurisdiction's prison system was 7.7% and 9.1%, respectively [60, 61].

Trained research staff carried out eligibility screening, recruitment, and research interviews, independent of correctional authorities. Interviewers read aloud all interview questions, to obviate literacy concerns.

Baseline measures

Baseline surveys collected information on sociodemographic and criminal justice factors, mental health and substance use, cognitive disability, chronic and infectious disease, and health risk behaviours. Questions regarding lifetime diagnoses of health conditions were adapted from Australia's National Health Survey [62]. With respect to mental illness, participants were asked: "Have you ever been told by a doctor, psychologist or psychiatrist that you have a mental illness? (No/Yes), and "If Yes,

what type of mental illness(es) have you been diagnosed with?" (Anxiety disorder/Depression/Substance abuse/dependence/Schizophrenia/Other [Specify]). We manually recoded responses originally recorded as "Other" to "Substance abuse/dependence" when the further specified information indicated a substance-use diagnosis. Participants were classified as non-Indigenous, or Aboriginal and/or Torres Strait Islander, based on self-report.

Prison medical records

Prison medical records covering the entirely of the index prison sentence were reviewed and coded by trained researchers using the International Classification of Primary Care - second edition (ICPC-2) [63]. The researchers assigned P70–76, P79–82, P86–98, or P99 codes to the health encounter if a psychologist, psychiatrist or general practitioner had made a diagnosis of mental illness, and P15, P18, or P19 if the health professional had made a diagnosis of substance use disorder.

Administrative health records

Baseline survey data were retrospectively and prospectively linked to person-level, state-wide hospital and emergency department records. Accredited data integrating authorities in each state conducted probabilistic data linkage using participant name, date of birth, sex, postcode of residence (Queensland only), and all known aliases, using a previously validated method that has been shown to have 99.9% accuracy [64]. Administrative health records included all hospital admissions and emergency department presentations to all state-run public hospitals and licensed private hospitals during the study period within WA and Queensland, respectively. Queensland hospital admission data were available from 1 July 1999 and emergency department data were available from 1 June 2002. Western Australia hospital and emergency department data were extracted for each individual for the five years prior to each participant's index prison sentence. Western Australia emergency department data were available from January 2002. This resulted in seven individuals (0.5% of the WA sample) in our dataset whose emergency department data did not span the full five-years prior to their incarceration. Variables obtained from inpatient records included primary and secondary diagnosis codes using the International Classification of Diseases, 10th Revision, Australian Modification (ICD-10-AM) [65] and dates of admission and discharge. Variables obtained from emergency department records included primary diagnosis ICD-10-AM code, Major Diagnostic Category (MDC; WA only), and presentation date and time. These ICD-10-AM codes identified hospital admissions and emergency department presentations prior to the baseline survey in which mental illness (F01-09 and F20-99) or a substance use disorder (F10-19) was recorded as a primary or secondary diagnosis. ICD-10-AM codes were missing for 34.8% (3,898) of emergency department encounters in the Western Australian cohort. In these instances, we used MDCs to identify mental illness (MDC 19) and substance use disorder (MCD 20). Major Diagnostic Category is a classification system designed to group patients with similar primary diagnoses together, primarily for billing purposes. Major Diagnostic Categories 19 and 20 encompass the ICD-10-AM codes which we used to define mental illness and substance use disorder, as well as suicidal ideation, hallucinations, unhappiness, and antisocial behaviour (MDC 19); and findings of alcohol and other substances in blood (MDC 20).

Statistical analyses

Ascertainment of diagnoses

We used two slightly different definitions of diagnoses for our prevalence and concordance analyses.

Prevalence For the purposes of estimating lifetime prevalence, we defined dual diagnosis as a diagnosis of both mental illness and substance use disorder in hospital and emergency department data at any point prior to the baseline survey, in prison medical records during the index prison sentence, and/or using baseline survey data. We classified participants into one of four mutually exclusive and collectively exhaustive categories: no mental disorder, mental illness only, substance use disorder only, or dual diagnosis. We constructed four versions of this variable, first using each data source (baseline survey, prison medical records, administrative data) separately, and then combining all available data sources. The variable which used all data sources allowed for dual diagnosis to be coded when we observed a mental illness diagnosis and substance use disorder diagnosis in different data sources for the same individual.

Concordance Agreement analyses used the same methodology as prevalence analyses, but with non-exclusive diagnosis definitions. For these analyses, if an individual had a diagnosis of mental illness and a substance use disorder, we recorded that person as having a mental illness diagnosis, a substance use disorder diagnosis, and dual diagnosis. This differs from the exclusive mental illness *only* and substance use *only* definitions used in our prevalence analyses.

Main analyses

We generated prevalence estimates by calculating the proportion of the sample with each diagnosis, while also incorporating probability sample weights with bootstrapping to account for non-random sampling of participants.

Sample weights were created using prisoner population statistics on age, sex, Indigenous status, and number of sentenced prisoners at 30 June 2010 for Queensland participants [66] and 2016 for Western Australia participants [67]. We conducted paired-samples z-tests to identify differences in prevalence estimates between individual data sources and all three data sources combined. We did not further stratify estimates by sex due to the relatively small number of females.

We conducted analyses to assess agreement of diagnoses at the individual level, given that similar prevalence estimates in each data source do not necessarily indicate good agreement. To illustrate the overlap in diagnosis ascertainment across data sources, we created Venn diagrams using the eulerr package [68] in R (v.4.3.2) [69]. To measure agreement across data sources at the individual level, we calculated two inter-rater reliability statistics; prevalence and bias-adjusted kappa (PABAK) [70, 71], and Gwet's agreement coefficient (AC) [72]. These metrics are appropriate in situations where prevalence is not close to 50% [73]. We interpreted our results using probabilistic benchmarking [74] applied to common guidelines [52].

We conducted all analyses separately for non-Indigenous and Aboriginal and Torres Strait Islander subsamples. Analysing these sub-samples separately and refraining from direct comparisons between the subsamples allows for discussion of specific health needs for each cohort and aligns with best practice [75]. We ran all analyses (apart from the Venn diagrams) using STATA version 18 [76].

Sensitivity analyses

To assess how our choice of left-censoring date, the proximity of diagnoses, and the use of MDCs affected prevalence estimates, we conducted sensitivity analyses using the linked administrative data only. First, we restricted the data to diagnoses recorded no more than five years prior to the baseline survey. Second, we applied a more restrictive definition of dual diagnosis that mental illness and substance use disorder diagnoses to have occurred within 12 months of each other. In a third sensitivity analysis we removed participants whose diagnoses relied solely on MDCs and compared prevalence estimates from this restricted sample to the full sample.

Ethical review

The study received ethics approval from The University of Queensland's Behavioural and Social Sciences Ethical Review Committee (2007000607). Approval for linkage to the Emergency Department Information System and the Queensland Hospital Admitted Patient Data Collection was provided by the Queensland Government Department of Health (HREC/11/QHC/40) under the Queensland Public Health Act (2005) [77] (RD004706). The Western Australian arm of the study was also approved by the University of Western Australia Human Research Ethics Committee (RA/4/1/5076). Approval for linkage to the WA Emergency Department Data Collection and Hospital Morbidity Data Collection was provided by the Western Australia Department of Health (RGS0000000110). Approvals to access prison medical records were provided by Queensland Corrective Services and the WA Department of Corrective Services, Research Application Assessment Committee (Approval no. 306). All participants provided written, informed consent to participate in baseline surveys. Participants in WA also gave consent for linkage with state health records; data linkage in Queensland was undertaken with a waiver of consent approved under the Queensland Public Health Act (2005).

