Exploring the Impact of Criminal Justice Contact on Mortality Among Individuals Engaging in Drug Treatment in Scotland (2012–2015): A Retrospective Cohort Study Using Linked Administrative Data

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Abstract

Scotland continues to experience exceptionally high rates of drug-related harm, disproportionately affecting people facing multiple, overlapping health and social vulnerabilities. Many of these vulnerabilities are closely linked to contact with the criminal justice system (CJS), yet there remain persistent limitations in how this contact is recorded and understood in drug treatment and mortality data. This thesis addresses these gaps by analysing linked administrative data from the Scottish Drug Misuse Database (SDMD) and National Records of Scotland (NRS) mortality records. The study includes all individuals who entered Tier 3 or Tier 4 drug treatment services in Scotland between 2012 and 2015, with mortality follow-up to the end of 2020, comprising a cohort of 35,331 individuals and 4,008 deaths.

The thesis is guided by eight research questions and structured into three empirical chapters. Chapter 3 reconceptualises the measurement of CJS contact, showing that standard recording practices substantially underestimate the extent of justice involvement among the treatment population. Using a broader set of indicators, the analysis shows that over half (52.6%) of individuals in treatment had some form of CJS contact. Chapter 4 examines how demographic characteristics, substance use patterns, health status, and social conditions vary across three CJS categories: no contact, non-prison contact, and prison experience. Chapter 5 investigates mortality within the cohort and assesses the factors associated with death, including whether these associations differ across CJS groups.

The analysis combines descriptive statistics, chi-squared and Kruskal–Wallis tests, and regression modelling to examine associations between mortality and a range of demographic, health, substance use, and social variables. The findings show that individuals with different forms of CJS contact exhibit distinct profiles of risk and vulnerability, particularly among those with a history of imprisonment. However, after adjustment for these factors, CJS contact was not independently associated with mortality. Instead, mortality was associated with a combination of high-risk drug use (including injecting and benzodiazepine use), health-related need, and markers of social and structural disadvantage, such as unstable housing and limited employment engagement. These factors were unevenly distributed across CJS groups, shaping distinct risk profiles.

The findings suggest that mortality among people in drug treatment is best understood as the outcome of intersecting health, social, and structural conditions, rather than as a consequence of criminal justice contact in isolation. The thesis concludes that reducing preventable deaths in this population requires more integrated, public health-oriented responses that address these underlying determinants, alongside improvements in how justice involvement is recorded and understood in administrative data.

Table of contents

List of Tables and Figures

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In memory of my best friend, Tony McGowan—your loss has left a void no words can fill.

Author's Declaration

I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

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1 Introduction

1.1 Background and policy context

Scotland continues to have one of the highest rates of drug-related deaths (DRDs) in Europe, with harms disproportionately affecting individuals with longstanding substance use, poor health, and social disadvantage. Many of the same factors, such as housing instability, unemployment, and mental health difficulties, are also strongly associated with contact with the criminal justice system (CJS). Despite this overlap, there is limited research in Scotland examining how different forms of criminal justice (CJ) involvement relate to mortality risk among people who use drugs. This thesis addresses that gap by using linked administrative data to examine the prevalence of CJ contact among people in drug treatment, how their profiles differ by CJ experience, and the factors related to mortality. This thesis approaches these overlapping issues through a framework of structurally produced vulnerability, developed in Chapter 2 and used to guide both analysis and interpretation.

Over the past two decades, Scotland has experienced a steady rise in drug-related harms, culminating in one of the highest DRD rates in Europe (National Records of Scotland, 2021, 2022, see Chapter 2). A combination of long-term opioid dependence, polydrug use, and socioeconomic deprivation drives the crisis. These issues have placed growing pressure on health and justice services and prompted renewed efforts to reduce drug-related harm through public health and criminal justice interventions.

Although health and justice are devolved to the Scottish Government, the Misuse of Drugs Act 1971, the legal basis for U.K. drug policy and enforcement, remains reserved to the U.K. Parliament. This division has created ongoing tensions between Scotland's ambition to pursue a public health approach to drug use and Westminster's continued control over a criminal justice-focused response. While Scotland has adopted a harm reduction approach in policy terms, to some extent underpinning The Road to Recovery (Scottish Government, 2008) and even more so Rights, Respect and Recovery (Scottish Government, 2018), the power to implement interventions such as supervised drug consumption rooms or to decriminalise possession offences is constrained by current UK legislation. However, even in areas where Scotland does have devolved powers, such as policing, prosecution, and sentencing, responses to drug use among people already involved in the CJS often remain

punitive. For example, community sentencing options such as Drug Treatment and Testing Orders (DTTOs) and Community Payback Orders (CPOs) with treatment elements are often applied in ways that prioritise enforcement and compliance over therapeutic support, and many people with complex needs are still routed into custody despite being eligible for community-based treatment options (Scottish Government, 2023b).

Against this backdrop, there remains a lack of research in Scotland examining how structural factors, including contact with the CJS, shape exposure to drug-related harms and mortality patterns. While Scottish drug policies increasingly recognise the role of inequality, trauma, and systemic exclusion, it remains unclear how, where, and for whom these public health principles are implemented in practice. In particular, there is limited evidence that these approaches reach people already involved in the CJS. If a substantial proportion of individuals entering drug treatment have CJ experience (as this research examines), then knowing how this group is treated (or not) matters. It is therefore worth questioning whether current policies and practices are adequate to support them. These gaps in our understanding of this group and their outcomes, combined with the political and practical challenges of reform, shaped the direction of this PhD, alongside my own experiences navigating the same policy landscape. The findings presented in this thesis show that, once these factors are accounted for, criminal justice contact is not independently associated with mortality but instead reflects underlying patterns of structural vulnerability.

This thesis argues that mortality among people in drug treatment is shaped by overlapping health, substance use, and social vulnerabilities within an already high-risk population. While the literature often associates criminal justice contact with elevated risk, the findings presented here show that it is not independently associated with mortality once these factors are accounted for. Instead, criminal justice experience serves as a marker of clustered vulnerability, reflecting the concentration of health needs, high-risk drug use, and social disadvantage within this population. By reframing how CJS contact is defined, measured, and analysed, this study examines how these overlapping vulnerabilities relate to prevalence, demographic, health, and social profiles, as well as mortality outcomes.

1.2 Research Origins and Development

An account of how this project evolved is set out in the methodology (Chapter 3). However, some background is worth noting here, as the project I set out to do and the one I was then funded to do are very different from the research I ultimately carried out. My original goal as a PhD researcher was to explore whether a person's prison experience was linked to early mortality following release. I initially submitted an independent, self-funded proposal to the University of Glasgow for a small-scale qualitative project using interviews and focus groups with the family members of people who had died, alongside content analysis of documents such as prisoner records (PR2) and death records. My motivation for a qualitative approach stemmed from a desire to speak directly to those most affected by these deaths, such as the family members and friends left behind. I wanted to understand, in their own words, what they felt had gone wrong in the support their loved one received to reintegrate into the community, and how punitive approaches such as parole or other forms of post-release 'care' may have contributed to harm. This was not only a matter of interest but also of training and ability: my background was entirely in qualitative research, and I had no prior experience in quantitative methods.

As I developed my qualitative research proposal on prison deaths, I learned of a funded PhD opportunity using quantitative methods to explore similar issues. I knew the two academics developing that project, so I got in touch and was encouraged to apply. Although I was not trained in quantitative methods at the time, I felt the opportunity was too important to pass up. My genuine commitment to producing knowledge that could save lives must have convinced them, as I won the funding. However, the transition to working with linked administrative data and the skills required for quantitative analysis posed a steep, at times almost impossible, learning curve throughout my PhD.

At the time the funded *quantitative* research was being developed, Scotland was experiencing record levels of drug-related deaths (DRDs), the highest in Europe. International evidence had begun to highlight the increased mortality risk among At the time the funded quantitative research was being developed, Scotland was experiencing record levels of drug-related deaths (DRDs), the highest in Europe. International evidence had begun to highlight the increased mortality risk among people leaving prison (Philips et al., 2016; Borschmann et al., 2020; Willoughby et al., 2021). There had been no recent Scottish study on post-custodial mortality since Graham et al. (2015), which covered

deaths between 1996 and 2007 (see also Bird et al., 2015, which used the same data to measure opioid-related deaths soon after prison release in Scotland). I had intended to build on this qualitatively by exploring how prison experience and post-release support (or lack thereof) contributed to premature death. After securing the PhD scholarship for a linked datasets project, I began to see the merit and powerful potential of exploring my original questions using quantitative methods. people leaving prison (Philips *et al.*, 2016; Borschmann *et al.*, 2020; Willoughby *et al.*, 2021). There had been no recent Scottish study on post-custodial mortality since Graham et al. (2015), which covered deaths between 1996 and 2007 (see also Bird (*et al.*, 2015) which used the same data to measure opioid related deaths soon after prison release in Scotland). I had intended to build on this qualitatively by exploring how prison experience and post-release support (or lack thereof) contributed to premature death. After securing the PhD scholarship to do a linked datasets project, I began to see the merit and powerful potential of exploring my original questions using quantitative methods.

However, as I began this research, I experienced significant disruption due to the COVID-19 pandemic, which had a lasting impact on the SPS, the organisation responsible for holding the data necessary for my original project. I discuss this further in Chapter 3, but highlight it in the introduction to state at the outset that this was a project and a PhD that very nearly never happened. This period was one of considerable uncertainty and frustration; there were genuine moments where I doubted I would be able to complete a thesis at all. The final project reflects multiple changes in direction, delays, and attempts to reconfigure the research in response to circumstances beyond my control. Ultimately, I gained access to the data used in this study six months before my PhD completion date of October 2023 (later obtaining a 3-month Covid-19-related extension). This left me trying to complete a three-year PhD in less than a year, using secondary data that was far from research-ready, within a secure research environment with checks and balances that, whilst necessary, were time-consuming.

The thesis-pending period gave me some additional breathing space to work on the analysis and put the thesis together. Some chapters were written during periods when the research topic and data were evolving, and I comment on this in the thesis structure outline below.

1.3 Rationale for this Research

Though my interest was driven by a contemporary concern with the impact of drugs and prison on so many people and communities around me, problematic drug use in Scotland's most deprived communities can be traced back to at least the early 1980s. Since then, drug use has been persistently linked to health and social harms in what has been described as the 'Scottish effect'. This is the observation that mortality rates in Scotland are higher than in other parts of Western Europe, even after accounting for deprivation (Hanlon *et al.*, 2005; Parkinson *et al.*, 2018). Over recent decades, successive governments have introduced various policy responses, ranging from abstinence-focused recovery models to more recent harm reduction strategies. However, the harms caused by drugs are persistent, with Scotland recording year-on-year record DRDs across the 2010s and into the early 2020s (Barnsdale, Gordon and McAuley, 2015; European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), 2019; National Records of Scotland, 2021).

While Scotland's drug use problem, along with the resulting DRD crisis, has been receiving increased attention at the government policy level (Scottish Government, 2008, 2018, 2020, 2023b), relatively little is known about how these deaths are distributed across different groups of drug users, particularly those with CJ experience. Despite research from Scotland and the U.K. demonstrating that individuals with prison experience face increased risks of drug-related post-release mortality (Farrell and Marsden, 2008; Bird *et al.*, 2015; Graham *et al.*, 2015; Marsden *et al.*, 2017), there remains a critical gap in research specific to other types of CJS contact alongside those with prison experience. Most studies on DRDs in Scotland have focused on broader population trends rather than assessing how different kinds of CJ contact influence mortality risk.

While some studies acknowledge the link between justice involvement and DRDs (for example McPhee, Sheridan and O'Rawe, 2019), most Scottish research has not systematically examined how different types of CJ contact influence vulnerability and mortality risk. This narrow focus has left a blind spot in both research and policy, where the distinct needs of justice-experienced drug users are overlooked, with official figures of this group being surprisingly low (Public Health Scotland, 2022b). During the period this study covers (2012–2020), Scotland's formal policy narrative increasingly emphasised harm reduction, but punitive justice responses remained dominant in practice, as will be discussed in this thesis. Many people who use drugs are still routed into treatment through

the courts, community justice, or prison. Understanding how prevalent CJS contact is within the drug treatment population, and how that contact relates to mortality risk is essential to ensure these individuals are not left behind by public health reform.

This research addresses that gap by providing the first detailed, population-level analysis of mortality outcomes among drug treatment patients in Scotland, taking into account their CJS contact during the study period. By linking administrative datasets from the Scottish Drug Misuse Database (SDMD) and National Records of Scotland (NRS), the study demonstrates the unique potential of data linkage to generate new insights into drug-related mortality that would otherwise be impossible. While it does not capture all people who use drugs, it focuses on a cohort actively engaging with drug treatment services, offering valuable insight into a population often viewed as 'reachable', but whose justice system involvement may still pose overlooked risks. By identifying whether mortality differs between those with prison or community justice experience, and how these differences are explained by underlying health, drug use, and social factors, the study provides a stronger evidence base for potential collaboration to deliver a public health-centred approach to justice for each CJS-experienced group, particularly where mortality risk reflects broader patterns of structural vulnerability rather than justice contact alone.

1.4 Research Aims and Objectives

The overarching aim of this research is to examine the relationship between CJ contact and mortality risk among individuals engaged in drug treatment in Scotland. By linking administrative datasets, this study aims to determine whether mortality outcomes differ and, to what extent, these differences are explained by underlying demographic, health, and social factors among those who have experienced different forms of CJ involvement, ranging from no contact to non-prison involvement to imprisonment.

More specifically, this research has the following three broad objectives:

- To develop a more accurate estimate of the prevalence of CJ contact amongst those seeking treatment for problematic drug use.
- To assess and explore the demographic, drug-use, health and social profile of individuals seeking drug treatment, and how this differs by CJ status.

- To examine mortality outcomes amongst individuals seeking drug treatment, controlling for CJ status, as well as demographic, drug-use, health, and social factors.

By answering research questions focused on these objectives, the study aims to clarify how structural disadvantage and health inequality shape mortality outcomes among drug users, and how these factors intersect with justice involvement among drug users with CJ experience. It also aims to provide an evidence base for policy and practice by highlighting where targeted harm reduction, healthcare, and justice reforms may be most needed.

1.5 Research Questions

The following research questions guide this thesis:

1. Among people seeking drug treatment, how does the known prevalence of CJ experience vary depending on how criminal justice contact is defined and measured?

2. Does the demographic profile (age, sex and health board) of people seeking drug treatment vary by the type of CJ contact they have had?

3. Does the drug-taking profile of people seeking drug treatment vary by the type of CJ contact they have had?

4. Does the health profile (mental and physical) of people seeking drug treatment vary by the type of CJ contact they have had?

5. Does the social profile (such as employment status and housing instability) of people seeking drug treatment vary by the type of CJ contact they have had?

6. Is the mortality rate higher among CJ-experienced drug treatment patients than among those with no CJ contact?

7. What demographic, drug-use, health and social factors are associated with mortality amongst people seeking drug treatment?

8. What demographic, drug-use, health and social factors are most predictive of mortality rate by CJ status amongst people seeking drug treatment?

This set of questions may seem long, but they are interconnected, and all speak to the three aims set out above. The findings in each chapter also overlap and are interwoven, but to guide the reader, the questions are explored as follows: Chapter 3 especially addresses RQ1; Chapter 4 is the main space where RQs 2-5 are explored; and Chapter 5 focuses on RQs 6-8.

1.6 Methodological Overview

This study uses a retrospective cohort design, linking administrative datasets to examine how CJ contact intersects with health, drug use, and social vulnerabilities to influence mortality. The analysis follows a national cohort of drug treatment patients who entered Tier 3 or Tier 4 services between 2012 and 2015, with follow-up data through March 2020 (Chapter 3 provides further details).

There are several advantages to using this type of study design to research the mortality of drug treatment patients with criminal justice experience. Using routinely collected administrative data provides access to a large, nationally representative sample of individuals (n = 35,331) whose health, social, and mortality outcomes can be tracked over time. This is particularly valuable for studying marginalised populations that may be difficult to reach through traditional surveys or interviews. This type of design also allows us to look across different areas of administrative data, from self-report data to routinely collected organisation data, such as a patient's health board or a person's employment, to capture data across time. Relevant to RQ1, this allows us to fill gaps in knowledge about who amongst this cohort has experiences with the criminal justice system and how we can obtain a more accurate account of these and other experiences.

Because the SDMD captures all individuals entering publicly funded drug treatment, the findings in this thesis are representative of the Scottish drug treatment population. This allows for policy-relevant conclusions regarding mortality and criminal justice contact.

The research draws on two separate data sources:

- Scottish Drug Misuse Database (SDMD): A national dataset capturing demographic, social, health, and drug use information.
- Collected during initial and follow-up assessments for people entering community or residential drug treatment in Scotland.
- These data include indicators of criminal justice contact such as prison status, referral route, and self-reported legal involvement.
- National Records of Scotland (NRS) Mortality Data: A comprehensive dataset recording all registered deaths in Scotland.
- Includes cause of death, coded using ICD-10 classifications.
- Also includes two contributory factors, also using ICD-10 classifications.
- Linked to the SDMD cohort to identify individuals who died during the study.

After linking these datasets, a binomial logistic regression model was developed with a binary outcome variable:

- Died during the study period
- Still alive until the end of the study period
- This analysis estimates the likelihood of individuals falling into either mortality category whilst accounting for demographic, health, social, and substance use variables.

This approach enables the study to examine how a range of vulnerabilities experienced by drug treatment patients (including demographic, drug-use, health vulnerabilities, and social conditions) contributed to mortality risk across the cohort, and how these patterns vary in relation to CJ contact.

1.7 Structure of the Thesis

Each chapter builds on the previous one, progressing from contextual background and theoretical foundations to the analysis and discussion of findings. Taken together, the chapters systematically examine how CJ contact relates to mortality risk within a wider

context of health, substance use, and social vulnerability among individuals in drug treatment in Scotland.

This chapter does two things. First, it sets the scene by situating the research within the broader context of Scotland's drug crisis. Second, it considers the existing literature relevant to the study to clarify the gaps in current knowledge. The literature reviewed focuses on Scotland and its specific dynamics regarding drugs, drawing on academic scholarship and key policy documents. A notable absence in the existing research, though one that is relevant in the Scottish context, is a deeper understanding of how contact with the criminal justice system (including imprisonment) impacts health and mortality among people who use drugs. While there is some research on this intersection, significant gaps remain, particularly in empirical work focused on Scotland.

The chapter gives substantial attention to the types of drugs implicated in drug-related deaths in Scotland, as a way of clarifying the distinctive conditions contributing to the country's Europe-leading rates of mortality. This framing is essential to understanding the urgency and specificity of the problem the thesis seeks to address.

This was one of the chapters developed during the earlier stages of the project, and it includes some topics that were initially central to the broader research proposal but are now less directly connected to the final focus on the relationship between drug use, criminal justice experience, and mortality. I have revised the chapter to align more closely with the current research questions, and some material from the original literature review remains. This is partly due to time constraints but also reflects a continued belief in the importance of recognising wider social determinants, such as deprivation, which remain crucial to understanding the context in which both drug use and criminal justice involvement occur.

Chapter 3 presents the study's methodology and further background on how the study design evolved. It provides detailed information on the datasets used and explains the rationale for using linked administrative data to address the research questions. The chapter outlines the overall research design, including the retrospective cohort approach, and describes the development and approval processes that supported the project.

It walks through the process of data linkage and variable construction, with a particular focus on defining criminal justice (CJ) contact and mortality outcomes. It also discusses the steps for preparing a research-ready dataset, including challenges encountered during data wrangling and cleaning. An extensive ethical framework governs the use of administrative data in this study, and the chapter reflects in depth on key ethical and governance considerations.

Finally, the chapter introduces and explains the central outcome variable, mortality, and presents a descriptive analysis exploring the prevalence of CJ contact among people entering drug treatment. This analysis addresses Research Question 1, demonstrating how different operational definitions of CJ contact produce different estimates and setting the stage for the more detailed analyses in Chapters 4 and 5.

Chapters 4 and 5 contain the bulk of the substantive data analysis. Chapter 4 explores Research Questions 2 to 5, examining how drug-taking profiles and criminal justice contact relate to each other using various analytical tests and techniques. Crucial to the research are the qualities of vulnerability, which are analysed in the chapter. There are multiple health vulnerabilities among CJ-experienced drug users, including drug-related physical and mental health conditions, self-reported drug use, and other health-related variables such as history of injecting, as well as social vulnerabilities such as employment engagement and housing stability (Research Questions 3, 4 and 5). In addition, the chapter examines how the demographic profile of people in treatment, including age, sex, and health board, varies by CJ contact (Research Question 2).

Chapter 5 moves on to the central concern with mortality. It analyses mortality in relation to criminal justice experience alongside demographic, health, and social vulnerability factors (Research Question 6). It identifies demographic, drug-use, health, and social factors associated with mortality, examining these alongside criminal justice experience within a multivariable framework (Research Question 7). An original contribution of this study is to consider specifically non-prison experiences of criminal justice (e.g. probation, other community-based sanctions) about mortality in those accessing drug treatment. It also adds to the larger body of knowledge about prison experience and mortality (in drug users), but with the specificity of the Scottish context.

This chapter focuses on statistical modelling of mortality risk using binomial regression, testing whether different variables make people who use drugs in the dataset more or less likely to experience the outcome of interest during the study period, which, in this case, is mortality. It addresses:

- Differences in mortality in relation to CJ contact, and how these are explained by underlying health, drug use, and social vulnerabilities (Research Question 6)
- The interaction of health, drug use, and social vulnerabilities shapes the mortality outcomes of people in each of the CJ categories (Research Question 8).
- Key statistical findings and significance levels, including odds ratios (ORs) comparing mortality risk whilst controlling for various demographic, health and justice experiences.

Chapter 6 provides a thematic discussion and overall conclusion, drawing together the main findings from Chapters 4 and 5 to consider what they reveal about the relationship between CJ contact and mortality among people in drug treatment. Rather than treating justice involvement as a uniform risk factor, the chapter explores how different forms of CJ contact intersect with health, drug use, and structural vulnerabilities, and how these combinations shape mortality outcomes.

The chapter also highlights how patterns of risk are unevenly distributed, with prison-experienced individuals facing the highest levels of disadvantage. It considers missed opportunities for earlier intervention, the limits of current service models, and the implications for the design and delivery of support. Drawing on the thesis findings, it outlines five policy recommendations, emphasising the need for more accurate identification of justice-involved individuals, improved continuity of care, and a more holistic understanding of risk.

As the final chapter, it also revisits the original research questions, summarises the thesis's original contribution to knowledge, and reflects on key methodological and data limitations. It closes by calling for a more structurally informed public health response to drug-related deaths, one that recognises how systems of exclusion shape both justice involvement and health outcomes.

2 Chapter 2 Vulnerability and the dynamics of the drug crisis in Scotland

2.1 Introduction

This chapter lays the conceptual and empirical groundwork for the analysis in this thesis. It examines a key issue: how to understand the link between drug use, criminal justice contact, and mortality beyond individual causes, by considering broader social, institutional, and policy factors. To do this, the chapter uses vulnerability as an analytical framework. Vulnerability here is viewed not as an inherent trait of individuals but as something shaped, distributed, and worsened by structural conditions, institutional setups, and policy choices. This perspective is crucial for the entire thesis, influencing how variables are defined in the empirical analysis and guiding the interpretation of findings in subsequent chapters.

The chapter is divided into two sections. The first offers a theoretical overview of vulnerability tailored to the objectives of this research. Incorporating ideas from Wacquant, Houchin, Rhodes, Western, and Nixon, it places vulnerability within intersecting systems of welfare, criminal justice, and public health. Wacquant's analysis of "workfare" and "prisonfare" provides a framework to understand how modern states control marginalised groups through a blend of social support and penal measures. Houchin's research shows how these mechanisms operate in Scotland, especially through the concentration of imprisonment in poorer communities. Western's notion of "structural frailty" explains how disadvantage accumulates after contact with the criminal justice system, while Rhodes' "risk environment" shifts the focus from individual choices to the social and policy environments that generate harm. Nixon's idea of "slow violence" emphasises the gradual, long-term nature of harm caused by repeated institutional disruptions and persistent inequality.

Taken together, these perspectives allow vulnerability to be understood as the cumulative outcome of structurally produced conditions rather than isolated risk factors. This theoretical framing is not an abstract exercise but directly informs the thesis's empirical strategy. In this study, vulnerability is operationalised through measurable indicators available within administrative data, including housing instability, employment status, health service contact, patterns of drug use, and criminal justice experience. These are not

treated as background characteristics, but as observable expressions of underlying structural processes. Establishing this conceptual foundation at the outset is therefore critical for interpreting the quantitative analysis that follows in later chapters.

The second part of the chapter situates this conceptual framework within the Scottish context. It provides a detailed account of the scale and nature of problem drug use in Scotland, including patterns of hospital admissions, drug-related deaths, and demographic distributions of harm. Particular attention is given to the period 2012–2020, which corresponds to the study period of this research. This section also examines the role of criminal justice involvement in shaping health and social outcomes, drawing together existing evidence on imprisonment, community sanctions, health inequalities, and post-release mortality. While there is a substantial body of research on drug-related harm and on prison-related mortality in Scotland, there remains a significant gap in understanding how different forms of criminal justice contact, beyond imprisonment alone, relate to mortality risk among people in drug treatment. Identifying and addressing this gap is a key motivation for the present study.

This chapter analyses Scotland's policy response to problematic drug use, tracing the shift from earlier criminal justice-focused approaches to more recent public health and harm reduction strategies. It reviews policies such as The Road to Recovery (2008) and Rights, Respect and Recovery (2018), alongside ongoing limitations imposed by UK-wide drug laws. Although these changes indicate a move towards health-centred policies, the chapter emphasises ongoing conflicts between public health objectives and punitive practices, especially within criminal justice systems. These conflicts are crucial for understanding how vulnerability varies across different groups and institutional settings.

This chapter integrates theoretical insights, empirical data, and policy considerations to set the stage for the thesis and highlight its unique contribution. It argues that drug-related harm in Scotland cannot be fully understood through individual behaviour or substance use alone but must be viewed within larger systems of inequality, governance, and institutional interactions. The chapter wraps up by emphasising the need for empirical research to examine how these intersecting factors influence mortality risks, particularly among those with varying experiences of criminal justice contact. This lays the groundwork for the data and methodology discussed in the next chapter, as well as the subsequent analysis of mortality outcomes.

2.2 Part one - Theorising vulnerability: drug use, inequality and criminal justice

2.2.1 Wacquant and Houchin, punishing the poor in Scotland

Loïc Wacquant's account of the punitive regulation of poverty in Punishing the Poor (2009) offers a framework for understanding how contemporary states manage social insecurity through the joint transformation of welfare and penal policy. Challenging the idea that neoliberalism simply involves a retreat of the state, Wacquant claims that the state has been restructured, that its social functions are now more conditional and disciplinary, and that its penal aspect has grown. He conceptualises this through the ideas of "workfare" and "prisonfare", where workfare represents the welfare regimes in which assistance is increasingly tied to behavioural conditions and labour-market compliance. Prisonfare, on the other hand, refers to the intensified utilisation of policing, supervision and incarceration, and their administrative extensions, within marginalised neighbourhoods. Together, according to Wacquant, these concepts establish a dual mechanism by which the state regulates poverty.

Central to this reorganisation is responsibilisation, whereby structural risk is displaced onto individuals who are required to demonstrate employability, compliance and self-management under conditions shaped by insecurity and inequality. In this reconfiguration, welfare and criminal justice are no longer analytically separable policy domains but interconnected mechanisms through which marginalised populations are monitored, sanctioned and contained. This framework provides a lens through which the Scottish case can be examined, allowing the subsequent analysis in this thesis to trace how workfare, prisonfare and responsibilisation operate in practice and how they contribute to the production of vulnerability observable in administrative data.

The dynamics Wacquant describes, the convergence of workfare and prisonfare, are evident across Scottish social institutions that are supposed to assist people. For example, welfare agencies, housing services, social work, and parts of the NHS now often work alongside criminal justice agencies effectively producing a 'convergence' of welfare and justice in a punitive discourse to regulate and discipline individuals under their care (Munro, Mooney and Croall 2010: 269). In many local authorities, these services are housed together in civic centres, meaning that people seeking help with benefits, housing, or social care are often in the same place where they attend court, meet probation officers,

or are processed by police. Additionally, Health and Social Care Partnerships further merge therapeutic and punitive roles where clinical assessments in addiction services routinely share information about drug treatment plans and relapses with CJSW personnel for individuals on parole or Drug Treatment and Testing Orders (DTTOs). These then inform breach proceedings or parole decisions, which can result in a person being sent to prison, being resentenced, or being given additional community sanctions or more intensive supervision. The sharing of information between health services and CJSW in this respect erodes the boundary between care and control. Similar connections have been drawn in the case of imprisoned women, where Scotland's new model of 'community custody units' or CCUs have been described as 'therapunitive' (Armstrong and Malloch 2024).

The way remand is used in Scotland also demonstrates how bureaucratic systems tend to amplify vulnerabilities among those caught up in the CJS. Even short periods of custody can lead to automatic benefit withdrawals and housing loss, illustrating how prisonfare feeds back into workfare, intensifying conditionality and instability. Individuals must then navigate complex systems that require administrative skills, digital literacy, and emotional resilience to deal with this setback. According to Wacquant, these are not accidental byproducts but typical aspects of governance mirroring his idea that the welfare state has not vanished but has been restructured. Instead of shielding citizens from job insecurity and social instability, it increasingly disciplines those pushed to the margins.

While Wacquant writes from a United States perspective known to be centred around racialised poverty, the mechanisms he discusses are also evident in Scotland, particularly through issues like deprivation, addiction, chronic illness, and long-term exclusion from stable work. Houchin's (2005) research on Scottish imprisonment shows that it is mainly concentrated in the most deprived areas, both geographically and socially. Imprisonment here is less about responding to higher rates of serious crime, given that imprisoned populations have been growing at the same time as crime rates are falling. Mooney, Croall and Munro (2010) have argued that prisons and criminal justice generally are more about managing populations already affected by poverty, trauma, addiction, and poor health. Scottish Government data also confirm this pattern, as more than 35% of prison arrivals into Scottish prisons annually come from Scotland's 10% most deprived SIMD datazones (Scottish Government 2025). Together, Wacquant and Houchin, along with the more recent government report, reveal similar dynamics across different countries: both are using

prisons to control marginalised groups whose lives have been significantly impacted by social neglect.

A key aspect of this governance approach involves cutting welfare benefits while emphasising individual responsibility. Wacquant suggests that the growth of penal measures is driven more by reductions in social safety nets and moral judgments about poverty than by rising crime rates. In this sense, structural issues are often attributed to personal shortcomings, which is also evident in Scotland, where the quality of legal aid has significantly declined, leading to “legal aid deserts" (Equalities, Human Rights and Civil Committee, 2025; King, 2025). In these areas, individuals facing eviction, debt, domestic violence, or criminal charges find it increasingly difficult to access legal representation. The most vulnerable are those already experiencing hardship and instability, and as legal defence becomes less accessible, the risk of deeper involvement with the CJS rises.

Due to the retraction of health and social care funding in Scotland, mental health infrastructure has deteriorated under sustained financial strain (MacPherson 2026), with Scottish Health Boards consistently failing to meet their 10% spending target between 2011/12 and 2022/23 (Royal College of Psychiatrists 2025). As provision contracts, police increasingly act as first responders to psychiatric crises (Scottish Police Authority, no date). In 2024, Police Scotland reported training an additional 1,700 officers in Distress Brief Intervention, and by 2025, described the scale of mental health call-outs as unsustainable (BBC 2025). Anecdotal reports of individuals being criminally charged to secure a “place of safety” illustrate how the need for healthcare is reframed within a penal logic. At the same time, long-term support is increasingly delivered by underfunded third-sector organisations with uneven regional coverage.

This does not represent a simple absence of welfare but a reconfiguration of responsibility. Individuals experiencing acute vulnerability must demonstrate stability, compliance, and administrative competence to access support, even when instability is the very reason they seek help. Navigational failure within complex bureaucratic systems is attributed to personal unwillingness rather than systemic constraints. In this sense, vulnerability becomes individualised, precisely as Wacquant’s concept of responsibilisation suggests, because structural risk is displaced onto those least equipped to manage it.

In this context, welfare and punishment do not operate as separate systems but as overlapping (Wacquant 2009) or convergent Munro, Mooney and Croall 2010) regulatory mechanisms. Drug treatment, housing provision and community supervision are embedded within the same framework of monitoring and sanction, where clinical disclosures, missed appointments, or relapse can carry serious consequences all the way up to imprisonment. Support is therefore conditional upon the stability undermined by repeated remands, recalls, and short custodial episodes, which interrupt continuity in housing, employment, and treatment, compounding instability and vulnerability. These processes illustrate administrative punishment: harm delivered through routine bureaucratic practices that, in isolation, rarely appear punitive, yet cumulatively intensify vulnerability.

Vulnerability, as argued by Wacquant, is something that social and penal arrangements worsen, or even create. Hence, vulnerability is a key lens for this research, but is employed in ways that both complement and contrast with other studies of the vulnerability of criminal justice-involved people in Scotland. Gormley (2017) explored intersectional oppressions that people with learning disabilities experience, focusing on how the label of vulnerable, once assigned to them in penal settings, worsened their treatment. Cornish's (2022) study also analysed prisoners labelled vulnerable (for reasons not limited to disability), showing that this was too static a concept, as vulnerability in prison environments varies even within the same person, depending on where they are in prison or their sentence. These are valuable and nuanced analyses which problematise the notion of vulnerability. In the present project, and in the literature drawn on here, the focus is on how social structures, both outside and beyond criminal justice, increase people's risk of harm, including health outcomes and mortality. Hence, I recognise that a discourse of vulnerability within criminal justice can be weaponised and should be approached cautiously but stick with this term as a valid way of conceptualising differential exposure to risk. Like both Gormley and Cornish, this research recognises that criminal justice settings and actions play a role in this, combining with other forces of inequality.

As Houchin demonstrated two decades ago, imprisonment in Scotland is geographically and socially concentrated in the most deprived communities, a pattern that contemporary data confirm persists (Houchin 2005, Scottish Government 2025). When read alongside Wacquant's account of penal expansion, this concentration suggests that prison functions less as a proportionate response to serious offending and more as a mechanism for governing populations already positioned at the sharpest edge of social inequality. Those

most exposed to custody are disproportionately from deprived communities, conditions that both precede and are intensified by CJ contact (e.g. Gormley 2017, Houchin 2005). While much of the Scottish literature captures structural disadvantage through area-based measures such as SIMD or the Carstairs index (Carstairs and Morris 1992), deprivation alone does not fully account for the excess mortality observed among vulnerable groups such as people with prison experience. As Graham et al. (2015) found in their linked datasets analysis, area-level deprivation explained only part of the mortality burden of ex-prisoners in Scotland. To reiterate and specify, vulnerability in the present study is conceptualised and operationalised through evidenced indicators discussed later in this chapter: housing instability, employment exclusion, health service contact, drug use profiles, and criminal justice experience. These are not treated as isolated demographic covariates, but as measurable expressions of structurally produced vulnerability, i.e. the cumulative outcome of sustained exposure to fragmented welfare provision, punitive governance, and institutional instability.

The significance of these arrangements becomes clearer when viewed in terms of their temporal effects. That is, the harms described above do not manifest as singular crises but accumulate incrementally across the life course, where instability generated by conditional welfare, institutional churn, and repeated penal contact rarely produces an immediate catastrophe. Instead, it gradually erodes stability, producing a pattern of recurring disruption that consolidates disadvantage over time. Under conditions of Wacquant's responsibilisation (see also Garland 2002), the consequences of this attritional harm are attributed to individual failure, rendering structurally produced vulnerability both routine and politically tolerable.

2.2.2 Western and structural frailty

Bruce Western's analysis in Homeward (2018) makes explicit the kinds of vulnerability that follow from justice contact and why they matter for life chances. Drawing on longitudinal qualitative interviews with over one hundred men and women released from Massachusetts state prisons, Western shows that the first year after release is characterised by acute material hardship and fragile social integration. Most participants could not secure independent housing and relied on unstable family arrangements or temporary accommodation, with many living in deep poverty. Chronic pain, untreated mental illness and substance dependence were common, and unemployment was widespread. Western

captures the situation of people leaving prison in terms of ‘human frailty’, but firmly situates this frailty in the structural underinvestment in social welfare and support for the racialised poor. Vulnerability is a state experienced by individuals but produced by a structural context that includes factors such as poverty, criminal justice involvement, and personal factors.

When we consider Wacquant and Houchin, these compounding vulnerabilities are not incidental hardships. They are directly measurable: unstable housing, labour market exclusion, repeated substance-related healthcare contact, as well as substance dependence, alongside repeated justice system contact. Western demonstrates that these disadvantages are mutually reinforcing. Poor health undermines employment; unemployment restricts housing options; housing instability disrupts treatment; relapse invites renewed supervision or recall. Re-entry does not resolve marginality but often reproduces it through institutional churn. Individuals move between prison, hospital, homelessness services, community supervision and precarious employment, each transition introducing new bureaucratic demands and renewed exposure to sanctions. Vulnerability, in this sense, is cumulative and structurally embedded rather than episodic.

As discussed elsewhere, area-based deprivation measures account for only part of the overall increased risk of mortality observed among prison-experienced individuals in Scotland. Graham et al. (2015) demonstrated that deprivation accounts for only around half of the elevated risk, leaving a substantial proportion unaccounted for. Western’s work helps identify what may constitute these “missing” mechanisms beyond area-level deprivation: housing instability, disengagement from employment, untreated drug-related physical and mental illness, drug use profiles, and repeated criminal justice contact. This thesis positions them not simply as correlates of justice involvement, but as observable manifestations of structurally produced vulnerability, the lived consequences of cumulative disadvantage and institutional churn. In the absence of individual-level postcode data as used in Houchin’s study, vulnerability is therefore operationalised through these measurable indicators, treating them not as background covariates but as substantive expressions of structural disadvantage, consistent with Western’s (and Graham et al. 2015’s) findings.

