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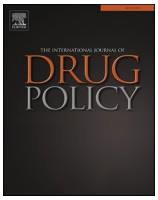

Systematic Review

Factors associated with drug use in prison: A systematic review of quantitative and qualitative evidence

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ABSTRACT

Background: About a third of people use drugs during their incarceration, which is associated with multiple adverse health and criminal justice outcomes. Many studies have examined factors associated with in-prison drug use, but this evidence has not yet been systematically reviewed. We aimed to systematically review and synthesise the evidence on factors related to drug use in prison.

Methods: Three databases (PubMed, PsycINFO and Embase) were systematically searched as well as grey literature, for quantitative, qualitative and mixed-methods studies examining factors related to drug use inside prison. We excluded studies that did not explicitly measure *in prison* drug use or only measured alcohol and/or tobacco use. Study quality was assessed using the Newcastle Ottawa Scale (NOS) for quantitative studies and Critical Appraisal Skills Programme (CASP) for qualitative studies. The review was prospectively registered on PROSPERO (CRD42021295898).

Results: Fifty-four studies met the inclusion criteria, reporting data on 26,399 people in prison. Most studies were of low or moderate-quality, and all used self-report to assess drug use. In quantitative studies, studies found that previous criminal justice involvement, poor prison conditions, pre-prison drug use and psychiatric diagnosis were positively associated with drug use in prison. In qualitative studies, reasons for drug use were closely linked to the prison environment lacking purposeful activity and the social context of the prison whereby drug use was seen as acceptable, necessary for cohesion and pressurised.

Conclusion: In the first systematic review of factors associated with drug use in prison, key modifiable risk factors identified from quantitative and qualitative studies were psychiatric morbidity and poor prison conditions. Non-modifiable factors included previous drug use and criminal history linked to substance use. Our findings indicate an opportunity to intervene and improve the prison environment to reduce drug use and associated adverse outcomes.

Introduction

People who use drugs are overrepresented in prison (Montanari et al., 2022). Approximately half of those in prison in Europe have used drugs in the year prior to imprisonment (Favril, 2023; van de Baan et al., 2022) and 30–51 % of prison entrants meet diagnostic criteria for a drug use disorder (Fazel et al., 2017). While for some people incarceration may result in cessation of drug use, many continue to use drugs during imprisonment (although often less frequently) and others may even start using drugs in prison (Boys et al., 2002; Favril, 2023; Plugge et al., 2009; Rousselet et al., 2019; Strang et al., 2006). Overall, evidence indicates that approximately 20–45 % people in prison use drugs in some form during their incarceration (Bukten et al., 2020; Carpentier et al., 2018; Favril, 2023; Mundt et al., 2018; Norman, 2022).

Drug use in prisons is linked to a wide range of adverse outcomes. People in prison who use drugs are more likely to contract infectious diseases such as hepatitis C, have psychiatric morbidity, self-harm, overdose, re-offend on release and die prematurely (Chang, Larsson et al., 2015, Chang, Lichtenstein et al., 2015; Favril et al., 2020; Montanari et al., 2022). The relationship between drug use and crime is complex, however, re-offending related to drug use often results in recurrent short sentences (Montanari et al., 2022). Given the frequent contact with the community due to repeat sentences, as well as the risks identified in terms of continued drug use, risk behaviour leading to

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infectious diseases and increased mortality, addressing drug use in prison and related harms is beneficial for both people in prison and wider society (Chandler et al., 2009; Montanari et al., 2022).

The impact of drug use in prison on both individuals and communities warrants further efforts to prevent and intervene with this behaviour (Favril, 2023; Montanari et al., 2022). However, a thorough understanding of the factors, such as individual characteristics and environmental influences, related to drug use in prison has not yet been established. Better characterisation of the population that uses drugs while in prison in terms of demographics, criminal history variables, prison influences and motives for drug use, hereinafter referred to collectively as 'factors', would enhance the current understanding of potential predictors or drivers for drug use in prison. Identification of risk factors can help determine the nature and type of interventions required as well as improve screening and help target interventions for high-risk groups, enabling prisons to plan and deliver effective services and treatment (Montanari et al., 2022).

To our knowledge, factors associated with drug use in prison have not been systematically reviewed. We aimed to systematically review and synthesise the existing evidence base regarding factors linked to drug use in prison.

Method

This review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021; Table S1) and pre-registered on PROSPERO (number CRD42021295898).

Eligibility criteria

Studies were included if they met the following criteria: (1) the sample comprised of people currently in prison (sentenced and/or remand), (2) the study included a measure of drug use *inside* prison as the outcome (either self-report or biologically verified) and (3) the study measured factor(s) related to drug use. For quantitative studies, factors were defined as any variable (e.g., sociodemographic, health, criminal justice, or drug-related variables) on which statistical analysis was conducted to assess its association with drug use in prison. For qualitative studies, factors were defined as any emergent theme that was identified as being related to drug use in prison. Qualitative studies did not need to have a comparison group. Qualitative studies that also included staff perspectives and did not distinguish this in the results were excluded.

We excluded studies with people released from prison who were retrospectively reporting on prison drug use and those only examining pre-prison or lifetime drug use. Studies that defined people who used drugs by diagnoses (e.g. substance use disorders) without verifying drug use *in* prison were also excluded. Any illicit drugs (including non-prescribed medications) were considered; studies exclusively examining alcohol and/or tobacco use were not included. No age restrictions were set. Quantitative, qualitative and mixed-methods studies were included. Studies without original data (such as reviews), conference abstracts, and case studies were excluded.

There were no language exclusions as part of the search, however, terms were developed in English. Due to the multilingual review team, studies were included if they were written in English, Dutch, French or German. There was no limit on publication date.

Search strategy and study selection

A systematic search was conducted using PubMed, Embase, and PsycINFO databases on 5th May 2022 and later updated on 21st March 2023. Title, abstract, and keyword searches were conducted using terms that were inclusive of drugs AND prison (full search strategy in Table S2). Grey literature was searched using targeted searches of relevant organisations (e.g., European Monitoring Centre for Drugs and Drug Addiction) (August 2022). The reference lists of related systematic reviews and included studies were also hand searched (November 2022).

