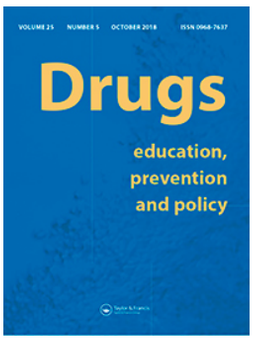

Drugs: Education, Prevention and Policy

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/idep20

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To cite this article: Frank C. van de Baan, Linda Montanari, Luis Royuela & Paul H. H. M. Lemmens (2021): Prevalence of illicit drug use before imprisonment in Europe: results from a comprehensive literature review, Drugs: Education, Prevention and Policy, DOI: 10.1080/09687637.2021.1879022

To link to this article: https://doi.org/10.1080/09687637.2021.1879022

Published online: 08 Feb 2021.

DRUGS: EDUCATION, PREVENTION AND POLICY
https://doi.org/10.1080/09687637.2021.1879022

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REVIEW

Prevalence of illicit drug use before imprisonment in Europe: results from a comprehensive literature review

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ABSTRACT

Current data on the prevalence of prior illicit drug use among the prison population in Europe is scarce. The aim of this study is to identify the prevalence of illicit drug use prior to incarceration, as reported by studies conducted in 30 European countries. A comprehensive literature review was conducted from the 5–31 of March 2018 using the databases Cochrane Library, Embase, MEDLINE, PsychINFO and PubMed. After the deletion of duplications, 2607 articles meeting the eligibility criteria for review were identified. In total, 26 studies from 12 different countries have been included in this review. The review found that the lifetime prevalence of illicit drug use before imprisonment ranged from 30 to 93%; last year prevalence from 51 to 69%; last 6 months prevalence from 13 to 75% and last month prevalence from 58 to 62%. The prevalence of illicit drug use was especially high among women. The rates varied across the 26 studies although high prevalence values are reported in most studies and variations are partly related to methodological differences in the reviewed studies. The high levels of prior involvement with drugs, necessitates prisons to develop clear strategies to deal with illicit drug use.

ARTICLE HISTORY
Received 7 July 2020
Revised 5 January 2021
Accepted 14 January 2021

KEYWORDS
Illicit drug use; prison; Europe; drug-related interventions

Introduction

On 31 January 2019, more than 856,000 people were held in prison institutions in the 27 European Union Member States, Norway, the United Kingdom, and Turkey (EU-30) (Aebi & Delgrande, 2019). Many of those entering prison came from vulnerable groups and poor communities (Arain et al., 2014; Fazel & Baillargeon, 2011; Stöver & Kastelic, 2014). A large proportion came from environments affected by social issues such as homelessness, unemployment and low levels of education. Taking into account health literacy, an important indicator for low education and unemployment, 53% of the Irish prison population were found to have the lowest health literacy level (Hawley et al., 2013), with similar rates being reported for other countries (Jones & Manger, 2019). Those coming from deprived societies have also been reported to engage more often in risky behaviours such as injecting drug use (EMCDDA, 2012; Fazel & Baillargeon, 2011; Montanari et al., 2014). A study conducted in the United States found that among 696 people who injected drugs, 80% had a low income (i.e. earning under $1350 per month) and 63% were homeless (Arreola et al., 2014). A study from the Netherlands examining the characteristics of 62 persons who inject drugs found that many did not complete their high school education (37%), were housing insecure (32%), and unemployed (66%) (Havinga et al., 2014). High risk drug use in turn has been associated with increased risks of negative health including infectious disease, alcohol misuse, smoking, cardiovascular diseases and mental health problems (Fazel & Baillargeon, 2011). In addition to increased risks for negative health consequences, people using illicit drugs, especially the most problematic forms of drug use, are also at greater risk of being arrested and imprisoned for drug law offences and other drug-related crimes. At the European level, studies have shown that between 30 and 75% of people with problematic drug use have been in prison at some point during their lives (EMCDDA, 2020b).

Once imprisoned, the health and psychological conditions of drug users may worsen, with some of them continuing to use drugs in detention facilities (Arain et al., 2014; EMCDDA, 2012; Plugge et al., 2009). Overall, this leads to increased risk of violence and suicide inside prisons (EMCDDA, 2012; Fazel et al., 2017). In Europe, the risk of suicide in prison is seven times that of the general population. While the evidence is not conclusive, drug users are believed to represent a considerable share of suicides in prison (EMCDDA, 2012; Rivlin et al., 2010). A study examining 60 near-lethal suicide attempts in a prison in the UK found 70% ($n = 42$) of the survivors in those cases to have a drug use disorder (Rivlin et al., 2010). Drug use has also been associated with increased health and societal risks after release, including high risks of mortality and repeat offending (Fazel et al.,

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2017; The Centre for Social Justice, 2015). For people with a history of problematic drug use, the period following release is a time of very high overdose risk, due to reduced tolerance to opioids and frequent relapse to heroin use (EMCDDA, 2011, 2012). In Europe, six out of ten deaths in the first three months after release were drug related (EMCDDA, 2012; Merrall et al., 2010). In addition to consequences for the individual, a history of drug use among people released from prison has a societal impact, as reoffending rates are high. In England and Wales, 57% of drug-abusing offenders reoffended within a year of their release, compared to 27% among other types of offenders (The Centre for Social Justice, 2015). Strong associations between drug use and reoffending have been found as well in Norway (Kjelsberg & Rustad, 2009), Sweden (Hakansson & Berglund, 2012) and Switzerland (Pflueger et al., 2015).

