

Substance use disorders in the Norwegian prison population: Needs, treatment, and post-release outcomes

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Summary of thesis

Background Globally, the prison population is approaching 11 million people imprisoned daily and it continues to grow. In contrast, the prison population in Norway has been decreasing for a decade, constituting approximately 3,000 people in 2022. While more people in Norway are being sentenced to alternative sanctions to prison in the community, the prison population is characterized by being a more marginalized group than previously, with a heavier burden of socio-economic disparities and mental health disorders. Substance use disorders (SUDs) are also prevalent, including both drug use disorder (DUD) and alcohol use disorder (AUD), contributing to the increased risk of negative outcomes post release, including re-incarceration and increased mortality rates. In Norway, inmates retain their right to healthcare comparable to the standard in the wider community. Yet, the lack of systematic screening for SUDs at entry results in knowledge gaps about the treatment needs of people in prison and the utilization of treatment among people with SUDs in prison.

Study aims The overall objective of this thesis was to study SUD among people in prisons in Norway, adverse outcomes related to these disorders, and how DUD treatment is utilized by people in prison. The five specific aims were to: I) Describe the characteristics of the Norwegian Offender Mental Health and Addiction (NorMA) cohort; II) Explore the external validity of the NorMA cohort; III) Estimate the prevalence of drug use in the Norwegian prison population; IV) Describe re-imprisonment among the NorMA cohort and investigate the association between drug use and re-imprisonments; and V) Describe the utilization of DUD treatment among people in prison, and investigate factors associated with DUD treatment utilization.

Methods This thesis was conducted using the NorMA cohort ($n=733$) and a longitudinal cohort design, linking baseline survey data with national registry data from the Norwegian Prison Registry, the Norwegian Patient Registry, and the Norwegian Cause of Death Registry. The cohort includes participants from almost all Norwegian prison units who responded to the baseline survey on mental health, drug use, and social- and demographic background characteristics in 2013 and 2014. 1,495 persons answered the baseline survey, 733 provided personal identification number (PIN) and consent for its use, while 762 were lost to follow-up. The representativeness of the NorMA cohort was assessed by comparing the cohort participants to 1) those lost to follow-up and 2) a one-day sample of the general Norwegian prison population ($n=3386$), stratifying the one-day sample by possession of PIN ($n=2479$)/no PIN ($n=907$). Level of drug use was measured with the standardized screening tools Drug Use Disorder Identification Test (DUDIT) and the Alcohol Use Disorder Identification Test (AUDIT), both validated for use in the prison

context. Based on the screening tools, level of drug use was categorized as low-risk drug use, harmful drug use or likely drug dependence. Re-imprisonment among the released participants of the NorMA cohort (n=711) was studied by level of pre-prison drug use, adjusting for other risk factors for re-imprisonment. Treatment coverage was assessed by studying the utilization of DUD treatment, defined as treatment related to diagnosis codes F11-F19 of ICD-10 in prison among people with harmful drug use or a likely drug dependence.

Results The NorMA cohort was found to be a representative sample of the Norwegian prison population with a PIN, in terms of sex, imprisonment, and drug use. The cohort was characterized as having a heavy burden of social, economic, and health disparities. In terms of SUDs, 40% were likely drug dependent, 18% were likely alcohol dependent and 47% were likely dependent on drugs and/or alcohol. Four in ten were re-imprisoned within follow-up, and people with likely drug dependence had four times higher risk of re-imprisonment, compared with people with low-risk use. Younger age and low level of education were associated with re-imprisonment. Among persons with likely drug dependence, more than 60% received DUD treatment during their index imprisonment. Polydrug use, injecting drug use, longer sentences, and Nordic origin was associated with DUD treatment utilization among people with harmful drug use or likely drug dependence.

Discussion and conclusion This thesis describes the prevalence of harmful drug use and likely drug dependence in a representative sample of the Norwegian prison population with a PIN. Furthermore, findings showed that people with likely drug dependence had an elevated risk of returning to prison. Finally, we found a high level of treatment coverage for people with harmful drug use and likely drug dependence, though we also identified some potential gaps in treatment provision for people with short sentences and people of foreign origin. In conclusion, this research highlights the need for systematic screening for SUD in the prison population and the potential benefits of DUD treatment to the individual and society. Future research should explore strategies to reduce the burden of SUD among people in prisons, including the quality and effects of DUD treatment in prisons, with the goal of improving health outcomes, reducing recidivism, and enhancing the well-being of people in prison.

Norsk resymé

Bakgrunn Den globale fengselspopulasjon vokser og nærmer seg i dag 11 millioner mennesker. I Norge har fengselspopulasjonen derimot gått ned gjennom tiår, og utgjorde i 2022 omtrent 3000 mennesker på daglig basis. Samtidig med at flere mennesker blir idømt alternative sanksjoner til fengsel, utgjør de som fengsles en mer marginalisert gruppe enn tidligere, karakterisert av mer sosioøkonomiske problemer og psykiske lidelser. Rusmiddellidelser er også utbredt blant personer i fengsel som igjen er assosiert med residiv og økt risiko for dødelighet etter løslatelse. På tross av dette mangler vi fortsatt kunnskap om personer med rusmiddellidelser i fengsel og om omfanget av rusmiddellidelser. Som en konsekvens av dette har vi heller ikke nok kunnskap om behandlingsbehovet i populasjonen eller hvor ofte personer med rusmiddellidelser får rusbehandling under fengsling.

Formål Det overordnede målet med denne avhandlingen var å studere rusmiddellidelser blant mennesker i fengsel i Norge, negative konsekvenser relatert til disse lidelsene og bruken av rusbehandling under fengsling. De fem spesifikke målene var å: I) Beskrive karakteristika ved NorMA-kohorten, II) Utforske den eksterne validiteten til NorMA-kohorten, III) Anslå forekomsten av rusmiddelbruk og rusmiddellidelse i den norske fengselspopulasjon, IV) Beskrive residiv blant NorMA-kohorten og undersøke sammenhengen mellom rusmiddelbruk og residiv til fengsel, og V) Beskrive bruken av behandling for rusmiddellidelser blant personer med rusmiddellidelser i fengsel, samt undersøke faktorer assosiert med denne behandling.

Metode Studiene i denne avhandlingen bruker et longitudinelt kohortdesign, basert på data fra NorMA studien. I studiene brukes primært data fra NorMA-kohorten ($n=733$), bestående av baseline spørreskjemadata, koblet med nasjonale registerdata, fra det norske fengselsregisteret, det norske pasientregisteret og det norske dødsårsaksregisteret. NorMA-kohorten bestod av deltakere fra norske fengsler som fylte ut en baseline spørreskjema om mental helse, rusmiddelbruk og sosioøkonomiske bakgrunns karakteristikk, i forbindelse med datainnsamling i 2013-2014. Deltakere som oppga sitt fødsels- eller personnummer (PIN) ble inkludert i NorMA-kohorten, mens mennesker som svarte på undersøkelsen uten å oppgi PIN ikke ble inkludert i oppfølgingsstudiene ($n=762$). Vi undersøkte om NorMA-kohorten var representativ for den generelle norske fengselspopulasjonen, ved å sammenligne kohortdeltakerne med 1) de som gikk tapt for videre oppfølging ($n=762$), og 2) et utvalg av den generelle norske fengselsbefolkningen ($n=3386$), stratifisert etter om de hadde norsk PIN ($n=2479$), eller ikke ($n=907$). Rusmiddelbruk ble målt med de standardiserte screeningverktøyene Drug Use Disorder Identification Test (DUDIT) og Alcohol Use Disorder Identification Test (AUDIT), som begge er validert for bruk i fengselskonteksten. Videre ble grad av rusmiddelbruk kategorisert som lav risiko rusmiddelbruk,

skadelig rusmiddelbruk eller sannsynlig rusmiddelavhengighet. Sammenhengen mellom grad av rusmiddelbruk før innsettelse og residiv blant de løslatte deltakerne i NorMA-kohorten ($n=711$) ble undersøkt, justert for andre risikofaktorer for residiv. Behandlingsdekning ble vurdert ved å undersøke rusbehandling, definert som behandling relatert til diagnoser med kodene F11-F19 i ICD-10, under fengsling blant personer med skadelig rusmiddelbruk eller sannsynlig rusmiddelavhengighet.

Resultater NorMA-kohorten viste seg å være et representativt utvalg av den norske fengselsbefolkningen med PIN, når det gjelder kjønn, fengsling og rusmiddelbruk. Kohorten var preget av å ha en rekke sosiale, økonomiske og helsemessige utfordringer. Når det gjelder rusmiddellidelser, kom det frem at 40% hadde sannsynlig avhengighet av rusmidler foruten alkohol, 18% var sannsynligvis avhengige av alkohol og 47% var sannsynligvis avhengige av alkohol og/eller andre rusmidler. Mer enn halvparten av personene med sannsynlig rusmiddellidelse ble gjeninnsatt innen 1000 dager etter løslatelse, og mennesker med sannsynlig rusmiddellidelse hadde fire ganger høyere risiko for gjeninnsettelse sammenlignet med mennesker med lavrisiko bruk. Yngre alder og lavt utdanningsnivå var assosiert med gjeninnsettelse. Blant personer med sannsynlig rusmiddellidelse mottok mer enn 60% behandling for en ruslidelse under deres indeks fengsling. Bruk av flere rusmidler, injiserende stoffbruk, lengre straffer og nordisk opprinnelse var assosiert med å få behandling for en rusmiddellidelse, blant mennesker med skadelig rusmiddelbruk eller sannsynlig rusmiddellidelse.

Diskusjon og konklusjon Denne avhandlingen beskriver forekomsten av skadelig rusmiddelbruk og sannsynlig rusmiddellidelse i et representativt utvalg av den norske fengselspopulasjon. Personer med sannsynlig rusmiddellidelse hadde en økt risiko for å bli fengslet igjen, sammenlignet med personer med ingen eller lavrisiko rusmiddelbruk. Samtidig hadde flertallet av personer med sannsynlig rusmiddellidelse kontakt med spesialisthelsetjenesten for behandling av rusmiddellidelse, under indeks soning. De som hadde injiserende rusbruk og som brukte flere rusmidler, hadde en større sannsynlighet for å få behandling, mens personer med korte fengslinger og de som var født utenfor Norge hadde mindre sannsynlighet for å ha behandlingskontakt. Resultatene fra disse studier tydeliggjør den høye forekomsten av rusmiddellidelser og sosial marginalisering blant personer i fengsel. Dette peker på nødvendigheten av systematisk screening av rusmiddellidelser blant personer i fengsel og et stort behov for oppfølging og behandling. Fremtidig forskning bør undersøke omfanget og kvaliteten av den nåværende behandling, samt dens effekt i forhold til å forbedre helseutfall, redusere tilbakefall og forbedre trivselen til fengslede personer.

List of papers

- I. Nicoline Toresen Lokdam, Marianne Riksheim Stavseth, Anne Bukten. Exploring the External Validity of Survey Data with Triangulation: A Case Study from the Norwegian Offender Mental Health and Addiction (Norma) Study. *Research Methods in Medicine & Health Sciences* 2021; 2(4): 140-147.
- II. Nicoline Toresen Lokdam, Marianne Riksheim Stavseth, Anne Bukten. Drug use and re-imprisonment: A prospective study of the Norwegian Offender Mental Health and Addiction (NorMA) cohort. *Drug and Alcohol Dependence Reports* 2022; 5: 1-7.
- III. Nicoline Toresen Lokdam, Marianne Riksheim Stavseth, Ingeborg Skjærvø, Anne Bukten. Treatment utilization among people with drug use disorders in prison: A national longitudinal cohort study [Submitted]

Abbreviations

AUD: Alcohol use disorder

AUDIT: Alcohol Use Disorder Identification Test

CI: Confidence interval

DUD: Drug use disorder, in this thesis drugs are defined by all legal and illegal substances, excluding alcohol.

DUDIT: Drug Use Disorder Identification Test.

DSM: Diagnostic and Statistical Manual of Mental Disorders

EMCDDA: European Monitoring Centre for Drugs and Drug Addiction

HSCL-10: The Hopkins Symptom Checklist-10, measures symptoms of clinically concerning psychological distress.

HR: Hazard Ratio (aHR: Adjusted Hazard Ratio)

ICD-10: The International Classification of Diseases, 10th edition.

IDU: Injecting drug use

GLM: Good Lives Model

NorMA: Norwegian Offender Mental Health and Addiction Study

NPR: The Norwegian Patient Registry

OAT: Opioid agonist therapy

OR: Odds ratio (aOR: Adjusted odds ratio)

OUD: Opioid use disorder

PWID: People who inject drugs

QoL: Quality of Life

RNR: Risk-Need-Responsivity model

SUD: Substance use disorder

UPR: Unpublished Results

WHO: World Health Organization

Definitions

Drug use: The level of drug use is defined according to the scoring categories in the DUDIT screening tool. DUDIT is an 11 items screening instrument used in the NorMA study to map the frequency of drug use in the year leading up to the index imprisonment. Scores range from 0-44, with standard categories: low-risk (<6), harmful drug use (6-24) and likely drug dependence (≥25). **Low-risk** indicate no use or a low-risk of developing problems related to drug use. **Harmful drug use** indicate that the person probably has drug-related problems, possibly drug dependence, and imply a recommendation for further assessment and evaluation. **Likely drug dependence** means that it is highly probable that the person is dependent on one or more drugs.

SUD: An overall term for the harmful use of and dependency on, drugs and alcohol. This includes drug use disorder (DUD) and alcohol use disorder (AUD). The overall focus of this thesis is SUD and problems related to use of all substances. However, in some parts, I have narrowed it to focus solely on DUD for methodological reasons.

Preface

My motivation for working with the health of people in prison started during my master studies in public health science in Copenhagen while working as a student assistant in the health department at the Danish Institute Against Torture (Dignity). I assisted DIGNITY in their effort to prevent torture, violence, and degrading treatment in places of detention in Denmark and globally. Inspired by this work, I wrote my master's thesis on solitary confinement in Danish prisons, a qualitative thesis based on 19 interviews with incarcerated persons and staff in two Danish prisons. During this fieldwork, the substantial role of substance use, psychiatric disorders, and substance use disorder (SUD) among people in prison, became evident to me. It seemed clear that the incarcerated people I met carried a heavy burden of health disparities, constituting both a cause and a consequence of their criminal acts and their imprisonment. Furthermore, it became obvious to me that the health problems of people in prison should constitute an important concern for public health as it affects both the individual well-being, and also the health and safety of society as a whole.

This PhD thesis is based on my research on SUD among people in prisons, studied from a public health perspective, with statistics and epidemiology as my core methodology.

The PhD research has been conducted as part of the PriSUD project which is led by my principal supervisor, Anne Bukten, at the Norwegian Centre for Addiction Research (SERAF) at the University of Oslo. The PriSUD project focusses on mental health and SUD among people in prison and has collected and linked unique and rich data material on all people who have been imprisoned in Norway during the last 20 years. This data material includes the Norwegian Offender Mental Health and Addiction (NorMA) cohort, which is the basis of this PhD.

The NorMA cohort data material consists of survey data collected by my supervisor Anne Bukten and her colleagues during 2013 and 2014, and of longitudinal follow-up data from the Norwegian prison registry, The Norwegian Cause of Death Registry, and the Norwegian Patient Registry. With this data material I study the prevalence of SUD in the Norwegian prison context and the characteristics of people in prisons with SUD. Furthermore, I study the association between DUD and imprisonments and how people in prison utilize DUD treatment. This thesis covers 1) A description of the main characteristics of the NorMA cohort, including their substance use, 2) A triangulation assessment of the external validity of the NorMA cohort, the main data source of this PhD, 3) A prospective follow-up study of the re-imprisonments of the NorMA cohort, and 4) an investigation of DUD treatment utilization among the NorMA cohort.

1. Introduction

Prison settings and prison populations around the world are highly diverse and face different challenges depending on the political, social, and economic situation of the country and the local context of the prison. While some countries are faced with large prison populations per capita, resulting in overcrowding (1-3), other contexts, such as the Norwegian, have concerns regarding the extended use of solitary confinement, while still others have both problems, sometimes even within the same prison institutions (4).

However, across all the variations of prison settings around the world, some factors are common; prison populations are characterized by having a high burden of social and economic disparities, somatic and mental health problems, and a high prevalence of SUDs, compared with the general population (5, 6). This makes prisons important arenas for public health interventions, especially in terms of harm reduction and treatment of SUDs (5).

In the following sections I will describe the Norwegian prison setting and correctional system, including some basic characteristics of the prison population in Norway. Furthermore, I will describe the health characteristics of people in prison and how prisons can be important arenas for rehabilitation and public health interventions. Substance use and SUD are central when discussing health and prisons, and I will therefore continue by explaining some causal connections between drug use and crime (the drug-crime nexus), before describing the current knowledge base on substance use and SUD in the general population and among people in prison. Finally, I will provide an overview of how those with SUD can receive treatment while serving their sentence in the Norwegian correctional system.

1.1. Punishment in the Norwegian penal system

The purpose of punishment in the Norwegian penal system is to prevent new criminal behaviors (7). This purpose should be fulfilled through three intended effects of punishment: incapacitation; deterrence; and the restorative process (7).

Individual crime prevention by incapacitation and restricted freedom of movement should physically hinder the offender from committing new crimes. This is carried out through imprisonment, or through alternative sanctions, such as electronic monitoring.

Second, punishment should act as deterrence and thereby have a general preventive effect both on the individual offender and for the general population. The punishment should affect the individual to re-think their behaviour, and act differently in the future (7). Among the general population, seeing others

getting punished should scare people away from committing crime (7). This effect is disputed, as it assumes that people commit crime based on rational decisions. In which case, potential offenders will consider the risk of capture and potential punishment with the potential gains from committing the criminal act (7). This effect would be minimal for crime conducted on impulse, or under the influence of drugs (7, 8). For people with a substance use disorder (SUD), deterrence is a particularly weak reason for imprisonment, because SUDs often co-occur with other conditions, such as mental illness, poverty or social isolation, that undermine the capacity for choice, which is a pre-requisite of the deterrence theory (8).

Thirdly, the punishment should have a restorative or rehabilitative effect on the offender, in a way that supports their abstaining from crime in the future (7). Mathiesen (2007) has argued that since the evidence for the positive effects of both punishment and rehabilitation efforts in prison are limited, this purpose cannot in itself justify punishment (9). However, this does *not* mean that rehabilitation efforts should not be offered in prisons, but rehabilitation efforts should solely be based on humanistic principles, in line with the universal rights of people in prison (9).

A fourth effect could also be mentioned, namely the effect on the common sense of justice and social order, such that the general population feels that the level of punishment for criminal offences is fair and restores a sense of justice when an injustice has taken place (7, 10). However, much research has documented that the general public often have limited knowledge about the actual level of legal sanctions, and tends to underestimate it, making this effect difficult to transfer into actual legal practice (7, 10).

The implementation of punishment

The legal framework for how the Norwegian Correctional Service should execute punishment is described in the Execution of Sentences Act in Norwegian legislation (11). According to this, the punishment shall be carried out in a manner that takes into account the purpose of the punishment, counteracts new criminal acts, provides reassurance to society, and ensures satisfactory conditions for the inmates within these parameters (Chapter 1) (11). Furthermore, it says that *“There must be an offer to undergo a restorative process while the sentence is being served”* (11). The aim is, therefore, first and foremost to prevent new criminal acts and secure the safety of society, but the restorative process is also a core element. The mention of the restorative process as a core element of the execution of punishment are often understood as rehabilitation efforts and the wide range of programs provided by the correctional service (12). According to the Directorate of the Norwegian Correctional Service, the aim of the program

activities is to facilitate change for the individual's pattern of criminal behavior. However, it also aims to motivate people to seek treatment or help from the social welfare system (13). The program activities does not involve treatment or healthcare services, nor any of the other regular welfare services (13). These services are provided by external welfare providers in accordance with the principles of normality and the Norwegian import model (14-16). Healthcare services, including SUD treatment are thus delivered by primary and secondary healthcare providers.

Though both target people with drug use and SUDs, it is important to distinguish between programs provided by the correctional services and the treatment provided by healthcare providers, as they are delivered by different sectors, often in different settings, and follow different traditions, frameworks, and overall goals. The main objective of rehabilitation programs provided by correctional services is to prevent recidivism. Positive effects on individuals' health are viewed as incidental or pathways toward achieving this goal. In contrast, healthcare services aim to enhance patients' health and well-being, regardless of whether it will decrease the risk of crime.

In order to offer a successful restorative process, the principle of normality and the universal rights of the person imprisoned are equally important as the activities and programs provided by the correctional services. This is in part because it secures the individual a wide range of health and welfare services, activities, and benefits (7).

Rehabilitation programs in prisons

Programs provided by the Norwegian Correctional Service should be based on research and/or proven experience (13), often inspired by the frameworks and theoretical tradition of evidence-practiced crime prevention developed since the 1970s. One important theoretical aspect of programs in prisons derives from the "what works" tradition. This, again, was a reaction to the empirical studies by Martinson (1974) and others claiming that the American prison practice was characterized by a lack of systematic empirical knowledge about rehabilitation of people in prisons, later described as the "nothing works" tradition (9, 17). Martinson's conclusion was, in fact, not only focused on rehabilitation efforts and treatment, but also on the overall lack of evidence for the ability to rehabilitate criminal offenders through imprisonment, as well as its deterrent effect (17). As such, Martinson's main conclusion pointed to the lack of valid research and the need for an evidence-based prison practice, and asked whether prisons could be replaced by more effective means of social control (17). However, the claims from the "nothing works" literature were followed by prison policies rejecting the idea of rehabilitation as crime prevention and the promotion of various "tough-on-crime" policies (18).

The “what works” tradition is often related to the Canadian psychologists James Bonta and Donald Andrews and the Risk-Need-Responsivity model (12, 19, 20). The Risk-Need-Responsivity (RNR) model, developed by Andrews, Bonta and Hoge in 1990, was the first offender rehabilitation model used for an evidence-based assessment and treatment for people in prison (19-22). As Andrews and Bonta later pointed out, the failures of the “tough-on-crime” policy in the North American prison context, with its increasing prison population rates and severe consequences in terms of financial hardship both to the state and to families, suggest that crime prevention efforts that ignore the psychology of human behavior are unlikely to succeed (18). The model includes three core principles: 1) The level of service should be matched the offender’s *risk* to re-offend; 2) The treatment should target the criminogenic *needs* of the offender; and 3) The treatment should be *responsive* to the offender’s ability to learn from the rehabilitation intervention by providing cognitive behavioral treatment and tailoring the intervention (19-21). In other words, the risk principle speaks of *who* should be treated, the need principle describes *what* should be treated (criminogenic needs) and the responsivity principle helps determine *how* to treat (20).

The RNR model can be considered a fundamental framework of rehabilitation efforts in correctional settings. However, the RNR model was criticized for primarily focusing on the criminogenic needs, ignoring the wider contexts and life situation of the individual, thereby risking overlooking relevant needs experienced by the individual, and reducing their motivation for participating in rehabilitation efforts (12, 23). Based on this critique, Ward and Brown developed the Good Lives Model (GLM), promoting the idea that rehabilitation efforts should focus on promoting human goods, providing the offender with the ability to live a good life, as well as reducing and avoiding risk (23-25). In Norwegian prisons today, the GLM framework is used in many programs, e.g., programs designed for people sentenced for sexual offences (26, 27) and people with SUD (12). Hence, the purpose of the programs offered by the correctional services is both to provide people with knowledge and motivation for personal change and to stimulate their personal resources and competencies, enabling them to manage a life without crime (28). This is often mentioned as an important step towards enrolling in treatment from the specialized healthcare services, either during their time in prison or upon release. Optimally, the person enrolled in a rehabilitation program should experience a continuum of care, with collaboration between the providers of the prison-based programs and the external providers of treatment and welfare services.

The principle of normality and the import model

The principle of normality is described in European Prison Rules (2007), Rule 5: “Life in prison shall approximate as closely as possible the positive aspects of life in the community”. According to Ploeg

(2017), the principle has three main implications for the Norwegian correctional system. First, the punishment is in the restriction of freedom that is imposed by the court, while all other rights as a citizen are still in place. Second, the level of security should be the lowest possible, while securing the safety of the community. When there is no specific risk of reoffending, a sentence should begin in a low-security prison. And third, life in prison must resemble 'normal' life wherever it can, and the correctional services should provide normal circumstances in as many details of everyday life as possible (15). The principle of normality is a working principle, and the actual realization is limited by the detention situation in the correctional system (15).

A core element of the normality principle in the Norwegian correctional system is the import model. Similar to the other Scandinavian countries, Norway is characterized by universal healthcare coverage, and people in prison retain this universal coverage during their imprisonment. The import model implies that all healthcare services in prison are delivered by the health care providers from the community where the prison is located, with primary healthcare services delivered by the municipality and specialized healthcare services, including DUD treatment, delivered by the regional health authorities (14, 29). In contrast, healthcare services in Danish and Swedish prisons are organized according to the "self-providing" model (Fridhov & Langelid, 2017). This entails that primary healthcare is financed by the correctional services, with healthcare workers employed by the correctional system (Fridhov & Langelid, 2017).

The import model was first described by the Norwegian criminologist Nils Christie in 1970 and introduced into the Norwegian Correctional Service during the 1970s and '80s (14). In 1988, the responsibility for healthcare services for people in prison was transferred from the correctional services to the healthcare services (29).

The intention of the import model was that healthcare providers should work independently of the correctional system, following the same principles and clinical guidelines as outside the correctional system, and thereby secure healthcare services of the same standard and quality as in the general community (29). Christie believed it would also enhance transparency regarding the prison conditions, as representatives from other welfare providers would pass through the prisons every day (14).

An important implication of the import model is that treatment, rehabilitation, and healthcare provision become a goal in itself and not merely a means of reducing recidivism, unlike in the programs provided by the correctional service. However, though the Correctional Services are not providers of healthcare

services, they still affect the healthcare provision through their obligation to support and facilitate the access to healthcare.

The right to health

In addition to the principle of normality and the import model, people in prison are protected by their universal human rights, including “The right to the enjoyment of the highest attainable standard of physical and mental health”, in short: The right to health (30). The right to health is a part of the economic, social and cultural rights (ESCR), and refers to both timely and appropriate healthcare as well as to determinants of health (30, 31). The right to health entails an obligation of the state to respect, protect and fulfil the health of the individual (32). This means to *respect* the health of the individual by refraining from, for example, discrimination against individuals based on ethnicity, gender, health status, or age. The obligation to *protect* implies protecting individuals from negative impacts on their health from third parties such as companies or groups. Finally, the state has the obligation to *fulfil* the right to health, through positive measures, including healthcare. Among one of the core minimum obligations described in the Right to Health is the right to access health facilities, goods, and services on a non-discriminatory basis, especially for vulnerable or marginalized groups (30). This implies non-discrimination due to imprisonment, and also non-discrimination of people imprisoned, irrespective of gender, ethnic origin, or health status. This universal right to health includes access to the same standards of health care for people in prison as is available in the general community, without discrimination on the grounds of their legal status (5, 30).

1.2. The global prison population

The world prison population is steadily growing, and on average there are over 11 million people incarcerated daily, with more than 30 million people incarcerated annually (33). As the general population of the world is increasing slightly faster, the prison population rate, defined as people imprisoned per 100,000 citizens, is decreasing to a mean rate of 140 today (34). This mean rate encompasses large variations across and within regions. In the EU, the prison population rate in 2019 was 112 (35). In 2021, in the United States, the country with the largest prison population in the world, the prison population rate was 531 (34). Though the majority of the global prison population consists of young men, over the past 20 years there has been an increase in women, children and older people (3).

The prison population represents a diverse group of people, and often carries a larger burden of socioeconomic disparities than the general population (3). Many people enter prison from socially excluded and underprivileged communities, characterized by social inequality and greater probability of

physical and mental health problems, disability, substance use, and physical and sexual abuse, as well as a higher likelihood of being involved in crime (3, 6, 36, 37).

The health status of people in prison is characterized by a high prevalence of both somatic and mental illness (6, 38-41). Their health is both affected by imported factors related to pre-existing health problems and social disparities and depriving factors related to the prison system (36).

Reviews of the international research on mental health among people in prison have found high prevalence of antisocial personality disorders (men = 47%, women = 21%), major depression (men = 10%, women = 14%), and psychosis (4%, both genders) (42). Studies from low- and middle-income countries found even higher prevalence of psychosis (6%) and depression (23%) compared with high-income countries, though the research from these settings is limited (42). Women in prison have a higher prevalence of mental health problems than men (42, 43).

1.3. The Norwegian prison population

Norway, like other Nordic countries, has one of the lowest prison population rates in the world, characterized by a decreasing number of yearly imprisonments since 2010 (Figure 1). In 2021, the Norwegian prison population rate was 56, with approximately 3,000 people imprisoned daily distributed among the 58 prison units in Norway (34, 44). Women, who constitute a minority of 6% of the prison population, are imprisoned separately from men, primarily in one of the four women-only prisons or in designated women's units (45). Almost two-thirds of prison cells are in high-security units, while 36% are low security, including transition houses (44). As more than 80 percent are imprisoned for less than one year, the yearly turnover is high, around 13,500 in 2014 (the latest published numbers), while the number of new incarcerations today is a little less than 6,000 per year and decreasing (Figure 1) (46). Pre-trial detentions constitute 20-30% of all prison-days, with an average length of 90 days (44). Both sentencing in high-security units and pre-trial imprisonments in Norwegian prisons have been associated with solitary confinement, leading to high levels of stress, self-harm, and elevated mortality risk, including the risk of suicide (6, 47-51).

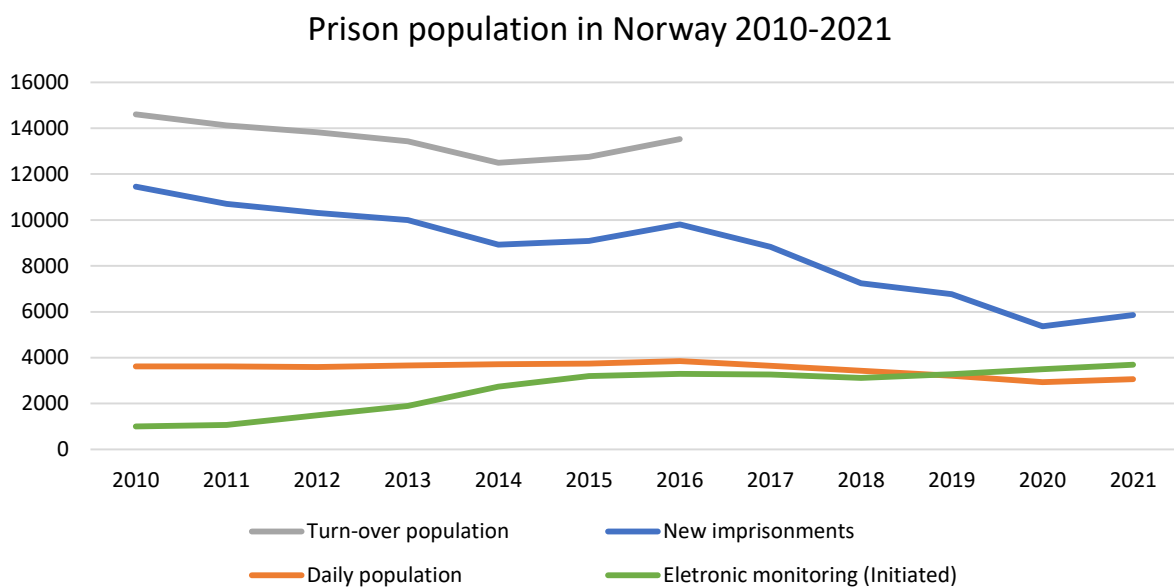
People of foreign nationality constitute approximately 20-35% of the daily prison population, and about half of those in pre-trial detention (44, 52). The most common foreign nationalities in Norwegian prisons in 2021 were Polish, Lithuanian, Romanian, Swedish, and Somali.

Alternative sanctions

Community sentencing with electronic monitoring has been increasingly used since it was introduced in 2008 (Figure 1), and a majority now serve all or part of their sentence with electronic monitoring (53).

Alternative sanctions have several restrictions, and known substance use, unstable housing and unemployment can make people unsuitable for electronic monitoring (54). The increasing use of alternative sanctions in Norway amplifies adversity among the prison population, because people given alternative sanctions can be characterized as relatively more resourceful, with less social, economic, and health related disparities, compared with those who are sentenced to prison (54).

Figure 1: The Norwegian prison population 2010-2021, based on data from Norwegian Correctional Service Annual Reports



Source: Annual reports from the Norwegian Correctional Service 2010-2021 (46). Electronic monitoring (Initiated) means the number of sentences with electronic monitoring which was initiated that year.