After removing duplicates, title and abstract screening was conducted independently by two reviewers (AA and either LF or SC) using the eligibility criteria. Two reviewers then independently screened the full text of studies for inclusion. Screening at both stages was completed using Rayyan, an online screening tool (Ouzzani et al., 2016), with a blind filter. Disagreements between researchers were resolved through discussion.

Data extraction

The following characteristics were extracted by two reviewers independently (AA and either LF or SC): study characteristics, sample characteristics, prison characteristics, drug use and factors examined in relation to drug use in prison. For quantitative studies, any examined association was extracted. Where authors reported both adjusted and unadjusted estimates of association effects, adjusted estimates were preferred. For qualitative studies, themes and quotes were extracted. Quantitative and qualitative components from mixed-methods studies were extracted with the relevant extraction form. Data was not categorised in any way at the point of extraction.

Where multiple publications covered the same or overlapping samples, data were extracted from the study with the most comprehensive analysis of factors (e.g. hierarchical regression compared to correlation), or, if this was equal, the largest sample.

Quality assessment

Study quality was assessed by two independent reviewers (AA and either SC or PT) and discrepancies were discussed. For quantitative studies, the Newcastle-Ottawa Scale (NOS; Wells et al., 2000) was used for cohort and case-control studies adapted by adding relevant examples to the definitions. Adaptations were made for utilisation with cross-sectional studies, based on a previous systematic review (Petrilli et al., 2022) and discussions within the research team (AA, LF, SC, TF). The maximum score indicating high-quality was 10 for cross-sectional, 11 for case-control, and 12 for cohort studies.

The Critical Appraisal Skills Programme (CASP, 2022) was used for quality assessment of qualitative studies. The maximum score was 10.

To allow for a comparison across study designs, a standardised score was created by dividing the sum of items by the total possible score to create a score from 0 to 100. Studies with scores equal to or less than 75 were considered high-quality, between 74 and 50 moderate, and less than or equal to 49 low (Favril et al., 2020).

Data analysis

Findings were narratively synthesised. Meta-analysis was not appropriate due to the substantial heterogeneity in samples and outcomes. A parallel-results convergent synthesis design was employed whereby quantitative and qualitative data were extracted and analysed separately (Hong et al., 2017). The results of each analysis are presented separately and synthesised in the discussion.

Results

Study identification

A total of 11,421 records were identified (Fig. 1). Following title and abstract screening, 345 records were assessed for eligibility. An additional four studies were identified from reference lists and one from updating the search. This resulted in 54 studies being included in the narrative synthesis: 42 quantitative, 9 qualitative, and 3 mixed methods. With duplicate samples removed from analysis, there were 38 unique

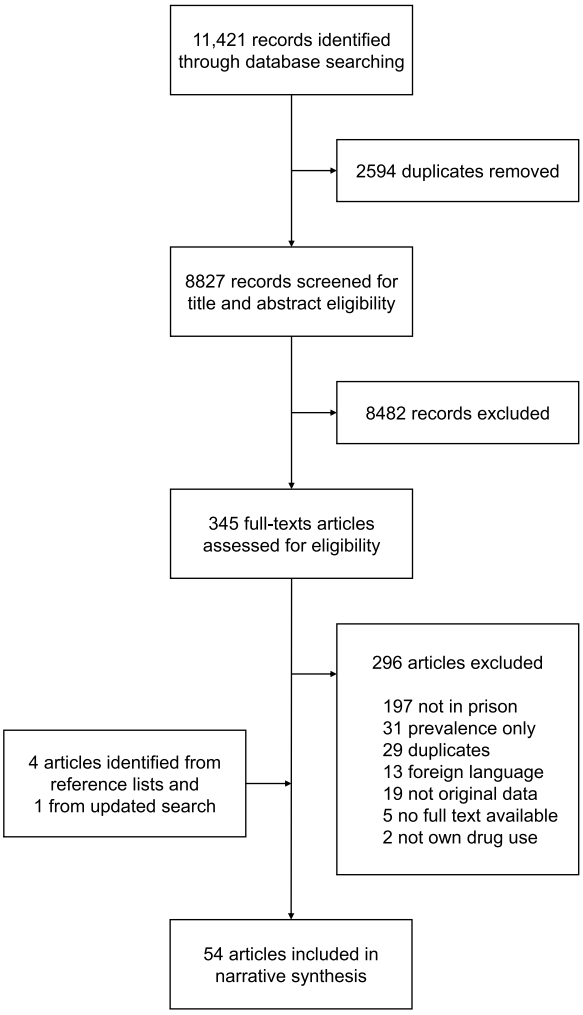

Fig. 1. PRISMA flow diagram of included studies.

samples for quantitative studies, 8 for qualitative and 3 mixed methods. Of the 3 mixed methods studies, one was included for its qualitative component only, one for its quantitative component only and one for both. Therefore, 40 studies were extracted with the quantitative extraction form and 10 studies were extracted with the qualitative. The included studies had a total sample size of 26,399 (M = 550.0, SD = 624.9) people in prisons.

Quality assessment

Using the NOS, cross-sectional studies had a mean score of 4.9 out of 10 (SD = 2.0, range 1–9). Case-control studies had a mean score of 4.5 out of 11 (SD = 0.7, range 4–5) and for cohort studies the mean score was 7.0 out of 12 (SD = 2.6, range 4–9). Overall, 7 studies (17.5 %) were rated as high-quality, 17 (42.5 %) as moderate, and 16 (40 %) as low (see Table S3). Common weaknesses were failing to justify sample size, provide a summary of non-respondents and use a validated measure for exposure.

On the CASP, the mean score for qualitative studies was 7.6 out of 10 (SD = 1.8, range 4–9. Overall, 7 studies (70 %) were rated as high-quality, 2 (20 %) as moderate and 1 (10 %) as low (Table S4). Common weaknesses were not providing a detailed description of the analysis process or considering the relationship between researcher and participants and how this may bias the research process.

