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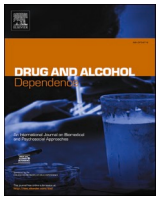

Review

The prevalence and correlates of dual diagnosis among adults in custody: A systematic review and meta-analysis

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ABSTRACT

Background: Incarcerated individuals experience mental illness (MI), substance use disorders (SUD), and their co-occurrence – dual diagnosis – at higher rates than the general population. By systematically reviewing the literature on dual diagnosis in custody, we aimed to (1) estimate the pooled prevalence of dual diagnosis among adults in custody, and (2) identify the psychosocial, health-related, and criminal justice correlates of dual diagnosis.

Method: We searched CINAHL, CINCH, Embase, Medline, PsycINFO, and Web of Science for studies investigating dual diagnosis among adults in custody. We also conducted backward citation chaining of a previous systematic review of dual diagnosis in Australian prisons. We used random-effects meta-analysis to generate a pooled prevalence estimate of dual diagnosis and conducted a narrative synthesis of the identified correlates of dual diagnosis in the literature.

Results: Twenty-five studies met the inclusion criteria; 20 had sufficient data for meta-analysis. The pooled prevalence estimate of dual diagnosis among adults in custody was 25.3 % [95 %CI: 18.6, 32.7]. Correlates of dual diagnosis included illicit substance use before 15 years old, living with someone who used substances before incarceration, violence victimisation, increased suicide risk, and a lifetime history of multiple convictions.

Conclusions: Our findings suggest that approximately one out of every four adults in custody have a dual diagnosis, highlighting the need for coordinated mental health and alcohol and other drug services for justice-involved individuals. It is crucial that correctional healthcare providers have the capacity and resources necessary to address the complex needs of adults with dual diagnosis in custody.

People in prison experience substance use disorders (SUD) at a substantially higher rate than the general population (Fazel et al., 2006, 2017). A systematic review of 18,388 people in custody across 10 countries estimated a pooled prevalence of alcohol use disorder (AUD) of 24 %, and a pooled prevalence of drug use disorder (DUD) of 30 % among incarcerated males and 51 % among incarcerated females (Fazel

Abbreviations: ASD, Autism spectrum disorder; ASPD, Antisocial personality disorder; AUD, Alcohol use disorder; BPD, Borderline personality disorder; DSM, Diagnostic and Statistical Manual of Mental Disorders; DUD, Drug use disorder; HIV, Human immunodeficiency virus; ICD, International Classification of Diseases; MI, Mental illness; PSTD, Post-traumatic stress disorder; SUD, Substance use disorder.

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et al., 2017). By comparison, data from the Global Status Report on Alcohol and Health and Treatment of Substance Use Disorders, and the World Drug Report 2019, estimate a global prevalence of AUD of 7 % and DUD of 0.7 % (United Nations Office on Drugs and Crime [UNODC], 2019; World Health Organization [WHO], 2024).

There is also a disproportionate burden of mental illness (MI) in custodial settings, with prevalence estimates typically two to four times higher in custody than in the general community (Fazel et al., 2016). Major depression affects approximately 4 % of the general population and autism spectrum disorders (ASD) is observed in approximately 0.4 % of the population (GBD 2019 Mental Disorders Collaborators, 2022). In contrast, research estimates indicate that between 9 % and 18 % of incarcerated individuals have major depression, while between 4 % and 9 % have ASD (Fazel and Seewald, 2012; Fazio et al., 2012; Robinson et al., 2012; S. Young et al., 2018). Similarly, approximately 1.5 % of the global population live with attention-deficit hyperactivity disorder (ADHD), compared with between 11 % and 17 % of adults in custody (GBDN, 2020; Gaïffas et al., 2014; Substance Abuse and Mental Health Services Administration [SAMHSA], 2015). The country with the largest prison population in the world, the United States, houses three times more people with MI in prisons than in psychiatric care facilities (Torrey et al., 2010).

1. The co-occurrence of mental illness and substance use disorders

Mental illnesses and substance use disorders commonly co-occur – often termed dual diagnosis – and are strongly associated such that the onset of one diagnosis increases the probability of the other (Conway et al., 2006; Lai et al., 2015). The relationship between MI and SUD is likely bi-directional, often arising against a backdrop of complex needs and social disadvantage (Canaway and Merkes, 2010; Folsom et al., 2005; Todd et al., 2004). Once co-occurrence onsets, MI and SUD reinforce the frequency and severity of symptoms for each other, compounding associated health burden and complicating the treatment and management of either condition alone (Howland et al., 2009; Najt et al., 2011; SAMHSA, 2015). Parallel or referral-based treatment approaches have been found to be suboptimal for treating dual diagnosis; the clinical and psychosocial complexity of dual diagnosis necessitates access to integrated, multidisciplinary mental health care and alcohol and other drug treatment services (Glover-Wright et al., 2023).

Dual diagnosis is more prevalent in correctional settings than in the community, posing a significant challenge for under-resourced criminal justice settings (Regier, 1990; SAMHSA, 2015). At a population level, it is estimated that approximately 4 % of individuals in the US have a dual diagnosis (SAMHSA, 2020). In comparison, a 2019 study of incarcerated adults in the US estimated that approximately 37 % met the criteria for dual diagnosis (James and Glaze, 2006). The prevalence of dual diagnosis is especially high among incarcerated females, with one study of women incarcerated in US state prisons estimating a prevalence rate of 74 % (James and Glaze, 2006). Among adults in custody in Brazil and Australia, cross-sectional studies have produced prevalence estimates of dual diagnosis ranging from 22 % to 25 % (Borschmann et al., 2020). A recent systematic review of 34 studies from 13 countries estimated that 9.1 % of people in prison had co-occurring major depression and SUD, and that 3.5 % had co-occurring nonaffective psychosis and SUD (Baranyi et al., 2022). This review only considered the co-occurrence of SUD with axis 1 disorders and did not account for axis 2 or neurodevelopmental disorders, which are highly prevalent in custodial populations (Baranyi et al., 2022; Rebbapragada et al., 2021; S. Young et al., 2018). Overall, custodial populations experience all forms of dual diagnosis at a rate that is estimated to be five to 18 times higher than in the community; however, the literature has yet to be synthesised.

Within custodial settings, dual diagnosis is associated with an increased risk of suicide, near-lethal self-harm, and prison violence, both as a victim and as a perpetrator (Fazel et al., 2016). Further, individuals with dual diagnosis are almost twice as likely as those without dual diagnosis to return to prison (Grann et al., 2008). Health outcomes for individuals with dual diagnosis after incarceration are also typically poor. In an Australian cohort of adults recently released from custody, individuals with dual diagnosis presented to the emergency department at a rate three times higher than their peers with no mental disorder (J. T. Young et al., 2018). The rate of resultant hospitalisation in this group was 12 times greater than in the general Australian population (J. T. Young et al., 2018).

Despite the very poor outcomes for people with dual diagnosis, both in prison and after their release, the disparate literature regarding the prevalence of all forms of dual diagnosis among adults in prison has yet to be synthesised. Determining the prevalence of dual diagnosis and identifying other common, co-occurring health and social justice needs among adults in custody can help generate hypotheses about causal pathways and identify potential targets for intervention. By undertaking a systematic review of the peer-reviewed literature on the prevalence of dual diagnosis among adults in custody, we aimed to:

1. Estimate the pooled prevalence of all forms of dual diagnosis; and
2. Identify the psychosocial, health-related, and criminal justice factors associated with dual diagnosis among adults in custody.