Recidivism

In terms of recidivism to prison, Norway has low rates of recidivism of less than one in three returning to prison within five years, compared with a global recidivism rate of 60%-70% (55, 56). However, this contains great variation between groups of people and types of imprisonments. Young people (<25 years) often have higher rates of recidivism and men in general have more recidivism than women (56, 57). Kristoffersen (2020) found that people released from high-security prisons had almost double re-imprisonment rates than people released from low-security prisons (44% versus 23%) (56). Furthermore, substance use can lead to new criminal activities, simultaneously creating a barrier to participation in reintegration activities, such as education, work, or treatment (58, 59), and thus linked to increased risk of re-imprisonment (55, 58, 60-65).

Socioeconomic disparities and mental health

Previous studies of living conditions, and social and health status of people imprisoned in Norway documented a wide range of socioeconomic disparities, and a high burden of mental health problems (66). Few had employment before imprisonment (36% versus 82% of the general Norwegian population), and two-thirds reported high school (10 years) as the highest level of education, compared with one in five in the general Norwegian population (66).

Many reported social problems and traumatic events in childhood, with eight in ten reporting one or more potentially traumatic experience in their childhood and four in ten experiencing physical, psychological, or sexual abuse (66). Of these, nine in ten had experienced physical abuse, six in ten psychological abuse and two in ten had experienced sexual abuse. Moreover, 38% of respondents indicated issues related to substance use within their families, while 41% reported having a family member with a history of incarceration (66). Additionally, 12% disclosed a lack of close relations, and 14% reported having no reliable support, including family members, in times of personal crisis, notably higher compared with the general population, where only 8% reported having two or fewer individuals in their lives to rely on during significant personal challenges (66, 67).

In terms of mental health, previous studies have estimated that 21-42% of people in prison showed symptoms of anxiety and/or depression, compared with 10% in the general Norwegian populations (66, 68). Since 2010, there has been an increase in the burden of mental disorders among the Norwegian prison population, and the latest study of prevalence of psychiatric disorders found that 60% of the Norwegian prison population in 2010-2019 had a mental disorder before entering prison (69, 70). Women have a particular high prevalence of mental disorders, as 75% of women entering prison in the same period had a psychiatric disorder (71).

1.4. Prisons as places for rehabilitation and promotion of public health

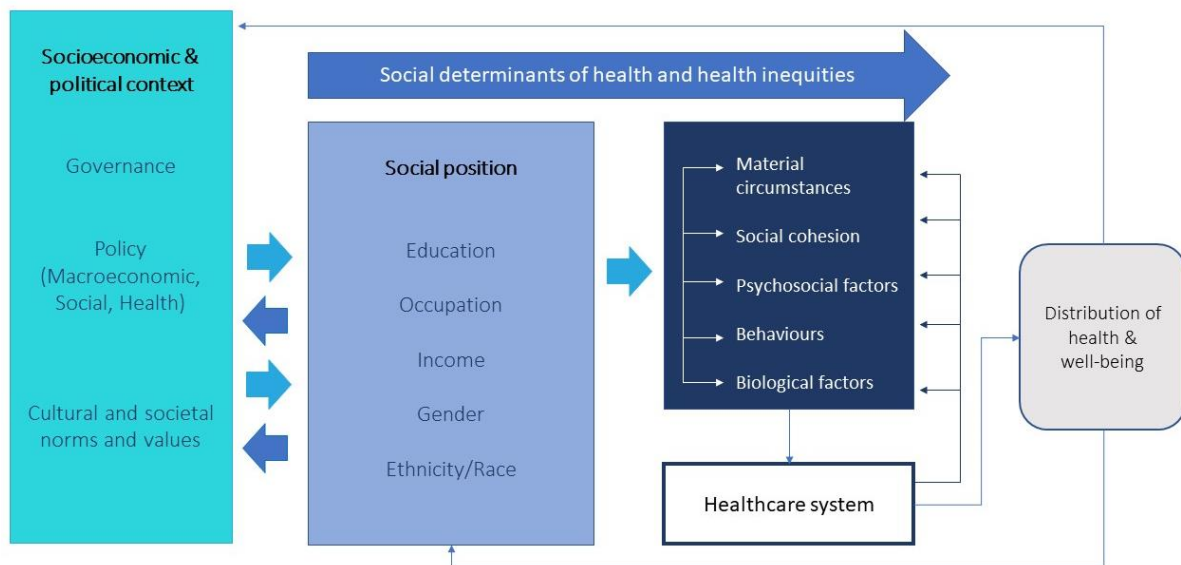
With the high prevalence of health problems among people who are incarcerated, prisons constitute an important arena for public health interventions and could be an ideal setting for reducing health inequalities (2, 72).

Health in prison has traditionally been studied from a biomedical perspective, focusing on physical and psychiatric pathology, morbidity, and mortality, and this continues to be the dominant paradigm in prison health research today (36). This perspective provides us with fundamental evidence on the health of people in prisons, with a particular focus on acute pathology, including overdoses and suicides. However, growing evidence of the complex vulnerabilities and social disparities among people in prison has

highlighted the need for a public health approach targeting the broader social determinants of health (6, 36, 73).

Public health policies affect selection into the prison population. Simultaneously, targeting the social determinants of health in the prison setting is an important opportunity to equalize social inequity and improve public health in society as a whole (6, 74, 75). The conceptual framework of the social determinants of health (Figure 2) describes how individual risk factors are associated with an individual's social position and characteristics of their socioeconomic and political context (76-78). The effect of social position on health is determined by the interaction between living conditions related to the social position and the heredity and environmental factors of the individual (76, 78). The key social determinants of health include education, occupation, income, gender, and ethnicity (77-79). The social stratification of these determinants accumulates through childhood, adolescence, and adulthood via material circumstances, social cohesion, biological and psychosocial factors, and behavior (76, 77). Social determinants affect health through the risk of negative life events, such as diseases or imprisonment, the access to healthcare systems and treatment, the outcome of treatment, and chances of rehabilitation (77, 78, 80, 81).

Figure 2: Conceptual framework of Social Determinants of Health (78)



As a determinant for health, imprisonment can affect the health of an individual in both positive and negative ways. Negative effects include deprivation of social relations, health care services, physical movement, and psychological hardship, especially related to isolation and an unpredictable future, e.g. during pre-trial detention (6, 48). Moreover, the negative health impact of imprisonment can pose an

important threat to the public health, e.g. increased imprisonment rates in the US have been associated with a wide range of negative public health outcomes, including reduced life expectancy and increasing drug-related deaths (74, 82, 83).

However, prisons can also have positive effects on the health of the individual and provide an opportunity for improving public health and reducing health inequalities (5, 6, 36, 73, 75, 84). For some, incarceration can create a break from a chaotic life situation, offering stable living conditions, safety, sanitation, and vital amenities. From a public health perspective, the imprisonment may present an opportunity to reach a marginalized population otherwise hard to include in health promoting activities (6, 36, 72, 73). This potential might be particularly relevant for people with SUD (5, 85, 86). Hence, the high level of SUD among people in prison makes the prison an important arena for tackling SUD and related health problems in society (75). Furthermore, the disproportionate burden of disease and social marginalization in the prison population highlights a need for proportionate universalism, allocating a higher proportion of resources to those with the highest need (87).

1.5. The drug-crime nexus

The theoretical connection between drug use and crime is often described as the drug-crime nexus, with direct and indirect causal connections (Table 1) (60, 88). The direct causal mechanism of drug use and crime can be divided into “substance-use-causes-crime” and “crime-causes-substance-use” explanations, both of which consist of economic, pharmacological, and lifestyle mechanisms (60, 88).

Table 1: The causal connection between substance use and crime. Adapted from Bennet and Holloway (88).

	Substance use → Crime	Crime → Substance use
Economic	Crime to acquire money to finance substance use.	Using substance use as a reward for committing crime.
Pharmacologic	Psychological effects of substance use causing crime. E.g., Alcohol → Aggression → Violence	Using substance use to cope with stress related to committing crime. E.g., building courage or handling stress.
Lifestyle	Criminal social networks Conflicts related to drugs and substance use.	Being around substances and people with substance use, e.g., as a dealer, leading to own use.

Furthermore, underlying and indirect mechanisms can create an association between substance use and crime through common causes, such as when low socio-economic status or psychiatric disorders affect both substance use and crime (60, 89). These mechanisms can be used to explain the high prevalence of crime among people with SUD as well as of SUD among people in prison. In addition, they can be

considered when designing interventions for people with SUD in prisons to tackle the underlying mechanisms of the substance use and crime.

The high concentration of people with SUD in the prison population can be explained by three overlapping mechanisms (5). First, since many activities related to substance use and illegal drugs are criminalized, people often enter prison due to crime related to drug law offences (3, 5, 90). This would include use and possession and “driving under the influence”, but also drug law offences related to drug trafficking. Secondly, the high cost of illegal drugs, in combination with the social and economic situation of many people with SUD, leads to people being imprisoned for offences committed to support their own substance use, including acquisitive crimes (5). The third mechanism involves imprisonment for non-drug-related offences such as acts of violence committed by those who use drugs (5, 61). People who use drugs have a higher risk of imprisonment than those who do not, with the risk varying based on the specific types of crimes and of drugs used (61).

1.6. Measuring the prevalence of substance use

Information on substance use in the general population has often been gathered through general population surveys or through treatment samples (91). In general population surveys, it can be a challenge to obtain valid estimates for the use of rare drug types, such as heroin, as the sample sizes are often too small (91). Treatment samples, on the other hand, estimating use based on the population in treatment, only provide information on people in need of treatment, not reflecting the pattern of use among the majority of people with occasional use (91). The current evidence on the prevalence of drug use in both the general population and in the prison population is, therefore, scarce, fragmented and raises some important reservations in terms of representativeness (91-93).

Measuring substance use and SUD in the prison population

There are substantial challenges in collecting data on drug use and monitoring the prevalence of substance use among people in prison (5, 94). This includes the structural limitations of the prison system, the low priority of research on the prison population, and the practical and ethical challenges related to participation in research for people in prison (5, 94). Many of these challenges are also related to the fact that people with substance use and activities related to illegal drugs are at risk of legal sanctions and stigma, both in and outside prison, which makes the information sensitive to obtain (91, 94).

Since 2002, the EMCDDA has been collecting annual epidemiological data on drug use among people in prison from all European Member States, Norway and Turkey to monitor drug use and drug-related interventions in prisons across Europe (94). However, scarce data and the methodological differences in

national reporting have challenged the comparison across national borders (94-96). To establish a common instrument for this monitoring, the European Questionnaire on Drug Use Among People Living in Prison (EQDP) was drafted. An early version of the EQDP model was used in the study by Montanari et al.(2023) on the prevalence of drug use before and during imprisonment in seven European countries (Czechia, Spain, Latvia, Portugal, Slovenia, Poland and Lithuania) from 2014-2018 (94). However, the EQDP has not yet been fully implemented across Europe.

Despite these limitations, most evidence suggests that illegal drug use is more common among people in prisons, compared with the general population (5, 94, 96). The ratios between use in the prison population compared with the general population depends on which drugs we measure and varies across countries (5, 94, 96).

Prevalence of substance use

The EMCDDA estimates that 29% of European adults aged 15-64 have ever used an illicit drug (92), while the UNODC estimates that 5.8% of the global population aged 15-64 had used an illegal drug during the past 12 months (97).

In the most recent survey of drug use in the Norwegian population, cannabis was the most commonly used drug, used by 5% in the past year (98). Besides cannabis, the most used illicit drugs are cocaine (2% last 12 months), amphetamines and ecstasy/MDMA (<1% last 12 months)(98). The latest estimates from 2013 on opioid use in the general Norwegian population reported 2.0-4.2 per 1000, based on treatment samples of people in OAT treatment (92). Young people have a higher prevalence of use with more than 10% of people in the age-group 16-30 years reporting cannabis use and 5% reporting use of cocaine in the past 12 months (98). National surveys among school children, including children from lower- and upper secondary school, also showed that 9% had used cannabis and 5% had used other drugs within the last year (99).

The most recent international review of drug use before imprisonment included a total of 26 studies published from 2008-2018 from 12 European countries and with a total sample of 13,533 people in prison (95). This found a pooled drug use prevalence of 57% in the year before imprisonment, while 30 to 93% had a lifetime prevalence of illicit drug use (pooled estimate 61%) (95).

In the Norwegian prison population, Revold (2015) have found that 56% had “any use of drugs” the past 12 months before imprisonment, while 34% reported daily drug use and 20% described themselves as heavy users (66). Cannabis was the most common illicit drug, used by 43% in the year before

imprisonment, followed by amphetamines (34%), cocaine (23%), and sedatives (benzodiazepine) (20%). Heroin was used by 7% of participants at least once in the year prior to imprisonment (66).

Polydrug use is considered a risk factor for accidents and injuries, playing an important role in drug-induced mortality (100-104), as the effect of one drug can escalate the risky use of other substances and because interactions between different drugs can increase the drug toxicity (105). Revold (2015) found that 39% of the study sample had used two types of drugs or more in the year before imprisonment (66).

In summary, cannabis is the most common illicit drug used in both populations, and while the prison population has a higher prevalence of all types of illicit drugs used, the biggest differences are seen among drugs with low-prevalent use in the general population, such as opioids, amphetamines, and benzodiazepines.

1.7. Defining and diagnosing substance use disorder

Within the field of clinical medicine, SUDs are described, defined, and diagnosed according to the two most widely used classification systems, the International Classification of Disease (ICD) published by the World Health Organization (WHO) and The Diagnostic and Statistical Manual of Mental Disorders (DSM) published by the American Psychiatric Association. The ICD system is the most used classification system globally, which all WHO member countries are obliged to employ for diagnostic coding and epidemiology reporting (106) while the DSM is widely used among mental health professionals, especially in the US (107). Though the WHO introduced the ICD-11 in 2022 (108), Norway still uses the ICD-10. Prior to the introduction of the ICD 11 (109, 110), some diagnostic criteria from the DSM-V are recommended in treatment of mental health disorders, for example ADHD (111).

The classification of SUDs in both ICD-10 and DSM-V reflects some underlying norms of how addiction is understood and explained, in particular regarding the relationship between the biological and neurological components of addiction versus the social and behavioral components.

The DSM-V groups disorders according to outward phenomena involving “clinically significant disturbances of cognition, emotion and behavior”, rather than the underlying biological or neurological dysfunction (112). This reflects a view of addiction as a neurochemical condition, but where the social context within which it has developed and exists are critically important (112). In the DSM-V, SUD is defined as a problematic pattern of substance use leading to clinically significant impairment or distress, as manifested by at least two of eleven diagnostic criteria within a 12-month period (106). It is, therefore,

considered a very broad and heterogeneous condition, as this leaves room for more than 2,000 combinations of the diagnostic criteria within the SUD diagnosis (106).

Both the DSM and ICD have included disorders related to addictive behaviors in their most recent versions, namely gambling and gaming (106). This follows an increasing acceptance of these behaviors as addictive disorders, with common features to other addictions, similar neurobiological mechanisms, and common associations to comorbidities (106, 113).

Though the overall concordance between the ICD and DSM depends on the versions used, many efforts have been made to harmonize the two systems, and the agreement between the latest versions of the ICD and DSM is quite high (113, 114). However, there are still important differences in their characterization of SUDs, especially related to mild SUDs, and the lack of an objective gold standard for defining SUD remains a challenge within the field (114). In the following, I will focus on how SUD is defined according to the ICD-10, as this is the main classification system used in Norway today, and the system used in this thesis.

Substance use disorder in ICD-10

Substance use disorder is described in the ICD-10 Chapter 5 on mental and behavioral disorders (F00-F99), in the block, 'Mental and behavioral disorders due to psychoactive substance use (F10-F19)(115). The disorders can be divided into disorders related to the actual use of the substance and its effects, including acute intoxication, harmful use, dependence syndrome and withdrawal state, and disorders related to the complications of use, generally termed *substance induced disorders* (106). *Dependence syndrome* is the central diagnosis among the former, defined as a clinical syndrome of cognitive, behavioral, and physiological features reflecting an "internal driving force" to use the substance. Central to the diagnostic is that it developed after repeated use and the presence of at least three of the following six manifestations: 1) A strong desire to take the drug, 2) difficulties in controlling its use, 3) persisting in its use despite harmful consequences, 4) a higher priority given to drug use than to other activities and obligations, 5) increased tolerance and 6) physical withdrawal (106, 115). Substance use that is causing damage to the health, but without the presence of dependence syndrome is defined as *harmful use* (106).

Substance use induced disorders can include mental and physical disorders, such as alcohol cirrhosis of the liver (K70.3), but the majority of these are described in other chapters of the ICD-10. The psychoactive substance use block in the ICD-10 only included four neuropsychiatric complications of substance use, described as withdrawal state with delirium, psychotic disorder, amnesic syndrome and residual and late-onset psychotic disorder (106, 115).

1.8. The prevalence of substance use disorder

Prevalence in the general population

In the latest reports from 2019 by the Global Burden of Disease (GBD) study, it is estimated that 2.2% of the global population has an SUD (men:3.1%, women: 1.3%), consisting of 1.4% with alcohol use disorder (AUD) (Men: 2.3%, women: 0.6%), and 0.8 with drug use disorder (DUD) (men: 0.9%, women: 0.6%) (116). In Norway, it is estimated that 2.8% of the general population has an SUD, consisting of 1.8% with AUD and 1.0% with DUD (116). Men have a higher prevalence of both AUD (2.8% in men versus 0.9% in women) and DUD (1.3% versus 0.7%). Men have had a decreasing prevalence of AUD since 1990 (40% decrease), while the AUD prevalence among women and the prevalence of DUD among both men and women have been rather stable in Norway since 1990 (116).

Prevalence in the prison population

SUDs are some of the most prevalent mental health disorders in the prison population, globally and in Norway, and are more prevalent among people in prison than among those in the general population (3, 66, 68, 70, 71, 117). In contrast to the general population, DUD are equally or more prevalent than AUD in the prison population (117), and women in prison have been found to have a higher prevalence of DUD compared with men (71, 117).

The most recent review of SUD prevalence in the global prison population found an estimated DUD prevalence of 30% among men and 51% among women in prisons, and an AUD prevalence of 26% for men and 20% for women (117).

In Norway, previous research on the life-time prevalence of high-risk use or dependence on drugs or alcohol among people in prison found a prevalence of 51% (drugs) and 29% (alcohol) respectively, while 15% had both (68). The most recent study of mental health and SUDs among people in prisons found that 44% of people imprisoned from 2010-2019 had received SUD treatment from specialized health care services within the study period (70). Based on the same data material, Svendsen (2023) found a higher prevalence of psychiatric disorders and SUD among women than men (all psychiatric disorders: 75 versus 56%, SUDs: 59 versus 43%) (71). During 2010 -2019, there was a 40% relative increase in people with SUDs in prison, measured as people receiving SUD treatment within the year before imprisonment (70).

People in prisons also have a high prevalence of psychiatric comorbidity (41, 42, 70, 71). The co-occurrence of mental disorders and SUD can add complexity and risks to imprisonment and treatment needs, and it also underlines the potential for public health interventions in prisons (42, 71). In the

Norwegian prison population, there has been an increase in the prevalence of psychiatric comorbidity, and 38% of women and 24% of men imprisoned from 2010-2019 had a psychiatric comorbidity, very often a combination of SUD and other mental health disorders (70, 71).

1.9. Substance use disorder treatment and health interventions in prison

According to the WHO, the goal of SUD treatment in prison must be to improve health and, ideally, that people are psychosocially stabilized with continued treatment after release (6). Health interventions targeting SUDs vary widely in practice, both nationally and internationally, and can occur at any phase of imprisonment, including entry, duration of stay, and release (5, 85). Upon entry into prison, it is essential to conduct a comprehensive health assessment for all individuals, including screening for SUD, mental health issues, suicide risk, infectious diseases, and social background (5). In some cases, drug detoxification may be necessary immediately or later during the incarceration period.

As the imprisonment continues, treatment can be delivered both inpatient or outpatient, consisting of pharmaceutical interventions, psychosocial counselling, or educational and training programs (5).

The WHO recommends the provision of Opioid Agonist Treatment (OAT) for people with Opioid Use Disorder (OUD)(118). Previous studies have found positive health effects of in-prison SUD treatment, particularly related to OAT (5, 6, 85, 86, 118-130). Research on in-prison OAT has consistently found positive outcomes across various correctional systems, including retention to treatment after release (121, 122, 128, 131), reduced overdoses and drug-related mortality (86, 119, 120, 123, 124, 128, 130), and reduced recidivism (126, 128). Research on other types of in-prison SUD treatment, including cognitive behavioral therapy and therapeutic communities, has also shown positive results (85, 126, 129), though this branch of research is less extensive and findings are less consistent than the research on OAT (85).

In addition to treatment, other health promoting and harm reducing initiatives should be offered, such as prevention and testing for infectious diseases, needle and syringe exchange programs, and condom distribution (5, 6). These measures includes targeting infectious diseases such as Hepatitis type B and C, and HIV, which have a higher prevalence among people in prisons, especially among people who inject drugs (5, 6, 132-136).

Before release, another health assessment should be carried out, encompassing measures to prevent overdoses, and supporting retention to treatment upon release (5, 137, 138).

Substance use disorder treatment in Norwegian prisons

People with SUDs have the right to access specialized treatment during their imprisonment, most often delivered in a poly-clinical facility either in prison or in a specialized institution (29). For people with opioid use disorder (OUD), this can include opioid agonist treatment (OAT). Initiation, titration and tapering of OAT can only be decided by the specialized healthcare services, but patients in stabilized OAT are normally followed by their general practitioner or the prison healthcare service, in collaboration with the specialized healthcare services (29). The European Monitoring Centre for Drug and Drug Addiction (EMCDDA) estimates that most European countries, including Norway, provide opioid agonist therapy (OAT) to 1-10% of the prison population (5). In a recent study, Bukten et al. (2023) found that among the 14% of the Norwegian prison population who received an OUD diagnosis in 2010-2019, 64% received OAT, with coverage increasing from 36% to 71% during this time-period (139). However, this study did not look specifically at in-prison OAT. As people entering prisons are not systematically screened for SUD, we still lack knowledge about the prevalence of SUD, including OUD. This makes the actual treatment coverage for people with SUDs in prisons unknown, both in Norway and globally (5).

Almost one-third of Norwegian prisons have established Drug Counselling Units, organized as separate units within the prison (140). These units are run by the correctional services but have a cross-disciplinary approach and staff from both the correctional services and the specialized healthcare services (140, 141). One of the main goals of the Drug Counselling Units is to establish collaboration between correctional services, social services, and specialized healthcare services, to prepare people with SUD for release, and to support continuation into specialized treatment outside prison (29, 141).

In addition, people in prison can apply to serve all or part of a sentence in an inpatient SUD facility outside of the prison, according to the Execution of Sentences Act §12 (often referred to as §12-sentencing) (29). The §12-sentencing can normally last for up to 12 months, sometimes longer (29). §12-sentencing will only be approved if the correctional services are unable to provide for the necessary treatment within a prison institution, and if they believe the person will abstain from criminal conduct during the treatment, and that the person will not be a risk to the safety of staff or patients in the treatment facility (142, 143).

1.10. Summary and knowledge gaps

As opposed to the increasing global prison population, for the past decade Norway has seen a decrease in people entering prison each year. Simultaneously, with an increased use of alternative sanctions, the decreasing Norwegian prison population consists of a population with an increasing prevalence of mental disorders. However, while it is well-documented that people entering prison in Norway have a high burden

of social, economic, and health disparities, including a high prevalence of SUD, we still lack research describing the characteristics of people in prison with SUD, their treatment needs, and treatment coverage. We know that one in three who leave prison in Norway will return within five years, and that substance use and SUD are a risk-factor for crime and re-imprisonment. However, we lack research on the specific risk of re-imprisonment among people with drug use in Norway.

The principle of normality and the import model are key in the provision of healthcare services to people in prison in Norway. In line with this, people in prison retain their universal right to healthcare services during their imprisonment, including specialized treatment for people with SUD. In-prison SUD treatment has been found to have positive effects on post-release outcomes, including reduced recidivism and mortality. However, the actual coverage of SUD treatment among people in prisons in Norway remains unknown.

1.11. Aims

The research presented in this thesis was conducted with the overall goal to study SUD among people in prisons in Norway, adverse outcomes related to these disorders, and how DUD treatment is utilized by people in prison. The goal was conceptualized into five main objectives which were investigated in the three papers included in the thesis and unpublished results (UPR):

- I. Describe the characteristics of the Norwegian Offender Mental Health and Addiction (NorMA) cohort (paper I and UPR);
- II. Explore the external validity of the NorMA cohort (paper I);
- III. Estimate the prevalence of drug use in the Norwegian prison population (paper I-III & UPR);
- IV. Describe re-imprisonment among the NorMA cohort (paper II) and investigate the association between drug use and re-imprisonments (paper II);
- V. Describe the utilization of DUD treatment among people in prison, and investigate factors associated with DUD treatment utilization (paper III & UPR).

1.12. Structure of the thesis

This thesis is structured according to the aims described above, with an initial description of the material and methods. The NorMA cohort is the basis of all the other findings in this thesis, and I will therefore begin by describing and discussing the characteristics and external validity of the NorMA cohort, according to aim I and II. Then I will move on to present the findings on DUD, re-imprisonment, and DUD treatment utilization as outlined in aim III-V. To add more depth to the descriptive analysis than was possible in the three papers, more details on demographic characteristics, health status, drug use, and DUD treatment

have been included in the results as UPR. After presenting the findings, I will discuss the strengths and limitations of the data material and methodology, including some ethical concerns. In relation to the methodological discussion regarding selection bias (4.1), I will also discuss the external validity, as described in aim II. Finally, I will discuss the key findings and some general perspectives, before I discuss the implications and recommendations for future research, followed by my concluding remarks.

2. Methods

2.1. Design

All research behind all three papers in this thesis was conducted with a longitudinal cohort design, linking baseline survey data with the national registry from the NorMA study (Figure 3) (144).

The baseline survey data was based on the NorMA questionnaire collected during 2013 and 2014, during visits to 57 prison units (of 63 available) throughout Norway (144). The total study sample thereby included multiple cross-sectional samples, from each prison unit included in the data collection. Data collection took place in both high- and low-security units and transitional houses, including the three all-women prisons in Norway (144). The questionnaire was administered by the study investigators and distributed to the participants on the day of the data collection visit (144). All inmates imprisoned in Norway at the time of data collection were eligible to participate, and inmates were encouraged to participate regardless of nationality, age, gender, or health status (144). The questionnaire was available in Norwegian, English, Russian, French, and German. A total of 1,495 people returned the NorMA questionnaire. Previous research has been conducted based on the cross-sectional survey data (84, 145-151).

A one-page consent form was included in the beginning of the questionnaire, explaining the purpose of the study and the confidentiality of the answers. Respondents were further asked to be included in follow-up, to provide their personal identification number (PIN), and then to consent to its use for linking the survey responses with registry data. People were encouraged to contribute to the cross-sectional part of the study, even if they could not or would not provide PIN (144). In all, the NorMA cohort consists of 733 participants who provided their PIN and informed consent.

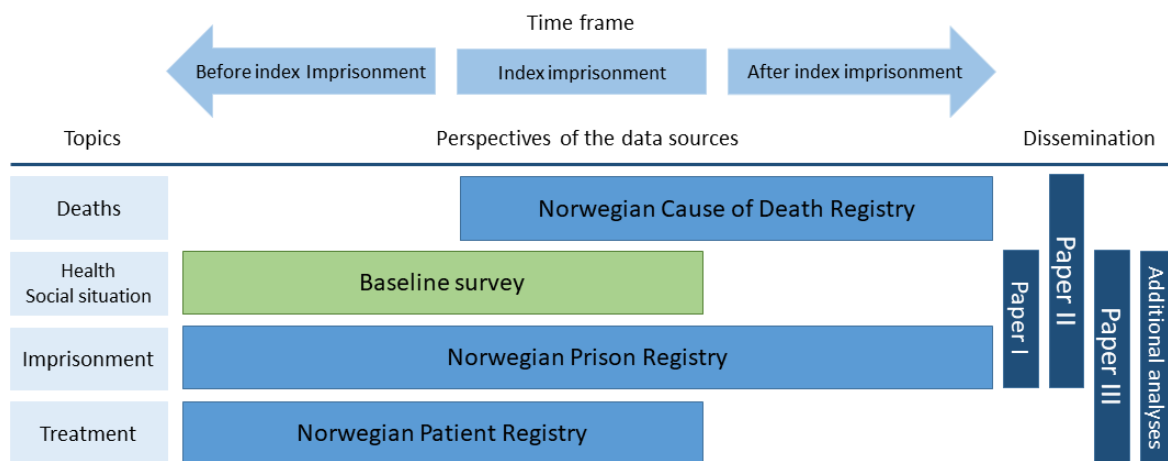
The baseline survey data was linked to the registry data by using the PIN. The registry data made it possible to obtain information about the NorMA cohort participants before, during, and after their index imprisonment. The index imprisonment was defined as the ongoing imprisonment at the time of inclusion into the study.

Study samples

The three papers in this thesis used different study samples, according to the aim of the paper. Paper I used data from the entire NorMA study sample ($n=1,495$), comparing the participants in the NorMA cohort ($n=733$) to participants lost to follow-up ($n=762$). Furthermore, a sample from the general prison population was drawn from the Norwegian Prison Registry ($n=3368$), stratifying the sample according to

Norwegian PIN or no Norwegian PIN. Paper II studied the re-imprisonment of the NorMA cohort among people released from their index imprisonment ($n=711$). Paper III studied the utilization of DUD treatment during imprisonment among the entire NorMA cohort ($n=733$).

Figure 3: Data material in the NorMA study. The figure illustrates the topics included in the four data sources, how the data refer to different aspects of time (before, during, or after index imprisonment), and in which paper or analysis the data sources were included.



2.2. Data material

Baseline survey

The NorMA questionnaire had 116 questions, including several sub items, about a wide range of topics, from demography, imprisonment, mental health, substance use, self-control, and motivation for change. The specific items and measures relevant in this thesis will be described in greater detail later in this thesis.

The questionnaire included 59 questions on drug use, covering both lifetime prevalence, drug use the year before imprisonment, drug use six months before imprisonment, and drug use during imprisonment. Drug use was assessed with drug-specific questions, including details regarding age of onset and frequency of use, in addition to the validated screening tools Drug Use Disorder Identification Test (DUDIT) and the Alcohol Use Disorder Identification Test (AUDIT). A further description of the DUDIT is given in section '2.3 Measures'. In addition, the questionnaire included the DUDIT-E, with 44 questions focusing on perceived positive and negative aspects of drug use and treatment readiness (152).

Registry data

The responses in the NorMA survey were linked to data from the Norwegian prison registry, the Norwegian Cause of Death Registry, the Norwegian Patient Registry, and the Norwegian Police Registry. The work presented in this thesis utilizes data from the first three. The observation period for all three registers was from the establishment of the registries until the end of observation on December 31, 2019.

The Norwegian Prison registry

The Norwegian Prison Registry was established in 1992 to serve a range of administrative and statistical purposes. The registry includes data on all individuals imprisoned in all Norwegian prisons, with information on pre-trial imprisonments, sentences, entry and exit dates, sentence length, transfers between prison units, security level, participation in programs, and other variables for the activities related to imprisonment. The dataset does not include data on sentences carried out in the community, such as electronic monitoring, community sentencing, or drug court. The registry is administered by the Norwegian Correctional Service (153).

The Norwegian Patient Registry

The Norwegian Patient registry (NPR) contains information on all patients receiving specialized health care services for psychiatric or somatic illnesses, from both inpatient and outpatient facilities. It was made available for research in 2008 (154). The registry contains information on the date of admission and discharge, up to two primary diagnoses, and up to 18 secondary diagnoses registered according to the International Classification of Diseases, 10th edition (ICD-10).

The Norwegian Cause of Death Registry

The cohort was linked to the Norwegian Cause of Death Registry (NCDR) to account for loss to follow-up due to deaths of cohort participants. The NCDR includes information about deaths of all people dying in Norway or people who were registered as Norwegian citizens at the time of death (155, 156). It includes the time and place of death and the primary and secondary cause of death (according to the ICD-10), though we only used time of death in the studies in this thesis.

2.3. Measures

In the following section I will present the key measures used throughout this thesis according to demographics and socioeconomics, mental health, substance use, and imprisonment characteristics.

Demography and socioeconomic characteristics

Characteristics of demography and socioeconomic situation before imprisonment were included in all papers in this thesis, primarily using baseline survey data (Table 2). In most cases variables were used as dichotomous in the papers, but some are presented with more detailed categories in the thesis (Table 2). In the papers “country of birth” was dichotomized into Nordic born or born outside the Nordics, as most participants were Nordic born and more detailed geographical categories would result in very small groups. In the thesis details on the regions of origin of people born outside Norway have been added. Socioeconomic variables include “education”, “occupation”, and “income”. “Education” describes the length of finished education ranging from not finishing primary school to more than three years of university education. “Occupation” describes occupation before index imprisonment, including all part-time or full-time work or education. “Income” describes the most important source of income the month before index imprisonment.

Table 2: Demographic measurements used in this thesis and the included papers, their source, and a description of their content.