Results

Descriptive analysis

Baseline characteristics for the non-Indigenous and Aboriginal and Torres Strait Islander samples are presented in Table 1. After excluding participants who did not have their administrative health records linked, we retained 2,645 (98.0%) of the 2,698 participants for analysis. A total of 1,667 participants (63.0%) were non-Indigenous and 978 (37.0%) identified as Aboriginal and/or Torres Strait Islander. The non-Indigenous sample was predominantly male ($n = 1392$, 83.5%) and more than half were incarcerated in Queensland ($n = 979$, 58.7%). The Aboriginal and Torres Strait Islander sample was predominantly male ($n = 732$, 74.9%) and around two thirds were incarcerated in Western Australia ($n = 642$, 65.6%).

Prevalence of diagnoses by data source

Non-Indigenous sample

Table 2 Fig. 1 present the prevalence estimates of no diagnosis, mental illness only, substance use disorder only, and dual diagnosis for both cohorts. By using information from all three data sources, we estimated the prevalence of mental illness only, substance use disorder only, and dual diagnosis among non-Indigenous people to be 17.0% (95%CI 12.0–24.5), 14.8% (95%CI 9.6–18.1), and 44.2% (95%CI 33.2–54.7), respectively. Each individual data source had lower estimated prevalence for dual diagnoses, when compared to all three data sources combined. Specifically, for dual diagnosis estimates, and using the combined data sources, we demonstrated higher prevalence estimates than the survey (8.1%, 95%CI [5.4, 9.8], $z = -6.8$, $p < .001$), prison medical records (29.4%, 95%CI [17.8, 41.6], $z = -6.8$, $p < .001$), or linked administrative data (15.5%, 95%CI [12.4, 18.0], $z = -6.0$, $p < .001$) individually. Prevalence estimates of substance use disorder in the survey data alone (3.5%, 95% CI [1.5, 4.6], $z =$

Table 1 Self-reported baseline characteristics of the cohort

	Self-reported Indigenous status			
	Non-Indigenous (n= 1667)		Aboriginal and Torres Strait Islander (n = 978)	
	n	%	n	%
Sex				
Male	1392	83.5	732	74.8
Female	275	16.5	246	25.2
Age in years				
< 25	465	27.9	334	34.2
25–39	838	50.3	542	55.4
40+	364	21.8	102	10.4
State				
Queensland	979	58.7	336	34.4
WA	688	41.3	642	65.6
Sexual identity				
Heterosexual	1594	95.6	920	94.1
Gay/Lesbian	30	1.8	18	1.8
Bisexual	42	2.5	38	3.9
Stable relationship at baseline	640	38.4	378	38.7
Number of school years completed[a]				
< 10	555	33.4	501	51.8
>=10	1105	66.6	467	48.2
Ever injected drugs	931	55.8	576	58.9
Ever overdosed	428	25.7	198	20.2
Self-rated health[b]				
Excellent	150	21.9	187	29.4
Very good/good	467	68.2	397	62.5
Fair/poor	68	9.9	51	8.0
Ever self-harmed	97	5.8	118	12.1
Under influence of alcohol and/or drugs at time of offence[c]	1130	67.9	752	76.9

WA = Western Australia

[a] $n_{\text{Non-Indigenous}}$=1660, $n_{\text{Aboriginal Torres Strait Islander}}$ =968

[b] $n_{\text{Non-Indigenous}}$=685, $n_{\text{Aboriginal Torres Strait Islander}}$ =635

[c] $n_{\text{Non-Indigenous}}$=1665, $n_{\text{Aboriginal TorresStrait Islander}}$=978

−6.2, p <.001) were lower than the combined data sources (14.8%, 95% CI [9.6, 18.1]). Using the combined data sources did not always produce higher prevalence estimates when examining mental illness only and substance use disorder only though. This was an artefact of our mutually exclusive diagnosis categories, and we therefore limit our discussion of these differences.

As expected, both our two restrictions on timing of diagnoses ascertained through the linked administrative data resulted in lower dual diagnosis prevalence estimates (5-year pre-survey window: 11.9%, 95%CI [8.6, 14.5], z = −6.6, p <.001; 12-month co-occurrence: 14.0%, 95%CI [11.1, 16.0], z = −5.2, p <.001) than the unrestricted linked administrative data analyses (15.5%, 95%CI [12.4, 18.0]). Removing diagnoses ascertained through MDCs did not result in significantly different estimates than the unrestricted analyses. Table S1 presents these results.

Aboriginal and Torres Strait Islander sample

For Aboriginal and Torres Strait Islander people in Queensland and WA prisons, using all three data sources, we estimated the prevalence of mental illness only, substance use disorder only, and dual diagnosis to be 7.0% (95%CI 4.3–11.5), 26.8% (95%CI 18.9–33.5), and 40.9% (95%CI 30.1–48.2), respectively. Estimating prevalence using singular data sources resulted in higher or lower estimates than the combined data sources given we coded the diagnoses to be mutually exclusive. Specifically, for dual diagnosis, and using the combined data sources, we produced higher prevalence estimates (40.9%, 95%CI [30.1, 48.2]) than the survey (5.5%, 95%CI [3.0, 7.4], z = −8.1, p <.001), prison medical records (24.6%, 95%CI [14.6, 31.9], z = −6.9, p <.001), and linked administrative data (16.4%, 95%CI [10.4, 21.9], z = −9.6, p <.001) individually. We estimated lower prevalence for substance use disorder only using survey responses only (4.4%, 95% CI [2.0, 6.8], z = −5.2, p <.001), when compared to all data sources combined (26.8%, 95% CI [18.9, 33.5]). Again, our mutually exclusive coding of diagnoses explained instances where the combined data sources produced lower prevalence estimates of mental illness only than those estimated using individual data sources.

Sensitivity analyses suggested no significant differences in prevalence estimates obtained through the inpatient and emergency department data when we restricted ascertainment of dual diagnosis to individual diagnoses occurring within the same 12-month period, compared to the unrestricted administrative data. When we restricted ascertainment of diagnoses to be within the five years prior to baseline survey, dual diagnosis estimates (12.6%, 95%CI [7.9, 16.8], z = −4.2, p <.001) were lower than the unrestricted data (16.4%, 95%CI [10.4, 21.9]). Removing individuals whose diagnoses relied on MDCs did not produce statistically significantly different prevalence estimates for any of the diagnoses.