Although promoting health is not one of the main goals of prison incarceration, health promotion may significantly contribute to the improvement of the health and wellbeing of people in prison (Baybutt, Dooris, and Farrier 2019; Sander et al. 2016; Zurhold et al. 2011). There has been increasing awareness in the EU-30 for the need of drug-related interventions in prison, with the first measures being adopted in 2003 (Council of the European Union, 2003). Nevertheless, although some measures are now available in the EU-30, such as the availability of drug-related information for staff or those imprisoned, the majority of interventions are not fully operating or meeting the specific needs of the prison population (EMCDDA, 2017; Michel et al., 2015; Sander et al., 2016). Among the isolated drug-related interventions in place, are needle and syringe programs and treatment for Hepatitis B and C (EMCDDA, 2017). Furthermore, studies highlighted the need for better availability of drug-related interventions for women (Valencia et al., 2020; van den Bergh et al., 2014; Zurhold et al. 2011). Constituting around 5% of the prison populations in Europe, they present specific needs and complex personal histories, including child abuse and (sexual) violence (EMCDDA, 2012; van den Bergh et al., 2014). To address those needs, women would benefit from interventions such as psychological support and self-esteem training (Valencia et al., 2020; van den Bergh et al., 2014; Zurhold et al. 2011).

Overall, drug-related health problems among Europe's prison populations are varied and complex. Despite sporadic attempts to effectively deal with these problems, coverage and availability of drug-related interventions needs to be improved. This can only be based on evidence-based information on the drug problems among people in prison. A better understanding of the prevalence of illicit drug use before incarceration is a starting point for building this evidence. Data on prevalence of illicit drug use prior to imprisonment is scarce and international analyses are rare, including at the European level. The aim of this study is to identify the prevalence of the use of illicit drugs prior to incarceration, as reported by studies conducted in 30 European countries. In addition, this review aims to provide an insight into types and patterns of prior illicit drug use, to examine differences in prior use of illicit drugs between male and female detainees, and to identify similarities and differences between studies and countries. The study was conducted within the framework of the EMCDDA monitoring activities on drugs and prison and represents a basis for further development of appropriate data collection tools in the European countries reporting to the EMCDDA.

Methods

The comprehensive literature review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Liberati et al., 2009). The PRISMA guidelines were developed to ensure good quality and completeness of literature reviews and consists of a 27-item checklist of points deemed essential for transparent reporting.

Search strategy

The search for articles providing information on illicit drug use prevalence prior to incarceration began on 5 March 2018. For this review, articles had to include the general prison population of EMCDDA reporting countries. Countries reporting to the EMCDDA in 2018 were the current 27 European Member States, Norway, Turkey and United Kingdom, known as the EU-30. All databases were last assessed on 31 March 2018. For this study, illicit drug refers to: non-medical use of any psychoactive substance other than tobacco, alcohol or anabolic androgenic steroids.

Articles found in the databases Cochrane Library, Embase, MEDLINE, PsychINFO and PubMed, published between January 2008 and March 2018, were assessed for eligibility. The time frame of 10 years was selected in order to be able to present the most relevant and comparable data. To ensure the inclusion of all relevant articles, a combination of key terms regarding illicit drug use before imprisonment was used. Terms related to illicit drugs included: 'illicit drug', 'psychoactive substance', and substance*. Terms related to use included: usage, use, consumption, dependence, addiction, and misuse. Lastly, terms related to prison and people living in prison included: prison*, 'penal institution', jail, incarcerated, inmate*, detaine*, custody, and convicted. The full search terms used for each database and the number of hits generated can be found in Table 1. For example, to retrieve articles from Embase, the database focused more on European based studies, OVID was used with Embase as the selected resource. For each search term, the field terms abstract (ab), keyword (kw) and title (ti) were selected. To ensure a proper search string, each key term related to illicit drugs was first searched individually before being combined, using the term OR. The same was done for the terms related to use and prison. Following this, the three search strings were added together using AND. Finally, the search was filtered by the specific year range 2008–2018.

In addition to the articles found through the databases, relevant in-text references of the assessed full-text articles were also included. Although only European results were to be included in this study, the authors decided not to use key terms related to the specific reporting countries as this could

Table 1. Search terms and number of hits per database.

Database	Search term	Number of hits
Cochrane Library	(((((((("illicit drug") OR "psychoactive substance") OR substance*)) AND ((((((use) OR usage) OR consumption) OR dependence) OR addiction) OR misuse)) AND (((((((prison*) OR "penal institution") OR jail) OR incarcerated) OR inmate*) OR detaine*) OR custody) OR convicted)))	143
Embase (OVID)	'illicit drug':ti,ab,kw OR 'psychoactive substance':ti,ab,kw OR 'substance*':ti,ab,kw & 'use':ti,ab,kw OR 'usage':ti,ab,kw OR 'consumption':ti,ab,kw OR 'dependence':ti,ab,kw OR 'addicition':ti,ab,kw OR 'misuse':ti,ab,kw & 'prison*':ti,ab,kw OR 'penal institution':ti,ab,kw OR 'jail':ti,ab,kw OR 'incarcerated':ti,ab,kw OR 'inmate*':ti,ab,kw OR 'detaine*':ti,ab,kw OR 'custody':ti,ab,kw OR 'convicted':ti,ab,kw	1346
MEDLINE (OVID)	(((((((("illicit drug") OR "psychoactive substance") OR substance*)) AND ((((((use) OR usage) OR consumption) OR dependence) OR addiction) OR misuse)) AND (((((((prison*) OR "penal institution") OR jail) OR incarcerated) OR inmate*) OR detaine*) OR custody) OR convicted)))	1300
PsychINFO (EBSCO)	SU "illicit drugs" OR SU "psychoactive substance" OR SU substance* & SU use OR SU usage OR SU consumption OR SU dependence OR SU addiction OR SU misuse & SU prison* OR SU "penal institution" OR SU jail OR SU incarcerated OR SU inmate* OR SU detaine* OR SU custody OR SU convicted Selected journal only (all journal)	399
PubMed	(((((((("illicit drug") OR "psychoactive substance") OR substance*)) AND ((((((use) OR usage) OR consumption) OR dependence) OR addiction) OR misuse)) AND (((((((prison*) OR "penal institution") OR jail) OR incarcerated) OR inmate*) OR detaine*) OR custody) OR convicted)))	1378

lead to exclusion of relevant articles which did not use such keywords in their title or abstract. Furthermore, a first orientating round showed that many articles reporting illicit drug use in prisons also analyzed illicit drug use before imprisonment, therefore the search was not limited to articles reporting only prior use. The articles found were archived using Mendeley reference manager.