2. Methods

2.1. Search strategy

We conducted this systematic review in accordance with the Preferred Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021) and registered the protocol with PROSPERO (ID: CRD42022335734). We systematically searched for peer-reviewed literature using six electronic databases: Cumulative Index to Nursing and Allied Health (CINAHL; EBSCOhost), CINCH Australian Criminology Database (Koha), Embase (Ovid), Medline (Ovid), PsycINFO (Ovid), and Web of Science (Clarivate). We searched each database from the date of inception to 21st June 2023. Our search strategy (see Tables S1-S6) was developed in consultation with a research librarian. We used a combination of keywords relating to mental illness (e.g., mental disorder*, psychiatric disorder*), substance use disorders (e.g., addict*, substance depend*), and their cooccurrence (e.g., comorbid*, coexist*) and custodial settings (e.g., prison*, incarcerat*).

For studies that measured both MI and SUD but did not report the prevalence of their co-occurrence, we made two attempts to contact study authors to source relevant data. If no response was received, we excluded the study. We did not include systematic reviews as primary research; however, we screened the list of studies included in relevant reviews to identify any primary studies that may have been missed in our database searches. We also manually screened the reference lists of potentially eligible studies to identify any relevant articles.

2.2. Study eligibility and selection

Studies were included if they (a) involved adults in prison or jail, either sentenced or in pre-trial detention (i.e., remand), (b) were a peer-reviewed, quantitative, observational study, reported in English, and (c) reported the rate of MI and SUD that had been diagnosed in accordance with International Classification of Diseases (ICD) or Diagnostic and Statistical Manual of Mental Disorders (DSM) diagnostic criteria (American Psychiatric Association, 2013; WHO, 2019). Studies were excluded if they involved selected samples (e.g., incarcerated adults with HIV) or relied on self-reported MI or SUD diagnoses alone.

We imported all articles identified by our search into EndNote 20 (The EndNote Team, 2013) and removed any duplicates. The lead author (NT) used Rayyan to screen all article titles and abstracts in line with the inclusion criteria to identify potentially eligible studies

(Ouzzani et al., 2016). A second researcher independently screened 10 % of article titles and abstracts to ensure that the inclusion criteria were being applied consistently. Any discrepancies were resolved through discussion and the determination to include or exclude articles was made through consensus. The lead author reviewed the full text of all potentially eligible articles against the inclusion criteria to assess suitability for inclusion in the review.

2.3. Data extraction

The lead author independently extracted the data from the final sample of included studies using a pre-specified Excel spreadsheet. Data extracted included the location of the study, type of correctional facility, number and characteristics of participants, sampling frame and strategy, the diagnostic criteria employed, and how the study defined dual diagnosis (Table 1).

The lead author extracted correlates of dual diagnosis into three domains defined *a priori*: psychosocial, health-related, and criminal justice. These domains were informed by those reported in the literature as potentially being associated with dual diagnosis among adults in custody (Baillargeon et al., 2010; Peters et al., 2015).

Although our aim was to estimate the prevalence of the co-occurrence of any MI with any SUD, some studies reported on the co-occurrence of specific MIs with specific SUDs (e.g., major depression and cannabis dependence). We included these studies and intended to conduct separate meta-analyses for studies reporting the co-occurrence of specific MI and/or SUD diagnoses.

2.4. Risk of bias

We used the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Studies Reporting Prevalence Data to assess the methodological quality of included studies (Munn et al., 2015). This appraisal evaluates the extent to which a study has addressed the possibility of bias in nine areas of design, conduct, and analysis (Munn et al., 2015). The lead author reviewed included studies across the nine domains and assigned a score from 0, indicative of an increased risk of bias, to 2, indicative of a lower risk of bias, for each domain. A total score out of 18 for each study was generated, with higher scores signifying a lower possibility of bias. The JBI scores for each study are reported in Table 1.

2.5. Statistical analyses

We performed a random-effects meta-analysis of proportions using Freeman-Tukey transformations (Miller, 1978) specified with Wilson-Score 95 % confidence intervals (Barker et al., 2021). We quantified heterogeneity using the I^2 measure (Higgins et al., 2003). To examine heterogeneity in the operational definition of dual diagnosis, we conducted six post-hoc sub-group analyses. We defined dual diagnosis as the co-occurrence of specific ICD-10 (WHO, 2004) diagnostic sub-categories of mental illness with any SUD (i.e., where the specific substance was not reported), any DUD (e.g., cannabis use disorder, opioid use disorder), or any AUD. These meta-analyses generated pooled proportion estimates for each dual diagnosis sub-group, with respective 95 % confidence intervals (95 %CI). To assess if any individual study significantly influenced the results of our primary pooled prevalence estimate, we conducted leave-one-out sensitivity analyses.

We used Stata version 18.0 to conduct all analyses (StataCorp, 2023).

2.6. Narrative synthesis

As not all included studies provided data suitable for meta-analysis, we conducted a narrative synthesis of six studies to ascertain the correlates of dual diagnosis. Our narrative synthesis was underpinned by the guidance and principles outlined by the Economic and Social Research Council Methods Program (Popay et al., 2006). These guidelines help authors to systematically analyse and integrate the results of included studies, and to form conclusions based on the body of evidence (Popay et al., 2006).

3. Results

3.1. Search Results

Fig. 1 provides a PRISMA flowchart for our search results. Our search returned 4548 potentially eligible articles, 2043 of which were removed as duplicates. In total, 2505 titles and abstracts were systematically screened using Rayyan (Ouzzani et al., 2016), and 2345 articles were excluded after title and abstract screening. One hundred and fifty-nine full-text articles were screened, and 25 articles met the inclusion criteria for this systematic review. Twenty of these studies provided sufficient data for meta-analysis, six of which contributed multiple data points to the subgroup meta-analyses.

3.2. Characteristics of included studies

Table 1 provides a summary of the articles included in our study. The 25 articles included in our study comprise a total of 118,513 participants, from nine countries, across five continents. Almost one quarter of these participants (23.7 %) were in the US.

A total of 23 studies were based on survey data, all of which were cross-sectional, and the remaining two used retrospective data linkage methods. Studies were published between 1988 and 2023. The population size for the studies ranged from 56 to 50,861. Most studies ($n = 13$) used DSM-IV diagnostic criteria to ascertain diagnoses of MI and SUDs, with another four using DSM-III diagnostic criteria (APA, 2022). One study used DSM-V diagnostic criteria. Five studies used ICD-10 and two studies used ICD-9 diagnostic criteria (WHO, 2019).

Eleven studies ascertained the prevalence of any MI and any SUD. Eight of these studies reported the prevalence of MI only and SUD only or reported enough information to permit calculation of these rates. The other three studies did not report enough data to permit calculation of rates of MI only and/or SUD only. The prevalence rates for studies that examined all diagnoses are presented in Table 2. Fifteen studies reported on the co-occurrence of specific MIs with specific SUDs (e.g., major depression and opioid use disorder; major depression and cannabis use disorder). The prevalence rates for studies that reported on the co-occurrence of specific MIs with specific SUDs are presented in Table 3.

3.3. Prevalence of dual diagnosis

3.3.1. The co-occurrence of any MI with any SUD

The overall pooled prevalence estimate for dual diagnosis among adults in custody, when considering any MI and any SUD, was 25.3 % [95 %CI: 18.6, 32.7]. There was a very high level of heterogeneity among the included studies ($I^2 = 99.8$ %). The prevalence estimates for the included studies ranged from 5.0 % [95 %CI: 4.7, 5.4] to 56.0 % [95 %CI: 48.0, 63.7]. The individual prevalence estimates and overall pooled prevalence estimate for studies that ascertained all diagnoses are depicted in Fig. 2. The leave-one-out sensitivity analysis revealed that no individual study significantly influenced the results of our pooled prevalence estimate. The results of this analysis are shown in Figure S7.

3.3.2. The co-occurrence of a specific MI with any SUD, any DUD, or any AUD

The pooled prevalence estimates for specific sub-group analyses among adults in custody ranged from 9.8 % [95 %CI: 2.3, 21.6] to 31.0 % [95 %CI: 14.1, 51.1]. The overall prevalence estimates for studies that ascertained only specific diagnoses are displayed in Table 4. See Table S7 for a full prevalence estimate matrix. The results of the leave-one-out sensitivity analyses for these subgroups are shown in Figure S8 to Figure S13.