Western’s findings reinforce a central claim explored in this thesis: that vulnerability among people with justice experience is not an inherent characteristic but the cumulative product of repeated exposure to destabilising institutions. Housing insecurity,

unemployment, health burden and supervision are therefore not background characteristics in this study. They are measurable signs of structurally generated vulnerability that shape mortality risk across the life course for people who come into contact with these institutions. People experiencing addiction, mental illness, homelessness and chronic poverty are governed through medical, welfare and justice systems. Addiction is framed simultaneously as illness and as a breach; relapse may trigger eviction from accommodation, resentencing for an offence originally disposed of in the community or recall to custody for those on licence. At the same time, police increasingly mediate access to mental health care, reflecting further the convergence of health and criminal justice. An example of this is the police powers to remove someone under the Mental Health Act to a 'place of safety', which includes police cells (Mental Welfare Commission 2025: 43). These dynamics illustrate institutional layering: vulnerability is not only pre-existing but continually reproduced and intensified through repeated system contact.

Taken together, the work of Wacquant, Houchin and Western suggests that early death among people in drug treatment is better understood not as the outcome of individual failure or isolated risk exposure, but as the endpoint of cumulative, structurally produced harm unfolding across institutions and across the course of a person's life. In Scotland, addiction, poverty, and interactions with the criminal justice system intersect, highlighting a population whose suffering is often normalised and whose deaths are tolerated.

2.2.3 Rhodes – Risk Environments and the Production of Vulnerability

A final perspective on vulnerability and its use in the present study comes from the field of health research. Working on harm reduction and drug policy from the early 2000s onwards, Tim Rhodes sought to reconceptualise how drug-related harm was understood in public health. Writing against behavioural and psychiatric models that designated 'risk' to the individual, for example, blaming poor decision-making, Rhodes (2009) advanced what he termed the "risk environment" framework. Drawing on social epidemiology and political economy, he argued that drug harms are shaped by the social, economic, physical and policy environments within which drug use occurs, and that these environments operate at both micro and macro levels. The framework does not deny individual agency, but it relocates the primary analytical focus in medical and health research from individual deficit to structured conditions of risk production. Rather than asking why an individual uses drugs or relapses, Rhodes's work directs attention to the environments in which risk is

produced. A risk environment can include poverty, unstable housing, labour market exclusion, limited access to care and punitive policy contexts. Overdose and mortality are not reducible to isolated decisions but emerge within patterned social and institutional conditions that constrain choice and amplify exposure to harm.

In this thesis, the analytical focus shifts accordingly, as the question is not whether drug use alone explains mortality, but whether different exposure profiles, from housing insecurity, unemployment, chronic illness, repeated institutional transitions to different kinds of criminal justice contact, constitute risk environments that generate vulnerability over time. This reframing foregrounds upstream determinants, because although overdose is a health event, the conditions that heighten its likelihood often lie outside healthcare and are instead situated amongst (dis)continuity of housing, income instability, inequality in access to non-punitive care, and the institutional disruption. Housing stability and labour market inclusion are therefore not peripheral welfare concerns but central components of harm reduction.

Policy shifts, for Rhodes, illustrate how risk environments are structured. An example of this can be seen In Scotland, where during the study period (discussed in detail elsewhere in this chapter) changes to benzodiazepine prescribing practices in the early 2010s altered access to legitimate medicinal supplies and reshaped local drug markets. Restrictions intended to reduce prescribing, apparently due to addiction and overdose risk, did not eliminate demand and instead contributed to the expansion of illicit benzodiazepine production and circulation. This, in turn, disproportionately affected older, long-term dependent users already experiencing multiple forms of vulnerability (see below). Here, harm did not arise from independent changes in individual behaviour but from the reconfiguration of the policy environment that changed the availability of drugs. Risk was reorganised at a policy level and experienced at the individual level, but among groups experiencing significant structural disadvantage.

In health research, addiction and instability commonly are framed as individual deficits requiring discipline or compliance, yet the environments that generate risk are institutionally organised. Rhodes challenges what he describes as an over-reliance on individual “risk factors” detached from their structural context. Harm is not linear or reducible to individual behavioural choices; it is instead reliant on the interaction of social, economic and policy environments operating across levels.

Rhodes further warns that public health and harm reduction discourses themselves can function as sites of governance (resonating with Wacquant 2009), shaping “risk subjectivities” in which individuals come to understand themselves as responsible for managing structurally produced risk. In this context, people who use drugs occupy a dual position as welfare clients and criminal justice subjects. They are medicalised as ill, responsibilised as failing, and sanctioned as non-compliant. Structural constraints such as trauma, poor health, insecure housing and disengaging from employment or education are reinterpreted as personal shortcomings, and vulnerability is recoded as irresponsibility.

As Houchin demonstrates in the Scottish context, imprisonment is spatially concentrated within already deprived communities, while Western shows how release is followed by housing instability, unemployment and untreated illness. These individualised vulnerabilities illustrate what Rhodes terms the interaction of micro and macro environments in shaping harm. Wacquant’s characterisation of contemporary imprisonment as a form of circulation rather than exclusion further illuminates this process. Repeated short custodial episodes among people with addiction, chronic illness and housing insecurity function less as proportionate punishment than as mechanisms for managing marginality. Movement between prison and community disrupts continuity in housing, income, social supports, and treatment. Institutional contact, therefore, does not merely reflect pre-existing vulnerability; it reorganises and intensifies risk, which is then embodied in deteriorating health and heightened mortality over time.

2.2.4 Nixon – Slow Violence and the Temporality of Harm

Writing within environmental humanities and political theory, Rob Nixon developed the concept of “slow violence” to describe forms of harm that are cumulative, temporally dispersed, and largely invisible within dominant political and media narratives (Nixon 2011). In contrast to conventional understandings of violence as sudden and spectacular, Nixon argues that some of the most destructive harms unfold gradually, through attrition and delay, and are therefore difficult to see, measure or politically contest. Because these harms are disproportionately experienced by already marginalised populations, they rarely provoke moral outrage or urgent intervention.

If Rhodes provides a spatial and structural account of how risk is produced, Nixon supplies the temporal dimension. The environments described by Rhodes and the punitive governance analysed by Wacquant do not simply generate episodic hardship; they create conditions of ongoing, cumulative harm. In the Scottish context, people experiencing long-term addiction, deprivation and criminal justice contact occupy precisely this position. Loss of legal aid access, conditional welfare provision, fragmented mental health services, short periods on remand, and housing instability rarely produce immediate catastrophe. Instead, they generate recurring disruption across the life course, where each episode may appear minor or administrative in isolation, but when occurring simultaneously, they erode stability, health, and social support mechanisms.

For Nixon, a defining feature of this violence is the way harm moves while people remain physically static. Individuals may remain geographically situated within the same deprived communities, yet their lives are characterised by constant institutional circulation, as Western and Rhodes described. Case files are transferred, eligibility reassessed, risk statuses recalculated, and responsibilities reallocated as individuals move, sometimes physically, often administratively, between prisons, courts, hospitals, addiction services, housing providers and welfare systems. This produces institutional mobility imposed upon socially immobile lives, and each transition introduces new conditions and opportunities for sanction, generating new, slowly developing vulnerabilities through churn rather than a sudden, dramatic crisis.

Nixon's emphasis on temporality is particularly important for understanding the ageing cohort at the centre of Scotland's drug death crisis (McPhee et al 2019, McDonald et al. 2021). Many began using heroin in the 1980s and 1990s, surviving HIV, hepatitis C and earlier overdose waves while enduring decades of poverty, imprisonment, stigma and unstable care. A slow violence perspective would reframe this ageing, long-term drug-using cohort as the cumulative endpoint of prolonged institutional exposure, or rather a form of Nixon's "long dying" which is produced through layered disadvantage over a long period of time. Here, mortality is not an abrupt event detached from context but the predictable outcome of harm unfolding across decades.

When combined with Wacquant's account of responsibilising governance and Rhodes' analysis of risk environments, slow violence clarifies how structurally generated vulnerability becomes lethal while remaining politically tolerable. People who use drugs

and experience criminal justice contact are governed through systems that manage instability rather than resolve it. Their deaths do not appear as policy failure but as individual tragedy, obscuring the institutional processes that made them likely.

2.3 Part two - The Scottish context: drug-related harm, criminal justice and policy response

This section reviews the policy landscape relevant to this study, examining how broader issues like addiction, health, social vulnerability, and drug-related deaths connect to Scotland's criminal justice system (CJS). It consolidates existing knowledge about people with criminal justice experience regarding drug-related harms, framing these harms within the structural and institutional processes detailed in Part One. Crucially, the patterns discussed are not seen as isolated incidents or individual problems, but as manifestations of structurally driven vulnerability influenced by the interplay of welfare, health, and criminal justice systems over time.

It sets the scene by establishing the Scottish context for drug use, criminal justice experience, and drug-related mortality. It draws on policy and briefing reports, so-called grey literature, and academic literature to provide a comprehensive account of how these intersecting systems operate in practice.

This section is divided into several parts. It first examines Scotland's drug issues in terms of prevalence, hospitalisations, and drug-related deaths, offering an overview of the extent and distribution of harm. It emphasises that drug-related risks tend to be socially generated rather than randomly dispersed. Data on hospital admissions related to drug use and demographic trends from 2012 to 2020 are included to highlight this. The second part details various factors involved in drug-related deaths (DRDs) in Scotland, which reflect the drug types and demographics of hospital admissions, including changes in the substances involved over the past decade. These patterns are analysed through the lens of the "risk environment" framework, illustrating how policy, market, and social conditions influence exposure to harm.

Third, it considers CJS involvement and its relationship to health and social vulnerabilities, drawing on key points from earlier discussions of the literature by Wacquant, Western, and

others. A key impetus for the research is the vulnerabilities of people in the criminal justice system and how these overlap with mortality risk tied to drug addiction. Here, criminal justice contact is understood not simply as a marker of disadvantage, but as part of the institutional processes that can reproduce and intensify vulnerability over time. Therefore, particular attention is paid to support for those with addiction in criminal justice settings (especially prison), as well as to gaps in throughcare and the heightened overdose risks experienced by those leaving custody.

The fourth and final section of this part examines Scotland's policy response to problematic drug use and the DRD problem. While Scottish policy is constrained by UK retention of powers over drug laws, it still has some room to set its own policy, as it has done with its harm reduction agenda. Such policy agendas can be carried out through how Scotland spends its money on health and social care. The Scottish Government has released two drug strategies, the first of which is called *The Road to Recovery* (Scottish Government, 2008). This was Scotland's first national drug strategy, claiming to fully embrace recovery-oriented principles, apparently shifting policy away from a model focused primarily on methadone maintenance towards a person-centred, outcome-driven approach which emphasised abstinence, employment, and social reintegration. Ten years later, a new drug strategy, *Rights, Respect, and Recovery* (RRR) (Scottish Government, 2018) marked a shift from *the Road to Recovery*, moving away from an abstinence-focused model towards a public health approach. It prioritised harm reduction, recognising that methadone treatment, naloxone distribution, and supervised drug consumption facilities can play key roles in reducing deaths. The strategy acknowledged Scotland's ageing, high-risk drug-using population and emphasised diverting people away from the criminal justice system where possible.

By synthesising impacts of addiction, vulnerabilities and criminal justice involvement, the discussion establishes the urgent need to understand how criminal justice contact influences mortality outcomes in one of Europe's most severe drug-death crises. This chapter concludes that Scotland is making progressive policy changes to reduce drug-related harms. Still, the benefits of policy changes appear to vary with an individual's sociodemographic status and their experience with the criminal justice system. And there remain gaps in what we know about the risks and vulnerabilities of people with different experiences of criminal justice and different patterns of drug usage.

2.4 The Scale and Impact of Scotland's Drug Problem

Scotland has high levels of problem drug use, with the Scottish Public Health Observatory noting in relation to opioids:

> The estimated number of people with opioid dependence in Scotland was 43,400 (95% Credible Interval (CrI) 41,900 to 45,100). This represented an estimated prevalence of 1.23% (95% CrI: 1.19% to 1.28%) of 15- to 64-year-olds.[1]

There has been a continuous year-on-year rise in drug-related harms recorded in Scotland over the past two decades, resulting in the country consistently having one of the highest drug-related death rates in Europe since the late 2010s (National Records of Scotland, 2021; Public Health Scotland, 2022a). Various risk factors have been identified as contributing to this rise in drug-related deaths, for example being part of an aging cohort who have continuously used drugs for a decade or more (Public Health Scotland, 2022:19-20), socioeconomic deprivation, polydrug use, and shifts in drug choice, have all been identified as factors contributing to the ongoing drug death crisis across various studies (McPhee et al., 2019; Matthews *et al.*, 2020; Tweed *et al.*, 2022; McAuley *et al.*, 2022). However, what is not clear from much of the official reports and academic literature is the extent to which criminal justice experience influences the likelihood that a person will suffer any drug harm, such as being in hospital, worsening physical and/or mental health, or death. Before discussing criminal justice experience, I consider the broader issue of problem drug use and the dynamics and effects of this in Scotland.

The widespread prevalence of drug addiction in Scotland has placed a significant burden on public health services, the economy, and social welfare systems. The consequences of substance use extend beyond the individual health and experiences of the person using drugs, affecting families, communities, and the structures of broader society, such as our welfare, healthcare and judicial systems. The following section outlines the major health, social, and economic implications of Scotland's ongoing drug crisis.

[1] Scottish Public Health Observatory (2025) Drugs Availability and Prevalence, https://www.scotpho.org.uk/risk-factors/drugs/data/availability-and-prevalence/#:~:text=In%202022%2F23%3A,(Table%201). [accessed 7 April 2026]

2.5 Drug-Related Hospital Admissions in Scotland

Scotland's health system faces substantial pressures due to the high rate of drug-related harms. Hospital admission statistics are an accepted means of measuring the prevalence of problematic drug use. Scotland has experienced two decades of increases in drug-related hospital admissions (Parkinson *et al.*, 2018). According to statistics released in a Public Health Scotland report in 2022, hospitalisation rates more than tripled in just over 20 years, rising from 87 per 100,000 in 1997/98 to 283 per 100,000 in 2019/20 (Public Health Scotland, 2022a, see also McLoone and Crombie, 1996; Merrall, Bird and Hutchinson, 2013)). Non-fatal overdoses represent a considerable proportion of emergency department visits, with ambulance callouts for suspected overdoses continuing to rise in recent years (Merrall, et al., 2013; White *et al.*, 2015; Information Services Division (ISD), 2017; Public Health Scotland, 2022a). Many of these cases require urgent medical intervention, particularly where respiratory depression from opioid use or cardiovascular complications from stimulants are involved. Recurring medical treatment for drug-related conditions, including infections related to injecting drug use and substance-induced mental health crises, places a sustained demand on acute care services. Beyond immediate medical interventions, the long-term healthcare needs of individuals with substance dependence, such as treatment for chronic liver disease, endocarditis, and respiratory disorders, require ongoing specialist care, increasing the strain on NHS Scotland.

Opioids remain the primary driver of admissions, with cocaine and synthetic cannabinoids also increasing since 2013/14 (Public Health Scotland, 2022:14). Polydrug use, particularly combinations of opioids, benzodiazepines, gabapentinoids, and alcohol, further increased the risk to health for drug users whilst also complicating clinical management (McAuley, Matheson and Robertson, 2022).

2.5.1 Sociodemographic breakdown

The highest rates of drug-related hospital stays are among individuals aged 35–44, followed by those aged 45–54 (Scottish Drugs Forum, 2017). Hospital admissions among those under 25 have declined, evidence of a shift in the age profile of problematic drug users (Public Health Scotland, 2022:14). Men account for approximately 70% of all drug-related hospital admissions, mirroring what is known about drug-related deaths (see below) (Parkinson *et al.*, 2018; Public Health Scotland, 2022; Markoulidakis *et al.*, 2024; Barnsdale *et al.*, 2015).

Deprivation is a key determinant of hospitalisation rates. Over 50% of drug-related hospital admissions occur among individuals from Scotland's most deprived areas (Public Health Scotland, 2022:2). Hospitalisation rates in Scotland's most deprived communities went from 218 per 100,000 in 2012/13 to 540 per 100,000 in 2019/20, before experiencing a slight reduction in 2021/22 (ibid:18). As noted above, research by McPhee (*et al.,* 2019) highlighted that in 2015/16, drug-related hospital admissions were significantly higher in the most deprived quintile (448.7 per 100,000) compared to the least deprived (27 per 100,000). This would indicate the intersection of poverty, unemployment, unstable living conditions and poor access to other resources alongside chronic problematic drug use, making people from these areas more likely to require hospital attention than those experiencing less deprivation (McAuley, et al. 2022).

Hospitalisation rates vary significantly across Scotland, aligning with patterns of socioeconomic deprivation. Glasgow has historically recorded the highest drug-related hospital admissions in Scotland, particularly for cocaine-related cases, which have increased in recent years (Public Health Scotland, 2022a). McAuley, Matheson and Robertson (2022) found that areas with higher levels of deprivation also reported the highest prevalence of polydrug use and opioid-related deaths.

2.5.2 Drug Profiles in Hospital Admissions

The substances most commonly linked to drug-related hospital admissions in Scotland mirror the data for drug-related deaths across the same period (discussed next, and see, Barnsdale *et al.*, 2016; National Records of Scotland, 2021; Smith, 2021). Opioids continue to be the primary driver of hospital stays, with heroin and methadone also being prominent in admission data due to overdose, respiratory failure, and withdrawal-related complications (Public Health Scotland, 2022a). However, in recent years, there has been a significant increase in admissions related to synthetic opioids and benzodiazepines, particularly illicitly manufactured versions such as etizolam, which are frequently implicated in cases of respiratory depression (Scottish Drugs Forum, 2017; Public Health Scotland, 2022), and death (McAuley, 2019; Nielsen and McAuley, 2020; McAuley, Matheson and Robertson, 2022).

Polydrug use remains one of the main features of drug-related hospital admissions, as with drug-related deaths, further discussed below (Public Health Scotland, 2022a). This pattern significantly increases the complexity of clinical management, as interactions between depressants such as opioids and benzodiazepines can lead to potentially fatal respiratory depression. At the same time, stimulants like cocaine contribute to cardiovascular complications, seizures, and psychiatric disturbances (Jones, Mogali and Comer, 2012). The simultaneous use of gabapentinoids with opioids has also been identified as a factor in hospitalisations, with various studies highlighting the role of pregabalin and gabapentin in compounding overdose risk (Baird, Fox and Colvin, 2014; Evoy *et al.*, 2021; Tweed *et al.*, 2022).

Alongside polydrug use, particular drugs are also seeing a rise in use and are drivers of hospital admissions. Public Health Scotland (2022) reports that the number of cocaine-related hospitalisations has increased markedly since 2013, with synthetic cannabinoids also being linked to an increasing number of hospital admissions over the same period. These substances, which are frequently marketed as "legal highs" despite their prohibition, have been associated with a growing number of emergency department presentations due to their potency and lack of standardisation in chemical composition (Scottish Drug Forum, 2017)[2].

2.6 Drug-Related Deaths (DRDs) in Scotland

Defining what counts as a drug-related death is complicated, as acknowledged by the Scottish Government. The definition used by the NRS and Scottish Government is:

> all deaths with an underlying cause of drug poisoning or drug abuse, but only where any of the substances involved are controlled in the UK. This means that deaths from only e.g. paracetamol or antidepressants are excluded.[3]

Rates of drug-related hospital admissions are not unsurprisingly connected to drug-related deaths (whether or not in hospital), and Scotland has among the highest drug-related

[2] https://sdf.org.uk/highest-ever-rate-of-drug-related-hospital-admissions-recorded-in-scotland/

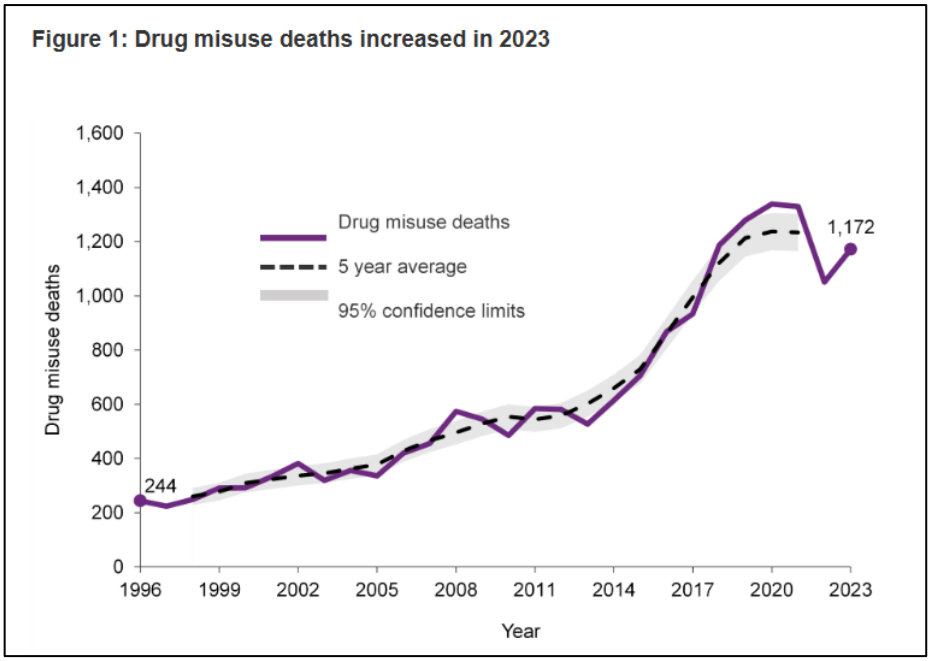
[3] The Methodology Annex to the regular government bulletin on Suspected Drug Death in Scotland explains this: https://www.gov.scot/publications/suspected-drug-deaths-scotland-october-december-2024/pages/7/ [accessed 29 April 2025]. Excluding therapeutic doses and uses of prescribed medicines (and their potential interactions with non-prescribed and controlled substances) is one limitation of this data. As pointed out in Chapter 3, the research presented here includes all cause mortality of drug users, not just drug-related deaths.

mortality rates in Europe (Parkinson *et al.*, 2018). Drug-related deaths (DRDs), have risen sharply, with Scotland's mortality rate being more than three and half times higher than in England and Wales (European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), 2019; National Records of Scotland, 2021, 2024). This section delves deeper into this issue, further detailing issues of drug type, demographic characteristics and vulnerabilities among those who suffered a drug-related death.

2.6.1 Trends Over Time

Scotland has not always led Europe in drug deaths; it experienced a massive increase in DRDs over the past few decades (Parkinson *et al.*, 2018; European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), 2019). The rise in drug deaths from 2010 onwards has garnered particular concern, covering the decade within which this current research is situated. National Records of Scotland (2024) reported that DRDs reached an all-time high in 2020, with 1,339 recorded deaths, marking a 212% increase compared to figures from 2000; while the number of fatalities decreased slightly in 2021, it has been rising since to 1,172 in 2023. These changes are shown in the graph below from the most recent NRS bulletin on DRDs in Scotland.

Figure 2.1: Changes in drug deaths in Scotland 1996-2023



Reproduced from: NRS (2024) Drug-related Deaths in Scotland 2023

Adjusting for age, 'the rate of drug misuse deaths was 4.2 times as high in 2023 as in 2000' (NRS, 2024). This escalation has been attributed to a range of factors, including an ageing

cohort of individuals with long-term dependency on various substances but especially opiates, increasing levels of polydrug use, and the spread of synthetic benzodiazepines such as etizolam, which, as noted above, have compounded the risks associated with opioid use (Information Services Division (ISD), 2016b; McAuley, 2019; Nielsen and McAuley, 2020; Public Health Scotland, 2022a).

The sharpest increase in DRDs were between 2014 and 2019, coinciding with growing availability and misuse of street benzodiazepines. During this period, Scotland's DRD rate rose to levels far higher than the rest of the UK, reaching a point where Scotland's per capita rate reached 3.7 times that of England and Wales (van Amsterdam, van den Brink and Pierce, 2021). In contrast, some European countries saw a decrease in drug-related mortality or a much smaller increase between these years (European Drugs Agency, 2024).

2.6.2 Drug-Related Deaths in Scotland during key periods

2.6.2.1 2012–2015

As described in the introductory chapter to this thesis, the study period for this project was between 2012 and 2015, capturing the data of every patient entering tier three and tier four drug treatment services in Scotland with a follow-up period through 2020 (see the methodology chapter for further detail). Therefore, I focus on these years to clarify the significance of the DRD problem during the period of interest in the research. During the 2012-15 period, Public Health Scotland reported that DRDs rose from 581 in 2012 to 706 in 2015, representing a 21.5% increase (Public Health Scotland, 2022c). This reflected broader shifts in the drug-use patterns outlined above in the hospital admission data over the same period (Public Health Scotland, 2022a).

Whilst a significant number of cases included illicit forms of benzodiazepines such as etizolam, heroin and methadone remained the most commonly detected opioids, with methadone accounting for an increased share of opioid-related deaths. Heroin related fatalities remained high during this period. However, they were made worse by the presence of other central nervous system depressants, particularly benzodiazepines[4]. The street availability of illicitly manufactured benzodiazepines, such as etizolam, contributed to a noticeable rise in DRDs in Scotland, particularly from 2014 onwards (McAuley, Matheson and Robertson, 2022). Gabapentinoids, including pregabalin and gabapentin,

[4] https://www.ashfordstpeters.net/formulary/BNF%20Section%204.htm.

also became more prevalent in toxicology reports during this period, amplifying the sedative effects of opioids, further increasing the risk of overdoses during the study period (Public Health Scotland, 2022).

Polydrug use was a defining characteristic of DRDs between 2012 and 2015, with the majority of fatalities involving two or more substances. National Records of Scotland (2016) highlighted that more than half of all DRDs in this period involved a combination of opioids and benzodiazepines, with the simultaneous use of gabapentinoids and alcohol further adding to the risks of patients needing treatment for overdose during this period (Tweed *et al.*, 2022).

Overall, the period between 2012 and 2015 was significant in Scotland's drug crisis, with DRDs becoming more frequent than in the previous decade, leading to record high DRD rates. However, there is little information about drug-related mortality among those with experience of the criminal justice system, aside from a few academic outputs covered later in this chapter (Deeb *et al.*, 2020; Toomey, Fotopoulou and Armstrong, 2022; Marland *et al.*, 2024). What research there has been on Scotland is focused on individuals with prison experience; this leaves a significant gap in understanding of how individuals with non-prison experiences of the CJS, such as drug court, DTTOs or probation, fare in terms of drug-related harms and deaths.

2.6.2.2 2015–2020

Scotland's DRDs continued to escalate over the past decade, reaching record levels between 2015 and 2020. National Records of Scotland (2021, 2024) reported a sharp rise in fatalities, with drug misuse being recorded as the primary cause of death, increasing from 706 in 2015 to 1,339 in 2020, marking a nearly 90% increase over five years. This period saw the most significant year-on-year increases in DRDs, and was the period in which Scotland came to have the highest drug mortality rate per capita in Europe[5] (European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), 2019; National Records of Scotland, 2021). This was driven by the continued prevalence of illicit benzo-type drugs, high levels of opioid related overdoses and a rise in hospitalisations and

[5] www.rcpsych.ac.uk/news-and-features/latest-news/detail/2024/10/31/drug-and-drink-deaths-in-scotland-still-among-europe-s-worst-despite-new-funding#:~:text=Scotland's%20drug%2Dinduced%20death%20rate,growing%20prevalence%20of%20synthetic%20opioids.

mortality linked to stimulants. During this follow-up period, gabapentinoids also began showing up more frequently in toxicology reports (Public Health Scotland, 2022c).

2.6.3 Demographic, social and regional breakdown of DRDs

Scotland's DRDs are not evenly distributed across the population, with significant differences across sex, age, and socioeconomic status. These demographic patterns provide critical insights into the structural and social determinants of drug-related mortality, highlighting the need for targeted interventions. The structural nature of vulnerability set out at the start of this chapter is confirmed in the distribution of deaths due to drugs and is further discussed below and throughout the analysis.

2.6.3.1 Sex/Gender

Differences between men and women[6] in DRDs have remained consistent over time, with males accounting for the majority of drug-related fatalities. National Records of Scotland (2021) reports that approximately 70% of DRDs involve male drug users, a trend that could be attributed to higher levels of problematic drug use among men (Information Services Division (ISD), 2016a, 2019). However, recent data suggest that the gender gap may be narrowing with some substances, particularly in relation to benzodiazepine-related deaths (Tweed *et al.*, 2022). Public Health Scotland, (2022b) notes that the proportion of female fatalities has increased slightly in recent years, reflecting shifting patterns of substance use and vulnerabilities among women who use drugs. Women with problematic drug use often face distinct risk factors, including a higher likelihood of experiencing trauma, domestic violence, and economic instability, all of which contribute to increased mortality risk (Tweed *et al.*, 2022).

2.6.3.2 Age

DRDs are most prevalent among individuals aged 35–44, followed closely by those in the 45–54 age group (National Records of Scotland, 2021, 2024). For some, this reflects the ageing cohort of individuals with long-term substance dependence, many of whom have accumulated significant health complications over years of drug use. Unlike in some other European countries where younger populations contribute more significantly to DRD

[6] Data from official sources continue to be organised in binary terms as male/female. I use the terms 'gender' and 'sex' interchangeably though acknowledge the contested nature of this and make no comment on the validity of one phrase over another.

statistics, Scotland's crisis is primarily driven by individuals who began using heroin during the 1990s and early 2000s and have since developed complex health and social vulnerabilities (McAuley, Matheson and Robertson, 2022). However, whilst McPhee (et al., 2019) agree that deaths among older drug users is a characteristic of DRDs, deprivation is still the dominant characteristic to be found across all DRDs. A relatively lower rate of DRDs among individuals under 25 and changing patterns of high-risk drug use leads one to speculate there may be changes in how people are introduced to substance use behaviours and perhaps benefiting from harm reduction efforts.

2.6.3.3 Deprivation

Economic and social deprivation continue to shape patterns of drug-related harm, with the highest DRD rates occurring in Scotland's most deprived areas (McPhee et al., 2019) In 2017, McPhee found that a disproportionate number of drug-related deaths occurred in the most deprived quintile. This pattern persisted across multiple study years. According to McAuley (*et al.* 2022), the crisis is driven by high rates of opioid dependency, increasing polydrug use, and growing social inequalities.

2.6.3.4 Geographical Distribution of DRDs

The geographical distribution of DRDs between 2015 and 2020 highlights significant regional differences, with Glasgow, Lanarkshire, and Lothian recording the highest mortality rates. However, in more recent years, Dundee and Glasgow overwhelmingly held the majority of drug-related deaths, with Dundee standing out as having such a high rate for such a small population (National Records of Scotland, 2013, 2016, 2018, 2021, 2021; Tayside Drug Death Review Group, 2019; Dundee Health and Social Care Partnership, 2023).

2.6.4 Drug Types in DRDs

While covered briefly in some of the above sections, this section provides a more comprehensive discussion of the drug types that contributed to the rise of Scotland's DRDs, as they are key variables in the analysis that follows.

2.6.4.1 Opioids

Opioids are the primary driver of drug-related deaths (DRDs) in Scotland, with heroin, methadone, and morphine featuring prominently in toxicology reports. In 2012, National Records of Scotland (2013) reported that heroin/morphine was implicated in 38% of all drug deaths (n = 221) and methadone was implicated in 41% (n = 221) of a total of 581[7]. Between 2015 and 2020, National Records of Scotland (2021) indicates that over 80% of DRDs involved an opioid (n = 1192). This reflects the persistence of methadone and heroin use in Scotland. Methadone, while effective in reducing illicit opioid use, has also been implicated in a significant proportion of fatalities, often in combination with other drug types. It is also noteworthy that the role of fentanyl and other synthetic opioids, which have driven overdose epidemics in North America, remains comparatively limited in Scotland. However, these synthetic opioids have been identified as posing an emerging threat (McAuley, Matheson and Robertson, 2022)

2.6.4.2 Benzodiazepines

Benzodiazepines, particularly illicitly manufactured versions such as etizolam, have been increasingly implicated in DRDs. Public Health Scotland (2022) highlights that benzodiazepine presence in DRDs has risen sharply since 2015, often in combination with opioids (Johnson, Barnsdale and McAuley, 2016). Diazepam and temazepam, which were historically the most common benzodiazepines detected, have been largely replaced by illicitly produced and sourced "street Valium" drugs such as etizolam. For example, in 2010, benzodiazepines such as diazepam were implicated in 25% of all drug-related deaths in Scotland (n = 122) (National Records of Scotland, 2011). By 2020, street Valium, such as etizolam, were implicated in 66% (n = 879) of all drug-related deaths in Scotland in 2020 (n = 1192), whilst all benzodiazepines were implicated in 73% of deaths (n = 974) (National Records of Scotland, 2021). The rise in raw figures alone indicates that benzodiazepines play a significant role in Scotland's drug death crisis across the period of interest to the research (roughly, 2010-2020).

2.6.4.3 Gabapentinoids

Gabapentinoids, including pregabalin and gabapentin, have also emerged as a significant factor in Scotland's DRD crisis. Initially prescribed for neuropathic pain and in seizure

[7] Both drug types might have been present in one death along with other drugs so numbers should not be summed.

prevention[8], these drugs have increasingly been misused, particularly among those on methadone prescriptions to enhance the effects of both drugs (Baird, Fox and Colvin, 2014; Family *et al.*, 2025) Research suggests that gabapentinoids increase the respiratory depressant effects of opioids, increasing the likelihood of fatal overdoses (Public Health Scotland, 2022c). Their role in DRDs has grown considerably over the past decade, leading to increased scrutiny around prescribing practices in America (Pauly *et al.*, 2020) and the U.K. (Ashworth *et al.*, 2023). Public Health Scotland (2019) reported a five-fold increase in gabapentinoid prescriptions between 2010 and 2018, correlating with a rise in DRDs where pregabalin and gabapentin were detected in toxicology reports. However, this increase in harms by misusing gabapentinoids is not unique to Scotland, with Asia, Australia and North America also experiencing a rise in deaths through polydrug use of this medication across the same period (Evoy *et al.*, 2021).

2.6.4.4 Cocaine

According to the National Drug-Related Death Database (NDRDD), cocaine use also began to be present more often as a contributory cause of death in DRDs between 2015 and 2020. By 2020, cocaine was detected in 23% of all DRDs (n = 459), compared to 10% in 2015 (n = 93) (Public Health Scotland, 2022c). This nearly 400% rise in cocaine related deaths indicates that cocaine use has also become a primary cause of drug-related harms in Scotland. Cocaine may be used in combination with depressants such as heroin or methadone, a pattern of polydrug use often termed “speedballing”, which presents complex physiological risks, including heightened cardiovascular strain and increased likelihood of respiratory failure (Scottish Drugs Forum, 2017).

2.6.4.5 Polydrug Use

The gathered research makes clear that polydrug use is a defining characteristic of Scotland’s drug-related deaths. The majority of drug-related fatalities in Scotland involve multiple substances rather than a single drug (Public Health Scotland, 2022c). The combination of opioids, benzodiazepines, and gabapentinoids has been described as a "toxic triad", significantly increasing overdose risk (Jones, Mogali and Comer, 2012; Baird, Fox and Colvin, 2014; Evoy *et al.*, 2021; McAuley, Matheson and Robertson, 2022). Alcohol is also regularly detected alongside other substances, further worsening

[8] https://bnf.nice.org.uk/drugs/gabapentin/.

central nervous system depression [9] (National Records of Scotland, 2020). This widespread polydrug use pattern complicates clinical interventions and public health strategies. This highlights the need for an integrated harm reduction approach that accounts for the different drugs being used and the social circumstances of the people using them.

2.6.5 Shifts in Prescribing and their unintended consequences

Since the early 2010s, prescribing guidelines across NHS Scotland have tightened around both benzodiazepines and gabapentinoids (gabapentin, pregabalin). The National Therapeutic Indicators Baseline Report (Hurding and MacBride-Stewart, 2013) recommended reducing prescriptions for hypnotics and anxiety medications (such as diazepam) due to dependency risks, cognitive impairment, and heightened fall risks in older adults. Figures presented by McAuley (2019) show a decline in benzodiazepine prescribing from 2006 to 2017, reflecting these national efforts to minimise harm from potentially addictive medications (see Fig. 1 below). Despite these policies having a well-intentioned public health rationale, including the prevention of dependence and overdose, they also had unintended downstream consequences, as this decline in prescribing coincides with a rise in use of illicit benzodiazepines like Etizolam.