Data source agreement

Non-Indigenous sample

Figure 2 demonstrates the degree of overlap in diagnoses across all data sources. For people who received a diagnosis of mental illness, substance use disorder, or dual diagnosis, all three data sources agreed on these diagnoses for only 19%, 20%, and 22% of individuals, respectively. For diagnoses involving substance use disorder (substance use disorder and dual diagnosis), we ascertained 4% through survey results only. We ascertained 13% of mental illness diagnoses through self-reports alone. Inter-rater reliability statistics demonstrated fair agreement among data sources for mental illness (PABAK = 0.36,

Table 2 Prevalence of mental illness, substance use disorder, and dual diagnosis using multiple data sources for aboriginal and Torres Strait Islander and Non-Indigenous samples

	Survey			Prison medical records			Hospital/ED			All data sources	
	n	% [95%CI]	z-value *(p)*	n	% [95%CI]	z-value *(p)*	n	% [95%CI]	z-value *(p)*	n	% [95%CI]
Non-indigenous (n = 1667)											
No diagnosis	895	53.2 [46.3, 57.1]	6.1 (<.001)	655	38.5 [22.8, 53.7]	3.1 (.002)	1054	64.1 [59.8, 71.0]	11.3 (<.001)	399	24.0 [15.8, 32.4]
Mental illness only	579	35.2 [31.5, 43.1]	5.9 (<.001)	231	14.0 [11.3, 20.3]	−1.4 (.165)	119	6.8 [5.6, 8.4]	−2.8 (.004)	287	17.0 [12.0, 24.5]
Substance use disorder only	63	3.5 [1.5, 4.6]	−6.2 (<.001)	292	18.1 [12.1, 22.8]	2.4 (.017)	233	13.5 [9.2, 15.4]	−1.0 (.336)	259	14.8 [9.6, 18.1]
Dual diagnosis	130	8.1 [5.4, 9.8]	−6.8 (<.001)	489	29.4 [17.8, 41.6]	−6.8 (<.001)	261	15.5 [12.4, 18.0]	−6.0 (<.001)	722	44.2 [33.2, 54.7]
Aboriginal and Torres Strait Islander (n = 978)											
No diagnosis	638	67.6 [60.1, 74.7]	6.8 (<.001)	307	45.0 [27.6, 66.2]	3.3 (.001)	480	54.1 [45.2, 63.2]	6.4 (<.001)	166	25.4 [15.9, 36.8]
Mental illness only	245	22.5 [16.9, 31.6]	6.3 (<.001)	83	5.5 [2.8, 9.9]	−0.8 (.444)	55	4.7 [2.4, 7.9]	−1.4 (.164)	66	7.0 [4.3, 11.5]
Substance use disorder only	39	4.4 [2.0, 6.8]	−5.2 (<.001)	295	24.8 [14.8, 34.2]	−0.3 (.733)	234	24.8 [20.4, 31.1]	−0.7 (.461)	281	26.8 [18.9, 33.5]
Dual diagnosis	56	5.5 [3.0, 7.4]	−8.1 (<.001)	293	24.6 [14.6, 31.9]	−6.9 (<.001)	209	16.4 [10.4, 21.9]	−9.6 (<.001)	465	40.9 [30.1, 48.2]

Survey = Self-report of ever being diagnosed by a medical professional. Hospital/ED = Statewide hospital and emergency department linked administrative data. % = Bootstrapped prevalence estimates (10,000 repetitions) of subsample diagnosed using each data source and sample weighted by Australian prisoner population statistics, represented by percentage. CI = Bootstrapped bias-corrected confidence intervals. z-value = Z test comparing prevalence estimate from individual data source to prevalence estimate obtained using all data sources combined

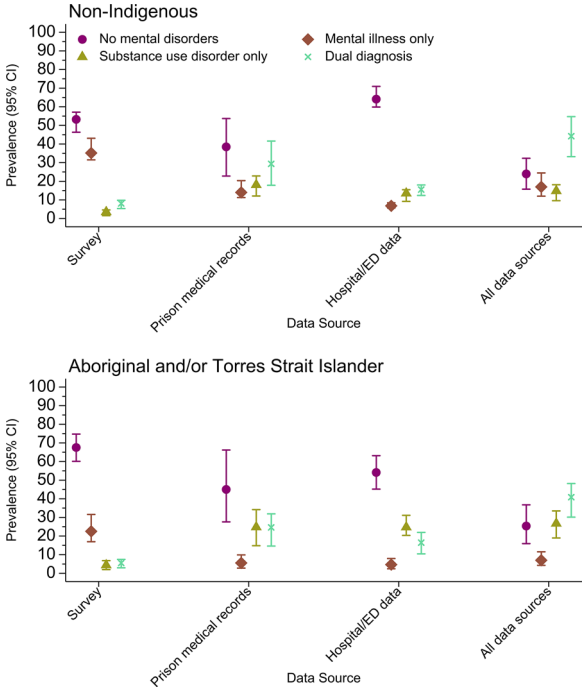


Fig. 1 Prevalence of mental illness, substance use disorder, and dual diagnosis using multiple data sources for Non-Indigenous and Aboriginal and Torres Strait Islander samples

AC = 0.40), substance use disorder (PABAK = 0.27, AC = 0.38), and moderate (PABAK = 0.52) to substantial (AC = 0.66) agreement for dual diagnosis. Table 3 presents the full inter-rater reliability results.

Aboriginal and Torres Strait Islander sample

The level of overlap in diagnoses across data sources was also low for Aboriginal and Torres Strait Islander participants. For participants who received a diagnosis of mental illness, substance use disorder, or dual diagnosis, all three data sources agreed on these diagnoses for 19%, 20%, and 22% of individuals, respectively (Fig. 2). We ascertained a small percentage of substance use disorder diagnoses and dual diagnoses (3% each) through survey results alone. Comparatively, we ascertained 11% of mental illness diagnoses through self-reports alone. Inter-rater reliability tests suggested fair (PABAK = 0.42) to moderate (AC = 0.49) agreement across the data sources for mental illness. Data sources only slightly agreed for substance use disorder diagnoses (PABAK = 0.04, AC = 0.09) and moderately agreed for dual diagnosis (PABAK = 0.46, AC = 0.61).

Discussion

Using innovative data triangulation, the present study produced prevalence estimates of mental illness, substance use disorders, and their dual diagnosis among Aboriginal and Torres Strait Islander and non-Indigenous people in prison. Given our enhanced ascertainment