Quantitative study characteristics

Including eligible mixed-methods studies, in total there were 44 quantitative studies reporting on 40 unique samples between 1987 and 2022 (Table 1). Studies reported on data from 17 countries, most were from the United States (k = 7), Australia (k = 5), Spain (k = 5) and Brazil (k = 4). Most studies (k = 35, 87.5 %) were cross-sectional, with three (7.5 %) cohort and two (5 %) case-control studies. The total number of participants across all individual studies was 26,152 with individual study sample sizes ranging between 71 and 3142 (M = 670.6, SD = 637.7). Most studies (k = 17, 42.5 %) included men and women, while 35 % were men-only (k = 14), 20 % (k = 8) women-only and one (2.5 %) did not report this. Most studies included adult samples (k = 32, 80 %), two were exclusively juvenile (<18 years) (5 %), two were a mix of adult and juvenile (5 %). The rest did not state the population or ages studied. A third (k = 13, 32.5 %) of studies reported how long participants had spent in prison, 69 % (k = 9) of which reported an average which ranged from 11 to 60 months. Most studies (k = 31, 77.5 %) did not report the type or security level of the prison. In-prison drug use was assessed by self-report in all studies (k = 40, 100 %).

The most common method of assessing drug use in prison was 'ever use' during imprisonment (k = 16, 40 %) followed by 'within the last six months' (k = 5, 12.5 %) and 'three months' (k = 5, 12.5 %). Other measures included 'past month' (n = 2, 5 %), 'month following entry' (k = 2, 5 %) or 'use at least once a month' (k = 2, 5 %) and 'past 12 months' (k = 1, 2.5 %). Two studies (5 %) measured drug use from participants' last reported use (5 %). Five studies (12.5 %) did not state the time frame in which drug use in prison was measured.

Half the studies (k = 18, 45 %) measured the use of multiple drugs (most commonly cannabis, heroin, cocaine, and non-prescribed medications such as benzodiazepines) without differentiating in analyses. Three studies (7.5 %) focused on one specific drug; cocaine (Carvalho et al., 2005), cannabis (Jacups & Rogerson, 2015) and non-prescribed medication (Thomas & Cage, 1977). In addition to illicit drugs, 14 studies (35 %) also asked about alcohol and/or tobacco use, 10 of which included them in their definition of illicit drugs and therefore included in their analysis. Eight studies (20.5 %) exclusively reported on injection drug use (IDU) in prison as the outcome variable.

Studies mainly compared people who had used drugs in prison to those who had not (k = 34, 85 %). However, six (15 %) used alternative comparisons. Specifically, one compared people who had used drugs in prison to those that had used drugs elsewhere (Boys et al., 2002) and another compared different types of drug use between people in prison (e.g. heroin and cocaine), excluding people who did not use drugs (Caravaca-Sánchez et al., 2022). Two examined drug use in prison in those with a pre-prison history of IDU (Calzavara et al., 2003; Kinner et al., 2012). Another compared drug use to never using the drug (Carvalho et al., 2005), excluding those who had used drugs outside of prison. One compared people who did not use drugs in prison to those who had continued their use into prison (Plugge et al., 2009), excluding those had only used in prison.

Quantitative factors related to drug use in prison

In total, 428 associations for 31 different factors were measured across the 40 unique samples of which there was evidence for a significant association (either positive or negative) in 209 (49 %) and no evidence for a significant association in 219 (51 %). The factors identified were organised into five overarching themes: sociodemographic, criminal history, prison, substance use, and psychological characteristics. Factors identified in five or more studies are discussed below.

Substance use characteristics. Factors within this theme related to drug use and treatment, both before and during imprisonment. Substance use characteristics were the most frequently identified theme, examined in 27 (67.5 %) of the 40 studies.

Within this, pre-prison substance use was examined by 22 of the 27

Table 1
Study characteristics for quantitative evidence.

Study	Country	Prisons (*n*)	Sample Sample type	Mean age (range)	Sample size (% female)	Outcome Drugs examined (multiple or specific)	Measurement of drug use in prison	Variables adjusted for in analysis	Study quality
Cross-sectional									
Albertie et al. (2017)	Mexico	3	First time in prison	≥18	593 (0 %)	Multiple	Past month	S, M, D	High
Azbel et al. (2018)*	Kyrgyzstan	8	Soon to be released	37.4	368 (13 %)	Multiple (IDU)	Ever (current incarceration only)	S, D, C, P	High
Baltieri (2014)	Brazil	1	Convicted of violent offence	31.6	315 (100 %)	Multiple	Past 6 months	S, M, D, C	High
Bañuls-Oncina et al. (2019)	Spain	1	Potential use of drugs	36.8	178 (38.2 %)	Multiple (IDU)	Past 6 months	S, D, C, P	Low
Boys et al. (2002)	UK	NR	General	≥16	3142 (24.5 %)	Multiple	Ever	S	High
Bukten et al. (2020)	Norway	57	General	34.6	1499 (6.4 %)	Multiple	Ever	S, M, D, C	Mod
Butler et al. (2003)	Australia	27	General	NR	789 (16.7 %)	Multiple (IDU)	Ever	None	Mod
Calzavara et al. (2003)	Canada	6	General	≥18	597 (26.5 %)	Multiple (IDU)	Past 12 months	D, C	Mod
Caravaca-Sánchez et al. (2022)	Spain	6	General	38.48 (18–66)	1325 (15.6 %)	Multiple	Past 3 months	S, M, C, P	Low
Caravaca-Sánchez and García-Jarillo (2020)	Spain	2	General	37.6	174 (100 %)	Multiple	Past 3 months	S, C, P	Mod
Caravaca-Sánchez and Wolff (2020)	Spain	3	General	37.2 (18–83)	943 (0 %)	Multiple	Past 3 months	S, P, M	Mod
Culbert et al. (2015)**	Indonesia	2	HIV positive	31.3	102 (0 %)	Multiple (IDU)	Ever	D, P	Low
Ebiti et al. (2012)	Nigeria	NR	General	20.6 (12–39)	401 (0 %)	Multiple	NR	None	Low
Favril and Vander Laenen (2018)	Belgium	15	General	37.7 (18–77)	1326 (9 %)	Multiple	Ever (current incarceration only)	S, M, D, C, P	Mod
Jacups and Rogerson (2015)**	Australia	1	Indigenous	18–40	101 (0 %)	Cannabis	Past 3 months	None	Mod
Khalooei et al. (2016)	Iran	1	General	32.6 (18–60)	332 (0 %)	Multiple	At least once a month	S, D	Mod
Kinner et al. (2012)***	Australia	7	General	NR	1322 (NS)	(IDU)	Ever (current incarceration only)	S, D, P	Low
Korte et al. (1998)	Finland	4	General	32 (18–76)	354 (0 %)	Multiple	Ever (current incarceration only)	None	Low
Koulierakis (2006)	Greece	1	General	34.8	103 (0 %)	Multiple (IDU)	Last injected	D	Low
Lanza-Kaduce and Radosevich (1987)	USA	1	General	16.5 (14–20)	148 (0 %)	Multiple	Ever (current incarceration only)	None	Low
Leigey (2019)	USA	2	General	35.8 (18–72)	1821 (100 %)	NR	Ever	P	Low
Lins-Filho et al. (2021)	Brazil	1	General	18–63	294 (91.5 %)	NR	At least once a month	None	Mod
Martin et al. (2005)	Canada	1	General	NR	104 (100 %)	Multiple	Ever (current incarceration only)	None	Low
Narkauskaite et al. (2007)	Lithuania	8	General	27 (15–78)	1304 (5.2 %)	Multiple	NR	None	Low
Narkauskaite et al. (2010)	Lithuania	1	General	34 (20–60)	71 (100 %)	Multiple	NR	None	Low
Nevárez-Sida et al. (2012)	Mexico	NR	General	NR	1223 (17.5 %)	Multiple	Past month	D, C, P	Mod
Plourde et al. (2012)****	Canada	NR	General	NR	493 (35.7 %)	Multiple	Past 3 months	S, P	Mod
Reed et al. (2009)	Brazil	NR	General	NR	377 (100 %)	Multiple	NR	S, C, P	Mod
Rowell et al. (2012)	USA	1	Black	42.1 (23-74)	134 (0 %)	NR	Month/year stopped using	D, C, P	Low
Rowell-Cunsolo et al. (2016)	USA	NR	General	NR	1361 (43.9 %)	Multiple	Past 6 months	S, D, P	Mod
Sahajian et al. (2017)	France	NR	General	NR	457 (9.19 %)	Multiple	Ever	None	Low
Sánchez et al. (2018)	Spain	6	General	37.5 (19–70)	225 (100 %)	Multiple	Past 6 months	S, D	Mod
Simpler et al. (2005)	USA	2	General	33.1	103 (0 %)	Multiple	Ever	None	Low
Strang et al. (2006)	UK	13	General	NR	1009 (0 %)	Multiple	1 month following entry	None	Low
Thomas & Cage, (1977)	USA	1	General	NR	273 (0 %)	Prescription medication	Ever	None	Low