Study eligibility

Studies included in the analysis were those: (1) reporting use of an illicit substance before imprisonment; (2) retrieving data from an EU-30 country; (3) assessing prevalence of use through surveys via interviews or questionnaires, as other methods for assessing prevalence, such as wastewater analysis, were deemed less accurate; (4) including a general population sample; (5) published between 2008 and 2018. Studies were excluded if they: (1) reported substance use disorders that included alcohol and/or tobacco, as the focus of the study was on illicit drugs; (2) analyzed prevalence of specific routes of drug administration, such as injecting drug use, as this would have provided information on a selected population of problematic drug users, whilst this study aims to provide insight on the prevalence of prior use of an illicit drug use among the general prison population; (3) only analyzed illicit drug use among a subgroup of the general prison population (e.g. juveniles), since this review focusses on the general prison population.

The literature search identified 4566 articles from the different databases. After having removed duplicates using Mendeley Desktop, a total of 2607 articles were screened as meeting the eligibility criteria. After the exclusion of irrelevant articles based on title and abstract, 97 articles were fully assessed. The majority of the 97 articles were written in English. Articles written in French, German, Spanish, and Croatian were also obtained. Due to language barriers, some articles were only assessed by one of the authors of this study. This included the full-text articles written in French and Spanish (done by L.M.) and articles written in German (done by F.B). As none of the researchers were familiar with Croatian, this article was excluded. Bibliographies of full-text articles obtained through the search were assessed for relevant publications and web resources. Reasons for exclusion of full-text articles can be found in Figure 1. During the full-text assessment, four different publications were found which based their results on the same sample population as other studies, looking at different relationships between specific characteristics. In that case, the publication with the most details on prior illicit drug use among the participants was selected. Five publications from Spain and the United Kingdom based their results on samples from different prisons, thus all five publications were included in this review.

Data extraction and statistical analysis

The researchers used a self-developed data extraction sheet to extract relevant information from each study. Among others, the data extraction sheet included year of publication; country; study design; study date; sampling method; method used for prevalence assessment; sample characteristics (e.g. mean age, gender, remand or sentenced); response rate; prevalence of prior illicit drug use (lifetime, last year, past 6 months, past month); measurement of substance use disorder/dependence; period of drug use assessed, and type of illicit drugs used.

The quality of the included full-text articles was assessed using the 2014 JBI Critical Appraisal Checklist for Studies Reporting Prevalence Data (Munn et al., 2015). Based on this checklist, articles were appraised for on the basis of ten criteria, which included representativeness of the sample population; sample recruitment; proper statistical analysis; objective measurement of data, and identification of confounders.

The statistical analysis, including calculation of pooled prevalence rates, was done using IBM SPSS Statistics 22 (IBM SPSS Statistics for Windows, version 22, IBM Corp., Armonk, N.Y., USA). Alongside the analysis of total prevalence of prior illicit drug use, mean prevalence rates for the different time frames were also assessed. For each period, the mean prevalence was weighted by the number of cases in each of the studies reviewed. Furthermore, the analysis focused on examining a difference in prevalence between illicit drug use and DSM-IV or ICD-10 substance use disorder/dependence

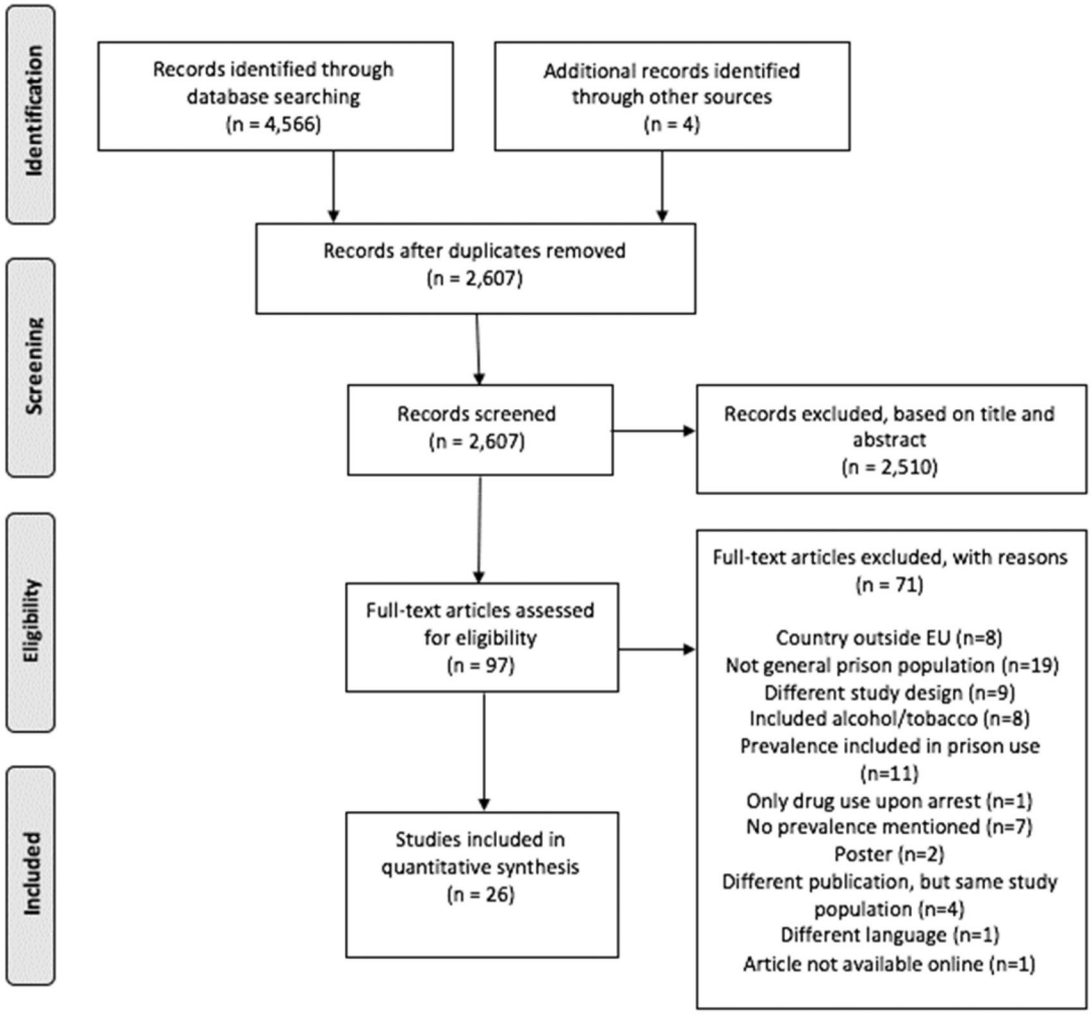


Figure 1. Flow diagram of search strategy.