Variable	Source	Description
Demographics		
Gender	Survey	Female versus male
Age	Registry	Continuous variable
Region of birth	Survey	Regions: Norway, Asia, Eastern Europe, Africa, Western Europe (excl. Norway), or Other.
Socioeconomics		
Education	Survey	Level of education: “Did not finish primary school”, “Primary school only (10 years)”, “Secondary school (1-3 years)”, “Three years of university or similar level”, or “More than three years of university or similar level”.
Occupation	Survey	Part-time or full-time job or education before index imprisonment vs. no occupation
Income	Survey	Income before index imprisonment: “Only legal, paid work”, “Other legal income*”, “Paid work and other legal income*”, “Only crime”, or “Both crime and legal income”.

*Social, unemployment or sickness benefits, pensions, student loan/stipend, economic support from others and other legal sources.

Social Background

Various aspects of the social background and living situation before imprisonment were included in the thesis (Table 3). “Problems in childhood” was a combined measure of having any experience with parental substance use and/or mental illness during childhood. “Foster care” included all experiences with being placed into care by someone other than the biological parents. This included both short- and long-term

placements, adoptions, placements with other family members, and placements in an institution. “Accommodation”, describes if the housing situation was stable or unstable in the month before imprisonment. “Living alone” described whether the person was living with someone the month before the index imprisonment or not. “Civil status” described their current civil status. “Relationships” was a combined evaluation of the current quality of their relationship with partner and/or friends.

Table 3: Measures on social background used in this thesis and the included papers, their source, and a description of their content.

Variable	Source	Description
Upbringing		
Problems in childhood	Survey	Being in a family with drug use and/or psychiatric disorders in childhood versus no problems
Foster care	Survey	Any experiences with foster care at any time during childhood categorized as “ <i>Living with relatives (not biologic parents)</i> ”, “ <i>Adopted</i> ”, “ <i>Foster home</i> ”, or “ <i>Other foster care</i> ”. One could chose more than one answer.
Living situation and relationships		
Accommodation	Survey	Unstable housing situation one month before imprisonment versus stable housing.
Living alone	Survey	Living alone the month before index imprisonment versus living with partner, friends, family members or others.
Civil status	Survey	Current civil status: Single, cohabitant, married, divorced or widow(er).
Relationships	Survey	Quality of social relationships based on items from the five item Quality of Life (QoL5) tool (157), using items on relationship to partner and friends: “ <i>How do you consider your relationship with your partner at the moment?</i> ” and “ <i>How do you consider your relationship with your friends at the moment?</i> ” Participants evaluated their relationship from 1: “ <i>very good</i> ” to 5: “ <i>very bad</i> ”. The combined measure categorized the evaluations of relationships into “ <i>Good/very good relationship w. partner and/or friends</i> ”, “ <i>Contact w. friends or partner, but no good relationships</i> ”, and “ <i>Bad, very bad or no contact/relationship with partner and friends</i> ”.

Health and substance use

Mental health, substance use, and the need for DUD treatment were estimated with measures from the baseline survey data (Table 4). Symptoms of mental distress were measured with the HSCL-10, using the standard cut-off score of ≥ 1.85 , indicating symptoms of clinical concern (158). Self-reported mental health and physical health was based on items from the QoL5 (157).

This thesis estimates DUD and the need for DUD treatment with ten different measures, describing different aspects of drug use. These measures are based on both survey and registry data. In paper I the prevalence of drug use was estimated with both self-reported drug use, including AUDIT and DUDIT, and by using sentences for use and possession as a proxy for problematic drug use. In paper II and paper III

we measured drug use by DUDIT score, with three categories: low risk drug use; harmful drug use; and high-risk drug use. High-risk drug use was referred to as “likely drug dependence” in paper III, in line with the DUDIT guidelines, which I will continue to use in this thesis. In paper III we also studied the utilization of DUD treatment from the specialized health care services, before and during imprisonment, which can also be considered a relevant measure of DUD.

Table 4: Measures of health and substance use included in this thesis and the included papers, their source, and description of their content.

Variable	Source	Description
Health		
Physical health	Survey	Self-reported physical health, extracted from the QOL5 (157): <i>“How do you consider your physical health at the moment?”</i> Participants evaluated their physical health on a Likert-type scale from 1 “very good” to 5 “very poor”.
Mental distress	Survey	Hopkins symptom check list (HSCL-10), measuring symptoms of psychological distress (158). Scores ≥ 1.85 indicate clinical concern.
Mental health	Survey	Self-reported mental health, extracted from the QOL5 (157): <i>“How do you consider your mental health at the moment?”</i> Participants evaluated their mental health on a Likert-type scale from 1 “very good” to 5 “very poor”.
Tobacco	Survey	Use of cigarettes or snuff a) During imprisonment and b) The last 6 months before index imprisonment: Yes/no.
Exercise	Survey	Exercise a) During index imprisonment and b) The last 6 months before index imprisonment: Yes/no.
Hepatitis status	Survey	Knowledge about own hepatitis status: <i>“Are you infected with hepatitis B or C?”</i> . Participants self-reported their status as <i>“Yes, hepatitis B”, “Yes, hepatitis C”, “Yes, both”, “No”, “Unknown status”</i> or <i>“Do not wish to answer”</i> .
Substance use		
Alcohol use	Survey	Alcohol Use Disorder Identification Test (AUDIT) (159). 10 items instrument to map the frequency of alcohol use in the year leading up to the index imprisonment. Scores from 0-40, with standard categories: low-risk (<7), hazardous drinking (8-15), harmful drinking (16-19) and likely dependence (≥ 20) (159). In this thesis and the papers, the categories hazardous drinking and harmful drinking have sometimes been combined.
Injecting drug use	Survey	Status of injecting drug use last 6 months before index imprisonment. Categories: No injecting drug use, Daily/almost daily, 1-2 times per week or 1-3 times per month.
Polydrug use	Survey	Weekly use of more than two substances (not including alcohol) during the 6 months leading up to index imprisonment versus no polydrug use.
Level of drug use	Survey	Drug Use Disorder Identification Test (DUDIT). 11 items screening instrument to map the frequency of substance use in the year leading up to the index imprisonment. Scores from 0-44, with standard categories: low-risk (<6), harmful substance use (6-24) and likely drug dependence (≥ 25).

Drug use was measured with items on injecting drug use, polydrug use, and level of drug use from the DUDIT. The life-time prevalence of drug use was assessed with the question *“Have you ever used narcotics*

or medications to get high?". The three papers in this thesis assess non-specific drug use, including all substances except alcohol. As the specific drugs used can have implications for access to DUD treatment, this thesis includes some additional findings on the specific drugs used by the NorMA cohort participants. This includes an assessment of the most common combinations of drugs used daily.

The DUDIT was developed to offer a simple screening tool for practitioners and patients in criminal justice, addiction treatment, and psychiatric settings to quickly assess the extent of problematic drug use prior to further assessment (160). The tool was developed with the intention to be used together with its alcohol parallel, the AUDIT. The eleven questions in DUDIT focus on frequency and quantity of drug use, symptoms of abstinence and dependence, and negative impacts on social relations due to drug use. The first 9 items have five response alternatives from 0 to 4 and the last two had three alternatives coded 0, 2, and 4. The DUDIT has a sum score range from 0 to 44. A score of between 6 and 24 is indicative of harmful drug use (i.e., full assessment and evaluation recommended), while a score ≥ 25 indicates likely drug dependence (160, 161). Based on these cut-offs, we categorized persons as having 'low-risk use' (<6), 'harmful use' (6-24), or 'likely drug dependence' (≥ 25). Although some validation studies of the DUDIT recommend adjusted cut-off scores for women (162-164), we used the same cut-offs for all, as previous research on the full NorMA sample found similar patterns of drug use among men and women (147, 148).

Treatment

The DUDIT-Extended (DUDIT-E) was included to measure treatment motivation (Table 5). The DUDIT-E includes 17 items on positive aspects of drug use, 17 negative aspects of drug use, and 10 items on treatment readiness. Following the standard of the DUDIT-E, the three aspects were used to calculate the motivational index by dividing the scores of the negative aspects with the scores of the positive aspects and multiplying the result by the treatment readiness score (152).

DUD treatment was defined by treatment registered with one or more of the F11-F19 ICD-10 codes in the NPR. In the ICD-10, all SUDs are grouped under "Mental and behavioral disorders due to psychoactive substance use", with the substance specific categories F10-F18 and polysubstance use F19. In this thesis, I primarily study disorders related to the use of drugs other than alcohol (F11-F19). These chapters of the ICD-10 contain disorders attributable to the use of one or more psychoactive substances, with different levels of severity and clinical form (165). The specific codes refer to the use of F11: Opioids, F12: Cannabinoids, F13: Sedatives or hypnotics, F14: Cocaine, F15: Other stimulants, F16: Hallucinogen, F17: Nicotine, F18: Inhalants, and F19: Multiple drug use and use of other psychoactive substances (chaotic and indiscriminate substance-taking, or if the contribution of different substances are inextricably mixed).

Table 5: Measures of treatment included in this thesis and the included papers, their source, and description of their content.

Variable	Source	Description
Treatment		
Treatment motivation	Survey	Drug Use Disorder Identification Test – Extended (DUDIT-E). Instrument measuring perceived positive aspects of using drugs (17 items), negative aspects (17 items) and treatment readiness (10 items). Used as a combined motivation index according to Berman et al. (2007) (152) with three categories: low, middle, and high motivation.
DUD Treatment – Index imprisonment	NPR	Any treatment related to F11-19 during the index imprisonment.
DUD Treatment – The year before index imprisonment	NPR	Any treatment related to F11-19 in the year leading up to the index imprisonment.

Imprisonment

Variables on imprisonment were derived from the Norwegian Prison Registry. If a person was in pre-trial detention, the first day of pre-trial imprisonment was defined as the first day of the index imprisonment. All imprisonments prior to the index imprisonment were defined as previous imprisonments, while new imprisonments after release from index imprisonment was defined as re-imprisonments.

Table 6: Measures of imprisonment included in this thesis and the included papers, their source, and description of their content.

Variable	Source	Description
Imprisonment		
Previously imprisoned	Registry	Any imprisonments before index imprisonment versus none.
Previous imprisonments	Registry	Number of imprisonments before index imprisonment.
Substance use related crime	Registry	Substance use related crime among index imprisonment convictions, defined as use and possession and/or intoxicated driving, yes/no.
Use and possession	Registry	Convicted for use and possession in index imprisonment, yes/no.
Intoxicated driving	Registry	Convicted for Intoxicated driving in index imprisonment, yes/no.
Convictions	Registry	Number of convictions in index imprisonment. A person can have up to 40 convictions registered as part of the same imprisonment. A person who was imprisoned pre-trial and acquitted without any convictions will not have any convictions registered to their imprisonment.
Length of index imprisonment	Registry	Time spent in prison. Categorical: Less than 6 months, 6-12 months, and 12 months or more.
Re-imprisonments after index imprisonment	Registry	Re-imprisonments after index imprisonment, from 0 to 3 or more imprisonments.
Time to first re-imprisonment	Registry	Time to first re-imprisonment after index imprisonment, days.

Many types of crime can be associated with drug use, though not necessarily indicating problematic drug use among the sentenced individual. This could include sentences related to selling or distributing narcotics. In this study, we defined substance use related crime as crime that by definition could be related to one's own substance use, which included use and possession as well as driving while intoxicated.

2.4. Data analysis

Diverse data analyses have been used in the three papers and unpublished findings, according to the specific data sets and research questions (Table 7).

Table 7: Statistical analysis applied in the three papers and unpublished findings included in this thesis.

Statistical analysis	Paper I	Paper II	Paper III	Unpublished findings
Descriptive statistics	X	X	X	X
Chi-square test	X			
T-test	X			
Survival analysis				
Kaplan-Meier and log-rank test		X		
Cox regression analysis		X		
Binary logistic regression			X	

The analyses for paper II and III were carried out in three steps inspired by the Treatment And Reporting of Missing data in Observational Studies framework (166). The analyses were carried out in the following steps:

- I. Analysis plan: Developing the analysis model based on the study objectives and the directed acyclic graph (DAG).
- II. Handling missing:
 - a. Specifying the missing data assumptions;
 - b. Handling missing, e.g. by Multiple Imputation by Chained Equations (MICE);
 - c. Sensitivity analysis; and
 - d. Examination of the data, considering if the methods outlined was appropriate or need modification.
- III. Analyzing the complete datasets individually, pooling the results to one summary estimate according to the combination rules by Rubin (167).

Directed acyclic graphs (DAGs)

Directed acyclic graphs (DAGs) have been used to visualize the underlying causal assumptions of the analyses, using the browser-based environment *DAGitty.net*. This guided the design of the regression models and the imputation models when performing multiple imputation by chained equations (MICE), as suggested by Lee et al.(2021). A DAG illustrates the causal assumptions between all variables in the study and improves the ability to identify potential confounders, mediators, and colliders and to reduce bias (168, 169). DAGs have been recommended for studying causal inference in the research field of addiction (168).

Analyses in paper I

To explore the external validity of the NorMA cohort, the participants in the NorMA cohort were compared to the general prison population on key characteristics using data from the Norwegian prison registry and descriptive statistics (χ^2 -test and t-test).

The external validity was assessed in two steps. First, comparing the NorMA cohort to the group who were lost to follow-up in the NorMA study ($n=762$). In this step the two groups were compared with survey data. Second, the NorMA cohort was compared to a one-day cohort of the general prison population, consisting of all people imprisoned on September 1, 2013, excluding the participants in the NorMA cohort ($n=3386$). This included people with no PIN ($n=907$) who were extracted and studied separately. September 1, 2013 was chosen as a day with a prison population close to the average number of people imprisoned during that period.

Analyses in paper II

This study was a prospective cohort study following all participants from the NorMA cohort who had been released from their index imprisonment within the observation period, thereby excluding 32 persons who were still imprisoned on December 31, 2019 ($n=701$). We conducted a survival analysis with Kaplan-Meier curves and a Cox regression analysis calculating time-at-risk from the first day following release from index imprisonment until either 1) re-imprisonment, 2) death, or 3) the end of the observation period (December 31, 2019). Univariate and adjusted Cox regression analysis was performed on data imputed using MICE (handling of missing with MICE will be described in detail below). The main exposure of interest was drug use measured with DUDIT.

Analyses in paper III

For paper 3 we used data on all participants in the NorMA cohort, linking their self-reported drug use from the NorMA survey to data on DUD treatment utilization from the NPR. Treatment need was estimated using DUDIT scores. The main outcome was the utilization of DUD treatment during the index imprisonment. Treatment utilization in the year before index imprisonment was also included as a covariate in the descriptive analysis. Due to the limited prevalence of F16, F17 and F18 ($n \leq 1$) these three diagnoses were excluded from the analysis.

Descriptive statistics were conducted on complete data. Univariate and adjusted logistic regression analysis was performed on data imputed using MICE, with results pooled according to Rubin's rules (167, 170). The imputation model was constructed according to the analysis plan (166), which designed the logistic regression model based on assumptions of causality and potential confounders, illustrated with a DAG. This included the potential confounders country of birth, age, education, length of imprisonment, IDU and polydrug use. We performed univariate and adjusted logistic regression analysis on a sample of people with harmful drug use and likely dependence, since many participants in the harmful category had high scores close to the cut-off for likely dependence, indicating a possible treatment need.

Analyses in unpublished results

The additional descriptive analyses of demographic characteristics, health status, and drug use were performed on complete cases. Correlation between drugs used daily was assessed using Kendall's tau correlation coefficient, using a cut-off value of 0.3-0.7 for a moderate correlation and values more than 0.7 indicating a strong correlation. We explored substance use related sentences as a proxy for harmful drug use prior to imprisonment by examining the self-reported drug use on the DUDIT among people with and without substance use related crime in their index imprisonment.

2.5. Methods for handling missing data

Missing data is a common issue in medical science research, and it can have significant consequences on the accuracy and reliability of study results. Failure to handle missing data appropriately can lead to biased estimates, reduced statistical power, and an increased risk of errors.

Complete case analysis (CCA), where only complete cases are used for analysis, is a common approach to handle missing data. However, it can result in a loss of statistical power, reduced sample size, and biased estimates, as it assumes that the missing data is completely random, which is often not the case in real-world data.

The consideration of how to handle missing data was important in working with the NorMA baseline survey data, as some of the items had high levels of missing. The applied theory on missing data mechanisms and multiple imputations is described in further detail below. The proportion of missing data in each variable in the thesis is described in sections 3.1 and 3.3 (tables 8 to 12).

Missing data mechanisms

Missing data mechanisms refer to the underlying reasons why data is missing in a dataset. The approach used for handling missing data depends on the type of mechanism identified. There are three main types of mechanisms identified by Rubin (1976): missing not at random (MNAR); missing at random (MAR); and missing completely at random (MCAR)(170, 171).

MCAR assumes that missing values are unsystematic and unrelated to any variables, observed or unobserved (170, 171). On the other hand, MAR assumes that missing values are conditionally random, meaning that they depend on other observed data, but not on missing data (170-172). MNAR assumes that missing values depend on unobserved variables, which may or may not be related to the observed variables in the dataset (170, 171).

The MCAR assumption can be tested with a table of characteristics comparing cases with and without missing. If we identify variables that differentiate between cases with and without missing, we can assume that the values are not MCAR. Contrarily, we cannot reject the possibility of MNAR as long as we do not know the missing data itself (173).

If the missing data is MCAR, a CCA, excluding all cases with missing data, would produce unbiased estimates. However, if the missing data is MNAR or MAR, our estimates would be biased if we do a CCA (174). Moreover, removing cases with almost complete data, as in the case of extensive questionnaires such as the NorMA survey, can result in the loss of valuable information and statistical power.

Although most variables in the NorMA baseline survey had few missing data points, the key exposure variable DUDIT had an 11% missing rate, requiring further investigation. We observed variations between complete and missing cases on DUDIT, indicating that the missingness was not MCAR. Given these differences, we assumed that the missing data on DUDIT was MAR. A growing body of literature recommends handling missing data considered MAR with multiple imputations by chained equations (MICE) (174-177). Therefore, in papers II and III, where DUDIT was the main exposure variable in the regression analyses, we pre-processed the datasets using MICE to account for the missing data.

Imputation and MICE

Imputation is a method for estimating plausible values of missing data by utilizing the available data (174). Multiple imputation involves generating copies of the dataset, with missing values replaced by imputed values sampled from a posterior predictive distribution estimated from the partially observed data (178). Various multiple imputation techniques exist, with varying levels of conditioning and parametric assumptions. Some of them, including MICE, have the advantage of allowing for conditioning for various distributions, defining the imputation model variable-by-variable (174). MICE can handle various types of variables, including categorical, ordinal, continuous, and count variables, by using appropriate models for each. MICE is also known as a fully conditional specification and sequential regression multivariate imputation, as it produces the imputed data sets through sequential chained cycles, conditioning the imputed values on the already imputed values. These cycles are called iterations and are repeated several times to produce an imputed dataset, and the whole procedure is repeated m times to produce m imputed datasets (177).

We performed the imputations in Stata (Version 16), using 'mi impute' with 100 imputations and 1000 iterations.

The imputation model should include all variables in the analysis model and possibly additional auxiliary variables. Auxiliary variables are variables that are not included in the analysis model, but are related to the probability of missing, which we can therefore use to recover some of the missing data in the incomplete variables and to keep the missing process random (166, 173, 179). An auxiliary variable is only relevant for inclusion if it is observed when the variables of interest are missing (166). Interactions are not easily included in the MICE model (174), which should be considered if the analysis model includes interactions. When conducting Cox regression model, as we did in paper II, the Nelson Aalen estimator was included in the imputation model, to account for the baseline hazard (180).

When the missing data has been imputed, the complete data sets are analyzed individually and the results are then pooled together to one summary estimate, according to the combination rules by Rubin (167), and in this study were performed using the Stata function 'mi estimate'.

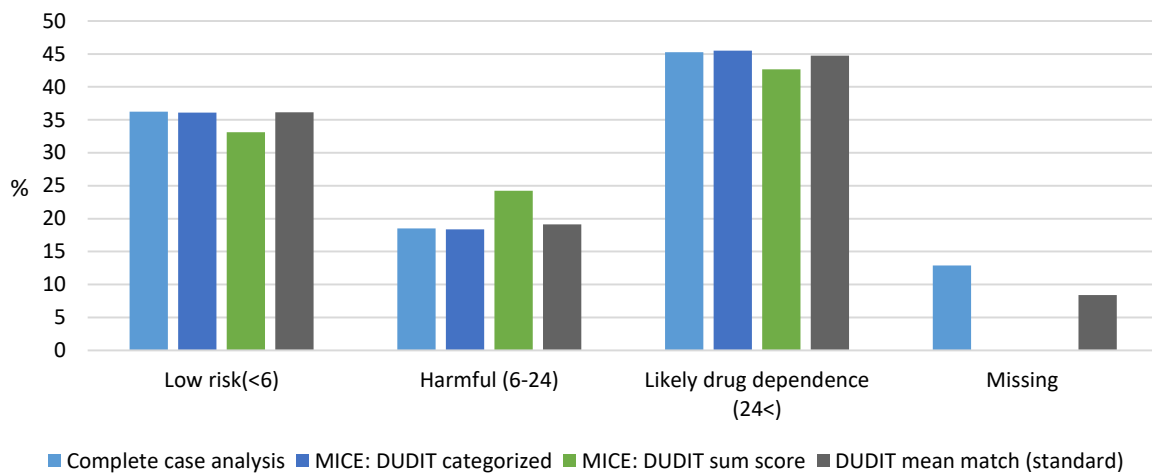
Sensitivity analysis

To test the assumptions of our imputation model, we performed several sensitivity analyses. First, we conducted a sensitivity analysis comparing the estimates from, respectively, a CCA, an analysis on data imputed with auxiliary variables (MICE AUX), and an analysis on data imputed with only the variables from

the regression model (also called full model). In both paper II and paper III, we concluded by using the full model with no auxiliary variables, as this resulted in the most conservative estimates.

A second sensitivity analysis was conducted to assess the consequences of imputing DUDIT, comparing the effect of four different methods for handling missing data on the estimates from the regression analysis. The four methods were: 1) CCA; 2) The standard imputation method for DUDIT (mean matching); 3) MICE: “DUDIT sum score”, imputing DUDIT as sum score of the ten items; and 4) MICE: imputing DUDIT as categories. The effect of the different methods on the distribution across the three DUDIT categories is illustrated in Figure 4.

Figure 4: The distribution of DUDIT categories based on complete case analysis, mean matching, and two versions of MICE (%).



As seen in Figure 4, the distribution between the three categories of DUDIT was stable across the four methods of handling missing data. However, if we use the CCA or the standard imputation method, a substantial part of the cases would be excluded due to missing. By using the datasets imputed with MICE, we would be able to keep all cases in our analysis, avoiding the loss of information and retaining strength to our analysis. Using the MICE model that imputed DUDIT as categorized resulted in the most conservative estimates, as described in detail in the supplementary material for Paper II.

2.6. Ethics

Research on captive populations, such as people in prison, involves particular moral hazards, because they live under physical restraints and control from others, with limited ability to exercise choice (181). This vulnerable position is especially important to consider during data collection and in research dissemination to avoid coercion and exploitation (182).

According to the Declaration of Helsinki on ethical principles for medical research involving human subjects, all participation must be voluntary and based on adequate and sufficient information understood by the participants (183, 184). This should include complete and accurate information about the study and their right to refuse or withdraw participation at any time without any penalty (184, 185). Furthermore, researchers collecting data in prison should inform participants about the researcher's relationship with the prison institution or prison authorities (186). After ensuring that the potential participant has understood the information, the researcher must seek the participants informed consent (184).

The NorMA study was conducted according to the Declaration of Helsinki and ethically approved by the local and regional ethical committee, including the prison authorities, the University of Oslo, and the Regional Ethical Committee (REK Reference: 22396). Participation in the NorMA study was voluntary, and people were invited to participate by the study investigators, who also distributed the questionnaires, to make it clear that the study had no association to the prison staff or the prison authorities. Furthermore, people were encouraged to participate with or without providing a PIN. The confidentiality of the participants was ensured by giving the participants the choice of whether to complete the questionnaire in a room with others or alone in their cells. People filled out the questionnaire on the day of the data collection, but if the respondents required more time to fill out the questionnaire they were collected in sealed envelopes and returned to the study investigator by registered mail (144).

Participants who agreed to provide their PIN had to sign an informed consent for its use with linkage to a listed number of national registries. This informed consent included information about the scope of the study, the confidentiality of their personal information, and their right to withdraw from the study at any time.

Confidential data handling

The data that was analyzed for this thesis includes highly sensitive information from multiple sources. This included sensitive information on imprisonment, sentences, substance use, health status, and treatment. In the data handling process, it was therefore crucial to secure the confidentiality, anonymity, and unrecognizability of the participants. This was done through anonymizing the questionnaires before handling the data, and linkage was performed by the external data providers. The linkage-key was unavailable to the researchers. All data was directly loaded to and saved on an IT-platform at the University of Oslo specifically dedicated to storage of sensitive research data, Tjenester for Sensitive Data (TSD).

3. Results

3.1. Characteristics of the NorMA

Demography

The vast majority of the NorMA cohort were men, while 7% of the NorMA cohort were women (Table 8). The mean age at the beginning of their index imprisonment was 35.5 years. People born in Norway were the majority, while the group born outside Norway (12%) were dominated by people born in Asia, Eastern Europe, and Africa. In terms of education and occupation, almost 60% had finished secondary school or higher level of education, while 7% had no education and 34% only had primary school level. Four in ten had been occupied with work or education before imprisonment, almost 60% were unemployed. The majority reported living on income from either paid work or welfare payments, while around 20% reported living primarily or partly on income from criminal activities.

Table 8: Demographic and socioeconomic characteristics of the NorMA cohort (n=733).

	<i>n</i> (%)	Missing
Demography		
Gender (male)	606 (93.1)	0 (0.0)
Age, mean (SD)	35.5 (11.6)	0 (0.0)
Region of birth:		18 (2.8)
Norway	602 (82.1)	
Asia	40 (5.5)	
Eastern Europe	25 (3.4)	
Africa	23 (3.1)	
Western Europe (excl. Norway)	18 (2.5)	
Other	7 (1.0)	
Education and occupation		
Level of education:		9 (1.2)
Did not finish primary school	52 (7.1)	
Primary school only (10 years)	248 (33.8)	
Secondary school (1-3 years)	359 (49.0)	
Three years of university or similar level	40 (5.5)	
More than three years of university or similar level	25 (3.5)	
Occupation: Job or education	264 (40.6)	16 (2.5)
Income:		13 (7.8)
Only legal, paid work	169 (23.1)	
Other legal income*	377 (51.4)	
Paid work and other legal income*	18 (2.5)	
Only crime	57 (7.8)	
Both crime and legal income	99 (13.5)	

Social background

One in three had experienced parental problems with mental illness and/or substance use, while one in five had at least one experience with either temporary or permanent foster care (unpublished results (UPR)) (Table 9). The majority of the participants had stable housing before they were imprisoned and lived with friends or family. The majority (59%) reported a good or very good relationship with a partner and/or friends. However, one in three had an unstable housing situation, one in three reported living alone before imprisonment and 24% reported having a bad/very bad or no contact with partner or friends at the time of the data collection (UPR).

Table 9: Sociodemographic characteristics of the NorMA cohort ($n=733$).

	<i>n</i> (%)	Missing
Upbringing		
Childhood w. parental mental illness and/or substance use	225 (34.6)	26 (4.0)
Experience w. Foster care:	129 (19.8)	16 (2.5)
Living with relatives (not biologic parents)	45 (6.1)	
Adopted	15 (2.0)	
Foster home	68 (9.3)	
Other	70 (9.5)	
Living situation and relationships		
Accommodation: Stable housing	471 (72.4)	26 (4.0)
Living alone	238 (32.5)	13 (1.8)
Civil status		8 (1.1)
Single	412 (56.2)	
Cohabitant	138 (18.8)	
Married	70 (9.5)	
Divorced	70 (9.5)	
Widow(er)	11 (1.5)	
Relationships:		24 (3.3)
Good/very good relationship w. partner and/or friends	410 (59.0)	
Contact w. friends or partner, but no good relationships	121 (16.5)	
Bad, very bad or no contact/relationship with partner and friends	178 (24.3)	

Health

The majority (57%) of the NorMA cohort participants considered their physical health to be good or very good at the time of imprisonment (Table 10). Seven in ten smoked tobacco both before and during imprisonment. Exercise increased during imprisonment, from 40% reporting exercising before imprisonment to 60% reporting that they exercised in prison. Almost one in five reported to be hepatitis B and/or C positive, while 65% reported no hepatitis and 10% reported that they did not know their status (UPR). Less than 1% reported known HIV-positive status (not reported in table). More than half of the

cohort participants reported good or very good mental health. However, at the same time, almost 40% reported symptoms of severe mental distress according to the HSCL-10. Detailed information on DUDs will be presented in 3.3.

Table 10: Health characteristics of the NorMA cohort ($n=733$).

	<i>n</i> (%)	Missing
Physical health		9 (1.2)
Bad or very bad	131 (17.9)	
Neither good or bad	279 (23.5)	
Good or very good	421 (57.4)	
Mental health		7 (1.0)
Bad or very bad	170 (23.2)	
Neither good or bad	178 (24.3)	
Good or very good	378 (51.6)	
Mental distress	239 (36.7)	164 (25.2)
Tobacco		
Smoking: before imprisonment	553 (75.4)	8 (1.1)
Smoking: during imprisonment	529 (72.2)	12 (1.6)
Snuff: before imprisonment	158 (21.6)	23 (3.1)
Snuff: during imprisonment	239 (32.6)	22 (3.0)
Exercise		
Before imprisonment	280 (38.2)	13 (1.8)
During imprisonment	468 (63.8)	15 (2.0)
Hepatitis status		44 (6.0)
No hepatitis	479 (65.3)	
B	11 (1.5)	
C	98 (13.4)	
B and C	28 (3.8)	
All w. positive hepatitis status	137 (18.7)	
Unknown	72 (9.8)	

Imprisonment

Among the NorMA cohort participants, 70% had at least one imprisonment before their current imprisonment, the median number being two previous imprisonments (Interquartile range: 1-3) (Table 9). At the time of data collection, almost 80% were sentenced and 19% were in pre-trial detention (UPR). The majority (60%) were imprisoned at high-security level at the time of data collection, while 36% were imprisoned at a low-security level and 4% were living in a transition house. Almost half of the cohort participants were imprisoned more than a year, 21% had been imprisoned 6 to 12 months, 13% 3 to 6 months and 19% 3 months or less. One in three had use and possession among one of their sentences, while 62% had received this sentence at least once in the observation period (from 1992 to 2019).

Table 11: Imprisonment characteristics of the NorMA cohort ($n=733$).

	<i>n</i> (%)	Missing
Past imprisonment(s)		
Previous imprisoned	456 (70.0)	0 (0.0)
Median number of previous imprisonment (Q1-Q3)	2 (1-3)	0 (0.0)
Index imprisonment		
Status of imprisonment		12 (1.6)
Pre-trial	141 (19.1)	
Sentenced	575 (78.4)	
Preventive detention	16 (2.2)	
Security level		5 (0.7)
High	438 (59.8)	
Low	264 (36.0)	
Transition housing	26 (3.5)	
Conviction for use and possession		0 (0.0)
In index imprisonment	244 (33.3)	
In any imprisonment during observation period	457 (62.3)	
Length of imprisonment		0 (0.0)
<3 months	122 (18.7)	
3-6 months	83 (12.7)	
6-12 months	134 (20.6)	
>12 months	310 (47.6)	

3.2. The external validity of the NorMA cohort (Paper I)

When comparing the 733 participants of the NorMA cohort to the 762 persons lost to follow-up, the NorMA cohort was characterized by more social disparities in terms of education, occupation, and family problems. The NorMA cohort also had more previous imprisonments, drug use related crime, mental distress, and self-reported drug use. This included higher lifetime drug use (76 versus 62%), daily drug use (56 versus 38%), and harmful drug use (65 versus 48%), measured as a DUDIT score of 6<. The majority (84%) of the NorMA cohort were born in Norway, while this proportion was 55% among persons lost to follow-up.

When comparing the NorMA cohort to the total one-day cohort, the NorMA cohort was younger when they entered prison the first time (median age 24 versus 27 years), had more imprisonments (median 4 versus 2 imprisonments) and had served more days in prison (902 versus 792 days). Three in four of the NorMA cohort were re-offenders, compared to approximately half of the one-day cohort. Sixty-two percent of the NorMA cohort had been convicted of use and possession at least once, compared with 54% in the one-day cohort.

The one-day cohort included 907 individuals (27%) who did not have a Norwegian PIN. The one-day cohort without Norwegian PIN were older and had fewer, but longer imprisonments and less total days of lifetime imprisonments (519 days versus 792 days in the total one-day cohort and 962 days in the one-day cohort with PIN). In this group, fewer had a conviction for use and possession (46%).

When excluding people without PINs from the one-day cohort, the differences between the NorMA cohort and the one-day cohort were small and often insignificant. The one-day cohort without PIN was significantly different from the NorMA cohort in terms of age, re-offenders, number of previous imprisonments, days per imprisonments, total days in prison, and sentences for use and possession. In conclusion, the NorMA cohort was found to be representative of the general Norwegian prison population with PIN.