Cohort									
Cunningham et al. (2018)	Australia	23	Pre-prison IDU	28	499 (35.1 %)	Multiple (IDU)	Ever (current incarceration only)	S, C, P	Low
Kimonis et al. (2012)	USA	1	General	16.4 (14–17)	373 (0 %)	NR	NR	P	High
Plugge et al. (2009)	UK	13	General	21–39	505 (100 %)	Multiple	1 month following entry	None	Mod
Case-control									
Carvalho et al. (2005)	Brazil	NR	General	NR	1314 (6.1 %)	Cocaine	Ever	S	High
Darke et al. (1998)	Australia	5	Methadone maintenance	31.7 (20–48)	100 (53 %)	Multiple	Past 6 months	None	Mod

Note. NR = not reported ; ** = Mixed-methods study ; Adjustment key ; *S* = sociodemographic variables, *M* = mental health variables, *D* = drug use variables, C = criminological, *P* = prison conditions, *Kyrgyzstan sample same as Polonsky et al. (2016), ***Queensland sample same as Kinner et al. (2013), ****male sample same as Plourde and Brochu (2002a and 2002b), study quality; mod = moderate.

studies (81.5 %) with three (13.6 %) being considered high-quality. In representative samples, cross-sectional studies found that use in the 30 days before prison (Azbel et al., 2018) and frequent (once a week, three times a week or every day) pre-prison substance use (Albertie et al., 2017) were positively associated with drug use in prison. Using a case-control design, prior alcohol use (yes/no) but not cannabis use (yes/no) before prison was associated with prison drug use (Carvalho et al., 2005). The remainder of the studies were moderate or low-quality (k = 24). These studies consistently found that pre-prison drug use including any use (Ebiti et al., 2012; Rowell et al., 2012; Thomas & Cage, 1977), frequent use (Albertie et al., 2017; Thomas & Cage, 1977), use in the 6 (Bukten et al., 2020) or 12 (Favril & Vander Laenen, 2018) months prior to prison were all associated with drug use in prison. Injecting heroin or other opiates in the year before prison (Calzavara et al., 2003), ever injected drugs (Kinner et al., 2012) and number of drugs used in lifetime (Bukten et al., 2020) were also associated with drug use in prison. The evidence was most frequently for any pre-prison substance use rather than the use of specific drugs such as heroin.

Five studies examined whether there was an association between severity of substance use or dependence and drug use in prison. Of these, one was rated as high-quality and found that, when controlling for confounders, higher scores on a measure of drug abuse were positively associated with the use of drugs in prison among those convicted of a violent offence (Baltieri, 2014). The remaining studies of low and moderate-quality did not find an association (Bañuls-Oncina et al., 2019; Calzavara et al., 2003; Leigey, 2019; Strang et al., 2006).

Receiving drug treatment before prison was associated with drug use in prison in two studies (Favril & Vander Laenen, 2018; Strang et al., 2006), but not in three other studies (Bañuls-Oncina et al., 2019; Leigey, 2019; Plugge et al., 2009). Treatment in prison was protective against drug use in prison in one study (Darke et al., 1998) but no association was found in another (Kinner et al., 2012). All studies examining drug treatment were of low to moderate-quality.

Sociodemographic characteristics. Sociodemographic factors related to social and demographic characteristics which define individual populations. These were examined in 28 (70 %) of all quantitative studies.