classification, the differences between males and females, and country-specific prevalence rates.

Results

Study characteristics

Overall, 26 studies from 12 different countries were identified. Except for a study conducted in Lithuania, no studies from Eastern European countries were found, presumably because of language (i.e. these articles might not have titles or abstracts written in English). From both the United Kingdom and Spain, five studies were identified. From France, three eligible studies were found. From Greece, Italy and Norway, two eligible studies were identified. Results from Finland, Germany, Lithuania, the Netherlands, Sweden and Ireland are all based on one country-specific study each.

The total sample reported in the 26 studies included in the review consisted of 13,533 people living in prison. Most studies (15) examined prevalence exclusively among men, compared to eight studies examining prevalence solely among women. Of the three studies which included both women and men, most participants were male (90.8%). Study characteristics, including methodology, can be found in Table 2. A total of 18 of the 26 studies examined illicit drug use, the other eight reported prevalence based on DSM-IV or ICD-10 classification. The majority of examined studies reported lifetime prevalence. Other periods for which prevalence was reported included the year, 6 months, or month immediately prior to imprisonment. Almost all studies were cross-sectional (i.e. an observational study analyzing data from a population at one specific time frame), with two being prospective cohort studies (i.e. longitudinal studies following participants over time) (Gordis, 2009). The identified studies assessed prevalence through either questionnaires or (semi-structured) interviews. While some studies only reported total prevalence of illicit drug use, 15 studies also provided drug-specific prevalence rates.

Identified prevalence of illicit drug use prior to imprisonment

The identified prevalence per study and time frame can be found in Tables 3 and 4. The pooled average estimated lifetime prevalence rate of illicit drug use before imprisonment, as assessed by 13 studies, was found to be 60.6%. The lowest prevalence rate was found in a study conducted in Italy, which reported 29.9% (Nobile et al., 2011). The highest prevalence rate was found in a study done in

Table 2. Study characteristics.

Study	Country	Study design	Study date	Prison population	Sampling method	Method used to assess prevalence	Lifetime use	Disorder or prevalence	Mean age (years)	% Male	Type of prisoner	Response rate (%)
Manière-Haesebaert et al. 2008	France	Cross-sectional	2004	Lyon prison		Self-administered questionnaire	6 months	Drug use	30.7	100	Sentenced + remand	93.7
Stewart, 2009	UK	Cross-sectional	2005–2006	49 prisons in England and Wales	Census approach: all eligible new receptions were included	Interviews at reception, using the Maudsley Addiction Profile	Lifetime, last -year, last month	Drug use	30.2	91	sentenced	60
Friestad and Kjelsberg 2009	Norway	Cross-sectional	Jun-03	Nation-wide	Sample was randomly drawn from register of prison inmates	Interviews done by professionals from the national statistics bureau	Last month	Drug use	Most were aged 25-44	100	Sentenced	73
Bulten 2009	Netherlands	Cross-sectional	Not reported	Prison in Vught	Random sample	Interviews using MINI	Last year	DSM-III SD	30.4	100	Sentenced + remand	61.8
Plugge 2009	UK	Prospective cohort	Not reported	13 prisons in England and Wales	All eligible new receptions were approached	A health questionnaire which prisoners could fill in privately	last 6 months and daily use	Drug use	Most were aged 21-39	0	Not reported	82
Curtin et al. 2009	Ireland	Cross-sectional	2004	Cloverhill and Mountjoy prison	Consecutive sampling from committal lists	Semi-structured interviews using SADS-L	Lifetime, 6 months, current	ICD-10 harmful use or dependence	29.6	100	Sentenced + remand	100
Sakelliadis et al. 2010	Greece	Cross-sectional	Not reported	Chalkida prison	Not reported	Self-administered questionnaire	Lifetime	Drug use	41.9	100	Sentenced + remand	94.8
Narkauskaite 2010	Lithuania	Cross-sectional	May–June 2009	Panevezys prison	All eligible prisoners were approached	Anonymous questionnaire	Lifetime	Drug use	34	0	Not reported	27.8
Vicens 2011	Spain	Cross-sectional	2007–2008	5 prisons	Stratified random sampling	Clinical interviews done by psychologists	Lifetime	DSM-IV	36.8	100	Sentenced	90.3
Nesset 2011	Norway	Cross-sectional	2007	29 prisons	All eligible prisoners were approached	Self-administered questionnaire	Lifetime	Drug misuse	35	95	Sentenced + remand	90
Lintonen 2011	Finland	Cross-sectional	2005–2007	3 prisons	Simple random sampling	Structured clinical interviews	Lifetime	Drug use	34.2	75.4	Sentenced + remand	87
Nobile 2011	Italy	Cross-sectional	2005	Calabria prison	Simple random sampling	Self-administered questionnaire	Lifetime	Drug use	39.8	100	Sentenced	71.6
Sannier et al. 2012	France	Cross-sectional	2011	Liancourt prison	All prisoners were approached	Self-administered questionnaire	Lifetime	Drug use	35	100	Sentenced + remand	54.4
Sahajian et al. 2012	France	Prospective cohort	2004–2008	Lyon prison	All eligible new receptions were approached	Interview using OFDT classification for substance use	6 months	Occasional use, abuse, dependence	31.5	0	Sentenced + remand	63.5
Rodríguez-Díaz et al. 2013	Spain	Cross-sectional	Not reported	Penitentiary of Villabona	Simple random sampling	Self-administered "life history" questionnaire	Lifetime	Drug use	30.7	100	Sentenced	94.9
Ireland Higgins 2013	UK	Cross-sectional	Not reported	One category B prison	Not reported	Self-administered questionnaire using DAST-20	Last year	Drug dependence	36.1	100	Sentenced	44.6
Mir 2015	Germany	Cross-sectional	2012–2013	Penal justice system Berlin	All eligible new receptions were approached	Fully structured interviews using MINI 6.0 (German)	Last year	DSM-IV SD or SA	34.3	0	Sentenced + remand	75.6
Konstenius 2015	Sweden	Cross-sectional	2008	6 Swedish prisons	All eligible prisoners were approached	Interviews by professionals using DUDIT	Last year	ICD-10 harmful use or dependence	39.7	0	Sentenced	57
Geitona and Milioni 2016	Greece	Cross-sectional	2014	Korydallos detention center	All eligible prisoners were approached	Self-administered questionnaire	Lifetime	Drug use	37.5	0	Sentenced + remand	74.8
Zabala-Banos 2016	Spain	Cross-sectional	Not reported	Castilla-La Mancha and Madrid prison	Stratified random sampling for each prison	Structured clinical interviews according to SCID-1	Lifetime	DSM-IV SD or SA	39.6	100	Sentenced	97.7
Sánchez and Wolff 2017	Spain	Cross-sectional	2014	8 Spanish prisons	Stratified random sampling for each prison	Self-administered questionnaire	6 months	Drug use	36.3	100	Sentenced + remand	63.4