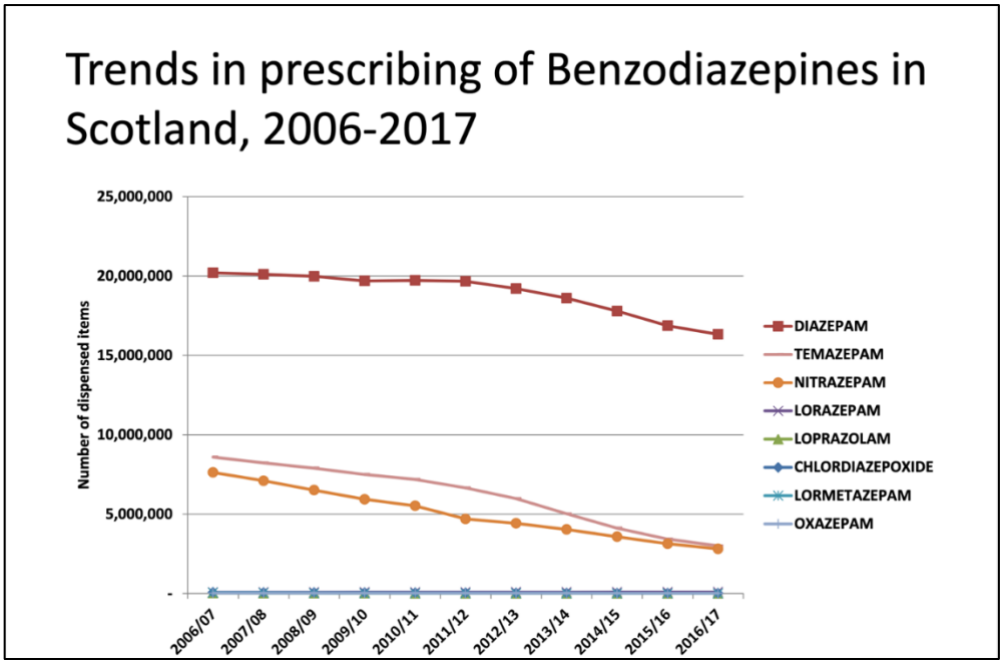


Figure 2.2: Trends in prescribing of benzodiazepines in Scotland - 2006 to 2017.
Reproduced from McAuley, 2019.[10]

[9] https://bnf.nice.org.uk/interactions/alcohol/
[10] Lesser prescribed substances are so minimal in comparison to the main benzodiazepines they are shown along the bottom line. This is why there are eight substances listed in the legend but only four apparent lines.

Gabapentinoids similarly faced new restrictions amidst rising reports of misuse and diversion, particularly in combination with opioids (Hurding and MacBride-Stewart, 2013). Gabapentinoids, such as pregabalin and gabapentin, were initially prescribed for neuropathic pain. Still, increasing evidence linked them to non-medical use, diversion, and overdose risk, particularly among individuals with opioid dependency(Scottish Intercollegiate Guidelines Network, 2013; Baird, Fox and Colvin, 2014; Evoy *et al.*, 2021; Public Health Scotland, 2024). As a result, gabapentinoids were reclassified as Class C controlled substances in the UK in April 2019, placing them under stricter regulatory control ('Misuse of Drugs Act', 1971)[11]. However, concerns have emerged that this shift may have unintentionally contributed to an increased reliance on illicit substitutes.

Data from the Drug Prevalence in Scotland report for 2015/16 (Information Services Division, 2019) shows that an increased proportion of people who use drugs, especially those who are younger, reported benzodiazepine misuse alongside opioids. McAuley (2019) also notes that "consumption roulette" emerges when demand remains high but legitimate supply becomes restricted, leading to uncontrolled strength in street versions (McAuley, 2019, slides 8–9). The NRS (2022) underscores that the ease of manufacturing and distributing counterfeit benzodiazepines, plus decreasing prescription availability, has significantly contributed to today's benzodiazepine-heavy fatality rates in Scotland.

Given that over 900 drug misuse deaths in 2021 involved benzodiazepines—mostly non-prescribed—some researchers have questioned whether a more balanced, carefully managed change to the prescribing framework might have mitigated the shift to illicit markets (NRS, 2022, pp. 15–16). Critics argue that more robust harm reduction measures—including drug-checking services, monitored prescribing for those dependent on benzodiazepines, and close follow-up—could prevent the surge in unregulated supply without neglecting individuals reliant on these medications (McAuley, 2019).

[11] https://www.gov.uk/government/publications/circular-0192018-control-of-pregabalin-and-gabapentin-under-the-misuse-of-drugs-act-1971/control-of-pregabalin-and-gabapentin-under-the-misuse-of-drugs-act-1971.

2.7 Demographic, health and social factors associated with drug-related impacts

It has already been stated, as if it were not somewhat obvious, that substance dependency has far-ranging impacts on individuals, families, communities and society. Social vulnerabilities such as housing instability, homelessness, and family disruption are captured through variables within the Scottish Drug Misuse Database (SDMD). This section offers some further background as to how and why these factors are important ways of understanding the impacts of drug use and criminal justice experience. This section should be read with the opening discussion of this chapter in mind. That discussion emphasised the structural nature of vulnerability, and how it is produced or amplified through changing arrangements and declining investment in social supports. Rhodes' (2009) concept of the risk environment is especially pertinent in this section, as he gives space both to structural and policy forces which shape environments in which individuals still exercise some agency but overall may be in situations of great vulnerability. The earlier discussion started with Wacquant's argument of declining social investment and increasing punitivity being a means of governing the most marginalised. This sets the context for the overall study, but perhaps it is Rhodes' and also Western's (2018) interventions which are most useful to situate the discussion of this section. I bring criminal justice into the picture to some extent, but here we are concerned to show how drug use combines with and exacerbates social factors of deprivation and vulnerability. Keeping in mind the structurally produced nature of deprivation, the specific focus here is on how drug use (whatever the drivers of this are for an individual) generally makes other aspects of a person's situation, including employment, housing, relationships and aging (recalling Nixon's, 2011, arguments about the slow violence of structural poverty), more precarious.

There is quite a significant economic and social impact of drug use in Scotland. Unemployment rates among individuals with problematic substance use remain significantly higher than the national average, contributing to economic marginalisation and continued engagement with the criminal justice system (Tweed *et al.*, 2022). Many individuals with substance dependence face barriers to employment, including due to criminal records, poor physical and mental health, and unstable housing situations (The Scottish Government, 2010; McPhee et al., 2019; Weaver and Jardine, 2022; Miller, 2016). Weaver and Jardine (2022) found whilst researching employment market exclusion of

people sentenced to probation in Scotland, that individuals who received a non-custodial sentence at court (probation, community payback, etc.) often cycle between unemployment and short-term, low-quality work. This, in turn, left participants feeling isolated and anxious about revealing their probation status, a stressor which often merged with existing mental health or drug use problems (Id.). This was built on the work of Miller and Borchardt (2016) whose participants were people with convictions in Scotland, who described feelings of isolation, loneliness, lack of connection to others, and poverty, with one suggesting that prolonged unemployment caused them to feel they 'might be better back inside' (Miller and Borchardt: 2). This suggests that individuals with criminal justice contact experienced significant barriers to employment, leading to increased mental health and financial difficulties as a result. Miller and Borchardt also found that being unemployed had a negative impact on mental health, self-esteem, and relationships and could lead to more harmful behaviours such as increased drug or alcohol intake (Id.). Both of these studies indicate the unemployment challenges and impacts for sentenced individuals in Scotland, indicating the need to consider criminal justice centrally in the health and social effects of addiction.

Homelessness is both a cause and a consequence of substance use disorders, with a high proportion of Scotland's homeless population reporting problematic drug use as a key issue (Scottish Drugs Forum, 2017). Substance use often overlaps with homelessness in Scotland, creating combined health and social vulnerabilities (Aldridge *et al.*, 2018). Individuals who lack stable accommodation frequently experience barriers to consistent healthcare, exacerbating conditions such as opioid dependence and untreated mental illness (Lowrie *et al.*, 2023).Tweed *et al.*, (2022) It has been observed that homeless populations often face overlapping challenges, including justice involvement and polysubstance use, which makes the risk of mortality more likely in this already vulnerable group. Unsurprisingly, the proportion of homeless people requiring emergency hospital treatment and specialist interventions has increased in Scotland, adding further pressure on the Scottish NHS (Audit Scotland, 2022). Many people experiencing homelessness rely on temporary and/or shared accommodation, where relapse triggers and unaddressed trauma can undermine recovery (Lowrie *et al.*, 2023).

Meanwhile, older people with long-term substance use face chronic conditions, including cardiovascular and respiratory complications, often worsened by substandard living conditions (Aldridge *et al.*, 2018). Harm reduction initiatives, such as naloxone distribution

and multidisciplinary outreach teams, have had some impact on mitigating the adverse outcomes of homelessness. Still, ongoing barriers such as stigma, funding constraints, and fragmented services limit the spread of the implementation across Scotland (Audit Scotland, 2022). Addressing homelessness alongside evidence-based addiction treatment remains essential to reducing drug-related harm and improving health outcomes for Scotland's most vulnerable populations.

Living arrangements and family structure, captured in the SDMD through variables such as 'living with parents' and 'living with friends/family', are key social variables examined in this study. Drug dependency within a household can place significant strains on family structures and routines, often resulting in disrupted caregiving, heightened stress, and social isolation (Manning *et al.*, 2009; Gilliver, 2018). Children of people who misuse drugs are particularly vulnerable to adverse experiences such as poor mental health, stigma, and instability in their home lives (Nicholson, 2025). These challenges often accumulate and reinforce each other, creating conditions that undermine children's coping mechanisms, increasing their vulnerability to later problematic substance use (Manning *et al.*, 2009). In Scotland, broader socio-economic factors such as poverty, substandard housing, and limited local services (see above) can compound these difficulties, further exposing children to mental health risks and educational setbacks (Kirkby et al., 2008; Manning *et al.*, 2009; Walsh, 2020; Nicholson, 2025).

As Templeton *et al.* (2017) observed, families already under strain may feel guilt or resignation about the possibility of worsening drug use, or even a fatal overdose, emotions that can turn into isolation and stigma. Such emotional burdens intensify financial and practical challenges, for example, where family members must shoulder additional caregiving responsibilities or manage their fears around children's welfare. As a result, entire networks, not just the parent/child relationship, can be drawn into cycles of stress and uncertainty (Deacon, 2019).

Given this wide range of harmful impacts on a family's day-to-day living due to a person's problematic substance misuse, a wide range of services are necessary to lessen this impact (Manning et al. 2009). In their study of overdose bereavement, Templeton *et al.* (2017) they highlight how stigma and isolation can prevent a person from asking for help, highlighting the importance of multi-layered programs that involve the entire family in the process, which in turn will help reduce the feelings of stigma for people who use drugs

within these families. When services attend to social, economic, and emotional needs, families are better positioned to maintain their routines, protect children's well-being, and interrupt intergenerational substance use (Manning *et al.*, 2009).

Whilst this wraparound care for families is necessary to combat the impact of drug use within the family and wider communities, this places a significant burden on the families themselves as well as the local services within communities already facing significant levels of deprivation, as highlighted above.

The next section moves to criminal justice, considering policy and scholarship that shed light on how drug use in criminal justice settings is addressed, including the health services available in these settings. In discussing the drug-related death literature earlier, a factor that has received less consideration is criminal justice experience. Therefore, it is important to gather what is known about this and to identify the gaps.

2.8 Criminal justice, health, and drug use

People who come into contact with the CJS often face a combination of vulnerabilities linked to deprivation, health and other drug-related vulnerabilities. Deprivation and the increased health-related vulnerabilities of people who use drugs are well established in the literature SH,(see for e.g. Parkinson *et al.*, 2018; McPhee et al., 2019; Dundee health and social care partnership, 2023). It is also well known that people in prison often come from Scotland's most deprived communities (Houchin, 2005; McPhee, 2020; National Records of Scotland, 2021; Gilling McIntosh *et al.*, 2023). Despite deprivation being closely tied to both problem drug use and criminal justice involvement, during the drug death crisis in 2017, there was no recognition of these issues within official Scottish Government prison health policy documents (The Scottish Government, 2017). In their 2017 cross-party report on Healthcare in Prisons, the Scottish Parliament's Health and Sport Committee examined staffing, continuity of care, governance challenges, and had a small section on drugs and alcohol. However, it offered no policy direction on addressing how socioeconomic deprivation drives poorer health outcomes and drug misuse among those in prison. We will see how Scottish policy on drugs addresses the needs of those with criminal justice contact below, with this section building on the previous to consider specifically the drug use patterns and vulnerabilities of those with criminal justice experience.

In 2022, research aiming to assess the mental health needs of people in Scottish prisons acknowledged high rates of anxiety, depression, and other psychiatric conditions among incarcerated individuals (Gilling McIntosh *et al.*, 2023). The 2022 report acknowledges that people in Scottish prisons often report long-standing mental health difficulties originating, or at least being exacerbated by, factors linked to deprivation. The focus remains on the immediate challenges of managing mental illness or substance use in custody, rather than on broader structural changes such as investment in community-based services and fundamental change in who gets sent to prison in the first place. However, the Scottish Government's commitment to a 'whole-prison approach' to addiction could help address some of the issues around deprivation if the wider agencies being brought into the fold include those beyond health and criminal justice, for example, housing, employment, benefits, or advocacy agencies. The salient aspect of this for the research presented here is that we know that deprivation is a driver of criminal justice contact and also drug use, but we know very little about criminal justice contact and drugs (use and deaths). Completing the triangle of connections is an aspiration of the study.

While the majority of research discussed so far recognises that deprivation is important to understanding health outcomes for people within the CJS (Houchin, 2005; Miller, 2016; Weaver and Jardine, 2022), it does not fully explain post-prison mortality. Graham *et al.'s* (2015) groundbreaking study mentioned earlier linked Scottish Prison Service records to mortality data, finding that adjusting for area-based measures of deprivation explained only part of the increased risk of mortality for people released from Scottish prisons. Graham also found that a large share of the excess mortality was driven by drug and alcohol use, with "mental and behavioural disorders" almost entirely related to drugs or alcohol, representing the most common cause of death. In particular, men leaving Scottish prisons were over four times as likely to die of drug-related causes as their age and gender counterparts in the Scottish population. In contrast, women were nearly twenty times as likely. While this study provides further evidence of socioeconomic deprivation in raising mortality risk, having any experience of prison also appeared to do so, underlining the need for studies like the present research which explore the connections of drug use, criminal justice involvement and health outcomes.

The impact of deprivation on people who use drugs who are also caught up in the CJS is clear, but measuring this impact has been limited. Although the data analysed in this study do not directly address this, it is a relevant gap to note.

2.8.1 Health care and criminal justice in Scotland

The links between health care and criminal justice are important for understanding drug use outcomes. Some background on health care in the penal context is therefore useful. Transferring prison healthcare from the SPS to NHS Scotland in 2011 was a potentially progressive step toward addressing embedded health inequalities in the prison population[12]. Five years after the handover of responsibilities, the Royal College of Nursing's Five Years On report (Royal College of Nursing (RCN), 2016) detailed the reality of health service delivery during this period, suggesting that it fell short of achieving significant reductions in health inequality.

According to the RCN, people entering prison in Scotland were significantly more likely to experience severe health conditions than the general population. Hepatitis C was found in an estimated 20% of prisoners, while 9% of men and 36% of women had schizophrenia, and around 66% were estimated to be living with a personality disorder (RCN, 2016). The prevalence of co-occurring mental health conditions was exceptionally high, with many of these diagnoses complicated by histories of trauma, adverse childhood experiences, and substance dependence. Bloodborne viruses, particularly hepatitis C and HIV, remained a public health concern within prison settings, with Aldridge (*et al.*, 2018) reporting that in high-income countries, hepatitis C can have a prevalence as high as 90%. Indeed, the 20% prevalence rate for Scottish prisoners was considered "low" (Taylor *et al.*, 2013) for prisoners, despite the prevalence in the community only being 1%.

Given the known burden of health inequalities amongst those in prison, the Healthcare in Prisons report acknowledged the operational shortcomings by the SPS and private contractors. Many prisoners experienced delays in accessing care due to staff shortages, cancelled appointments, and frequent limitations on healthcare staff's access to patients (Scottish Government, 2017). Some health boards reported an absence of national workforce standards, meaning staffing levels often failed to reflect population needs. Prisoners' opportunity to access timely primary care, mental health support, or addiction services was reportedly dependent on how the prison they were in operated, as opposed to comparable healthcare access across all SPS sites.

[12] https://www.sps.gov.uk/healthcare#:~:text=The%20responsibility%20and%20accountability%20for,the%20respective%20local%20Health%20Boards.

The national needs assessment of mental health in Scotland's prisons found that 15% of the population likely had a long-term mental health condition, whilst 17% had a history of self-harm (Gilling McIntosh *et al.*, 2023). The most acutely unwell individuals were often women and people on remand; these groups were disproportionately accessing help with their mental health. The report also appeared to agree with the previous two reports on healthcare provision in Scottish prisons above (Royal College of Nursing, 2016; The Scottish Government, 2017) in that mental health care in custody was uneven, fragmented, and overwhelmingly reactive. NHS resources appeared to focus more on crisis management than early intervention or holistic support for the people in their care.

Health literacy, defined as a person's ability to access, understand, and use health information[13], has also emerged as a key vulnerability in this population, and its absence shapes their outcomes. As Mehay et al. (2021) argue, people in prison often exhibit low health literacy due to disrupted education, marginalisation, and mistrust of institutions. This significantly impairs their capacity to advocate for their care. In practice, this meant that individuals with the most complex health needs were often the least equipped to access or benefit from available services, reinforcing the cycle of unmet needs and deteriorating health.

Fernandes *et al.* (2018) discusses the ideological framing of prisons as spaces of 'rehabilitative care', arguing that this often masks more profound structural inequalities. The rhetoric of prison as a place where health can be improved is, in their view, part of a symbolic system that attempts to draw attention away from the punitive nature of being imprisoned. For them, the very condition of being in prison is inherently damaging to a person's health, and the common misconception that prisoners are a homogenous group that can go to prison and have their healthcare needs addressed is in itself damaging and punitive. Fernandes claims that prison is a place where physical and mental health concerns worsen in part due to the lack of health literacy discussed above, and in part due to the inherently damaging nature of taking away a person's liberty. Fernandes et al. and Mehay draw attention to prisons as sites where disempowered people are further disempowered in their ability to get help. While not directly in conversation with the arguments of Wacquant (2009), Western (2018), and Rhodes (2009), their work

[13] https://www.who.int/teams/health-promotion/enhanced-wellbeing/ninth-global-conference/health-literacy

complements and resonates with these authors. In particular, the ‘frailty’ that Western found among people after leaving prison implies the kind of damaging experiences Fernandes et al. and Mehay et al. found. And Rhodes’ concept of the risk environment helps us understand the dynamics of people using drugs in places like prison, where choices and access to help are constrained. Armstrong et al. (2025), for example, noted cases of people dying in Scottish prisons from drugs who had been self-medicating when they could not access health care professionals (for cancer pain) or were given prescriptions (that they overdosed on) because of long waitlists for mental health counselling.

This extended consideration of health care issues helps paint a picture of how health care and needs relate to outcomes for people in the criminal justice system, especially those involved in problematic drug use, the issue we turn to now.

2.8.2 Prison and Drugs

Whilst there is not a lot of recent peer-reviewed research into drug use in Scottish prisons, Deeb (*et al.*, 2020) report that out of 904 Scottish prisoners drug tested in 2013, 18% (n = 164) tested positive for anti-epilepsy medications such as pregabalin or gabapentin. Out of the 15 prisons in Scotland at that time, eight establishments participated in the study by urine testing all consenting male and female prisoners being admitted or released across November 2013 for illicit substances. Of those who tested positive for anti-epilepsy drugs, 81% tested positive for other illegal substances, with 67% also having benzodiazepines (n = 71), 57% containing opiates (n = 63) and cannabis being present in 47% of positive samples (n = 55). They found that polydrug use was shared by 70% of the total sample, having at least two illicit substances within their urine.

A similar study testing urine samples of Scottish prisoners at admission to two Scottish prisons was conducted from June to April 2015 Campbell (2016). Analysing samples provided by 209 prisoners, just over half (52%) received Opiate Replacement Therapy (ORT). The author found that around 70% of prisoners on ORT also had at least one additional substance in their sample. The two most common drugs for all prisoners, whether prescribed ORT or not, were opiates, with 80% of those on methadone also testing positive for opiates, and 75% of prisoners on buprenorphine also testing positive for benzodiazepines.

Recent SPS surveys also highlight similar drug-use patterns to those in the research by Deeb and Campbell. According to the 16th Prisoner Survey (Carnie *et al.*, 2017), among individuals who self-reported using drugs the most frequently mentioned substances were cannabis (64%), Subutex (51%), benzodiazepines (46%), and heroin (42%). Within the following survey two years later, a substantial proportion of participants used multiple substances, again with almost half self-reporting use of Subutex (45%), benzodiazepines (47%) and heroin (50%) (Carnie and Broderick, 2019). Although neither survey specifically sought to measure polydrug use as an element of their analysis, the breakdown of individual substances figures reveals that people in custody often combine illicit drugs, much like the findings observed in the Deeb et al. and Campbell studies.

2.8.3 Prison and mortality

While the scope of drug use amongst people with CJ experience is evident, a separate yet closely related issue is the heightened risk of premature death (from all causes, not limited to drug-related deaths) among people who have spent time in Scottish prisons. As noted above, this excess mortality persists even after accounting for the severe social disadvantage disproportionately affecting the prison population (Houchin, 2005; Graham *et al.*, 2015). In the 2015 study by Graham and colleagues, prison and mortality data for over 76,000 individuals were linked using methods similar to those used in this thesis. Whilst the data captured for the Graham study was between 1996 and 2007, five years before the beginning of this current research, it still illustrates the heightened risk of mortality experienced by individuals with prison experience in Scotland.

Graham et al. found that men's overall mortality was more than three times that of the general population, and women's was over seven times higher. Although area-based deprivation accounted for part of the difference (men = 43%, women = 29%), the methods employed in this research could not fully explain why so many more prison-experienced people died compared to their age and gender counterparts in the community. Drug and alcohol appeared to play a clear role, with considerable numbers of deaths due to causes involving these, with Standardised Mortality Ratios (SMRs) above 4.0 for men and close to 20.0 for women, and the highest risk window was the first two weeks following release. This is similar to post-custodial mortality findings in other studies (e.g. Harding-Pink, 1990; Sodhi-Berry *et al.*, 2015; Borschmann *et al.*, 2020). This research also found that

individuals with multiple short prison sentences were at higher risk of all-cause mortality, suggesting that repeated disruptions to a person's social situation may cause breakdown in support structures alongside loss of employment, loss of stable accommodation and worsening drug use.

Finally, individuals who have been incarcerated for drug offences are at substantially increased risk of overdose upon release, as their tolerance decreases during imprisonment, heightening the danger of fatal overdose upon relapse (House of Commons Scottish Affairs Committee, 2019). People with prison experience in Scotland experienced an excessively high mortality risk, with drug and alcohol use accounting for a considerable amount of this.

2.8.4 The Emergence of NPS and its use by those in the CJS

As discussed above, from 2010 onwards, Scotland experienced a significant change in its drug use landscape, which may be relevant to understanding the changing mortality risk of criminal justice-involved people. The appearance of New (or Novel) Psychoactive Substances (NPS), which ranged from synthetic cannabinoids ("Spice") to stimulants or benzodiazepine equivalents (McAuley *et al.*, 2015; McLoed and Pickering, 2016; Black, 2020; Morales-Gómez et al., 2022). Services appeared to be at a loss in how to deal with these new drugs, as they had been used to dealing with more 'traditional' problem drugs such as heroin or diazepam.

McLeod and Pickering (2016) Identified multiple at-risk groups, including people who inject drugs, individuals with mental health issues, and people affected by homelessness. Among these populations, NPS sometimes intersected with other substance use, leading to dangerous polydrug use patterns. In practice, frontline workers struggled to keep pace with NPS trends due to rapidly changing chemical formulas. The 2016 research found that few individuals sought help specifically for NPS, with use often remaining unreported until severe harms (like overdose or mental health crises) prompted emergency intervention.

From a criminal justice standpoint, the NPS surge was partially addressed by new legislation: the Psychoactive Substances Act 2016,[14], which aimed to close so-called "head shops" selling 'legal high' substances such as mephedrone. Yet the 2016 McLeod study

[14] https://www.legislation.gov.uk/ukpga/2016/2/contents.

predicted that shutting down head shops might shift supply to illicit markets or online sources, complicating enforcement and making NPS less visible but not necessarily less harmful.

Further evidence highlights that New Psychoactive Substances (NPS), particularly synthetic cannabinoids (commonly referred to as “Spice”), are now a well-established feature of substance use within the Scottish prison system. Prisoner survey data show a clear upward trend in NPS use among incarcerated individuals between 2017 and 2019; drug-related mortality in prison began to rise from this point as well (Armstrong et al. 2025). According to the 16th Prisoner Survey (2017), 18% of respondents reported using NPS before entering prison, and the same proportion (18%) reported using NPS during their sentence. Two years later, the 17th Prisoner Survey (2019) found that these figures had risen to 22% for pre-prison use and 30% for in-prison use, indicating a notable increase in exposure and consumption during custody (Carnie *et al.*, 2017; Carnie and Broderick, 2019).

In both survey waves, synthetic cannabinoids were identified as the most commonly used NPS within prison, though exact proportions differ slightly: 70% in 2017 and 59% in 2019 among pre-prison users; 78% in 2017 and 62% in 2019 among in-prison users. This trend is reinforced by broader forensic literature. A systematic review by Vaccaro (*et al.*, 2022) idenfies synthetic cannabinoids as the most frequently detected class of NPS in UK and Scottish prisons. These substances are typically smuggled into prisons by soaking them into paper items such as letters, artwork, or children’s drawings before being dried and cut into pieces for smoking. Forensic analysis of seized materials from Scottish prisons revealed high inconsistencies in potency, with concentrations ranging from 0.05 to 1.17 mg/cm², posing a significant risk for accidental overdose due to uneven drug distribution across a single sheet (Vaccaro et al., 2022).

Detection remains a persistent challenge, with the Scottish Prison Service updating policy measures to combat the introduction of NPS into their establishments. While some establishments have piloted the use of ion mobility spectrometry to scan for synthetic cannabinoids at entry points, this technique can be prone to false negatives or fail to detect newer variations of the drug. Routine mandatory drug testing also struggles to keep up with the rapidly changing chemical compounds used to create NPS. This led to a significant policy change from the SPS: prisoners’ mail would be opened without them

being present, photocopied, and the copies handed to them instead of the original article.[15] This policy initiative has led to media claims of massive reductions in ambulance call-outs to Scottish prisons.[16]

The Briefing Report on Prison Health in Scotland (Schölin et al., 2018) notes that although healthcare delivery in prisons has been under NHS control since 2011, services are often under-resourced and inconsistently equipped to address the risks associated with NPS use. Staff training is patchy, and prisoners who experience adverse effects such as seizures, psychosis, or loss of consciousness often do so without prior engagement with prison drug services. Furthermore, the report suggests that existing models of treatment are still heavily geared toward opioid substitution, meaning that synthetic cannabinoids fall into a treatment gap, where neither clinical expertise nor therapeutic models are in place.

Altogether, these findings illustrate how NPS use, especially synthetic cannabinoids, has become a key feature within the Scottish prison's drug scene, with little apparent policy measures beyond punitive actions such as taking every prisoner's mail and photocopying it. Little appears to have been done about healthcare policies around providing treatment for people using NPS or dealing with the underlying issues that make people use drugs in general, and specifically NPS. The data suggest a rapidly escalating pattern of in-prison consumption that outpaces policy and clinical responses.

The following section will discuss how national drug policy plays out in criminal justice contexts. Although national drug policy in Scotland increasingly uses public health rhetoric, practices within criminal justice agencies, including the SPS and Criminal Justice Social Work (CJSW), often continue to emphasise punitive approaches. These practices may deter individuals from seeking help for mental health and substance use issues, potentially exacerbating health vulnerabilities. Understanding these tensions is important for this study, as it explores how different types of criminal justice contact are associated with mortality risks among individuals seeking drug treatment.

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[15] https://www.glasgowlive.co.uk/news/letters-soaked-drugs-getting-through-22050489. And see, https://www.parliament.scot/chamber-and-committees/committees/current-and-previous-committees/session-6-criminal-justice-committee/correspondence/2021/photocopying-of-prisoner-mail.

[16] https://news.stv.tv/scotland/scottish-prisoners-caught-with-drugs-up-over-1100-since-2014-new-figures-show.

2.9 Drug Policy in Scotland

This section focuses on Scotland's drug policy landscape up to 2020, and how well it has responded to the issues discussed so far – the scale and impact of drug use and related harms in Scotland, especially for those caught up in the criminal justice system. Over the past two decades, Scotland's official approach to drug use has shifted considerably, reflecting changing attitudes around abstinence-based models and the benefits of harm reduction, recovery, and public health models (Scottish Government, 2008; Malloch and McIvor, 2013; McIvor, 2009). The 2008 strategy, *The Road to Recovery,* was often cited as the country's first policy to frame drug use primarily as a public health issue (see below). However, the government's policy on abstinence-based recovery was criticised for not addressing the complex nature of chronic substance dependence (McIvor, 2009a; Malloch, 2011).

A larger shift in policy regarding a harm reduction approach occurred in 2018 with the publication of *Rights, Respect, and Recovery* 2018, which moved closer to incorporating human rights principles (Scottish Government, 2023a). This policy acknowledged the rising prevalence of polydrug use (Scottish Government, 2023b), and it ignited the discussion on the importance of safe consumption practices, claiming to aim to reduce stigma by implementing a human rights framework for people using substances (Scottish Government, 2018, 2023a; Parkes *et al.*, 2022). In principle, this marks a departure from purely abstinence-focused approaches, emphasising person-centred care and more holistic responses. Nonetheless, as Loughery (2022) notes, the practical implementation of these progressive visions has sometimes been undermined by structural barriers and insufficient legislative autonomy. I have already noted that the UK government's primacy in this policy area, and outlined key aspects of drug policy before 2008. This section discusses key stages of policy in this area prior to 2008, then *The Road to Recovery* in 2008 (Scottish Government, 2008) and finally *Rights, Respect, Recovery* in 2018 (Scottish Government, 2018).

2.9.1 Pre-2008 and 'traditional' approaches

Scotland's response to drug use has historically been influenced by the UK's broader criminal justice model, which has traditionally prioritised punitive responses over harm reduction measures (Yates, 2002; Scottish Government, 2023a). Despite policy shifts in

recent years, Scotland remains constrained by UK-wide drug legislation, limiting its ability to fully adopt a public health-led approach.

The UK's official policy on drug use has been a long-standing zero-tolerance criminal justice approach, where substance use is viewed as a criminal offence rather than a health issue. This approach centres on the Misuse of Drugs Act 1971,[17], which criminalises possession and supply of controlled substances and imposes strict penalties on 'offenders'. Despite its devolved powers in health and justice, Scotland remains bound by this UK-wide framework, which restricts its ability to implement progressive drug policies (Scottish Government, 2023a).

The Scottish Government has repeatedly called for the devolution of drug policy, arguing that the UK's punitive model is incompatible with Scotland's public health aspirations. In 2019, the Scottish Affairs Committee urged the UK Government to declare Scotland's drug death crisis a public health emergency, a recommendation that was flatly rejected (House of Commons Scottish Affairs Committee, 2019, 2020a).

Advocates of the criminal justice model argue that stigma and deterrence are necessary tools to prevent drug use (House of Commons Scottish Affairs Committee, 2020a). Residuals of this approach can still be found in Scotland, e.g., in mandatory drug testing policies in Scottish prisons and in community justice social work. Research has repeatedly shown that punitive measures, rather than reducing drug-related harm, exacerbate the vulnerabilities of people who use drugs, reinforcing cycles of criminalisation, social exclusion, and overdose risk (Scottish Prison Service, 2010; Price, Parkes and Malloch, 2021; Player, 2022; Scottish Government, 2023a).

2.9.2 The Road to Recovery (2008)

By the early 2000s, Scotland's rates of problem drug use, particularly heroin and benzodiazepines, had become disproportionately high compared to other parts of the UK and Europe (Scottish Government, 2008). Local services were mainly built around "harm-reduction" methods, for example, methadone prescribing and needle exchanges, which had some success in reducing HIV among people who inject drugs.

[17] The Government of the United Kingdom, 1971.

During these years, many individuals with drug misuse issues cycled repeatedly through short-term prison sentences or repeated convictions for low-level theft or drug possession. There appeared to be an incentive for a more robust "throughcare" alternative to criminal sanctions, which originated partly from a desire to keep individuals, particularly those with a clear link between drug use and offending, out of prison and engaged in 'meaningful' recovery. This logic eventually supported the introduction of Scotland's first pilot drug court in Glasgow (2001) and, soon after, in Fife (2002). These pilots offered structured community-based orders, with frequent judicial reviews and the explicit goal of reducing reoffending by stabilising or reducing drug use (McIvor, 2009b). The community-based orders were often Drug Treatment and Testing Orders (DTTOs), which were targeted at high-tariff offenders and combined community supervision with intensive drug treatment and testing. (Eley, 2002; Scottish Government, 2008)

According to McIvor (*et al.*, 2006) early evaluations of drug courts, there were some successes, with many individuals experiencing fewer convictions and improvements in drug use patterns. However, they also noted that "net-widening" was being implemented, where lower-level offenders, who might otherwise receive a simple community sentence, ended up on intensive Drug Court Orders. This may provide some evidence in Scotland of Wacquant's 'prisonfare' claim, where the introduction of public health approaches to addiction, administered through courts rather than through properly invested community services, leads to expansion of criminal justice populations (and more intrusive forms of governance).

It was in the context of a growing concern about the scale of the drug problem and initiatives being developed that recognised the limits of enforcement as a sole means of addressing it that The Road to Recovery (2008), Scotland's first national drug strategy, was introduced. The ministerial foreword noted the absence of a broader recovery vision in Scotland. It stated that this new policy approach in Scotland would see 'drug treatment and rehabilitation services based on the principle of recovery'. However, the focus of this new policy was on abstinence, with some language around harm reduction as a tool to help towards abstinence. Whilst introducing some harm reductionist elements, *The Road to Recovery's* emphasis on abstinence and continued support of enforcement led some to comment that the strategy failed to recognise the complex nature of drug addiction. This continued the debate over whether punitive measures, both by the criminal justice system

and through non-compliance with treatment plans, did more harm than good (Eley, 2002; Holland, 2020).

The 2008 policy document introduced the arrest referral scheme, where problem drug users who had been arrested were allowed to engage with treatment services after arrest. This voluntary scheme was aimed at diverting people into treatment at an earlier stage than prison. The policy document noted that 69% of prisoners had used illicit drugs in the 12 months before 2006, 53% having used heroin, suggesting opportunities had been missed to address their drug use, and possibly also their offending, before it reached the stage of a person ending up with a custodial sentence (Scottish Government, 2008). However, during the same period, diversionary practices such as drug courts were being used less frequently (McIvor, 2009a; Malloch and McIvor, 2013; Loughery, 2022). In these years, there were also calls for safe injection facilities, which initially faced opposition from the UK Government[18] (it wasn't until 2025 that the first safe injection site opened in Glasgow).

In the years following this first strategy, Novel Psychoactive Substances (NPS) arrived on the scene (see above) and spread rapidly, leading to a call for a change in policy direction. This led to various changes, such as 'de facto' decriminalisation through police warning schemes, where people would no longer be criminalised for simple possession of class A drugs (Holland, 2020; Falzon *et al.*, 2022; Loughery, 2022).

2.9.3 Rights, Respect, and Recovery (2018)

After Scotland adopted The Road to Recovery in 2008, the criminal justice system continued to incorporate treatment-focused approaches, though still, as noted, with abstinence as the primary goal (Lightowler, 2024). Debates around how best to deal with drug-related harms persisted as drug deaths increased and harms were found to be more severe in Scotland's most deprived communities (McPhee et al., 2019; Tayside Drug Death Review Group, 2019; Player, 2022; Public Health Scotland, 2022b). Policy documents like *The Road to Recovery* began to be challenged by growing calls for recognising human rights, public health, and respect for individual recovery journeys. This shift concluded in the 2018 publication of Rights, Respect and Recovery (RRR). *Rights, Respect, Recovery*

constituted a revised approach that moved away from the abstinence focus towards a harm reduction approach. Though this public health framework has been officially adopted in Scottish policy towards drug use, we will see that it is not apparent that this approach is applied evenly for all drug users, specifically relating to people who have experience of the criminal justice system.

RRR aimed to incorporate a "rights-based approach", supporting individuals in their communities, promoting early intervention, and challenging the stigma that undermined treatment engagement (Scottish Government, 2018; 'Monitoring and Evaluating Rights, Respect and Recovery (MERRR)', 2021; Fotopoulou and Aston, 2022). Under this new policy direction, the Scottish Government reiterated its commitment to public health as the key framework (Nicholls *et al.*, 2022). There was a clear emphasis on integrating drug treatment with broader health and social services, based on the principle that individuals who use drugs often present with mental health, housing, and social support needs (Scottish Government, 2018; 'Monitoring and Evaluating Rights, Respect and Recovery (MERRR)', 2021; Connell et al., 2023). Nonetheless, decision-making powers reserved at the UK level constrained local moves to implement progressive measures, such as decriminalisation or safer consumption facilities (Nicholls *et al.*, 2022). In addition, although Scottish policy makers increasingly championed harm reduction, commentators argued that this contradiction between national ambition and reserved legal limitations impeded genuine reform (House of Commons Scottish Affairs Committee, 2019, 2020b; Futopoulou and Aston, 2022).

In terms of justice-led interventions, such as drug courts, there was ongoing use of some of these in the 2012–2020 period of interest to this study. These schemes were introduced in Scotland in the early 2000s (Eley *et al.*, 2002; Eley, Beaton and McIvor, 2005; McIvor, 2009b; Loughery, 2022). Still, despite some initial enthusiasm, support for dedicated drug courts appeared to decline, with concerns that resources might be better invested in health-led, community-based services (Scottish Government, 2023b). Over time, Recorded Police Warnings (RPWs) emerged as a preferred route for lower-level offences, rising from around 4,000 police disposals in 2015/6, when they were introduced, to around 19,600 a year later[19]. These warnings aimed to prevent individuals from unnecessarily entering the criminal justice system. The Lord Advocate later issued a directive in 2021 allowing police

[19] https://www.gov.scot/publications/criminal-proceedings-scotland-2017-18/pages/32/.

to issue recorded warnings for possession of Class A drugs, representing a slight shift towards decriminalisation in Scotland. However, critics noted that extending police discretion in this way did not constitute full decriminalisation as seen in Portugal (Greenwald, 2009; Holland, 2020; Stevens *et al.*, 2022), as it lacks the availability of real health or social support following a warning (Futopoulou and Aston, 2022).