Table 1
Characteristics of included studies.

Study	Location	Type of custodial facility	Sample size	Sex	Sampling frame	Sample	Diagnostic criteria	Dual diagnosis	JBI score[a]
Abram et al., (2003)	Illinois, USA	Jail	1272	100 % female	All females in Cook County Department of Corrections jail intake; sampling period dates not reported.	Randomly selected female arrestees, stratified by charge (misdemeanour, felony) and race (African American, non-Hispanic white, Hispanic), who consented to participate.	DSM-III	Co-occurring severe psychiatric disorder and SUD; period prevalence – 2 weeks.	15/18
Barrett et al., (2021)	North Carolina, USA	Jail	349	100 % male	All males booked into the facility within the preceding four days; sampling period dates not reported.	Randomly selected males, who were processed into the jail within the preceding 24–96 hours and consented to participate.	DSM-V	Co-occurring PTSD or panic disorder and SUD; period prevalence – 12 months.	13/18
Bebbington et al., (2017)	London, UK	Prison	368	53.5 % male 46.5 % female	All individuals incarcerated in Pentonville Prison and Holloway Prison between September 2007 and December 2009.	Randomly selected individuals from four groups: male remand, male sentenced, female remand, female sentenced, who consented to participate.	ICD−10	Co-occurring MI and alcohol or drug dependency; lifetime prevalence.[b]	15/18
Black et al., (2010)	Iowa, USA	Classification centre	320	82.5 % male 17.5 % female	All newly incarcerated individuals undergoing intake assessment at the Iowa Medical and Classification Centre; sampling period dates not reported.	Randomly selected individuals from daily census roster of incoming offenders, who consented to participate.	DSM-IV	Co-occurring ASPD and any SUD; lifetime prevalence.	14/18
Butler et al., (2011)	New South Wales, Australia	Prison	270[d]	100 % female	All females in correction centres in New South Wales over a 4-month period in 2001.	Consecutively admitted females, who consented to participate in the 2001 NSW Inmate Health Survey.	DSM-IV and ICD−10	Co-occurring ICD−10 SUD and any mental disorder; period prevalence – 12 months and 1 month.	13/18
Chaplin et al., (2021)	London, UK	Prison	240	100 % male	Males ($N = 378$) imprisoned across four wings of a London prison, and all newly incarcerated males arriving in the past 4 weeks; sampling period dates not reported.	Males who consented to screening and subsequent diagnostic assessment.	ICD−10	Co-occurring ASD and alcohol or drug dependency; point prevalence.	15/18
Chapman and Cellucci, (2007)	Idaho, USA	Prison	105	100 % female	All females incarcerated in a multilevel women's prison; sampling period dates not reported.	Females who responded to pamphlets posted in cell blocks and consented to participate.	DSM-IV	Co-occurring BPD or ASPD and alcohol or drug dependence; lifetime prevalence.[b]	13/18
Collins et al., (1988)	North Carolina, USA	Prison	1149	100 % male	Consecutive admissions across five reception centres ($N = 1327$) between March and May 1983.	Males who consented to be interviewed and were not physically or mentally incapacitated.	DSM-III	Co-occurring ASPD and alcohol or drug dependency; lifetime prevalence.	15/18
Côté and Hodgins, (1990)	Quebec, Canada	Prison	495	Not reported	Random sample, controlled for facility and age, of individuals ($N = 650$) in penitentiaries situated in Quebec in April 1988.	Individuals who consented to participate.	DSM-III	Co-occurring SMI (bipolar disorder, schizophrenia, major depression, atypical bipolar disorder) and alcohol or drug	9/18

(*continued on next page*)

Table 1 (*continued*)

Study	Location	Type of custodial facility	Sample size	Sex	Sampling frame	Sample	Diagnostic criteria	Dual diagnosis	JBI score[a]
								dependence; lifetime prevalence.	
Denton, (1995)	Victoria, Australia	Prison	56	100 % female	All females in Fairlea Prison, Melbourne, at midnight on an appointed date in 1991.	Females yielded by a midnight census, who consented to participate.	DSM-III	Co-occurring SMI (major mood disorders, dysthymia, schizophrenia, psychotic disorders) and substance dependence disorder; point and lifetime prevalence.	15/18
Gates et al., (2017)	East South Central region[c], USA	Prison	10,988	90.1 % male 9.9 % female	All individuals imprisoned between June 1, 2005 and December 31, 2010 and had records in the electronic health and offender management systems.	All individuals imprisoned between June 1, 2005 and December 31, 2010 and had records in the electronic health and offender management systems.	ICD−9	Co-occurring SUD and mental health disorder (bipolar, anxiety, depression, psychotic); lifetime prevalence.[b]	17/18
McNiel et al., (2005)	California, USA	Jail	12,934	79.5 % male 17.6 % female	All individuals who entered the San Francisco County Jail system between January 1 and June 30, 2000.	All individuals who entered the San Francisco County Jail system between January 1 and June 30, 2000.	DSM-IV	Co-occurring MI and SUD; point prevalence.	13/18
Mir et al., (2015)	Berlin, Germany	Prison admission facility	150	100 % female	All females imprisoned in the central prison admission facility between April 2012 and May 2013.	Females consecutively admitted, who consented to participate.	DSM-IV	Co-occurring mental disorder and one-year prevalence of SUDs (without nicotine).	16/18
Moore et al., (2016)	New South Wales, Australia	Prison	88	76 % male 24 % female	All individuals imprisoned in facilities of interest between January 2011 and June 2012.	Randomly selected individuals from each facility of interest, who consented to participate.	DSM-IV	Co-occurring ADHD and SUD; lifetime prevalence.	15/18
Mundt and Baranyi, (2020)	Santiago, Chile	Prison	427	53.6 % male 46.4 % female	All newly incarcerated individuals ($N = 470$) in the three remand prison facilities serving the metropolitan region of Santiago, Chile, between February and September 2013.	Consecutively admitted individuals, who consented to participate.	DSM-IV	Co-occurring SMI and SUD, psychotic disorder and SUD, or SMI, psychotic disorder, and SUD; lifetime prevalence.	13/18
Nowotny et al., (2014)	South Atlantic[e] and West Mountain[f] regions, USA	Jail	491	100 % female	All females incarcerated across nine local county jails in Maryland, South Carolina, Virginia, Colorado, and Idaho between 2011 and 2012.	Randomly selected females from nine local county jails in Maryland, South Carolina, Virginia, Colorado, and Idaho.	DSM-IV	Co-occurring SMI (major depression, schizophrenia, bipolar) and any SUD; period prevalence – 12 months.	11/18
Piselli et al., (2009)	Umbria, Italy	Prison	302	100 % male	All newly incarcerated males in the Prison of Perugia between August 2005 and July 2006.	Males who consented to participate.	DSM-IV	Co-occurring SUD and psychiatric disorder; lifetime prevalence.[b]	14/18
Piselli et al., (2015)	Umbria, Italy	Prison	526	100 % male	All sentenced males in Spoleto Prison, Perugia between October 2010 and September 2011.	Males who consented to participate and were not leading figures in organised crime.	DSM-IV	Co-occurring SUD and psychiatric disorder; lifetime prevalence.[b]	14/18
Rezansoff et al., (2013)	British Columbia, Canada	Prison	31,014	84.1 % male 15.9 % female	All individuals imprisoned in British Columbia with at least one sentence start date	All individuals imprisoned in British Columbia with at least one sentence start date between April 1, 2005	ICD−9	Co-occurring non-substance mental disorder and SUD; period prevalence –	15/18