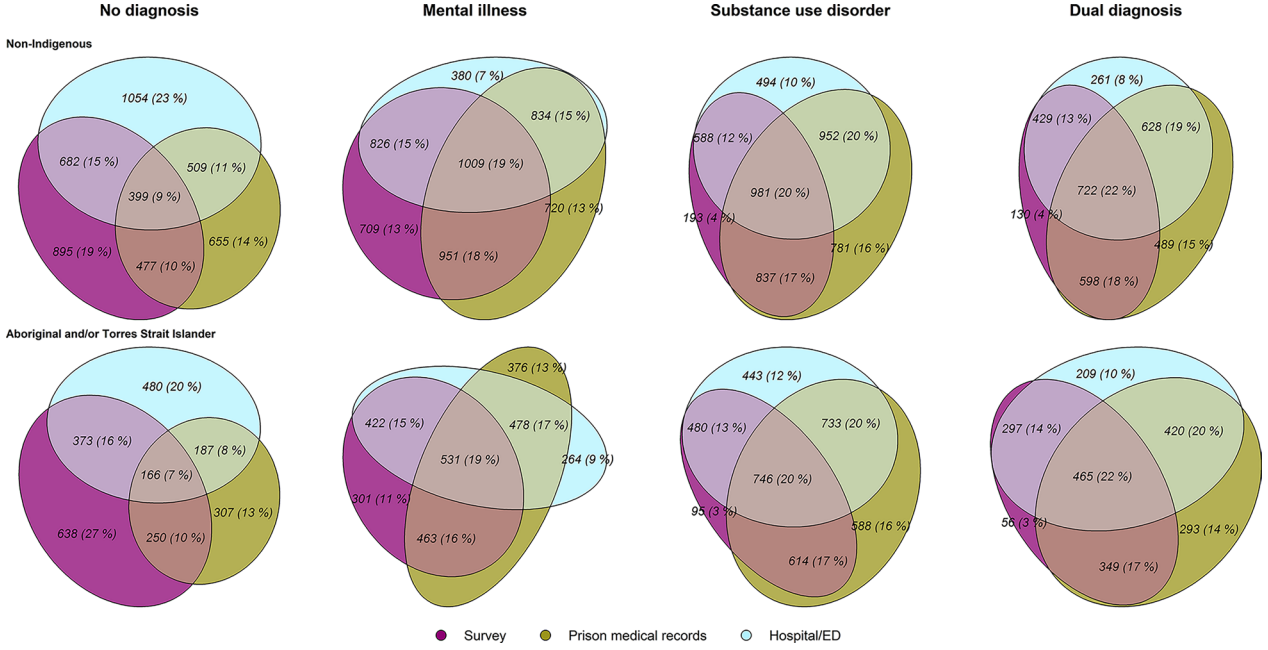


Fig. 2 Overlap of data sources for diagnoses of mental illness, substance use disorder, and dual diagnosis: Non-Indigenous sample ($n = 1{,}667$), Aboriginal and Torres Strait Islander sample ($n = 978$)

Table 3 Agreement between survey, prison medical records, and combined hospital and emergency department sources for mental illness, substance use disorder, and dual diagnoses with aboriginal and Torres Strait Islander and Non-Indigenous samples

	Gwet's AC	PABAK
Non-Indigenous (n = 1667)		
No mental illness	.25	.25
Mental illness	.40	.36
Substance use disorder	.38	.27
Dual diagnosis	.66	.52
Aboriginal and Torres Strait Islander (n = 978)		
No mental illness	.16	.16
Mental illness	.49	.42
Substance use disorder	.09	.04
Dual diagnosis	.61	.46

Gwet's AC = agreement coefficient [72]. PABAK = Prevalence and bias-adjusted kappa [70, 71]

methods, our estimates are likely closer to the true prevalence of these diagnoses than previously estimated among people in prison. Our results suggest that over 40% of people in Australian prisons have been diagnosed with both a mental illness and substance use disorder. This is substantially higher than our estimates for those who have not received diagnoses or who have received a diagnosis of either mental illness or a substance use disorder, but not both. The study also demonstrates that the prevalence of mental illness, substance use disorders, and dual diagnosis is highly dependent on the source(s) of data used. Due to the likely low sensitivity but high specificity of each data source, our findings show that using multiple data sources provides greater capture of diagnoses and likely more accurate estimates of prevalence of these conditions.

Our datasets are presumably characterised by low sensitivity and high specificity, meaning diagnoses we do capture are likely true positives, but we also expect to encounter many false and true negatives. Characteristics of our datasets such as diagnoses recorded by medical professionals (in-prison medical records and administrative data) and no foreseeable advantage to disclosing non-existent diagnoses to the interviewer (self-report) likely result in data sources of high specificity. Restricted timeframes on diagnoses and only clinically relevant and presenting problems being recorded (in-prison medical records and administrative data), and the likely under-reporting of stigmatised health conditions (self-report) likely resulted in low specificity. Combining data sources of this type may reduce the number of false negatives, thus improving sensitivity. We ascertained more total diagnoses after combining data but given that our diagnosis categories were mutually exclusive, the direction of change in ascertainment for each outcome separately was not always positive.

Using data triangulation, we estimated dual diagnosis prevalence to be 44.2% for the non-Indigenous sample, and 40.9% for the Aboriginal and Torres Strait Islander sample. While study variations such as differences in jurisdictions, type of data source used, differences in ascertainment period (e.g., 12 months or lifetime), and varying definitions of mental illness, make comparisons of prevalence estimates across studies difficult, we

observed higher dual diagnosis prevalence than in a previous similar study. Lifetime prevalence of dual diagnosis for people in prison in NSW was estimated (through self-report) to be 23.7% (males) and 26.5% (females) in 2009 and 18.1% (males) and 29.6% (females) in 2015 [2]. Our use of multiple data sources likely contributed to the higher estimates in the present study.

By reporting mutually exclusive prevalence estimates, we highlight the overlap of mental illness and substance use disorders among people in prison. For example, while Browne et al. [2] reported lower dual diagnosis estimates than in our study, they estimated prevalence of lifetime mental illness diagnosis (45.0% [2009], 63.1% [2015]) to be higher than our self-report estimates (non-Indigenous = 35.2%, Aboriginal and Torres Strait Islander = 22.5%). This difference was greater when we used multiple data sources (non-Indigenous = 17.0%, Aboriginal and Torres Strait Islander = 7.0%) estimates. Accurate estimates of these mutually exclusive diagnoses are important to inform the resourcing needs for dual diagnosis-specific services (e.g., integrated mental health and alcohol and other drug services) and services required for mental illness and substance use disorders only. While the integration of these services may be costly, we have demonstrated that a large proportion of the population in prison likely require these services. A previous study using the Queensland cohort demonstrated 3.5-fold higher healthcare costs and 2.8-fold higher reincarceration costs for people with dual diagnosis compared to those with no diagnosis, mental illness only, or substance use disorder only diagnoses [78]. This may mean that the costs to establish tailored dual diagnosis services could be offset by savings in reduced acute presentations and reincarcerations. We have minimised any discussion of differences between individual data sources for mental illness only and substance use disorder only prevalence estimates as these differences may partly be an artefact of using mutually exclusive categories.

Despite this, findings regarding substance use disorder diagnoses highlight the risk of underestimating prevalence when relying on a single data source. The number of individuals identified as having a substance use disorder based on self-report was notably lower than the number identified through either prison medical records or administrative data. Under-reporting of substance use is common, as disclosure may result in real or perceived consequences including shame, discrimination, reinforcement of stigma, implications for release from prison, health care, housing, employment, and child protection system involvement [42, 43, 79–83]. These consequences are especially relevant for people soon to be released from prison given this cohort's high rates of contact with justice and child protection systems [84] and the existing barriers they face to secure employment [85] and housing [86]. Non-disclosure of substance use disorder diagnoses may also not be a deliberate attempt to conceal use. Recall accuracy of diagnoses received in acute settings such as emergency departments has been shown to be low, with misunderstandings, inadequate communication, and unawareness of diagnoses suggested as explanations [40, 87, 88]. Given potential under-reporting of conditions, data sharing across sectors (e.g. corrections and health), and between community and prison settings is crucial for quality continuity of care [89]. While structural limitations and resistance from governments/prison operators may hinder this data sharing, its importance is recognised by the World Health Organisation's "whole-of-government approach to healthcare in prisons, which to be effective requires data sharing [26, 90].

Consistent with principles of Indigenous data sovereignty [75], in this study we conducted our analyses separately for Aboriginal and Torres Strait Islander and non-Indigenous people and refrained from direct comparisons of their prevalence. Nevertheless, our findings with regard to both prevalence estimates and concordance analyses were similar in both groups. One notable exception to this is that for Aboriginal and Torres Strait Islander people, prevalence estimates for mental illness only and substance use disorder only were similar between the combined data sources and prison medical records and administrative data, whereas this was not always the case for the non-Indigenous sample. This suggests there may be systematic differences in the diagnoses captured by data sources for each cohort. Overall, our findings suggest that combining data sources likely improves ascertainment of mental illness and substance use disorder for both Aboriginal and Torres Strait Islander and non-Indigenous people in custodial settings.