(*continued*)

Table 2. Continued.

Study	Country	Study design	Study date	Prison population	Sampling method	Method used to assess prevalence	Lifetime use	Disorder or prevalence	Mean age (years)	% Male	Type of prisoner	Response rate (%)
Howard 2017	UK	Cross-sectional	Not reported	Scottish prison	Prisoners potentially meeting inclusion criteria were approached	Self-administered questionnaire	Lifetime	Drug use	34.5	0	Sentenced	89
Verdolini et al. 2017	Italy	Cross-sectional	2010–2011	Spoleto prison (Umbria)	All eligible prisoners were approached	Semi-structured interviews using ASI-X	Lifetime	Drug use	41.2	100	Sentenced	92.6
Young 2017	UK	Cross-Sectional	Not reported	Iverness prison, Porterfield	Opportunity sampling	Interviews using the Maudsley Addiction Profile	Lifetime	Drug use	30.3	100	Not reported	Not reported
Huddy et al. 2017	UK	Cross-sectional	Not reported	London prison	All eligible new receptions were approached	Semi-structured interviews, questions were utilised from CEQ	Lifetime	Drug use	21	100	Not reported	Not reported
Sánchez et al. 2018	Spain	Cross-sectional	2014	6 Spanish prisons	All eligible prisoners were approached	Self-administered questionnaire adapted from the EMCDDA	6 months	Drug use	37.5	0	Sentenced	55.6

SD: substance dependence; SA: substance abuse; MINI: Mini International Neuropsychiatric Interview; SADS-L: Schedule for Affective Disorders and Schizophrenia-Lifetime version; SCAN: Schedules for Clinical Assessment in Neuropsychiatry; OFDT: Observatoire Français des Drogues et des Toxicomanies; the Life History Questionnaire by Paino, 1995; DAST-20: Drug Abuse Screening Test; DUDIT: Drug Use Disorders Identification Test; SCID-1: Structured Clinical Interview for DSM-IV Axis 1 Disorders; ASI-X: Addiction Severity Index – Expanded version; CEQ: Cannabis Experience Questionnaire; EMCDDA: European Monitoring Centre for Drugs and Drug Addiction.

a prison in the UK, where 92.8% of the participants reported having used at least one illicit drug in their lives (Young, Gonzalez, Wolff, Xenitidis, et al., 2020). Three studies reported lifetime prevalence rates of drug use disorder or dependence, with a pooled average estimate of 60.1%. The lowest prevalence, 39.6%, was reported by a study conducted in Spain (Zabala-Banos et al., 2016), while the highest prevalence, 61.1%, was reported by a study conducted in Ireland (Curtin et al., 2009).

Last year prevalence was assessed as drug use disorder or dependence by four studies; resulting in a pooled average estimate of 57.4%. With 51%, the lowest prevalence rate was reported by a study done in Germany (Mir et al., 2015). A study done in Sweden reported the highest rate, namely 68% (Konstenius et al., 2015). Both studies were conducted among women only. One study conducted in the UK examined last year illicit drug use and found that 69% of the people in prison had used at least one illicit drug the year prior to imprisonment (Stewart, 2009). This study included both men and women.

Out of the four studies examining illicit drug use in the six months prior to incarceration, 43.3% of the study subjects reported having used drugs. The lowest reported prevalence rate was reported by a study conducted in France (Manière-Haesebaert et al., 2008). The highest prevalence, 75.4%, was reported by a study done in women's prisons in the UK (Plugge et al., 2009). Regarding 6 month substance use disorder, a study conducted among female prisoners in France found that 13.3% of the female prison population had a disorder for cannabis (Sahajian et al., 2012). Although the use of other substances is also mentioned, the article does not state whether these disorders occurred among different participants, therefore the actual prevalence rate could be higher (up to 26.2%).

Two studies examined the prevalence of drug use during the last month before being taken into custody (Friestad & Kjelsberg, 2009; Stewart, 2009). Both studies included both males and females. In Norway, a prevalence rate of 51% was found (Friestad & Kjelsberg, 2009), whereas a study conducted in the UK found 62% of participants to have used drugs (Stewart, 2009). This resulted in a pooled average estimate of last month prevalence of 60.5%.