(*continued on next page*)

Table 1 (*continued*)

Study	Location	Type of custodial facility	Sample size	Sex	Sampling frame	Sample	Diagnostic criteria	Dual diagnosis	JBI score[a]
					between April 1, 2005 and March 31, 2007.	and March 31, 2007, and for whom Medical Services Plan coverage could be confirmed.		5 years prior to index offence.	
Rösler et al., (2009)	Zweibrücken, Germany	Prison	110	100 % female	All females incarcerated at the state prison in Zweibrücken; sampling period dates not reported.	Females who consented to participate.	DSM-IV	Co-occurring ADHD and SUD; lifetime prevalence.	10/18
Svendsen et al., (2023)	Norway	Prison	50,861	89.3 % male 10.7 % female	All individuals imprisoned in Norway between January 1, 2000 and December 31, 2019.	All individuals imprisoned in Norway between January 1, 2000 and December 31, 2019, who also held a valid Norwegian personal identification number.	ICD−10	Co-occurring SUD and at least one other psychiatric disorder from another diagnostic category; lifetime prevalence.	16/18
Tye and Mullen, (2006)	Victoria, Australia	Prison	103	100 % female	All females incarcerated in H.M. P. Tarrengower, Melbourne on March 22, 2000, and all females incarcerated in the Metropolitan Women's Correctional Centre on June 28, 2000.	Females who consented to participate.	ICD−10	Co-occurring mental disorder and drug-related disorder; period prevalence – 12 months.	9/18
Velez-Pastrana et al., (2020)	Puerto Rico, USA	Correctional system	483	100 % male	All males incarcerated in the Puerto Rico Corrections Department between June 2015 and March 2016.	Randomly selected males from eight facilities, who consented to participate and did not have psychosis.	DSM-V	Co-occurring ADHD and SUD; lifetime prevalence.	14/18
Zhu et al., (2017)	Hunan Province, People's Republic of China	Prison	2709	100 % female	All females incarcerated in Hunan Provincial Female Prison from December 1, 2012 to December 30, 2013.	Females who responded to advertisements about the study and consented to participate.	DSM-IV	Co-occurring BPD and SUD; lifetime prevalence.	11/18
Zhong et al., (2020)	Hunan Province, People's Republic of China	Prison	2703	100 % female	All females incarcerated in Hunan Provincial Female Prison from December 1, 2012 to December 30, 2013.	Cluster-sampled females, who consented to participate.	DSM-IV	Co-occurring mental disorder (psychotic, affective, PTSD) and AUD or DUD; lifetime prevalence.	14/18

Note. DSM = Diagnostic and Statistical Manual of Mental Disorders; SUD = substance use disorder; ICD = International Classification of Diseases; MI = mental illness; ASPD = antisocial personality disorder; ASD = autism spectrum disorder; SMI = serious mental illness; ADHD = attention-deficit hyperactivity disorder; PTSD = post-traumatic stress disorder; AUD = alcohol use disorder; DUD = drug use disorder; BPD = borderline personality disorder.

[a] The median JBI score of all included studies was 14/18.

[b] The type of prevalence was not explicitly reported; it has been interpreted as lifetime prevalence.

[c] East South Central region states in this study were Alabama, Kentucky, Mississippi, and Tennessee.

[d] Only the data for females were extracted as the male sample contained participants who were < 18 years old.

[e] The South Atlantic region states in this study were Maryland, South Carolina, and Virginia.

[f] The West Mountain region states in this study were Colorado and Idaho.

3.3.3. Heterogeneity between studies

The I^2 indices for the principal meta-analysis (e.g., co-occurrence of any MI with any SUD) and six sub-group analyses (e.g., specific MI with any SUD, any DUD, or any AUD) were greater than 91 %, with four being greater that 99 %, and all Cochrane's Q heterogeneity tests were $p < 0.0001$. This suggests a large amount of variance between the studies meta-analysed (Huedo-Medina et al., 2006).

3.4. Correlates of dual diagnosis

We identified five correlates associated with dual diagnosis among adults in custody. A summary of the psychosocial, health-related, and criminal justice correlates is provided in Table 5.

3.4.1. Psychosocial correlates

Both studies that measured the age of first substance use found that initiation of substance use before the age of 15 was associated with dual diagnosis (Collins et al., 1988; Piselli et al., 2009). In Collins et al.'s

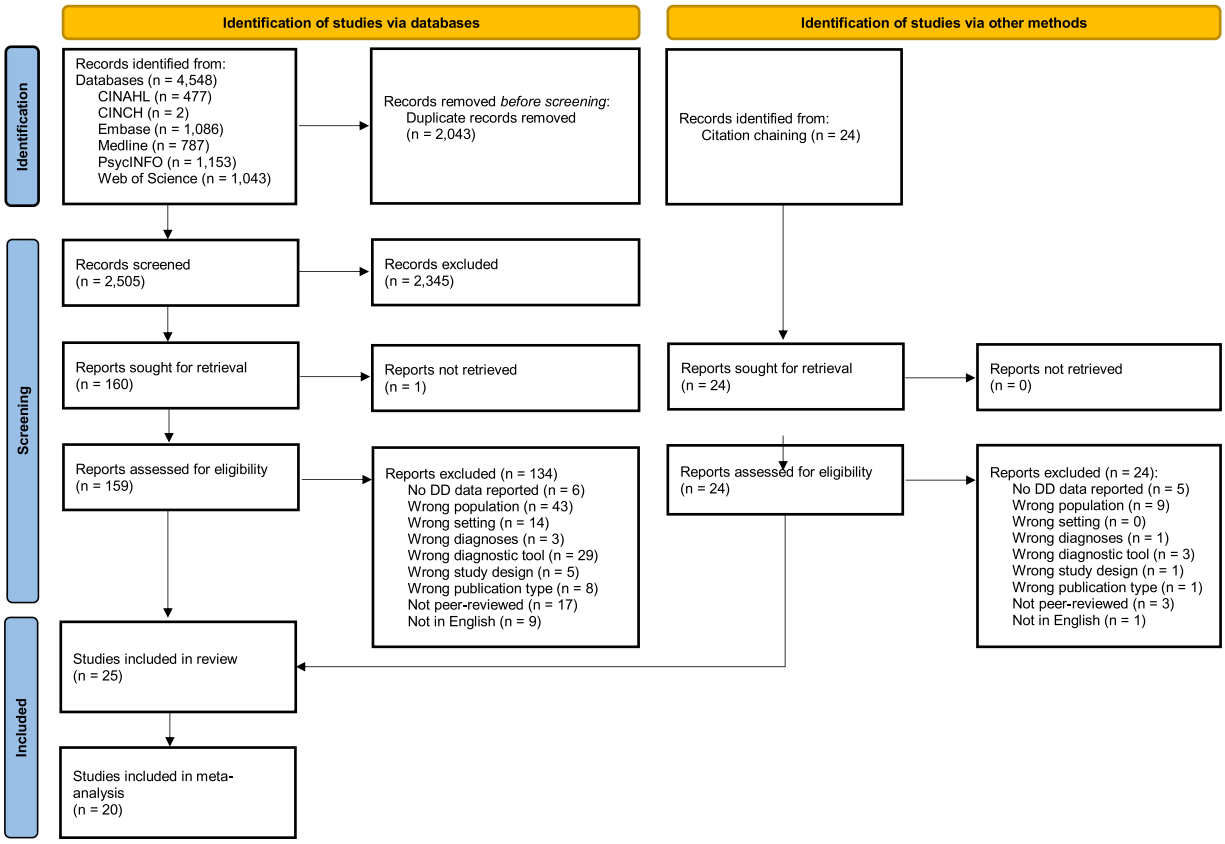

Fig. 1. PRISMA flow chart of search results.

study of incarcerated men in North Carolina, US, between 64 % and 74 % of individuals with a dual diagnosis reported having consumed alcohol or illicit substances before 15 years old (Collins et al., 1988). In Piselli et al.'s study of males in custody in Perugia, Italy, 46 % of individuals with a dual diagnosis had used substances before 16 years old (Piselli et al., 2009). Piselli et al. also found that 37 % of individuals with a dual diagnosis had lived with someone who used psychoactive drugs, which was a significantly larger proportion than among those with only one disorder (10 % of those with a psychiatric disorder only; 29 % of those with a SUD only; Piselli et al., 2009). Similarly, a 2014 study of incarcerated females in the South Atlantic and West Mountain regions of the US found that females with a dual diagnosis were significantly more likely than females with only MI or SUD to have had a family member use substances whilst they were growing up (72 % *vs.* 59 %), and significantly more likely to have had a parent provide them with substances (21 % *vs.* 11 %; Nowotny et al., 2014).