The stated goal of *Rights, Respect and Recovery*—that services be brought closer to those most in need—surfaced against criticisms of underfunding and inconsistent local provision (McPhee, 2020). Following budgetary decisions in the mid-2010s, many Alcohol and Drug Partnerships reported reductions in allocations, potentially undermining the new strategy's objectives (McPhee, 2020; Audit Scotland, 2022; McPhee and Sheridan, 2023). While Scottish Government policy advocated multi-agency collaboration, some stated that institutional fragmentation and a lack of dedicated resources continued to obstruct comprehensive, wraparound care (Scottish Drugs Deaths Taskforce, 2019). Supporters of RRR nonetheless saw these constraints as transitional, suggesting that enhanced cooperation between local authorities, the NHS, and third-sector organisations might gradually improve the situation (Nicholls *et al.*, 2022).

Overall, the years 2012 to 2020 saw a significant reorientation in Scottish drug policy, with Rights, Respect and Recovery (Scottish Government, 2018) signalling a definitive change in how Scotland will be approaching drug addiction for the foreseeable future. This approach shifted away from an exclusively punitive framework towards one that emphasised prevention, harm reduction, and human rights (Scottish Government, 2023a). However, the discussion above about the drug use patterns, vulnerability and policies to address those in the criminal justice system shows that harm reduction and rights awareness that is being advocated come up against criminal justice goals of punishment and practices that criminalise rather than support those who use illicit drugs.

2.10 Conclusion

This chapter has covered a lot of ground, laying an important foundation for the chapters that follow. It provides a framework for understanding how vulnerability is deployed in this research, emphasising its structural determinants. It also identifies that criminal justice involvement amplifies the vulnerabilities of those already experiencing many negative consequences of social inequalities. This provides the context in which a considerable

amount of information is provided about drug use, deprivation and criminal justice in Scotland. Data on hospital admissions, overdoses and drug-related deaths reflect both factors of deprivation but also changing patterns of drug use, especially polydrug use and NPS hitting the streets. The impact of drug use on individuals, families and communities may not be surprising, but it is important to lay it out.

Policy initiatives, from The Road to Recovery (2008) to Rights, Respect, and Recovery (2018), illustrate Scotland's gradual progress from a purely abstinence-based drug intervention landscape toward a framework that emphasises harm reduction, human rights, and continuity of care. However, the influence of UK-wide legislation (particularly the Misuse of Drugs Act 1971) continues to limit the scope for more innovative public health reforms. This has seen Scottish policy makers struggle to bring in progressive laws around simple drug possession of class drugs, and progressive policies such as safe consumption facilities.

Despite Scotland's policy makers attempting more progressive public health approaches to drug use, a criminal justice model that, despite also having treatment pathways (e.g., Drug Courts, Drug Treatment and Testing Orders, and Arrest Referral Schemes), remains shaped by punitive traditions within the criminal justice system. For individuals in contact with the criminal justice system, the studies and official reports highlighted within this chapter point to higher risks of drug-related harms not strictly limited to mortality, and only partly attributable to their higher levels of deprivation. Changing prescribing policies alongside changes in the drugs available to drug users have accumulated in a worsening drug crisis for all drug users, regardless of CJS experience.

In 2025, Glasgow launched Scotland's first Safe Consumption Facility (SCF) pilot[20]. This was the most fundamental shift towards a public health-led drug policy to date. The facility, designed to provide a supervised environment for people to use drugs safely, was introduced as a direct response to the escalating overdose crisis in Scotland. However, its implementation remains legally precarious, as the UK Government has repeatedly blocked legislative changes that allowed for the broader rollout of injecting facilities. A 2010 SDF report identified several vulnerable groups, one of which was people who inject drugs,

[20] https://www.theguardian.com/society/2025/jan/10/all-eyes-are-on-glasgow-uk-first-legal-drug-consumption-room-ready-open.

stating that this group were 15 times more likely to overdose than non-injectors. ‘Forced’ abstinence, such as through hospitalisation or imprisonment, made this group of drug users even more vulnerable (Scottish Drugs Forum, 2017; Tweed *et al.*, 2018). Research showing positive results with harm reduction approaches may hold out some hope that initiatives like the SCF being opened may have an impact on DRDs(Ramsay *et al.*, 2010; McPhee, et al., 2013; Palmateer *et al.*, 2014; Hutchinson *et al.*, 2015), which only time will tell.

However, there remains a significant gap in knowledge about the extent to which drug users who have experienced justice system contact are at enhanced risk of mortality, either at all or due to a DRD. That’s the gap in our knowledge and understanding that this thesis fills. By linking drug treatment patient data to mortality data collected in the same years as Scotland’s worsening DRD crisis, it will examine whether, and to what extent, criminal justice involvement is associated with increased mortality risk among people who use drugs. At an even more basic level, the measurement of drug use, CJ experience and mortality is not fully known, the focus of RQ1, explored in the next chapter.

3 Methodology – Data Linkage, Variable Construction, and Analytic Strategy

3.1 Introduction

This chapter describes the methodological approach used to investigate how mortality differs by criminal justice (CJ) experience among individuals in drug treatment in Scotland. The analysis examines whether individuals with different forms of CJ contact, including prison experience and non-prison justice involvement, display distinct risk profiles in relation to mortality compared to those with no recorded CJ contact. CJ contact is therefore treated as a key explanatory variable, with individuals categorised into three groups: no CJ contact, non-prison CJ contact, and prison contact. Mortality is modelled as a binary outcome (dead or alive during the study period), allowing comparisons across these groups. Notably, the analysis considers all-cause mortality rather than focusing solely on drug-related deaths (DRDs), enabling a broader evaluation of how CJ contact is associated with a range of health and social vulnerabilities across the cohort between 2012 and 2020.

This chapter begins with a detailed account of how the research project evolved, including changes to the original study design and a reflection on my philosophical position. While the Introduction chapter outlines the broader origins and context of the project, the focus here is on how those developments shaped the final research design, data selection, and methodological approach. In addition to outlining the methodological process, this chapter addresses the first research question, which examines how the prevalence of CJ contact varies depending on how it is defined and measured within the SDMD dataset. This question is addressed here because the operationalisation of CJ contact underpins all subsequent analyses in Chapters 4 and 5. Establishing how different definitions affect prevalence estimates is, therefore, a necessary step before examining variation in vulnerability and mortality outcomes. The remainder of the chapter outlines the final methodology, including study design, data sources, variable construction, analytical strategy, and ethical considerations.

As a reminder to the reader, the eight research questions guiding this thesis are:

Explored in this chapter (as it discusses how I created the CJ variable):

1. Among people seeking drug treatment, how does the known prevalence of CJ-experience vary depending on how criminal justice contact is defined and measured?

Explored in Chapter 4:

2. Does the demographic profile (age, sex and health board) of people seeking drug treatment vary by the type of CJ contact they have had?

3. Does the drug-taking profile of people seeking drug treatment vary by the type of CJ contact they have had?

4. Does the health profile (mental and physical) of people seeking drug treatment vary by the type of CJ contact they have had?

5. Does the social profile (such as employment status and housing instability) of people seeking drug treatment vary by the type of CJ contact they have had?

Explored in Chapter 5:

6. Is the mortality rate higher among CJ-experienced drug treatment patients than among those with no CJ contact?

7. What demographic, drug-use, health and social factors are associated with mortality amongst people seeking drug treatment?

8. What demographic, drug-use, health and social factors are most predictive of mortality rate by CJ status amongst people seeking drug treatment?

A quantitative approach was used to address these research questions, drawing on linked administrative datasets from the Scottish Drug Misuse Database (SDMD) and National Records of Scotland (NRS) mortality records. The use of linked data enables a population-level analysis of individuals entering drug treatment and allows mortality outcomes to be examined alongside a wide range of demographic, health, social, and justice-related variables. SDMD data were recorded by healthcare professionals during initial and follow-

up assessments with individuals entering community-based or residential drug treatment in Scotland between 2012 and 2015, with approximately five years of follow-up data.

The study includes all individuals in Scotland who entered Tier 3 or Tier 4 drug treatment during this period, resulting in a cohort of 35,331 people and approximately 200,000 rows of data. Each row represents an assessment, so many individuals appeared multiple times in the dataset. These records were linked to mortality data from NRS, identifying 4,008 deaths (11.3% of the cohort). The use of linked administrative data is a key strength of this study, enabling the examination of mortality within a large, national cohort and allowing forms of criminal justice contact and social vulnerability to be identified across multiple data fields rather than relying on a single indicator.

This chapter sets out how the data were analysed using a staged approach. First, descriptive statistics were used to examine the prevalence of CJ contact and to explore variations in demographic, health, drug use, and social vulnerability across CJ groups. Chi-squared and Kruskal–Wallis tests were then applied to determine whether observed differences between groups were statistically significant, with appropriate post hoc testing applied where necessary. Prevalence Ratios (PRs) were calculated to aid interpretation by indicating the relative concentration of vulnerabilities across CJ groups.

Building on these findings, regression modelling was used to examine factors associated with mortality within the cohort. The analysis was conducted in stages. An initial binary logistic regression model was estimated across the full cohort to assess associations between mortality and demographic characteristics, health indicators, substance use profiles, social factors, and a binary measure of prison experience. Subsequent models were developed to compare groups defined by the type of CJ contact, including comparisons between prison and non-prison CJ contact, between prison and no CJ contact, and between non-prison CJ contact and no CJ contact. This enabled a more detailed assessment of how different forms of justice involvement relate to mortality. Interaction terms were then included to examine whether associations between selected variables and mortality varied by CJ status. Together, these steps provide a systematic approach to exploring the relationships between CJ contact, vulnerability, and mortality.

The chapter also reflects on the practical challenges and benefits of using linked administrative data to study marginalised populations. While such data enable large-scale,

population-level analysis, they are not collected for research purposes and require substantial preparation. Much of the analytical work involved transforming raw variables into usable formats, including recoding categorical variables, constructing composite measures, and grouping complex data such as ICD-10 mortality codes and over 120 individual drug types into analytically meaningful categories. This data preparation process was both technically demanding and time-intensive.

Finally, the chapter discusses the ethical and governance requirements associated with working in Scotland's Safe Haven environment, including training, approvals, and disclosure controls. The sections that follow provide a detailed account of these processes and the analytical decisions that underpin the findings presented in subsequent chapters.

3.2 Research design and philosophical approach

This section outlines how the research was designed and how the final study took its current form. Building on the story begun in the introduction, this section describes the original quantitative project and its intended use of Scottish Prison Service data to explore post-custodial mortality. It then sets out the significant disruptions caused by the COVID-19 pandemic, which led to a redirection of the project and the adoption of an alternative dataset. The section describes the philosophical shift that resulted from these changes, particularly the move from a qualitative orientation to a more pragmatic approach to methods. Finally, it outlines the study's retrospective cohort design, key data sources, and the rationale for using linked administrative data to examine mortality outcomes among individuals with varying levels of involvement in the criminal justice system.

3.3 Project Origins and Context

This research was funded through a supervisor-led, ESRC-funded project under the Scottish Graduate School of Social Science (SGSSS) Datasets Training Pathway, which supports doctoral research using complex or large-scale data, including longitudinal, qualitative, and administrative datasets[21]. One of the key aims of the SGSSS Datasets Steer is to support researchers in developing skills in secondary data analysis, and studentships

[21] https://social.sgsss.ac.uk/files/documents/steers-competition/guidance-on-steers-and-targets-june18.pdf. Accessed 01/04/2025

are awarded to projects that include a clear plan for training in data management, cleaning, and analysis techniques.

The original SGSSS-funded project focused on post-custodial mortality in Scotland. The proposal set out to link Scottish Prison Service (SPS) prison records with health and mortality data to explore how the prison experience itself, as distinct from pre-existing vulnerabilities, contributes to the elevated risk of death observed among people leaving custody. This study aligned with broader concerns in criminology and public health about the long-term effects of incarceration. It was designed to update and extend earlier research (e.g., Graham *et al.*, 2015) using new data sources.

However, the project was developed during the early stages of the COVID-19 pandemic and overlapped with a period of industrial action across various universities in Scotland, including my own, which meant that training and access to key project stakeholders were limited or delayed. I began the PhD with a purely qualitative background in criminology and law, which required significant training in R programming and statistical reasoning to complete the project. Although some training was provided, organisational disruptions due to COVID meant the support available in the first year was substantially reduced. As a result, much of the data preparation and analysis had to be learned independently and developed through trial and error.

3.3.1 **Initial Design and COVID-19**

The early stages of this project were significantly affected by the COVID-19 pandemic. I began the doctoral programme in October 2020. I used the first several months to conduct a literature review on post-custodial mortality, refine the original project plan, identify training needs, and complete documentation for research governance and ethical approvals. This initial period also involved reviewing the structure and linkage potential of the Scottish prison records and other administrative datasets. By May 2021, I had clearly understood the project's scope and data requirements. I was in a position to formally contact the Scottish Prison Service (SPS) to initiate discussions around data access.

However, my initial approach in May received no response, nor did a follow-up email in August. It was not until 9 December 2021, following prompting from colleagues already conducting health research in Scottish prisons, that I secured the initial meeting with the

relevant member of SPS staff. While this first meeting was encouraging and generated some ideas for advancing the project, a second meeting in February 2022 made it clear that it would take at least 12 months before SPS could formally support the work and begin the necessary processes for data access on their end. By that stage, around 16 months of the three-year funding period had already passed, making it increasingly unlikely that the original project could be delivered within the available time. At one stage, I was informed that only one SPS staff member had the required knowledge and access to extract the data. However, that individual had been seconded full-time to Covid response work and would not be available for at least another year. Throughout 2021 and early 2022, I explored several mitigation strategies, including efforts to access other datasets, join new data-linkage partnerships, or reduce the scope of my project, but none of these proved feasible. Although I remained committed to researching post-custodial mortality, it became clear that my original design was not viable within the timeframe or resourcing of a PhD.

Around the 16-month mark of the funded period, my supervisors and I began exploring alternatives, such as DataLoch, a partnership between the National Health Service (NHS) Lothian and the University of Edinburgh that holds health and social care data for the east of Scotland. However, at the time, DataLoch was in its infancy and proved unworkable due to long application turnaround times, inadequate coverage of individuals with prison experience, and potentially expensive costs associated with secure hosting and linkage. We had various meetings with Public Health Scotland and the Scottish Prison Service, with possible access to prison health data suggested by the SPS on 12 October 2022, a full two years into my Phd-funded period. However, this project was also in the early stages of access permissions and was too far from being available as a workable, research-ready dataset.

Eventually, after these various attempts each of which played out over periods of months, it became clear that the original project, solely focused on prison, could not go ahead. I could not obtain SPS health records or other prison-focused administrative datasets from different sources. During this period, one of my supervisors (Prof Susan McVie) led a separate project through the Scottish Centre for Administrative Data Research (SCADR) to examine mortality among individuals engaged in drug treatment services in Scotland. The project involved linking the Scottish Drug Misuse Database (SDMD) with National Records of Scotland (NRS) mortality data and, specifically, included indicators of CJ contact, such as referral route, legal status, and recent imprisonment. When it became clear

that the SPS-based design was no longer feasible, a case was made for me joining the SCADR project. This presented an opportunity to return to my core research interests- mortality, drug use, and imprisonment, while using an established dataset already progressing through the approvals process.

The SCADR project spanned from 2012 to 2020. It included drug treatment patients in Scotland at a time the country was experiencing record high DRDs and sought to identify whether or not CJ involvement was linked to higher rates of mortality for this cohort. Importantly, this data included some indicators of prison experience; however, the prevalence of CJ experience among this cohort was reported to be surprisingly low at between 15% and 28% annually. [22]

A case was made that this data could be used to address my research aims by exploring a link between prison experience and mortality, while also comparing this group to people with other experiences of the criminal justice system.

In practical terms, I did not receive access to the linked dataset until April 2023. At that point, I had just six months of funding remaining to complete an entirely new project, from data cleaning to analysis and write-up. Although I was later granted a three-month Covid disruption extension (meaning I had a total of nine months' funded time when I first gained access to data), this still left me working under severe time constraints with the expectation to complete a PhD in less than a year. Once this funding ended in December 2023, I entered my thesis-pending year while working to support myself and my family. This period was particularly challenging as I was still learning quantitative methods, how to use the R programming language, and the Safe Haven environment, which places strict controls on data access and outputs. These disclosure processes, while important, added further delays, requiring me to rerun some analyses using alternative statistical approaches (for example, replacing Q-Q plots due to disclosive residuals), as well as working through lengthy checks to determine whether summary outputs (such as standard deviations under 5) could be released. All of this left me feeling like time was closing in just as I could finally begin the substantive work. Despite this, I remained committed to the project and took every possible opportunity to advance the research, given the circumstances I faced.

[22] See https://publichealthscotland.scot/publications/scottish-drug-misuse-database/scottish-drug-misuse-database-overview-of-initial-assessments-for-specialist-drug-treatment-202021/ data tables for annual SDMD CJ figures. Accessed 01/04/2025

The result of all these time-consuming setbacks, though, was that I was still waiting on outputs from the Safe Haven weeks before the end of the thesis, pending time, and still writing this thesis with only days to go.

3.3.2 **Epistemological Position**

My academic background in criminology and law, as well as my advocacy experience working with people affected by imprisonment, as noted, initially shaped my approach to most research questions along qualitative lines. I began the PhD with strong interpretivist instincts. I expected to draw on narrative and lived experience to understand harm and marginalisation, perhaps through a mixed-methods approach, such as document analysis of health records from when people were in prison, or sampling misconduct reports and other resources from the SPS Prisoner Records 2 (PR2) system within the larger SPS administrative dataset. However, as I began training in R programming and working with linked administrative datasets, I came to better understand the value of quantitative methods, particularly for studying rare outcomes such as death and identifying structural inequalities across large populations.

This shift was not just practical but philosophical. As the research progressed, I moved away from an interpretivist orientation and towards an epistemological position more aligned with pragmatism, which I understand as choosing methods based on their ability to address research questions meaningfully, rather than allegiance to a particular philosophical outlook. Although practical limitations partly shaped the change in approach, it also reflected a growing appreciation for what large-scale data could offer. I came to recognise the utility of quantitative methods for identifying distributions that may not be visible through smaller, more detailed forms of inquiry. These methods allowed me to work with count data and variables not typically available in qualitative research, and they provided an opportunity to challenge my own biases and preconceptions about how knowledge is created, and what is knowable about a subject.

The use of administrative data provided important access to a population that is often overlooked or under-researched due to stigma, institutional barriers, or ethical sensitivities. Although the data were not originally designed for research, their scale and coverage offered the opportunity to investigate mortality and CJ experience and how these intersected with health and social vulnerabilities.

3.3.3 Study Design: Retrospective Cohort Design

This study used a retrospective cohort design, identifying individuals who entered the SDMD between 1 January 2012 and 31 December 2015 and following them until 31 March 2020. These data were subsequently linked to NRS mortality records (see "Data linkage" section below), enabling the utilisation of linked administrative data, a key methodological strength of the study. By linking treatment records from the SDMD with national mortality records from the NRS, it is possible to observe long-term outcomes that would not be visible in either dataset alone. Data linkage allows researchers to track large populations across institutional systems and to explore how health, social, and criminal justice experiences intersect over time. In this case, the linked dataset provides a rare opportunity to examine mortality outcomes among a national cohort of individuals accessing drug treatment in Scotland and to investigate how different forms of criminal justice contact relate to subsequent mortality risk. The analyses presented in this thesis, therefore, illustrate the insights that can be gained through the use of linked administrative data in public health and criminological research. Retrospective cohort designs, such as what was used in the current research, are commonly used in mortality studies, where the outcome of interest has already occurred and routinely collected data enable follow-up without additional data collection (Mann, 2003). This type of study design is often used in research on the mortality of people who use drugs (for example, international research into post-custodial mortality (Binswanger, 2010; Binswanger et al., 2016; Brinkley-Rubinstein et al., 2019) and also post-custodial mortality in Scotland (Graham et al., 2015; Bird, 2024).

In this case, the design allowed for an investigation of mortality across a national cohort of individuals in drug treatment, including those with different forms of contact with the criminal justice system. As Mann (2003) notes, retrospective cohorts enable researchers to establish temporal sequences, assess incidence, and avoid some ethical and practical limitations associated with other types of research. This design was well-suited to the research questions, which are stated at the beginning of this chapter, and the retrospective structure enabled the use of administrative data, a requirement of the SGSSS funding. It also provided a robust sample size of over 35,000 individuals, capturing a nationally representative population of people engaged in drug treatment services during a period of record DRDs in Scotland.

3.4 Data Sources, Quality, and Linkage

This project linked two administrative datasets, the Scottish Drug Misuse Database (SDMD) and the National Records of Scotland (NRS) mortality dataset. The SDMD provided extensive information on individuals accessing drug treatment services in Scotland, whilst the NRS mortality data provided all-cause death information for the subset of SDMD patients who died during the study period. Linkage was conducted to allow investigation into the impact of Criminal Justice System (CJS) contact (data contained in the SDMD) on mortality amongst problem drug users in Scotland between 2012 and 2015, with five years of follow-up.

3.4.1 Scottish Drug Misuse Database (SDMD)

The SDMD was established in 1990 to systematically capture a wide range of data of individuals accessing Tier 3 and 4 drug treatment services in Scotland. Within the context of drug treatment provision, **Tier 3** services typically refer to community-based interventions such as psychosocial support or Medication-Assisted Treatment (MAT), such as prescribed methadone or buprenorphine. **Tier 4** typically involves more intensive or residential rehabilitation for patients with more complex drug treatment needs (Public Health Scotland, 2022c).

The original aims of the database were to monitor trends in drug misuse and service engagement, support the development of policies by providing more in-depth understandings of the social and demographic structure of drug treatment patients, whilst also enhancing service provision (PHS 2021:41). Data for the SDMD were recorded on Scottish Morbidity Records (SMR25a for initial assessments; SMR25b for follow-up assessments[23]) by voluntary organisations, statutory NHS teams, primary care providers, and the SPS[24]. In addition to collecting personal data and recording the patient's community health index number (chi-number), the interviewer also records the main source of referral for all patients (Figure 1).

Importantly, the referral section of the SMR25a is where PHS typically quantifies CJ experience amongst drug treatment patients in Scotland. However, as it excludes those

[23] Please see appendix for full SMR25a and SMR25b proformas.
[24] https://www.parliament.scot/chamber-and-committees/questions-and-answers/question?ref=S3W-34532. Accessed 01/04/2025

referred through criminal justice social work (CJSW) and counts these referrals under the 'social work' category, it is likely that the true knowable number of people with CJ experience within the dataset is underrepresented. Also, beyond CJSW referrals, other sections of the SMR25a forms could indicate whether a patient has or has had CJ contact. For example, as shown in Figure 2, prison can also be a reason a person is no longer cared for by a service. Also, in the social profile section of the SMR25a form, Figure 3 shows that a person can self-disclose having been in prison in the past 12 months, with their current employment, living situation, and legal situation all recorded as in prison.

This matters because the definition of CJ contact significantly affects how many people are counted as having that experience. If only the referral field is used to identify contact with the criminal justice system, it is very likely that a large number of people are being missed and, as a result, are not properly recognised or catered for in services or wider policy. This is the main reason for Research Question 1: how different ways of defining and measuring CJ contact affect its apparent prevalence in the data. Drawing on other sections of the SMR25a form gives us a broader view of who has had contact with the justice system, and helps inform different kinds of support or needs this group might have.

Alongside these CJ indicators, the SMR25a form also captures other key factors that shape people's needs and risks. For example, a person's drug and alcohol related healthcare needs are recorded (Figure 3.1), as well as experiences of homelessness or other high-risk living situations, such as living with other drug users (Figure 3.22).

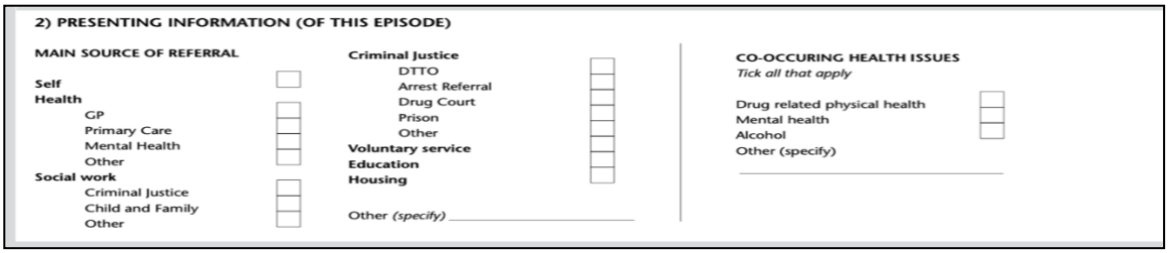
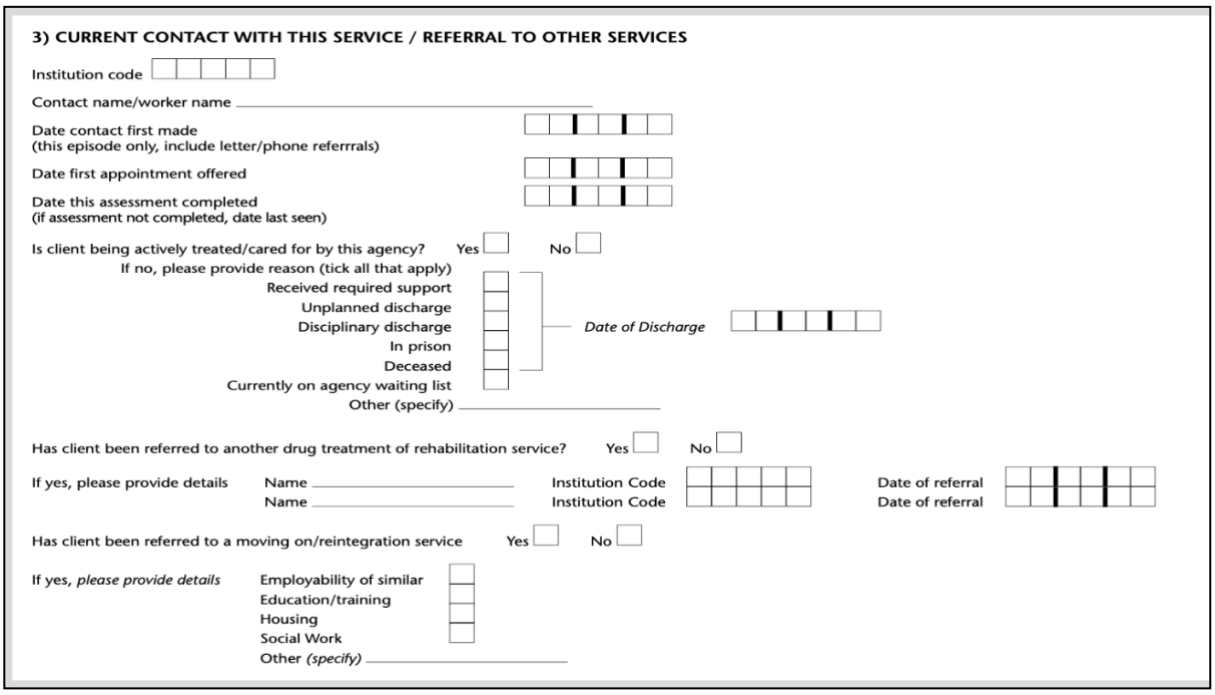


Figure 3.1: SMR25a - Source of referral to drug treatment services and co-occurring health issues



3) CURRENT CONTACT WITH THIS SERVICE / REFERRAL TO OTHER SERVICES

Institution code

Contact name/worker name

Date contact first made
(this episode only, include letter/phone referrrals)

Date first appointment offered

Date this assessment completed
(if assessment not completed, date last seen)

Is client being actively treated/cared for by this agency? Yes No

If no, please provide reason (tick all that apply)
- Received required support
- Unplanned discharge
- Disciplinary discharge
- In prison
- Deceased
- Currently on agency waiting list
- Other (specify)

Date of Discharge

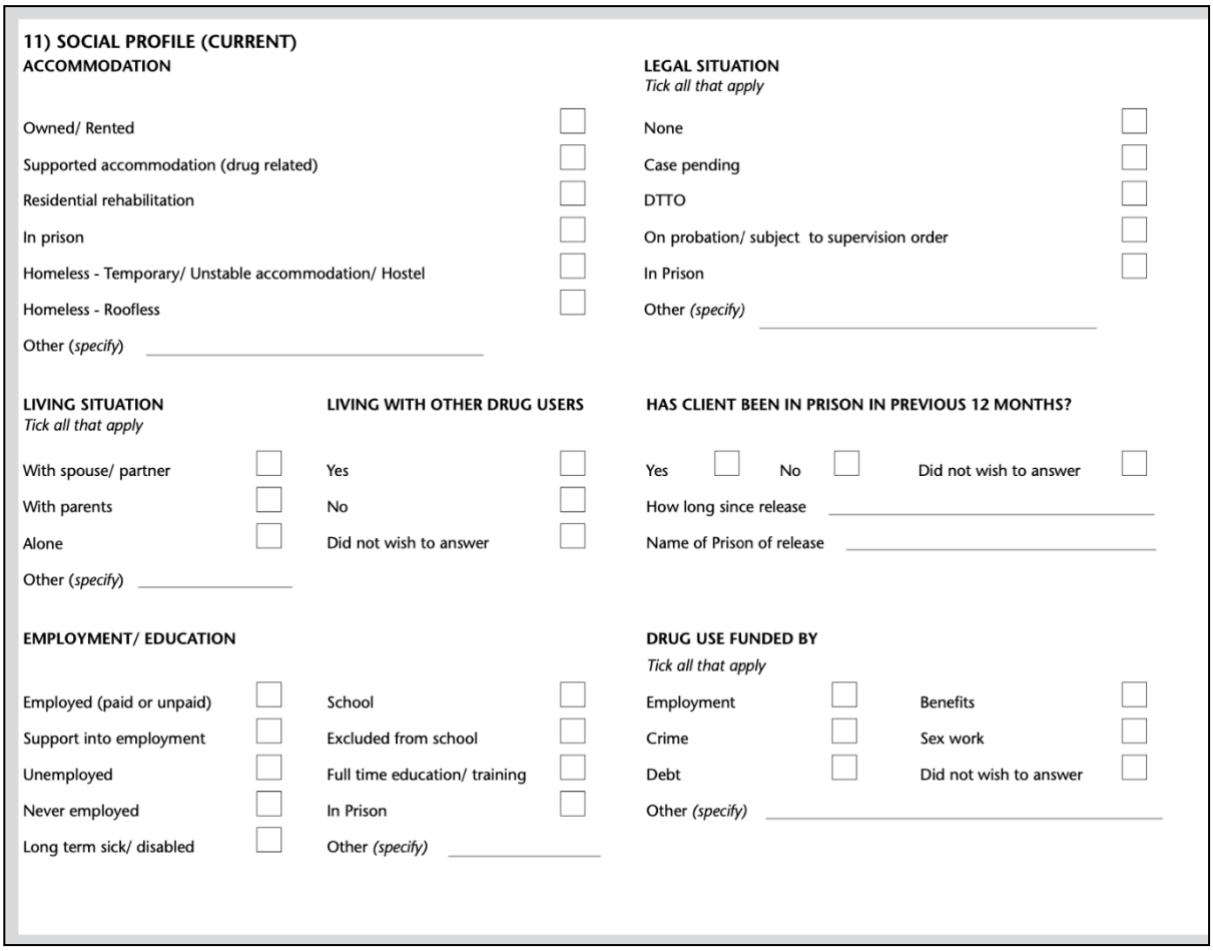
Has client been referred to another drug treatment of rehabilitation service? Yes No

If yes, please provide details Name Institution Code Date of referral
Name Institution Code Date of referral

Has client been referred to a moving on/reintegration service Yes No

If yes, *please provide details*
- Employability of similar
- Education/training
- Housing
- Social Work
- Other *(specify)*

Figure 3.2: SMR25a - Discharge from drug treatment services variables



11) SOCIAL PROFILE (CURRENT)

ACCOMMODATION
- Owned/ Rented
- Supported accommodation (drug related)
- Residential rehabilitation
- In prison
- Homeless - Temporary/ Unstable accommodation/ Hostel
- Homeless - Roofless
- Other (*specify*)

LEGAL SITUATION
Tick all that apply
- None
- Case pending
- DTTO
- On probation/ subject to supervision order
- In Prison
- Other *(specify)*

LIVING SITUATION
Tick all that apply
- With spouse/ partner
- With parents
- Alone
- Other (*specify*)

LIVING WITH OTHER DRUG USERS
- Yes
- No
- Did not wish to answer

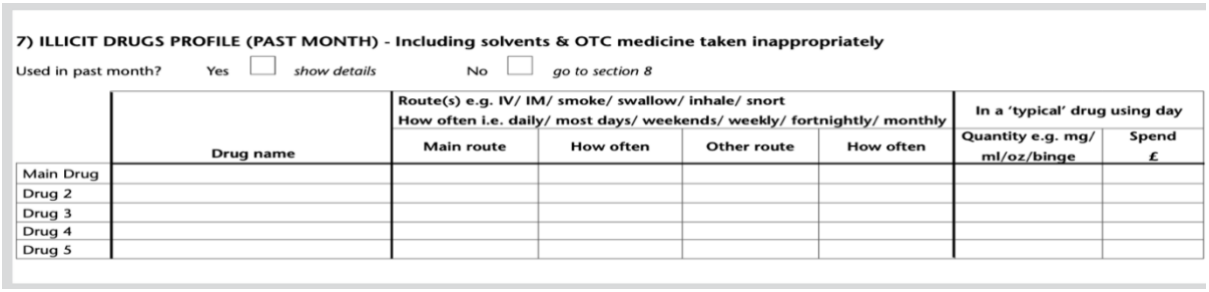
HAS CLIENT BEEN IN PRISON IN PREVIOUS 12 MONTHS?
Yes No Did not wish to answer
How long since release
Name of Prison of release

EMPLOYMENT/ EDUCATION
- Employed (paid or unpaid)
- Support into employment
- Unemployed
- Never employed
- Long term sick/ disabled
- School
- Excluded from school
- Full time education/ training
- In Prison
- Other *(specify)*

DRUG USE FUNDED BY
Tick all that apply
- Employment
- Crime
- Debt
- Benefits
- Sex work
- Did not wish to answer
- Other *(specify)*

Figure 3.3: SMR25a - Social profile, legal situation, history of imprisonment, living situation, and employment status of drug treatment patients

In addition to personal details, health, and social variables, and criminal justice experiences, the SMR25a forms also collect information on a patient's current illicit drug taking profile (Figure 4) as well as drugs they are prescribed, their alcohol use and also their history of drug taking. These data offer a detailed picture of current drug use, which may be relevant in assessing risk profiles for mortality. Additional variables include information on prescribed medication, alcohol consumption, and historical patterns of use.



7) ILLICIT DRUGS PROFILE (PAST MONTH) - Including solvents & OTC medicine taken inappropriately

Used in past month? Yes ☐ *show details* No ☐ *go to section 8*

	Drug name	Route(s) e.g. IV/ IM/ smoke/ swallow/ inhale/ snort How often i.e. daily/ most days/ weekends/ weekly/ fortnightly/ monthly				In a 'typical' drug using day	
		Main route	How often	Other route	How often	Quantity e.g. mg/ ml/oz/binge	Spend £
Main Drug							
Drug 2							
Drug 3							
Drug 4							
Drug 5							

Figure 3.4: SMR25a - Self-reported illicit drug profile

While the SDMD provides extensive data on drug-treatment patients in Scotland, it has known limitations. Public Health Scotland (2022:6-18) reported that SDMD data completeness was "consistently lower" than that of the Drug and Alcohol Treatment Waiting Times (DATWT) dataset, particularly in 2012/13 and 2013/14, when data quality issues led to the suspension of national SDMD reporting in some NHS Boards.

These inconsistencies are important to acknowledge when interpreting trends across health boards or over time, and when assessing whether deaths within this cohort may be missing. As outlined by Harron (*et al.*, 2017), bias may arise when individuals fail to appear in administrative datasets due to non-interaction with services or linkage failure. In this study, some individuals with CJ involvement may not have been recorded in the SDMD, potentially leading to an underestimation of the prevalence of CJ contact and weakening the observed associations with mortality.

Table 3.1: SDMD data % completeness vs DATWT 2012 to 2020

Financial year	**11/12**	**12/13**	**13/14**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**
% SDMD complete	65.9	72.5	X	71.8	66.7	67.2	64.7	60.3	64.2

3.4.2 National Records of Scotland (NRS) mortality data as a data source

The National Records of Scotland (NRS) is a non-ministerial department of the Scottish Government formed in 2011 by merging the General Register Office for Scotland (GROS) with the National Archives of Scotland. The remit of NRS is to collect, preserve, and produce information about Scotland's people and history. One of its key responsibilities is the registration of vital events such as births, marriages, and deaths – publishing reports on specialist subjects within its remit, such as its recent series of DRD reports in response to the record levels of drug deaths in Scotland (see Chapter 2).[25]

As a result, NRS holds all the mortality data necessary for this linkage project. When a death occurs in Scotland, it must be registered with a local registrar within eight days. This process involves the production of a Medical Certificate of Cause of Death (MCCD), completed by the medical practitioner detailing the cause of death as well as any underlying causes of death.[26] This is then sent by the medical practitioner directly to the registrar for inclusion in the civil register. Then, according to the Scottish Public Health Observatory (SCTPHO 2025), NRS codes each death using the International Classification of Diseases, Tenth Revision (ICD-10) guidelines set by the World Health Organisation (WHO).[27] This coding identifies both the primary cause of death and any contributory factors.