3.3. Drug use disorders in the NorMA cohort

Three in four had used drugs at some point in their life (Table 12). More than half (56%) had used drugs weekly or more than weekly during the last six months prior to imprisonment.

According to the self-reports on DUDIT, 40% of the NorMA cohort had a likely drug dependence, while 16% had a harmful drug use and 33% had a low-risk drug use. One in five reported a likely alcohol dependence, while 34% reported hazardous or harmful drinking and 35% no or low-risk drinking.

There was a considerable overlap between the test results from AUDIT and DUDIT. Combining the AUDIT and DUDIT to assess the overall prevalence of likely dependence on drugs and/or alcohol, almost half of the NorMA cohort (47%) would be categorized as likely dependent on drugs and/or alcohol (UPR). Among the 135 people with a likely dependence on alcohol, 65% also reported likely drug dependence, while 14% reported harmful drug use and 15% reported low-risk drug use.

Four in ten reported IDU in the six months prior to index imprisonment. The most common drug injected was amphetamine, including methamphetamine, which 28% of the NorMA cohort had injected, followed by heroin (12%), anabolic steroids (11%), and methadone (10%).

Poly drug use was prevalent in the NorMA cohort. Four in ten of the NorMA cohort had a weekly use of two or more drugs (not including alcohol). Among the 23% who had a daily drug use, more than 90% had a daily polydrug use. Most frequent were three different types of drugs among daily users (32%), but 40% of people with daily drug use had used four drugs or more.

Table 12: Substance use, treatment and substance use related crime among participants in the NorMA cohort (n=733).

	n (%)	Missing
Life-time prevalence	541 (76.0)	21 (2.9)
Weekly drug use or more	411 (56.1)	0 (0.0)
IDU		53 (7.2)
No IDU	456 (62.2)	
Daily/almost daily	165 (22.5)	
1-2 times per week	35 (4.8)	
1-3 times per month	24 (3.3)	
Weekly poly drug use	271 (37.0)	41 (6.3)
DUDIT		82 (11.2)
Low risk (score <6)	238 (32.5)	
Harmful (score 6-24)	119 (16.2)	
Likely dependence (Score ≥25)	294 (40.1)	
AUDIT		98 (13.4)
Low risk drinking (scores <7)	254 (34.7)	
Hazardous drinking (Score 8-15)	194 (26.5)	
Harmful drinking (score 16-19)	52 (7.1)	
Likely dependence (score ≥20)	135 (18.4)	
Level of substance use (AUDIT and DUDIT combined)		
Low-risk	127 (17.3)	76 (10.4)
Harmful	189 (25.8)	
High-risk/Likely dependence	341 (46.5)	
DUD treatment the year before imprisonment	222 (30.3)	0 (0.0)
Substance use related crime*	311 (42.4)	0 (0.0)
Use and possession*	244 (33.3)	0 (0.0)

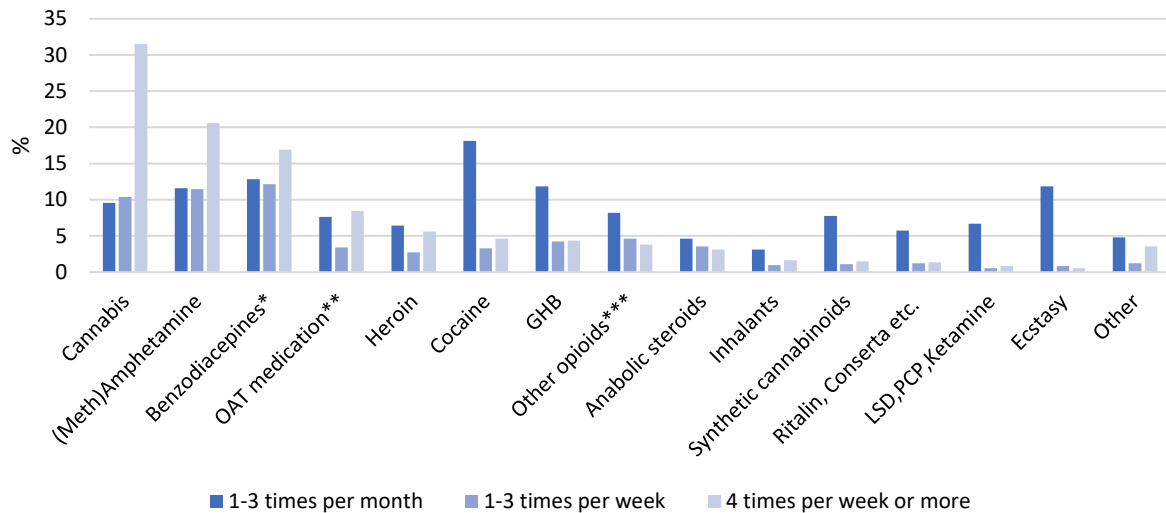
*At least one conviction among all convictions related to the index imprisonment

Specific drugs used before imprisonment (UPR)

Figure 5 shows the frequency of the specific drugs reported being used during the six months prior to imprisonment. Cannabis (32%) was the most prevalent drug, used four times per week or more, followed by amphetamine (including methamphetamine) (21%), and benzodiazepines (17%).

The most common combinations of drugs used daily (measured with Kendall's τ correlation coefficients) were benzodiazepines and opioids (including heroin, methadone, Subutex, and other opioids) (0.50 ($p < 0.1$)) and ecstasy in combination with other inhalants (0.43 ($p < 0.1$)), LSD (0.40 ($p < 0.1$)) and GHB (0.35 ($p < 0.1$)).

Figure 5: Drugs used six months before imprisonment by monthly, weekly, or daily use (n=733).



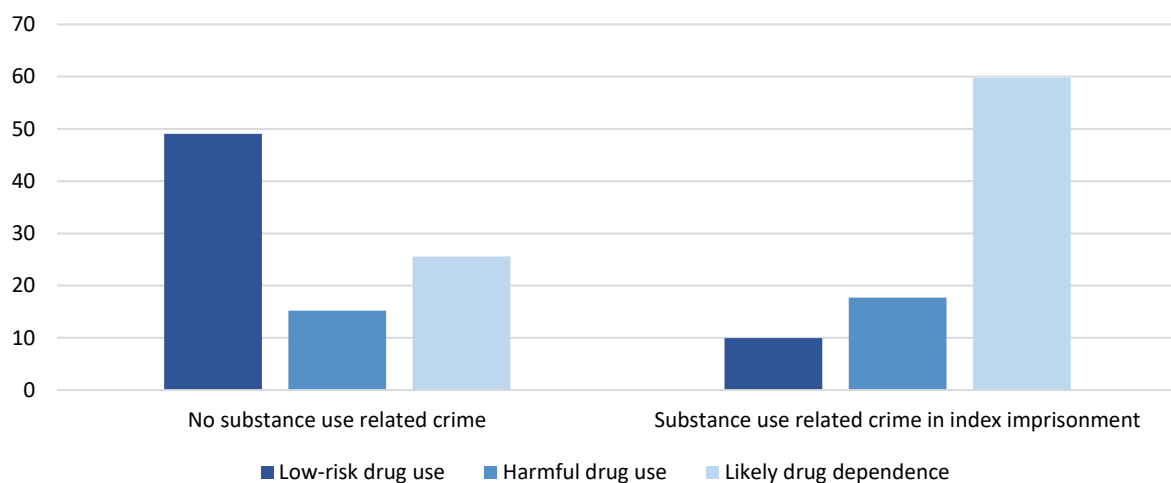
*Valium, Vival, Stesolid, Sobril, Alopam, Rohypnol, Flunipam, Rivotril. Xanor, Apodorm, Mogadon (Non-prescribed).

**Metadon, Subutex, Suboxone (non-prescribed)

***Dolcontin, Paralgin Forte, Nobligan, Oxycontin (Non-prescribed)

Almost half (42%) of the NorMA cohort entered prison with a substance use related sentence. Figure 6 shows the level of drug use among people with and without this type of sentence. Among people with a substance use related sentence 60% were likely drug dependent, while 10% had a low-risk drug use.

Figure 6: Level of drug use among people with and without substance use related crime in the NorMA cohort (n=651 (82 missing)).



3.4. Drug use and risk of re-imprisonments (Paper II)

Among the study sample ($n=701$), 225 persons (36.2 %) reported low-risk drug use (Score of <6), 115 persons (18.5 %) reported harmful drug use (Score of 6-24), and 281 persons (45.2 %) reported likely dependence (Score of >24), while 80 (11.4%) were missing.

The total time at risk for all 701 participants was 905,372 days, equivalent to 2,479 person-years and an average of 3.5 person-years per participant. Two-fifths of the people ($n=267$, 43%) in the cohort were re-imprisoned within the follow-up period, with a mean time to first re-imprisonment of 651 days (SE=26.9). When stratifying on drug use, we excluded 80 persons with missing items on DUDIT, leaving 621 persons with 2,021 person-years at risk. Among persons reporting likely drug dependence, almost seven in ten returned to prison, and they returned sooner than persons reporting low-risk drug use (mean days to re-imprisonment: 610 days versus 879 days). More than half of persons reporting likely drug dependence had returned to prison within 1,000 days, compared with one in four among those reporting harmful use and less than one in ten among persons reporting low-risk drug use.

Compared with people with low-risk drug use, people with likely drug dependence had four times higher hazard ratio (HR) for re-imprisonments (aHR=4.20, $p<0.001$) and people with harmful drug use had 80% higher HR for re-imprisonments ($p=0.008$). Higher age (aHR=0.98, $p<0.001$) and having more education than primary school (aHR=0.76, $p=0.025$) were protective factors against re-imprisonment.

3.5. Utilization of drug use disorder treatment among people in prison (Paper III)

Among all NorMA cohort participants, 35% received DUD treatment during the index imprisonment, compared to 30% the year leading up to the index imprisonment. Among those who received treatment during the index imprisonment, 63% had also received treatment in the year leading up to this imprisonment. Among people with likely drug dependence, 64% received DUD treatment during their index imprisonment.

Comparing people who received DUD treatment during index imprisonment to those who did not, those who received DUD treatment were younger (mean: 33 years versus 37 years) and were more often Nordic born (93% versus 79%). Furthermore, the treatment group appeared to have lower socio-economic status, with less education beyond primary school (46% versus 64%), less occupation before index imprisonment (22% versus 51%), and less stable housing (61% versus 78%) (Paper III). They also had more social problems during upbringing, including experiences with foster care (27% versus 17%) and parental substance use or psychiatric illness (47% versus 30%) (Paper III). In terms of their imprisonment, people

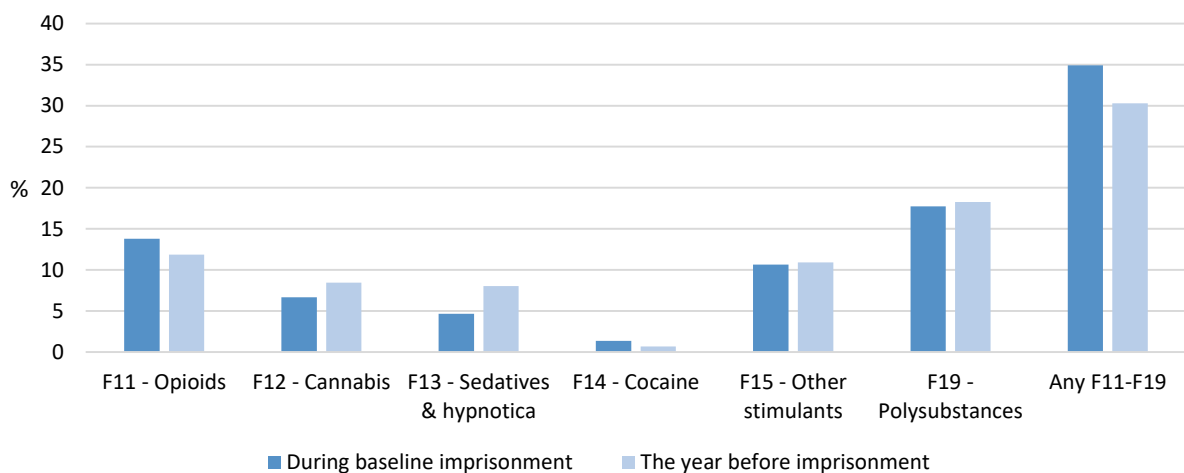
who received treatment during their index imprisonment had more previous imprisonments (median: 4 versus 2), drug use related crime (66% versus 30%), and longer index imprisonment (median: 12 versus 10 months).

People receiving treatment during the index imprisonment, most often reported likely drug dependence (73%), daily or almost daily drug use (88%), weekly polydrug use (74%), and daily or almost daily IDU (45%). Most people in the treatment group reported low (32%) or middle (22%) treatment motivation.

DUD treatment utilization was associated with daily IDU (aOR = 2.58, CI=1.51-4.39), polydrug use (aOR = 2.19, CI=1.34-3.60), length of imprisonment (3-6 months: aOR= 3.44, CI=1.58-7.52; 6-12 months: aOR=6.33, CI=3.11-12.89; >12 months: aOR 8.87, CI=4.48-17.55), and Nordic country of birth (aOR=2.85, CI=1.42-5.73).

Both before and during index imprisonment, people most often received treatment for polydrug use (18% both before and in prison), opioids (12% before, 14% during imprisonment), and stimulants, including amphetamines and methamphetamines (11% both before and during imprisonment) (Figure 7) (UPR).

Figure 7: Treatment received before and during imprisonment.



3.6. Summary of findings

The NorMA cohort is a national sample of the prison population in Norway, characterized by social and economic disparities and a high burden of physical and mental health problems. This includes a high prevalence of substance use, including IDU and polydrug use. In line with this, 40% had a likely drug dependence, 18% were likely alcohol dependent, and 47% were likely dependent of drugs and/or alcohol.

In terms of basic demographics and imprisonment characteristics, the NorMA cohort is representative of people in prisons with Norwegian PIN.

When assessing re-imprisonments after release from index imprisonment, we found that 43% of the NorMA cohort were re-imprisoned after their release from the index imprisonment. However, people with likely drug dependence were more often and sooner re-imprisoned, compared to those with harmful drug use and low-risk drug use. When adjusting for other risk-factors for re-imprisonment, people with likely drug dependence had a four times higher risk of re-imprisonment than those with low-risk use. Higher age and more education than primary school were protective against re-imprisonment.

One in three of the NorMA cohort received DUD treatment during the index imprisonment. However, among people with likely drug dependence, 64% received DUD treatment. Overall, people who received treatment were characterized by a heavy burden of social disparities and high prevalence of likely dependence, polydrug use, and IDU before imprisonment.

Among people with a harmful drug use or likely drug dependence, polydrug use, IDU, longer sentences and Nordic origin were associated with DUD treatment utilization.

4. Discussion of methods

All studies are subject to sources of error. The internal and external validity of the study findings are affected by how these errors are assessed and handled. Errors in estimation are traditionally classified as either random or systematic, threatening the validity and precision of our estimates (187). Random error exists in all data materials, but decreases with increasing sample size, and we quantify it with statistical tests, p-values, and confidence intervals (CIs)(188). Random error, if handled appropriately, is rarely a large driver for bias.

Systematic errors, however, can potentially introduce serious bias, threatening the validity of the study results. Below I will discuss some potential sources of systematic errors in the NorMA study, in terms of selection bias, information bias, and confounding. These concepts can be overlapping and some phenomena can be described as both selection bias and confounding (187). Most importantly, selection bias and information bias can influence the validity and precision of our results, while uncontrolled confounders can lead to false interpretation of the findings.

4.1. Selection bias

When implementing any type of survey, it is important to clearly define the target population that we wish to draw a sample from (189). When we are unable to include all members of the target population we wish to study, we need to draw a sample that reflects the characteristics of the population from which it is drawn (189). Using random sampling, where all members of the target population have equal probability of being included for study, is usually the best way to obtain a representative sample. Failing to obtain a representative sample will lead to selection bias, meaning that the relation between exposure and outcome is different for participants compared to non-participants (187). This issue can make the findings applicable only to the sample, not the wider population, thereby limiting the study's external validity (188).

The NorMA study was designed based on the intention to reach as many people in prisons in Norway at the time of data collection through visits to almost all Norwegian prisons (144). Several measures were taken to include a representative sample responding to the NorMA baseline survey. Firstly, all prisons in Norway were sought to be included in the study, all individuals imprisoned at the day of data collection were defined eligible for participation, and the study investigators encouraged everyone to participate. Secondly, the questionnaire was translated into five other languages, and people who needed more time had the option of returning the questionnaire by mail. Thirdly, the data collection also sought to take the activities and time schedule in the prison into account, seeking to perform the data collection at the most

convenient time of the day. The physical presence of the data collectors could also have induced a sense of trust among participants, as this made it clear that the survey was part of an independent research project, with no attachment to the prison authorities. Furthermore, though people were encouraged to provide their PIN, the ability to participate without providing a PIN might have lowered the threshold for some participants.

However, selection mechanisms could have excluded both the most and the least vulnerable people from the target population (144). For instance, the NorMA questionnaire was a comprehensive questionnaire, consisting of 116 questions, which participants had to fill out themselves. Participants could include people with low literacy skills, including language barriers, people with a high level of physical or mental disability, or people in solitary confinement. An important source of potential selection bias could therefore be the unintended exclusion of vulnerable and hard-to-reach groups, who were unable, unwilling, or uninterested in participating. On the other hand, people with more personal resources might have been unavailable during data collection due to activities, such as work, school, and training.

Furthermore, survey studies based on optional participation can also be hampered by so-called “self-selection bias”. In the context of the NorMA-survey, where the title of the survey refers to mental health and addiction, this could mean that some people did not participate because they did not identify with the topics of mental health and/or addiction. Selection bias, both related to vulnerable groups and people with more resources, could reduce the validity of the measured prevalence in our studies, such as the prevalence of drug dependence.

External validity of the NorMA cohort

Selection bias can affect the external validity of our study findings, which was assessed in depth in Paper I. This found that the NorMA cohort was a representative sample of the total Norwegian prison population possessing a Norwegian PIN, in terms of basic demographics and characteristics of imprisonment. Furthermore, studying the prevalence of use and possession gave us an indication that the level of problematic drug use found in the NorMA cohort would to a large extent be representative of the general Norwegian prison population with a Norwegian PIN.

Though the NorMA cohort included people in pre-trial detention, it included fewer people in pre-trial detention than the general prison population (19%, compared with 28% in the general prison population during 2013 and 2014). This was probably due to the exclusion of people with no Norwegian PIN, as people without Norwegian citizenship are overrepresented among those in pre-trial detention (46, 190, 191).

Almost half of the members of the NorMA cohort spent more than a year in prison. As 90% of people released from prison in 2014 had been incarcerated for less than a year (190), this duration might appear lengthy. However, this is primarily explained by the cross-sectional sampling of the NorMA cohort and the normal difference between the stock (the current population at a given point in time) and flow (rate of turnover) of prison populations.

Stock- versus flow sampling

In a cross-sectional sampling we sample from the stock population. This means that people with longer imprisonments, or repeating imprisonments, are more likely of being included in the sample (192). To illustrate the difference between cross-sectional sampling (stock population) and a longitudinal sampling (flow population) Table 13 shows some basic characteristics of the NorMA cohort and the flow population during the data collection in the NorMA survey. If the study had used longitudinal sampling, the flow of people in prison during the time period, the sample would have included a population with fewer imprisonments (2 versus 4 within the follow-up period), shorter imprisonments (60 versus 93 days), fewer sentences (3 versus 10 per imprisonment) and fewer sentences for use and possession (45 versus 62%).

Table 13: Characteristics of the NorMA cohort ($n=733$) and the flow population in all Norwegian prisons during the time of data collection of the NorMA cohort, from 1. July 2013 to 1. August 2014 ($n=14410$).

	Norma cohort ($n=733$)	Flow population ($n=14410$)
Age at first imprisonment (mean)	28.1	30.3
Gender (% Male)	93.0	92.0
Days per imprisonment (Median)	93	60
Number of imprisonments (Median)	4	2
Re-offenders (%)	75.6	53.5
Number of sentences per imprisonment (Median)	10	3
Use and possession (%)	62.3	45.4

Both ways of sampling provide a truthful representation of the prison population, and both can provide important information for health service provision in prisons. For example, if health providers planned to initiate a systematic screening of SUD among all people who enter prison with the intention to provide treatment for all who screen positively, they would need information based on flow sampling to know how many people they should expect to treat within the year. However, when organizing how many health workers are needed on a daily basis to deliver the SUD treatment, it is equally relevant to have estimates based on cross-sectional data (stock population) because they need to know the average daily

service needs. Both measures of prevalence can be true. However, it is important to be aware of the implications of the sampling and avoid comparisons between different kinds of samplings.

While the studies in this thesis were conducted using a cross-sectional sampling design, it was a strength of the registry data source that we had the opportunity to compare the characteristics of our stock sampling to the flow sampling.

As the prison population today includes a more selected population, with longer sentences and a higher prevalence of SUD than in 2013-2014, it seems likely that the difference between the stock population and the flow population today is smaller than during the time of data collection.

4.2. Information bias

Information bias includes bias related to measurement error and misclassification. Misclassification means measuring things incorrectly and classifying cases accordingly (188). Information bias can occur due to various reasons, such as recall bias, interviewer bias, or instrument measurement errors.

When studying substance use, SUD, and DUD treatment, it is important to consider the risk of information bias and how this could affect our findings. I will, therefore, discuss how information bias could have affected our estimates of drug use and treatment need and our findings on DUD treatment utilization.

Studies of the validity of self-reported drug use have shown a general tendency to underreport substance use (193, 194), including among people under arrest (195, 196). This could be attributed to social desirability, in which the risk of misreporting increases with the perception of social stigma and illegality attached to drug use (195, 197). Yet, less misreporting is observed among injecting and long-term drug users compared with recreational users (195, 198), and more underreporting is seen among cocaine and crack users compared with marijuana users (196). A study of nearly 5,000 detainees in the US showed no effect of age, gender, race, offence seriousness, or drug type on the accuracy of self-reported drug use (196).

So how could misclassification occur in the studies of this thesis and how would it have affected the findings?

Figure 8: DUDIT scores from 1-44 in the NorMA cohort. Scores of 0 not shown ($n=194$). Light blue, blue, and dark blue illustrates the category attached to the score (low-risk, harmful, and likely dependence ($n=457$)).

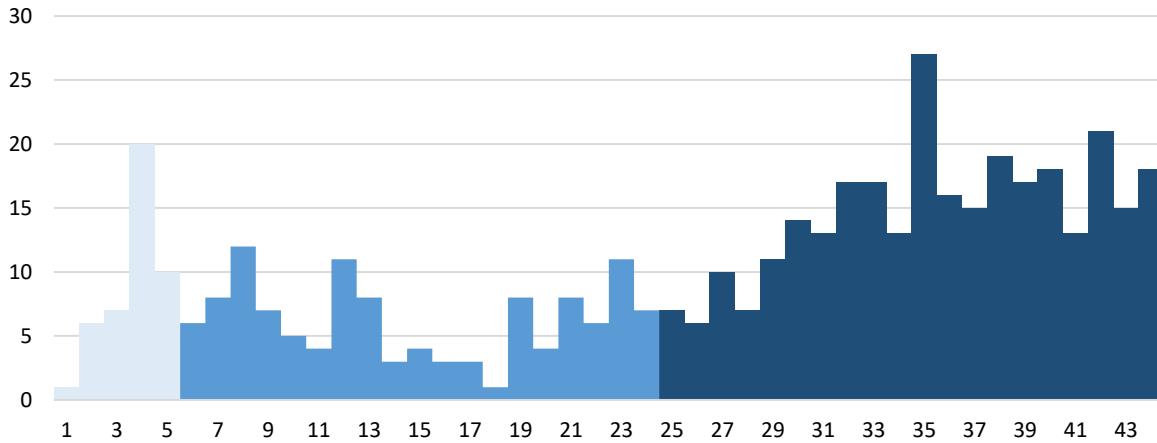


Figure 8 illustrates the total DUDIT score for persons answering all items on the DUDIT, while not showing those with a null score ($n=194$). As is apparent, there are several observations falling closely to the cut-offs between the three categories: ‘low-risk use’, ‘harmful use’, and ‘likely dependence’. Two aspects are important to consider in this situation. First, if this classification is based on systematic underreporting of drug use, this could lead to an underestimation of the effect of drug use in our study. Second, the ‘harmful use’ group is very wide, including persons scoring between 6 (which indicates not very likely to be dependent) and 24 (likely to be dependent). Collapsing persons on both sides of this spectrum means we are treating people with very different risk profiles as equal. This issue of using cut-offs is a universal concern in medical research, and is often not explored in detail. In the case of the DUDIT, the cut-offs have been thoroughly tried and tested (160). Still, it is important to keep in mind the limitations such constructed categorizations impose. However, using standardized categories also holds some clear benefits, especially in regression analysis with limited sample sizes, where continuous variables can cause problems with statistical strength.

Measures were taken to reduce the misreporting of drug use. First, in contrast with an oral interview situation, the effect of social desirability would probably have been minimized through the written and anonymous participation, securing the confidentiality of the research participants. Second, the DUDIT has been validated specifically for measuring drug dependence among people in prison settings, predicting drug dependence with 90% sensitivity compared to clinical instruments ICD-10 and DSM-4. Hence, the design of the data collection and the use of DUDIT as the key measurement of drug use would most likely have reduced the level of information bias.

Another source of information bias could be related to our categorization of DUD treatment utilization. While we had complete data on all DUD treatment received from specialized health care providers, we did not include data on other health care providers offering DUD treatment, including primary health care providers. This can create an underestimation of DUD treatment utilization and treatment coverage, if we classify people as not getting DUD treatment, even though they did get treatment from other providers.

Recall bias

Recall bias is a type of information bias that occurs if participants are systematically more or less likely to recall information on exposure depending on their outcome status or to recall information regarding their outcome dependent on their exposure (199). This type of bias often occurs in case-control or retrospective cohort study designs in which participants are required to evaluate exposure variables retrospectively using a self-reporting method, such as self-administered questionnaires (200). Data from the NorMA study can be sensitive to recall bias, as some of the items focus on events happening in the past, for example, an upbringing by parents with mental or drug-related disorders. We would also expect that items measuring drug use could be vulnerable to recall bias. Our registry data is, on the other hand, protected from this kind of bias, as it is collected in real time from registries and thus not reliant upon an individual's memory.

I identify two types of potential recall bias related to DUDIT. First, the 11 items in DUDIT asked participants to report their drug use behavior during the 12 months leading up to their imprisonment. This is a long time span to report on, which in itself could induce recall bias. Furthermore, the cross-sectional sampling means there were big variations in how long participants had been imprisoned when they answered the baseline survey. Hence, the effect of the recall bias could be dependent on how far back in time participants had to remember. This could have been investigated with a sensitivity analysis, comparing the self-reported drug use among people who had been imprisoned for more or less than, for example, three months, as done by Pape et al (2022), who also analyzed data from the NorMA cohort (145). Pape et al. found no significant differences in their sensitivity analysis, comparing AUDIT scores among people imprisoned for <3 months and people imprisoned for 3-12 months.

Response fatigue

The NorMA questionnaire was rather long (116 questions) and was estimated to take 60 minutes to complete (144). This could increase the risk of bias related to response fatigue (201), in which participants, by the end of the survey, would tend to either reply similarly to all questions (e.g., responding no or yes to all questions) or to refuse to answer all of the questions (201). This can be reduced through the

questionnaire design, by breaking the pattern of the statements or by providing open-ended questions (201). Such strategies were incorporated into the NorMA questionnaire design. To test the experience of participating in the survey, the questionnaire was piloted by people in a local prison. In this pilot, people answered the questionnaire along with an additional survey on how they experienced filling out the questionnaire, and some participants were additionally asked to participate in focus group interviews. As a result of these pilot tests, a few questions were added because the participants felt the need for further opportunities to describe their social situation and background.

Moreover, during data collection participants were provided with breaks and given the opportunity to complete the questionnaire at their convenience, allowing them to send it back via mail. This might have reduced the influence of response fatigue. However, it is likely that response fatigue might have been more common among people with mental health issues, such as cognitive impairment or troubles with concentration, who might also have been less represented in the pilot testing of the questionnaire.

4.3. Confounding

Confounding is a type of bias in estimating causal effects, in which we mix the effect of a confounding variable as an effect of the exposure of interest (202, 203). A confounding variable is one that is associated with both the exposure and the outcome under investigation, without acting as an intermediate link in the causal chain that connects the two (203). A confounder thereby creates an illusion of a causal relationship between the exposure and the outcome where one does not exist, and it might distort a real causal relationship.

Aspects of the study design and sampling method can prevent or reduce confounding (202). In case-control studies, this is often done through *matching*, in which cases and controls are matched according to different levels of the confounding variable (203). In intervention studies or medical trials, confounding is often controlled through a randomized allocation of the exposure, as in randomized controlled trials (RCT) (188, 202). However, when controlling for confounding variables through study design is infeasible or insufficient, confounding can also be controlled for by analytic adjustments (202). This includes stratification of the sample on the values of the confounder or adjusting for the confounder in regression models (202, 204).

In this thesis confounding was primarily controlled through analytic adjustments. To create a visually and transparent description of the causal assumptions in the analysis and to identify confounders, the causal relations between the main exposure and outcomes and all observed covariates were initially assessed

through DAGs (205). We then adjusted the regression analyses to control for the confounders identified in the DAGs.

However, it is complex to address the causal mechanisms between drug use and crime with epidemiological research methods, as it can be challenging to identify and measure all relevant sources of confounding. This reflects the multifaceted reality and life experience of living with drug use and a wide range of social and economic problems. Despite our rich data material and adjustment in the regression analysis, there might therefore remain unobserved and uncontrolled confounding, which we are unable to account for.

4.4. Strengths

This thesis has several methodological strengths, in particularly related to the data material and methodology. The NorMA cohort is the first longitudinal cohort of people in prison in Norway, with both self-reported survey data and national registry data. This combination of data sources gave us a unique opportunity to study the actual selection into the cohort and its representativeness to the general prison population. By applying this, we found that the NorMA cohort was representative when it came to imprisonments, including re-imprisonments, type of crime, length of imprisonment, and sentences for substance use related crime, which is key to the interpretation and implications of our findings.

Data material: Combining survey and registry data

The combination of self-reported survey data and national registry data gives us the great advantage of being able to include information on socio-demographic background characteristics, thereby taking social determinants of health into account. The rich data on self-reported drug use, including information on subclinical harmful drug use, not available from the patient registry data, gives us a valuable insight into the level of drug use and potential treatment needs in the cohort.

The use of national registry data gives us complete follow-up on imprisonments, treatment, and deaths. This made it possible to assess the external validity of the NorMA cohort, and to quantify the variation between the NorMA cohort, the participants lost to follow-up, the general prison population, and a flow sample. The combination of self-reported drug use and complete follow-up data on re-imprisonment made it possible to estimate the association of drug use on future re-imprisonment, avoiding bias related to follow-up.

Access to self-reported data on drug use in combination with complete data on treatment utilization from the Norwegian patient registry made it possible to estimate the treatment coverage among people with

a self-reported treatment need. Furthermore, using the socio-demographic background information from the survey data material, we were able to incorporate the aspect of social determinants for health in the analysis.

Measuring prevalence with different data sources

The way we measure prevalence of an exposure or outcome has important implications for our findings and our interpretation of these. When it is not possible to measure the phenomenon we wish to study directly, as it is often infeasible to do on the total population, we can try to use indirect measurements, or proxies for the phenomenon we wish to measure.

Due to the combination of data sources in this thesis, it has been possible to estimate prevalence of substance use in various ways, with different implications for our findings. For example, one way to estimate the prevalence of people with substance use would be to measure how many are imprisoned for substance use related crime. Many people in the NorMA cohort had convictions for substance use related crime in their index imprisonment (42%), and from the survey data we found that most of them reported harmful drug use or likely drug dependence (90%). In our sample, convictions for substance-use-related crime were thus an indication for harmful drug use. However, only 63% of people with a likely drug dependence had a conviction for substance-use-related crime. In that case, using the convictions for substance-use-related crime as a proxy for likely drug dependence, would have led to an underestimation of the prevalence by almost 40%.

Similarly, a common way to measure the prevalence of SUD would be to consider treatment data and the utilization of SUD treatment, such as specialized DUD treatment from specialized healthcare providers during the year before imprisonment. However, when we compared the one-year prevalence of registered DUD treatment with the screening results from DUDIT, only 54% of those who screened positive on likely drug dependence had received treatment during the year before imprisonment.

Both measurements based on registry data would thus estimate a lower prevalence compared to the self-reported screening. Though none of these ways of measuring substance use should be considered the actual “true” value, it is a strength of the study that we have been able to use various sources and measurements to study the prevalence of substance use, as these add more nuances to the understanding of the actual level of substance use and SUDs.