Table 2
Prevalence rates of mental illness only, substance use disorder only, and dual diagnosis reported in included studies that examined all diagnoses (i.e., any mental illness and any substance use disorder).

		Mental Illness Only			Substance Use Disorder Only			Dual Diagnosis		
Study	*N*	*n*	%	95 % CI	*n*	%	95 % CI	*n*	%	95 % CI
Abram et al., (2003)[a]	1272	-	-	-	569[b]	44.7[c]	42.0, 47.5	112[d]	8.8[c]	7.4, 10.5
Butler et al., (2011)[e]	270	41[b]	15.2[c]	11.4, 20.0	62[b]	23.0[c]	18.4, 28.3	124[b]	45.8	40.1, 51.9
Denton, (1995)[f]	56	4[b]	7.1[c]	2.8, 17.0	30[b]	53.6[c]	40.7, 66.0	8	14.3[c]	7.4, 25.7
McNiel et al., (2005)[g]	12,934	-	-	-	-	-	-	650[b]	5.0[c]	4.7, 5.4
Mir et al., (2015)[h]	150	43[b]	28.7[c]	22.0, 36.4	9[b]	6.0[c]	3.2, 11.0	84	56.0[c]	48.0, 63.7
Nowotny et al., (2014)[e]	490	53[b]	10.8[c]	8.4, 13.9	156[b]	31.8[c]	27.9, 36.1	104	21.2[c]	17.8, 25.1
Piselli et al., (2009)[h]	302	20[b]	6.6	4.3, 10.0	81[b]	26.8	22.1, 32.1	63[b]	20.9	16.7, 25.8
Piselli et al., (2015)[h]	526	122[b]	23.2[c]	19.8, 27.0	27	5.1	3.6, 7.4	193[b]	36.7[c]	32.7, 40.9
Rezansoff et al., (2013)[i]	31,014	6532	21.1[c]	20.6, 21.5	2939	9.5[c]	9.2, 9.8	7221	23.3[c]	22.8, 23.8
Svendsen et al., (2023)[f]	50,861	-	-	-	-	-	-	12,967	25.5[c]	25.1, 25.9
Tye and Mullen, (2006)[e]	103	68	66.0	56.4, 74.4	19[b]	18.4[c,f]	12.1, 27.0	41	39.8[c]	30.1, 49.5

[a] 2-week period prevalence.
[b] Raw numbers were estimated using reported percentages.
[c] Percentages were calculated using reported raw data.
[d] Most recently reported data extracted (2006).
[e] 12-month period prevalence.
[f] Lifetime prevalence.
[g] Point prevalence.
[h] The type of prevalence was not explicitly reported; it has been interpreted as lifetime prevalence.
[i] 5-year period prevalence.

Table 3
Prevalence rates of mental illness, substance use disorder, and dual diagnosis reported in included studies that measured specific diagnoses.

Study	*N*	Mental Illness				Substance Use Disorder				Dual Diagnosis			
		Diagnosis	*n*	%	95 % CI	Diagnosis	*n*	%	95 % CI	Diagnosis	*n*	%	95 % CI
Barrett et al., (2021)[a]	349	PTSD	150[b]	43.0	37.9, 48.2	AUD	133[b]	38.0	33.2, 43.3	PTSD and AUD	71[b]	20.3[c]	16.5, 24.9
Bebbington et al., (2017)[d]	368	Psychosis	45	12.2	9.3, 16.0	Alcohol dependence	121[c]	33.1[c]	28.3, 37.8	Depressive disorder and alcohol dependence	116[b]	31.7[e]	27.0, 36.4
		Depressive disorder	197[e]	53.8[e]	48.4, 58.6								
		Anxiety disorder	98 [f]	26.8 [f]	22.4, 31.4								
		Phobias	40[e]	10.9[e]	8.1, 14.5	Drug dependence	210	57.1	52.0, 62.0	Depressive disorder and drug dependence	121[b]	33.1[e]	28.3, 37.8
		Panic disorder	20[c]	5.5[e]	3.5, 8.2								
		PTSD	29 [g]	8.0 [g]	5.5, 11.1								
		Personality disorder	126	34.2	29.6, 39.2								
Black et al., (2010)[d]	320	ASPD	113	35.3[c]	30.3, 40.7	SUD	-	-		ASPD and SUD	111[d]	34.7[c]	29.7, 40.1
Chaplin et al., (2021)[d]	240	ASD	11	4.6[c]	2.6, 8.0	Alcohol dependence	-	-		ASD and alcohol dependence	1	0.42[c]	0.07, 2.3
						Drug dependence	-	-		ASD and drug dependence	2	0.83[c]	0.2, 3.0
Chapman and Cellucci, (2007)[d]	105	ASPD	-	-		Alcohol dependence	58	55.2	45.7, 64.4	ASPD and alcohol dependence	30[b]	28.6[c]	
										BPD and alcohol dependence	14[b]	13.3[c]	
		BPD	-	-		Drug dependence	73	69.5	60.1, 77.5	ASPD and drug dependence	40[b]	38.1[c]	29.4, 47.6
										BPD and drug dependence	21[b]	20.0[c]	13.5, 28.6
Collins et al., (1988)[d]	1149	ASPD	320	28.3	25.3, 30.5	Alcohol dependence	550	49.0	45.0, 50.8	ASPD and alcohol dependence	229	19.9[c]	17.7, 22.3
						Drug dependence	175	15.0	13.3, 17.4	ASPD and drug dependence	91	7.9[c]	6.5, 9.6
Côté and Hodgins, (1990)[d]	490	Schizophrenic disorders[h]	38	7.7	5.7, 10.5	Alcohol dependence	330	66.9	63.1, 71.4	Schizophrenic disorders[h] and alcohol dependence	28	5.7[c]	4.0, 8.1
		Bipolar disorder	17	3.4	2.2, 5.5					Bipolar disorder and alcohol dependence	11	2.2[c]	1.3, 4.0
		Atypical bipolar disorder	16	3.2	2.0, 5.2					Atypical bipolar disorder and alcohol dependence	9	1.8[c]	1.0, 3.5
		Major depression	73	14.8	12.0, 18.3	Drug dependence	241	48.9	44.8, 53.6	Major depression and alcohol dependence	61	12.4[c]	9.8, 15.7
										ASPD and alcohol dependence	225	45.9[c]	41.6, 50.4
		ASPD	303	61.5	57.5, 66.2					Schizophrenic disorders[h] and drug dependence	26	5.3[c]	3.6, 7.7
										Bipolar disorder and drug dependence	13	2.7[c]	1.6, 4.5
										Atypical bipolar disorder and drug dependence	13	2.7[c]	1.6, 4.5
										Major depression and drug dependence	42	8.6[c]	6.4, 11.4
										ASPD and drug dependence	180	36.7[c]	32.6, 41.1
Gates et al., (2017)[d]	10,988	Anxiety disorder	972	8.9	8.3, 9.4	Alcohol SUD	652	5.9	5.5, 6.4	Depression and alcohol SUD	78	0.71[c]	0.6, 0.9
		Bipolar disorder	277	2.5	2.2, 2.8								
		Depression	1098	10.0	9.4, 10.6	Cannabis SUD	747	6.8	6.3, 7.3	Depression and cannabis SUD	60	0.55[c]	0.4, 0.7
		Psychotic disorder	315	2.9	2.6, 3.2								