The NRS mortality dataset used in this study included several key variables relevant to the analysis of the deaths of drug treatment patients from the SDMD cohort. These included the date of death, underlying cause of death, and up to two contributory causes, all coded according to ICD-10 classifications. Additional fields included the age at death, sex, and a unique person-level identifier that allowed linkage to the SDMD. The availability of multiple contributory causes of death enabled the identification of various factors behind a person's death over and above DRDs, including overlapping physical health conditions, external causes such as assaults, accidents or suicide. This level of detail was essential for capturing the full range of deaths experienced within the cohort, beyond just those officially recorded as drug-related.

[25] https://www.nrscotland.gov.uk/about-us/what-we-do/. Accessed 01/04/2025
[26] https://www.nrscotland.gov.uk/registration/registering-a-death/#. Accessed 01/04/2025
[27] https://www.scotpho.org.uk/population-dynamics/deaths/data/data-introduction/. Accessed 01/04/2025

3.4.3 Data quality and completeness

As the official curator of Scotland's vital records, NRS maintains datasets that are widely regarded as near-complete. Their methods and coverage mean the NRS mortality data are unlikely to suffer from misreporting of variables or missing records. Deaths in Scotland must be legally registered using the methods detailed above, ensuring that mortality data is both robust and exhaustive for the Scottish population as a whole. It is highly likely that the mortality data for this research are complete. However, the mortality data is only as good as the data it is linked to, meaning if there are missing SDMD patients, then the mortality records will also be missing. This is because the mortality dataset is a sub-cohort of the SDMD dataset (see Table 3.1 above).

3.5 Linkage

The linkage between these two datasets was performed using the Community Health Index (CHI) numbers. According to PHS, in Scotland, every individual registered with a General Practitioner (GP) is assigned a CHI number.[28] This unique ten-digit identifier typically includes an individual's date of birth and additional check digits to ensure accuracy. The CHI system, managed by NHS Scotland, is the basis of much of the country's health data infrastructure. CHI number coverage enables the consistent and secure sharing of patient information across different health boards.

Because a CHI number is unique to a person, it provides a unique key to match across any records for the same person without using personally identifying data such as names and/or addresses. When the same CHI number appears in both the SDMD and NRS datasets, they can be confidently linked and considered the correct health and mortality records. Deterministic linkage (covered in more detail below) using CHI numbers greatly reduces the risk of false matches, unlike probabilistic methods, which rely on combinations of identifiers such as name, date of birth, and postcode.

Below is a table providing a high-level description of the data resulting from the linkage process. It shows that while there are over 193,000 SDMD entries across the 2012–2020

[28] https://publichealthscotland.scot/resources-and-tools/health-intelligence-and-data-management/national-data-catalogue/data-dictionary/search-the-data-dictionary/chi-number/#:~:text=The%20CHI%20number%20is%20a,used%20to%20identify%20a%20patient. Accessed 01/04/2025

period, these represent around 35,000 unique individuals. Of these, 4,008 were successfully linked to mortality records in the NRS data. The gender breakdowns highlight the much higher number of deaths among men (2,929) compared to women (1,079), which reflects the wider trends in DRDs during this time (National Records of Scotland, 2022). These figures also give a sense of the scale and structure of the cohort being used in the analysis.

Table 3.2: SDMD and NRS datasets 2012-2020 cohort

	SDMD	**NRS**
Total	193,295	4,008
Unique	35,331	4,008
Male	25,011	2,929
Female	10,320	1,079

3.5.1 **Data linkage process**

This section describes the method used to match and link records across the Scottish Drug Misuse Database (SDMD) and National Records of Scotland (NRS) datasets, beginning with an overview of the technical approach to linkage, followed by a description of the role of trusted third parties. Understanding how the datasets were combined is essential for interpreting the final dataset used in this analysis.

Although I was not involved in the initial CHI-based linkage, I was responsible for preparing and managing the de-identified linked datasets once they were deposited in Scotland's National Safe Haven (see below). This involved merging the SDMD and mortality data using a study-specific ID generated by eDRIS, verifying mortality status, and creating custom lookup tables to recode ICD-10 causes of death into meaningful categories for analysis. These were converted into factor variables to enable consistent analysis across categories of CJ involvement. These steps are described in detail later in the methodology chapter, but they reflect the considerable data wrangling required to transform raw linkage outputs into an analysable format.

3.5.2 **Deterministic vs Probabilistic linkage**

The linkage used in this research was deterministic, meaning records were only joined when an exact match was found using the Community Health Index (CHI) number.

Deterministic linkage is considered the most accurate method for reducing false matches, as it avoids the uncertainty involved in comparing multiple identifiers such as name, postcode, or date of birth.

However, even deterministic methods are not without limitations. As Kinner, et al. (2013) point out, some true matches can still be missed if key identifiers are incorrectly recorded, incomplete, or missing entirely. Although CHI coverage is high across NHS datasets in Scotland Fleming (et al., 2012), note that there can still be gaps or inconsistencies, especially when drawing on multiple data sources. In such cases, additional matching strategies may be required to ensure sample completeness and minimise bias through inconsistent coverage across datasets, as discussed above regarding differences between DATWT and SDMD figures across the study period (Harron et al., 2017). This is particularly important when studying populations that are more likely to experience administrative or data quality issues.

3.5.3 **Third party linkage**

In Scotland, all record linkage involving personal identifiers is conducted by a trusted third party to ensure that individual privacy is protected throughout the research process. For this project, the Electronic Data Research and Innovation Service (eDRIS), operated by Public Health Scotland (PHS), performed this role.[29] eDRIS held the Scottish Drug Misuse Database (SDMD) and was responsible for securely initiating the linkage to mortality records held by the National Records of Scotland (NRS).

Following standard procedure under the Scottish model for data linkage (Fleming et al., 2012; Pavis and Morris, 2015), eDRIS used CHI numbers to extract the relevant cohort from the SDMD. These CHI numbers were then transferred securely to NRS, which returned mortality records for individuals with matching identifiers. Once the records had been returned, eDRIS removed all CHI numbers and replaced them with study-specific pseudonyms, ensuring that no directly identifying information was present in the final dataset made available for research (see Figure 3.5).

At no stage could any one organisation, including eDRIS, NRS, or the research team, access both the personal identifiers and the content data simultaneously. This separation is

[29] https://publichealthscotland.scot/resources-and-tools/health-intelligence-and-data-management/electronic-data-research-and-innovation-service-edris/overview/what-is-edris/. Accessed 01/04/2025.

critical for protecting confidentiality and minimising the risk of re-identification (see Figure 3.6 for data flow; Higgins and Matthews, 2020).

Prior to my involvement in the study, the SCADR team had sought full ethical approval for the project and conducted a Data Privacy Impact Assessment. The team had also developed a research proposal seeking approval to access data from the Public Benefit and Privacy Panel for Health and Social Care (HSC-PBPP). This panel, made up of experts in health, ethics, and information governance, evaluates whether a proposed project meets the required standards for privacy protection and serves a clear public benefit. It is the project itself, not the researcher, that must be approved before access is granted (ibid, Harron *et al.*, 2017). In developing my PhD study, I had to ensure that my research questions were fully aligned with the terms of the PBPP approval.

Once approved, eDRIS deposited the final de-identified dataset into Scotland's National Safe Haven which is a secure, virtual research environment governed by strict access controls[30]. Approved researchers may access the Safe Haven remotely via secure login, but cannot download or export data directly. All outputs are subject to disclosure control checks by an eDRIS coordinator before they can be released. This ensures that the results do not unintentionally reveal information about individuals or small subgroups (see below).

[30] https://publichealthscotland.scot/resources-and-tools/health-intelligence-and-data-management/electronic-data-research-and-innovation-service-edris/national-safe-haven-nsh/. Accessed 01/04/2025.

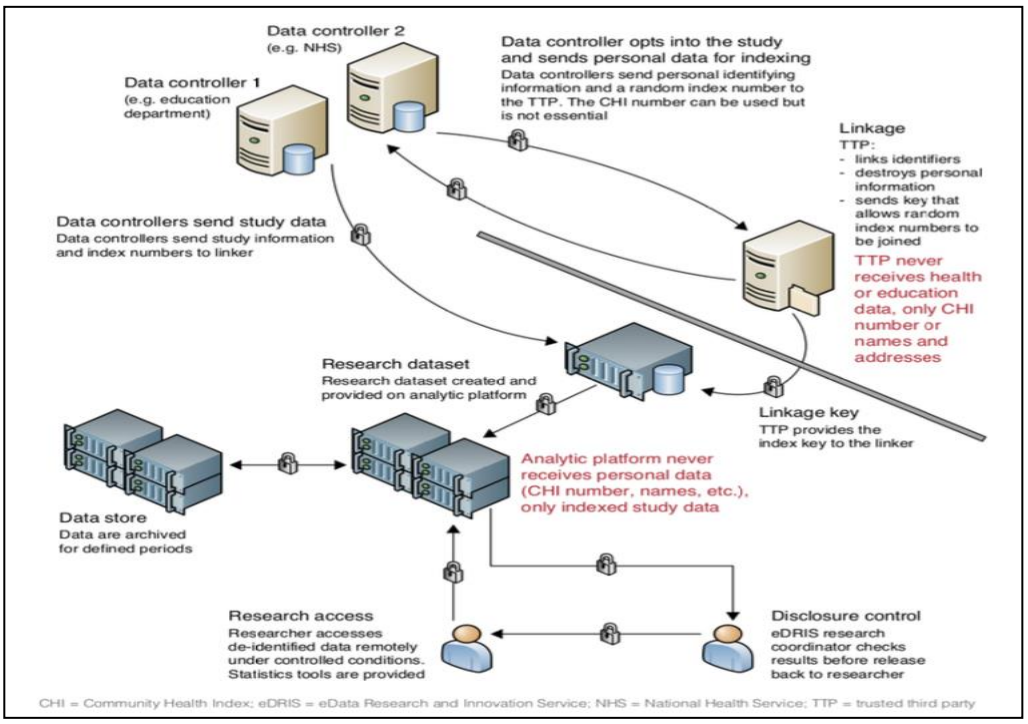


Figure 3.5: Data linkage process
(recreated from Pavis and Morris, 2015)

3.5.4 **Statistical Disclosure Control (SDC)**

All research using linked administrative data in Scotland is subject to Statistical Disclosure Control (SDC) procedures to ensure that individual identities cannot be deduced from published outputs. SDC refers to a set of methods used to reduce the risk of disclosing sensitive or identifying information when presenting tabular or statistical results. These safeguards are especially important in projects involving vulnerable or small population groups, where the risk of inadvertent disclosure is heightened. As mentioned above, within the Safe Haven, researchers are not permitted to export any data until all outputs, such as tables, charts, and regression results, have been manually reviewed and approved by an eDRIS coordinator. Suppression rules and rounding are applied where necessary to ensure no outputs reveal potentially identifying small cell counts, extreme values, or combinations of variables that could lead to re-identification (Government Statistical Service, 2014; Grifiths et al., 2019; Public Health Scotland, 2024). These processes are part of a broader legal and ethical framework that upholds data confidentiality while allowing for meaningful public health research.

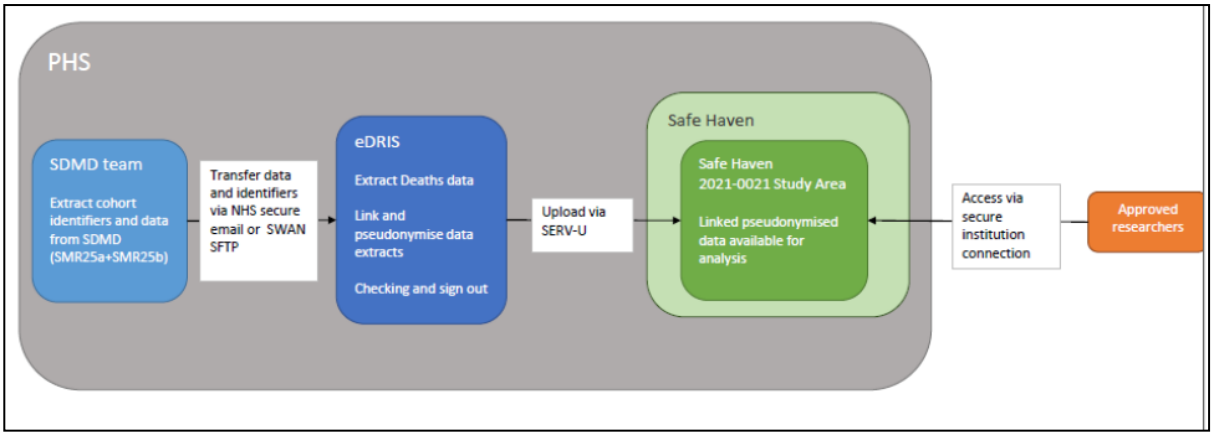


Figure 3.6: Data flow for this thesis (Internal PBPP documentation)

3.6 Ethics and access

This section discusses the ethical foundations for this project, which were constantly updated and referred back to where and when necessary, throughout. This included, but was not limited to, legal approvals, data protection responsibilities, training requirements, and safeguards to minimise harm. Working with sensitive health and mortality data drawn from an already vulnerable population meant that extra care was taken at every stage of the project, from design and governance to data handling and dissemination. Ethical approval and regulatory oversight were secured by the SCADR team through multiple channels, most notably via the Public Benefit and Privacy Panel for Health and Social Care (PBPP), which assesses whether projects serve a clear public interest and meet strict privacy standards.[31] In addition to this, I obtained my own ethical approval to work with this data and conduct the analysis through the University of Glasgow's College of Social Sciences ethics process.

3.6.1 Permissions process

As highlighted above, this project was initially conceived of and developed by another researcher as part of a Scottish Centre for Administrative Data Research (SCADR) project. As such, all legal and ethical approvals were sought and granted prior to this thesis. Due to the nature of the research and the data required to meet its aims, legal and ethical approvals must be obtained.

[31] https://www.informationgovernance.scot.nhs.uk/pbpphsc/#:~:text=and%20access%20needs.-,NHS%20Scotland%20Public%20Benefit%20and%20Privacy%20Panel%20for%20Health%20and,benefit%20and%20information%20governance%20requirements.. Accessed 01/04/2025.

At the time of the PBPP application, the legal basis for processing the personal and special category data used in this project was the General Data Protection Regulation (GDPR) Article 6(1)(e), which permits processing in the exercise of official authority. Article 9(2)(j) also provides a legal basis for processing special category data for research purposes in the public interest (Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (United Kingdom General Data Protection Regulation)). Although the application was made under the EU GDPR before the end of the Brexit transition period, these provisions have since been carried over into UK law under the UK GDPR and the Data Protection Act 2018. While the broader implications of this legal transition are beyond the scope of this thesis, it is noted here to reflect the changing legal context in which this research took place. These justifications were incorporated into the project's Data Protection Impact Assessment (DPIA)[32] and ethics documentation as part of the approvals process followed by SCADR and the University of Edinburgh.

3.6.2 **Secure Data Access and Scotland's Safe Haven**

As noted earlier in this chapter, both the National Safe Haven and the PBPP for Health and Social Care are essential for ensuring the ethical and secure handling of the data used in this study. This section provides a fuller account of the Safe Haven infrastructure and the PBPP approval process.

The ISD Scotland Safe Haven is a secure computing environment that provides researchers access to de-identified, linked health data from various Scottish health and social care databases. Managed by the eDRIS team within Public Health Scotland, the Safe Haven is designed to meet high information governance and data protection standards, including compliance with the UK General Data Protection Regulation (UK GDPR) and associated national legislation (see above).

Safe Haven supports a wide range of research projects, particularly in public health, by providing controlled access to data such as hospital admissions, cancer registrations, mental health records, prescribing data, and vital events like births and deaths. The data

[32] https://data-protection.ed.ac.uk/data-protection-impact-assessments. Accessed 01/04/2025.

used in this thesis, individuals in drug treatment, also includes data on criminal justice experience and mortality, which all fall well within the remit of Safe Haven research.

To gain access to data within the Safe Haven, researchers must submit a detailed application outlining the project's research aims, data requirements, and analytical plans. This application is then reviewed by eDRIS in collaboration with the PBPP. Researchers must also sign a User Agreement confirming that they will comply with all conditions imposed by eDRIS regarding access, analysis, and use of the data, which I did with the lead researcher, Professor Susan McVie.

3.6.3 **Mandatory training**

Access to the data was conditional on the researcher completing several mandatory training courses covering GDPR, statistical disclosure control, data security, and information governance. These requirements were in line with the Five Safes framework (Griffiths *et al.*, 2019), which supports Scotland's secure data environment and is central to ensuring responsible use of administrative data. Responsible use is premised on the principles that data use for research is lawful, proportionate, and secure.

As part of this framework, I was required to demonstrate that I was a Safe Researcher, someone with appropriate training, background, and authorisation to access restricted data. Therefore, I completed the Office for National Statistics (ONS) Safe Researcher Training, which is delivered by SCADR, on two separate occasions, initially in 2021 and then again in 2024, as it is mandatory to renew the training every three years. This training introduced the principles of data security, legal responsibilities, statistical disclosure control, and ethical risk management in administrative data research. It also covered handling sensitive variables, the importance of audit trails, and good practices in remote-working environments such as Scotland's Safe Haven.

In addition to the ONS and GMC training, I also completed several mandatory internal courses through the University of Glasgow. These included GDPR training, which provided a grounding in the legal basis for processing personal data, data subjects' rights, and how to respond to breaches. I also completed modules on Information Governance, covering data protection, confidentiality, and secure data-handling practices, and on

Research Data Management, focusing on planning, storing, and responsibly preserving research data throughout the project.

This training ensured that I understood the safeguards required for each stage of the project, from accessing and analysing the data to managing outputs in line with Safe Output principles. It also provided the tools needed to work within the constraints of the Safe Haven setting, including limitations on file sharing, downloading, and data exporting.

All training was completed before accessing the data and remained a central component of the project's ethical commitments. Although the legal and governance structures were in place before I joined the project, I was responsible for upholding them in practice throughout the data access and analysis phases.

3.6.4 **The Five Safes**

The Five Safes framework is a widely adopted model for managing access to sensitive data in secure environments. Developed by Felix Ritchie at the UK Office for National Statistics, the framework ensures that data use is ethical, safe, and in the public interest. It comprises the following elements:

- *Safe People*: Only named researchers, including myself, who completed all required training and were approved under the Health and Social Care PBPP application, were granted access.
- *Safe Projects*: The research received approval from the Research Ethics and Integrity Group (REIG) at the University of Edinburgh and the Public Benefit and Privacy Panel (PBPP), with a clear case for public benefit.
- *Safe Data*: Only de-identified, linked administrative records from the SDMD and NRS were accessed, and variables necessary to answer the research questions.
- *Safe Settings*: All analyses were conducted within the Scottish National Safe Haven, a secure, controlled, and trusted research environment.
- *Safe Outputs*: All outputs underwent statistical disclosure control and were only released after being reviewed and approved by Safe Haven staff.

These safeguards collectively ensured that the project complied with high standards of data protection, confidentiality, and ethical research practices, consistent with best practices outlined in the Handbook on Statistical Disclosure Control for Outputs (Griffiths et al., 2019).

3.6.5 Additional Ethics

Although the legal, regulatory, and data protection frameworks were already in place before I joined this SCADR project, I remained responsible for ensuring that all ethical safeguards were upheld throughout the data access and analysis phases. In line with best practice in administrative data research, this project did not involve direct contact with individuals or require the active participation of anyone included within the SDMD dataset. Because of this, individual informed consent was not sought or required. This approach is standard for secondary analysis of de-identified data and was approved through the PBPP.

As the data were de-identified before access, participants could not be recontacted or withdrawn from the study following linkage. This limitation was mitigated through strict adherence to information governance protocols and the application of disclosure control procedures. All statistical outputs were reviewed by Safe Haven staff and assessed for disclosure risk. Where necessary, small cell counts were suppressed or redacted to avoid the possibility of re-identification.

It is also acknowledged that the use of administrative data, while essential for large-scale, population-level research, can limit its ability to capture the full complexity of individual lives. This trade-off is recognised, particularly with respect to the social, health, and criminal justice experiences of those represented in the data.

3.7 Data preparation and variable construction

This section outlines the steps taken to transform the raw linked administrative data into a format suitable for statistical analysis. Although the datasets used in this project were comprehensive in scope, they were not initially designed for research purposes. As a result, considerable work was required to restructure, recode, and prepare the data before any meaningful analysis occurred.

This section has two main aims. First, it explains how the original variables from the Scottish Drug Misuse Database (SDMD) and the National Records of Scotland (NRS) were cleaned, reshaped, and organised into a usable format. Second, it documents how new variables were constructed in line with the project's aims, including the main variables: mortality and CJS experience.

Given the size and structure of the dataset, which has just under 200,000 rows representing treatment episodes for 35,331 unique patients, 115 original variables, and more than 120 individual drug codes spread across five separate fields, this preparation work was far from straightforward. None of the variables were immediately analysable, and all required recoding, cleaning, and restructuring. Most of this was implemented using R (R Core Team, 2024) within the Safe Haven environment, primarily the Tidyverse package (Wickham et al., 2019). This stage was the most technically demanding and time-consuming part of the project, but it was essential for producing a clean dataset suitable for modelling and interpretation.

3.8 Data cleaning and pre-processing

The raw dataset contained just under 200,000 rows of patient assessments, drawn from 35,331 unique individuals. These assessments were often repeated over time, so the data were structured in long format with multiple entries per person. There were 115 original variables, most of which were recorded as either character or numeric types. None of these were in a format that could be analysed directly. Almost every variable had to be converted to a factor with defined levels, and many character strings had to be standardised to correct for inconsistent entries.

To make the data research-ready, it had to be transformed from long to wide format. This meant generating binary (dummy) variables to capture individual-level experiences across multiple treatment episodes. Without doing this, key information such as whether someone had ever reported contact with the CJS risked being missed. For example, Figure 3.1 above shows at least 16 different referral pathways, six of which are related to the CJS. These were collapsed into a new CJS referral variable, but only after checking for consistency across entries. Similarly, ‘legal situation’ (Figure 3.3) was another field where CJS contact could be self-disclosed. Each unique value in this field was converted into a binary variable to avoid overlooking any past experience that had been inconsistently recorded across a patient’s assessments.

CJS involvement, particularly in the case of prison, was documented in a fragmented manner. Patients could report contact through various means such as referral pathways, legal situations, health board locations, or factors related to employment and

accommodation. Specifically for prison, there were at least seven different indicators showing whether an individual had been in custody, such as being assessed in a prison, listing prison as an accommodation or employment setting, or reporting that treatment was halted due to a prison sentence. Each of these indicators had to be extracted, validated, and consolidated into a single variable representing the 'Prison CJS Experience' category (Figure 3.9). This approach was similarly applied to the other two CJS categories: 'Non-Prison CJS Experience' (Figure 3.8) and 'No reported CJS Experience' (Figure 3.7). These variables were essential for addressing Research Questions 1–5 regarding the prevalence and characteristics of individuals with different types of CJS contact.

This work alone required extensive R scripting, manual checking, and repeated validation across thousands of rows. It was also only one part of the broader data preparation process. By the time mortality- related RQs were being analysed, the cleaned dataset had been expanded to include almost 300 variables. The timeline from start to end was also relatively short, with the data entered into the Safe Haven in April 2023 and ready to be worked on in May 2023, my PhD funding ending in December the same year, and then one year's thesis-pending time.

The complexity was increased when it came to variables related to drug use. Using a national NHS drug coding system, the SMR25a form allowed up to five self-reported substances to be recorded per assessment (figures on substances follow CJ experience). Across the whole dataset, there were 124 distinct illicitly used drug entries, including prescribed medications, street drugs, and unspecified substances. Each of these had to be reviewed and manually matched to a grouped drug type using a custom lookup table created in R. For example, all entries referring to benzodiazepines, including brand names like Diazepam and Zimovane or vague descriptions such as "control of anxiety (unspecified)", were collapsed into a single variable (see Figure 9). These drug groupings were essential for any meaningful analysis of substance use profiles and their association with CJS contact or mortality.

This entire data-cleaning and preparation process took many months of sustained effort and was the most labour-intensive stage of the PhD. All in, from accessing the data to writing and submitting this thesis, I had around 23 months, and, importantly, I did so under significant limitations. My formal statistical training had been severely disrupted - first due to industrial action during my Master's year, and then COVID-19, which cancelled in-

person teaching and left me with only two weeks of formal quantitative methods instruction. The first 18 months of my PhD were similarly affected by lockdowns and reduced access to training and support. As a result, this work was largely self-taught and conducted independently in the National Safe Haven, using R. Despite this, it was essential to build a robust dataset to support the modelling strategy outlined in the next section.

3.9 Key variables: mortality and CJS status

This section explains the construction of the primary outcome variable, mortality, and the key explanatory variable, criminal justice system (CJS) status. These variables were used to address Research Question 8: What demographic, drug-use, health and social factors are most predictive of mortality amongst people seeking drug treatment, and how do these relationships vary by CJS experience?

The National Records of Scotland (NRS) mortality dataset was linked to the Scottish Drug Misuse Database (SDMD) using pseudonymised identifiers provided through the Safe Haven. Each death was recorded in the NRS data with a variable indicating the month and year of death. This was used to create a binary dependent variable in R.

- 1 = deceased if a death date was recorded during the follow-up period
- 0 = alive if no death was recorded

Mortality was therefore treated as a binary outcome indicating whether an individual died during the observation period.

Criminal justice system (CJS) status was constructed as a separate explanatory variable based on information recorded in the SDMD. Individuals were classified into three mutually exclusive categories reflecting their type of justice involvement:

- No CJS contact
- Non-prison CJS contact
- Prison CJS contact

This variable was used to examine differences in mortality risk across types of justice exposure. In addition to models that included the full cohort, further analyses compared these groups directly to explore whether the factors associated with mortality differed

among individuals with prison experience, non-prison CJS contact, and no recorded justice involvement.

It is important to note that the analytical approach differs across chapters. In Chapter 4, mortality is not included in the analysis; instead, the focus is on how social, health, and drug-related vulnerabilities vary by criminal justice system (CJS) contact. In this context, CJS status is treated as the key explanatory variable, with "No CJS contact" used as the reference category when calculating prevalence ratios. These analyses address Research Questions 2-5 by examining how vulnerability patterns differ across groups defined by the type of justice involvement.

In contrast, Chapter 5 introduces mortality as the outcome of interest. In this chapter, mortality is modelled as a binary dependent variable, and CJS status is included as an explanatory variable to assess how different forms of justice contact relate to the risk of death in answer to research questions 6-8.

3.10 Research Question 1: How does the prevalence of justice-experienced drug users vary depending on how criminal justice contact is defined?

This research question is situated in the methodology chapter because it directly addresses how one of the key variables used throughout the thesis, CJ contact, was constructed and defined. Understanding the implications of these definitions is a necessary first step before moving to the descriptive and outcome-focused analyses in later chapters. RQ1 explores the extent to which the known prevalence of CJS experience among those in drug treatment varies depending on how it is measured, and whether relying solely on referral data underestimates inclusion within the CJ-experienced subcohort.

Various indicators of CJ contact recorded in the SDMD were collected to address this, including referral source, self-reported prison history, reason for service discharge, and self-reported information on legal and/or living circumstances. These indicators were used to categorise individuals into three distinct groups of CJ experience: no recorded contact (acknowledging that contact may have occurred but was not self-disclosed or captured during the study period), non-prison contact, and prison contact. This grouping is used throughout the thesis to examine differences in demographic, social, health, and drug-use characteristics, and their associations with mortality. Clarifying how these groups were

formed is important for understanding the patterns discussed in later chapters. Additionally, it reflects one of the key aims of the thesis: to produce a more accurate estimate of the knowable number of drug treatment patients who have had contact with the criminal justice system.

3.10.1 Referral routes

Data collected annually on all initial assessments for treatment are published by Public Health Scotland (PHS). Figures published for 2015/16 show that only 7% of those with a referral to specialist drug treatment services were referred by social workers, including CJSW[33]. By 2018/19, this figure had increased to 17% (Public Health Scotland, 2022b). Even though the proportion recorded as being referred by CJSW had more than doubled between these two periods, the statistics appear surprisingly low given the widespread belief that criminal justice contact among problem drug users is high (Carnie *et al.*, 2017; Carnie and Broderick, 2019; Toomney, et al., 2022).

Table 3.3 presents the distribution of referral routes of patients accessing drug treatment by CJ experience between 2012 and 2015 (n = 35,331), as recorded on SMR25a forms by healthcare professionals. In the SMR25a dataset, the 'CJS referral' category includes referrals from prison-based services, criminal justice social work (CJSW), Drug Treatment and Testing Orders (DTTOs), and court-mandated treatment pathways such as Drug Courts. This reflects the current operational definition used by Public Health Scotland to indicate justice involvement.

While CJS referrals are the official indicator used by PHS, these data show that only 44.5% of people with prison contact and just 16.5% of those with non-prison CJS contact entered treatment through these routes. This means that more than half of the prison group and over four-fifths of the non-prison group would be excluded from any analysis. These figures reinforce the need for a more inclusive operationalisation of CJS contact, incorporating multiple indicators available within the SMR25a dataset.

Given the number of CJ-related indicators and the small counts in some categories, grouping these into broader categories, whilst separating prison and non-prison experiences, made the analysis more feasible and reduced disclosure risk. As most of the

[33]See data table (sheet 2.4) https://publichealthscotland.scot/publications/scottish-drug-misuse-database/scottish-drug-misuse-database-overview-of-initial-assessments-for-specialist-drug-treatment-202021/.

literature on CJ contact and drug use in Scotland has focused on the prison population, it was essential to have a 'prison' group for analysis. However, during data analysis, many individuals were involved with the CJ system but had no evidence of having been in prison. (As a side note, this discovery was made well after I had completed the literature review, and there was no time to thoroughly examine the literature on people with CJ experience short of prison who were also in drug treatment). For example, several people had been referred as part of a Drug Treatment and Testing Order (DTTOs) or from a specific Drug Court. Drug Courts and DTTOs are alternatives to standard criminal prosecution, where a person's drug addiction issue is supposed to be taken into account alongside any offending which brought the individuals into contact with the CJS. There were also referrals for probation, police arrest and various other justice-related processes. However, there were insufficient numbers to examine these individually (as these might have posed a disclosure risk if analysing them by other variables); therefore, individuals with CJ experience other than prison were clustered into a 'Non-prison experience' group.

The remaining cohort members (without flags indicating CJ contact) were classified as the 'No CJS experience' group, which, as previously explained, included those who had no recorded contact with the CJS during the study period. However, they might have had contacts that were missed by data collectors or occurred before the study period. These three categories together make up the 'CJS contact' variable.

Table 3.3: Route of referral by CJS experience

Variable	**No contact**		**Non prison contact**		**Prison contact**	
	N	**%**	**N**	**%**	**N**	**%**
Social work	1026	6.1	404	6.2	197	1.6
Health Service	6025	36.1	1827	27.9	1615	13.3
CJS	0	0	1127	17.2	5385	44.5
Self-Referral	7256	43.5	2527	38.6	3857	31.9
Other routes	2380	14.3	660	10.1	1045	8.6
Total	16,687	100	6545	100	12,099	99.9

3.10.2 CJS status

Figure 3.7 shows the composition of the 'No CJS' group. This group consists of individuals who fulfil both of the following criteria: (1) those who explicitly self-reported no contact with the criminal justice system at the time of their initial assessment, and (2)

those who were not flagged by any of the administrative indicators in the SDMD relating to referral route, legal situation, prison location, or imprisonment-related accommodation or employment. This group serves as the reference category throughout the descriptive and inferential analyses of justice-experienced individuals, and is labelled 'No CJS' in all tables, charts, and regression outputs.

CJS contact is conceptualised in this study not simply as an administrative exposure, but as a key dimension of structural vulnerability. As outlined in Chapter 2, forms of criminal justice contact, including imprisonment and community-based sanctions, are embedded within broader processes of social marginalisation and penal regulation (Wacquant, 2009; Western, 2018). Within this framework, CJS contact may operate both as a source of harm, through disruption, stigma, and heightened risk during and after contact, and as an indicator of underlying disadvantage. The categorisation of CJS experience into prison, non-prison, and no contact, therefore, allows the analysis to distinguish between different forms of institutional exposure and to examine whether mortality risk is associated with CJ contact itself, or with other health or social vulnerabilities within which such contact occurs.

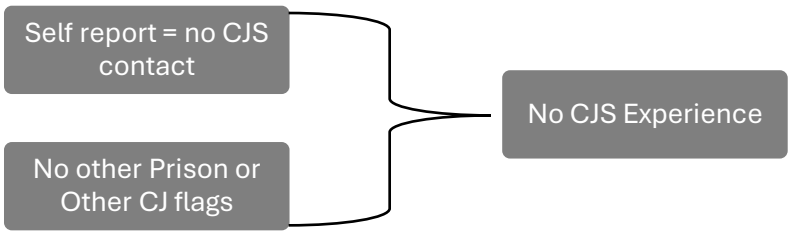


Figure 3.7: Creation of "No CJS Experience" variable

3.10.3 **Non-prison CJS Experience**

Figure 3.8 shows the composition of the group of people with CJ experience that did not include prison. This group, described throughout this study as 'Non-prison CJ experience', had either self-reported as having experience of the Criminal Justice System or were flagged by variables that indicated they had experienced the criminal justice system, for example having had a Community Payback Order (CPO), a Drug Treatment and Testing Order (DTTO) or having been referred to treatment through one of the referral routes listed above. As above, individuals within this group may have had other experiences with the

CJS that were either not disclosed by the patients during their initial assessment or not flagged by any of the CJS flag variables. This group may have had more than one of these experiences, however measuring this was beyond the scope of this current thesis and individuals were included in this group by having at least one of the above without any prison flags (see below).

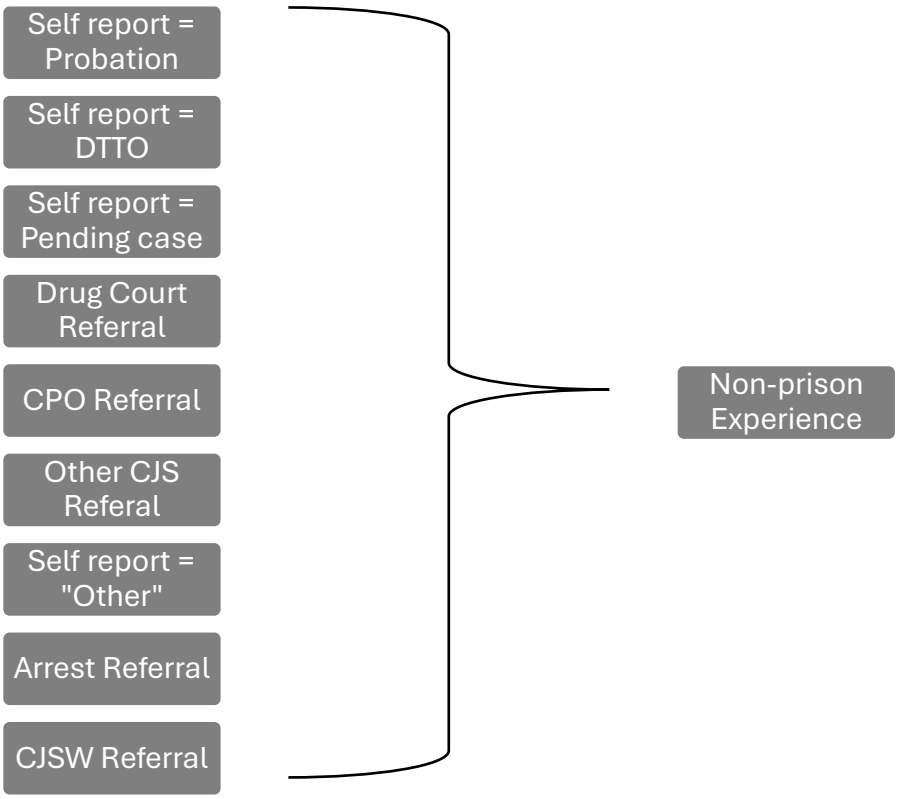


Figure 3.8: Creation of "Non-Prison CJS Experience" variable

3.10.4 **Prison CJS Experience**

Figure 3.9 shows the composition of the final CJ status group, 'Prison CJ Experience'. These patients met the criteria of having experienced some form of prison custody during the study period, either because they had reported themselves as being in prison, their accommodation (Accom) was registered as a prison, their Scottish Health Board was registered as being a prison, or their treatment was stopped because they were in prison. There was also an option for patients to disclose that they had experienced imprisonment in the 12 months before their initial assessment for treatment, which was logged and used to flag prison experience in this thesis. It should be noted that many in this group also reported having non-prison CJS experiences, as listed above. However, an analysis of the effects of being in both groups is beyond the scope of this thesis. Individuals with flags

indicating both prison and non-prison CJS experience will be solely in the prison CJS experience group.