Age was examined in 20 studies of the 28 studies (71.4 %). There were mixed findings among high-quality studies with cross sectional studies finding older age was positively (Boys et al., 2002), negatively (Albertie et al., 2017) and not (Baltieri, 2014) associated with drug use in prison. Age was most frequently found to be negatively associated with drug use in prison meaning that as people got older, they were less likely to use drugs (Albertie et al., 2017; Butler et al., 2003; Caravaca-Sánchez & Wolff, 2020; Carvalho et al., 2005; Cunningham et al., 2018; Favril & Vander Laenen, 2018; Korte et al., 1998; Rowell et al., 2012; Sahajian et al., 2017), including IDU (Cunningham et al., 2018). However, 11 studies found no association for age (Baltieri, 2014; Bañuls-Oncina et al., 2019; Boys et al., 2002; Bukten et al., 2020; Caravaca-Sánchez & García-Jarillo, 2020; Caravaca-Sánchez & Wolff, 2020; Caravaca-Sánchez et al., 2022; Jacups & Rogerson, 2015; Leigey, 2019; Plugge et al., 2009; Sánchez et al., 2018).

Nationality was examined in five studies. Three studies (Bañuls-Oncina et al., 2019; Caravaca-Sánchez & García-Jarillo, 2020; Favril & Vander Laenen, 2018) found domestic nationality, compared to foreign, was associated with drug use in prison while two found no association (Bukten et al., 2020; Caravaca-Sánchez & Wolff, 2020). All studies were of low to moderate-quality, most being limited by failing to justify the sample size (k = 3, 60 %). Pre-prison unemployment was associated with drug use in prison in four studies, including IDU (Kinner et al., 2012), in male (Leigey, 2019; Thomas & Cage, 1977) and female samples (Martin et al., 2005), but all were considered low quality. Furthermore, five studies found no association (Albertie et al., 2017; Boys et al., 2002; Bukten et al., 2020; Jacups & Rogerson, 2015; Leigey, 2019).

Male (Bukten et al., 2020; Kinner et al., 2012; Plourde et al., 2012; Rowell-Cunsolo et al., 2016), female (Butler et al., 2003; Darke et al., 1998) and transgender (Lins-Filho et al., 2021) status were associated with drug use in prison while six studies found no sex/gender difference (Azbel et al., 2018; Bañuls-Oncina et al., 2019; Boys et al., 2002; Cunningham et al., 2018; Favril & Vander Laenen, 2018; Sahajian et al., 2017). Studies that found an association were mostly moderate-quality and were limited by a possible response bias due to lacking information on non-respondents (Bukten et al., 2020; Butler et al., 2003; Kinner et al., 2012; Lins-Filho et al., 2021; Plourde et al., 2012; Rowell-Cunsolo et al., 2016), while the high-quality studies that examined sex/gender did not find an association (Azbel et al., 2018; Boys et al., 2002).

White ethnicity was associated with greater likelihood of using drugs in prison in one low quality study (Thomas & Cage, 1977) but six studies found no relationship (Azbel et al., 2018; Boys et al., 2002; Butler et al., 2003; Kinner et al., 2012; Martin et al., 2005; Plugge et al., 2009).

Four studies found lower educational attainment to be associated with drug use (Boys et al., 2002; Caravaca-Sánchez & García-Jarillo, 2020; Caravaca-Sánchez et al., 2022; Jacups & Rogerson, 2015). One of these was rated as high-quality, however, two studies found the opposite, that higher educational attainment was associated with drug use in prison (Khalooei et al., 2016; Thomas & Cage, 1977). Additionally, ten studies did not find an association (Albertie et al., 2017; Boys et al., 2002; Bukten et al., 2020; Butler et al., 2003; Caravaca-Sánchez & Wolff, 2020; Caravaca-Sánchez et al., 2022; Khalooei et al., 2016; Kinner et al., 2012; Martin et al., 2005; Plugge et al., 2009).

Only one study, rated as high-quality, identified homelessness as associated with drug use in prison (Boys et al., 2002) with five moderate to low-quality studies finding no relationship between pre-prison accommodation status or stability (Boys et al., 2002; Jacups & Rogerson, 2015; Kinner et al., 2012; Leigey, 2019; Martin et al., 2005) and drug use in prison.

Two studies, one high (Boys et al., 2002) and one low-quality (Thomas & Cage, 1977), found that those who were unmarried or divorced were more likely to use drugs in prison but seven did not find an association with relationship status (Albertie et al., 2017; Azbel et al., 2018; Caravaca-Sánchez & García-Jarillo, 2020; Caravaca-Sánchez & Wolff, 2020; Jacups & Rogerson, 2015; Kinner et al., 2012; Leigey, 2019).

No association was clearly demonstrated between family factors, such as having children (Albertie et al., 2017; Jacups & Rogerson, 2015; Leigey, 2019; Martin et al., 2005) or experiencing family difficulties (Bukten et al., 2020; Carvalho et al., 2005; Sánchez et al., 2018) and all but one study was low or moderate-quality.

Criminal history characteristics. Criminal history characteristics included factors that related to participants past involvement with any element of the criminal justice systems (CJS) and were examined in 27 (67.5 %) of the 40 studies.

Previous criminal justice contact was investigated in 21 of the 27 studies (77.8 %), of which four (19 %) were considered high-quality. Three (Albertie et al., 2017; Boys et al., 2002; Carvalho et al., 2005) out of the four high-quality studies found previous CJS contact, including having been to prison before and having more than three arrests prior to prison, to be positively associated with drug use in prison. Legal problems as a juvenile (Jacups & Rogerson, 2015) and recidivism (Carvalho et al., 2005; Jacups & Rogerson, 2015; Thomas & Cage, 1977) were also positively associated with drug use in prison. However, previous imprisonment was the type of CJS contact most often associated with drug use in prison within criminal history characteristics (Boys et al., 2002; Butler et al., 2003; Calzavara et al., 2003; Caravaca-Sánchez & Wolff, 2020; Cunningham et al., 2018; Leigey, 2019; Narkauskaite et al., 2007). One study found that being imprisoned for the first time was positively associated with drug use in prison (Narkauskaite et al., 2007) and women-only samples found that, opposite to the dominant association pattern, previous imprisonment was negatively associated with drug use meaning they were less likely to use drugs in prison (Boys et al., 2002; Narkauskaite et al., 2010).