(*continued on next page*)

Table 3 (*continued*)

Study	*N*	Mental Illness				Substance Use Disorder				Dual Diagnosis			
		Diagnosis	*n*	%	95 % CI	Diagnosis	*n*	%	95 % CI	Diagnosis	*n*	%	95 % CI
Moore et al., (2016)[d]	88	ADHD	15	17.0	10.6, 26.2	Alcohol dependence	42[b]	47.7	37.6, 58.0	ADHD and alcohol dependence	10[b]	11.4[c]	6.3, 19.7
						Stimulant dependence	38[b]	43.2	33.3, 53.6	ADHD and stimulant dependence	10[b]	11.4[c]	6.3, 19.7
						Cocaine dependence	18[b]	20.5	13.4, 30.0	ADHD and cocaine dependence	3[b]	3.4[c]	1.2, 9.6
						Opioid dependence	32[b]	36.4	27.1, 46.8	ADHD and opioid dependence	9[b]	10.2[c]	5.5, 18.3
						Ecstasy dependence	11[b]	12.5	7.1, 21.0	ADHD and ecstasy dependence	4[b]	4.5[c]	1.8, 11.1
						Cannabis dependence	45[b]	51.1	40.1, 61.3	ADHD and cannabis dependence	11[b]	12.5[c]	7.1, 21.0
						Benzodiazepine dependence	18[b]	20.5	13.4, 30.0	ADHD and benzodiazepine dependence	8[b]	9.1[c]	4.7, 16.9
						Any illicit drug dependence	59[b]	67.0	56.7, 76.0	ADHD and any illicit drug dependence[i]	13[b]	14.8[c]	8.8, 23.7
Mundt and Baranyi, (2020)[d]	427	Psychosis	68	15.9	12.8, 19.7	SUD	237	55.5	50.8, 60.2	Psychosis and SUD	59	13.8	10.9, 17.4
		Major depression	233	54.6	49.8, 59.2					Major depression and SUD	153	35.8	31.4, 40.5
		BPD	216	50.6	45.9, 55.3					BPD and SUD	170	39.8	35.3, 44.5
		ASPD	126	29.5	25.4, 34.0					ASPD and SUD	111	26.0	22.1, 30.4
Rösler et al., (2009)[d]	110	ADHD	27[b]	24.5	17.5, 33.4	SUD	66[b]	60.0[c]	50.7, 68.7	ADHD and SUD	22[b]	20.0[c]	13.6, 28.4
Svendsen et al., (2023)[a]	5429 [k]	Depressive and mood disorders	1571	27.0	27.8, 30.2	SUD	3031	56.0	54.5, 57.2	Major depression and SUD	940	17.3[c]	16.3, 18.3
		Non-affective psychosis	378	7.0	6.3, 7.7					Non-affective psychosis and SUD	320	5.9[c]	5.3, 6.6
		Phobia and anxiety disorders	1254	23.0	22.0, 24.2					Phobia and anxiety disorders and SUD	454	8.4[c]	7.7, 9.1
		Stress and adjustment disorders	1571	29.0	27.8, 30.2					Stress and adjustment disorders and SUD	459	8.5[c]	7.7, 9.2
		Bipolar disorders	292	5.4	4.8, 6.0					Bipolar disorders and SUD	88	1.6[c]	1.3, 2.0
		Eating disorders	154	2.8	2.4, 3.3					Eating disorders and SUD	49	0.9[c]	0.7, 1.2
		Somatoform and other disorders	117	2.2	1.8, 2.6					Somatoform and other disorders and SUD	36	0.7[c]	0.5, 0.9
Velez-Pastrana et al., (2020)[d]	483	ADHD	82	17.0	13.9	SUD	358	74.1	70.0, 77.8	ADHD and SUD	69	14.3[c]	11.5, 17.7
Zhong et al., (2020)[d]	2703	Psychotic disorder	100[b]	3.7	3.1, 4.5	AUD	138[b]	5.1	4.3, 6.0	Psychotic disorder and AUD	243[b]	9.0	8.0, 10.1
										Any affective disorder [j] and AUD	151[b]	5.6	4.8, 6.5
		Any affective disorder [j]	1003[b]	37.1	35.3, 39.0					PTSD and AUD	695[b]	25.7	24.1, 27.4
						DUD	592[b]	21.9	20.4, 23.5	Psychotic disorder and DUD	1000[b]	37.0	35.2, 38.8
		PTSD	600[b]	22.2	20.7, 23.8					Any affective disorder [j] and DUD	562[b]	20.8	19.3, 22.4
										PTSD and DUD	454[b]	16.8	15.4, 18.3
Zhu et al., (2017)[d]	2709	BPD	288	10.6[c]	9.5, 11.9	SUD	701	25.9	24.3, 27.6	BPD and SUD	166[b]	6.1[c]	5.3, 7.1

Note. PTSD = post-traumatic stress disorder; AUD = alcohol use disorder; ASPD = antisocial personality disorder; ASD = autism spectrum disorder; BPD = borderline personality disorder; DUD = drug use disorder.

[a] 12-month period prevalence.
[b] Raw numbers were estimated using reported percentages.
[c] Percentages were calculated using reported raw numbers.
[d] Lifetime prevalence.
[e] Sample size is 366.
[f] Sample size is 365.
[g] Sample size is 363.
[h] Schizophrenic disorders include schizophrenia and schizophreniform disorder.

[i] This was excluded from the meta-analysis as "any illicit drug dependence" could not be matched with an ICD diagnostic code.
[j] Affective disorders include major depression, dysthymia, and hypomania.
[k] Only the female sample included data relating to specific diagnoses.

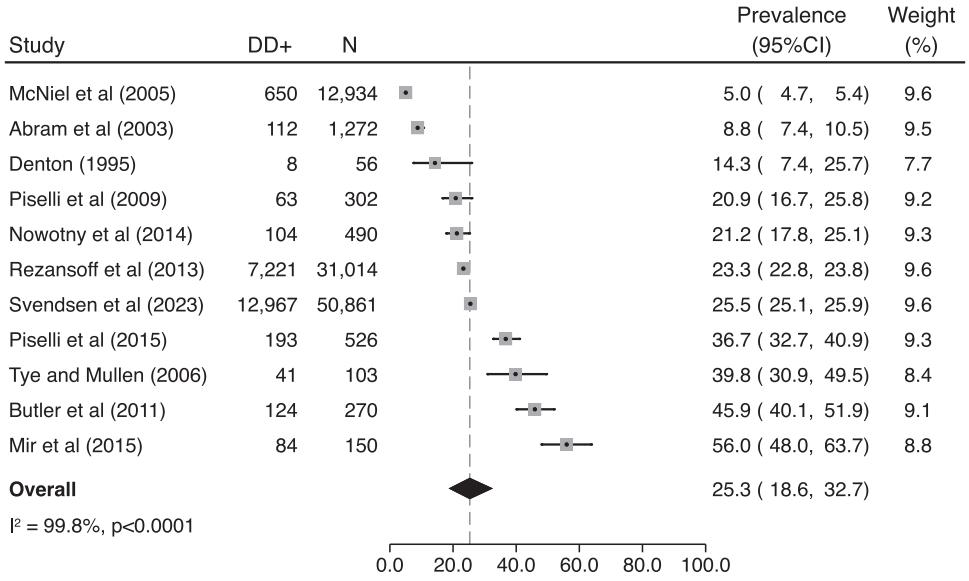

Fig. 2. *Pooled prevalence estimate of any mental illness and any substance use disorder. Note.* DD+ = dual diagnosis positive; N = total sample size; 95 %CI = 95 % confidence interval. p-value reported is derived from Cochrane's Q heterogeneity test.