Information on people without a PIN

People without a PIN are often excluded from registry studies, especially in studies with follow-up across national registries. It is a particular important limitation in prison research because foreign nationals constitute a large minority of 20% to 30% of the prison population in Norway (46), and many among these do not have a PIN. However, a strength of using data from the prison registry was that we had information on the entire population, including those not holding a PIN, which gave us the opportunity to describe basic demography and imprisonment regarding this group. One in four of the one-day population from the general prison population did not have a PIN.

Using screening tool validated in the prison context

Though various measures of self-reported drug use were studied, DUDIT is the primary measure used throughout this thesis and in the included papers. As previously stated, the DUDIT is a standardized screening tool, validated for use in the prison population (145, 160). This provides the study with a valid measurement of the level of drug use, reducing misclassification bias, and makes it easier to compare our findings with other prison settings.

Handling missing

Another methodological strength of this thesis is the handling of missing data using MICE and the performance of sensitivity analyses. The choice of a methodology to address missing data has an impact on our estimates and the interpretation of the statistical analysis (166, 174), and it is an important part of increasing research transparency (166). By using MICE to manage missing data when data is considered MAR, instead of CCA or imputing with alternative methodology, we could maintain the sample size and power of our analysis, making the most of the data we collected from the cohort participants.

4.5. Generalization to other contexts

Would the NorMA cohort be representative to the prison population in Norway today? Would these findings from a Norwegian context be generalizable to an international prison context?

A study sample's representability is important for estimating prevalence in a target population from a study sample. However, findings of association and causal mechanisms can have external validity across populations of different compositions for which the study sample is non-representative, conditioned on the internal validity of the findings. Proper generalization requires transparency about the specific conditions of the study setting and an understanding of causal mechanisms and their effects (206). Hence,

to generalize the results in other contexts, we need to understand the conditions of the setting and the compositions of the target population in these contexts.

Norway today: Increased selection and potential impacts of the drug reform

Since 2013 and 2014 when the baseline survey data was collected, the Norwegian prison population has gone through some important changes in demography, imprisonment lengths, and health status (69-71). In Norway, both the total number of people imprisoned and the share of people with sentences for use and possession have decreased over the past 20 years (207), while during the same period the prevalence of SUDs has increased among people in prison (70, 71). Some of this development could be related to the increased use of community sentencing such as electronic monitoring (illustrated in Figure 1). The use of electronic monitoring may have led to a selection of people with more serious crimes and a heavier burden of mental disorders in the prison population because people with short sentences and a stable social and economic situation are more likely to be sentenced outside of prison (69). This selection is even more distinct for women (53, 69, 71). Considering this, the prevalence of DUD might have been higher if the NorMA cohort had been sampled today.

Despite changes in the composition of the prison population, the validity of our findings would depend on contextual changes relevant to re-imprisonment and treatment utilization. In terms of re-imprisonment, this could include changes in the general socio-economic status of society, social security systems, rehabilitation efforts, or policy on drugs and crime, among others. In terms of treatment in prison, this could be structural changes in specialized health care services, in policies and guidelines, resource allocation for DUD treatment overall, and in DUD treatment for the prison population. Structural changes that would reduce the risk of recidivism and re-imprisonment among people with DUD could weaken the association between DUD and re-imprisonment.

The Norwegian Drug Reform - "From punishment to help"

In December 2019, the Drug Reform Committee (Rusreformutvalget) presented its report titled "Drug Reform – From Punishment to Help" (NOU 2019:26, Original title in Norwegian: Rusreform – fra straff til hjelp)(208). The Committee's mandate was to facilitate the implementation of the government's drug reform, specifically emphasizing the shift in responsibility of addressing the use and possession of illegal drugs for personal use from the justice system to the healthcare services (Ibid.). The report underwent a hearing in 2020 and was put to a vote on May 27, 2021. Although certain aspects of the reform were approved, the most contentious element pertaining to the decriminalization of small-scale possession of illegal drugs for personal use did not gain approval (209). The discussions on the report, the hearing, and

the parliamentary vote highlighted broad political backing for addressing individuals with substance use issues as a health concern rather than solely a criminal matter. However, the proposed government legislation failed to secure enough political support.

As a reaction to these political signals, the Norwegian Supreme Court wished to clarify the meaning and scope of the new legislative signals and decided to rule on three cases about the use and possession of different amounts of illegal drugs (210). The Supreme Court decided on milder sentences in all three cases, though only one case, in which the offender had possessed less than the defined user levels, was exempt from legal sanctions. However, it is important to clarify that all three appeal cases were sentences to alternative sanctions or conditional imprisonment. None of the three cases was sentenced to prison before or after the ruling from the Supreme Court. Hence, even before the NOU 2019:26 and the debate related to this, practically no cases of use and possession were sanctioned with prison sentences (207).

Penalizing use and possession

Sentences for use and possession of illegal drugs for personal use, which were the primary focus of the drug reform proposed in 2019, were present in about 20% of all sentences in Norway during 2000-2019 and have been decreasing during this period (207). However, almost no prison sentences (<0.15%) were solely for offences related to use and possession. Instead, people were imprisoned because of convictions for other drug offenses (99.8% of the time), most often driving under the influence (50%), property theft (46%), and order and integrity (40%)(207). As noted by the Supreme Court, the legislation proposed in the reform and the political debate related to this, did not express an intention to reduce the penalty of larger amounts of illegal drugs, even if solely for personal use (210). Instead of relying on the proposed legislation in the Drug Reform, the Supreme Court instead turned to existing recommendations regarding the use of alternative sanctions for individuals with SUDs. In the one instance where they opted for community sentencing, these recommendations formed the primary basis of their decision, rather than the aforementioned legislation (211).

Would the debate and Supreme Court ruling surrounding the NOU 2019:26 have affected the composition of the prison population, and how would this affect the generalizability of this thesis to the prison context of today?

The debate, proposed law, and Supreme Court rulings first and foremost were targeting the so-called “Use and Possession” offences, which have been decreasingly prevalent among people in prisons since 2010. Most importantly, these do not contribute to any imprisonments today, and thus it seems unlikely that the influence of the NOU 2019:26 will have any direct ramification on the socio-demographic composition

of the prison population or their health status. However, the public debate and general acknowledgement of substance use as a problem related to health and social disparities could have had a positive impact on the social stigma related to substance use, and perhaps lowered the threshold for accessing help and treatment for people with SUDs. In that sense, the NOU 2019:26 could indirectly have a preventive effect on substance-use -related crime, and thereby on the imprisonment of people with SUDs.

From criminalization to medicalization

The decriminalization of drug use reflects an intention to change the perception of substance use from a crime problem to a health problem (208), to medicalize substance use and addiction. The medicalization of substance use affects the overall moral understanding of addiction and questions whether people can control their addiction or are led by an 'internal driving force' (106). This again raises the question of the moral agency of people with addiction, and to what extent they are accountable for their actions (Glackin, 2020). This can be a dilemma, when the mitigating of wrong-doing often comes at the cost of regarding people with addiction as less than full participants in a moral society, in which we are accountable to others for our actions (Glackin, 2020). Hence, though in a different way, medicalization of SUD and drug use could lead to just another kind of stigmatization, which might reduce the motivation to seek treatment and help.

In this perspective, merely legalizing or decriminalizing drug use and possession would not necessarily reduce the prevalence of SUD nor the treatment needs in the prison population unless it is accompanied by the implementation of social services and SUD treatment programs(8). For example, even with decriminalization of drug use, the cost of buying drugs could still lead to crime committed to finance the drug use (8). On the other hand, in the Norwegian context engagement with SUD treatment, where people are offered opioid agonist medications, has been associated with desistance from crime and reduced criminal convictions (212-214).

Generalization to international contexts

Norway is one of the richest countries in the world, with a highly functional welfare system, universal health care (215), a more humane prison system than many other countries (216), and low rates of re-imprisonments (217). Therefore, the NorMA cohort might not be directly representative of a global context, and generalizations may be most appropriate to countries with similar social and economic circumstances, such as other Nordic countries. Still, if we account for the factors in the context that would be relevant for the association, the nature of the association can still apply across different settings and populations.

4.6. Ethical considerations

Conducting research among people in prison requires careful consideration of the moral hazards and the vulnerable situation of the research participants (181). However, the challenges involving research on people in prison should not exclude them from participating or benefitting from research (218). The ethical principles described in the Declaration of Helsinki clearly state that research on vulnerable populations, such as the prison population, is only justified if the research is responsive to the health needs or priorities of the affected group and the research cannot be carried out in a non-vulnerable group (181, 184). Furthermore, research should pose minimal risk to the vulnerable group while promising potential benefits from its results (184, 218).

Another important ethical aspect to consider is the researcher's own participation in the study, and how to avoid the focus, analysis, and dissemination of the research contributing to further stigmatization. This includes the use of person-first and inclusive language in research dissemination and publications.

Informed consent and free choice

The purpose of the informed consent is to show respect for the autonomy of the individual. The informed consent has two core elements: All participants must receive full information, and this information must be fully understood, and the participants must have the ability to consent (both legally and actually) and do so completely voluntary, without any coercion (183, 184). Therefore, obtaining a valid informed consent involves informing about the project, engaging the person in reflection concerning the project, and allowing the person sufficient time to make up his or her mind as to whether to participate (183). This was a part of the data collection, implemented not only by informed consent, but also through non-coercive data collection, providing participants the opportunity to refuse participation, an option to participate without providing their PIN, and the offer of additional time to answer the questionnaire without the presence of a data collector. Because of these procedures, many refused to participate at all, and many of those who did participate refused to provide their PIN (though we do not know how many of these had a PIN). Some received the questionnaire without returning it (though we do not have the exact number for this). Furthermore, without an invitation or request from the data collector, many participants included personal notes and letters with additional information about themselves, thoughts, ideas, and perspectives, which indicate their ability to participate freely and voluntarily. In comparison with the restrictive regime, lack of meaningful activities, and duties that many experience while in prison, the participation in the NorMA study may have presented an actual opportunity for free choice. Indeed, some expressed that they felt it was meaningful to participate in a research project that took their health

and living conditions into consideration. In that sense, respecting the autonomy of the individual, whether it is people in prison or people with SUDs, also entails respecting and acknowledging their capacity and ability to perform free choice. Though there may remain a risk that some feel social pressure or fear of negative consequences, the alternative, avoiding including them in research, may be more discriminatory. Hence, refusing to conduct research with people in prison or denying vulnerable groups research participation, can lead to underrepresentation in research, reproduce stigma about people in prison, and preserve our inability to take their needs and perspectives into account.

In the case of longitudinal cohort studies, such as the NorMA study, it can be very difficult for an individual to comprehend the full extent of the study and the actual content of the informed consent (183). The informed consent in the NorMA study asked for a broad consent to “any future use” of the material, referring to a use which neither study participant nor researcher has envisaged at the time of consent, which may call into question the sufficiency of the information and the validity of the consent (183, 186). On the other hand, recurrent or renewed consent clearly creates a significant burden on researchers and participants, and such consent may be impossible to obtain if the participants are untraceable or dead (183). In the NorMA study, follow-up through new survey data collection, would have been infeasible, requiring a considerable use of resources, both from researchers and participants, and adding severe limitations to the study and the quality of the research findings. Furthermore, many would have been lost to follow-up, including the participants who died ($n=56$). In that sense there were both practical, methodological, and ethical implications for using the broad informed consent and follow-up through registry data.

User participation in research

The researchers must also consider their own participation in the research and how this can produce or prevent stigmatization of the people in the study. User involvement in research can help in this aspect because it often involves collaborative reflection, clarification, and revision of the purpose and process of the research (219). Involving user representatives in research is an important way of considering the needs and perspectives of the groups we do research on and for (220). Through user involvement, research can be used to provide knowledge and draw attention to perspectives, experiences and challenges of the people in the research, and through this reduce stigma and discrimination (219).

The NorMA study involved user participation during the designing and planning of the research, through testing the pilot of the NorMA questionnaire on people imprisoned in Oslo Prison, including focus group interviews regarding their experience of the questionnaire.

Though not established during the data collection period, the research conducted on the NorMA cohort and for this thesis has involved a collaborative partnership with Wayback, a non-profit foundation run by those formerly incarcerated that works to support them in their return to society (221). This was initiated in recognition of the ethical principles of involving the community in which the research is being conducted (185). This collaboration involved sharing and discussing the aims, methods, and findings of the research with the partners from Wayback and incorporating their valuable input and feedback. In the PriSUD project, Wayback are also active in the data collection process and in the dissemination of the research results. This kind of collaboration helps ensure that the research developed over time is acceptable and responsive to the actual health problems and needs of the prison population (185).

Preconception

Considering a researcher's preconceptions is important because they profoundly shape their perspective, methodology, and ultimately, the conclusions drawn from their work. With a Master's degree in Public Health Science and a career focused on epidemiology, my professional perspective is deeply influenced by established frameworks in medicine and epidemiology. Notably, I am influenced by the biopsychosocial model (222) and the Social Determinants of Health framework (78) in my approach. Furthermore, my research trajectory and understanding of SUD treatment is influenced by the clinical research environment that I am associated with at the Institute of Clinical Medicine at Oslo University and Oslo University Hospital. One derived effect of this, is that I primarily focus on specialized health care services when studying SUD treatment, potentially overlooking the benefits of other activities and treatment provided by other healthcare providers.

5. Discussion of findings

5.1. The characteristics of the NorMA cohort

The NorMA cohort was characterized by an accumulated burden of social, economic, and health disparities, including high levels of potentially traumatic experiences in childhood and marginalization in adulthood. Their social situation was characterized by low education level, weak social networks, high prevalence of unemployment, and a high share of people living on social benefits. Health-related characteristics included a high prevalence of smoking, hepatitis B and C, and mental distress. Though the prevalence of these social and health-related disparities varies slightly across settings and study designs, our findings resonate with the majority of other recent studies of prison populations, including the national studies from Norway by Cramer (2014) and Revold (2015) and the latest major reviews of the global and European prison population (5, 41, 223).

Though we find local variations, the high burden of pre-existing disparities among people entering prisons has been described across the global prison population, despite the large differences in social and economic conditions in the general population and substantial variations in the prison systems (3, 223). Some of the explanations for this phenomenon might be relevant across the global context, while others can be more closely attributed to the local contexts.

These shared characteristics of the prison populations across various settings, shows how crime and imprisonment can be the outcomes of accumulated disparities in social, economic, and health conditions, as described in the theoretical framework of the social determinants of health (73, 224). The social stratification of these disparities, and the risk of crime and imprisonment associated with these disparities, leads to the universal overrepresentation in prisons of people from marginalized groups within society.

Drug use in the NorMA cohort

Among participants in the NorMA cohort, 40% had a likely drug dependence, 18% had a likely dependence on alcohol, and 47% had a likely dependence on drugs and/or alcohol, according to DUDIT and AUDIT. This included high rates of daily drug use, IDU, and polydrug use, a finding which underlines the severity of drug use among people in the NorMA cohort before index imprisonment, when compared with the general Norwegian population. These findings were in line with the prevalence of drug use and DUD found in the previous Norwegian studies by Revold (2015) and Cramer (2014). Furthermore, they add to the international reviews of drug use among people in prison, which consistently document an elevated prevalence of both drug use and DUDs compared with the general national population (5, 94, 117). Though prevalence varies depending on the national context, the overrepresentation of people with drug

use and DUD among the prison population seems to persist across wide differences in the prison systems (117).

The disproportionate burden of disease and social marginalization in the prison population highlights a need for proportionate universalism, meaning to allocate a higher proportion of resources to those with the highest need (Delgadillo et al., 2016). Because of this high burden, correctional settings constitute potential arenas for implementation of proportionate universalism, for example, in the provision of healthcare services.

5.2. Drug use and re-imprisonment

By combining survey and registry data, this study was able to study the re-imprisonment of people in the NorMA cohort and investigate the independent effect of drug use on re-imprisonment by adjusting for other risk factors. Our results showed that more than four in ten had been imprisoned after the index imprisonment, and that both harmful drug use and likely drug dependence were associated with increased risk of re-imprisonment. This finding is in line with findings from a similar prospective cohort study by Thomas et al. (2015) which found increased re-imprisonment related to risky use of cannabis, amphetamines, and opioids among people released from prison (65). One important mechanism explaining the association between pre-imprisonment drug use and re-imprisonment is the risk of continuing the drug use at release. Post-release drug use can act as a push factor for re-imprisonment, because it drives recidivism, and simultaneously because it can be a barrier for re-entry to society, complicating participation in re-entry activities such as education, school, or treatment (58, 59).

Previous prospective studies have found drug use severity an important risk factor for re-imprisonment among people released from prison with known substance use. This includes the studies by Håkansson and Berglund (2012) and Winter et al. (2019), which found drug use severity, especially IDU, to be strong risk factors for re-imprisonment (62, 225). However, both studies included only people who used drugs. Without a comparison group of individuals who do not use drugs, these studies were unable to examine the independent effects of drug use.

While other Scandinavian prospective studies have addressed the influence of drug use on imprisonment among people who use drugs, this thesis focused on re-imprisonments and allowed for examining the independent effect of drug use. Grahn et al. (2020) followed almost 15,000 individuals in Sweden with known SUD from 2003 to 2016, at which point 15% had been sentenced to prison. They found that drug use severity together with parental drug problems of both mother and father predicted imprisonment, while education and older age was protective against imprisonment (226). A Norwegian study following

people with drug use, recruited from street- and low-threshold services, found a high frequency of imprisonment (45%) within a five-year follow-up (64). This study also found that factors related to drug use severity and social conditions, including homelessness, increased the risk of imprisonment. Again, these studies included only people with known drug use, and are therefore unable to draw conclusions from the independent effect of drug use.

In addition to drug use, we found higher risks of re-imprisonment for young people and those with low levels of education. These findings are consistent with previous research by Skardhamar and Telle (2009) on employment and recidivism among people released from prison in 2003 (227). They found that being in employment or finding employment after release were associated with a lower risk of re-imprisonment, an association moderated by individual characteristics, such as employment before imprisonment and education level (227). However, this study did not study the influence of drug use on re-imprisonment and did not include drug use in their analysis as a potential confounder.

All in all, our findings add to the current knowledge on the risk of re-imprisonment among people with drug use in prisons, and the importance of interventions targeting this group and their social and health related disparities. One important type of intervention would be DUD treatment.

5.3. Utilization of drug use disorder treatment

To estimate treatment coverage during imprisonment, we used individual level data on self-perceived treatment needs and data on DUD treatment utilization during imprisonment. We estimated that 40% of the NorMA cohort were classified as likely drug dependent, and that 64% of people with likely drug dependence received treatment in prison. This was higher than expected, though in line with previous findings for the general population in high-income countries (228). People who received DUD treatment in prison were characterized by a high burden of social and economic vulnerability, but were also more often male, younger, and born in a Nordic country.

Drug use severity was associated with treatment utilization, which would be expected among a sample of people with both harmful drug use and likely drug dependence. Nevertheless, it is encouraging that people with the most high-risk drug use and most severe need receive treatment. Though our findings did not look at OAT in particular, OAT would be an important element in the treatment of patients with OUD. Previous estimates of OAT treatment in European prisons have suggested a low coverage as it is largely unavailable to the majority of people in prisons in Europe (5). A recent study by Bukten et al.(2023), found an increasing OAT coverage among people imprisoned in Norway from 2010-2019, from 36% to 71% of people with OUD, though this study did not describe actual OAT treatment during imprisonment (139).

This could indicate that we would have found a higher coverage of DUD treatment had we studied the treatment utilization during imprisonment today.

Length of imprisonment was strongly associated with treatment utilization, and people spending more than a year in prison had almost nine times higher odds of receiving treatment. Thus, shorter imprisonments appear to be a barrier to receiving DUD treatment in prison. However, this study did not explore whether those with short imprisonments received DUD treatment upon release, such as from a referral from the prison health care services. Also, if people were released from prison in order to continue treatment in an inpatient treatment facility, this would not appear in our analysis. This potential bias could therefore exaggerate our results.

The increased odds related to Nordic country of birth could be interpreted as a barrier to DUD treatment for people born outside the Nordic countries. Previous studies have described issues of discrimination and cultural- or language barriers in accessing DUD treatment outside prison (229, 230), which could also impact access to treatment in prison. However, previous findings from the NorMA study found that people born in non-Nordic countries reported different drug use patterns, characterized by less use of opioids, amphetamines, and benzodiazepines, but more use of cocaine (231). If DUDs related to these drugs received less treatment from specialized health care providers, this could be another explanation for this finding.

Furthermore, we estimated a simple outcome of any utilization compared to none, which is different from estimating whether people received treatment of a quality or quantity adequate for their needs. In line with this, we only considered the utilization of specialized healthcare services, while treatment from primary healthcare providers and rehabilitation programs offered by the correctional services are not considered. However, as described in section 1.1, these interventions are rather different in their scope and content, and while some patients might only receive help from primary health care providers or programs, it seems likely that these interventions could be facilitators for specialized treatment for people with SUD. Hence, rather than considering these interventions as opposites or substitutes, it is likely that many patients have or would benefit from more kinds of interventions during their imprisonment.

6. Discussion of general perspectives

6.1. Challenges of providing healthcare in prisons

Despite the importance of healthcare services as a part of the restorative process and the benefits of the import model, healthcare providers face a wide range of challenges, ethical dilemmas and competing interests when delivering healthcare in Norwegian prisons (14, 232). Some of these current challenges occur despite the import model, others are to some degree amplified by the import model, while some challenges occur across correctional systems with or without the import model. These challenges of providing healthcare are increasingly relevant following the growing number of people with health problems in the prison population, especially related to mental disorders and SUD and with an increasing prevalence of complex morbidity and comorbidity (69, 70).

According to the import model, the municipality has the administrative and professional responsibility for providing primary healthcare services for people in prison, while it is the responsibility of the Correctional Service to secure satisfying physical conditions for delivering healthcare services (29). However, as it is the Correctional Service that has the overall decision-making power in prisons (29), the healthcare providers often need to adapt to the punitive environment. Providing rehabilitation and treatment in a prison setting is challenged by the correctional service's overarching ideology of punishment and security, as it controls the limits and possibilities of the rehabilitation and treatment activities (47). Thus, the correctional service often limits the access to rehabilitation and treatment activities both within and outside the correctional institution. For example, regulations might actively deny certain kinds of medicine or participation in programs because of safety concerns. More passively, there may be a refusal to facilitate access to medical appointments outside the prison, which would require the assistance of correctional officers (232). Adaptation can include that tasks normally performed by healthcare staff, can be delegated to correctional staff, most often due to practical concerns. This could include the handling of medicine, which should be delivered by health professionals, but has often been delegated to prison officers, despite the risk to both the privacy and safety of the patients (233). Furthermore, whether old or new prisons are rarely designed to provide for healthcare provision or for universal access, which can make it difficult to provide for e.g. people with functional disabilities. Hence, many of these challenges also relate to the resource allocation, affected by competing ideologies, as some practical challenges would be solvable if the necessary resources had been in place.

Health information and communication

Challenges regarding obtaining, sharing, and communicating health information are particularly acute within the correctional setting. Information sharing between healthcare providers can entail a challenge, such as in the case of a person who does not consent to the exchange of information between healthcare providers outside the prison and the healthcare staff within the prison(29). Though this is an important right of the patient, insufficient information about previous treatment and health status can be a risk to the continuity and quality of care. For patients who were in SUD treatment prior to imprisonment, sudden imprisonment can lead to discontinuation of treatment and complications related to abstinence(29). In combination with a loss of drug tolerance during imprisonment, this discontinuation can increase the risk of overdose upon release (118, 122, 234).

For the patient, limited access to seek and obtain health information can weaken their autonomy and ability to practice informed choice in matters related to their health (235). This is an even bigger challenge for people with limited Norwegian or English-language skills if interpreters or translated information material is not in place. Lack of health information and health literacy among patients can be an important threat to the quality of care, as it can hinder the access to treatment and/or challenge compliance.

In line with this, people in prison can face digital exclusion both in terms of limited access to internet and digital tools, and in their ability to use digital solutions (236). As internet access is such an integrated part of daily life in the general society, and public welfare providers more often communicate via digital solutions, this can be a challenge to the import model and the normality principle in general (14, 237).

Dilemmas specific to drug use disorder treatment in a punitive environment

For some people with SUDs, the correctional setting can represent a stable environment that provides for the most basic needs, constituting a break from a chaotic life situation outside prison. This can have a positive impact on their overall health, and the controlled correctional setting may facilitate attendance at scheduled treatment appointments (238). However, the provision of DUD treatment in a punitive environment such as the one in prisons, also entails some particular challenges and dilemmas.

A particular dilemma related to delivering DUD treatment in prisons is the use of control and sanctions for possessing or using drugs in prison, which make it different from DUD treatment in the community (238). People who are unable to discontinue their drug use in prison or who are in OAT will often be most at risk of this control and these sanctions, though they might have the greatest need for treatment (232, 238). The punitive environment of the prison, including the sanctions related to drug use, can create a barrier to establishing trust in a treatment situation, both among patients and between patients and

healthcare professionals (238). Treatment involving conversational therapy such as cognitive behavioral therapy or group therapy, which is often applied in DUD treatment, require a high level of trust between patient and therapist as well as among patients. Though this can be a challenge outside the correctional setting as well, prisons impose a specific challenge in this regard. Besides the already mentioned regime on sanctions and control of drug use, challenges can also be related to the limited ability to practice free choice, such as the choice of therapist. Few prisons have many therapists to choose from, if any. The sometimes-unpredictable circumstances of imprisonment, especially related to remand imprisonment, short sentences, and transfers between prison units can be a barrier for establishing a therapeutic alliance and for continuity of treatment.

For people in OAT, imprisonment often involves a delay in OAT that can lead to withdrawal, causing highly painful and harmful consequences for the individual, and reduce the retention in OAT during and after imprisonment (239). Hence, some patients describe a reduced motivation to re-enter OAT once they have gone through withdrawal, while others describe negative aspects related to stigma and lack of confidentiality associated with the delivery of OAT in prisons (239). The lack of confidentiality related to OAT can furthermore cause negative experiences with other people who use drugs, as people in OAT can feel a pressure to share or sell their medication, though this varies depending on the type and form of medication (239).

Adding to the challenges of healthcare delivery are the adverse impacts of imprisonment on individuals' health and well-being, which are especially related the prison environment, the moral performance of the prison and the experience of prison pain (240-242). The stress related to prison life itself can thereby increase, or even introduce, the need for treatment or counteract the potentially positive effects of treatment (238). An important example of health-threatening factors includes the use of solitary confinement and isolation, which has often been associated with mental disorders, self-harm, and mortality (243-246). People with mental disorders and SUDs are more at risk of being placed in solitary confinement (247-249), despite also being more vulnerable to harm from such sanctions.

6.2. Substance use disorders among people in prison – The consequence of a deliberate policy?

Over the past decade, we have seen increases in social problems and health challenges among people in prison, especially related to SUDs (2, 75, 83). This is occurring in nations with growing prison populations, such as the US as well as in countries with declining prison populations, such as Norway and other Nordic countries (69, 70). In the US context, the increased prison population can be linked to the development of legal frameworks and procedural law, as well as deepening social and economic inequality, and a lack

of healthcare services and institutions for people with mental health disorders and SUDs (8, 250). The high prevalence of SUDs in the US prison population can, to some extent, be related to a deliberate “war on drugs”, in which sanctions for people who use drugs lead to imprisonment both directly, through tracking and punishing people involved in drug use, and indirectly, through stigmatization and limited access to help and treatment (250). The “War on Drugs” was a global campaign originally initiated by President Nixon in 1971, proclaiming drug addiction to be “the public enemy number one”, which resulted in increased levels of punishments for drug-related activities in the US and internationally (251).

In a Scandinavian and Norwegian context, the perception of drug use has changed since the beginning of recreational use of drugs in the 1960s, from initially being considered a medical problem, then a social problem, and later a crime problem, until it was again considered a health problem in the 1990s (251-253). During the 1970s and 80s, to combat the crime and social problems cause associated with drug use, political reforms introduced harsher punishment and an increased focus on controlling the availability of illegal drugs in Norway (251). The legal sanctions were intended to prevent drug use by scaring people away from drugs and targeting the organized crime behind the drug markets (251). However, the legal sanctions very often affected a more vulnerable population of people with substance use disorders (251). Since the 1990s there has been a significant change in Norwegian drug policy, which now focuses more on harm-reduction initiatives, including the national implementation of opioid agonist treatment in 1998 (251, 253). Since the end of the 1990s, the police in Oslo, the city with the majority of the open drug scenes in Norway, have tried to adapt a “dual-track policy”, by combining harm-reducing measures with punitive approaches to drug use (254). Still, there seems to be a large uncertainty regarding how the police are meant to assist people in accessing treatment. This concern which was also raised in 2022 during the debate of the drug reform (NOU 2019:26)(208). One argument often raised against drug reform was the lack of resources allocated for the help that people with drug use were supposed to receive. Hence, parallel to changes in legislation and public opinion on drug use and SUDs, intentions must be followed up with resources for actual help and support.

Liberal drug policies and future public health priorities

In Norway today, and many other westerns countries, we see a shift towards more liberal policies on drug use (253). Though this might lead to increased use, we do not know how this will affect the prevalence of SUDs, crime or other problems related to substance use. It seems clear that more strict sanctions and imprisonment for people who use drugs would have negative consequences, while the availability of treatment and help for people with SUDs could have the opposite. However, the overall effect of a more

liberal policy on drug use, will also be affected by the level of welfare and social equity in society, as harmful substance use is also a symptom of a general increase in social, economic and psychological deprivation and malaise. Prevention of harmful substance use, and the many negative consequences related to this, therefore also includes efforts to improve the general living conditions and health of marginalized and vulnerable populations. Hence, though prisons can constitute arenas for public health interventions for people who use drugs and people with SUDs, the most important preventive efforts to reduce the harms from drug use, are occurring outside the prison wall.

Such preventive efforts must aim at reducing social inequity by securing safe and healthy environments for all members of society and strengthening social cohesion and the social determinants of health. The Norwegian welfare state model possesses some important tools in these regards, especially in terms of a strong social support system, well-established public health institutions, and a relatively high level of resources provided for childcare and public education. However, future preventive efforts should focus on the increasing gap in health among people in the lowest income groups (255), including the more than 10% of Norwegian children and adolescents who live in consistently low-income families (256). Among other negative outcomes associated with low socioeconomic status (79, 255, 257), this group faces a higher risk of developing mental disorders and substance use disorders (SUDs), as well as more negative consequences of these mental disorders on their school completion (258). Consequently, prioritizing targeted interventions aimed at mitigating these disparities is imperative for fostering a more equitable and healthier society for all.

7. Implications and future research

The research presented in this thesis has implications for provision of SUD treatment, public health policies, and future research concerning people in prisons. By shedding light on the high prevalence of health disparities, especially related to drug use among people in prison, this study underscores the urgent need for targeted interventions to address these issues.

The evaluation of the NorMA cohort's characteristics underscores its value as a reliable data source for research on the Norwegian prison population and emphasizes the importance of using such cohorts in combination with registry data for future studies.

Furthermore, the findings emphasize the importance of systematically screening individuals in prison for drug use disorders using validated tools such as the Drug Use Disorders Identification Test (DUDIT). Such screening is important both for providing relevant treatment to the individual patient and to inform the overall planning of treatment, public health measures and research. Convictions for substance use-related crimes were prevalent among the NorMA cohort, indicating the importance of such convictions as indicators of drug use in prison populations. However, it is essential to recognize that these convictions may not capture all individuals with harmful drug use or likely drug dependence. Likewise, estimates based on registered treatment from specialized healthcare services, also tend to underestimate the actual level of harmful use or likely dependence. By implementing standardized screening procedures, correctional staff can identify individuals with harmful drug use or likely drug dependence and facilitate their access to appropriate treatment and rehabilitative services. However, it is crucial to also consider specific drug use patterns, including polydrug use and co-occurring AUD, to tailor treatment provision effectively.

Though we found that many had contact with specialized DUD treatment during imprisonment, many people with likely drug dependence still returned to prison. This could indicate that the restorative process has been unsuccessful, and perhaps that the treatment received was insufficient, either in quality, quantity or both. This can be attributed to some of the significant challenges of providing of healthcare and treatment in prisons. Future research should focus on assessing the adequacy and effectiveness of drug use disorder (DUD) treatment within correctional settings. Utilizing established criteria, such as the definition of minimum adequate treatment proposed by Degenhardt et al. (2017), can serve as a benchmark for evaluating treatment outcomes. Longitudinal studies are warranted to examine the continuity of treatment before, during, and after imprisonment, as well as its impact on health outcomes, quality of life, and rates of recidivism. In relation to this, we need more research on the overall provision

of health interventions, including the utilization of primary healthcare services and prison-based rehabilitation programs. One important aspect of this would be to study the integration and collaboration between the different providers of health-related interventions, and how this affects the continuity and quality of care for people with SUDs in prison.

In addition, research should explore disparities in DUD treatment utilization among marginalized groups, including individuals born outside Norway. Investigating patterns of drug use, treatment needs, and barriers to access for these populations will provide valuable insights for developing targeted interventions and policies to address disparities in care. Efforts should also be made to study incarcerated individuals without a Norwegian personal identification number (PIN), ensuring that research findings are representative of the entire prison population.