Studies presenting the prevalence of illicit drug use in male and female prison populations were analyzed. The analysis examined the prevalence of illicit drug use for males and females in the year and 6 month periods prior to incarceration. For those periods four studies were conducted: two on male and two on female illicit drug use. The pooled average estimate of the prior year's prevalence of illicit drug use among men was 57.3%, compared to 57.6% among women. For the 6-month period, the pooled prevalence estimate was 39.8% among men, with the studies conducted among women reporting a rate of 42.5%. With the two periods, 6 months and 1 year, combined, the pooled average estimate among men was 41.3%, whereas among women this was 62.3%.

Out of the 27 identified studies, 17 included information on prevalence of specific drugs used in the period before imprisonment. An overview of studies and types of drugs

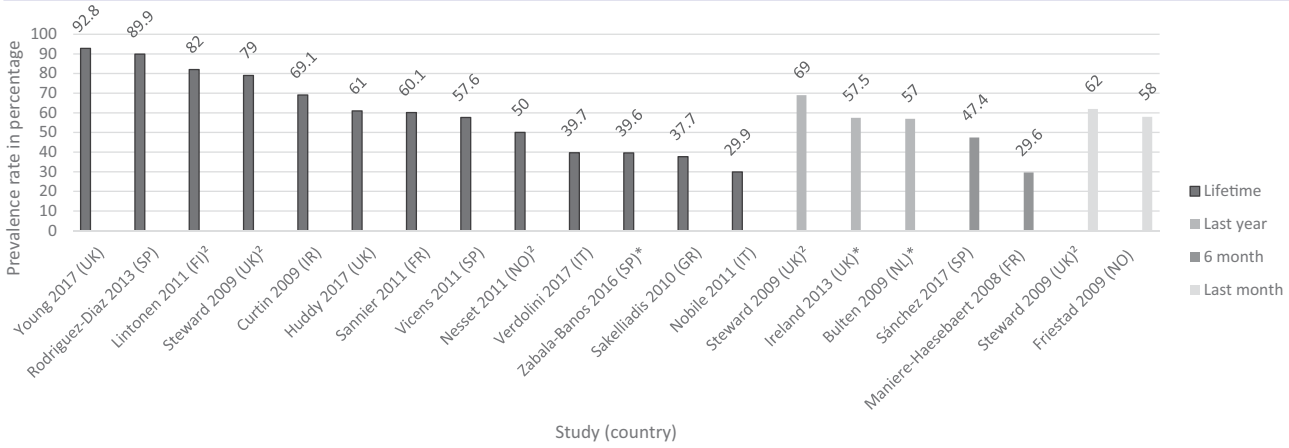
used can be found in Table 5. Categories of drugs that were mentioned by only one study, or articles mentioning the category 'any other drug' are not included. Overall, 10 studies reported drug-specific lifetime prevalence rates. Among these studies, six found cannabis to be the drug most frequently used, whereas four studies reported the highest prevalence to be for crack/cocaine.

Overall, a cross-country comparison was conducted based on studies reporting lifetime prevalence rates of illicit drug use. In total, 13 studies from eight different countries were included in the analysis. Prevalence rates varied widely with the following rates per country: Italy: 34.9%; Greece: 35.4%; Norway: 50.0%; Lithuania: 57.7%; France: 60.1%; UK: 80.6%; Finland 82.0%; and Spain 89.9%.

Mean sample age and disparities between reported prevalence rates

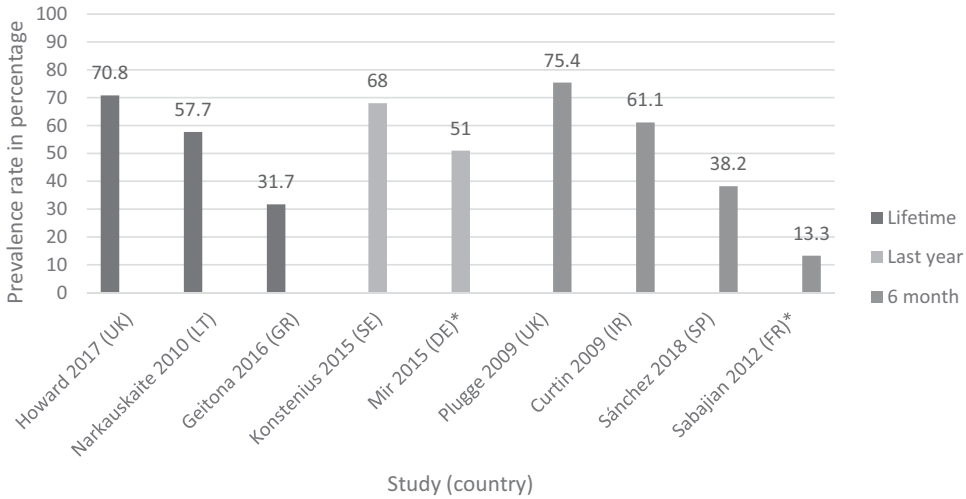
As can be observed from Tables 2–4, studies reporting higher lifetime prevalence rates also included a sample with a higher mean age compared to studies reporting lower lifetime prevalence rates. For example, the study done by Nobile et al. (mean age 39.8) and Sakelliadis et al. (mean age 41.9) found prevalence rates of 29.9 and 37.7% respectively, whereas the study done by Young et al. (mean age 30.3) and Rodrigues-Diaz et al. (mean age 30.7) found prevalence rates of 92.7 and 89.9%, respectively (Nobile et al., 2011; Rodríguez-Díaz et al., 2013; Sakelliadis et al., 2010; Young, Gonzalez, Wolff, Mutch, et al., 2017). Regarding lifetime

Table 3. Study-specific prevalence rates of illicit drug use prior to imprisonment of male and both male/female studies.



Note: In case studies reported prevalence rates for multiple time frames the studies are represented multiple times.
[2]Includes both males and females.
*Regards prevalence of SA/SD.

Table 4. Study-specific prevalence rates of illicit drug use prior to imprisonment of female studies.