Nine studies examined drug-related offending. Only one study was considered high-quality but, using a case control design to compare people who had used cocaine in prison with those who have never used cocaine, offending while under the influence or to obtain drugs was positively associated with drug use as was being sentenced for drug dealing (Carvalho et al., 2005). Three further studies of low and moderate-quality found a similar pattern that being intoxicated at the time of the offence (Bukten et al., 2020) and being arrested for drug related offences (Thomas & Cage, 1977) was positively associated with drug use. Drug-related offending was also found to increase the risk of polydrug use in prison for both men and women (Caravaca-Sánchez et al., 2022). However, two low quality studies found that being in prison for crimes related to drugs was negatively associated with drug use (Narkauskaite et al., 2007, 2010) and three studies of low and moderate-quality found that drug offences and convictions (Favril et al., 2020; Leigey, 2019) were not associated with use in prison.

There was no clear association between violent (Albertie et al., 2017; Bukten et al., 2020; Butler et al., 2003; Caravaca-Sánchez et al., 2022; Korte et al., 1998; Leigey, 2019) or other types of offence (Baltieri, 2014; Bukten et al., 2020; Caravaca-Sánchez et al., 2022; Nevárez-Sida et al., 2012) and drug use in prison.

Prison characteristics. Factors related to any environmental, situational or contextual characteristics of prison life were considered under the prison characteristics theme and these were examined in 23 of the 40 (57.5 %) studies.

Eleven studies looked at time spent in prison and drug use. Of these, four were rated as high-quality and three of these found that time in prison was positively associated with drug use in prison (Albertie et al., 2017; Boys et al., 2002; Carvalho et al., 2005). This finding was mirrored in cross-sectional, case-control and cohort designs with more time in prison increasing the risk of using drugs (Albertie et al., 2017; Boys et al., 2002; Carvalho et al., 2005; Nevárez-Sida et al., 2012; Rowell et al., 2012), including injecting them (Cunningham et al., 2018).

Prison conditions were assessed in 11 (47.8 %) studies. Poor prison conditions, specifically, lack of purposeful activity such as education or work (Albertie et al., 2017; Caravaca-Sánchez & García-Jarillo, 2020; Caravaca-Sánchez & Wolff, 2020; Leigey, 2019; Nevárez-Sida et al., 2012) and poor prisoner-staff relationships (Lanza-Kaduce & Radosevich, 1987; Nevárez-Sida et al., 2012; Thomas & Cage, 1977), were associated with drug use in prison. However, only one study was considered high-quality (Albertie et al., 2017). There were fewer associations for overcrowding (Albertie et al., 2017), perceived drug availability (Leigey, 2019), and receiving conjugal visits (Albertie et al., 2017) being associated with drug use. Studies did not find an association between prisoner-on-prisoner violence (Leigey, 2019) or prison location (city or not) (Nevárez-Sida et al., 2012) and drug use in prison. One women-only study found that being in a same-sex relationships in prison was associated with using drugs in prison (Baltieri, 2014).

Evidence was not consistent for an association between length of sentence and drug use in prison which was examined in 6 studies.

Psychological characteristics. Psychological characteristics were factors that addressed any measurement of wellbeing, both historic and current, and were the least frequently examined (18 studies, 45 %).

Trauma was assessed in varying ways in 5 of the 18 studies. Experiencing trauma was associated with drug use in prison in four studies (Boys et al., 2002; Caravaca-Sánchez & Wolff, 2020; Lanza-Kaduce & Radosevich, 1987; Reed et al., 2009) but only one was high-quality. The high-quality study found that being in local authority care as a child and experiencing another traumatic event (aside from sexual abuse, witnessing or experiencing physical abuse or being bullied) was positively associated with drug use in prison (Boys et al., 2002). Studies of poorer quality found that emotional, physical and sexual trauma and/or violence as well as isolation was associated with drug use (Caravaca-Sánchez & Wolff, 2020; Lanza-Kaduce & Radosevich, 1987; Reed et al., 2009). Traumas related to serious illness, familial death or injury were not associated with drug use in prison (Boys et al., 2002).

The presence of psychiatric morbidity (diagnosis or distress) was looked at in 10 of the 18 (55.6 %) of studies. Of these, six (60 %) found an association with drug use in prison but only two were considered high-quality. One of these studies found that in a juvenile cohort study controlling for prison conditions, secondary psychopathy compared to primary or no psychopathy was positively associated with drug use in prison (Kimonis et al., 2012). In a cross-sectional representative study, heroin use in prison was positively associated with the number of diagnoses and antisocial personality disorder (Boys et al., 2002). The low and moderate-quality studies found that depression was associated with drug use in male samples while anxiety was associated with drug use in male and female samples (Caravaca-Sánchez et al., 2022).

Qualitative study characteristics

With the eligible mixed-methods components included, there were 11 studies (reporting on 10 samples) between 1993 and 2019 (Table 2). Most studies ($k = 4$, 40 %) were conducted in the UK. The total sample size was 349, ranging from 4 to 102 ($M = 34.9$, $SD = 26.5$). Three studies additionally interviewed staff (data which was not included in our analysis). The most common method used was interview ($k = 9$, 90 %), followed by focus group ($k = 3$, 33 %) and observations ($k = 2$, 20 %); three studies used multiple methods. Only 8 studies reported drug use measurement (80 %), all assessing 'ever use' in prison.

Qualitative factors related to drug use in prison

A consistent theme throughout the studies was the identification of boredom or excess time as a factor linked to drug use. The use of drugs appeared to act as a coping mechanism in response to a limited prison regime (Ralphs et al., 2017) and the absence of purposeful activity (Woodall, 2011). As outlined by one participant discussing their cannabis use, "the way I look at it is it makes time go faster" (Cope, 2000, p. 360). Similarly, the use of synthetic cannabinoids (also known as 'Spice') was described as a "time killer" (Ralphs et al., 2017, p. 63). Managing insomnia was also frequently mentioned as a motivation for use (Clua-García et al., 2019). Additionally, drugs were used to help manage the 'pains of imprisonment' (Kolind et al., 2016; Mjåland,

Table 2
Study characteristics for qualitative evidence.