Strengths and limitations

To our knowledge, this is the first study to examine the ascertainment of mental illness, substance use disorder, and dual diagnosis in a prison setting, using multiple data sources. This use of a novel data triangulation method for ascertaining mental and behavioural disorders is valuable in this context given the high prevalence of mental illness, substance use disorder, and dual diagnosis in prison settings; the importance of prison settings for identifying dual diagnosis among a population that often has low rates of health care access in the community; and the need for reliable prevalence estimates to inform the design and resourcing of prison health care services.

Our study has four main limitations. First, we focussed only on known diagnoses. Given the barriers to healthcare in the community that this population often faces [91, 92], the proportion of undetected diagnoses may be higher among this cohort than the general community. Though apart from self-report, the only community

healthcare encounters our study captured were acute hospital presentations where these barriers may be less likely to exist. This is our second limitation. Although we were able to capture diagnoses through self-report, prison medical records, and emergency department and hospital data, we did not have access to other data that may have recorded diagnoses, such as community mental health and alcohol and other drug treatment services. As such, our prevalence estimates, although high, are likely conservative. Third, while the use of multiple data sources likely improves ascertainment of mental and behavioural disorders, without a 'gold standard' (e.g., diagnostic interview with a culturally capable psychiatrist [32]) to compare against we cannot be certain that our prevalence estimates are accurate. Fourth, our study relies on diagnoses derived from Western-centric medical and health systems. Given the holistic nature of social and emotional wellbeing, and importance of connection to country and community for many Aboriginal and Torres Strait Islander people [93, 94], the diagnoses we relied on may not be as informative for the treatment needs for this sample as they are for the non-Indigenous sample.

Conclusions

People in contact with criminal justice systems experience disproportionate health burden, including high rates of mental illness, substance use disorder, and dual diagnosis. Given that these mental and behavioural disorders are associated with adverse health and justice outcomes, and that people leaving prisons face many barriers to healthcare access in the community, prisons are an important setting to identify and commence treatment for these disorders. To ensure that mental health and substance use services are adequately resourced and available, it is necessary to have accurate prevalence estimates. To ensure that appropriate services in prison are offered to those who require them, high case detection by prison health services is required. However, health data in prisons are often limited and existing estimates and screening rely heavily on a single data source, often self-report.

Our findings indicate that a substantial proportion of people in Australian prisons have dual diagnoses, and that prevalence estimates are highly dependent on the data source used to identify diagnoses. Therefore, this study supports the use of multiple data sources to ascertain mental illness, substance use disorder, and dual diagnosis in prison settings. We suggest that using multiple data sources to estimate prevalence of known mental illness and substance use disorder diagnoses, as well as their co-occurrence, may protect against the limitations and biases of each individual data source. Accurate ascertainment is needed to adequately fund and resource in-prison and transitional mental health and substance use services. Use of multiple data sources will also increase the capacity of prison health services to identify, and offer appropriate treatment to, people entering custody with these conditions and improve release planning in terms of health needs.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12963-025-00408-7.

Supplementary Material 1

Acknowledgements
This work was supported by the Australian Institute of Criminology [Indigenous Justice Research Program]; and the National Health and Medical Research Council [grant numbers 409966, 1002463, 2015177].

Author contributions
DJC: Conceptualisation, data curation, formal analysis, methodology, writing – original draft preparation, writing – review & editing. LAP: Conceptualisation, methodology, project administration, writing – original draft preparation, writing – review & editing. ML: Conceptualisation, data curation, formal analysis, methodology, writing – review & editing. JTY: Data curation, formal analysis, funding acquisition, methodology, writing – review & editing. DBP: Conceptualisation, funding acquisition, writing – review & editing. EH: Conceptualisation, funding acquisition, writing – review & editing. JJ: Conceptualisation, funding acquisition, project administration, supervision, writing – review & editing. SAK: Conceptualisation, funding acquisition, methodology, project administration, resources, supervision, writing - reviewing and editing. JJ and SAK are joint senior authors.

Data availability
Data cannot be shared publicly because of ethical requirements and the sensitive nature of these data. Data are available subject to approval from all relevant data custodians and ethics committees. The baseline survey data were collected by some of the authors and are subject to multiple ethics and research committees' approvals. The administrativedata include sensitive personal information that has been obtained with a waiver of consent, with approval from the relevant data custodians. These data are owned by government agencies and the approval of these agencies is required for access to the data to be granted.

Declarations

Competing interests
The authors declare no competing interests.

Author details
[1]Justice Health Group, enAble Institute, Curtin University, Perth, WA, Australia
[2]School of Population Health, Curtin University, Perth, WA, Australia
[3]Melbourne Institute: Applied Economic & Social Research, University of Melbourne, Melbourne, VIC, Australia
[4]Justice Health Group, Centre for Adolescent Health, Murdoch Children's Research Institute & Royal Children's Hospital, Melbourne, VIC, Australia
[5]Melbourne School of Population and Global Health, University of Melbourne, Melbourne, VIC, Australia
[6]Institute for Mental Health Policy Research, Centre for Addiction and Mental Health, Toronto, ON, Canada
[7]Dalla Lana School of Public Health, University of Toronto, Toronto, ON, Canada
[8]School of Population and Global Health, The University of Western Australia, Perth, WA, Australia
[9]Forensic Mental Health Group, Queensland Centre for Mental Health Research, Brisbane, QLD, Australia
[10]Faculty of Medicine, The University of Queensland, Brisbane, QLD, Australia

[11]Queensland Forensic Mental Health Service, Queensland Health, Brisbane, QLD, Australia
[12]Maladjiny Research Centre, Kurongkurl Katitjin, Edith Cowan University, Perth, WA, Australia