Furthermore, future research should assess the implications of DUD treatment in prisons, including its effects on health and welfare, but also overdose and mortality rates, as well as risk of recidivism. By evaluating the efficacy of treatment, policymakers and practitioners can make informed decisions regarding resource allocation for healthcare within correctional settings.

Finally, it is imperative to acknowledge the substantial burden of health disparities among people in prisons, and that the health of people in prison should be recognized as core components of public health. Among the various explanations of how drug use can lead to crime, many are unrelated to the legal status of a substance or substance use. Despite changes in policies and practices within the general community, the correctional services inevitably will need to accommodate for people with substance use and SUDs. Similarly, the healthcare system needs to make treatment available and accessible for people in prisons. Hence, providing for the health needs of people in prison, particularly regarding substance use and SUDs, is essential for promoting public health and promoting equity in health. Moreover, the extensive range of adverse consequences from crime and imprisonment, affecting individuals, communities, and society at large, underscores the imperative for evaluating crime and imprisonment as both risk factors and adverse outcomes of public health policies and interventions.

8. Concluding remarks

This thesis addresses the current knowledge gaps on drug use among people in prison, re-imprisonments, and DUD treatment by using a unique combination of survey data and national registry data. The thesis has presented a thorough description of important characteristics related to substance use and DUD among people in the NorMA cohort, a cohort representative of the Norwegian prison population with a PIN. An important contribution is the description of the social, economic, and health characteristics of people with harmful drug use and likely drug dependence, identified using the standardized and validated screening tool DUDIT.

Furthermore, we have shown the increased risk of re-imprisonment related to harmful drug use and likely drug dependence. The independent effect of drug use remained after adjustment for other important risk factors for re-imprisonment.

Finally, this thesis is the first to study DUD treatment utilization and treatment coverage for people with harmful drug use and likely drug dependence in the Norwegian prison population, using complete follow-up data on utilization of DUD treatment from specialized health care providers. The results showed high treatment utilization in prison among people with likely drug dependence. Drug use severity was most strongly associated with treatment utilization, while short imprisonments and being born outside Norway were negatively associated with DUD treatment in prison.

In conclusion, addressing the health needs of people in prison, particularly regarding SUDs, is essential for promoting public health and reducing societal inequity in health. By prioritizing research on health and healthcare for people in prisons, and implementing evidence-based interventions, we can work towards a more effective healthcare provision within correctional settings, ultimately improving outcomes of health and welfare for both individuals and society.

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Paper I-III

I

Exploring the external validity of survey data with triangulation: A case study from the Norwegian Offender Mental Health and Addiction (NorMA) Study

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Abstract

Objectives: This paper demonstrates how to investigate the external validity of a study sample by triangulating survey and registry data, using data from the Norwegian Offender Mental Health and Addiction (NorMA) Study as a case.

Methods: We use survey data from the NorMA study ($n = 1495$), including the NorMA cohort ($n = 733$), and data from the Norwegian Prison Registry on all people imprisoned on 1 September 2013 ($n = 3386$). Triangulation was performed by (1) comparing the NorMA cohort to those lost to follow-up ($n = 762$), using survey data from the NorMA study. Secondly, we compared the NorMA cohort to the one-day population, using data from the Norwegian Prison Registry. We also stratified the one-day sample by possession of a Norwegian personal identification number (PIN).

Results: We found differences in birthplace, imprisonment and drug use between the NorMA cohort, lost to follow-up and the one-day population. Twenty-three percent of the one-day population did not have a Norwegian PIN. The NorMA cohort was more similar to those with a Norwegian PIN in the one-day population. Our triangulation demonstrates that 56–62% of the Norwegian prison population had an indication of drug use before imprisonment.

Conclusions: The NorMA cohort was overall representative of the one-day prison population holding a Norwegian PIN and less representative of prisoners without a Norwegian PIN. Using this method provides tangible inputs on the strengths and limitations of a study sample and can be a feasible method to investigate the external validity of survey data.

Keywords

NorMA Cohort, External validity, Triangulation, Registry data, Prison population, Selection bias, Drug use, Cohort studies

Background

External validity rarely receives quantitative analysis, perhaps due to lack of comparison data.^{1,2} A frequent threat to external validity is selection bias; bias caused by non-representative sampling, which consequently may hamper the study results. A representative study sample is especially important in descriptive studies that wish to describe a specific population at a point in time.³

In this article, we will explore how external validity and selection bias in survey data can be assessed with data triangulation with alternative data sources. To illustrate the triangulation method, we use the Norwegian Offender Mental Health and Addiction (NorMA) Study and the Norwegian Prison Registry.

Globally, as well as in Norway, epidemiological research on drug use in the prison population has been based on a wide

variety of research designs, sampling strategies and measurements of drug use.^{4–6} However, cross-sectional surveys, which are more sensitive to selection bias, are most common,^{4,7} while national registries and databases provide untapped potential for research on drug use and the prison population.^{8,9}

The Nordic countries have developed advanced national registries and databases based on personal identification

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numbers (PINs) assigned to all residents. The unique PIN enables the linkage of information on an individual level between several registries for the purpose of official statistics and research. The advantage of these registries is their almost complete inclusion of the population. Registry data can therefore be used to triangulate research data^{10,11} in order to investigate whether a study sample is representative of the target population. One important condition for validating with triangulation is that the study sample and the more complete data are drawn from the same target population. Triangulation can therefore be conducted using data from national surveys, insurance data or administrative records as alternatives to national registries, as long as it is possible to identify the study sample by a PIN.

The NorMA study was conducted in 2013–2014 in Norway and aimed to describe substance use and mental health among people in Norwegian prisons. A total of 1495 inmates responded to the survey, and 733 (49%) provided a Norwegian PIN and informed consent for its use in future research, thus constituting the NorMA cohort. Anonymous participation was also encouraged, and 762 (51%) inmates responded without providing a PIN, thereby constituting the lost to follow-up cohort.

In this study, we triangulated data from the NorMA study and the Norwegian Prison Registry to assess the representativeness and external validity of the NorMA cohort. We identified two selection processes potentially introducing bias into the NorMA cohort. Firstly, selection into the NorMA cohort among respondents in the NorMA study; those who provided their PIN's at baseline and consent to link it in future research. Secondly, selection into the NorMA study from the target population; those who participated in the NorMA study among all prisoners in Norway at the time of data collection.

In this article, we will investigate these two selections with triangulation and discuss the representativeness of the NorMA cohort to the general Norwegian prison population. The specific objectives of the study are the following:

1. To compare the individuals in the NorMA cohort to those lost to follow-up using baseline survey data from the NorMA study, and
2. To compare the NorMA cohort to the general prison population using registry data from the Norwegian Prison Registry.

Methods

Setting

Norway has one of the lowest prison population rates in the world, with an average of 3850 individuals imprisoned in 2016, equal to a prison population rate of 73 per 100,000 of national population, compared to a global average of 145 per 100,000 and 655 per 100,000 in the United States.^{12,13} As 85% of prisoners serve sentences of less than 1 year and 60% serve less than 3 months, the yearly turn-over is high.¹⁴

Women constitute a minority in Norwegian prisons, with an annual proportion of approximately six percent. Almost two-thirds of prisons are high security prisons. All Norwegian prisons are publicly funded, and all inmates have access to universal health care coverage, like all other individuals in Norway.¹⁵ The criminal justice system is characterized by having a rehabilitative focus on incarceration, and some prisons have separate drug treatment units to achieve the goals of rehabilitation.¹⁶

Patients and/or the public were not involved in the design, conduct, reporting or dissemination plans of this research.

Study design and data sources

Triangulation requires two or more sources of data. We triangulated the NorMA cohort with data from the NorMA study (Objective 1) and registry data from the Norwegian Prison Registry (Objective 2), as illustrated in [Figure 1](#).

The NorMA study

The NorMA study includes a cross-sectional study sample with baseline survey data. The survey contains a 116-item questionnaire, including questions on mental health and substance use, as well as demographics and other background information. The questionnaire took 30–60 min to complete and was available in five languages, including Norwegian, English, Russian, French and German. Data was collected by study investigators who visited 57 prison units (of 63 eligible) during the time of data collection from June 2013 until July 2014. Six prisons were not visited due to limited staff capacity and geographical inconvenience. Those prison units had a total capacity of 179 inmates and did not differ from the prisons included in the data collection. The questionnaires were administered by the study investigators and distributed to the prisoners on the day of the visit. The respondents filled out the questionnaire themselves. They could complete the questionnaire in a common room with others or alone in their cell, depending on their prison situation and preferences. All inmates in the prison on the day of data collection were considered eligible to participate in the study. The questionnaire included a consent form that explained the purpose of the study and sought permission for linking the survey responses with registry data. In addition to a signature field, an 11-digit field was provided to capture the PINs. For a more thorough description of the methodology and study design, please see [Bukten et al.](#)¹⁶

The Norwegian Prison Registry

The Norwegian Prison Registry was established in 1992 to serve a range of administrative and statistical purposes. The registry includes data from all Norwegian prisons on sentences, imprisonment status, security level, participation in

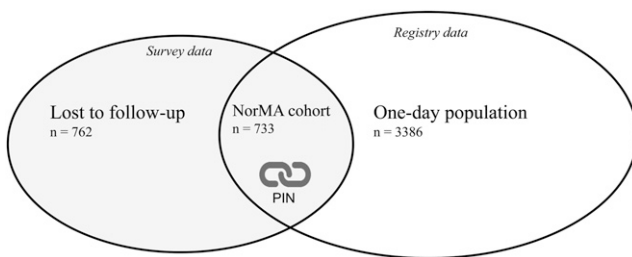


Figure 1. Triangulation of survey and registry data, made possible by the personal identification numbers (PIN) in the NorMA cohort.

programmes and other variables on the activities related to imprisonment. The registry is administered by the Correctional Service of Norway, who oversees execution of all remand and prison sentences in Norway.¹⁶

From the Norwegian Prison Registry, we retrieved data on all prisoners imprisoned on 1 day within the data collection period of the NorMA study. To choose a comparison date, we drew 10 separate days within the data collection period, excluding public holidays. The 10 days had an average prison population of 3995 individuals with deviation of less than $\pm 2.5\%$ from this average. For the methodological purpose of this study, we randomly selected the 1st of September 2013 among the 10 days, on which 3908 individuals were imprisoned.

Among the 3908, 522 (13%) were also included in the NorMA cohort and therefore excluded from the one-day population. We retrieved data on all imprisonments from 1 January 1992 until 31 December 2019 for all persons in both the NorMA cohort and the one-day population. All the data from the Norwegian Prison Registry, including information referred to as ‘lifetime events’, therefore refers to imprisonments within the period from 1992 till 2019.

Measures

The two data sources included different variables and we therefore have different sets of measures in objective 1 and objective 2 of our analysis. The measures used in each objective and how they are defined are described in Table 1. The analysis of each data source and their measurements was performed separately, and we did not compare or test somewhat similar measures from both datasets against each other. We chose not to perform this comparison and verification of the survey data, to protect the integrity of the study participants, in accordance with our ethical approval from REK.

Analysis

We analyzed representativeness of the NorMA cohort according to our two objectives:

Objective 1: The NorMA cohort compared to lost to follow-up.

For objective 1, we compared the individuals in the NorMA cohort to the lost to follow-up group using baseline survey data from the NorMA study, and focusing on measures related to demographics, imprisonment and drug use.

Objective 2: NorMA cohort compared to the general prison population.

For objective 2, we compared the NorMA cohort to the one-day population ($n = 3386$), retrieved from the Norwegian Prison Registry. Objective 2 only included measures retrieved from the Norwegian Prison Registry on age, sex and imprisonment. We analyzed the one-day population in total and stratified by possession of a Norwegian PIN. An overview of the objectives, data and study samples is summarized in Table 2.

Medians and the interquartile ranges (Q1–Q3) were reported for skewed data, such as age at first imprisonment, number of imprisonments and days imprisoned. Test of difference between the NorMA cohort, the lost to follow-up group and the one-day population was done using chi-squared tests, T-test of means on normally distributed numerical variables and the Mann–Whitney-test for ordinal and categorical variables. We did all statistical analyses in SPSS Statistics version 26.

Missing data

The percentage of missing data ranged from 0 to 28.5% and was more frequent among the self-reported variables used to answer objective 1. Detailed information is described in Table 3. The registry data we used to answer objective 2 had no or very little missing data on all variables (not reported in table).

The standardized measures AUDIT, DUDIT and HSCL-10 were imputed according to standard methods. Missing values were replaced with a mean of the completed answers for individuals with at least five items answered for DUDIT and AUDIT and seven items answered for HSCL-10.^{21,22}

We performed multiple imputation by chained equations (MICE), with 10 imputations, on all missing values for the remaining variables. We tested the imputations with Chi²-test and T-test, but did not influence the statistical significance in difference between the groups. Due to the descriptive scope of this paper, we therefore chose to report only on data analyzed using complete case analysis.

We used the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) cohort checklist when writing our report.²³

Table 1. Measures.

Objective 1 NorMA cohort compared to lost to follow-up	Objective 2 NorMA cohort compared to the general prison population
Demography	Demography
Sex: % male	Sex: % male
Country of birth: % born in Norway	Imprisonment
History of family problems: % who had a childhood with substance use or mental health problems in the family	Age: Average age at first imprisonment
Education: % with a formal education beyond primary school	Re-offenders: % of prisoners with more than one lifetime imprisonment
Employment: % with any kind of employment: Including part-time employment or school: Before imprisonment	Days per imprisonment: Average length of each imprisonments
Imprisonment	Number of imprisonments: Average imprisonments recorded in the Prison Registry
Re-offenders: % with any previous imprisonments	Total days in prison: Average sum of days spend in prison (lifetime)
Number of imprisonments: Average lifetime imprisonments: Including the sentence they served when answering the questionnaire	'Use and possession': % individuals who had a conviction for using and/or possessing drugs (own use) defined Medical Act section 24 and 31, Norwegian Law
Type of crime: % with this crime as the main type the individual was sentenced or charged for	
Drug usage and mental health	
Respondents had a list of 16 drugs to choose from, including non-prescribed use of medications	
Lifetime drug use: % who had used any kind of drugs (except alcohol) ever	
Daily drug use: % with daily use of drugs 6 months before imprisonment	
Harmful drug use: % with harmful drug use, measured with the Drug Use Disorder Identification Test (DUDIT). ¹⁷ Harmful drug use was indicated by a score of ≥ 6 for men and ≥ 2 for women on the DUDIT. Individuals who indicated no lifetime drug use were coded into the 'no harmful use' group	
Harmful alcohol use: % with harmful alcohol use measured with Alcohol Use Disorder Identification Test (AUDIT). ^{18,19} Harmful alcohol use was defined as a score of ≥ 8 for men and ≥ 6 for women on the AUDIT. Individuals who indicated no lifetime alcohol use were coded into the 'no harmful use' group	
Current mental health and distress: % with 'severe mental stress' (score ≥ 185), ²⁰ assessed with the Hopkins symptom check list (HSCL-10)	

Results

Objective 1: NorMA cohort compared to persons lost to follow-up

The NorMA cohort had more previous imprisonments compared to the persons lost to follow-up. Sixty-eight percent of the NorMA cohort had a previous sentence, and their median number of imprisonments was three (Table 3).

A larger proportion of the NorMA cohort reported involvement in all types of crimes compared to the lost to follow-up group (except for 'other' with 15% in both groups).

The most common type of conviction in both groups was drug-related crime. Fifty-four percent of the NorMA cohort had this type of crime as one of their convictions or charges, while this was the case for 45% of the lost to follow-up group.

The NorMA cohort reported more drug use and mental distress, compared to the lost to follow-up. This included higher lifetime drug use (76 vs 62%), daily drug use (56 vs 38%) and as measured with a DUDIT score above cutoff (65 vs 48%) compared to the lost to follow-up group (See Table 3).

Table 2. Overview of objectives, data sources and samples.

	1	2
Objective	To compare the individuals in the NorMA cohort to the lost to follow-up group	To compare the NorMA cohort to the general prison population
Data source	The NorMA baseline data	Norwegian Prison Registry
Data type	Survey (self-reported)	Registry data
Sample size	NorMA cohort ($n = 733$) vs. lost to follow-up ($n = 762$)	NorMA cohort ($n = 733$) vs. general prison population ($n = 3386$)

Table 3. Baseline data on demographics, imprisonment and health by NorMA cohort ($n = 733$) and persons lost to follow-up ($n = 762$), with test of difference between groups.

	NorMA cohort n (%)	Missing n (%)	Lost to follow-up n (%)	Missing n (%)	p -value
Demographics					
Male	682 (93.0)	0 (0.0)	710 (94.0)	7 (1.0)	0.434 ^a
Age, mean (SD)	35.5 (11.6)	0 (0.0)	33.6 (10.8)	131 (17.2)	0.001 ^b
Born in Norway	602 (84.2)	18 (2.5)	402 (55.0)	31 (4.1)	<0.001 ^a
Primary school or less	300 (41.4)	9 (1.2)	255 (34.1)	14 (1.8)	0.004 ^a
Not working or studying before incarceration	419 (58.4)	16 (2.2)	299 (41.1)	34 (4.5)	<0.001 ^a
History of family problems	265 (37.5)	26 (3.5)	191 (26.3)	35 (4.6)	<0.001 ^a
Imprisonment					
Re-offenders	480 (68.3)	30 (4.1)	352 (50.4)	63 (8.3)	<0.001 ^a
Number of imprisonments, median (Q1–Q3)	3 (1–7)	0 (0.0)	1 (1–4)	1 (0.1)	<0.001 ^c
Type of crime in current imprisonment ^d	716	17 (2.3)	691	71 (9.3)	
Acquisitive crime	264 (36.9)		184 (26.6)		<0.001 ^a
Drug-related ^e	386 (53.9)		309 (44.7)		<0.001 ^a
Violence, sexual violence and murder	328 (45.8)		277 (40.1)		0.001 ^a
Other	110 (15.4)		102 (14.8)		0.369 ^a
Mental health					
Severe mental distress ^f	297 (47.1)	103 (14.1)	200 (36.7)	217 (28.5)	<0.001 ^a
Drug usage					
Lifetime drug use	541 (76.0)	21 (2.9)	444 (62.2)	48 (6.3)	<0.001 ^a
Daily use	411 (56.1)	0 (0.0)	289 (37.9)	0 (0.0)	<0.001 ^a
Harmful drug use	463 (65.4)	25 (3.4)	334 (47.9)	64 (8.4)	<0.001 ^a
Harmful alcohol use	413 (57.0)	9 (1.2)	390 (54.2)	43 (5.6)	0.284 ^a

^a χ^2 -test.^bT-test.^cMann–Whitney test.^dAs the respondents could have been convicted for more than one type of crime in one imprisonment, the percentage across the different types of crimes can add up to more than 100%.^eDrug-related crimes incl. driving while intoxicated.^fHSLC-10 score ≥ 1.85 .

Objective 2: NorMA cohort compared to the general prison population

The NorMA cohort was younger when they entered prison the first time, compared to the one-day population (24 vs 27 years) (Table 4). Both groups had more than 90% male participants. Except for days per imprisonment, the NorMA cohort had more imprisonments (median four vs two) and had served more days in prison (902 vs 792 days) compared to the one-day population (Table 4). Three in four individuals

in the NorMA cohort had more than one lifetime imprisonment, compared to approximately half of the individuals in the one-day population. Sixty-two percent of the NorMA cohort had been convicted of ‘use and possession’ at least once, compared to 54% in the one-day population.

In the one-day population ($n = 3386$), 907 individuals (27%) did not have a PIN, equivalent to 23% of the total prison population on this day (including the NorMA cohort, who all had PIN). When stratifying the one-day population by PIN/no PIN, those without Norwegian PIN were older and had fewer

Table 4. Background characteristics and life-time imprisonment by NorMA cohort ($n = 733$) and one-day population ($n = 3386$), stratified by PIN and no PIN, respectively, with test of difference between NorMA cohort and the one-day populations.

	NorMA cohort ($n = 733$)	One-day, all ($n = 3386$)	p	One-day, PIN ($n = 2479$)	p	One-day, no PIN ($n = 907$)	p
Demography							
Age at first imprisonment, median (Q1–Q3) ^a	24 (20–33)	27 (21–36)	<0.001	25 (21–35)	0.017	31 (25–37)	<0.001
Male (%) ^b	93	95	0.097	95	0.128	95	0.072
Imprisonment							
Re-offender (%) ^b	76	56	<0.001	73	0.259	9	<0.001
Number of imprisonments, median (Q1–Q3) ^a	4 (2–7)	2 (1–5)	<0.001	3 (1–7)	0.003	1 (1–1)	<0.001
Days per imprisonment, median (Q1–Q3) ^a	93 (29–240)	108 (35–304)	<0.001	99 (31–269)	0.116	394 (105–897)	<0.001
Total days in prison ^a	902 (376–1928)	792 (279–1806)	0.036	962 (343–2129)	0.449	519 (175–987)	<0.001
«Use and possession» (%) ^b	62	54	<0.001	57	0.015	46	<0.001

^aIndependent-Samples Mann–Whitney U Test.^b χ^2 -test.

imprisonments but with more days per imprisonment compared to the NorMA cohort. Their total days of life-time imprisonments were less than the NorMA cohort's (519 compared to 902 days) and fewer had a conviction for use and possession (46%).

Discussion

Studying the representativeness of a study sample is key in epidemiological health research. This includes considering potential sources of selection bias, related to the condition of the study setting and research design. Assessing this can require new perspectives, including alternative sources of data.

Rothman has argued that representativeness of a study sample does not in itself improve external validity; rather, it is the knowledge of specific conditions in the study setting and an understanding of causal mechanism that makes for proper generalization.²⁴ We argue that triangulation is a feasible method to assess these specific conditions and mechanisms of potential selection, and improves our knowledge of our sample's external validity.

The NorMA cohort was different from the lost to follow-up group and the one-day population on most variables. However, when we stratified the one-day population on PIN, the one-day population with PIN and the NorMA cohort were more similar. This indicates that some of the differences between the NorMA cohort and the lost to follow-up group could be explained by the presence of participants without PIN in the lost to follow-up group.

The NorMA study had 51% lost to follow-up: Those who participated in the survey without providing a PIN and/or informed consent. We do not have information on why they did not provide a PIN. We do not know, for example, whether

it was conscious choice, or if they simply could not remember their PIN, or if they did not have a Norwegian PIN. However, since we have the information provided in the NorMA survey, we are able to describe the lost to follow-up group with a broad range of characteristics. When comparing the NorMA cohort to the lost to follow-up group, we saw a difference in drug use and birth country. More than half of the NorMA cohort had used drugs in the previous 6 months before imprisonment, compared to 38% in the lost to follow-up. The NorMA cohort was mainly born in Norway, while a larger proportion of the lost to follow-up were born elsewhere (84% within NorMA cohort vs. 55% among lost to follow-up).

All Norwegian residents are assigned a PIN. As having a PIN was a criterion for participation in the NorMA cohort, immigrants without a visitor's permit and tourists were not eligible for follow-up in Norwegian registries. The NorMA cohort is vulnerable to selection bias based on country of birth and citizenship, and it was therefore important to stratify the one-day population by PIN possession. One in four of the one-day population from the general prison population did not have a PIN, and this group was different from those with a PIN. The one-day population with a PIN was similar to the NorMA cohort when looking at sex, re-offending and total days in prison. The tendency was the same for all variables. The stratification thus indicated that the NorMA cohort is largely representative of the general prison population in possession of a Norwegian PIN, but not to those without.

Drug use

Fifty-six percent of the NorMA cohort reported daily drug use before imprisonment. From the registry data, we have

information on convictions related to ‘use and possession’, which we use as a proxy for drug use prior to imprisonment. When looking at this proxy, 62% of the NorMA cohort and 57% of the general prison population with a Norwegian PIN had this conviction. Our triangulation can therefore demonstrate that 56–62% of the individuals in the Norwegian prison population had an indication of drug use prior to their imprisonment. However, the analysis also showed that this estimate will probably only be valid for the prison population holding a Norwegian PIN.

Limitations and strengths of the study

Both survey and registry data introduce some general strengths and limitations to our study. The survey data we used from the NorMA study included a very broad set of questions and provided rich baseline data. However, some variables had higher degrees of missing, which was more prevalent in the lost to follow-up group, with most missing values on the variables related to mental health status. On the other hand, the data we retrieved from the Norwegian Prison Registry had complete follow-up, but a limited and pre-defined set of variables chosen for administrative purposes. By combining the two, we gained valuable insight into the representativeness and external validity of the NorMA cohort, which is important for future research based on this cohort. Another strength of the Norwegian Prison Registry is the available data on those who did not have a Norwegian PIN and therefore are lost to follow-up in other registries. We do not know how many in the lost to follow-up group did not have a PIN, nor why those who had a PIN chose not to provide theirs. Though we cannot follow these individuals in future linkages with registries, the information provided to us in the Prison Registry data provides us with valuable insight into their characteristics, in comparison to the prison population with a PIN.

Implications

Studying selection bias is important in all sample-based research, because the selection itself, and the underlying mechanisms of selection, can affect the research results.

By triangulating different data source, as we have demonstrated in this article with survey data and registry data, we can investigate these selections and its effect on our results.

If PINs (or another linkable identification code) and informed consent are obtained, registry data can be used to investigate the representativeness of a study sample. For the triangulation method to be applicable, one should be able to identify the study sample within the alternative data source, which requires a linkable identification code. If possible, pay particular attention to groups that do not hold linkable identification codes, such as foreign citizens, and consider how they would appear in the study sample and how they should be treated in the analysis.

In our case, we linked our cohort to Norwegian registry data by using the Norwegian PIN. However, other potential data sources could be national surveys, insurance data or institutional records from institutions such as hospitals, education systems or prisons. Even with a limited number of variables available, for example, on demography or imprisonment, registry data can be valuable when investigating representativeness and evaluating the external validity of data and results. Including this information can therefore be relevant, even if linkage with registry data is not the main purpose of the study. When designing surveys with the intention to collect PIN, remember to emphasize to potential participants that anonymous participation is also encouraged and valuable to the survey.

Conclusion

Though all studies are at risk of selection bias, the characteristics and implications of these biases are often difficult to assess and measure. As we have shown in this study, triangulation of data sources can shed light on the specific conditions between the study sample and target population. With this method, we can improve our understanding of the mechanisms affecting selection bias and clarify the external validity of the study results.

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Author Contributions

NTL performed the data analysis and drafted the paper. MRS supervised NTL, particularly on the statistical analysis. AB is the principal investigator of the NorMA study and in charge of data acquisition and ethical approvals of the study. All authors designed the study and interpreted the data. All authors read, revised and approved the final manuscript.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethics approval and consent to participate

The NorMA study was approved by the Norwegian Committee of Research Ethics (REK 2012/297). It was also approved by the

Ministry of Justice and Public Security, and by the Directorate of the Norwegian Correctional Services, the national prison authorities in Norway. All methods were carried out in accordance with relevant guidelines and regulations. The PINs were provided by the participants following written informed consent. Furthermore, the use of Prison Registry data for comparison, including the identification of the NorMA cohort using PINs, was approved by REK in a supplementary approval in 2020. A precondition of the ethical approval from REK was that we refrain from testing internal validity of the NorMA study, as this could question the credibility and integrity of the participants in the study.

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and/or analyzed during the current study are highly sensitive data and not publicly available due to the limitations of the ethical approval from the Norwegian Committee of Research Ethics. The data can be made available from the corresponding author on reasonable request.

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II



Drug use and re-imprisonment: A prospective study of the Norwegian Offender Mental Health and Addiction (NorMA) cohort



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ABSTRACT

Background: Re-imprisonments are common among people in prison who use drugs. This study aims to describe sociodemographic factors, mental health and level of pre-prison substance use in a cohort of people in prison, and to investigate re-imprisonment during follow-up according to their level of pre-prison drug use.

Methods: This was a prospective study using baseline data from the Norwegian Offender Mental Health and Addiction (NorMA) cohort ($n = 733$) recruited in 2013–2014 linked to data from the Norwegian Prison Registry and the Norwegian Cause of Death Registry. Self-reported drug use before imprisonment was measured at baseline using the Drug Use Disorder Identification Test (DUDIT). The outcome of interest was re-imprisonment examined using Cox regression. We excluded 32 persons because they were not released before the study ended. The study sample included 701 persons, with a total time-at-risk of 2479 person-years.

Results: Almost half of the study sample reported high-risk drug use before imprisonment (DUDIT score >24). During the study period, 43% ($n = 267$) were re-imprisoned. People with high-risk use had a hazard ratio (HR) of 4.20 (95% CI: 2.95–5.97) of re-imprisonment compared with people with low-risk use (DUDIT score <6). Older age and more education than primary school were associated with a reduced risk of re-imprisonment.

Conclusion: Compared with low-risk use, high-risk drug use is highly prevalent among people in prison and is associated with higher rates of re-imprisonment. This highlights the need for screening and treatment of drug use disorders among people in prisons.

1. Introduction

Worldwide, more than 11 million people are incarcerated on any given day, with a global average of 140 people incarcerated per 100 000 citizens (Helen and Walmsley, 2021). The prison population represents a diverse group of people, but often carries a larger burden of socioeconomic disparities (Revolv, 2015), health problems (WHO 2014; Fazel and Baillargeon, 2011; Friestad and Kjelsberg, 2009; UNODC 2019; Fazel et al., 2016) and history of physical and sexual abuse (Lundgren et al., 2013) compared with the general population. Drug use disorders (DUDs) are also more prevalent among the prison population (Fazel et al., 2017; Carpentier et al., 2018; WHO, 2014). In a recent systematic review of DUDs in the prison population, Fazel and colleagues found an overall pooled prevalence of DUD among 30% (95% CI: 22–38%) of men and 51% (95% CI: 43–58%) of women (Fazel et al., 2017).

DUDs among people in prison are associated with a range of negative post-release consequences, including mortality (Chang et al., 2015) and especially overdose death in the immediate period af-

ter release (Bukten et al., 2017). In addition, re-arrest and re-imprisonment are frequent problems among the drug using prison population (Håkansson and Berglund, 2012; Gjersing and Bretteville-Jensen, 2021; Grahn et al., 2020; Thomas et al., 2015), particularly among people who resume drug use after release (Larney et al., 2012; Winter et al., 2019). Winter et al. found injecting drug use (IDU) re-summation after release from prison to more than double the risk of re-imprisonment (Winter et al., 2019).

As in the global prison population, the proportion of people with harmful drug use and mental health problems is higher in the Norwegian prison population than in the general population (Revolv, 2015; Cramer, 2014). Drug-related crime is a common reason for imprisonment; 29% of the prison population had drug-related crime as the main reason for their imprisonment (Statistics Norway, 2021) and 40% of all sentences are related to drug and alcohol use (Bukten et al., 2021).

The causal mechanisms linking drug use and crime and whether this association can be attributed to factors related to the social conditions among people with DUD has been debated (Link and Hamilton, 2017). Much of the current research includes samples of people with high-risk drug use and people who were previously imprisoned, which does

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not make up a representative sample of the overall prison population (Bennett et al., 2008). The absence of proper comparison groups, including people with no or low-risk drug use makes it difficult to study the independent effect of drug use compared with other relevant covariates.

This study adds to current knowledge by being the first to investigate re-imprisonment according to three different levels of pre-prison drug use, including low-risk drug use and adjusting for relevant sociodemographic factors. Furthermore, as prison populations can vary substantially between countries and across time, local, up-to-date knowledge of the characteristics of the prison population is important in order to sufficiently inform decision and policy makers. By linking baseline survey data to the Norwegian Prison Registry and the Norwegian Cause of Death Registry, we were able to observe any new imprisonments and account for persons who died during the observation period.

1.1. Aims

This study aims to: 1) describe sociodemographic, health, and drug use characteristics of the NorMA cohort, 2) explore reimprisonment during the observation period, and 3) determine the association between level of drug use (low risk, harmful, or high risk) and reimprisonment while controlling for sociodemographic characteristics.

2. Material and methods

2.1. Setting and participants

Norway has one of the world's lowest imprisonment rates, with an average of 3218 individuals imprisoned in 2019, equal to an imprisonment rate of 60 per 100,000 of national population (Directorate of the Norwegian Correctional Service 2020a). The mean length of sentences is 323 days, though most are released after two-thirds time served (Directorate of the Norwegian Correctional Service 2020b). Hence, as 85% of people in prison serve sentences less than a year and 50% serve less than three months, the yearly turn-over is high and in 2016 the total number of people imprisoned during 2016 was 13 528 (Directorate of the Norwegian Correctional Service, 2017). Women constitute a minority in Norwegian prisons, with an annual proportion of approximately six percent. Almost two-thirds of prisons are high security prisons. The five-year recidivism rate among persons released from Norwegian prisons is 32%, with higher recidivism among persons released from high security prisons than low security prisons (44% versus 23%) (Kristoffersen, 2020).