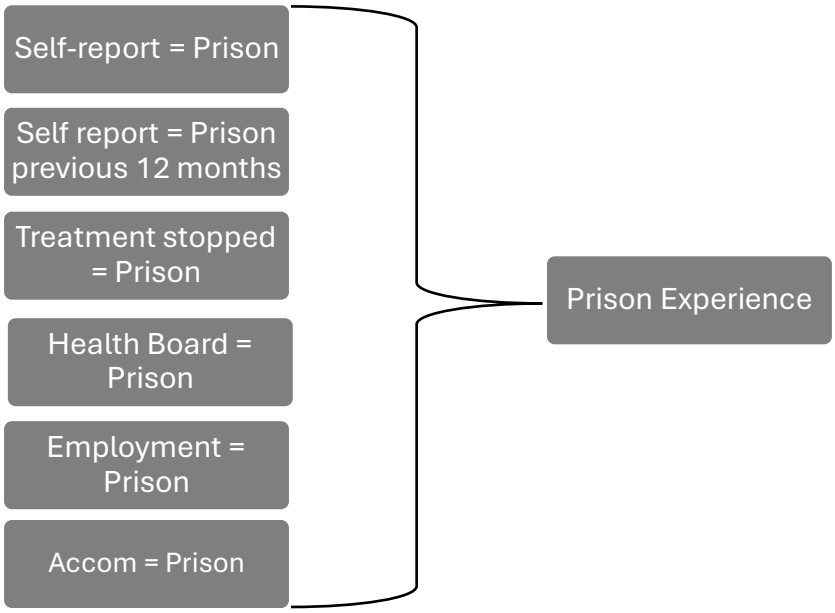


Figure 3.9: Creation of "Prison CJS Experience" variable.

The results presented in Table 3.4 answer Research Question 1. Among the 35,331 unique patients in the SDMD, 16,740 (47.4%) had no recorded CJS contact, 6,492 (18.4%) had non-prison CJS contact, and 12,099 (34.2%) had prison contact. When both CJS experience types are combined, more than half (52.6%) of drug treatment patients had some CJS experience across the study period. This is significantly higher than earlier estimates from Public Health Scotland, which reported that only 28% of individuals were subject to some form of criminal justice sanction or legal proceedings when they entered treatment in 2016/17, based solely on the self-reported legal status field SMR25a. This discrepancy highlights the limitations of relying on a single indicator. It demonstrates that a broader look at all administrative data yields a substantially higher proportion of justice-experienced individuals. The earlier table shows that many individuals with confirmed CJ contact were not referred through justice routes. In fact, 55.5% were referred through other routes; for the non-prison group, this was even higher at 83.5%.

Table 3.4: Criminal Justice System (CJS) Contact Breakdown of Cohort

CJS Contact Type	**Count**	**Percentage (%)**
No CJS contact	16,740	47.4
Non-prison CJS Contact	6,492	18.4
Prison CJS Contact	12,099	34.2
Total	35,331	100

Public Health Scotland's published figures mainly depend on 'source of referral', especially the 'CJS' category, as an indicator of criminal justice involvement, and use this to examine aspects of service delivery, such as methadone prescribing (Public Health Scotland, 2022b:52). However, this study shows that this method only identifies a small number of people with known criminal justice experience, particularly those with non-prison contacts. Additionally, referrals that are clearly justice-related, like those from Criminal Justice Social Work, are recorded under broader categories such as 'social work', which further obscures the true level of justice involvement.

By drawing on linked administrative data, this study can identify criminal justice contact across multiple indicators instead of relying on a single proxy measure. This demonstrates that the extent of criminal justice involvement among people accessing drug treatment is significantly underestimated in routine reports, rising from 28% in Public Health Scotland figures to 52.6% in this study.

This highlights the analytical value of data linkage, which enables more comprehensive and accurate identification of justice-experienced populations and allows analysis of patterns in service use and vulnerability that are not possible with single-source administrative data alone. Here, even looking across two SDMD data collection forms, SRM25a and SMR25b, gives us a better sense of the number of people with CJS experience in this cohort. The implications of adopting a broader definition of criminal justice contact are discussed further in Chapter 6.

3.11 Creation of drug type variables

To answer Research Question 2 (see Chapter 4), it was necessary to create a set of variables that summarised individuals' drug-use profiles in the SDMD dataset. The raw dataset included up to five self-reported illicit drug types per patient, recorded across five separate input variables (drug_type_i1 to drug_type_i5). In total, these fields contained over 120 unique drug codes, ranging from common substances such as heroin and diazepam to less frequently reported substances like LSD, synthetic cannabinoids, or non-specified pills. Many of these entries referred to the same type of substance but were coded inconsistently (e.g., different spellings of methadone, brand names, or vague entries such as "other opiate").

To enable meaningful analysis, each entry had to be standardised and grouped into broader categories reflecting clinical similarity and policy relevance. This process was essential because the fragmentation of drug types across five variables made it impossible to interpret trends or model associations without collapsing these data into usable structures.

Using R, I created a lookup table that mapped each of the 120+ original codes to one of 24 clinically and policy-relevant drug categories. These included widely recognised groups such as heroin, methadone, benzodiazepines, cocaine, antidepressants, and cannabis, as well as less commonly analysed but relevant categories such as gabapentinoids, synthetic cannabinoids, hallucinogens, and opiate tablets. A few codes could not be confidently matched to a group and were retained in a general "other/unspecified" category. This aspect of the data wrangling workflow was particularly time-consuming. As shown in Figures 8-10 below, some drug types had numerous possible entries, all of which needed to be verified against the British National Formulary[34] to ensure accuracy and consistency.

Each of the five original input variables was then recoded into a new variable (categorised_drug_type_i1 through categorised_drug_type_i5), using this lookup table. This allowed for precise and consistent categorisation of every drug type mentioned by each patient, regardless of its position in the input structure.

Where relevant for modelling, dummy variables were created for each of the 24 drug categories. These dummy variables indicated whether a patient reported using a specific drug type in any of the five input fields. This meant that someone who listed heroin in drug_type_i1 and benzodiazepines in drug_type_i3 would be flagged under both dummy variables, facilitating the analysis of multi-drug use. Importantly, no hierarchy was applied to the input variables; all were treated as equally valid.

This transformation was time-consuming and technically demanding, involving multiple stages of manual verification, recording, and reshaping within the Safe Haven environment. However, it was necessary to reflect the real-world complexity of drug use within the SDMD cohort and ensure that subsequent analyses were methodologically rigorous.

[34] https://bnf.nice.org.uk. Accessed 25/04/2025.

Substance use variables were included to capture proximal mechanisms of overdose and mortality risk, especially in the context of Scotland's polydrug crisis, where benzodiazepines and opioids are central. In line with Rhodes' risk environment framework (Rhodes 2002), these variables are understood not just as individual behaviours but as markers of exposure to high-risk drug environments and negative outcomes.

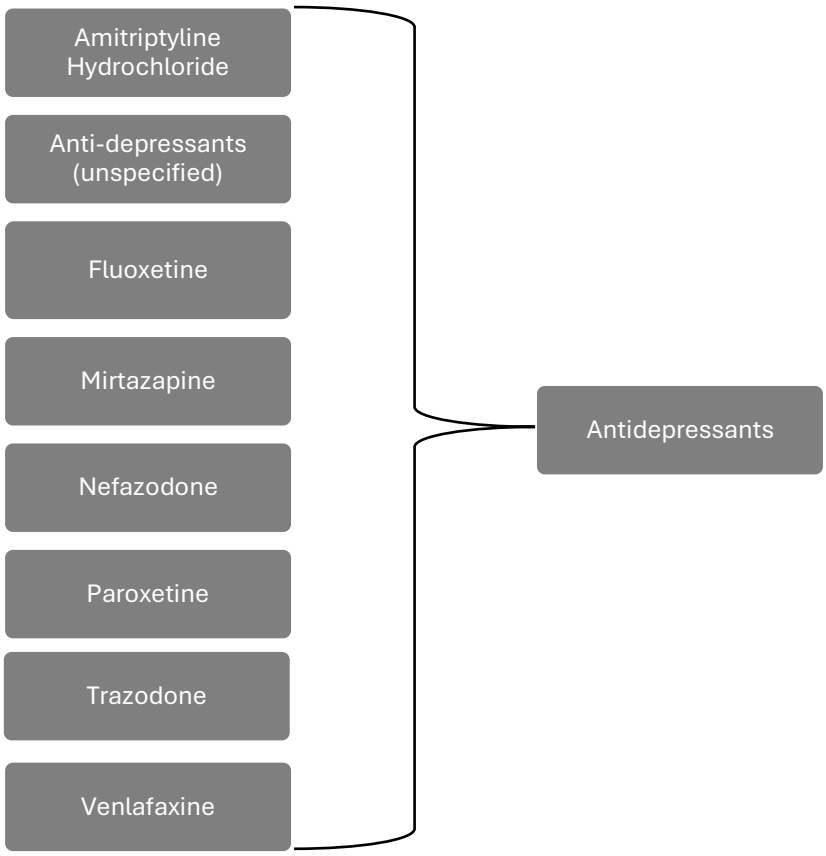


Figure 3.10: Creation of the "Antidepressants" drug group variable

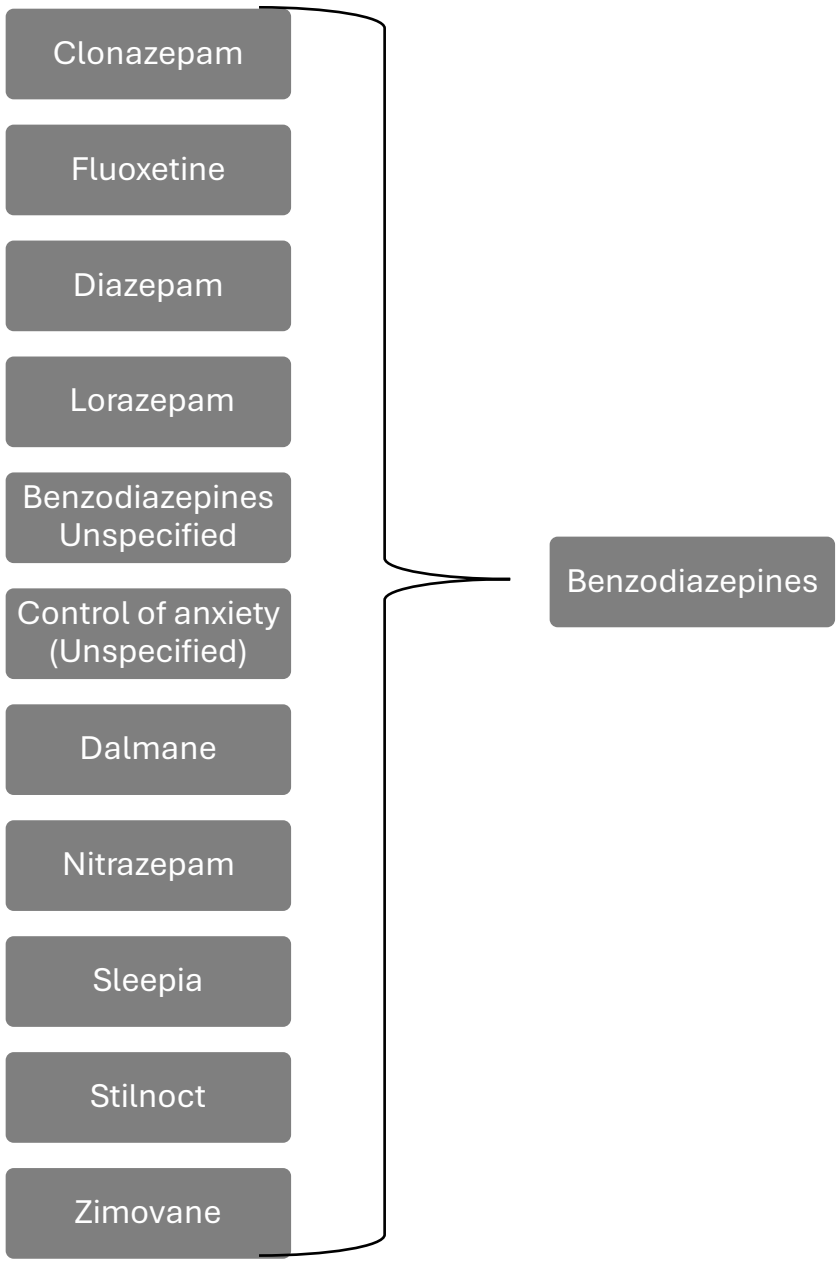


Figure 3.11: Creation of the "Benzodiazepines" drug group variable.

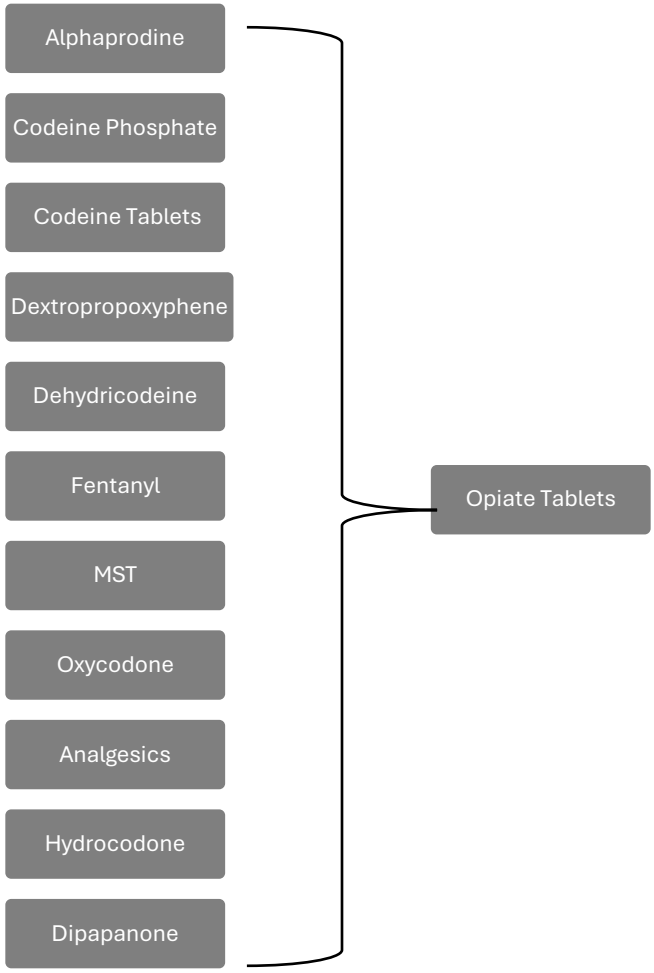


Figure 3.12: Creation of the "Opiate Tablets" drug group variable.

3.11.1 Other key variables created

Employment engagement

Employment status was derived from the SMR25a assessment forms, and individuals recorded as 'in prison' were excluded from the employment variable used in the logistic regression models in Chapter 5. This decision was made during data preparation because 'in prison' does not represent a labour market position and cannot be meaningfully compared with categories such as employment, education or unemployment (see missing data section).

Exclusion from the labour market is a well-established aspect of vulnerability among justice-experienced populations. As outlined in Chapter 2, Wacquant (2009) conceptualises labour market exclusion as part of the broader regulation of marginalised populations through the combined logics of workfare and prisonfare, where individuals are simultaneously subject to welfare conditionality and penal control. Western (2018) further shows that unemployment is widespread after release from prison and is closely linked to

housing instability, poor health, and ongoing institutional contact. Within Rhodes' (2002) risk environment framework, labour market exclusion forms a structural condition that limits stability and increases exposure to harm.

In this study, employment engagement is therefore not regarded as a mere demographic trait but as a visible indicator of structurally generated vulnerability, reflecting cumulative disadvantages across labour market, welfare, and criminal justice systems. However, this exclusion resulted in 3,287 individuals, approximately a quarter of those with prison experience, being omitted from the regression sample. This may have led to underrepresentation of the prison-experienced group and attenuated the observed associations between employment engagement and mortality.

Accommodation stability

The accommodation stability variable was created from the SMR25a accommodation and living situation fields. Responses were categorised into a binary variable indicating stable (e.g., owning or renting accommodation, or living with a partner, parent, or friends) versus unstable living arrangements (e.g., homelessness, living alone, residential rehabilitation, or living with other people who use drugs).

Housing instability is a well-established aspect of vulnerability among individuals who use drugs and those with criminal justice involvement. As discussed in Chapter 2, unstable housing is closely linked to poorer health outcomes, disrupted engagement with treatment, and increased risk of death (Rhodes, 2002; Western, 2018). It also signifies broader processes of structural disadvantage and institutional instability, especially where housing insecurity overlaps with labour market exclusion and penal contact (Wacquant, 2009). The variable is therefore understood not just as a housing measure but as an indicator of vulnerability created by structural factors, reflecting instability resulting from repeated exposure to fragmented welfare systems and institutional contact.

Individuals recorded as 'in prison' for accommodation were excluded from this variable, as custodial status cannot be directly compared to community-based housing conditions. These cases were treated as missing in the regression analysis to avoid conflating institutional residence with housing stability (see missing data section). However, as with the employment engagement variable, this exclusion may lead to underrepresentation of

the most vulnerable individuals and could underestimate the link between housing instability and mortality in the logistic regression models presented in Chapter 5.

3.12 **Statistical Analysis**

The statistical approach used in this thesis is based on two complementary methods that reflect the different aims of Chapters 4 and 5.

In Chapter 4, the analysis mainly seeks to determine whether individuals seeking drug treatment differ in their demographic background, drug use, social circumstances, and health profile based on the type of criminal justice (CJ) contact they experienced. This addresses a gap in knowledge about the degree and nature of vulnerability among those with prison experience compared to individuals with other forms of CJS contact and those with no recorded contact. This part of the analysis is descriptive and exploratory, using frequency tables, prevalence ratios, and tests of group differences (such as chi-squared and Kruskal–Wallis tests) to explore variations between groups. The aim is not to establish causality but to identify patterned differences that guide the selection and interpretation of variables for subsequent modelling.

In Chapter 5, the focus shifts to mortality, with two related aims: first, to determine whether mortality varies across criminal justice (CJ) groups; and second, to investigate which factors are associated with mortality within this population. Differences in mortality between groups are initially examined using descriptive statistics, followed by regression modelling to explore associations between explanatory variables and the likelihood of death. Interaction terms are included in selected models to assess whether the relationships between key variables and mortality vary by criminal justice experience.

Logistic regression is chosen as the most appropriate method due to the binary nature of the mortality outcome and the study's focus on estimating associations between exposures and the likelihood of death, rather than modelling time-to-event. A detailed model specification, including the use of interaction terms and variable selection procedures, is described in the following sections.

3.13 Methods of Analysis

A range of descriptive statistics was employed to identify key distributions and relationships within the study population, particularly for RQs 2–6. This included measures of central tendency, such as the mean, standard deviation, and median, to describe the distributions of continuous variables (e.g., age at initial assessment, age at first drug use, age at onset of problematic use, and age at death, where applicable). For categorical variables, percentages and prevalence ratios (PRs) were calculated to summarise differences across groups.

Analyses were stratified by criminal justice system (CJS) contact type (prison experience, non-prison CJS contact, and no CJS contact), allowing the identification of differences in demographic characteristics, drug use patterns, health status, and social vulnerability across groups. These descriptive findings provided an empirical overview of the cohort and guided subsequent statistical analyses. Tables and bar charts were used to present these patterns clearly. Bar charts were displayed horizontally to enhance readability and facilitate comparison across groups. Overall, the descriptive statistics presented in Chapters 4 and 5 serve three main purposes: to introduce the data and outline the characteristics of the study population; to identify key distributions and relationships within the data; and to lay a foundation for subsequent analyses. This ensures that the analytical approach is based on a clear understanding of the cohort's structure and composition. Alongside descriptive analyses, regression modelling was used to investigate relationships between explanatory variables and mortality outcomes. Logistic regression was utilised for this purpose, with full details of model specification and variable selection provided in later sections.

3.14 Assessing normality and group differences in age-related variables

As part of the initial analysis, it was necessary to assess whether the continuous age-related variables were normally distributed. This was required to determine whether parametric or non-parametric statistical tests were appropriate for comparing age across criminal justice system (CJS) contact groups. The variables assessed were:

- Age at first drug use
- Age at onset of problematic drug use
- Age at first engagement with services

- Age at initial assessment

Within the Safe Haven environment, quantile–quantile (Q–Q) plots were generated in R to assess whether these variables met the assumptions of normality required for parametric testing (Sedgwick, 2012). Due to statistical disclosure control restrictions, these plots could not be exported; however, visual inspection within the Safe Haven indicated deviations from normality across the variables. In line with statistical guidance (Sedgwick, 2012), non-parametric methods were therefore selected.

The Kruskal–Wallis test, a non-parametric alternative to one-way ANOVA, was used to examine differences in age-related variables across the three CJS groups. This test does not assume normality and is suitable for comparing more than two independent groups (Mahoney and Magel, 1996; Vargha and Delaney, 1998). When overall differences were detected, Wilcoxon rank-sum tests were applied for post hoc pairwise comparisons. This method ensured that differences in age-related variables between groups were evaluated using suitable techniques for the data's distributional properties, while also recognising the limitations of the Safe Haven environment.

3.14.1 **Missing data**

Missing data and variable exclusions were carefully managed throughout the analysis, especially where some variables conceptually overlapped with key explanatory variables. This created the risk of duplication, with closely related indicators of criminal justice (CJ) contact potentially being included simultaneously in ways that would not be analytically meaningful. For this reason, variables such as Health Board and Referral Type were restricted prior to modelling, as these contained prison-specific codes and CJ-related referral pathways that overlapped with the main CJS exposure variable.

A second form of missingness was intentionally introduced during data preparation. Specifically, individuals recorded as ‘in prison’ for employment or accommodation were recoded as missing for regression modelling. This decision was made because custodial status is not directly comparable to community-based measures of labour market participation or housing stability. Including these cases in standard employment or accommodation categories would have caused conceptual confusion and risked conflating institutional status with broader indicators of social and structural vulnerability. In

addition, prison status was used to define the main criminal justice exposure variable ('prison experience'), and including it in the employment or accommodation variables would have introduced overlapping explanatory content and reduced the interpretability of model estimates. This coding decision introduced 9,033 'missing' cases.

Missing data were handled through listwise deletion on a model-by-model basis. In practice, this meant excluding individuals only from analyses that involved the missing variable, rather than removing them entirely from the dataset. This approach minimised unnecessary data loss and maximised the use of available information across different models. However, for the main regression models presented in Chapter 5, a complete case analysis was required, resulting in a final analytical sample of 26,298 individuals, down from the original cohort of 35,331. Additionally, using listwise deletion on a model-by-model basis, combined with limiting analyses to specific CJS comparison groups, led to variation in sample sizes across regression models. For example, the model comparing individuals with prison experience to those with non-prison CJS contact included 12,553 individuals, while models comparing non-prison CJS contact to no recorded contact and prison experience to no recorded contact included 19,481 and 20,562 individuals, respectively. These differences reflect both patterns of missingness and the structure of the analytical comparisons.

Listwise deletion was selected over imputation for both practical and analytical reasons. Firstly, many variables with missing data relate to sensitive or stigmatised behaviours (e.g., injecting drug use or unstable housing), where missingness is unlikely to be random. Newman (2014) warns that in such cases, where data may be missing not at random (NMAR), imputation techniques may introduce additional bias rather than reduce it. Secondly, the overall sample size and sufficient subgroup sizes within each CJ contact category meant that the reduction in sample size did not substantially diminish statistical power.

Exploratory checks were also performed to determine if patterns of missing data varied across CJS groups. Although no consistent differences were found, it is crucial to recognise that the missing data in this study are unlikely to be missing at random. Specifically, recoding individuals in prison as missing for employment and accommodation variables reflects a deliberate analytical choice rather than a random process. Consequently, excluding these cases may result in the underrepresentation of individuals with prison

experience, who are also more likely to face greater social and structural disadvantage, as seen in the descriptive analysis in Chapter 4. This may result in conservative estimates of the relationship between social and structural vulnerability and mortality, as individuals with the highest levels of disadvantage, particularly those with prison experience, are underrepresented in these variables.

These limitations are considered when analysing the regression results, especially regarding variables that reflect social and structural vulnerability.

3.14.2 **Chi-Squared Tests and bivariate analysis**

Chi-squared tests were used at two stages of the analysis. First, in Chapter 4, they were applied following descriptive statistics to examine differences in the distribution of categorical variables across criminal justice system (CJS) contact groups. Second, in Chapter 5, they were used as a bivariate screening tool to assess associations between explanatory variables and mortality (alive/deceased), informing the development of the regression models.

In both stages, chi-squared tests were used to assess whether observed differences between groups were likely to reflect underlying patterns in the data rather than random variation. Analyses were conducted using contingency tables, from which chi-squared statistics and corresponding p-values were calculated to test the null hypothesis of independence between variables. The approach followed established guidance for categorical data analysis (Agresti, 2002). Where statistically significant associations were identified, interpretation was supported by examining standardised residuals. These indicate which specific categories contributed most to the overall association and provide insight into the direction and strength of relationships within the data (Sharpe, 2015).

Given the size of the dataset, chi-squared statistics were interpreted alongside p-values, and no strict thresholds were applied for inclusion or exclusion. Instead, results were interpreted pragmatically, recognising that statistical significance alone does not determine analytical importance. In the context of model development, chi-squared analyses were used to inform, but not determine, variable selection. Decisions on inclusion were made in conjunction with theoretical considerations outlined in Chapter 2 and the descriptive patterns identified in Chapter 4. This ensured that variables capturing known dimensions of

vulnerability, particularly those linked to drug-related harm, structural disadvantage, and criminal justice contact, were retained even where statistical associations were weaker.

This approach is consistent with the existing literature on drug-related mortality and justice-involved populations. For example, polydrug use involving opioids, benzodiazepines, and gabapentinoids has been widely identified as a key driver of overdose risk in Scotland (Jones, Mogali and Comer, 2012; Baird, Fox and Colvin, 2014; Evoy et al., 2021; McAuley, Matheson and Robertson, 2022). Within prison populations specifically, gabapentinoids have been shown to be prevalent and commonly used in combination with other substances, highlighting their relevance as a marker of elevated risk (Deeb et al., 2020). These variables were therefore retained in the modelling process, even where initial statistical associations were modest.

3.14.3 **Prevalence Ratios (PRs)**

In addition to reporting and testing frequencies and percentages, this thesis uses prevalence ratios (PRs) to compare outcomes across criminal justice contact groups. PRs were calculated throughout Chapter 4 to show how the prevalence of specific vulnerabilities, health issues, or drug use distributions differed between individuals with prison experience, non-prison CJ contact, or no CJ contact.

Prevalence ratios are calculated by dividing the prevalence of a given characteristic in one group by the prevalence in a reference group. In this thesis, the ‘No CJ contact’ group was used as the reference category, so all PRs describe how much more or less common a vulnerability was among justice-experienced groups compared to those with no known contact with the CJS.

As explained by Kirkwood and Sterne (2003), prevalence ratios are the most appropriate way to compare outcomes across groups, especially when the baseline risk is high, and the odds ratio would overstate the effect size. Their guidance makes clear that when analysing proportions across exposure groups, for example, whether someone reports heroin use, injecting, or a mental health issue, PRs are preferable to odds ratios for descriptive purposes.

Prevalence ratios in this study were calculated in R from cross-tabulated frequencies and then exported to an Excel spreadsheet for extraction from the Safe Haven. Within Excel, simple formulas were used to divide the prevalence in each CJS contact group by the prevalence in the reference group (No CJS contact), following the approach recommended by Kirkwood and Sterne (2003).

These were reported alongside the raw percentages to enable easy, accessible comparisons of each variable across CJ contact groups. They were used to support Chapter 4's primary aim of exploring variation in the prevalence of health, drug, and social risk factors across the SDMD cohort before moving into regression modelling in Chapter 5.

3.14.4 Thematic Model Building and Variable Selection Strategy

Following the thematic grouping of variables, regression models were developed iteratively within each domain to identify stable and meaningful predictors of mortality. For each thematic group (demographic, drug use, health, and social/structural factors), initial models included a broad set of variables informed by the literature (Chapter 2) and descriptive analyses (Chapter 4). These models were then progressively refined to improve model stability, interpretability, and overall fit.

Model refinement was guided by a combination of statistical diagnostics and conceptual considerations. Specifically:

- Akaike Information Criterion (AIC) was used to compare model fit across iterations, with lower values indicating a better balance between model fit and complexity (Burnham and Anderson, 2004);
- Variance Inflation Factors (VIFs) were used to assess multicollinearity, with variables contributing to instability reviewed or removed where appropriate (Kutner et al., 2005). High multicollinearity can make regression estimates unstable and difficult to interpret, and VIF values above 10 are generally considered indicative of problematic collinearity (Kutner et al., 2005).

In practice, VIF diagnostics guided the refinement of the final models. Initial models showed VIF scores above 10, indicating problematic multicollinearity. Through iterative testing, two variables in particular, the Health Board of assessment and polydrug use, were identified as significantly contributing to this instability. When these variables were

removed, VIF scores across the remaining predictors fell below 4. As a result, Health Board and polydrug use were excluded from the final models, thereby improving stability and preventing redundancy in the analysis. Since these variables were not theoretically vital to the research questions, their exclusion was not considered problematic.
Variables identified at the bivariate stage were carried into these thematic models but were not automatically retained. During model refinement, some variables were excluded if they caused multicollinearity, worsened model fit (as indicated by increasing AIC (Burnham and Anderson, 2004)) or reduced overall model stability.

Within the drug use models, for example, an initial set of individual substances was included to represent the full range of reported drug use. These were then refined into a smaller set of key substances for which inclusion improved model fit and stability, and variables aligned with established risk profiles identified in the literature (see Chapter 2). In some cases, variables initially retained for strong theoretical or policy relevance were later excluded when they introduced multicollinearity or worsened model fit. For example, gabapentinoid use, recognised in the literature as a significant contributor to drug-related harm, was included in early models but removed at later stages, where it reduced overall model stability.

The same modelling strategy was used across the sub-cohort models defined by criminal justice contact (prison experience, non-prison contact, and no contact). Consequently, the final models for each subgroup vary slightly, reflecting both differences in underlying risk profiles and the need to maintain model stability within each subgroup. Final model outputs are presented as odds ratios (ORs) with 95% confidence intervals, offering interpretable estimates of the strength and direction of associations between each predictor and mortality.

This iterative and structured approach ensured that the final models were both statistically robust and grounded in an evidence-based understanding of mortality risk within this population.

3.15 **Binary Logistic Regression**

The final stage of analysis employed logistic regression modelling to examine the relationship between demographic, drug-use, health, and social vulnerability variables and

mortality in the cohort. Building on the descriptive and bivariate analyses presented in Chapters 4 and 5, this stage introduced a multivariable approach to assess how these factors influence the probability of death.

The outcome variable was binary, indicating whether individuals died during the follow-up period or remained alive. Therefore, logistic regression was chosen as an appropriate method for estimating relationships between multiple predictors and a dichotomous outcome, while controlling for potential confounding. It is widely used for modelling binary outcomes and allows for estimating associations between explanatory variables and an outcome in terms of odds ratios (Hosmer et al., 2013; Kleinbaum and Klein, 2010).

The modelling strategy was implemented in stages, guided by theoretical insights and previous descriptive analyses (Kleinbaum and Klein, 2010). An initial model was estimated across the entire cohort to investigate the relationship between criminal justice contact, especially prison experience, and mortality. Further models were then developed for sub-cohorts defined by different types of criminal justice contact (e.g., prison experience, non-prison contact, and no contact), allowing a more detailed analysis of how various forms of justice involvement are associated with mortality risk.

Predictor variables were chosen based on their theoretical importance, as described in Chapter 2, and patterns identified in the descriptive analyses in Chapter 4. Before being included in the final models, variables were assessed through bivariate analyses and variance inflation factor (VIF) diagnostics to identify potential multicollinearity (Kutner et al., 2005). Final model results are shown as odds ratios (ORs) with 95% confidence intervals (Hosmer et al., 2013).

Although much of the literature discussed in Chapter 2 focuses specifically on drug-related deaths (DRDs), this study does not treat DRDs as a separate outcome in the primary models. All individuals in the cohort were engaged in treatment for problematic drug use, meaning drug-related harm is seen as a central and ongoing aspect of their broader health and social circumstances. Mortality is therefore understood as the result of cumulative and structurally produced vulnerability, rather than solely due to acute overdose events. By analysing all-cause mortality, the study captures the broader burden of premature death experienced by this population, including deaths linked to chronic health conditions, social instability, and repeated contact with institutions.

3.15.1 Odds Ratios and Confidence Intervals

Regression results are shown as odds ratios (ORs) with 95% confidence intervals (CIs). Odds ratios measure the association between each explanatory variable and the probability of mortality, controlling for other factors. An OR greater than 1 indicates an association with higher odds of death, while an OR below 1 indicates a connection to decreased odds.

Confidence intervals indicate the precision of these estimates. Where the 95% CI crosses 1, the association is not statistically significant at the conventional threshold ($p = 0.05$).

While prevalence ratios were used in Chapter 4 for descriptive comparisons, odds ratios are more appropriate for logistic regression modelling (Hosmer et al., 2013). It is recognised that when outcomes are common, ORs may overstate the magnitude of associations compared to prevalence ratios (Kirkwood and Sterne, 2003), and are therefore interpreted here as measures of association rather than direct estimates of relative risk.

3.16 Interaction terms

To assess whether associations between key explanatory variables and mortality differed by criminal justice (CJ) experience, interaction terms were included in selected models. These terms allow the relationship between a predictor and the outcome to vary by CJ status, providing insight into whether the effects of specific vulnerabilities differ across justice-involved groups (Hosmer et al., 2013; Kleinbaum and Klein, 2010).

Interaction terms were included where there was theoretical or empirical justification, particularly in relation to variables linked to structural vulnerability and drug-related harm. This approach enabled a more nuanced examination of how mortality risk factors operate within and across CJ groups.

Forest plots were used to complement the tabulated regression outputs, enabling comparisons across variables within models and between models, especially in subgroup analyses by criminal justice system (CJS) contact. In this study, forest plots are displayed as multi-panel figures, with separate panels presenting results for the entire cohort and for each CJS subgroup comparison.

3.17 Strengths and Limitations of Methodology

3.17.1 Generalisability and access to rare outcomes

This study linked data from 35,331 individuals in the Scottish Drug Misuse Database (SDMD) to national mortality records, generating over 190,000 treatment episodes. Because the SDMD includes all individuals entering NHS-funded drug treatment with a Community Health Index (CHI) number, the sample provides a near-complete national cohort. Such population-level coverage increases the generalisability of findings, particularly within the context of Scotland's ongoing drug-related death crisis. As Jutte (et al., 2011) and Harron (*et al.*, 2017) note, large-scale administrative datasets reduce the risk of sampling bias and allow research findings to be meaningfully applied to wider policy discussions.

Using linked administrative data also enabled analysis of rare outcomes, such as mortality following contact with the CJS, which are often challenging to study with conventional primary data collection methods (but see the comment above about the time-to-death issue associated with a fixed study and follow-up period). This is particularly relevant given the marginalisation and multi-layered stigma attached to drug use and criminal justice involvement, which can limit participation in interview-based or survey-based research (Boyd et al., 2012). By leveraging routine data collected across services, this study overcame these barriers and analysed mortality across multiple subgroups, including individuals with different types of CJ contact, which would otherwise be challenging to identify.

Another strength of these studies is that linkage reduces data fragmentation across regions or service providers, helping to create a more complete view of individuals' treatment trajectories and mortality outcomes over time. This comprehensive perspective strengthens the study's exploration of more nuanced distributions of risk across health and justice.

3.18 Challenges and limitations

3.18.1 Time and resource constraints

While a retrospective cohort design using linked administrative datasets should be time- and resource-efficient, in practice, various challenges have obstructed the completion of

this research project. One of the primary challenges lies in the involvement of multiple organisations responsible for supplying data and their differing levels of commitment to research projects and the diverse processes associated with data linkage. The time-consuming nature of obtaining, processing, and linking data from various sources can lead to significant delays in planning and implementing a project of this type.

Moreover, the costs associated with data linkage can be significantly higher than the average budget allocated for a Ph.D. project. According to eDRIS[35], small research projects begin at £6344 and larger projects costing £23,790, with additional costs for indexing support (£3172) and computing and disclosure (i.e. Safe Haven costs) (£1087), all exclusive of VAT, and prices can go up due to individual circumstances of a project. Due to the extensive data linkage being sought for the original SPS and mortality linkage, initial quotes for the project were in the tens of thousands. This is in addition to other costs, such as data security and ethics training (discussed above). Consequently, the research question being addressed must be of particular importance, emphasising its relevance and value to stakeholders who possess the power and resources to fund the project.

In the case of this study, the COVID-19 emergency further exacerbated these time and resource constraints. As noted above, the SPS could not provide the necessary data for the original post-custodial mortality project because their sole employee who knew how to access it was working on their institution's response to the global crisis. At the same time, eDRIS, the organisation responsible for data linkage, informed us that the estimated timeframe for any data to be available would be over a year. This would create a two-year gap within a project with only three years of funding, as the linkage could not begin at eDRIS until the SPS were ready. As mentioned elsewhere in this thesis, I only had access to the actual data from the end of April 2023, with the initial completion date being October 2023. This left me rushing through every aspect of the process, from making the data research-ready and analysing it to writing up the findings and addressing supervisory feedback. All in, I had access to the data for around seven months while still in my fully funded PhD, followed by three months under a short-term COVID-related extension, and then part-time access over the remaining 13 months while I balanced this work alongside employment outside academia after my funding had ended.

[35] https://publichealthscotland.scot/resources-and-tools/health-intelligence-and-data-management/electronic-data-research-and-innovation-service-edris/cost-of-services/. Accessed 01/03/2025

In conclusion, while the retrospective cohort design using linked administrative datasets offers numerous advantages, it is essential to recognise time and resource constraints arising due to multiple organisations' involvement, unforeseen challenges such as the COVID-19 pandemic, and the high costs associated with data linkage. These all have a massive knock-on effect on the timeline for finishing any project, and this project is no different, leaving me writing this chapter one week before the final submission deadline.