Received: 9 May 2025 / Accepted: 23 July 2025
Published online: 06 August 2025

References

1. Baranyi G, Fazel S, Langerfeldt SD, Mundt AP. The prevalence of comorbid serious mental illnesses and substance use disorders in prison populations: a systematic review and meta-analysis. Lancet Public Health. 2022;7:e557–68. https://doi.org/10.1016/S2468-2667(22)00093-7.
2. Browne CC, Korobanova D, Yee N, Spencer S-J, Ma T, Butler T, et al. The prevalence of self-reported mental illness among those imprisoned in new South Wales across three health surveys, from 2001 to 2015. Aust N Z J Psychiatry. 2023;57:550–61. https://doi.org/10.1177/00048674221104411.
3. Butler T, Andrews G, Allnutt S, Sakashita C, Smith NE, Basson J. Mental disorders in Australian prisoners: a comparison with a community sample. Aust N Z J Psychiatry. 2006;40:272–6. https://doi.org/10.1080/j.1440-1614.2006.01785.x.
4. Butler T, Indig D, Allnutt S, Mamoon H. Co-occurring mental illness and substance use disorder among Australian prisoners. Drug Alcohol Rev. 2011;30:188–94. https://doi.org/10.1111/j.1465-3362.2010.00216.x.
5. Ogloff JRP. Identifying and accommodating the needs of mentally ill people in gaols and prisons. Psychiatry Psychol Law. 2002;9:1–33. https://doi.org/10.1375/pplt.2002.9.1.1.
6. Osher FC. Integrated mental health/substance abuse responses to justice involved persons with co-occurring disorders. J Dual Diagn. 2008;4:3–33. https://doi.org/10.1300/J374v04n01_02.
7. Peters RH, Wexler HK, Lurigio AJ. Co-occurring substance use and mental disorders in the criminal justice system: a new frontier of clinical practice and research. Psychiatr Rehabil J. 2015;38:1–6. https://doi.org/10.1037/prj0000135.
8. Binswanger IA, Stern MF, Deyo RA, Heagerty PJ, Cheadle A, Elmore JG, et al. Release from prison — a high risk of death for former inmates. N Engl J Med. 2007;356:157–65. https://doi.org/10.1056/NEJMsa064115.
9. Young JT, Heffernan E, Borschmann R, Ogloff JRP, Spittal MJ, Kouyoumdjian FG, et al. Dual diagnosis of mental illness and substance use disorder and injury in adults recently released from prison: a prospective cohort study. Lancet Public Health. 2018;3:e237–48. https://doi.org/10.1016/S2468-2667(18)30052-5.
10. Nilsson SF, Nordentoft M, Fazel S, Laursen TM. Risk of homelessness after prison release and recidivism in denmark: a nationwide, register-based cohort study. Lancet Public Health. 2023;8:e756–65. https://doi.org/10.1016/S2468-2667(23)00152-4.
11. Baillargeon J, Penn JV, Knight K, Harzke AJ, Baillargeon G, Becker EA. Risk of reincarceration among prisoners with co-occurring severe mental illness and substance use disorders. Adm Policy Ment Health Ment Health Serv Res. 2010;37:367–74. https://doi.org/10.1007/s10488-009-0252-9.
12. Cloyes KG, Wong B, Latimer S, Abarca J. Time to prison return for offenders with serious mental illness released from prison: a survival analysis. Crim Justice Behav. 2010;37:175–87. https://doi.org/10.1177/0093854809354370.
13. Wilson JA, Wood PB. Dissecting the relationship between mental illness and return to incarceration. J Crim Justice. 2014;42:527–37. https://doi.org/10.1016/j.jcrimjus.2014.09.005.
14. Hilton NZ, McKee SA, Ham E, Green M, Wright L. Co-occurring mental illness and substance use disorders in Canadian forensic inpatients: underdiagnosis and implications for treatment planning. Int J Forensic Ment Health. 2018;17:145–53. https://doi.org/10.1080/14999013.2018.1451416.
15. Ogloff JRP, Talevski D, Lemphers A, Wood M, Simmons M. Co-occurring mental illness, substance use disorders, and antisocial personality disorder among clients of forensic mental health services. Psychiatr Rehabil J. 2015;38:16–23. https://doi.org/10.1037/prj0000088.
16. Prince JD, Wald C. Risk of criminal justice system involvement among people with co-occurring severe mental illness and substance use disorder. Int J Law Psychiatry. 2018;58:1–8. https://doi.org/10.1016/j.ijlp.2018.02.002.
17. Wilton G, Stewart LA. Outcomes of offenders with co-occurring substance use disorders and mental disorders. Psychiatr Serv. 2017;68:704–9. https://doi.org/10.1176/appi.ps.201500391.
18. Kinner SA, Southalan L, Janca E, Butler A, Young JT, Lidner SR et al. Submission to the PAHO Commission on Equity and Health Inequalities in the Americas: the role of prisons, jails and youth detention centres in addressing health inequalities in the Americas. 2018 Mar. Available: https://wephren.tghn.org/site_media/media/articles/Submission_to_the_PAHO_Commission_on_Equity_and_Health_Inequalities_-_pr… pdf
19. Hurst A, Castañeda B, Ramsdale E. Deliberate indifference: inadequate health care in U.S. Prisons. Ann Intern Med. 2019;170:563–4. https://doi.org/10.7326/M17-3154.
20. Wolf G, Bagaric M. Addressing a human rights crisis: health care for prisoners in Australia. J Law Med. 2024;31:42–69.
21. Lines R. From equivalence of standards to equivalence of objectives: the entitlement of prisoners to health care standards higher than those outside prisons. Int J Prison Health. 2006;2:269–80. https://doi.org/10.1080/17449200601069676.
22. Charles A, Draper H. Equivalence of care' in prison medicine: is equivalence of process the right measure of equity? J Med Ethics. 2012;38:215–8. https://doi.org/10.1136/medethics-2011-100083.
23. Alves da Costa F, Verschuuren M, Andersen Y, Stürup-Toft S, Lopez-Acuña D, Ferreira-Borges C. The WHO prison health framework: a framework for assessment of prison health system performance. Eur J Public Health. 2022;32:565–70. https://doi.org/10.1093/eurpub/ckac020.
24. Kinner SA, Young JT. Understanding and improving the health of people who experience incarceration: an overview and synthesis. Epidemiol Rev. 2018;40:4–11. https://doi.org/10.1093/epirev/mxx018.
25. Victorian Ombudsman. Investigation into healthcare provision for Aboriginal people in Victorian prisons. 2024. Available: https://assets.ombudsman.vic.gov.au/assets/FINAL_07.03.24_VO-PARLIAMENTARY-REPORT_Investigation-into-healthcare-provision-for-Aboriginal-people-in-Victorian-prisons_Mar-2024.pdf
26. Perrett S, Plugge E, Conaglen P, O'Moore E, Sturup-Toft S. The five nations model for prison health surveillance: lessons from practice across the UK and Republic of Ireland. J Public Health. 2020;42:e561–72. https://doi.org/10.1093/pubmed/fdz122.
27. Fazel S, Hayes AJ, Bartellas K, Clerici M, Trestman R. Mental health of prisoners: prevalence, adverse outcomes, and interventions. Lancet Psychiatry. 2016;3:871–81. https://doi.org/10.1016/S2215-0366(16)30142-0.
28. McFadden D, Prior K, Miles H, Hemraj S, Barrett EL. Genesis of change: substance use treatment for forensic patients with mental health concerns. Drug Alcohol Rev. 2022;41:256–9. https://doi.org/10.1111/dar.13344.
29. Australian Institute of Health and Welfare. The health of people in Australia's prisons 2022. 2023. Available: https://doi.org/10.25816/1md4-5g46
30. Australian Institute of Health and Welfare. The health of Australia's prisoners 2018. 2019. Available: https://doi.org/10.25816/5ec5c381ed17a
31. Australian Institute of Health and Welfare. The health of Australia's prisoners 2015. 2015. Available: https://www.aihw.gov.au/getmedia/9c42d6f3-2631-4452-b0df-9067fd71e33a/aihw-phe-207.pdf
32. Heffernan EB, Andersen KC, Dev A, Kinner S. Prevalence of mental illness among aboriginal and Torres Strait Islander people in Queensland prisons. Med J Aust. 2012;197:37–41. https://doi.org/10.5694/mja11.11352.
33. Ogloff JRP, Pfeifer JE, Shepherd SM, Ciorciari J. Assessing the mental health, substance abuse, cognitive functioning, and social/emotional well-being needs of aboriginal prisoners in Australia. J Correct Health Care. 2017;23:398–411. https://doi.org/10.1177/1078345817723345.
34. Shepherd SM, Ogloff JRP, Thomas SDM. Are Australian prisons meeting the needs of Indigenous offenders? Health Justice. 2016;4:13. https://doi.org/10.1186/s40352-016-0045-7.
35. Cooper JA, Murphy S, Kirk R, O'Reilly D, Donnelly M. Data linkage studies of primary care utilisation after release from prison: a scoping review. BMC Prim Care. 2024;25:287. https://doi.org/10.1186/s12875-024-02527-w.
36. Stewart A, Ogilvie JM, Thompson C, Dennison S, Allard T, Kisely S, et al. Lifetime prevalence of mental illness and incarceration: an analysis by gender and Indigenous status. Aust J Soc Issues. 2021;56:244–68. https://doi.org/10.1002/ajs4.146.
37. Bai JR, Mukherjee DV, Befus M, Apa Z, Lowy FD, Larson EL. Concordance between medical records and interview data in correctional facilities. BMC Med Res Methodol. 2014;14:50. https://doi.org/10.1186/1471-2288-14-50.
38. Davidson F, Clugston B, Perrin M, Williams M, Heffernan E, Kinner SA. Mapping the prison mental health service workforce in Australia. Australas Psychiatry. 2020;28:442–7. https://doi.org/10.1177/1039856219891525.