*Regards prevalence of SA/SD.

prevalence among women, the two studies reporting higher prevalence rates, namely the study done by Howard et al. and Narkauskaite et al., were also found to have a lower mean age compared to the study done by Geitona et al, which reported the lowest prevalence rate (Geitona & Milioni, 2016; Howard et al., 2017; Narkauskaite et al., 2010). Comparing the mean age and the reported prevalence rates for other time frames was deemed inappropriate due to variations in assessment (i.e. illicit drug use versus substance use disorder/dependence), no specification of mean age, or too few studies being conducted. The review did identify a study conducted among female prisoners in the UK that specifically examined differences in reported prevalence rates between age groups (Plugge et al., 2009). The study found that women under 30 years of age were more likely to have had used drugs in the 6 months prior to imprisonment compared to women aged 30 years and older.

Discussion

To our knowledge, this is the first comprehensive literature review of the prison population in European countries' drug use prior to imprisonment (in this case EU-30). The review is based on 26 studies and 13,533 individuals in 12 countries. Several findings can be reported.

First, a large proportion of people entering prison have had a history of illicit drug use. With 60.6%, the lifetime prevalence of illicit drug use among the prison population is more than double that of the general EU-30 population (29%) (EMCDDA, 2019). Moreover, many seem to have been using drugs during the year (57.4%) or the last six months (43.3%) prior to imprisonment. The highest rates of use are reported for cannabis, cocaine and amphetamines, and to a lower extent heroin and other types of drugs. These findings confirm data reported in previous reviews (Fazel et al., 2017; Jürgens et al., 2010; Penal Reform International, 2020a).

Based on the current analysis, the prevalence of illicit drug use prior to imprisonment among women (62.3%) is higher than that of men (41.3%). These findings are in line with results from a systematic literature review of American studies where the pooled prevalence of drug use disorder among women was reported to be 48% compared to 37% among men (Fazel et al., 2017). Women represent only a minority of the prison population (around 5% in Europe), mainly because women commit less crimes than men (EMCDDA, 2012). However, those going to prison usually present a more vulnerable social and health profile compared to males, including a more problematic drug using profile (International Alliance of Women, 2018; Penal Reform International, 2020b; UNODC, 2014). Women ending up in prison tend to have lived in challenging environments, dealing with issues such as abuse, sex work, or gender-based violence (Binswanger et al., 2010; Strathdee et al., 2015; van den Bergh et al., 2014). Women then tend to turn to drug use as a way to escape, or engage in risky behavior such as sex work to pay for their drug use (Binswanger et al., 2014; Strathdee et al., 2015). This in turn leads to high risk issues such as needle sharing or having unprotected sex, resulting in a large proportion of the female prison population with health issues such as being infected with HIV or hepatitis B/C (Strathdee et al., 2015; van den Bergh et al., 2014). Moreover, issues such as psychiatric disorders, self-harm and dental health problems have also been found to affect a larger proportion of the female prison population compared to males (van den Bergh et al., 2014). To meet the drug-related needs of women in prison, gender-specific approaches should be adopted in the provision of health and social prison services for women with drug-related problems (Bui & Morash, 2010; Sacks et al., 2012). In studies where the gender-specific interventions have been put in place, women reported better treatment outcomes, reduced mental health problems, reduced prevalence of drug use, and general improvement of their health status (Dolan et al., 2003; Grace et al., 2016; Pinkham et al., 2012; Sacks et al., 2012).

The results of the current analysis show variability between studies and across countries in reported prevalence rates of illicit drug use prior to imprisonment. These variabilities may be attributable to several factors, including the fact that studies varied greatly in methodology. Main differences in sample characteristics and their relation to disparities between reported prevalence of illicit drug use was difficult to determine, due to the heterogeneity in methodology of studies. For example, not all studies included information on socioeconomic indicators, the type of prisoner, prison security or country of origin of those incarcerated. Differences in time frames; gender of the sample; type of assessment (i.e. drug use or substance use disorder/dependence), and the limited number of studies conducted further complicated comparisons. Nonetheless, we were able to identify that as regards lifetime prevalence, studies that included a sample with a lower mean age reported higher prevalence rates compared to those that included a sample with a higher mean age.

Differences in reported prevalence rates between countries may be attributable to the priority given by certain law enforcement agencies to drug-related offences and the domestic drug laws (Carpentier et al., 2012; Kruithof et al., 2016). Countries with more extensive alternatives to coercive sanctioning report lower rates of lifetime prevalence of drug use among the prison population compared to countries who offer fewer or less extensive alternatives to coercive sanctioning. For example, countries with lower prevalence rates, such as Italy and Greece, allow for the suspension of sentencing of drug-related crimes, whereas countries with high reported prevalence rates do not have this policy in place (Kruithof et al., 2016). This can also be observed by the total amount of people being imprisoned for drug use offences. In Italy and Greece, around respectively, 0.06 and 0.1% of the entire population was imprisoned for drug use offences, compared to respectively, 0.31 and 0.81% for Finland and Spain (EMCDDA, 2020a). Other possible factors contributing to differences in reported prevalence rates between countries include differences in drug using behavior of populations and the presence of racial and ethnic minorities (Csete et al., 2016; EMCDDA, 2009). However, the relationship between these factors, including the influence of alternative to coercive sanctioning, and prevalence of illicit drug use

Table 5. Drug-specific prevalence rates of illicit drug use prior to imprisonment.