3.18.2 Methodological and modelling limitations

Several limitations arise from the analytical choices made during model development. Firstly, the use of complete-case analysis decreased the sample size compared to the original cohort. Although this method maximised consistency across variables included in the final models, it resulted in the exclusion of individuals with missing data for any variable. While the remaining sample was still large, this reduction might have affected the representativeness of the analytical sample.

Second, missing data within the SDMD are unlikely to occur at random. Many variables depend on self-reported information related to sensitive or stigmatised behaviours, such as having a history of injecting or housing instability, which may be underreported. Additionally, recoding individuals in prison as missing for the employment and accommodation variables reflects a deliberate analytical decision rather than a random process. Together, these factors create the potential for systematic bias, especially if individuals with higher levels of vulnerability are disproportionately excluded from certain analyses.

Third, some variables were removed from the final models due to multicollinearity, as indicated by high variance inflation factors (VIFs). This included variables such as Health Board of assessment and polydrug use, which contributed to model instability. While their removal enhanced statistical robustness, it also meant that potentially meaningful aspects of variation, including geographic differences and complex patterns of substance use, were not directly represented in the final models.

Finally, using logistic regression rather than survival analysis poses an important limitation. The models estimate relationships with mortality over a fixed follow-up period but do not consider the timing of death. Consequently, differences in time-to-event are not

captured, and individuals who die early are treated the same as those who die later. A survival modelling approach could have provided additional insights into the temporal patterns of mortality risk, but this was not feasible given the constraints of the available data and study design.

3.19 **Conclusion**

This chapter has outlined the research design, data preparation, and statistical approach used to examine mortality among individuals in drug treatment, with and without contact with the criminal justice system (CJS). It has explained the process of creating a linked administrative dataset, developing meaningful variables for analysis, and applying both descriptive and multivariable methods to examine patterns of vulnerability and mortality. In doing so, it has laid the methodological groundwork for the empirical analyses presented in the following chapters.

The development of this study was not straightforward. The original research plan, which focused more narrowly on post-custodial mortality, needed significant revision due to data access restrictions, Safe Haven limitations, and the practical realities of working with complex, linked administrative data. These challenges required a shift in both the scope and direction of the research. Instead of restricting the analysis to a single form of justice exposure, the study was expanded to include multiple dimensions of CJS contact and their relationship to mortality within a large national treatment cohort. Although this change was driven by constraints, it ultimately strengthened the study by allowing for a more comprehensive exploration of how justice involvement intersects with health and social vulnerabilities.

Working with these data also involved considerable technical complexity. Constructing usable variables required integrating multiple administrative fields, many of which were incomplete, overlapping, or not originally designed for research purposes. This included recoding and categorising numerous drug types, as well as developing a more comprehensive measure of CJS contact from several distinct indicators within the SMR25a dataset. These processes were time-consuming but essential to ensure that the resulting analyses were both internally consistent and conceptually meaningful. Despite the constraints under which the analysis was completed, the final dataset provides a detailed

and policy-relevant account of a population that is often difficult to study using conventional research methods.

A key contribution of this chapter is the definition and operationalisation of criminal justice contact, as well as the utilisation of linked administrative data to support this approach. Existing reporting, including estimates from Public Health Scotland, usually relies on the self-reported 'legal status' variable within the SMR25a, which includes categories like Drug Treatment and Testing Orders (DTTOs), probation, and ongoing legal cases. However, because this method relies on self-report data, it may not fully capture the extent of justice involvement in the treatment population.

By linking treatment records to a wider set of administrative indicators and systematically utilising multiple variables within the dataset, this study creates a more comprehensive measure of criminal justice contact. This includes the referral source, the health board at assessment, and variables relating to accommodation and employment, with 'in prison' recorded as a category, as well as indicators of recent imprisonment and treatment discharge due to custody. This multi-source approach captures a broader and more complete picture of justice involvement than is possible when using any single variable alone.

Using this expanded definition, more than half of the cohort were identified as having some form of CJS contact at the point of entering treatment, a significantly higher proportion than estimates based solely on the legal status field. This illustrates the value of linked administrative data in uncovering forms of institutional contact that are otherwise under-recorded and emphasises the extent to which justice involvement is embedded within the population accessing drug treatment in Scotland.

This finding has significant implications for both research and policy. It indicates that relying on narrow or single-source indicators of justice involvement may greatly underestimate how deeply people who use drugs are embedded within systems of criminalisation. By capturing a broader range of justice-related experiences, the approach used here offers a more accurate picture of the overlap between drug use, social disadvantage, and institutional contact. Consequently, this enhances the foundation for examining how these vulnerabilities are distributed across the population and their relationship to mortality risk.

The analytical strategy developed in this chapter reflects this broader conceptual framework. Descriptive analyses were employed to identify patterns of demographic, health, drug use, and social vulnerability across CJS groups, while regression modelling was used to explore associations between these factors and mortality. Throughout, variable selection and model development were guided by both empirical observations and theoretical considerations, ensuring that the analysis stayed grounded in existing evidence while remaining responsive to the data's structure.

The subsequent chapters build directly on this foundation. Chapter 4 offers a detailed analysis of how key characteristics and vulnerabilities differ across groups defined by CJS contact, providing an empirical overview of the cohort and highlighting patterned differences that inform later analysis. Chapter 5 then advances this work through regression modelling, exploring the relationships between criminal justice contact, health and social factors, and the likelihood of mortality within the study population.

Taken together, this chapter establishes a methodological framework for analysing mortality in a population characterised by complex and overlapping forms of disadvantage. Combining linked administrative data with a structured, iterative analytical approach enables a more comprehensive understanding of how criminal justice involvement relates to broader patterns of health inequality and premature death in Scotland.

4 Prevalence, social background, and health profile of drug users seeking treatment in Scotland

4.1 Introduction

This chapter addresses Research Questions 2 to 5, focusing on how different forms of contact with the criminal justice system (CJS) relate to the demographic, health, drug use, and social profile of individuals within the Scottish Drug Misuse Database (SDMD) cohort from 2012 to 2015. The overarching aim is to explore how the characteristics of people in drug treatment differ by type of CJS contact. This helps to build a clearer picture of how vulnerability varies across groups - information that is essential for understanding variation in mortality, which is the focus of the following chapter.

Using descriptive analysis, the chapter compares individuals with no recorded CJS contact, those with non-prison CJS experience, and those with prison experience. These groupings are based on the broader definitions developed in Chapter 3, which showed that official indicators undercount the true extent of CJS involvement among drug treatment patients. Building on that, this chapter focuses on how the profiles of these groups differ across a range of variables known to be linked to drug-related harm.

The chapter has three main objectives:

(1) To investigate whether the demographic profile (age, sex, and health board) of people in drug treatment differs by CJS contact type;

(2) To examine whether current drug use and health-related vulnerabilities vary across CJS groups; and

(3) To analyse social factors, including employment, housing instability, and homelessness, across the different CJS contact groups.

Understanding these differences is important. As discussed in Chapter 2, many of the factors examined here such as early initiation of drug use, housing instability, and poor health are associated with increased mortality risk. However, less is known about how

these factors cluster or differ between people with different experiences of the justice system. Identifying such differences offers important context for the modelling in Chapter 5, which explores how these same factors are associated with mortality within the cohort.

The chapter is structured around Research Questions 2 to 5, each providing insight into the profile of justice-experienced drug treatment patients. A summary of the key findings is provided at the beginning of the chapter.

4.2 Summary of key findings

This focuses on the connections between health vulnerabilities and CJS contact, addressing the research question: Do justice-experienced problem drug users have more health vulnerabilities than others, and how does this vary by definition of CJS experience?

This question examines SDMD recorded healthcare use, including engagement with health services in relation to general and/or mental health difficulties, highlighting differences in access to treatment among those with and without CJS experience. The data show that justice-experienced individuals experience higher levels of health vulnerabilities, especially in relation to their drug-taking behaviour. This includes: increased prevalence of poly-drug use, injecting drug use, and use of substances with higher risks of overdose and other negative health and social outcomes, such as heroin, crack cocaine, and Benzodiazepines.

Additionally, the mean age at which patients began using drugs as well as the mean age when their drug use became problematic are also analysed, showing that, on average, patients with CJS experience began using drugs much younger than those with no CJS experience. Given the established links between justice experience, health inequalities, and early mortality, this section provides valuable insights into the prevalence and interconnectedness of CJS contact and health vulnerabilities of this cohort. This is before factoring in how social vulnerabilities can also exacerbate health-related vulnerabilities.

The third Research Question focuses on the social vulnerabilities of patients within the dataset who had varying degrees of CJS contact, focusing on the question: how do the social vulnerabilities of justice-experienced problem drug users vary by definition of CJS experience?

This question looks at housing instability, experiences of homelessness, and employment status across the three CJS contact groups. The data show that prison-experienced individuals are disproportionately affected by housing instability, with higher rates of homelessness and unstable accommodation compared to those with no CJS contact.

Self-report data on employment also reveal significant inequalities in work participation across CJS contact groups. During initial assessment, individuals with prison experience were the least likely to be employed. At the same time, those with non-prison CJS contact showed higher unemployment levels than those without CJS contact. These findings emphasise the socioeconomic vulnerabilities associated with CJS experience, highlighting the barriers faced by patients with experience of the criminal justice system when it comes to accessing employment.

This chapter achieves two important goals. It highlights the health and social vulnerabilities faced by patients who have come into contact with the criminal justice system, and it also sets the scene for the following chapter on mortality, which builds on the findings within this chapter. The chapter is organised by the four RQs, providing descriptive statistics (on age, sex, the Scottish health board where patients accessed treatment, access to healthcare services, self-reported drug use, accommodation, and employment) that are then analysed in relation to the question. Some discussion is woven into these sections and further expanded in the concluding chapter.

4.3 Research Question 2: Does the demographic profile (age, sex and health board) of people seeking drug treatment vary by the type of CJ contact they have had?

This section explores how the demographic profile of individuals seeking drug treatment varies depending on their type of contact with the CJS. It focuses on three key variables: sex (male/female), age (examined both as a continuous variable and as grouped categories), and the Scottish health board where treatment was accessed. These factors provide important context for understanding patterns of CJ involvement among the drug treatment population and lay the foundation for later analysis of mortality outcomes.

4.3.1 Sex

Understanding the sex distribution of CJS contact amongst drug users is important, as patterns of CJ experience may differ by sex. This has potential implications for treatment engagement and service provision, as men and women have varying needs that become more complex when CJ experience is also factored in (see chapter 2). Table 4.1 presents the distribution of CJS contact by sex among individuals accessing drug treatment services in Scotland.

Among the 35,331 individuals in the dataset, men accounted for 25,011 (71.0%) of all drug treatment patients, while 10,320 (29.0%) were women. While the overall patients in drug treatment during this period was predominantly male, men were especially overrepresented in the CJS groups, particularly amongst those with prison experience. Men comprised around two-thirds (67.9%) of the non-prison group and 82.6% of the prison-experienced group. This highlights a disproportionate concentration of men within the CJS categories.

When examining prevalence ratios (PR), individuals in the non-prison CJS group were slightly more likely to be male (PR: 1.07) compared to those with no CJS contact, while those with prison experience were even more likely to be male (PR: 1.3)

Table 4.1: Gender distribution by CJS experience

Variable	No Contact		Non-Prison Contact			Prison Contact		
	N	%	N	%	PR	N	%	PR
Men	10,610	63.4	4409	67.9	1.07	9992	82.6	1.3
Women	6130	36.6	2083	32.1	0.9	2107	17.4	0.5
Total	16,740	100	6492	100	NA	12,099	100	NA

Prevalence Ratios (PR) measured against the reference category of No Contact

4.3.2 Chi-Squared Test for Significance - Sex

A Chi-squared test examined the relationship between sex and the three CJS contact categories. The results showed a statistically significant association between sex and CJS contact groups, chi-squared (2, N = 35,331) = 1284.4, $p < 0.001$. This indicates that men are disproportionately over-represented in the non-prison and prison CJS contact groups compared to the overall drug treatment population, with the p value indicating that this difference is statistically significant. As this is a binary variable, no standardised residuals will be measured.

Table 4.2: Chi-squared test results of sex by CJS contact

Variable	chi-squared	Degrees of Freedom	N	P Value
Sex	1284.4	2	35,331	< 2.2e-16

4.3.3 Age

Age is a key factor in understanding CJS experience within the drug treatment population, as different age groups may have distinct experiences with the justice system. We already know from the academic literature that younger age groups are more heavily represented within the prison population (see Chapter 2). That being said, there has been a rise in older age groups across the last ten years or so, which has caused the average age of people in prison to go up (Scottish Government, 2022:33). However, we do not know if the same applies to other criminal justice-experienced populations. To provide a fuller picture, the analysis here examined both age as a continuous variable (i.e., mean and median age) and categorised age into groups (under 25, 25–44, and 45+). This allows a more nuanced understanding of whether patterns differ depending on how age is conceptualised.

Table 4.3 presents individuals' mean and median ages across the three CJS contact categories. The average age is provided here to give a broad overview of the age distribution in each CJS experience group. The data shows that patients with no contact with the criminal justice system were the oldest on average, with a mean age of 36.8 (median 37, SD 10.4). Patients in the non-prison group have a mean age of 33.0 (median 34, SD 9.8), and patients with prison experience have a slightly higher mean age than the non-prison group at 33.4 (median 34, SD 8.8). This suggests that patients within the SDMD cohort for this study who have reported any CJS contact tend to be younger than those with no contact.

Table 4.3: Distribution of age by CJS experience

Variable	No Contact	Non-Prison contact	Prison Contact
Mean age	36.8	33.0	33.4
SD	10.4	9.8	8.8
Median age	37.0	34.0	34.0

4.3.4 Kruskal-Wallis test for significance - Age

A series of statistical tests were conducted to determine whether age differed significantly between these CJS experience groups, beginning with an assessment of normality. Given that the data were not normally distributed, a Kruskal-Wallis test was performed instead of an ANOVA, followed by post-hoc comparisons. Table 4.4 shows the results of the Kruskal-Wallis test for age, indicating a statistically significant difference across the three CJS contact categories ($p < 0.001$) (Vargha and Delaney, 1998).

Table 4.4: Kruskal-Wallis test for age

Variable	Chi-Squared	P Value
Age	989.36	< 2.2e-16

4.3.5 Post-hoc Wilcoxon Tests - Age

Pairwise Wilcoxon rank sum tests were carried out to identify which of the CJS groups differ significantly from each other in terms of age, as the Kruskal-Wallis tests only tell us that there is a difference, not where the difference lies between groups (Patel, Alam and Gupta, 2025). The results indicate that the no CJS experience and non-prison groups are significantly different ($p < 2.2e{-}16$). Similarly, there is also a significant difference in age between individuals with no CJS experience and those with prison experience ($p < 2.2e{-}16$). However, there is no statistically significant difference in age between the non-prison and prison groups ($p = 0.19$). This supports the findings from Table 4.3, that on average, patients within this cohort with CJS contact are younger than those without CJS contact. It also supports the figures in Table 4.3, showing that the two CJS contact groups do not significantly differ in age.

Table 4.5: Pairwise Wilcoxon rank sum tests of age by CJS contact

Comparison	P value
No CJS vs non prison	<2.2e-16
No CJS vs prison	<2.2e-16
Non prison vs prison	0.19

4.3.6 Scottish Health Boards

Table 4.6 presents the distribution of individuals engaging in drug treatment across Scottish Health Boards by CJS contact status, showing the number, percentage within group, and prevalence ratios (PRs) relative to the No CJS contact group.

Among those with prison experience, the largest proportions of patients came from Greater Glasgow and Clyde (14.3%), Lothian (10.8%), and Lanarkshire (8.7%). However, across all health boards, individuals with prison contact were generally under-represented compared to those with no CJS contact. This is indicated by prevalence ratios below 1.0 for every area. This under-representation is likely because individuals who began treatment while in prison are recorded separately under the NHS Scotland Prison Health Board (see chapter 2). In total, 3864 individuals (31.9% of those with prison contact) started treatment in prison, meaning their health board when back in the community is not captured here. A complete understanding of which health boards prison-experienced patients live in would require additional data, such as individual residential postcodes before imprisonment.

For those with non-prison CJS contact, the highest proportions were again found in Greater Glasgow and Clyde (27.1%), Lothian (17.1%), and Lanarkshire (12.3%). Prevalence ratios for this group were generally close to 1.0 across most Health Boards, indicating a broadly similar geographic distribution to those without CJS contact. However, individuals from Dumfries and Galloway (PR = 1.47) and Forth Valley (PR = 1.22) were over-represented compared to those without CJS contact. At the same time, those from Ayrshire and Arran (PR = 0.68) were under-represented.

Among individuals with no CJS contact, the largest proportions accessing treatment came from Greater Glasgow and Clyde (27.5%), Lothian (16.7%), and Lanarkshire (11.4%), broadly reflecting the distribution of Scotland's population and service provision patterns.

Table 4.6: Distribution of drug treatment access per Scottish health board by CJS experience

Variable	No contact		Non-prison contact			Prison contact		
	N	%	N	%	PR	N	%	PR
Ayrshire and Arran	1683	10.1	443	6.8	0.68	976	8.1	0.80
Borders	234	1.4	84	1.3	0.93	104	0.9	0.61
Dumfries & Gallwy	398	2.4	227	3.5	1.47	216	1.8	0.75
Fife	1315	7.9	425	6.5	0.83	690	5.7	0.73
Forth Valley	921	5.5	437	6.7	1.22	475	3.9	0.71
Grampian	1354	8.1	576	8.9	1.10	754	6.2	0.77
Glasgow and Clyde	4604	27.5	1758	27.1	0.98	1726	14.3	0.52
Highlands & Isl	411	2.5	186	2.9	1.17	233	1.9	0.78
Lanarkshire	1901	11.4	799	12.3	1.08	1052	8.7	0.77
Lothian	2798	16.7	1112	17.1	1.02	1310	10.8	0.65
Tayside	1121	6.7	455	7.0	1.05	699	5.8	0.86
Prison	0	0	0	0	NA	3864	31.9	0.80
Total	16,740	100	6502	6.8	NA	12,099	100	NA

Prevalence Ratios (PR) measured against the reference category of No Contact

4.3.7 Chi-Squared Test for Significance – Scottish Health Boards

A Pearson's chi-square test assessed the association between Scottish health boards and CJS contact status. This test produced a significant result: chi-squared (DF = 20, n = 35,331) = 296.13, $p < 0.001$.

Table 4.7: Chi-squared results for Scottish health board vs CJS contact

Variable	Chi-squared	Degrees of Freedom	P Value
Health Board	296.13	20	< 2.2e-16

4.3.8 Chi-Squared residuals for association – Scottish Health Boards

Standardised residuals of the chi-squared test above (Table 4.7) were calculated to determine which health boards where people accessed drug treatment contributed most to the association between health board and CJS status. As noted, residuals greater than two suggest the observed frequency differs significantly from what would be expected if the health board and CJS contact were independent.

Among patients with prison experience, several health boards show substantial deviations from what would be otherwise expected. Greater Glasgow and Clyde has a significant negative residual (-11.45). This suggests that significantly fewer patients with prison contact began drug treatment there than would be expected if CJS contact and health board were independent of each other. In contrast, Ayrshire and Arran (7.08) and Tayside (5.14) display positive residuals, indicating overrepresentation in these areas. As mentioned above, patients receiving treatment in prison are recorded under the prison health board rather than their home region, which may influence these figures.

The most significant deviation in the non-prison CJS contact group is Ayrshire and Arran, with a negative residual of -9.24. Dumfries and Galloway shows a notable positive residual (4.60), and Forth Valley (3.47) and Glasgow and Clyde (2.78) also deviate moderately from expectation. Most other health boards show smaller residuals.

The no-contact group generally shows fewer large deviations. However, Glasgow and Clyde again stand out with a high positive residual (7.82), indicating that more patients without CJS contact received treatment there than expected. Tayside (-3.88), Dumfries and Galloway (-3.45), and Grampian (-2.97) had lower-than-expected numbers in this group.

Table 4.8: Standardised residuals of chi-squared results for Scottish health board vs CJS contact

Variable	No contact	Non prison contact	Prison contact
Ayrshire and Arran	1.26	-9.24	7.08
Borders	0.94	-0.38	-0.71
Dumfries & Gallwy	-3.45	4.60	-0.32
Fife	0.96	-4.01	2.61
Forth Valley	-2.60	3.47	-0.25
Grampian	-2.97	1.08	2.38
Glasgow and Clyde	7.82	2.78	-11.45
Highlands & Isl	-2.14	1.26	1.27
Lanarkshire	-3.29	1.03	2.79
Lothian	0.67	1.26	-1.92
Tayside	-3.88	-0.80	5.14

4.4 Research Question 3: Does the drug-taking profile of people seeking drug treatment vary by the type of CJ contact they have had?

This section explores whether drug treatment service users who had contact with the Criminal Justice System (CJS) were more likely to have vulnerabilities linked to drug use. While existing research has shown that people in the justice system often experience poorer health outcomes and more complex treatment needs, there is limited data in Scotland on how vulnerabilities caused by the drugs being used differ between between CJS contact types. This research question focuses specifically on the types of substances people report using, whether they are drug-free at the point of assessment, and their history of injecting drug use. These are important indicators of both treatment need and potential mortality risk, and are used here to better understand the distinct substance use profiles associated with different types of CJS contact.

4.4.1 CJS contact by type of drug use

Table 4.9 presents self-reported drug use data, indicated by patients as substances they were currently using at their initial assessment upon entry into drug treatment services. Individuals could report up to five substances, so the percentages in the table do not sum to 100% and reflect overlapping patterns of drug use per patient. The data shows how CJS contact groups vary in their reported substance use, with both prison and non-prison groups showing elevated prevalence for high-risk substances such as heroin, benzodiazepines, and crack cocaine. These findings help contextualise the treatment needs of those with experiences of the CJS in Scotland when compared to patients with no CJS contact and will be a key predictor variable in the following chapter.

The three most commonly reported drugs used by patients within this cohort were heroin, benzodiazepines, and cannabis. Heroin was reported by 26.8% (n = 4491) of patients who had not reported any CJS contact during their initial assessment, 37.6% (n = 2440) of the non-prison group, and 37.3% (n = 4511) of those with prison experience. Benzodiazepine use was recorded at 17.6% (n = 2947) of the no-contact group's initial assessments by a health care professional, whilst 26.1% (n = 1691) in the non-prison group, and 25.7% (n = 3114) in the prison group reported benzodiazepine use. Cannabis was reported 25.2% (n = 4215) for no CJS contact patients, 31.1% (n = 2016) for non-prison patients, and 17.3% (n = 2098) for prison patients.

The percentage of self-reported heroin use was higher among patients with prison experience at 37.3% (n = 4511) than the reference category of no CJS contact (26.8%, n = 4491). Similarly, the proportion of benzodiazepine use was 25.7% (n = 3,114) among the prison group (no CJS = 17.6%, n = 2947), whereas cannabis use was lower at 17.3% (n = 2098, no CJS = 25.2%, n = 4215). This means that when compared to those with no CJS contact, individuals in the prison group had a higher prevalence of heroin use (PR: 1.4), benzodiazepine use (PR: 1.5), and crack cocaine (PR: 2.4). But they had lower prevalence of cannabis (PR: 0.7), powder cocaine (PR: 0.8), opiate tablets (PR: 0.6), and 'legal highs' (PR: 0.8) relative to the no-contact group. Additionally, the prison group was 2.4 times more likely than the no CJS contact group to report using anti-epilepsy medication (such as gabapentin and pregabalin).

The non-prison CJS group displayed similar patterns to the group of patients with prison experience, with 37.6% (n = 2440) reporting heroin use, 26.1% (n = 1691) reporting benzodiazepine use, and 31.1% (n = 2016) reporting cannabis use. Additionally, this group reported the highest usage of powder cocaine at 9.7% (n = 631). Compared to the no-contact group, the non-prison group had a higher prevalence of heroin use (PR = 1.4) and benzodiazepine use (PR = 1.5). Cannabis was also more prevalent (PR = 1.2). Further to this, the non-prison group were nearly twice as likely to report crack cocaine use (PR = 1.9) and more than twice as likely to report using anti-epileptic medication (PR = 1.9), and more likely to report 'legal highs' (PR = 1.2). But the non-prison group were less likely to report the use of any opiate tablets when compared to the reference group of no CJS contact (PR = 0.7).

By contrast, the no-CJS group served as the reference category for comparisons. Notably, this group had the highest rate of opiate tablet[36] use (7.0%, n = 1175) compared to individuals with CJS contact. This analysis demonstrates that CJS contact groups differ in their reported substance use, with both prison and non-prison groups showing elevated prevalence for high-risk substances such as heroin, benzodiazepines, and crack cocaine.

[36] The "opiate tablet" category includes 24 opioid-based medications used primarily for pain relief, excluding heroin and methadone. These were grouped together due to their shared pharmacological design and potential for misuse. Substances include codeine (various forms), dihydrocodeine, fentanyl, oxycodone, MST, tramadol, and others (see methods chapter for full list)

Table 4.9: Self-reported drug use at time of initial assessment

Variable	No CJS contact		Non-Prison CJS contact			Prison contact		
	N	%	N	%	PR	N	%	PR
Heroin	4491	26.8	2440	37.6	1.4	4511	37.3	1.4
Benzodiazepines	2947	17.6	1691	26.1	1.5	3114	25.7	1.5
Crack Cocaine	260	1.6	195	3.0	1.9	449	3.7	2.4
Cocaine	1330	7.9	631	9.7	1.2	736	6.1	0.8
Opiate Tablets	1175	7.0	312	4.8	0.7	537	4.4	0.6
Anti-epileptics	133	0.8	99	1.5	1.9	277	1.9	2.4
Cannabis	4215	25.2	2016	31.1	1.2	2098	17.3	0.7
Stimulants	761	4.5	360	5.5	1.2	303	2.5	0.6
Methadone	671	4.0	296	4.6	1.1	537	4.4	1.1
Legal Highs	374	2.2	177	2.7	1.2	212	1.8	0.8
Drug Free	3165	18.9	791	12.2	0.6	2653	21.9	1.2

Prevalence Ratios (PR) measured against the reference category of No Contact

4.4.2 Chi-squared test for significance – Drug Use

A Pearson's chi-square test was conducted to assess the association between self-reported drug type at initial assessment and CJS contact status (Table 4.10). The test produced a highly significant result: chi-squared = (22, N = 35,331) = 1504.08, $p < 0.001$, indicating that the distribution of reported drug use differed significantly across the three CJS contact groups.

Table 4.10: Chi-squared results for self-reported drug use vs CJS contact

Variable	Chi-squared	Degrees of Freedom	N	P Value
Drug type	1504	22	35,331	< 2.2e-16

4.4.3 Chi-squared Residuals for Association – Drug Use

To identify which substances individuals reported they were using contributed most to the statistically significant association between drug use and CJS contact status within the chi-squared test, standardised residuals were calculated. Among patients with prison experience, heroin (residual = 11.35) and benzodiazepines (residual = 10.37) were significantly overrepresented. Crack cocaine (9.30) and anti-epileptic medication (9.20) also showed very high positive residuals. These results confirm that people entering treatment who also have experienced imprisonment are more likely to report use of high-

risk drugs. Conversely, cannabis (-20.98), opiate tablets (-8.24), and cocaine (-8.74) were all significantly underrepresented in this group. Use of stimulants (-11.09) and legal highs (-4.25) was also lower than expected.

In the non-prison contact group, residuals were generally less extreme. Heroin (2.48), benzodiazepines (3.11), and cannabis (9.25) were all moderately above expected levels. Cocaine (3.82) also showed moderately positive deviations, while opiate tablets (-5.82) were used less than expected. The drug-free residual in this group was notably low (-18.67). This suggests that people with non-prison CJS contact were a lot less likely to state they were drug-free on initiating treatment compared to what would be expected if reported drug use and CJS contact were statistically independent from each other.

Among individuals with no CJS contact, there were significant positive residuals for opiate tablet use (12.64) as indicated above in the prevalence table, cannabis (12.63), and reporting as being drug free at the time of assessment (6.17). Conversely, heroin (-12.92), benzodiazepines (-12.49), and crack cocaine (-9.57) were all underrepresented. This group also had lower-than-expected stimulant use (-6.97) and anti-epileptic drug use (-8.35), suggesting a pattern of lower-risk drug profiles overall. These findings reinforce the notion that CJS contact is strongly associated with distinct and often serious patterns of substance use.

Table 4.11: Standardised residuals of chi-squared results for self-reported drug use vs CJS contact

Variable	No contact	Non prison contact	Prison contact
Heroin	-12.92	2.48	11.35
Benzos	-12.48	3.11	10.37
Crack	-9.57	0.79	9.29
Cocaine	5.28	3.81	-8.73
Opiates	12.64	-5.82	-8.23
Antiepileptics	-8.35	-0.60	9.20
Cannabis	12.63	9.25	-20.98
Stimulants	6.96	4.52	-11.08
Methadone	0.15	-0.81	0.52
NPS	2.58	1.84	-4.25
Alcohol	0.22	3.13	-2.89
Drug Free	6.16	-18.66	9.37

In summary, the chi-square test and standardised residuals confirm statistically significant differences between the CJS status groups and self-reported drug use. Patients with prison experience were more likely to report using heroin, benzodiazepines, crack cocaine, and anti-epileptic medication, and less likely to report cannabis, cocaine, or stimulants. It is also noteworthy that people with prison experience were more likely to report that they were drug-free than the other two groups. The non-prison group also showed higher prevalence for heroin, benzodiazepines, and cannabis, but with less extreme deviations. In contrast, the no-CJS group had higher-than-expected reporting of cannabis, opiate tablets, and being drug-free. They were also less likely to report high-risk substances like heroin, benzodiazepine-type drugs (see methodology chapter), or crack cocaine. These patterns support the inclusion of drug type as a predictor variable in the upcoming regression models.

4.4.4 Drug injecting behaviour by CJS experience

Table 4.12 presents data on whether individuals in the dataset reported injecting drugs during the study period or 12 months prior, compared by CJS status. Understanding injecting history is essential because it may increase the likelihood of health risks, including blood-borne viruses such as HIV and hepatitis C, as well as other injection-related harms such as the need for injecting wound care. It is also unknown which drug they injected, and whether these vary by type of contact with the criminal justice system.

Among patients with prison experience, 65.4% (n = 7911) reported a history of injecting, which was the highest of the three groups. Those with non-prison CJS contact followed, with 50.0% (n = 3249) reporting injecting. In comparison, 37.0% (n = 6188) of individuals with no CJS contact had a history of injecting. Across the whole cohort, nearly half of all patients (n = 17,348) reported having injected at some point in their lives.

Compared to the reference group with no CJS contact, patients with non-prison CJS experience had a prevalence ratio (PR) of 1.4, meaning they were 1.4 times as likely to report injecting. Those with prison experience had a PR of 1.8, indicating they were nearly twice as likely to have injected drugs. These findings highlight the need to better understand the intersection between injecting-related risks and criminal justice involvement for individuals in drug treatment.

Table 4.12: Injecting history

Variable	No Contact		Non-Prison Contact			Prison contact		
	N	%	N	%	PR	N	%	PR
Hist. of injecting	6188	37.0	3249	50	1.4	7911	65.4	1.8

Prevalence Ratios (PR) measured against the reference category of No Contact

4.4.5 Chi-Squared Test for Significance, people who inject drugs.

A Pearson's chi-squared test was conducted to examine the association between self-reported history of injecting drug use and CJS contact status (Table 4.13). The test returned a statistically significant result: chi-squared = (2, N = 35,331) = 7880.9, $p < 0.001$. This indicates that the likelihood of reporting a history of injecting differed significantly across the three CJS contact groups.

Table 4.13: Chi-squared results for self-reported history of injecting vs CJS contact

Variable	Chi-squared	Degrees of Freedom	N	P Value
Hist. of injecting	7880.9	2	35,331	< 2.2e-16

4.4.6 Chi-Squared Residuals for Association, people who inject drugs.

Standardised residuals were calculated to identify which group contributed most to the association between injecting history and CJS contact status (Table 4.14). Among patients with prison experience, injecting drug use was strongly overrepresented (residual = 16.65), indicating that a far greater number of individuals in this group reported a history of injecting than would be expected if.

In the non-prison contact group, injecting was slightly below expected levels (residual = -3.37). This means fewer people than would be expected if injecting history and CJS contacts were independent of each other disclosed that they had injected during the study period or 12 months before their initial assessment.

Injecting was significantly underrepresented in the no contact group (residual = -13.34), suggesting that individuals with no experience of the CJS were less likely than expected to report a history of injecting.

Table 4.14: Standardised residuals of chi-squared results for self-reported history of injecting vs CJS contact

Variable	No contact	Non prison contact	Prison contact
Hist. of injecting	-13.34	-3.37	16.65

4.5 Research Question 4: Does the health profile (mental and physical) of people seeking drug treatment vary by the type of CJ contact they have had?

This section examines whether individuals who have had contact with the Criminal Justice System (CJS) experience different patterns of health-related vulnerabilities compared to those with no CJS involvement. Health service contact, particularly concerning general health, mental health, and alcohol-related issues, can act as both an indicator of comorbidity needing addressed and a missed opportunity for early intervention. As discussed in the setting the scene chapter, people exposed to the justice system are often exposed to risk factors that can worsen health outcomes, including trauma, unstable housing, and limited throughcare between justice and community settings. Yet, little is known about how their patterns of health service use compare to those with no CJS experience at the point of accessing drug treatment.

This section examines the types of health care accessed across CJS groups to identify whether people with varying degrees of CJS contact are more or less likely to engage with general, mental, or alcohol-related health services. These indicators are relevant to understanding immediate vulnerabilities and will also serve as predictor variables in the upcoming multinomial regression examining mortality outcomes.

4.5.1 Health Service Contact

Table 4.15 presents the proportion of patients who reported accessing each of three types of healthcare – drug-related physical healthcare (‘general health’ in the tables that follow), mental health, and alcohol-related – by CJS status. These categories are not mutually exclusive, as patients could select multiple options if applicable. The data reflect real-world overlap in healthcare engagement and allow for each domain to be analysed independently. This table covers patients accessing healthcare settings for their drug-related physical health, mental health, and alcohol-related healthcare. Health service

contact is essential to measure as it may be a key factor in early mortality within the multinomial regression in the following chapter, and a possible missed opportunity for early intervention policies.

Among patients with prison experience, 29.1% (n = 3519) reported contact for general health problems, which is slightly higher than both other CJS status groups. However, only 24.2% (n = 2929) accessed mental health services, the lowest of the three groups. For alcohol-related health care, 16.2% (n = 1963) reported contact, again the lowest among the CJS categories. Compared to those with no CJS contact, the prison group had a slightly higher prevalence ratio for general health services (PR = 1.1), but lower for both mental health (PR = 0.8) and alcohol-related services (PR = 0.9).

For those with non-prison CJS contact, 27.3% (n = 1770) had contact for general health needs, broadly in line with the no-contact group. Mental health service use was highest in this group at 34.8% (n = 2260), while 19.9% (n = 1291) accessed alcohol-related health care. All three service types were slightly more likely to be accessed by this group than those with no CJS contact, with prevalence ratios of 1.0 for general health and 1.1 for mental health and alcohol-related services.

In the no contact group, 26.3% (n = 4405) accessed general health care, 31.7% (n = 5310) accessed mental health services, and 18.8% (n = 3141) had contact with a health service related to alcohol. These values serve as the reference category for prevalence ratio calculations.

Table 4.15: Health service contact by CJS experience

Variable	No CJS		Non-prison contact			Prison contact		
	N	%	N	%	PR	N	%	PR
General Hlth	4405	26.3	1770	27.3	1.0	3519	29.1	1.1
Alcohol Hlth	3141	18.8	1291	19.9	1.1	1963	16.2	0.9
Mental Hlth	5310	31.7	2260	34.8	1.1	2929	24.2	0.8

Prevalence Ratios (PR) measured against the reference category of No Contact

4.5.2 Chi-squared Test for Significance - Health Service Contact

A Pearson's chi-square test examined the association between health service contact and CJS contact status (Table 4.15). The test produced a statistically significant result: chi-squared = (4, N = 35,331) = 170.37, $p < 0.001$.

Table 4.16: Chi-squared results for health service contact vs CJS contact

Variable	Chi-squared	Degrees of Freedom	N	P Value
Health svc contact	170.37	4	35,331	< 2.2e-16

4.5.3 Chi-squared Residuals for Association – Health Service Contact

Standardised residuals were calculated (Table 4.16) to identify which types of health service contact contributed most to the overall association. Among individuals with prison experience, general health contact was substantially overrepresented (residual = 12.39), while mental health contact was notably underrepresented (residual = -10.58). Alcohol-related health service use was slightly below expectation but did not meet the threshold for significance (residual = -1.85).

In the non-prison group, general health contact was significantly underrepresented (residual = -5.42), and mental health contact was slightly above expected levels (residual = 4.98). Alcohol-related service use in this group was close to expected (residual = 0.40).

For individuals with no CJS contact, general health (residual = -7.20) and mental health contact (residual = 5.86) both deviated significantly from expectations, while alcohol-related contact remained within expected limits (residual = 1.40).

Table 4.17: Standardised residuals of chi-squared results for health service contact vs CJS contact

Variable	No contact	Non prison contact	Prison contact
Physical health	-7.20	-5.42	12.39
Alcohol health	1.40	0.40	-1.85
Mental health	5.86	4.98	-10.58

These results suggest that patterns of health service contact vary by CJS status. Patients with prison experience were significantly more likely to report general health service contact, but were underrepresented in mental health services. In contrast, those with non-prison CJS contact were more likely than expected to access mental health services, while showing lower-than-expected general health contact. Among patients with no CJS contact, mental health contact was more common than expected, whereas general health service use was underrepresented. Alcohol-related service use did not differ significantly across groups

based on the residuals, despite slight differences in overall proportions and prevalence ratios.