The NorMA study recruitment took place in 57 prison units (of 63 eligible), from 1 June 2013 to 31 July 2014. The questionnaires were administered by the study investigators and distributed on the day of the visit. The questionnaire took 30 to 60 min to complete and was available in five languages, including Norwegian, English, Russian, French and German. Participants were not offered reimbursement for participating. The survey data includes baseline data on mental health and drug use, as well as on demographics and other background information. For a more thorough description of the methodology and study design of the NorMA study please see Bukten et al. (2015). 1499 people returned the questionnaire.

A total of 733 participants were enrolled in the NorMA cohort at baseline. The only exclusion criteria for the NorMA cohort was the absence of, or declining to state, a Norwegian Personal Identification Number (PIN). This excluded foreign citizens without permanent or temporary residency to Norway, such as those on tourist visas or undocumented immigrants. In order to study re-imprisonment, we excluded 32 persons who were still in prison at the end of the study observation period (31. December 2019), leaving a total study population of 701 people (Fig. 1). A previous study of the external validity of the NorMA cohort found it to be representative of those in the Norwegian

prison population who possess a Norwegian PIN in terms of age, gender, re-offending, length of imprisonments and drug use related crime (Lokdam et al., 2021).

2.2. Design and data sources

This was a prospective cohort study. We used data from the NorMA study, combining survey data and prospective registry data from the Norwegian Prison Registry and the Norwegian Cause of Death registry on the NorMA cohort. Survey and registry data was linked by the 11-digit personal identification numbers (PIN) provided by the NorMA cohort participants.

The Norwegian Prison Registry was established in 1992 to serve a range of administrative and statistical purposes. The registry includes data from all Norwegian prisons on sentences, prison entry and exit dates, sentence length, offense data, security level, participation in programmes and other variables for the activities related to imprisonment. The registry is administered by the Norwegian Correctional Service (Directorate of the Norwegian Correctional Service). The cohort was also linked to the Norwegian Cause of Death Registry to account for deaths in the cohort during follow-up.

2.3. Measures

The main exposure was pre-prison drug use measured by the Drug Use Disorder Identification Test (DUDIT) (Berman et al., 2005). The DUDIT was included in the baseline survey and participants were asked to recall their drug use in the year leading up to their imprisonment. The DUDIT contains 11 items with scores ranging from zero to 44. A score of six or more is considered an affirmative score for both genders, indicating a harmful use of drugs. Scores of 25 or more indicate drug use dependence for both genders and are considered high-risk scores (Berman et al., 2005). Following these cut-offs, throughout this study we define persons as having 'low-risk use' if they score below 6, 'harmful use' if they score between 6 and 24 and 'high-risk use' if scoring 25 or more.

Validation studies of the DUDIT recommend adjusted cut-off scores for women, depending on the population studied (Berman et al., 2005; Basedow et al., 2021; Durbeej et al., 2010; Hildebrand, 2015). The NorMA cohort contains few women ($n = 51$, 6%) and previous research on the full NorMA sample found similar patterns of drug use among men and women (Pape et al., 2020; Bukten et al., 2016). Based on this, and because this study mainly focusses on high-risk drug use, which has the same cut-off for both genders, we chose to use the standard cut-off categories.

Baseline imprisonment refers to the imprisonment a participant was serving when recruited to the study. The length of the baseline imprisonment was the time from entry date to date of release.

Our main outcome of interest was re-imprisonment during follow-up. A detailed description of all measures can be found in the Supplementary Table 1.

2.4. Analysis

Statistical analyses were performed in Stata (Version 16). We performed descriptive analysis on the NorMA cohort with baseline survey data and prison registry data, presenting frequencies and proportions, as well as means and standard error where relevant. Time-at-risk was defined as the first day following release from the baseline imprisonment until either (1) re-imprisonment, (2) the end of the study observation period (31st December 2019) or (3) death. We used crude Kaplan-Meier curves to describe time to re-imprisonment using complete case data stratified on drug use by 'low-risk', 'harmful' or 'high-risk' DUDIT score. Using Cox regression on imputed data, we performed a time-to-event analysis of the effect of DUDIT score on time to re-imprisonment.

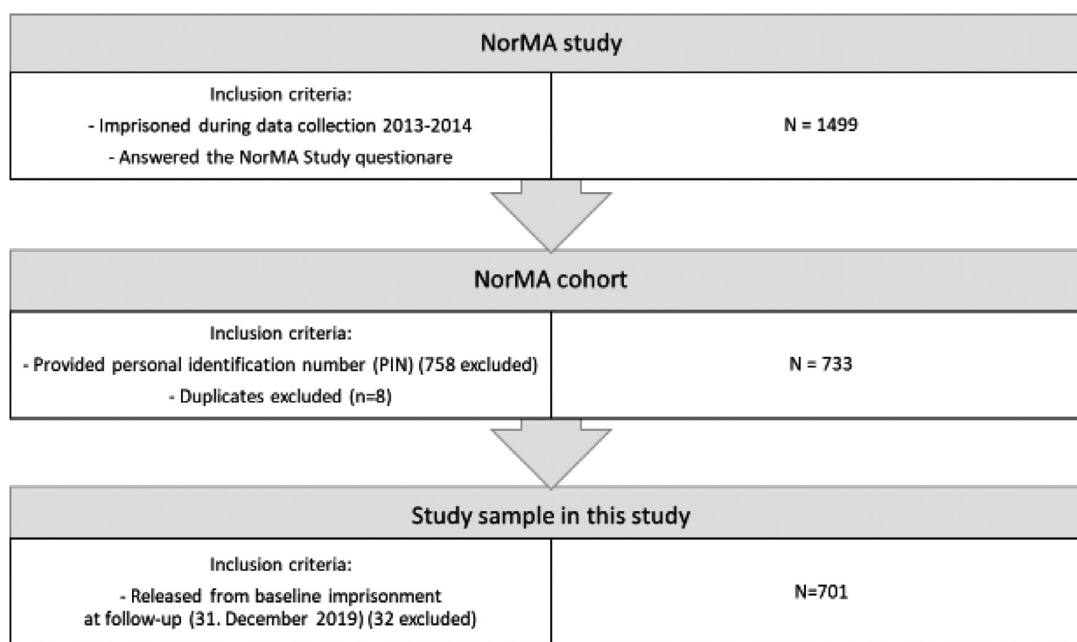


Fig. 1. Flowchart.

The Cox regression model included potential confounders identified using a directed acyclic graph (DAG) (see supplementary material). Additional step-wise reduction of insignificant estimates in the model did not change the estimates and the full model was kept.

2.5. Missing data

The level of missing data in the baseline material ranged from 0% to 19%, with 324 (46%) complete cases. Our exposure variable, the sum score of all DUDIT items, had 11% missing. Our outcome variable, re-imprisonment, did not have any missing data. A detailed list of missing data is shown in Table 1. As the missingness of the variables in our regression analysis was not considered missing completely at random (MCAR), we pre-processed the data by imputing all variables with missing data using multiple imputation by chained equations (MICE). In line with the Treatment and Reporting of Missing Data in Observational Studies framework by Lee et al. (2021) our imputation model included the variables from our regression analysis (Lee et al., 2021): exposure, outcome and potential confounders (sex, age, education, foster care and problems in childhood).

Several diagnostics of the imputation model were performed. First, the imputed values were compared by visual inspection with observed values in all imputations. We also assessed the percentage of persons assigned to each exposure group (low-risk/harmful/high-risk on the DUDIT). Then, we conducted three sets of sensitivity analyses to examine the effect of changes to the imputation model on the estimates from the regression analysis. The sensitivity analyses are described in detail in the supplementary material. MICE was conducted in Stata (Version 16) using ‘mi impute’ with 100 imputations and 1000 iterations. The estimates were pooled using the Stata function ‘mi estimate’ based on Rubin’s rules (Rubin, 1987).

2.6. Ethics

The NorMA study was approved by the Norwegian Committee of Research Ethics (REK 2012/297). It was also approved by the Ministry of Justice and Public Security and by the Directorate of the Norwegian Correctional Services, the national prison authorities in Norway. The

PINs were provided by the participants following written informed consent. We used the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) cohort checklist when writing our report (von Elm et al., 2007).

3. Results

3.1. Cohort characteristics

Among the study sample ($n = 701$) there were 225 (36.2%) persons reporting low-risk drug use (Score of <6), 115 (18.5%) persons reporting harmful drug use (Score of 6–24) and 281 persons (45.2%) reporting high-risk drug use (Score of >24), while 80 (11.4%) were missing (Table 1). The sample consisted of 43 females (6.9%). The mean age of all participants at baseline was 35.3 years ($SE=0.5$). There were 49 participants who died during follow-up, with the highest mortality among the group reporting high-risk use (10.0%). Compared with persons reporting low-risk and harmful use, those reporting high-risk use reported more socio-demographic problems such as unstable accommodation, less education and more drug-use related problems characterized by daily polydrug use (82.9%) and daily IDU (50.2%) in the six months leading up to their imprisonment. The high-risk group also had more imprisonments before baseline (mean=5.7, $SE=0.4$) and more had drug-use-related sentences in their baseline imprisonment (65.8%).

3.2. Re-imprisonment

The total time at risk for all 701 participants was 905,372 days, equivalent to 2479 person-years and an average of 3.5 person-years per participant. Two-fifths of the people (267, 43.0%) in the cohort were re-imprisoned within the follow-up period, with a mean time to first re-imprisonment of 651 days ($SE=26.9$). When stratifying on drug use, we excluded the 80 persons with missing items on DUDIT, leaving 621 persons with 2021 person-years at risk. Among persons reporting high-risk drug use, almost seven in ten returned to prison, and they returned sooner than persons reporting low-risk use (mean days to re-imprisonment: 610 days vs. 879 days). More than half of persons reporting high-risk use had returned to prison within 1000 days, compared

Table 1
Demographic characteristics (n, %), by reported DUDIT score, total and missing (n = 701).

	Low risk 225 (36.2)	Harmful 115 (18.5)	High-risk 281 (45.2)	Total 621 (88.6)	Missing 80 (11.4)
Demographics					
Sex, male	208 (92.4)	109 (94.8)	261 (92.9)	578 (93.1)	0 (0.0)
Age at baseline (Mean (SE))	39.5 (0.9)	31.8 (0.9)	33.5 (0.5)	35.3 (0.5)	0 (0.0)
Born in a Nordic country	172 (76.4)	99 (86.1)	255 (90.7)	526 (84.7)	11 (1.8)
Education: More than primary school	161 (71.6)	58 (50.4)	140 (49.8)	359 (57.8)	4 (0.6)
Occupation: Work or education before incarceration	147 (65.3)	52 (45.2)	54 (19.2)	253 (40.7)	11 (1.8)
Problems in childhood	49 (21.8)	38 (33.0)	130 (46.3)	217 (34.9)	16 (2.6)
Foster care	32 (14.2)	23 (20.0)	68 (24.2)	123 (19.8)	9 (1.4)
Unstable housing	26 (11.6)	20 (17.4)	109 (38.8)	155 (25.0)	18 (2.9)
Drug use					
Age at first drug use (mean, SD)	19.7 (0.9)	17.1 (0.6)	15.3 (0.3)	16.3 (0.3)	181 (29.1)
Poly-drug use	0 (0.0)	27 (23.5)	233 (82.9)	260 (41.9)	11 (1.8)
IDU					21 (3.4)
Daily/almost daily	0 (0.0)	7 (6.1)	141 (50.2)	148 (23.8)	
1–2 times per week	0 (0.0)	8 (7.0)	25 (8.9)	33 (5.3)	
1–3 times per month	0 (0.0)	11 (9.6)	8 (2.8)	19 (3.1)	
Mental health					
Severe mental stress (HSCL-10 >18.5)	58 (25.8)	35 (30.4)	136 (48.4)	229 (36.9)	116 (18.7)
Imprisonment					
Previously imprisoned	101 (44.9)	84 (73.0)	248 (88.3)	433 (69.7)	1 (0.2)
No. of imprisonments before baseline, mean (SD)	1.2 (0.1)	3.1 (0.4)	5.7 (0.4)	3.6 (0.2)	1 (0.2)
Drug-use related crime					
B&B	6 (2.7)	42 (36.5)	164 (58.4)	212 (34.1)	0 (0.0)
Driving under influence	26 (11.6)	33 (28.7)	109 (38.8)	168 (27.1)	0 (0.0)
Convictions, mean (SE)	2.5 (0.2)	4.3 (0.4)	6.6 (0.3)	4.7 (0.2)	0 (0.0)
Length of baseline sentence					
<6	80 (35.6)	48 (41.7)	77 (27.4)	205 (33.0)	0 (0.0)
6–12	28 (12.4)	18 (15.7)	88 (31.3)	134 (21.6)	0 (0.0)
12<	117 (52.0)	49 (42.6)	116 (41.3)	282 (45.4)	0 (0.0)
Follow-up status					
Dead during follow-up	13 (5.8)	8 (7.0)	28 (10.0)	49 (7.9)	0 (0.0)
Re-imprisonments					
0	187 (83.1)	73 (63.5)	94 (33.5)	354 (57.0)	0 (0.0)
1	21 (9.3)	14 (12.2)	68 (24.2)	103 (16.6)	0 (0.0)
2	13 (5.8)	16 (13.9)	57 (20.3)	86 (13.8)	0 (0.0)
3+	4 (1.8)	12 (10.4)	62 (22.1)	78 (12.6)	0 (0.0)
Time to first re-imprisonment, days (SE)	878.8 (77.2)	678.5 (70.2)	609.7 (34.3)	650.7 (26.9)	0 (0.0)

Table 2
Univariate and adjusted Cox regression analysis on pooled MICE data, with hazard ratios, 95 % confidence intervals (CI) and p-values, n = 701.

	Univariate HR (95% CI)	P	Adjusted HR (95% CI)	P
Level of drug use				
Harmful use	2.20 (1.44–3.37)	<0.001	1.80 (1.17–2.78)	0.008
High-risk use	5.06 (3.61–7.09)	<0.001	4.20 (2.95–5.97)	<0.001
Sociodemographic				
Age	0.98 (0.96–0.99)	<0.001	0.98 (0.97–1.04)	<0.001
Female	0.67 (0.42–1.06)	0.090	0.65 (0.40–0.99)	0.070
Problems in childhood	1.05 (0.83–1.34)	0.666	1.05 (0.83–1.35)	0.669
Education: More than primary school	0.69 (0.55–0.87)	0.002	0.76 (0.60–0.97)	0.025
Foster care	1.31 (1.00–1.70)	0.050	1.22 (0.93–1.61)	0.147

with one in four among those reporting harmful use and less than one in ten among persons reporting low-risk use (Fig. 2).

The adjusted Cox regression model is shown in Table 2. Compared with people with low-risk use, people with high-risk use had four times higher HR for re-imprisonments (HR=4.20, $P<0.001$) and people with harmful use had 80% higher HR for re-imprisonments ($P = 0.008$) (Table 2). Higher age (HR=0.98, $P<0.001$) and having more education than primary school (HR=0.76, P -value=0.025) were protective factors against re-imprisonment. We found no significant effect of gender, 'problems in childhood' or 'foster care' in the adjusted model.

4. Discussion

In this study of a representative sample of the Norwegian prison population (Lokdam et al., 2021), the majority of participants reported

harmful or high-risk drug use before imprisonment. Persons reporting high-risk drug use had a high prevalence of IDU, polydrug use and severe mental stress. They also had a high burden of social problems and previous prison experience.

By combining survey and registry data and adjusting for other risk factors for re-imprisonment, our study was able to investigate the independent effect of drug use on re-imprisonment. Our results showed that both harmful and high-risk drug use were associated with increased risk of re-imprisonment. Furthermore, older age and having more education than primary school was protective against re-imprisonment. Our findings are in line with previous research on criminal offending and imprisonment among people with high-risk drug use (Gjersing and Bretteville-Jensen, 2021; Thomas et al., 2015; Winter et al., 2019; Link and Hamilton, 2017; Bennett et al., 2008; Phillips, 2010; Bennett and Ed-

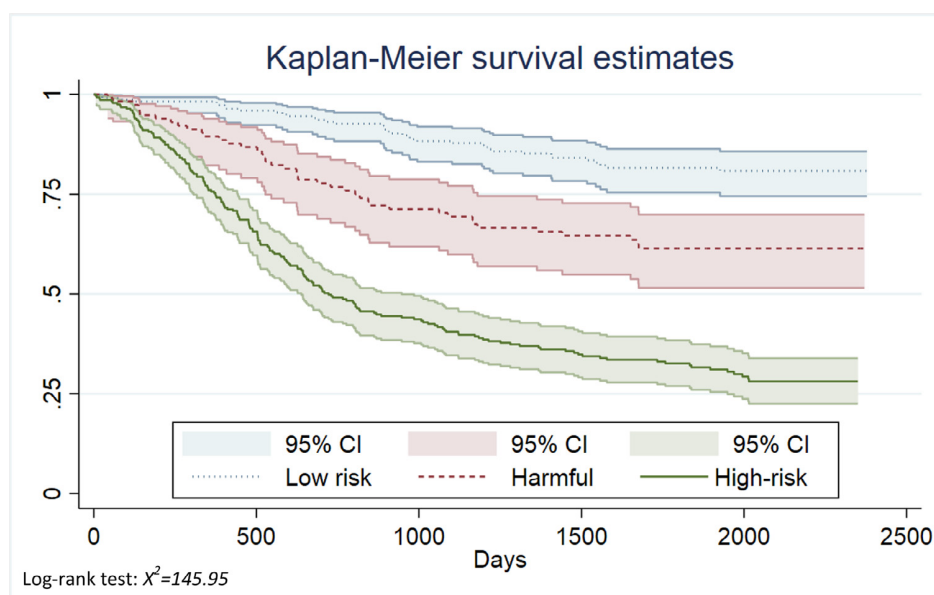


Fig. 2. Kaplan-Meier curves of days to re-imprisoned, by low-risk, harmful or high-risk drug use. 95% confidence intervals (CI), $n = 621$. Total time at risk= 803 878 days.

wards, 2015; Pierce et al., 2015). In a recent study using a large sample of adults assessed for risky drug use or SUD, Grahn and colleagues (Grahn et al., 2020) found higher Addiction Severity Index Composite Score (ASI CS) for use of drugs other than alcohol to be the strongest predictor for re-imprisonment across both genders (Grahn et al., 2020). Their regression model included parental narcotic problems, physical abuse, ASI CS on both narcotics and alcohol use, education and age. Their findings indicated that addiction severity could decrease the explanatory impact of the lifetime stressors. Hence, other risk factors had less importance if the drug use is more severe.

The mechanisms linking drugs and crime are often categorized as economic, pharmacological or lifestyle mechanisms and are complex and intertwined; drug use causes crime and crime causes drug use (Bennett and Holloway, 2009). In terms of recidivism, post-release drug use can act as a push factor, driving individuals into new criminal activities, and simultaneously be a barrier for re-entry to society because it complicates participation in re-entry activities such as education, school or treatment (Phillips, 2010; Larney et al., 2018). Our study did not examine the intricate causal mechanisms explaining the association between drug use and re-imprisonment. However, in addition to risky drug use being associated with more imprisonment, younger age and low level of education were also found to be positively associated with re-imprisonment. These findings are consistent with previous research on recidivism in the prison population in general (Skarðhamar and Telle, 2009) and the drug-using prison population in particular (Håkansson and Berglund, 2012; Grahn et al., 2020; Winter et al., 2019; Link and Hamilton, 2017).

Our results confirm that the complex vulnerabilities of people in prisons with high-risk drug use require interventions that integrate social, economic and health-related support to prevent further criminal activity and re-imprisonment.

4.1. Strengths and limitations

Our data included a unique combination of longitudinal registry data and high-quality baseline survey data collected from a representative cohort. Using national registry data makes our loss to follow-up negligible. Another strength of our study is the use of the standardized tool DUDIT validated in the prison population (Durbeej et al., 2010; Coulton et al., 2012) for our main exposure, drug use.

However, self-report data on drug use before imprisonment may have some limitations concerning validity and reliability. The original DUDIT instruments were modified to assess the year before incarceration and the validity of the responses may thus have been hampered by recall bias. However, using registry data on imprisonment and convictions reduces the limitations of recall bias related to crime and imprisonments.

The use of registry data indicates that our results are generalizable to the prison population that have Norwegian PINs, which excludes approximately 20–25% of the people imprisoned daily in Norway (Lokdam et al., 2021). From previous research on those in Norwegian prisons without PINs, we have seen that they have fewer drug-use-related convictions, a finding which might indicate that this group has fewer problems with drug use compared with people in prisons with Norwegian PINs (Lokdam et al., 2021). The challenge of follow-up of non-registered citizens applies to most longitudinal research using registry data and is not unique to this study. However, this should be taken into consideration when interpreting our results.

4.2. Implications

The high proportion of people with drug-use problems in prisons presents both a challenge and an important opportunity for public health interventions (Fazel and Baillargeon, 2011; Viggiani, 2007; James Woodall et al., 2014). Public health interventions and DUD treatment in prisons have been shown to reduce recidivism to drug use and imprisonment (Larney et al., 2012; De Andrade et al., 2018; Taxman and Mun, 2018) with potential benefit for both the individual and society. People with high-risk drug use often have a complex combination of risk factors, social and economic problems. Together with findings from other studies, our findings imply that interventions aimed at addressing harmful and high-risk drug use are crucial in order to rehabilitate people in prison with DUD and prevent re-imprisonment.

In Norway, people in prison have the right to access universal health care and to take part in health care interventions adjusted to their individual needs. However, limited treatment capacity and lack of systematic screening of DUD in Norwegian prisons (Oslo Economics, 2020), maintains a gap between the needs of people with DUD in prisons and the actual access and availability of treatment and rehabilitating interventions. Systematic screening of all people entering prison should therefore be based on standardized tests such as the DUDIT. Validation

studies of brief DUDIT screeners have found that short versions have performed well at detecting high-risk drug use in the prison population, and their use can thus be recommended in the prison setting (Pape et al., 2022). Screening and treatment should also be available to people with DUD serving shorter sentences.

5. Conclusion

Our results showed that half of the NorMA cohort reported high-risk drug use before their baseline imprisonment. Persons reporting high-risk drug use had four times the risk of re-imprisonment compared with those reporting low-risk use. This association persisted even when adjusting for socio-demographic variables, indicating the high burden of vulnerability related to high-risk drug use.

Contributors

All authors contributed to the interpretation of the results and editing of the manuscript.

Author disclosure section

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Declaration of Competing Interest

No conflict declared.

CRedit authorship contribution statement

Nicoline Toresen Lokdam: Formal analysis, Writing – original draft, Writing – review & editing. **Marianne Riksheim Stavseth:** Writing – original draft, Writing – review & editing. **Anne Bukten:** Writing – original draft, Writing – review & editing.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.dadr.2022.100127.

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III

Kartlegging av rus og helse i kriminalomsorgen



Kontaktperson:

Anne Bukten, Senter for rus-og avhengighetsforskning (SERAF)

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Bakgrunn

1. Kjønn og alder			
Mann	<input type="checkbox"/>	Kvinne	<input type="checkbox"/>
Alder	<input type="text"/>	<input type="text"/>	år
2. Har du lese- og skrivevansker?			
Ja	<input type="checkbox"/>	Nei	<input type="checkbox"/>
3. Fødeland for deg og dine foreldre			
	Meg	Mor	Far
Norge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Norden utenom Norge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vest-Europa utenom Norden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Øst-Europa	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Afrika	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sør-og Mellom-Amerika	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nord-Amerika	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Asia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oceania	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Hvem vokste du opp sammen med? (sett gjerne flere kryss)			
Begge mine biologiske foreldre	<input type="checkbox"/>		
En av mine biologiske foreldre	<input type="checkbox"/>		
Slektninger	<input type="checkbox"/>		
Adoptivforeldre	<input type="checkbox"/>		
Fosterforeldre	<input type="checkbox"/>		
Andre	<input type="checkbox"/>		
5. Har du hatt en stabil oppvekst? (sett gjerne flere kryss)			
Familie, uten problemer med alkohol/ narkotika/ medikamenter	<input type="checkbox"/>		
Familie, med problemer med alkohol/ narkotika/ medikamenter	<input type="checkbox"/>		
Familie med alvorlige psykiske problemer	<input type="checkbox"/>		
6. Har du norsk statsborgerskap?			
Ja	<input type="checkbox"/>	Nei	<input type="checkbox"/>
7. Sivilstatus			
Enslig	<input type="checkbox"/>	Gift	<input type="checkbox"/>
Samboer	<input type="checkbox"/>	Separert	<input type="checkbox"/>
Skilt	<input type="checkbox"/>	Enke/ enkemann	<input type="checkbox"/>
8. Høyeste fullførte utdanning			
Ikke fullført grunnskole	<input type="checkbox"/>		
Grunnskole	<input type="checkbox"/>		
Videregående eller gymnas	<input type="checkbox"/>		
Faglig yrkesutdanning	<input type="checkbox"/>		
Treårig høyskole eller universitet	<input type="checkbox"/>		
Mer enn treårig høyskole eller universitet	<input type="checkbox"/>		
9. Yrkesstatus siste 6 måneder før fengsling			
Heltidsjobb	<input type="checkbox"/>		
Deltidsjobb	<input type="checkbox"/>		
Under utdanning	<input type="checkbox"/>		
Ikke i arbeid eller under utdanning	<input type="checkbox"/>		

10. Viktigste inntekt siste måned før fengsling

Lønnet arbeid	<input type="checkbox"/>
Forsørget av andre	<input type="checkbox"/>
Dagpenger (arbeidsledighetstrygd)	<input type="checkbox"/>
Sykepenger	<input type="checkbox"/>
Arbeidsavklaringspenger (AAP)	<input type="checkbox"/>
Uførepensjon	<input type="checkbox"/>
Alderspensjon	<input type="checkbox"/>
Sosial stønad	<input type="checkbox"/>
Studielån/ stipend	<input type="checkbox"/>
Kriminell virksomhet	<input type="checkbox"/>
Annet	<input type="checkbox"/>

11. Hvem bodde du sammen med siste måned før fengsling? (Sett gjerne flere kryss)

Alene	<input type="checkbox"/>
I parforhold	<input type="checkbox"/>
Sammen med venner	<input type="checkbox"/>
Sammen med foreldre	<input type="checkbox"/>
Sammen med barn under 18 år	<input type="checkbox"/>
Sammen med barn over 18 år	<input type="checkbox"/>
Sammen med andre	<input type="checkbox"/>

12. Boligforhold siste måned før fengsling?

Privat bolig (selveier)	<input type="checkbox"/>	Privat bolig (leiet)	<input type="checkbox"/>
Kommunal bolig	<input type="checkbox"/>	Flyktningmottak	<input type="checkbox"/>
Hospits/ hybelhus	<input type="checkbox"/>	Institusjon	<input type="checkbox"/>
Ingen bolig	<input type="checkbox"/>	Annen	<input type="checkbox"/>

13. Hadde du i hovedsak en stabil bosituasjon siste måned før fengsling?

Ja	<input type="checkbox"/>	Nei	<input type="checkbox"/>
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Om nåværende fengsling

14. Hva er status i forbindelse med din nåværende fengsling?

Dom	<input type="checkbox"/>	Varetekt	<input type="checkbox"/>	Forvaring	<input type="checkbox"/>
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15. Hvis du er domfelt, hvor lang er dommen du nå soner (eventuelt minstetid)?

_____ år _____ mnd _____ dager

16. Hvor lenge har du vært fengslet i forbindelse med nåværende fengselsopphold?

_____ år _____ mnd _____ dager

17. Sitter du i et fengsel med høyt eller lavt sikkerhetsnivå?

Høyt sikkerhetsnivå	<input type="checkbox"/>
Lavt sikkerhetsnivå	<input type="checkbox"/>
Overgangsbolig	<input type="checkbox"/>

18. Hvilken type avdeling sitter du på?

Lukket avdeling	<input type="checkbox"/>	Fellesskapsavdeling	<input type="checkbox"/>
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19. Sitter du på en rusmestringsenhet?

Ja	<input type="checkbox"/>	Nei	<input type="checkbox"/>
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20. Har du deltatt på noen av kriminalomsorgens programmer?		
Ja	<input type="checkbox"/>	Nei <input type="checkbox"/>
Hvis ja, hvilke programmer?		
21. Hvilke lovbrudd er du siktet/dømt for i forbindelse med ditt nåværende fengselsopphold? (sett gjerne flere kryss)		
	Siktet	Dømt
Mindre alvorlig vinningskriminalitet	<input type="checkbox"/>	<input type="checkbox"/>
Grov vinningskriminalitet	<input type="checkbox"/>	<input type="checkbox"/>
Bruk og besittelse av narkotika	<input type="checkbox"/>	<input type="checkbox"/>
Smugling/ omsetning av narkotika	<input type="checkbox"/>	<input type="checkbox"/>
Økonomisk kriminalitet (bedrageri etc.)	<input type="checkbox"/>	<input type="checkbox"/>
Kjøring i beruset tilstand	<input type="checkbox"/>	<input type="checkbox"/>
Voldskriminalitet	<input type="checkbox"/>	<input type="checkbox"/>
Drap	<input type="checkbox"/>	<input type="checkbox"/>
Seksualkriminalitet	<input type="checkbox"/>	<input type="checkbox"/>
Annen kriminalitet	<input type="checkbox"/>	<input type="checkbox"/>
Helseopplysninger		
22. Hvordan synes du selv at din fysiske helse er for tiden?		
Meget bra	<input type="checkbox"/>	
Bra	<input type="checkbox"/>	
Verken bra eller dårlig	<input type="checkbox"/>	
Dårlig	<input type="checkbox"/>	
Meget dårlig	<input type="checkbox"/>	
23. Hvordan synes du selv at din psykiske helse er for tiden?		
Meget bra	<input type="checkbox"/>	
Bra	<input type="checkbox"/>	
Verken bra eller dårlig	<input type="checkbox"/>	
Dårlig	<input type="checkbox"/>	
Meget dårlig	<input type="checkbox"/>	
24. Hvordan er ditt forhold til din partner for tiden?		
Meget bra	<input type="checkbox"/>	
Bra	<input type="checkbox"/>	
Verken bra eller dårlig	<input type="checkbox"/>	
Dårlig	<input type="checkbox"/>	
Meget dårlig	<input type="checkbox"/>	
Har ingen partner	<input type="checkbox"/>	
25. Hvordan er ditt forhold til dine venner for tiden?		
Meget bra	<input type="checkbox"/>	
Bra	<input type="checkbox"/>	
Verken bra eller dårlig	<input type="checkbox"/>	
Dårlig	<input type="checkbox"/>	
Meget dårlig	<input type="checkbox"/>	
Har ikke kontakt med venner	<input type="checkbox"/>	
Har ingen venner	<input type="checkbox"/>	

26. Hvordan er ditt forhold til deg selv for tiden?				
Meget bra	<input type="checkbox"/>			
Bra	<input type="checkbox"/>			
Verken bra eller dårlig	<input type="checkbox"/>			
Dårlig	<input type="checkbox"/>			
Meget dårlig	<input type="checkbox"/>			
27. Er du for tiden i LAR-behandling?				
Ja	<input type="checkbox"/>			
Nei	<input type="checkbox"/>	Hvis nei - gå til spørsmål 30		
28. Hvor lenge har du vært i LAR-behandling?				
_____ år	_____ mnd			
29. Hvilken LAR-medisin bruker du i dag?				
<input type="checkbox"/>	Subutex	_____ mg pr dag		
<input type="checkbox"/>	Subuxone	_____ mg pr dag		
<input type="checkbox"/>	Metadon	_____ mg pr dag		
<input type="checkbox"/>	Annet	_____ mg pr dag		
30. Er du smittet av hepatitt B eller C?				
Ja, hepatitt B	<input type="checkbox"/>	Ja, hepatitt C	<input type="checkbox"/>	
Ja, både hepatitt B og C	<input type="checkbox"/>	Nei	<input type="checkbox"/>	
Vet ikke	<input type="checkbox"/>	Vil ikke svare	<input type="checkbox"/>	
31. Har du testet deg for HIV?				
Ja, i løpet av det siste året	<input type="checkbox"/>			
Ja, men ikke i løpet av det siste året	<input type="checkbox"/>			
Nei	<input type="checkbox"/>			
Vet ikke	<input type="checkbox"/>			
Vil ikke svare	<input type="checkbox"/>			
32. Hvis ja, hva var ditt siste testresultat?				
HIV negativ	<input type="checkbox"/>	HIV positiv	<input type="checkbox"/>	
Vil ikke svare	<input type="checkbox"/>			
33. Har du i løpet av de siste 14 dagene vært plaget av følgende?				
	Ikke plaget	Litt plaget	Ganske plaget	Veldig plaget
Matthet eller svimmelhet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plutselig frykt uten grunn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stadig redd eller engstelig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Følelse av å være anspent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lett for å klandre deg selv	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Søvnproblemer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Følelse av håpløshet med tanke på fremtiden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nedtrykt, tungsindig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Følelse av at alt er et slit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Følelse av å være unyttig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