A notable finding in the Piselli study was that nearly half (48 %) of individuals with a dual diagnosis had severe social/familial impairment, and this was significantly more prevalent among those with dual diagnosis than in other diagnostic groups (Piselli et al., 2009). Over one third (35 %) of individuals with a dual diagnosis had been victims of emotional, sexual, or physical violence. The theme of violence victimisation was also apparent in the Nowotny et al. study (Nowotny et al., 2014). In this sample, females with a dual diagnosis in American county jails were 2.5 times more likely to report having been sexually assaulted or raped in their lifetime, compared to females without a dual diagnosis. Females with a dual diagnosis were also significantly more likely than females without a dual diagnosis to report having experienced multiple forms of violence, including physical abuse by a family member (87 % *vs*. 72 %), intimate partner violence (78 % *vs*. 67 %), and rape (81 % *vs*. 57 %; Nowotny et al., 2014). In other words, 9 in 10 incarcerated females with a dual diagnosis in this sample had experienced physical abuse by a family member, and 8 in 10 had experienced intimate partner violence and rape.

3.4.2. *Health-related correlates*

The only health correlate of dual diagnosis reported in the literature was the increased risk of suicide in prison. In Gate et al.'s study of suicide risk among incarcerated males in the US, individuals with depression and co-occurring alcohol or cannabis use disorder were more likely to attempt suicide whilst incarcerated compared to those who had these SUDs without co-occurring depression (Gates et al., 2017). Similar patterns were seen in Piselli et al.'s sample (Piselli et al., 2009). Of the individuals with a dual diagnosis, 25 % had serious thoughts of suicide in the preceding 30 days, significantly higher than among those with only one disorder (10 % of those with a psychiatric disorder only; 11 % of those with a SUD only). Additionally, 10 % of individuals with a dual diagnosis had attempted suicide in the preceding 30 days, which was also significantly higher than among individuals without a dual diagnosis (5 % of those with a psychiatric disorder only; 4 % of those with a SUD only).

Table 4
Pooled prevalence estimates of dual diagnosis in included studies.

Diagnosis	Any Substance Use Disorder			Any Drug Use Disorder			Any Alcohol Use Disorder		
	Prevalence %	95 % CI	I^2 (%)	Prevalence %	95 % CI	I^2 (%)	Prevalence %	95 % CI	I^2 (%)
Any Mental Illness	25.4[a]	15.9, 36.3	99.7	-	-	-	-	-	-
Schizophrenia, Schizotypal, and Delusional Disorders	-	-	-	-	-	-	-	-	-
Mood Disorders	-	-	-	12.6[b,c]	0.8, 35.0	99.8	9.8[b,d]	2.3, 21.6	99.5
Neurotic, Stress-Related, and Somatoform Disorders	-	-	-	-	-	-	-	-	-
Personality Disorders	24.7[b,d]	3.9, 55.4	99.5	25.7[b,d]	5.8, 53.3	99.1	31.0[b,d]	14.1, 51.1	98.2
Pervasive and Specific Developmental Disorders	-	-	-	-	-	-	-	-	-
Behavioural and Emotional Disorders	-	-	-	-	-	-	-	-	-

Note. Drug use disorder = aggregated across all substance use disorders; alcohol use disorder = aggregated across all alcohol-related substance use disorders; CI = confidence interval. Prevalence estimates that could not be meta-analysed due to lack of data are represented with a dash. See Table S7 for a full prevalence estimate matrix.
[a] This prevalence estimate is based on nine studies.
[b] The type of prevalence used was not explicitly reported; it was interpreted as lifetime prevalence.
[c] This prevalence estimate is based on four studies.
[d] This prevalence estimate is based on three studies.

Table 5
Summary of correlates associated with dual diagnosis among adults in custody.

Correlate of Dual Diagnosis	Description	Studies
Substance Use Before Age 15	Using illicit substances before the age of 15.	Collins et al., (1988) Piselli et al., (2009)
Household Member Uses Psychoactive Substances	Living with individuals who use illicit substances before incarceration.	Nowotny et al., (2014)
Violence Victimisation	Experiencing emotional, sexual, or physical violence before incarceration.	Nowotny et al., (2014) Piselli et al., (2009)
Increased Suicide Risk	Having thoughts of suicide and/or attempting suicide during incarceration.	Gates et al., (2017) Piselli et al., (2009)
Lifetime History of Multiple Convictions	History of being convicted of multiple crimes over the course of a lifetime.	Piselli et al., (2009) Rezansoff et al., (2013)

3.4.3. *Criminal justice correlates*

Two of the three studies that measured number of offences found that multiple convictions were associated with dual diagnosis (Piselli et al., 2009; Rezansoff et al., 2013). Specifically, the likelihood of having multiple convictions was significantly higher among those with a dual diagnosis than among those without, and remained so after controlling for age, sex, ethnicity, and education (Rezansoff et al., 2013). In Piselli et al.'s study, 75 % of individuals with a dual diagnosis had prior convictions, compared with 37 % of those with no diagnosis and 40 % of those with MI only (Piselli et al., 2009). Rezansoff et al. reported that individuals with a dual diagnosis were 12 % more likely than those with SUDs only to reoffend (Rezansoff et al., 2013). Alongside this, individuals with a dual diagnosis were the earliest to reoffend after release from incarceration, returning to prison in an average of 295 days (Rezansoff et al., 2013).

There were notable discrepancies between the findings of two studies (Collins et al., 1988; Piselli et al., 2009). Piselli et al. reported that significantly more individuals with a dual diagnosis had been charged with violent offences compared with those with no diagnoses (43 % *vs*. 16 %; Piselli et al., 2009). However, in a sample of males in custody in North Carolina, Collins et al. found that incarceration for a violent offence was not a significant discriminator between individuals with antisocial personality disorder (ASPD) and co-occurring SUD, and those with ASPD only (Collins et al., 1988). In fact, individuals with ASPD and co-occurring drug and alcohol use disorder were slightly less likely to be incarcerated for a violent offence compared to individuals with ASPD only (Collins et al., 1988).

4. Discussion

To our knowledge, this is the first systematic review and meta-analysis to estimate the prevalence of all forms of dual diagnosis among adults in custody and identify associated correlates. We found that one in four adults in prisons has a dual diagnosis, necessitating co-ordinated, multidisciplinary care. This is compared to approximately 3.8 % of adults in the US general population (SAMHSA, 2020). Our findings are consistent with, and build upon, those of a more targeted review of co-occurring serious mental illness and SUD, which estimated that 9.1 % of individuals in prison had major depression with a co-morbid SUD (Baranyi et al., 2022). Collectively, these findings stand in stark contrast to the very modest investment in dual diagnosis services in prison settings in most countries (Forrester et al., 2018). Given that we were unable to disaggregate by prevalence type, we made an assumption that these were all lifetime prevalence estimates. Some of these estimates may have been point or period prevalence, which are by definition the same as or lower than lifetime prevalence. As such, our pooled estimate is necessarily a conservative estimate of lifetime prevalence. Nonetheless, our findings are consistent with the view that the prevalence of dual diagnosis is much higher among people in correctional settings than in the community.