Period and authors	Country	Amphetamine (%)	Cannabis (%)	Crack/cocaine (%)	Heroin (%)	Hallucinogens (%)	Methadone (%)	Stimulants (%)	Sedatives (%)
Lifetime prevalence									
Manière-Haesebaert et al. 2008	France		29.6						
Stewart 2009[a]	UK	37	70	43	37				
Vicens 2011*	Spain		50.4	57.6					25.7
Lintonen 2011[a]	Finland		78.3	42.7		32.7		73.4	59.5
Nobile 2011	Italy	3.8	18.8	20.3	9.4				
Sannier et al. 2012	France	11.3	53	22	18.9	8.1			
Rodríguez-Díaz et al. 2013	Spain	44.6	52.9	89.9	65				
Verdolini et al. 2017	Italy	3.6	26.2	39.7	15.2	4	10.7		
Young 2017	UK	73.9	92.8	78	45.2		25.8		
Huddy 2017	UK		61	29	12^				
Last year									
Mir 2015[b]	Germany	9	19	17	35^	2	13		
Konstenius 2015[b]*	Sweden		40		12^				
6 Months									
Sahajian 2012[b]*	France	12	13.3						
Sánchez anf Wolff 2017	Spain		47.4	36.8	17.6				
Sánchez et al. 2018[b]	Spain		38.2	35.6	24.9				
Last month									
Friestad and Kjelsberg 2009	Norway		14						
Zabala-Banos 2016*	Spain		16.3	39.6	18.4^	1.1		1.6	1.6

[a]Includes both men and women.
[b]Includes only women.
*Regards prevalence of SA/SD.
^includes other opiates.

prior to imprisonment would have to be examined through future research.

Despite country and study differences and variations in illicit drug use prevalence between men and women, the studies of this comprehensive literature confirm a high level of illicit drug use in European countries. The high prevalence may be linked to a high burden of drug-related problems in an already vulnerable population that frequently ends up in prison (Cooper et al., 2018; Decorte, 2007; Fazel et al., 2017). Prisons may be the first place where hard to reach people with drug problems who commit crimes can get in touch with drug rehabilitation programs (Alves et al., 2016). International organizations have published guidance and recommendations for addressing the needs of people in prison with drug-related problems (ECDC, 2018; Gatherer et al., 2014; Penal Reform International, 2020b; Stöver & Kastelic, 2014; The Centre for Social Justice, 2015). While some interventions are available in most or all EU-30 countries, such as the provision of drug-related information (all 30 countries) or the availability of opioid substitution treatment (29 out of the 30 countries), other drug-related interventions are only available in a limited number of countries (EMCDDA, 2019). For example, hepatitis B treatment is only available in 7 out of the 30 countries, and needle and syringe programs are only available in 3 out of the 30 countries (EMCDDA, 2019). Reasons for the limited availability of drug-related interventions in prison are multiple, complex, unclear and somehow unclear. Prisons are peculiar settings where the organization of any type of intervention presents challenges. Furthermore, prisons are places set up for punishment which is still the dominant prison culture. Other specific reasons for the limited availability of drug-related interventions include the fact that prison managers deal with societal pressures to keep prisons drug-free, which may contrast with the provision of interventions for drug use (Stöver & Kastelic, 2014). Furthermore, prisons often deal with limited resources, which results in prison staff does not having the capacity to respond adequately to the drug-related needs of those imprisoned (Stöver & Kastelic, 2014). Finally the nature of some drug-related interventions may represent a specific challenge. For example, concerns were raised among prison staff regarding the implementation of needles and syringes as these could be used to harm others (ECDC, 2018).

Overall, the available evidence is still scarce, and more information is needed. More information on the prevalence of prior illicit drug use among people in prison should be gathered through future studies. This will allow for a better overview of the extent of prior illicit drug use among people in prison in different countries and contexts and provide the basis for a better understanding of the drug-related needs of this population. Drug use prevalence data can provide the background elements for the planning and implementation of drug-related interventions for people in prison in the different stages of imprisonment (ECDC, 2018; Gatherer et al., 2014; Stöver & Kastelic, 2014). To improve cross-country comparability in data collection on illicit drug use, future studies should use a standardized methodology for implementing prison and drug surveys across countries as much as possible (Montanari et al., 2017). A model questionnaire to be used in cross-sectional surveys on drugs and prison in the European countries is available through the EMCDDA website and includes methodological guidelines for collecting data according to a standard methodology (Montanari et al., 2017).

The results of this comprehensive literature review are subject to several limitations. First, the review did not include a grey literature search, which might have meant that

relevant information on illicit drug use prior to imprisonment has been missed. Second, language barriers might have prevented a full retrieval of relevant articles. One article had to be excluded as to the paper was written in Croatian. Other relevant papers might not have been detected if the title/abstract was not being written in English. Third, the results of this comprehensive literature review are based on a limited number of studies and should thus be interpreted with caution. It is noted, for example, that the results for the periods other than lifetime prevalence of drug use are based on a very limited number of studies. The same applies to the limited amount of studies presenting a gender breakdown, which makes it difficult to understand the gender differences in drug use prevalence. Fourth, the studies reported in the analysis have used different sampling, assessment and classification methods (among others) to assess the use of illicit drugs. This makes the comparison between studies and countries difficult; these estimates should also therefore be interpreted with some caution when making comparisons. Fifth, the results on illicit drug use prevalence are subject to self-reporting bias, mainly due to the peculiar setting of prisons, where an illicit behavior may result in negative consequences. Even though the anonymity of participants is often guaranteed beforehand, participants might deny the use of drugs and try to present themselves in a positive manner. This could mean that reported prevalence rates will be less than the actual prevalence of drug use. Sixth, there are large differences between the sample sizes of the different studies. While this limitation was accounted for by weighting the results by the number of participants, the effect was that it made the results of smaller studies less represented. Lastly, due to the lack of studies from certain countries, it is difficult to project conclusions to all countries of the EU-30. This highlights the importance of conducting more analyses and research on drugs and prison.

To conclude, data collected shows a high prevalence of lifetime use of illicit drugs among people who live in prisons across different European countries; the prevalence remains high when analyzed over shorter time frames (such as the 12 months prior to incarceration). From the articles analyzed, it appears that women report a highly complex drug-using profile. Addressing the health and social needs of people in prison is important and should be done both during and after imprisonment. More data and robust evidence is needed to identify and quantify the drug-related needs of those who are in prison. Prevalence data would benefit from a harmonized approach across European countries to allow international comparisons and highlight the relevance of the drug and prison problem.

Acknowledgments

The authors would like to thank Marica Ferri, Lucas Wiessing, Liesbeth Vandam, Carolyn Edgerton and Anna Wurm for their valuable input.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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