34. Røyket du sigaretter det siste halvåret før fengsling?		
Nei <input type="checkbox"/>	Ja <input type="checkbox"/>	Hvis ja, hvor mange per dag? _ _ _ _ _
35. Brukte du snus det siste halve året før fengsling?		
Nei <input type="checkbox"/>	Ja <input type="checkbox"/>	Hvis ja, hvor mange per dag? _ _ _ _ _
36. Røyker du sigaretter under dette fengselsoppholdet?		
Nei <input type="checkbox"/>	Ja <input type="checkbox"/>	Hvis ja, hvor mange per dag? _ _ _ _ _
37. Bruker du snus under dette fengselsoppholdet?		
Nei <input type="checkbox"/>	Ja <input type="checkbox"/>	Hvis ja, hvor mange per dag? _ _ _ _ _
38. Trente du det siste halvåret før fengsling?		
Nei <input type="checkbox"/>	Ja <input type="checkbox"/>	Hvis ja, hvor mange ganger per uke? _ _ _ _
39. Trener du under dette fengselsoppholdet?		
Nei <input type="checkbox"/>	Ja <input type="checkbox"/>	Hvis ja, hvor mange ganger per uke? _ _ _ _
Bruk av alkohol før fengsling		
40. Har du noen gang drukket alkohol?		
Ja <input type="checkbox"/>	Nei <input type="checkbox"/>	Hvis nei - gå til spørsmål 54
41. Hvor gammel var du første gang du drakk alkohol?		
Alder _ _ _ _ år		
42. Hvor gammel var du første gang du drakk deg beruset?		
Alder _ _ _ _ år	Har aldri drukket meg beruset <input type="checkbox"/>	
43. Har du noen gang kommet på kant med loven på grunn av drikking, feks blitt arrestert eller fått bot?		
Ja <input type="checkbox"/>	Nei <input type="checkbox"/>	
44. Hvor ofte drakk du alkohol det siste året forut for fengsling?		
Aldri	<input type="checkbox"/>	
Månedlig eller sjeldnere	<input type="checkbox"/>	
2 til 4 ganger i måneden	<input type="checkbox"/>	
2 til 3 ganger i uken	<input type="checkbox"/>	
4 ganger i uken eller mer	<input type="checkbox"/>	
45. Hvor mange alkoholenheter (en drink, glass vin, eller pils) hadde du på en typisk drikke-dag det siste året før fengsling?		
1-2	<input type="checkbox"/>	
3-4	<input type="checkbox"/>	
5-6	<input type="checkbox"/>	
7-9	<input type="checkbox"/>	
10 eller flere	<input type="checkbox"/>	
46. Hvor ofte drakk du seks alkoholenheter eller mer det siste året før fengsling?		
Aldri	<input type="checkbox"/>	
Sjelden	<input type="checkbox"/>	
Noen ganger i måneden	<input type="checkbox"/>	
Noen ganger i uken	<input type="checkbox"/>	
Nesten daglig	<input type="checkbox"/>	

47. Hvor ofte i løpet av det siste året før fengsling var du ikke i stand til å stoppe og drikke etter at du hadde begynt?	
Aldri	<input type="checkbox"/>
Sjelden	<input type="checkbox"/>
Noen ganger i måneden	<input type="checkbox"/>
Noen ganger i uken	<input type="checkbox"/>
Nesten daglig	<input type="checkbox"/>
48. Hvor ofte i løpet av det siste året unnlot du å gjøre ting du skulle ha gjort på grunn av drikking?	
Aldri	<input type="checkbox"/>
Sjelden	<input type="checkbox"/>
Noen ganger i måneden	<input type="checkbox"/>
Noen ganger i uken	<input type="checkbox"/>
Nesten daglig	<input type="checkbox"/>
49. Hvor ofte startet du dagen din med alkohol året før fengsling?	
Aldri	<input type="checkbox"/>
Sjelden	<input type="checkbox"/>
Noen ganger i måneden	<input type="checkbox"/>
Noen ganger i uken	<input type="checkbox"/>
Nesten daglig	<input type="checkbox"/>
50. Hvor ofte i det siste året før fengsling, har du hatt skyldfølelse pga. drikking?	
Aldri	<input type="checkbox"/>
Sjelden	<input type="checkbox"/>
Noen ganger i måneden	<input type="checkbox"/>
Noen ganger i uken	<input type="checkbox"/>
Nesten daglig	<input type="checkbox"/>
51. Hvor ofte i løpet av det siste året før fengsling har det vært umulig å huske hva som hendte kvelden før pga. drikking?	
Aldri	<input type="checkbox"/>
Sjelden	<input type="checkbox"/>
Noen ganger i måneden	<input type="checkbox"/>
Noen ganger i uken	<input type="checkbox"/>
Nesten daglig	<input type="checkbox"/>
52. Har du eller noen andre blitt skadet som følge av at du har drukket?	
Nei	<input type="checkbox"/>
Ja, men ikke i løpet av siste år før fengsling	<input type="checkbox"/>
Ja, i løpet av det siste året før fengsling	<input type="checkbox"/>
53. Har en slektning, venn eller lege bekymret seg over drikkingen din, eller antydnet at du burde redusere?	
Nei	<input type="checkbox"/>
Ja, men ikke i løpet av siste år før fengsling	<input type="checkbox"/>
Ja, i løpet av det siste året før fengsling	<input type="checkbox"/>
Om bruk av narkotika og medikamenter	
54. Har du noen gang blitt tilbydt narkotika/ medikamenter mens du vært i fengsel?	
Ja <input type="checkbox"/>	Nei <input type="checkbox"/>

55. Er det enkelt å få tak narkotika/medikamenter i fengsel?			
Ja <input type="checkbox"/>	Nei <input type="checkbox"/>	Vet ikke <input type="checkbox"/>	
56. Er det enkelt å få tak i sprøyter i fengsel?			
Ja <input type="checkbox"/>	Nei <input type="checkbox"/>	Vet ikke <input type="checkbox"/>	
57. Hvor mye koster ulike typer narkotika/ medikamenter i fengsel?			
	Kroner	Bytte verdi (vare)	Vet ikke
1 dose cannabis	---	-----	<input type="checkbox"/>
1 dose heroin	---	-----	<input type="checkbox"/>
1 dose syntetiske cannabinoider (Spice, etc)	---	-----	<input type="checkbox"/>
1 dose amfetamin	---	-----	<input type="checkbox"/>
1 dose kokain	---	-----	<input type="checkbox"/>
1 pille (Valium, Vival, Stesolid, sobril, rivotril etc.)	---	-----	<input type="checkbox"/>
1 dose Metadon, Subutex	---	-----	<input type="checkbox"/>
58. Hvordan får man penger til narkotika/ medikamenter fengsel?			
Egne penger	<input type="checkbox"/>		
Krita (betaler når man kommer ut)	<input type="checkbox"/>		
Selger eiendeler man har i fengsel	<input type="checkbox"/>		
Byttehandel av tjenester	<input type="checkbox"/>		
Vet ikke	<input type="checkbox"/>		
59. Har du noen gang brukt anabole steroider?			
Ja <input type="checkbox"/>	Nei <input type="checkbox"/>		
60. Hvis ja, hvor brukte du anabole steroider for første gang?			
Ute, før første fengselsopphold	<input type="checkbox"/>		
Ute mellom fengselsopphold	<input type="checkbox"/>		
Under et tidligere fengselsopphold	<input type="checkbox"/>		
Under nåværende fengselsopphold	<input type="checkbox"/>		
61. Har du noen ganger satset penger på spill (for eksempel oddsen, tipping, poker, eller automater)?			
Ja <input type="checkbox"/>	Nei <input type="checkbox"/>		
62. Har du noen gang måttet øke innsatsen for å beholde spenningsfølelsen i spillet?			
Ja <input type="checkbox"/>	Nei <input type="checkbox"/>	Vet ikke <input type="checkbox"/>	
63. Har du noen gang løyet for din familie eller andre for å skjule hvor mye du spiller?			
Ja <input type="checkbox"/>	Nei <input type="checkbox"/>	Vet ikke <input type="checkbox"/>	
64. Har du noen gang brukt narkotika eller medikamenter for å ruse deg?			
Ja <input type="checkbox"/>	Nei <input type="checkbox"/>		
Hvis du svarte JA på dette spørsmålet er det viktig at du svarer så godt du kan på resten av spørsmålene.			
Hvis NEI – gå til spørsmål 99			
65. Hvor gammel var du første gang du brukte narkotika/ medikamenter for å ruse deg?			
Alder: ____ år			

66. Hvor var det du brukte narkotika/ medikamenter for første gang?		
Ute, før første fengselsopphold	<input type="checkbox"/>	
Ute mellom fengselsopphold	<input type="checkbox"/>	
Under et tidligere fengselsopphold	<input type="checkbox"/>	
Under nåværende fengselsopphold	<input type="checkbox"/>	
67. Hva slags type narkotika/ medikamenter var det?		
68. Kryss av for hvilke typer narkotika/ medikamenter du noen gang har brukt og skriv hvor gammel du var da du brukte dem for første gang.		
	Brukt	Alder
Cannabis (hasj/marihuana)	<input type="checkbox"/>	____ år
Syntetiske cannabinoider (Spice etc.)	<input type="checkbox"/>	____ år
Heroin	<input type="checkbox"/>	____ år
(Met)Amfetamin	<input type="checkbox"/>	____ år
Kokain	<input type="checkbox"/>	____ år
Ecstasy	<input type="checkbox"/>	____ år
LSD, PCP, Ketamin	<input type="checkbox"/>	____ år
GHB	<input type="checkbox"/>	____ år
Sniffestoffer	<input type="checkbox"/>	____ år
Anabole steroider	<input type="checkbox"/>	____ år
Metadon, Subutex, Suboxone (ikke resept)	<input type="checkbox"/>	____ år
Dolcontin, Paralgin Forte, Nobligan, Oxycontin (ikke resept)	<input type="checkbox"/>	____ år
Valium, Vival, Stesolid, Sobril, Alopam (ikke resept)	<input type="checkbox"/>	____ år
Rohypnol, Flunipam, Rivotril, Xanor, Apodorm, Mogadon (ikke resept)	<input type="checkbox"/>	____ år
Ritalin, Concerta etc. (ikke resept)	<input type="checkbox"/>	____ år
Andre stoffer /medikamenter	<input type="checkbox"/>	____ år
69. Har du hatt perioder med daglig eller nesten daglig bruk av narkotika/ medikamenter?		
Ja <input type="checkbox"/>	Nei <input type="checkbox"/>	
70. Har du noen gang brukt sprøyte for å injisere narkotika/ medikamenter?		
Ja <input type="checkbox"/>	Nei <input type="checkbox"/> Hvis nei - gå til spørsmål 74	
71. Hvor gammel var du første gang du satte en sprøyte?		
Alder: ____ år		
72. Hva slags type narkotika/ medikamenter injiserte du?		
73. Har du hatt perioder med daglig eller nesten daglig bruk av sprøyte?		
Ja <input type="checkbox"/>	Nei <input type="checkbox"/>	

74. Har du vært i behandling for rusmiddelproblemer? Hvilken type behandling?		
Kryss av de svar som passer	Alkohol	Andre rusmidler
Har aldri vært i behandling	<input type="checkbox"/>	<input type="checkbox"/>
Avrusning i institusjon	<input type="checkbox"/>	<input type="checkbox"/>
Poliklinisk avrusning	<input type="checkbox"/>	<input type="checkbox"/>
LAR-behandling	<input type="checkbox"/>	<input type="checkbox"/>
Annen poliklinisk behandling	<input type="checkbox"/>	<input type="checkbox"/>
Institusjonsbehandling	<input type="checkbox"/>	<input type="checkbox"/>
Dagtilbud	<input type="checkbox"/>	<input type="checkbox"/>
Legevakt	<input type="checkbox"/>	<input type="checkbox"/>
Sykehus	<input type="checkbox"/>	<input type="checkbox"/>
Psykiatrisk avdeling	<input type="checkbox"/>	<input type="checkbox"/>
Annen type behandling	<input type="checkbox"/>	<input type="checkbox"/>
75. Hvis annen type behandling, beskriv		
76. Hvor ofte brukte du narkotika/ medikamenter siste år før fengsling?		
Aldri	<input type="checkbox"/>	
En gang i måneden eller sjeldnere	<input type="checkbox"/>	
To til fire ganger i måneden	<input type="checkbox"/>	
To til tre ganger i uken	<input type="checkbox"/>	
Fire ganger i uken eller mer	<input type="checkbox"/>	
77. Brukte du flere typer narkotika/ medikamenter ved ett og samme tilfelle siste år før fengsling?		
Aldri	<input type="checkbox"/>	
En gang i måneden eller sjeldnere	<input type="checkbox"/>	
To til fire ganger i måneden	<input type="checkbox"/>	
To til tre ganger i uken	<input type="checkbox"/>	
Fire ganger i uken eller mer	<input type="checkbox"/>	
78. Hvor mange ganger i løpet av en typisk "rus-dag" tok du narkotika/ medikamenter siste år før fengsling?		
0	<input type="checkbox"/>	
1-2	<input type="checkbox"/>	
3-4	<input type="checkbox"/>	
5-6	<input type="checkbox"/>	
7 eller flere	<input type="checkbox"/>	
79. Hvor ofte i løpet siste år før fengsling ble du kraftig påvirket av narkotika/ medikamenter?		
Aldri	<input type="checkbox"/>	
Sjeldnere enn en gang i måneden	<input type="checkbox"/>	
Hver måned	<input type="checkbox"/>	
Hver uke	<input type="checkbox"/>	
Daglig eller nesten daglig	<input type="checkbox"/>	

80. Har du i det siste året før fengsling følt at lengselen etter narkotika/ medikamenter har vært så sterk at du ikke kunne stå imot?	
Aldri	<input type="checkbox"/>
Sjeldnere enn en gang i måneden	<input type="checkbox"/>
Hver måned	<input type="checkbox"/>
Hver uke	<input type="checkbox"/>
Daglig eller nesten daglig	<input type="checkbox"/>
81. Har det hendt at du i løpet av siste år før fengsling ikke kunne slutte å ta narkotika/ medikamenter når du først hadde begynt?	
Aldri	<input type="checkbox"/>
Sjeldnere enn en gang i måneden	<input type="checkbox"/>
Hver måned	<input type="checkbox"/>
Hver uke	<input type="checkbox"/>
Daglig eller nesten daglig	<input type="checkbox"/>
82. Hvor ofte i løpet av siste år før fengsling har du tatt narkotika/ medikamenter og så latt være å gjøre noe som du burde ha gjort?	
Aldri	<input type="checkbox"/>
Sjeldnere enn en gang i måneden	<input type="checkbox"/>
Hver måned	<input type="checkbox"/>
Hver uke	<input type="checkbox"/>
Daglig eller nesten daglig	<input type="checkbox"/>
83. Hvor ofte i løpet av siste år før fengsling har du hatt behov for å starte dagen med å ta narkotika/ medikamenter etter et stort inntak dagen før?	
Aldri	<input type="checkbox"/>
Sjeldnere enn en gang i måneden	<input type="checkbox"/>
Hver måned	<input type="checkbox"/>
Hver uke	<input type="checkbox"/>
Daglig eller nesten daglig	<input type="checkbox"/>
84. Hvor ofte i løpet av siste år før fengsling har du hatt skyldfølelse eller dårlig samvittighet fordi du har brukt narkotika/ medikamenter?	
Aldri	<input type="checkbox"/>
Sjeldnere enn en gang i måneden	<input type="checkbox"/>
Hver måned	<input type="checkbox"/>
Hver uke	<input type="checkbox"/>
Daglig eller nesten daglig	<input type="checkbox"/>
85. Har du eller noen andre blitt skadet (fysisk eller psykisk) på grunn av din bruk av narkotika/ medikamenter?	
Nei	<input type="checkbox"/>
Ja, men ikke i løpet av siste år før fengsling	<input type="checkbox"/>
Ja, i løpet av siste år før fengsling	<input type="checkbox"/>
86. Har en slektning eller venn, lege eller sykepleier, eller noen andre vært urolige for din bruk av rusmidler eller sagt til deg at du burde slutte med narkotika/ medikamenter?	
Nei	<input type="checkbox"/>
Ja, men ikke i løpet av siste år før fengsling	<input type="checkbox"/>
Ja, i løpet av det siste året før fengsling	<input type="checkbox"/>

87. Hvor ofte brukte du narkotika/ medikamenter siste halve året før soning?

	Ikke brukt	1-3 ganger pr mnd	1-3 ganger pr uke	4 ganger per uke eller mer
Cannabis (hasj/ marihuana)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Syntetiske cannabinoider (Spice etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heroin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(Met)Amfetamin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kokain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ecstasy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LSD, PCP, Ketamin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GHB	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sniffestoffer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Anabole steroider	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Metadon, Subutex, Suboxone (ikke resept)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dolcontin, Paralgin Forte, Nobligan, Oxycontin) (ikke resept)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Valium, Vival, Stesolid, Sobril, Alopam (ikke resept)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rohypnol, Flunipam, Rivotril, Xanor, Apodorm, Mogadon (ikke resept)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ritalin, Concerta etc. (ikke resept)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Andre stoffer/medikamenter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

88. Brukte du sprøyte siste halvår før soning?

Brukte sprøyte daglig / nesten daglig	<input type="checkbox"/>
Brukte det 1-3 ganger i uken	<input type="checkbox"/>
Brukte 1-3 ganger per måned	<input type="checkbox"/>
Ikke brukt siste 6 måneder	<input type="checkbox"/>
Aldri brukt sprøyte	<input type="checkbox"/>

89. Hvilken måte brukte du narkotika/medikamenter på siste halvår før soning?

	Ikke brukt	Munn/nese	Røyke	Sprøyte
Cannabis (hasj/ marihuana)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Syntetiske cannabinoider (Spice etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heroin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(Met)Amfetamin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kokain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ecstasy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LSD, PCP, Ketamin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

GHB	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sniffestoffer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Anabole steroider	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Metadon, Subutex, Suboxone (ikke resept)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dolcontin, Paralgin Forte, Nobligan, Oxycontin) (ikke resept)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Valium, Vival, Stesolid, Sobril, Alopam (ikke resept)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rohypnol, Flunipam, Rivotril, Xanor, Apodorm, Mogadon (ikke resept)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ritalin, Concerta etc. (ikke resept)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Andre stoffer/medikamenter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Om bruk av narkotika og medikamenter i fengsel

90. Har du noen gang brukt narkotika eller medikamenter ulovlig i fengsel?

Flere enn 3 ganger	<input type="checkbox"/>	1-2 ganger	<input type="checkbox"/>
Nei	<input type="checkbox"/>	Har ikke vært fengslet før	<input type="checkbox"/>

91. Har du hatt perioder med daglig eller nesten daglig bruk av narkotika/ medikamenter under tidligere fengselsopphold?

Ja	<input type="checkbox"/>	Nei	<input type="checkbox"/>	Har ikke vært fengslet før	<input type="checkbox"/>
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92. Hva slags type narkotika/ medikamenter har du brukt under tidligere fengselsopphold?

Ikke aktuelt	<input type="checkbox"/>
Cannabis (hasj/ marihuana)	<input type="checkbox"/>
Syntetiske cannabinoider (Spice etc.)	<input type="checkbox"/>
Heroin	<input type="checkbox"/>
(Met)Amfetamin	<input type="checkbox"/>
Kokain	<input type="checkbox"/>
Ecstasy	<input type="checkbox"/>
LSD, PCP, Ketamin	<input type="checkbox"/>
GHB	<input type="checkbox"/>
Sniffestoffer	<input type="checkbox"/>
Anabole steroider	<input type="checkbox"/>
Metadon, Subutex, Suboxone (ikke resept)	<input type="checkbox"/>
Dolcontin, Paralgin Forte, Nobligan, Oxycontin) (ikke resept)	<input type="checkbox"/>
Valium, Vival, Stesolid, Sobril, Alopam (ikke resept)	<input type="checkbox"/>
Rohypnol, Flunipam, Rivotril, Xanor, Apodorm, Mogadon (ikke resept)	<input type="checkbox"/>
Ritalin, Concerta etc. (ikke resept)	<input type="checkbox"/>
Andre stoffer	<input type="checkbox"/>
Flere typer stoffer hver dag	<input type="checkbox"/>

93. Hvilken funksjon har ditt rusbruk i fengsel?			
Avhengighet <input type="checkbox"/>		Spenning <input type="checkbox"/>	
Kjedsomhet <input type="checkbox"/>		Ikke aktuelt <input type="checkbox"/>	
94. Har du noen gang brukt sprøyte i fengsel?			
Ja, under tidligere fengselsopphold		<input type="checkbox"/>	
Ja, under dette fengselsoppholdet		<input type="checkbox"/>	
Nei		<input type="checkbox"/>	
95. Har du i forbindelse med fengselsopphold brukt en sprøyte som andre har brukt før deg?			
Ja <input type="checkbox"/>		Nei <input type="checkbox"/>	Vet ikke <input type="checkbox"/>
96. Har du brukt narkotika/ medikamenter under ditt nåværende fengselsopphold?			
Flere enn 3 ganger <input type="checkbox"/>		1 gang	<input type="checkbox"/>
2-3 ganger <input type="checkbox"/>		Nei	<input type="checkbox"/>
97. Har du under nåværende fengselsopphold og i løpet av siste 30 dager brukt narkotika/ medikamenter?			
Flere enn 3 ganger <input type="checkbox"/>		1 gang	<input type="checkbox"/>
2-3 ganger <input type="checkbox"/>		Nei	<input type="checkbox"/>
98. Hva slags type narkotika/ medikamenter har du brukt under nåværende fengselsopphold?			
Ikke aktuelt <input type="checkbox"/>			
Cannabis (hasj/marihuana) <input type="checkbox"/>			
Syntetisk cannabis (Spice, JWH etc) <input type="checkbox"/>			
Heroin <input type="checkbox"/>			
(Met)Amfetamin <input type="checkbox"/>			
Kokain <input type="checkbox"/>			
Ecstasy <input type="checkbox"/>			
LSD, PCP, Ketamin <input type="checkbox"/>			
GHB <input type="checkbox"/>			
Sniffestoffer <input type="checkbox"/>			
Anabole steroider <input type="checkbox"/>			
Metadon, Subutex, Suboxone (ikke resept) <input type="checkbox"/>			
Dolcontin, Paralgin Forte, Nobligan, Oxycontin (ikke resept) <input type="checkbox"/>			
Valium, Vival, Stesolid, Sobril, Alopam (ikke resept) <input type="checkbox"/>			
Rohypnol, Flunipam, Rivotril, Xanor, Apodorm, Mogadon (ikke resept) <input type="checkbox"/>			
Ritalin, Concerta etc. (ikke resept) <input type="checkbox"/>			
Andre stoffer <input type="checkbox"/>			
Flere typer stoffer hver dag <input type="checkbox"/>			
Utsatthet for kriminalitet			
99. Har du blitt utsatt for følgende?			
	Nei	Ja	Antall ganger
Frastjålet personlige ting som penger, mobiltelefon eller annet?	<input type="checkbox"/>	<input type="checkbox"/>	_____
Utsatt for vold som førte til synlige merker eller skader på kroppen?	<input type="checkbox"/>	<input type="checkbox"/>	_____

Utsatt for vold som ikke førte til synlige merker på kroppen?	<input type="checkbox"/>	<input type="checkbox"/>	_____
Utsatt for seksuelt motivert vold, overgrep eller forsøk på dette?	<input type="checkbox"/>	<input type="checkbox"/>	_____
Om tidligere kriminalitet			
100. Har du vært domfelt tidligere?			
Ja <input type="checkbox"/>			
Nei <input type="checkbox"/>		Hvis nei – gå til spørsmål 105	
101. Hvor mange tidligere dommer har du?			
_____ domfellelser			
102. Hvor gammel var du da du fikk din første dom?			
_____ år			
103. Hvor gammel var du første gang du satt i fengsel?			
_____ år			
104. Hvor lang tid av ditt liv totalt har du vært fengslet? Mindre enn 1 mnd, skriv 0			
_____ år _____ mnd			
105. Skriv antall ganger du har gjort følgende lovbrudd og hvor gammel du var første gang.			
	Antall ganger	Alder første gang	
Mindre alvorlig vinningskriminalitet	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grov vinningskriminalitet	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bruk og besittelse av narkotika	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Smugling/ omsetning av narkotika	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Økonomisk kriminalitet	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kjøring i beruset tilstand	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Voldskriminalitet	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drap	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seksualkriminalitet	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Annen kriminalitet	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ikke aktuelt	<input type="checkbox"/>		
106. Var du påvirket av alkohol eller narkotika/medikamenter (eller begge) da du begikk det lovbruddet som du nå soner for?			
Alkohol	<input type="checkbox"/>	Narkotika	<input type="checkbox"/>
Begge deler	<input type="checkbox"/>	Nei	<input type="checkbox"/>
107. Har du vært påvirket av alkohol eller narkotika/medikamenter (eller begge) i forbindelse med tidligere lovbrudd?			
Alkohol	<input type="checkbox"/>	Narkotika	<input type="checkbox"/>
Begge deler	<input type="checkbox"/>	Ikke aktuelt	<input type="checkbox"/>

108. De neste fem spørsmålene handler om uvanlige opplevelser noen mennesker kan ha.

De kan ha skjedd mens du var ruspåvirket eller mens du var rusfri.

Har du noen gang.....	Nei	Ja, kun under ruspåvirkning	Ja, kun mens rusfri	Ja, både under ruspåvirkning og uten rus	Hvis under rus, skriv hvilke rusmidler
1. opplevd synshallusinasjoner, altså at du har sett ting som ingen andre kunne se?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. opplevd hørselshallusinasjoner, altså at du har hørt ting som ingen andre kunne høre?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. hatt en periode hvor du fant skjulte betydninger i ting, syntes du mottok beskjeder fra tv eller radio, eller syntes folk snakket om deg?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. hatt en periode hvor du tenkte at folk fulgte etter deg, spionerte på deg, eller var ute etter deg?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Har du noen gang vært innlagt for slike plager	Ja <input type="checkbox"/>		Nei <input type="checkbox"/>		

109. Hva er **positivt for deg ved å bruke rusmidler?**

	Slett ikke	Litt	En del	Mye	Svært mye
1. Sover bedre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Blir avspent og avslappet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Blir glad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Blir sterk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Kjenner meg normal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Blir kreativ (får mange ideer)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Blir aktiv (rydder, vasker opp, vasker bilen)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Elsker alle og hele verden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Får økt selvtillit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Får mindre vondt i ryggen, nakken, hodet osv	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Får en følelse av at alt ordner seg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Livet uten rusmidler er kjedelig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Jeg kan styre følelser som sinne, angst og depresjon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Med rusmidler kan jeg fungere sosialt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Med rusmidler føler jeg at jeg er med i gruppen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Jeg får bedre kontakt med andre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Jeg får mer ut av mitt liv	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

110. Hva er **negativt for deg ved å bruke rusmidler?**

	Slett ikke	Litt	En del	Mye	Svært mye
1. Får angst	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Får selvmordstanker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Trekker meg unna andre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Får hodepine eller føler meg dårlig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Slett ikke	Litt	En del	Mye	Svært mye
5. Får dårligere kontakt med venner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Får vanskeligheter med å konsentrere meg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Lysten på sex blir redusert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Forstyrrer økonomien	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Blir passiv	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Får dårligere helse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Blir hensynsløs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Forstyrrer familielivet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Ser alt som et kaos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
111. Hva er negativt for deg ved å bruke rusmidler?					
	Aldri	Sjeldnere enn 1 gang i mnd	Hver måned	Hver uke	Daglig eller nesten daglig
1. Jeg har i løpet av de siste årene hatt problemer på jobb, skole eller hjemme på grunn av rusmidler	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1. Jeg har i løpet av det siste året søkt lege eller sykehusbehandling eller hatt medisinske problemer (f.eks. hukommelsestap eller hepatitt) på grunn av rusmidler	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Jeg har i løpet av det siste året havnet i bråk eller brukt vold når jeg har vært påvirket av rusmidler	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Jeg har i løpet av det siste året hatt problemer med politiet på grunn av rusmidler	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
112. Hva tenker du om rusmidler?					
	Slett ikke	Litt	Svært mye		
1. Trives du med å ta rusmidler?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. Blir du lei av å bruke rusmidler?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
3. Har du i løpet av det siste året uroet deg på grunn av din rusmiddelbruk?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. Er du klar for å jobbe med å endre din rusmiddelbruk?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5. Synes du at du trenger profesjonell hjelp for å forandre din rusmiddelbruk?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
6. Tror du at du kan fa tak i riktig type profesjonell hjelp?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
7. Tror du at du kan bli hjulpet av profesjonell behandling for din rusmiddelbruk?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
8. Synes du at det er viktig å forandre din rusmiddelbruk?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
9. Tror du at det blir vanskelig å forandre din rusmiddelbruk?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. Har du allerede forandret din rusmiddelbruk og søker etter metoder som hjelper deg å unngå tilbakefall?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

113. Nedenfor finner du en del beskrivende utsagn som du skal ta stilling til. I hvilken grad du er enig i følgende:				
	Sterkt uenig	Delvis uenig	Delvis enig	Sterkt enig
1. Jeg prøver å få det slik jeg vil, til og med når det forårsaker problemer for andre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Andre bør holde seg borte fra meg når jeg er sint	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Jeg misliker vanskelige oppgaver som krever det ytterste av meg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Når jeg er sterkt uenig med noen er det som regel vanskelig for meg å snakke rolig om det uten å bli opprørt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Jeg bryr meg mer om hva som hender meg på kort sikt enn på lang sikt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Jeg får mest glede ut av å gjøre enkle ting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Jeg prøver først å ta hensyn til meg selv, selv om det skaper problemer for andre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Jeg prøver ofte å unngå oppgaver jeg vet kommer til å bli vanskelig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Jeg har ikke mye sympati / forståelse for andre når de har problemer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Jeg liker å teste meg selv nå og da ved å gjøre noe risikofyllt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Det virker som jeg har mer energi og et større behov for aktivitet enn de fleste på min alder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Jeg liker bedre å gå ut og gjøre ting fremfor å lese eller filosofere	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Jeg har en tendens til å slutte eller trekke meg unna når ting blir vanskelig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Jeg gjør ofte det som gir meg glede her og nå, til og med når dette går på bekostning av fremtidige mål	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Noen ganger tar jeg sjanser bare for moro skyld	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Når jeg er sint på noen har jeg ofte mer lyst til å gjøre dem vondt enn å snakke med dem om hvorfor jeg er sint	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Jeg gjør ofte ting på sparket uten å tenke gjennom mine handlinger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Jeg føler meg alltid bedre når jeg er på farten enn når jeg sitter og tenker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Hvis jeg gjør ting som opprører andre er det deres problem, ikke mitt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Av og til synes jeg det er spennende å gjøre ting som kan gi meg problemer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Fart og spenning er viktigere for meg enn trygghet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Hvis jeg kunne velge, ville jeg nesten alltid gjøre noe fysisk fremfor noe mentalt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Jeg bruker ikke mye tid og krefter på å tenke på fremtiden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Jeg mister raskt besinnelsen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Bruk av medisiner på resept: siste halvår før fengsling

114. Siste halvår før fengsling: fikk du noen medisiner på resept fra legen din, og hvor ofte tok du dem?

	Hver dag	Flere ganger per uke	2-3 ganger per mnd	Mindre enn 2-3 ganger pr mnd	Ikke brukt
1. Sovemedisin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Beroligende medisin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Medisin mot depresjon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Metadon, Subutex eller Suboxone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Smertestillende medisin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. ADHD medisin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Husker du navnet på medisinene?

Bruk av medisiner på resept: siste 30 dager

115. Siste 30 dager: fikk du noen medisiner på resept fra legen din, og hvor ofte tok du dem?

	Hver dag	Flere ganger per uke	2-3 ganger	Mindre enn 2-3 ganger	Ikke brukt
1. Sovemedisin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Beroligende medisin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Medisin mot depresjon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Metadon, Subutex eller Suboxone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Smertestillende medisin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. ADHD medisin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Husker du navnet på medisinene?

Bruk av medisiner på resept: i løpet av dette fengselsoppholdet

116. I løpet av dette fengselsoppholdet: fikk du noen medisiner på resept fra legen din, og hvor ofte tok du dem?

	Hver dag	Flere ganger per uke	2-3 ganger pr mnd	Mindre enn 2-3 ganger pr mnd	Ikke brukt
1. Sovemedisin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Beroligende medisin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Medisiner mot depresjon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Metadon, Subutex eller Suboxone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Smertestillende medisin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. ADHD medisin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Husker du navnet på medisinene?

Informasjon om studie av heroinblokkerende behandling

Samtidig med denne studien foregår en annen forskningsstudie som prøver ut 4 ukers blokade av heroinstoffer og sammenligner dette med daglig Suboxone i LAR. Studien er beskrevet på nettsiden www.naltrekson.no

Dersom du ønsker å bli kontaktet for mer informasjon om denne studien, sett kryss her

Vi takker for din deltakelse!

Har du spørsmål angående undersøkelsen, ta kontakt med Anne Bukten

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