39. Heffernan E, Andersen K, Kinner SA. Enhancing research quality through cultural competence: a case study in Queensland prisons. Australas Psychiatry. 2015;23:654–7. https://doi.org/10.1177/1039856215609763.
40. Samuels-Kalow ME, Stack AM, Porter SC. Effective discharge communication in the emergency department. Ann Emerg Med. 2012;60:152–9. https://doi.org/10.1016/j.annemergmed.2011.10.023.
41. Brusco NK, Watts JJ. Empirical evidence of recall bias for primary health care visits. BMC Health Serv Res. 2015;15:381. https://doi.org/10.1186/s12913-015-1039-1.
42. Sankar P, Jones NL. To tell or not to tell: primary care patients' disclosure deliberations. Arch Intern Med. 2005;165:2378–83. https://doi.org/10.1001/archinte.165.20.2378.
43. Pearce LA, Homayra F, Dale LM, Moallef S, Barker B, Norton A, et al. Non-disclosure of drug use in outpatient health care settings: findings from a prospective cohort study in vancouver, Canada. Int J Drug Policy. 2020;84:102873. https://doi.org/10.1016/j.drugpo.2020.102873.
44. Martin MS, Hynes K, Hatcher S, Colman I. Diagnostic error in correctional mental health. J Correct Health Care. 2016;22:109–17. https://doi.org/10.1177/1078345816634327.
45. Black EB, Toombs,Maree R, Kisely S. The cultural validity of diagnostic psychiatric measures for Indigenous Australians. Aust Psychol. 2018;53:383–93. https://doi.org/10.1111/ap.12335.
46. Halacas C, Adams K. Keeping our mob healthy in and out of prison: exploring prison health in Victoria to improve quality, culturally appropriate health care for Aboriginal people. Collingwood, Victoria, Australia: Victorian Aboriginal Community Controlled Health Organisation; 2015. Available: http://www.vaccho.org.au/assets/01-RESOURCES/TOPIC-AREA/RESEARCH/KEEPING-OUR-MOB-HEALTHY.pdf
47. Pettit S, Simpson P, Jones J, Williams M, Islam MM, Parkinson A, et al. Holistic primary health care for aboriginal and Torres Strait Islander prisoners: exploring the role of aboriginal community controlled health organisations. Aust N Z J Public Health. 2019;43:538–43. https://doi.org/10.1111/1753-6405.12941.
48. Spilsbury K, Rosman D, Alan J, Boyd JH, Ferrante AM, Semmens JB. Cross border hospital use: analysis using data linkage across four Australian States. Med J Aust. 2015;202:582–6. https://doi.org/10.5694/mja14.01414.
49. Lujic S, Simpson JM, Zwar N, Hosseinzadeh H, Jorm L. Multimorbidity in australia: comparing estimates derived using administrative data sources and survey data. PLoS ONE. 2017;12:e0183817. https://doi.org/10.1371/journal.pone.0183817.
50. Okura Y, Urban LH, Mahoney DW, Jacobsen SJ, Rodeheffer RJ. Agreement between self-report questionnaires and medical record data was substantial for diabetes, hypertension, myocardial infarction and stroke but not for heart failure. J Clin Epidemiol. 2004;57:1096–103. https://doi.org/10.1016/j.jclinepi.2004.04.005.
51. Violán C, Foguet-Boreu Q, Hermosilla-Pérez E, Valderas JM, Bolíbar B, Fàbregas-Escurriola M, et al. Comparison of the information provided by electronic health records data and a population health survey to estimate prevalence of selected health conditions and Multimorbidity. BMC Public Health. 2013;13:251. https://doi.org/10.1186/1471-2458-13-251.
52. Landis JR, Koch GG. An application of hierarchical kappa-type statistics in the assessment of majority agreement among multiple observers. Biometrics. 1977;33:363–74. https://doi.org/10.2307/2529786.
53. Wright NM, Hearty P, Allgar V. Prison primary care and non-communicable diseases: a data-linkage survey of prevalence and associated risk factors. BJGP Open. 2019;3:bjgpopen19X101643. https://doi.org/10.3399/bjgpopen19X101643.
54. Australian Bureau of Statistics. Prisoner characteristics, Australia (Tables 1 to 13). Prisoners in Australia. 2023; 2024. Available: https://www.abs.gov.au/statistics/people/crime-and-justice/prisoners-australia/latest-release#data-downloads
55. Arthur L, Herceg A, Shukralla H, Payne J, Tongs J. Evaluating patient experience at a novel health service for Aboriginal and Torres Strait Islander prisoners: a pilot study. J Aust Indig Heal. 2022;3. https://doi.org/10.14221/aihjournal.v3n1.4.
56. Nerelle P, Julie T, Narrabundah. A.C.T: Winnunga Nimmityjah Aboriginal Health Service; 2007.
57. Royal Commission into Aboriginal Deaths in Custody. Royal commission into Aboriginal deaths in custody. 1991. Report No.: Vol. 2. Available: https://www.austlii.edu.au/au/other/IndigLRes/rciadic/national/vol2/
58. Davy C, Harfield S, McArthur A, Munn Z, Brown A. Access to primary health care services for Indigenous peoples: a framework synthesis. Int J Equity Health. 2016;15:163. https://doi.org/10.1186/s12939-016-0450-5.
59. Hail-Jares K, Cumming C, Young JT, Borschmann R, Lennox N, Kinner SA. Self-harm and suicide attempts among incarcerated lesbian, gay and bisexual people in Australia. Aust N Z J Psychiatry. 2023;57:562–71. https://doi.org/10.1177/00048674221104744.
60. Australian Bureau of Statistics. Prisoners in Australia. 2008. Available: https://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/F618C51B775B2CF7CA25751B0014A2D5/$File/45170_2008.pdf
61. Australian Bureau of Statistics. Prisoner characteristics, states and territories (Tables 14 to 36). Prisoners in Australia. 2013; 2014. Available: https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4517.02013?OpenDocument
62. Australian Bureau of Statistics. National health survey. Australian Bureau of Statistics. 2023. Available: https://www.abs.gov.au/statistics/health/health-conditions-and-risks/national-health-survey/latest-release
63. The WONCA International Classification Committee. editor. ICPC-2-R: international classification of primary care. Revised 2nd Ed. New York: Oxford University Press; 2005.
64. Brameld KJ, Thomas MAB, Holman CDJ, Bass AJ, Rouse IL. Validation of linked administrative data on end-stage renal failure: application of record linkage to a 'clinical base population'. Aust N Z J Public Health. 1999;23:464–7. https://doi.org/10.1111/j.1467-842X.1999.tb01299.x.
65. National Centre for Classification in Health. The international statistical classification of diseases and related health problems, 10th revision, Australian modification (ICD-10-AM). Sydney, Australia: National Centre for Classification in Health, University of Sydney; 1998.
66. Australian Bureau of Statistics. Supplementary data cubes. Prisoners in Australia. 2010; 2010. Available: https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4517.02010?OpenDocument
67. Australian Bureau of Statistics. Prisoner characteristics, states and territories (Tables 13 to 34). Prisoners in Australia. 2016; 2016. Available: https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4517.02016?OpenDocument
68. Larsson J. eulerr: area-proportional euler and venn diagrams with ellipses. 2024. Available: https://CRAN.R-project.org/package=eulerr
69. R Core Team. R: a language and environment for statistical computing. Vienna, Austria: R Foundation for Statistical Computing. 2023. Available: https://www.R-project.org/
70. Brennan RL, Prediger DJ. Coefficient kappa: some uses, misuses, and alternatives. Educ Psychol Meas. 1981;41:687–99. https://doi.org/10.1177/001316448104100307.
71. Byrt T, Bishop J, Carlin JB. Bias, prevalence and kappa. J Clin Epidemiol. 1993;46:423–9. https://doi.org/10.1016/0895-4356(93)90018-V.
72. Gwet KL. Computing inter-rater reliability and its variance in the presence of high agreement. Br J Math Stat Psychol. 2008;61:29–48. https://doi.org/10.1348/000711006X126600.
73. Chen G, Faris P, Hemmelgarn B, Walker RL, Quan H. Measuring agreement of administrative data with chart data using prevalence unadjusted and adjusted kappa. BMC Med Res Methodol. 2009;9:5. https://doi.org/10.1186/1471-2288-9-5.
74. Gwet KL. Handbook of inter-rater reliability, 4th edition: the definitive guide to measuring the extent of agreement among raters. Advanced Analytics, LLC; 2014.
75. Thurber KA, Thandrayen J, Banks E, Doery K, Sedgwick M, Lovett R. Strengths-based approaches for quantitative data analysis: a case study using the Australian longitudinal study of Indigenous children. SSM - Popul Health. 2020;12:100637. https://doi.org/10.1016/j.ssmph.2020.100637.
76. StataCorp. Stata statistical software. College Station, TX: StataCorp LLC; 2023.
77. Queensland Public Health Act. Qld 2005.
78. Snow KJ, Petrie D, Young JT, Preen DB, Heffernan E, Kinner SA. Impact of dual diagnosis on healthcare and criminal justice costs after release from Queensland prisons: a prospective cohort study. Aust J Prim Health. 2022;28:264–70. https://doi.org/10.1071/PY21142.
79. Biancarelli DL, Biello KB, Childs E, Drainoni M, Salhaney P, Edeza A, et al. Strategies used by people who inject drugs to avoid stigma in healthcare settings. Drug Alcohol Depend. 2019;198:80–6. https://doi.org/10.1016/j.drugalcdep.2019.01.037.
80. De Shalit A, van der Meulen E, Chu SKH, Thomas R. Drug use stigma and reprisal: barriers to prison needle exchange in Canada. Prison J. 2024;104:344–64. https://doi.org/10.1177/00328855241240142.
81. Islam MM, Topp L, Iversen J, Day C, Conigrave KM, Maher L. Healthcare utilisation and disclosure of injecting drug use among clients of australia's needle and syringe programs. Aust N Z J Public Health. 2013;37:148–54. https://doi.org/10.1111/1753-6405.12032.