Study	Country	Prisons (*n*)	Sample	Mean age (range)	Sample size (% female)	Outcome Drug examined (multiple or specific)	Measurement of drug use in prison	Study quality
Baker (2015)*	UK	1	General	20 s –30s	4 (0 %)	Synthetic cannabinoids	Ever	High
Clua-García et al. (2019)	Spain	1	General	24–25	29 (26.1 %)	Multiple	Ever	High
Cope (2000)**	UK	1	General	15–21	30 (0 %)	Cannabis	NR	Mod
Culbert et al. (2015)*	Indonesia	2	HIV positive	31.3	102 (0 %)	NR (IDU)	Ever	High
Dillon (2001)	Ireland	1	General	19–43	29 (NR)	Heroin and cannabis	Ever	High
Inciardi et al. (1993)	USA	2	Drug treatment	NR	18 (NR)	Multiple	Ever	Low
Kolind et al. (2016)	Denmark	8	Drug treatment	NR	51 (NR)	Multiple	Ever	High
Mjåland (2016)	Norway	1	Drug rehabilitation	25–45	23 (0 %)	NR	NR	Mod
Ralphs et al. (2017)	UK	1	In treatment or caught dealing drugs	mid 20 s –50s	27 (0 %)	Synthetic cannabinoids	Ever	High
Woodall (2011)	UK	3	General	NR	36 (NR)	NR	Ever	High

NR = Not reported, * = Mixed methods study, **same sample as Cope (2003), study quality: mod = moderate.

2016). Using drugs was seen as "an escape from reality, an escape from jail, an escape from life, things like that" (Dillon, 2001, p. 73) as well as to avoid experiencing certain emotions (Clua-García et al., 2019). Studies highlighting this theme were mostly high-quality (k = 5, 83.3 %).

Other studies highlighted the unique social culture of prisons as key for understanding drug use. Using drugs in prison represented a way to gain social cohesion, as one participant explained it meant other people in prison "respect you in a completely different way" (Mjåland, 2016, p. 159). Drug use was also part of marking life events with others (Clua-García et al., 2019; Mjåland, 2016). Peer pressure was cited as leading to drug use (Baker, 2015), especially when people had been successful at stopping their drug use in prison, others seemed to target them to re-use (Woodall, 2011). For some, drug use was felt to be an act of defiance against the prison (Baker, 2015; Kolind et al., 2016; Mjåland, 2016). Most studies that examined social culture were considered high-quality (k = 4, 80.0 %), with one being rated as moderate (20.0 %).

The influence of pre-prison drug use was identified in several studies (Cope, 2000; Dillon, 2001; Ralphs et al., 2017; Woodall, 2011), the majority of which (k = 3, 75.0 %) were high-quality, with drug use in prison being described as a continuation of pre-prison use. Those who found it harder to resist drugs in prison were noted to likely have a history of substance misuse (Cope, 2000; Woodall, 2011)' especially heroin and/or crack cocaine (Dillon, 2001; Ralphs et al., 2017).

Finally, studies highlighted the influence of the wider prison culture. Drugs were described as acceptable and normalised in prison. One participant stated, "I don't think officers really care about you smoking drugs" (Cope, 2000, p. 357) and another explained "we use drugs here in the open space… it's normal… it can be anywhere" (Culbert et al., 2015, p. 21). This open culture was identified as a factor that increased the chances of using drugs despite intentions to abstain (Baker, 2015; Kolind et al., 2016; Woodall, 2011). Furthermore, there seemed to be little concern with being caught and therefore the illegal nature of drug use in prison did not seem to influence decisions to use (Inciardi et al., 1993). Moreover, the choice of drugs was also described to be shaped by the prison environment. Cocaine or amphetamines were not seen as desirable in a prison setting (Clua-García et al., 2019; Kolind et al., 2016) whereas the effects of cannabis were better suited to the environment and easier to hide the effects of (Kolind et al., 2016). Similarly, synthetic cannabinoids were often chosen due to being undetectable on mandatory drug testing (Baker, 2015; Ralphs et al., 2017). Furthermore, due to the limited and unreliable nature of drug trafficking into prison, people in prison who used drugs were more likely to inject drugs to maximise the effects of their limited drug supply (Dillon, 2001). Most (k = 7, 77.8 %) of the studies that identified the influence of the prison culture were of high-quality.

Discussion

To our knowledge, this is the first systematic review of factors associated with drug use in prison. We synthesised data on 54 studies, reporting on 49 unique samples with a total of 26,399 people in prison. By summarising quantitative and qualitative evidence from both published and grey literature across 18 countries and spanning 35 years, this review represents a comprehensive overview of the evidence.

Data synthesis

Broadly speaking, the quantitative and qualitative studies identified factors associated with drug use in prison that can be understood as modifiable and non-modifiable.

Non-modifiable factors found in high-quality studies included drug use before entering prison, in varied frequencies and durations. Qualitative studies corroborated this, noting that those using drugs in prison were likely to have also used outside prison. This underscores previous findings that in-prison drug use commonly represents the continuation of pre-prison drug use (Favril, 2023; Strang et al., 2006). Nearly a third of quantitative studies found that people who had previous CJS involvement were more likely to use drugs in prison and this appeared to be especially the case among those with a history of committing substance related crimes, for example being under the influence of drugs at the time of the crime or offending to obtain drugs. Together, our review suggests that in-prison drug use can be partly understood as related to vulnerability profiles that people 'import' into prison. Quantitative studies, including those of high-quality, found that the risk of drug use in prison increased the longer people had been incarcerated.

There were two main modifiable areas associated with drug use in prison. First, psychiatric morbidity was positively associated with drug use in mixed quality quantitative studies. However, qualitative studies of high-quality corroborated this by highlighting the use of drugs in prison to cope with negative emotions. Second, prison conditions were identified to be associated with drug use in both quantitative and qualitative studies. High-quality qualitative studies emphasised drug use as a method to manage boredom, excess time and insomnia. Taken together with findings above related to time spent in prison, this suggests that long periods of time in unstimulating prison conditions encourages people to seek out alternative ways to pass the time. Furthermore, qualitative studies highlighted the open, normalised and sometimes pressured nature of drug use. Drug use in prison can be understood broadly as a coping mechanism to mitigate not only individual

distress but also the adverse prison environment characterised by deprivation. Therefore, people's wellbeing and prisons themselves can be understood as creating further susceptibility to drug use in prison, presenting opportunities to intervene and reduce in-prison drug use.