It is remarkable that, given the concentration of dual diagnosis in custodial settings and that there are over 11 million people in custody globally on any given day, our review was only able to locate 11 English-language studies that ascertained the prevalence of a dual diagnosis of any mental illness co-occurring with any substance use disorder in this setting (Fair and Walmsley, 2021). Further, most of these studies come from a small number of high-income, Western countries. Consequently, our pooled prevalence estimate should be interpreted with some caution. There is much variation between the primary studies, which is reflected by our high I^2 statistics. This heterogeneity may reflect true differences in the underlying prevalence of dual diagnosis between settings, or it could be due to variation in study design and/or measurement. Nonetheless, it is a reliable proxy for the complexity and concentration of health burden in custodial populations. However, statistical heterogeneity alone is not a reason to forego a meta-analysis as the included studies are, conceptually, comparable (Linden and Hönekopp, 2021; Schmidt and Oh, 2016). It would be useful to extend the present findings by conducting more large-sample studies that have the capacity to disaggregate by important demographic correlates, such as age, sex, and race.

We also examined the psychosocial, health-related, and criminal justice correlates of dual diagnosis, and established four main findings. Firstly, we found that early exposure to substances, including personal use before 15 years old and living with someone who uses substances to excess, was associated with the onset of a dual diagnosis. There is substantial evidence that substance use before adulthood increases the risk of developing a substance use disorder (Behrendt et al., 2009). There is also an established link between adolescent substance use and the development of comorbid psychiatric disorders in early adulthood; that is, a dual diagnosis (Bentler, 1992; Brook et al., 2000). This finding contributes to the understanding of factors that may predispose individuals to developing a dual diagnosis.

Secondly, we found that females with a dual diagnosis were significantly more likely than females without a dual diagnosis to have been victims of multiple types of violence. The two studies that reported this association were cross-sectional, such that it is not possible to determine a causal relationship between dual diagnosis and violence victimisation. It is likely, however, that such a relationship is bidirectional. To the extent that violent victimisation contributes to a dual diagnosis, preventing females from experiencing this violence is imperative. It may also be the case that females with a dual diagnosis are more vulnerable to experiencing violence, particularly after release from prison (Willoughby et al., 2021). For example, some females may return to a violent relationship to regain access to their children upon release. Further, parole conditions often require a fixed address, meaning that returning to an abusive environment may be the only choice given the scarcity of housing for people recently released from custody (Travis and Stacey, 2010). More longitudinal studies are required to help understand the causal pathways for the onset of dual diagnosis among females, so that provisions, such as housing and family and domestic violence supports, can be put in place before, during, and after release from incarceration.

We also found that individuals with a dual diagnosis are at increased risk of suicide in custody. This is consistent with what is currently known about the relationship between suicide and dual diagnosis (Gates et al., 2017; Lukasiewicz et al., 2009). An incarcerated individual with a dual

diagnosis is 5.7 times more likely than those without a dual diagnosis to die by suicide (Lukasiewicz et al., 2009). In the first 28 days after release from incarceration, the risk of suicide of those with a dual diagnosis is at its highest (Pratt et al., 2006). Taken together with previously published research, our findings reaffirm the importance of co-ordinating mental health services with substance use services, particularly when transitioning out of custody. The breadth of health issues experienced by individuals with dual diagnosis whilst in custody converges to form a risk profile that requires integrated psychiatric and addiction treatment services to manage; something that, at present, is widely unavailable in most prison settings (Fazel et al., 2016). Rigorous, independent evaluations of the current throughcare systems would be beneficial, along with policy reforms that can demonstrate a meaningful impact on the health outcomes of those in custody, in a way that is scalable.

Lastly, we found that the those with a dual diagnosis were more likely to have multiple convictions and, upon their release, were earlier to commit another offence than those without a dual diagnosis. Our finding suggests that the way we currently transition people with dual diagnosis out of prison is inadequate to prevent them from returning to custody. The relationship between dual diagnosis and recidivism is not well researched; however, the circumstances of living with a dual diagnosis, including psychiatric symptoms, treatment compliance issues, strained relationships, involvement in illicit drug markets, and housing instability, can all influence recidivism outcomes (Mueser et al., 2003). Longitudinal studies, including data linkage studies, would be beneficial to help explicate the relationship between dual diagnosis and recidivism.

A notable gap in our findings was the lack of data on co-occurring health-related issues for incarcerated people with a dual diagnosis. Multiple, co-occurring health conditions are normative among people in prison, particularly people with a dual diagnosis, yet our searches failed to return any published literature that discussed this (Calais-Ferreira et al., 2022). Future research should explore the co-occurrence of dual diagnosis with other chronic health conditions in correctional settings, to inform more coordinated treatment and management of these medically complex patients in custodial settings.

Our findings regarding the correlates of dual diagnosis support the view that chronic, complex mental health and substance use disorders are exacerbated by social disadvantage and environmental stressors, such as family and domestic violence, and housing instability. It is impossible for custodial services to combat the impact of this on their own. Whole-of-government approaches to providing integrated mental health and substance use treatment, while simultaneously addressing social disadvantage among those involved with the criminal justice system, are critical to reducing the stark inequalities experienced by those with dual diagnosis (Kinner and Borschmann, 2024).

Our review had two main limitations. First, due to resource and time constraints, we restricted our review to studies published in English language. As such, 10 studies were automatically excluded at the full-text screening level, with more excluded at the title and abstract level. However, there is evidence that estimates derived from such reviews are not dissimilar to those that include non-English studies (Morrison et al., 2012; Nussbaumer-Streit et al., 2020). Nonetheless, our review was dominated by literature from English-speaking, high-income countries, and we may have missed important data from countries of differing income levels and regions of the world. Future research should attempt to translate studies that are not in English and include the data in a systematic review. Further research on the health of incarcerated people in low- and middle-income countries is urgently required. Second, our sub-group analyses were often based on fewer than 10 studies each. Consequently, the heterogeneity evident in our overall prevalence estimate was even more pronounced in our sub-group estimates.

Our review is also subject to the limitations of the primary studies on which it is based. Firstly, incarcerated participants may under-report the extent of their substance use, fearing that disclosures may result in punishment (Carpentier et al., 2018). As such, we may have underestimated the true prevalence of dual diagnosis, although our estimate is still remarkably high. Secondly, four of the primary studies did not state whether they had measured lifetime, period, or point prevalence of dual diagnosis, and so we made the conservative assumption that lifetime prevalence was reported. Thirdly, variation in the types of interviewers used to establish diagnoses may have contributed to heterogeneity in prevalence estimates. With respect to alcohol-related disorders, in the study with the highest reported prevalence, correctional officers assessed participants (Côté and Hodgins, 1990), whilst in the study with the lowest prevalence, a psychiatrist undertook the assessments (Zhong et al., 2020). A similar trend was also reported by Fazel et al., who found that diagnoses based on psychiatric interviews were associated with lower prevalence estimates of alcohol use disorder in incarcerated people (Fazel et al., 2017). This begs the question: what is the most appropriate way to assess alcohol use disorder in custodial settings? This is an important area for future research to both inform the scaling up of services to meet need and ensure that the appropriate clinicians are in place to identify and respond to that need. Future research should prioritise answering this and other important questions using large, representative samples and longitudinal designs.

5. Conclusion

Approximately one in four adults in custody had a dual diagnosis, and dual diagnosis was associated with poor outcomes before, during, and after release from custody. Our findings add to growing evidence that the need for coordinated care for adults with a dual diagnosis is considerable, especially among adults in custody. The large and growing number of people with a dual diagnosis who experience incarceration should be a priority for investment in treatment and support.

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CRediT authorship contribution statement

Young Jesse T.: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Investigation, Funding acquisition, Formal analysis, Data curation. **Kinner Stuart A.:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Taggart Niamh:** Writing – review & editing, Writing – original draft, Visualization, Validation, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Jesse T. Young reports financial support was provided by National Health and Medical Research Council. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.drugalcdep.2025.112675.

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Glossary

Dual diagnosis: The co-occurrence of a mental illness and a substance use disorder.
Coordinated care Parallel treatment Integrated treatment: A treatment setting where mental health and substance use disorder needs are treated concurrently.