82. Lloyd C. The stigmatization of problem drug users: a narrative literature review. Drugs Educ Prev Policy. 2013. https://doi.org/10.3109/09687637.2012.743506.
83. Neale J, Tompkins C, Sheard L. Barriers to accessing generic health and social care services: a qualitative study of injecting drug users. Health Soc Care Community. 2008;16:147–54. https://doi.org/10.1111/j.1365-2524.2007.00739.x.
84. Dowell CM, Mejia GC, Preen DB, Segal L. Maternal incarceration, child protection, and infant mortality: a descriptive study of infant children of women prisoners in Western Australia. Health Justice. 2018;6:2. https://doi.org/10.1186/s40352-018-0060-y.
85. Baldry E, Bright D, Cale J, Day A, Dowse L, Giles M, et al. A future beyond the wall: improving post-release employment outcomes for people leaving prison final report. UNSW Sydney; 2018. https://doi.org/10.26190/5b4fd2de5cfb4.
86. Doyle C, Yates S, Bartels L, Hopkins A, Taylor H. People say you're going home, but I don't have a home: housing after prison. Int J Offender Ther Comp Criminol. 2024;68:1403–20. https://doi.org/10.1177/0306624X221132226.
87. Slater B, Dalawari P, Huang Y. Does the teach-back method increase patient recall of discharge instructions in the emergency department? Ann Emerg Med. 2013;62:S20. https://doi.org/10.1016/j.annemergmed.2013.07.335.
88. Zaranko B, Stoye G. How accurate are self-reported diagnoses? Comparing self-reported health events in the English Longitudinal Study of Ageing with administrative hospital records. The IFS; 2020. https://doi.org/10.1920/wp.ifs.2020.1320.
89. Butler B. Health information exchange between jails and their communities: a Bridge that is needed under healthcare reform. Perspect Health Inf Manag. 2014;11:1b.
90. World Health Organization Regional Office for Europe. Conclusions of the WHO international meeting on prisons and health Lisbon. 2017. 2018. Report No.: WHO/EURO:2018-3321-43080-60296. Available: https://iris.who.int/bitstream/handle/10665/345712/WHO-EURO-2018-3321-43080-60296-eng.pdf?sequence=3#:~:text=The%20meeting's%20conclusions%20aim%20to,of%20health%20and%20well%2Dbeing
91. Marlow E, White MC, Chesla CA. Barriers and facilitators: parolees' perceptions of community health care. J Correct Health Care. 2010;16:17–26. https://doi.org/10.1177/1078345809348201.
92. Hu C, Jurgutis J, Edwards D, O'Shea T, Regenstreif L, Bodkin C, et al. When you first walk out the gates… where do [you] go? Barriers and opportunities to achieving continuity of health care at the time of release from a provincial jail in Ontario.PLOS ONE. 2020;15: e0231211. doi:10.1371/journal.pone.0231211.
93. Gee G, Dudgeon P, Schultz C, Hart A, Kelly K. Aboriginal and Torres Strait Islander social and emotional wellbeing. In: Dudgeon P, Milroy H, Walker R, editors. Working together. Australia: Australian Government Department of the Prime Minister and Cabinet; 2014. pp. 55–68.
94. Westerman T. Engagement of Indigenous clients in mental health services: what role do cultural differences play? Aust. E-J Adv Ment Health. 2004;3:88–93. https://doi.org/10.5172/jamh.3.3.88.

Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.