Overall, the convergence of evidence relating to key modifiable and non-modifiable factors highlight the importance of including both quantitative and qualitative research in the review which examine different elements of drug use in prison as this enabled a triangulation of findings across these different methodologies.

Limitations of the literature and directions for future research

Our findings should be interpreted in light of the limitations of the extant literature. All studies relied on self-report data for drug use in prison. While a recent meta-analysis found that self-reports of drug use can be reliable and valid within criminal justice populations (Bharat et al., 2023), there may be additional influences of the prison setting which prevent accurate reporting.

Most studies were cross-sectional in design which means that while findings provide insight into relationships between variables, conclusions about directionality cannot be drawn. For example, psychological distress could be a *reason* for and/or a *consequence* of drug use. Given the lack of longitudinal studies, future research should utilise this method to further understand the direction of associations.

A quarter of studies also set inclusion criteria which further limited the sample such as a history of IDU or soon-to-be-released status. Future research should focus on specific sampling and reporting of participants related to particular variables of interest (e.g. females, European prisons), frequency (e.g. initiated, habitual) and drugs (e.g. heroin, synthetic cannabinoids) in order to better summarise specific factors associated with drug use in these subgroups. Similarly, drug use in prison was operationalised very differently across studies. Some studies included substances which are not considered illicit such as alcohol (although prohibited in prisons), while others focused on specific types of drugs. Utilising standardised measures in further research would help to improve comparability across findings (Carpentier et al., 2018).

Overall, the majority ($k = 36$, 72.0 %) of studies included here were rated as low or moderate-quality, indicating possible bias in the results reported. The quality assessments highlighted weaknesses due to limited information regarding non-respondents in quantitative studies and a lack of transparency with analysis methods or a consideration of the relationship between researcher and participant in qualitative studies. Given that all quantitative studies were self-report, data on non-respondents would enable an assessment of the degree to which the sample are biased or skewed in some way. Furthermore, there exists an inherent power imbalance between people who are in prison and researchers which may impact on people's choice to participate (Abbott et al., 2018). Closer consideration of the relationship between participants and researchers was missing from qualitative studies and would strengthen transparency and reflexivity regarding research in custodial environments.

Limitations of the review

We were not able to examine associations with the use of specific drugs, nor could we consider the influence of frequency of use. This was because most studies did not differentiate frequencies or types of illicit drug use, coding drug use dichotomously as used in prison or not. However, we recognise that occasional versus daily use or the presence of drug use disorders are likely to have different predictors or reasons for use. We could not comment on differences between prison types or sex/gender differences due to limited provision of this information but are aware that drug use may differ depending on the setting and this behaviour requires a gender-responsive approach (Messina, 2021). We also did not examine differences between countries but acknowledge the possible influence of societal and drug policy factors (Carpentier et al., 2018) on drug use in prison, for example, noting the increase in synthetic cannabinoid use in the UK (Baker, 2015; Craft et al., 2023; Lafortune et al., 2021). Furthermore, as we were unable to conduct a meta-analysis, it was not possible to comment on the strength of association between the factors identified and drug use in prison. Future studies could assess which non-modifiable and modifiable factors are the most impactful. Therefore, while this review provides a broad synthesis of the factors related to drug use in prison, we are unable to comment on whether the factors identified are relevant for all types of using frequencies, drugs, prisons, genders and countries or which factors have the strongest relationship to drug use in prison.

Implications

This review suggests that there are several static, non-modifiable characteristics associated with drug use in prison identified in high-quality studies such as pre-prison drug use, time spent in prison and previous criminal justice contact. Such factors could be screened for upon reception to prison, utilising screening tools such as the Drug Use Disorder Identification Test (DUDIT; Pape et al., 2022), in order to identify those who may require additional support and services to prevent or manage drug use in prison.

Furthermore, the non-modifiable characteristics identified, such as previous criminal justice contact, including substance-related offending, and time spent in prison, also point to populations that may be better suited to diversion schemes such as community sentences with drug rehabilitation requirements (Black, 2021). This was outlined in an independent review for the UK government which highlighted people who use drugs have repeated, short sentences which are rarely restorative and argued for diversions away from prisons as cost-effective and rehabilitative (Black, 2021). Such schemes could provide further opportunities for reducing drug use in prison.

Modifiable factors that appear linked to using drugs in prison are linked to psychiatric morbidity and poor prison conditions. This can be understood in the context of the high prevalence of co-morbid mental health and substance use disorders in prison populations (Baranyi et al., 2022). Qualitative studies clearly emphasised the role that boredom, driven by a lack of purposeful regime, has in acting as a motivator to use substances. By addressing wider contextual and cultural conditions (Duke, 2020) such as increasing opportunities for meaningful activity, improving relationships between staff and those in prison and providing support for mental health difficulties, it could be expected that underlying motivations for drug use, such as boredom and distress, would be reduced, therefore dissipating the demand for drugs. In line with the implications of this review, future research should focus on the effectiveness of whole prison interventions on levels of drug use in prison and associated harms. Given the evidence for the influence of the prison environment on drug use, attention should be paid to those programmes that aim to increase activity and improve relational aspects of the environment such as incentivised substance-free living units.

Conclusion

In conclusion, non-modifiable factors associated with drug use in prison include pre-prison use of drugs, criminal history and time spent in prison, and modifiable factors include the presence of psychiatric morbidity and poor prison conditions. Overall, this evidence suggests that people in prison should be assessed for the risk of using drugs to identify those at greater risk and efforts to improve the environment to increase purposeful activity and meaningful regimes could reduce in-prison drug use.

Ethics approval

No ethical approval was required.

CRediT authorship contribution statement

Alice Austin: Writing – review & editing, Writing – original draft, Validation, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Louis Favril:** Writing – review & editing, Validation, Project administration, Methodology, Investigation, Data curation. **Sam Craft:** Writing – review & editing, Validation, Methodology, Investigation, Data curation, Conceptualization. **Phoebe Thliveri:** Writing – review & editing, Validation, Methodology, Conceptualization. **Tom P Freeman:** Writing – review & editing, Supervision, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data sharing is not applicable to this article as no new data were created or analysed in this review.

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Supplementary materials

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