4.5.4 Age Grouped

Age groups here are particularly relevant as they will be included in the multinomial regression model as a categorical predictor in the following chapter on mortality. Table 4.18 below presents the distribution of CJS contact by three age groups, categorised into under 25 (n = 5377), 25-45 (n = 23,904), and 45+ (n = 6050). The data shown here indicate that individuals with any form of CJS contact were more likely to be younger, with both non-prison and prison-experienced groups disproportionately containing younger individuals compared to those with no CJS contact.

Among those with prison experience, 16.9% were under 25, and 72.2% were aged 25-45, showing a clear concentration of younger individuals in this category. Similarly, 19.1% of the non-prison CJS group were under 25, and 67.3% were aged 25-45. This resulted in prevalence ratios of 1.3 and 1.5, respectively, for the under-25s compared to those with no CJS contact.

Individuals with no CJS contact were more likely to be in the oldest age category (45+), accounting for 22.6% of this group. In contrast, individuals with CJ experience were less likely to be aged 45 or over. The prevalence ratio for being aged 45+ was 0.6 in the non-prison CJS group and 0.5 in the prison-experienced group, relative to those with no CJS contact. This indicates that older age was less common among those with CJS experience than those without. While the 25–45 age group was the largest across all categories, older individuals (45+) were comparatively more common in the no-CJS group.

Table 4.18: Age grouped by CJS experience

Variable	No Contact		Non-Prison Contact			Prison Contact		
	N	%	N	%	PR	N	%	PR
<25	2099	12.5	1239	19.1	1.5	2039	16.9	1.3
25-45	10802	64.5	4372	67.3	1.0	8730	72.2	1.1
45+	3839	22.6	881	13.6	0.6	1330	11.0	0.5
Total	16,746	100	6492	100	NA	12,099	100.1	NA

Prevalence Ratios (PR) measured against the reference category of No Contact

4.5.5 Chi-Squared Test for Significance – Age Grouped

A Pearson's chi-square test assessed the association between age group and CJS contact status. This test produced a significant result: chi-squared (DF = 4, n = 35,331) = 867.86, p < 0.001 (Sharpe, 2015).

Table 4.19: Chi-squared test result for age group vs CJS contact

Variable	chi - squared	Degrees of Freedom	N	P Value
Age Group	867.86	4	35,331	< 2.2e-16

4.5.6 Chi-Squared Residuals for Association – Age Grouped

Standardised residuals provide insight into which age groups are over- or underrepresented within each CJS contact group compared to what would be expected if age and CJS contact were independent (Agresti, 2002; Sharpe, 2015). Table 4.20 shows that among those with prison experience, individuals aged 25-44 were strongly overrepresented (residual = 13.04), while those aged 45 and over were significantly underrepresented (residual = -22.08). Those under 25 were also modestly overrepresented (residual = 6.17), suggesting that the prison-experienced group is skewed toward younger individuals.

In the non-prison CJS contact group, under-25s were also overrepresented (residual = 9.59), though to a slightly greater extent than in the prison group. However, the 25-44 group showed a distribution near what would be expected if age and CJS contact were independent (residual = -0.60). Individuals aged 45 and over were underrepresented (residual = -8.41), indicating that this group, too, isively young, but slightly more diverse than the prison group.

The no CJS contact group shows the inverse pattern, with a strong overrepresentation of individuals aged 45 and over (residual = 27.51) and an underrepresentation of both under-25s (residual =-13.31) and those aged 25-44 (residual = -11.93). This reinforces the earlier finding that individuals with no criminal justice contact in this cohort tend to be older on average than those with any form of CJS experience.

Table 4.20: Standardised residuals of chi-squared results for age group vs CJS contact

Variable	No contact	Non prison contact	Prison contact

<25	-13.31	9.59	6.17
25-44	-11.93	-0.60	13.04
45+	27.51	-8.41	-22.08

4.5.7 Age at which drugs became problematic

Table 4.21 compares the self-reported average ages at which patients first used drugs, when their drug use became a problem, and the age at which they first sought help for drug use, broken down by CJS experience group.

Patients with prison experience report the earliest experiences across all three variables. On average, they started using drugs at age 15.6 (median 15.0, SD = 5.0), experienced problematic use by age 20.7 (median 19.0, SD = 7.0), and sought help at age 24.4 (median 23.0, SD = 7.0). This suggests that for people who eventually end up in prison, they will, on average, start using drugs but also come to the attention of services at a much younger age than other CJS contact groups.

Patients with non-prison CJS contact began using drugs slightly later than those with prison experience, but earlier than those with no CJS contact. The average age of first drug use in this group was 16.7 (median 15.0, SD = 6.0), with problematic use reported by age 22.0 (median 20.0, SD = 7.5), and *began seeking help* at 26.0 (median 24.0, SD = 7.9). This group follows a similar pattern of early onset and progression, though the trajectory is slightly slower than for those with prison experience.

Among those with no recorded CJS contact, the onset of taking drugs and then escalating into a problem happened later on average. First drug use began at 18.1 (median 16.0, SD = 7.2), problematic use at 24.0 (median 22.0, SD = 8.7), and seeking help at 28.0 (median 26.0, SD = 9.0).

Table 4.21: Ages at first use, when became problematic, and help sought

Variable	No contact	Non-prison contact	Prison contact
Started use			
Mean	18.1	16.7	15.6
SD	7.2	6.0	5.0
Median	16.0	15.0	15.0
Became problem			
Mean	24.0	22.0	20.7
SD	8.7	7.5	6.3
Median	22.0	20.0	19.0
Sought help			
Mean	28..0	26.0	24.4
SD	9.0	7.9	7.0
Median	26.0	24.0	23.0

4.5.8 Kruskal-Wallis Test for Association – Age Drugs Became Problematic

The Kruskal-Wallis tests confirmed that the differences across the three CJS contact groups were statistically significant for all three age-related variables: the age patients first used drugs ($X^2 = 486.8$, $p < 0.001$), the age at which drug use became a problem ($X^2 = 331.9$, $p < 0.001$), and the age at which patients first sought help for drug use ($X^2 = 253.8$, $p < 0.001$). These results indicate that age at each stage of a patient's trajectory of drug use varied on average between initiation, escalation, and seeking help, depending on their later contact with the criminal justice system.

Table 4.22: Kruskal-Wallis test for ages of first use, the age of problematic use, and sought help

Variable	Chi-squared	P value
Age first used drugs	486.8	<2.2e-16
Age drugs became a problem	331.9	<2.2e-16
Age first sought help	253.8	<2.2e-16

4.6 Research Question 5: Does the social profile of people seeking drug treatment vary by the type of CJ contact they have had?

This research question looks at how people with different types of Criminal Justice System (CJS) contact differ regarding their broader social profile, focusing on three key self-reported variables: employment status, accommodation type, and history of homelessness. These variables are linked to socioeconomic and social stability, so understanding how these vulnerabilities vary across CJS contact groups helps build a better picture of the lives of drug treatment patients. This, in turn, can provide an early indication of risk to prevent mortality.

4.6.1 Employment status

Employment status is an important indicator of socioeconomic stability, which can be disrupted amongst people with CJS contact. Imprisonment is likely to cause the most disruption to employment due to the physical barriers of being unable to work, the increased use of Protection of Vulnerable Groups checks, and the need to disclose offences under the Rehabilitation of Offenders Act (1974)[37] (Weaver and Jardine, 2022) . However, non-prison CJS contact such as probation or community payback orders can also create barriers for socioeconomic activities such as working, as time out of the working day or even whole days out of the working week are needed to complete court-mandated appointments or work (Weaver and Jardine, 2022). Within the SDMD, during their initial assessment for treatment, patients were asked about their current employment status, to which they could reply with one of the variables discussed below.

Understanding the employment/unemployment distribution across CJS contact groups helps us gauge the extent of economic exclusion faced by patients with experiences of the CJS within the study cohort, which can also be related to worsening drug use patterns and early mortality (Miller, 2016; Weaver and Jardine, 2022). Employment data were not available for the whole cohort. Of the 35,331 individuals within the study, employment status was recorded for 29,493 patients (83.5%). The missingness was not evenly distributed across CJS contact groups: 20.1% (n = 2907) of those with no CJS contact had employment data, compared to 15.9% (n = 1025) of the non-prison group and 15.8% (n =

[37] Rehabilitaiton of Offenders Act 1974. https://www.legislation.gov.uk/ukpga/1974/53.. See also the Management of Offenders (Scotland) Act 2019. https://www.legislation.gov.uk/asp/2019/14/contents, Disclosure (Scotland) Act 2020 https://www.legislation.gov.uk/asp/2020/13/contents. Accessed 28/04/2025.

1906) of the prison group. While these differences are modest, it is essential to note that missing data could affect the comparison of employment outcomes across groups. Therefore, only those with recorded employment data were included in this section.

Analysing only the patients with available employment data, the prison group had the lowest reported employment levels, with 44.6% (n = 5396) classified as unemployed and only 3.6% (n = 434) in employment at the time of assessment. In addition to this, 27.2% of the prison experienced group (n = 3287) were recorded as being in prison at the time of assessment. Compared to those with no CJS contact, the prison group had a much lower prevalence of employment (PR = 0.2) and a slightly lower prevalence of unemployment (PR = 0.9). This group also had a lower likelihood of reporting being unemployed due to long-term disability (6.1%, n = 740; PR = 0.5), and were more likely than those with no CJS contact to report never having been employed (1.1%, n = 165; PR = 1.8). They were also the least likely group to be recorded in the 'support into employment' category (1.4%, n = 171; PR = 0.6).

The non-prison CJS group reported the highest levels of unemployment, with 57.2% (n = 3712) reporting that they were unemployed at the time of initial assessment. In contrast, 11.2% (n = 727) of this group reported employment. Compared to those with no CJS contact, this group was 1.2 times more likely to be unemployed (PR = 1.2) and 0.7 times as likely to be in employment (PR = 0.7). A small proportion (2.9%, n = 188) was recorded in the 'support into employment' category (PR = 1.2), the highest across the three groups. The proportion of individuals who had never been employed was 1.1% (n = 70; PR = 1.8), matching the prison group.

Table 4.23: Employment status per CJS experience

Variable	No CJS contact		Non prison CJS contact			Prison contact		
	N	%	N	%	PR	N	%	PR
Never employed	129	0.6	70	1.1	1.8	165	1.1	1.8
Employed	2815	16.8	727	11.2	0.7	434	3.6	0.2
Unemployed	8097	48.4	3712	57.2	1.2	5396	44.6	0.9
Long-term disabled	1940	11.6	770	11.9	1.0	740	6.1	0.5
Support into empl	402	2.4	188	2.9	1.2	171	1.4	0.6
In prison	NA	NA	NA	NA	NA	3287	21.1	NA
Missing	2907	20.1	1025	15.9	0.8	1906	15.8	0.8
Total	16,740	100	6492	100	NA	12,099	100	NA

Prevalence Ratios (PR) measured against the reference category of No Contact

4.6.2 Chi-Squared Test for Significance – Employment Status

A Pearson's chi-squared test was conducted to examine the association between employment status and CJS contact group (Table 4.24). The test returned a statistically significant result: chi-squared = (8, N = 29,603) = 1003.1, $p < 0.001$, indicating that the distribution of employment types differed significantly across the three CJS contact groups.

The 'in prison' category was excluded from this analysis, as it does not represent an employment status available for each CJS category. Including it would violate the assumption of independence between categories and artificially inflate the test statistic.

Table 4.24: Chi-squared results for employment status vs CJS status

Variable	Chi-squared	Degrees of Freedom	N	P Value
Employment status	1003.1	8	29,043	< 2.2e-16

4.6.3 Chi-Squared residuals for association – Employment Status

Standardised residuals were calculated to identify which employment categories contributed most to the overall association between employment status and CJS status (Table 4.25). Among patients with prison experience, there were substantial deviations from what would be expected if employment status and CJS status were independent of each other. This group was significantly underrepresented in the employed (residual = -24.61), long-term disabled (-7.64), and slightly underrepresented in the support into employment (-2.75) categories. Having prison experience was overrepresented in unemployment (23.38). A more minor positive deviation was also found for the never employed category (8.03), suggesting higher than expected rates of people who reported they had never worked.

In the non-prison CJS group, chi-squared residuals were less prominent. The most significant deviation was for the employment category (residual = -4.93), followed by support into employment (2.38) and employed (-4.93).

Patients with no CJS contact showed a very different pattern. They were overrepresented in the employed category (25.86) and underrepresented in the unemployed category (-22.32),

reflecting more stable employment histories. There was also a moderate overrepresentation in the long-term disabled group (5.40).

Table 4.25: Standardised residuals of chi-squared results for self-reported history of injecting vs CJS status

Variable	No CJS	Non-prison CJS	Prison
Never employed	-6.35	-0.94	8.03
Employed	25.86	-4.93	-24.61
Unemployed	-22.32	1.94	23.38
Long-term disabled	5.40	1.69	-7.64
Support into employment	0.48	2.38	-2.75

4.6.4 Accommodation type

Housing stability is an important factor in the lives of individuals accessing drug treatment services, as unstable living situations can exacerbate vulnerabilities leading to increased vulnerabilities in other areas of a person's life, such as their employability which paired with other vulnerabilities can lead to worsening general and mental health, drug use, as well as potentially increasing the risk of early mortality (Peck and Plant, 1986; Miller, 2016; Weaver and Jardine, 2022). Table 4.26 demonstrates how housing instability is strongly associated with CJS contact, particularly among prison-experienced patients, who report the highest levels of unstable housing. It provides an essential depiction for understanding the living conditions of CJS-experienced patients and the social profiles of justice-experienced SDMD patients at the time of their last initial assessment for treatment. As described in the methodology chapter, patients were asked about their accommodation status and living conditions during their initial assessment for treatment services. For this analysis, these responses were grouped into two broad categories (see the methodology chapter for full details).

Table 4.26 presents accommodation status for individuals within the SDMD cohort, with 10.2% reported as missing (n = 3615). As was the case with the employment data, there was missingness across all CJS status groups: the no CJS contact group having 12.7 of accommodation data missing (n = 2118), the non-prison CJS contact group at 6.7% missing (n = 433), and the prison contact group 8.8% (n = 1064). As the focus is on what is known regarding the intersection between CJS contact and SDMD patients' accommodation, these data are included in the table for completeness, but were excluded from further analysis.

Among those with prison experience, 44.4% (n = 5378) were recorded as living in stable accommodation, while 46.8% (n = 5657) reported unstable accommodation. This group was 5.6 times as likely to be in unstable housing (PR = 5.6) and 0.6 times as likely in stable housing (PR = 0.6) compared to those with no CJS contact.

In the non-prison CJS group, 79.0% (n = 5128) lived in stable accommodation, and 14.3% (n = 931) lived in unstable accommodation. Compared to those without CJS contact, this group was 1.7 times as likely to report housing instability (PR = 1.7).

Those with no reported contact with the Criminal Justice System had the most stable housing profile, with 79.0% (n = 13,232) in stable accommodation and 8.3% (n = 1390) in unstable housing.

Table 4.26: Accommodation type per CJS experience

Variable	No CJS contact		Non-prison CJS contact			Prison contact		
	N	%	N	%	PR	N	%	PR
Stable	13,232	79.0	5128	79.0	1.0	5378	44.4	0.6
Unstable	1390	8.3	931	14.3	1.7	5657	46.8	5.6
Missing	2188	12.7	433	6.7	NA	1064	8.8	NA
Total	14,622	100	6059	100	NA	12,099	100	NA

Prevalence Ratios (PR) measured against the reference category of No Contact

4.6.5 Chi-Squared Test for Significance – Accommodation Type

A Pearson's chi-squared test assessed the relationship between accommodation type (stable vs. unstable) and CJS contact group (Table 4.27). The result was statistically significant: chi-squared (2, N = 31,716) = 6205.9, $p < 0.001$. This indicates that the distribution of accommodation types differs significantly across the three CJS contact categories.

Table 4.27: Chi-squared result for accommodation type vs CJS status

Variable	Chi-squared	Degrees of Freedom	N	P Value
Accommodation Type	6205.9	2	31716	< 2.2e-16

4.6.6 Chi-Squared Residuals for Association – Accommodation Type

Standardised residuals were examined (Table 4.28) to determine which groups contributed most to this association. The most substantial differences were seen in the prison contact group. Patients with prison experience were significantly more likely to report unstable accommodation (residual = 78.28) and much less likely to report stable accommodation (residual = –78.28) than expected.

The non-prison CJS group also showed notable deviations, with slightly more stable accommodation (residual = 19.52) and somewhat less unstable accommodation (residual = –19.52) than expected under independence.

In contrast, individuals with no CJS contact were strongly overrepresented in stable accommodation (residual = 59.4) and underrepresented in unstable accommodation (residual = –59.4), highlighting a much more favourable housing profile than both CJS groups.

Table 4.28: Standardised residuals of chi-squared results for accommodation type vs CJS status

Variable	No CJS	Non-prison CJS	Prison
Stable	59.4	19.52	-78.28
Unstable	-59.4	-19.52	78.28

4.6.7 History of homelessness

A total of 8559 individuals (24.2% of the SDMD cohort) reported having ever experienced homelessness during the study period. This variable is used here to highlight a specific and severe form of housing instability, which is widely linked to poor health outcomes and increased risk of early mortality (Bramley, Fitzpatrick and Sosenko, 2020; Cooper and McCulloch, 2023; Lowrie et al., 2023). There is also literature (discussed in Chapter 2) in the Scottish context with regards to drug misuse, homelessness, contact with the CJS, and mortality (Aldridge et al., 2018; Tweed et al., 2022a).

Among patients with prison experience, 40.6% (n = 4,914) had experienced homelessness at some point during the study period. This group was 3.4 times more likely to report

homelessness compared to those with no CJS contact (PR = 3.4), suggesting a strong association between imprisonment and housing instability.

In the non-prison CJS group, 25.1% (n = 1,627) reported a history of homelessness, which is more than twice the rate found in the no-contact group. The prevalence ratio here was 2.1, indicating that individuals with community-based CJS contact were also significantly more likely to have experienced homelessness.

By contrast, only 12.1% of individuals with no recorded CJS contact (n = 2,018) had ever been homeless.

Table 4.29: History of homelessness per CJS experience type

Variable	No CJS contact		Non prison CJS contact			Prison contact		
	N	%	N	%	PR	N	%	PR
Ever homeless	2018	12.1	1627	25.1	2.1	4914	40.6	3.4

Prevalence Ratios (PR) measured against the reference category of No Contact

4.6.8 Chi-Squared test for significance – ever homeless

A Pearson's chi-squared test was conducted to examine the association between reported experiences of homelessness and CJS contact status (Table 4.30). The test returned a statistically significant result: chi-squared = (2, N = 35,331) = 3123.7, $p < 0.001$, indicating that the distribution of individuals reporting homelessness differed significantly across the three CJS contact groups.

Table 4.30: Chi-squared result for ever homeless vs CJS status

Variable	X - squared	Degrees of Freedom	N	P Value
Ever Homeless	3123.7	2	35,331	< 2.2e-16

4.6.9 Chi-Squared residuals for association – ever homeless

Standardised residuals were calculated to identify which groups contributed most to the overall association between CJS contact and self-reported history of homelessness (Table 4.31). Residuals greater than two are typically interpreted as showing a statistically significant difference from what would be expected if there were no association between variables.

Among those with prison experience, there was a very large positive residual for individuals who reported a history of homelessness (residual = 51.89). This indicates that individuals in the prison group were significantly more likely to have experienced homelessness than would be expected under independence.

The non-prison CJS group showed only a small residual of 1.74 for individuals with a history of homelessness. This suggests that the distribution of homelessness in this group was broadly in line with expectations and did not contribute strongly to the overall association.

In contrast, the no CJS contact group had a significant negative residual for individuals with a history of homelessness (residual = -50.66). This indicates that people in this group were significantly less likely to report homelessness than expected.

Table 4.31: Standardised residuals of chi-squared results for ever homeless vs CJS status

Variable	No CJS	Non-prison CJS	Prison
Ever Homeless	-50.66	1.74	51.89

4.7 Conclusion

This chapter examined how contact with the criminal justice system (CJS) intersects with demographic, drug use, health, and social vulnerabilities among individuals accessing drug treatment in Scotland between 2012 and 2015. Using descriptive statistics, it addressed four research questions, each focusing on a different aspect of the lives of drug treatment patients by their experience of the CJS.

Firstly, the chapter investigated demographic differences among people with prison, non-prison, and no recorded CJS contact. It found that those with any form of CJS experience were more likely to be male, younger, and—depending on the type of CJS contact—more likely to come from particular health board regions such as Ayrshire & Arran, Fife, and Tayside. In contrast, those with no CJS contact tended to be older and more evenly distributed across health boards. These findings suggest that CJS contact among people in drug treatment is not evenly spread, but shaped by underlying demographic and regional inequalities.

Secondly, the chapter examined differences in drug use and health-related vulnerabilities across CJS groups. The results showed that people with CJS contact—particularly those with prison experience—began using drugs at a younger age, were more likely to report heroin, crack cocaine, and benzodiazepine use, and had higher rates of injecting. These individuals also had more recorded contact with health services. Despite this, people with prison experience were underrepresented in alcohol and mental health services, indicating potential gaps in care pathways for justice-involved individuals with high health needs.

Thirdly, the chapter analysed social vulnerabilities, focusing on housing and employment status. The data showed that individuals with prison experience were the most likely to be unemployed, to have never worked, and to report living in unstable accommodation or having experienced homelessness. Those with non-prison CJS contact also experienced disadvantage on these measures, though typically to a lesser extent. These findings reinforce the social inequalities associated with criminal justice involvement.

Together, the findings presented in this chapter demonstrate that justice-involved drug users in Scotland, especially those with prison experience, face disproportionate levels of health and social vulnerability. While previous research has highlighted the overlap between drug use, criminal justice contact, and marginalisation, this chapter provides a more detailed account by distinguishing between different types of CJS experience. In doing so, it lays the foundation for the next chapter, which examines mortality, and how these intersecting vulnerabilities are associated with the risk of death.

5 Factors associated with mortality and justice experience amongst drug users seeking treatment

5.1 Introduction

Mortality among people who use drugs remains a significant public health concern in Scotland (Drug Deaths Taskforce, 2022; Public Health Scotland, 2022; Family et al., 2025). Understanding the factors associated with elevated mortality among already vulnerable populations is essential for informing harm reduction strategies, improving targeted interventions, and shaping policy responses aimed at reducing premature deaths. This is particularly relevant within the context of Scotland's wider public health approach to drug policy, where reducing drug-related harm and preventing avoidable deaths are central priorities (Scottish Government, 2018). Individuals who experience contact with the criminal justice system (CJS) have frequently been identified as facing elevated risks of drug-related mortality (Graham et al., 2015; Pierce et al., 2016). However, the mechanisms underlying this relationship remain complex and are often difficult to disentangle, particularly given the overlapping health, social, and structural vulnerabilities experienced by people who use drugs.

The aim of this chapter is to examine mortality among people represented in the Scottish Drug Misuse Database (2012 to 2015 cohort) and assess whether criminal justice experience is independently associated with mortality after controlling for demographic, health, substance use, and social factors. This chapter addresses three related research questions regarding mortality among individuals accessing drug treatment in Scotland. Research Question 6 asks whether mortality rates are higher among drug treatment patients with CJS experience compared to those with no recorded CJS contact. Research Question 7 investigates which demographic, drug-use, health, and social factors are linked to mortality within the cohort. Research Question 8 then considers whether these factors vary according to the type of CJS experience individuals have had.

The analysis builds directly on the descriptive findings presented in Chapter 4, which identified significant differences in health, drug use, and social vulnerability among individuals with different types of criminal justice system (CJS) contact. This chapter expands that analysis by examining mortality outcomes among individuals accessing drug treatment and investigating whether mortality risks vary across groups defined by their CJS

experience: those with no recorded CJS contact, those with non-prison forms of CJS contact, and those with prison experience. By comparing these groups, the chapter evaluates whether the differences noted in Chapter 4 are reflected in distinct mortality-related risk profiles across these forms of justice involvement.

The chapter begins with descriptive analyses of mortality prevalence and causes of death across these three groups. This section directly addresses Research Question 6 by comparing mortality rates and the distribution of drug-related and non-drug-related deaths based on CJS status. The chapter then estimates a logistic regression model using the full cohort of 26,298 individuals accessing drug treatment between 2012 and 2015. This model explores the relationship between mortality and a range of demographic characteristics, substance use variables, health-related factors, and indicators of social and structural vulnerability, thereby addressing Research Question 7.

Finally, the analysis explores whether these relationships differ based on criminal justice experience. This is done by estimating three additional cohort models: comparing individuals with prison experience to those with non-prison CJS contact, comparing individuals with prison experience to those with no recorded CJS contact, and comparing individuals with non-prison CJS contact to those with no recorded CJS contact. These models help determine whether the factors linked to mortality vary by the type of CJS exposure, thereby contributing to Research Question 8.

5.2 Research Question 6: Is the mortality rate higher among CJ-experienced drug treatment patients than among those with no CJ contact?

This section addresses Research Question 6: Is the mortality rate higher among CJ-experienced drug treatment patients than among those with no CJ contact? The aim here is to establish whether individuals who have had contact with the CJS during the study period, either through imprisonment or other forms of justice contact, have higher rates of mortality. While existing literature highlights an increased risk of mortality among people leaving prison (Binswanger, 2013; Graham et al., 2015; Wildeman and Andersen, 2020), there has been little exploration in Scotland of how mortality risk varies across other types of CJ contact. By comparing crude mortality rates and cause-specific prevalence across CJ experience groups, this section provides an initial step toward understanding whether

justice involvement is associated with an increased risk of death among people engaged in drug treatment.

5.2.1 Descriptive Statistics – mortality by CJS Status

Table 5.1 shows all-cause mortality among the entire cohort of 35,331 individuals accessing drug treatment in Scotland between 2012 and 2015. Mortality outcomes were assessed from 2012 to 2020, providing up to five years of follow-up after treatment initiation. The cohort was divided into three groups based on CJS experience: individuals with no recorded CJS contact, those with non-prison CJS contact, and those with prison experience.

Overall, the mortality rates were quite similar for those with no recorded CJS contact (11.7%, n = 1959), the prison-experienced group (11.5%, n = 1392), and the non-prison CJS contact group (10.1%, n = 657). However, the analysis in Chapter 4 revealed differences between groups by CJS status across various factors that could influence death. Therefore, it is essential to examine this relationship in more detail.

5.2.1.1.1 Table 5.1: Mortality (all cause) of SDMD cohort by CJS status

Variable	No CJS Contact		Non-Prison CJS Contact		Prison Contact	
	N	%	N	%	N	%
Deaths	1959	11.7	657	10.1	1392	11.5

Mortality was calculated as a percentage of total patients within each CJS group who died between 2012 and 2020.

5.2.1.1.2 Chi-squared test results of all-cause mortality

A Chi-squared test was used to examine the relationship between CJS contact status and all-cause mortality. The results showed a statistically significant association between CJS status and mortality, chi-squared (2, N = 35,331) = 12.12, p = 0.002. This indicates that mortality differs slightly across the CJS contact groups, though the differences are small in absolute terms.

Variable	chi-squared	Degrees of Freedom	N	P Value

mortality	12.1	2	35,331	<0.01

5.2.2 Cause of Death per CJS Status

This section explores how the cause of death varied between CJS groups, using prevalence ratios (PRs) to identify which types of drug- and non-drug-related deaths were disproportionately associated with CJS status. These results are descriptive and intended to contextualise the later regression analysis. Among the 4,008 individuals who died, Drug-Related Deaths (DRDs) were the most common overall. DRDs are defined here in line with National Records of Scotland (NRS) criteria, capturing deaths where controlled substances were the underlying or contributory cause, based on ICD-10 coding[38].

Individuals with prison experience had the highest overall prevalence of DRDs, with 891 of the 1392 deceased individuals (64.0%) dying from drug-related causes. The DRD rate was also high in the non-prison CJS contact group, accounting for 361 out of 657 deaths (54.9%). In contrast, among those with no recorded CJS contact, 802 of the 1,959 deaths (40.9%) were drug-related.

Several specific substances were more prevalent among those with criminal justice experience. Benzodiazepine related deaths accounted for 5.4% (n = 75) of all deaths in the prison group, 4.6% (n = 30) in the non-prison group, and 2.8% (n = 55) in the no CJS contact group. The Prevalence Ratio (PR) for benzodiazepine deaths was 1.9 in the prison group and 1.4 in the non-prison group, using the no CJS contact group as the reference. Cocaine-related deaths followed a similar distribution with 3.2% in the prison group (n = 44, PR = 2.7), 3.4% in the non-prison group (n = 22, PR = 2.5), and 1.4% among those with no CJS contact (n = 23). Methadone was also more commonly recorded as a cause of death among those with prison experience (3.5%, n = 49) than in the non-prison (2.7%, n = 18) or no CJS contact (2.0%, n = 38) groups. Again, using the no CJS contact group as the reference, the prison status group were 1.8 times as likely to die, and the non-prison group nearly three times more likely (PR = 2.7), with methadone stated as a contributory factor.

[38] In this chapter, Drug-Related Deaths (DRDs) are identified using the same approach adopted by National Records of Scotland (NRS) and Public Health Scotland. Specifically, deaths are coded as drug-related where the underlying or contributory cause matches ICD-10 codes associated with mental and behavioural disorders due to psychoactive substance use (F11–F16, F19), or accidental, intentional, or undetermined poisoning by drugs (e.g., X40–X44, X60–X64, Y10–Y14). This classification aligns with the baseline definition used in the UK Drugs Strategy and NDRDD reporting.

Among the non-drug-related causes of death, assault-related deaths were more frequent in the prison (2.1%, n = 29, PR = 1.9) and non-prison groups (1.8%, n = 12, PR = 1.7) than in the no-contact group (1.1%, n = 21). In contrast, self-inflicted deaths (e.g. suicide) were more evenly distributed across all groups, accounting for around 5–7% of deaths in each CJS status group. Although differences between groups were limited, this represents a substantial proportion of deaths within a high-risk population who are actively engaging with services, highlighting the importance of mental health and suicide prevention across all CJS groups for people seeking drug treatment in Scotland.

'Poly-Drug Deaths' refer to deaths where multiple substances are recorded as contributing factors and are a subset of DRDs. Polydrug use has been widely recognised as a major driver of Scotland's drug death crisis, as discussed in Chapter 2, and is consistently highlighted in both the academic literature (e.g., Jones et al., 2012; Family et al., 2025) and national reporting (Ciesluk et al., 2024; NRS, 2020; PHS, 2022). However, while the presence of polydrug-related deaths is routinely acknowledged, official statistics do not break these down by criminal justice status. This analysis, therefore, offers new insights into how polydrug deaths vary across CJS groups, as the findings show that polydrug deaths are more common among individuals with a history of contact with the criminal justice system. This was especially evident among the prison-experienced group (32.5%, PR = 1.4), compared to 28.5% in the non-prison group (PR = 1.2) and 22.9% in the reference group, with no CJS contact. This may reflect the more frequent presence of high-risk substances such as benzodiazepines, cocaine, and methadone in the CJS groups, as demonstrated in Chapter 4.

Table 5.2: Cause of death by CJS contact

Variable	No CJS contact		Non prison CJS contact			Prison contact		
	N	%	N	%	PR	N	%	PR
Anti epilepsy	103	5.3	26	4.0	0.8	76	5.5	1.0
Anti-depressants	131	6.7	56	8.5	1.3	147	10.6	1.6
Benzodiazepines	55	2.8	30	4.6	1.6	75	5.4	1.9
Cocaine	23	1.2	22	3.3	2.9	44	3.2	2.7
Methadone	38	1.9	18	2.7	1.4	49	3.5	1.8
Opioids	180	9.2	61	9.3	1.0	147	10.6	1.1
Cannabis	49	2.5	18	2.7	1.1	61	4.4	1.8
Drug Related Deaths	839	42.8	361	54.9	1.3	891	64.0	1.5
Poly-Drug Deaths	449	22.9	187	28.5	1.2	453	32.5	1.4
Alcohol + Drug	174	8.9	57	8.7	1.0	80	5.7	0.6
Hepatitis C	86	4.4	30	4.6	1.0	48	3.4	0.8
HIV	<10	NA	<10	NA	NA	<10	NA	NA
Self-Inflicted Death	125	6.4	48	7.3	1.1	74	5.3	0.8
Assault	21	1.1	12	1.8	1.7	29	2.1	1.9

Individuals may have more than one cause of death recorded. As such, counts and percentages do not sum to the total number of deaths. Percentages calculated as a proportion of those who died within each CJS group. PR = Prevalence Ratio compared to the reference group (no CJS contact).

The descriptive findings in this section demonstrate that mortality rates and causes of death differ across CJ status groups, with drug-related causes particularly common among those with CJ experience. However, these crude proportions do not take into account other potential contributing factors such as age, healthcare access, housing, or differences in substance use. The next section investigates which demographic, health, drug use, and social variables are significantly linked to mortality outcomes. This will help identify key factors that may explain these differences and guide the subsequent multivariate modelling.

5.3 Research Question 7: What demographic, drug-use, health and social factors are associated with mortality?

This section explores Research Question 7: *What demographic, drug-use, health, and social factors are associated with mortality among people in drug treatment?* The aim is to determine which personal characteristics are associated with an increased risk of death within the cohort accessing drug treatment services in Scotland. Previous studies have identified various factors associated with higher mortality, such as substance use profiles, health issues, and social or economic disadvantages (Darke et al., 2007; Pierce et al., 2016; Tweed et al., 2022; Lewer et al., 2019). However, the specific relevance of these factors for the Scottish drug treatment population remains unclear.

To examine these relationships, a logistic regression model was fitted to a cohort of 26,298 individuals, drawn from the full cohort of 35,331 after excluding cases with missing data. The model estimated the association between mortality and a range of demographic, drug-use, health, and social variables. The variables included in the model were defined and operationalised in Chapter 3, with decisions on grouping and categorisation informed by both the literature and the structure of the SDMD dataset. The analysis presented here, therefore, examines how these variables relate to mortality within the cohort, providing an adjusted assessment of which factors are most strongly associated with death among people engaged in drug treatment. The forest plot for the regression results is illustrated in Figure 5.2. Panel A displays the adjusted odds ratios for the whole cohort, addressing Research Question 7, whilst Panels B–D present the models comparing different criminal justice experience groups and are discussed in the answer to Research Question 8.

5.4 Analytic Approach

The results of the logistic regression models are presented in Tables 5.3–5.6, with each reporting adjusted odds ratios (ORs), 95% confidence intervals (CIs), and p-values for each variable included in the analysis. These estimates indicate the strength and direction of the association between each factor and mortality after accounting for the influence of the other variables in the model.

To aid interpretation, regression results are presented using a forest plot (Figure 5.2), which illustrates the associations between each factor and mortality. The interpretation is

organised by the domains in the research question: demographic characteristics, health-related factors, substance use profiles, and social and structural indicators. Interaction terms are also fitted for each model, and the results are visualised in Figures 5.1, 5.3, 5.4, and 5.5 below. This approach enables systematic examination of each variable group's contribution to mortality risk across the cohort.

5.5 Model fit diagnostics

To ensure the logistic regression model was robust, diagnostic checks for multicollinearity and model fit were carried out. Variance Inflation Factors (VIFs) were used to assess multicollinearity among the independent variables. All VIF values were low, with a maximum of 2.4. This indicates that the variables were sufficiently independent, enabling stable estimation of the regression coefficients.

Model fit was evaluated using the Akaike Information Criterion (AIC). During model development, AIC guided comparisons of different specifications. As described in Chapter 3, variables were grouped thematically based on theoretical relevance and evidence from the literature. When multiple possible specifications existed, AIC values were compared to determine if including variables improved or maintained the model fit. Variables that worsened the model fit or caused problematic multicollinearity were omitted from the final, fully adjusted model.

The final model was estimated using 26,298 observations after removing cases with missing data on key variables. The model's residual deviance was 16,881 on 26,281 degrees of freedom.

5.6 Demographic factors and mortality

Age and sex were included as demographic factors linked to mortality in the drug treatment cohort.

Age, treated as a continuous variable, was included as a control variable and was associated with increased odds of mortality (OR = 1.04, 95% CI: 1.03–1.05, $p < 0.001$), consistent with general population trends.

Sex was significantly associated with mortality, with males having higher odds of death compared to females (OR = 1.2, 95% CI: 1.1–1.3, $p < 0.001$).

5.7 Drug-related health service contact and mortality

Two substance-related health service contact variables were included: (1) drug-related health service contact, defined as any documented interaction with health services for issues related to drug use, and (2) alcohol-related health service contact, defined as any documented interaction with health services for issues related to alcohol use.

Both variables were linked to mortality. Individuals who accessed drug-related physical healthcare services had higher odds of death than those who did not (OR = 1.2, 95% CI: 1.1–1.3, $p < 0.001$).

Similarly, individuals who had reported accessing alcohol-related healthcare services had higher odds of mortality (OR = 1.5, 95% CI: 1.3–1.6, $p < 0.001$). These findings suggest an association between accessing substance-related healthcare services and mortality during the study period.

5.8 Drug-taking profile and mortality

Variables related to participants' self-reported substance use at initial assessment were included to analyse their association with mortality. Heroin use was significantly associated with higher mortality (OR = 1.6, 95% CI: 1.3–1.7, $p < 0.001$). Benzodiazepines were also linked to increased odds of death (OR = 1.5, 95% CI: 1.3–1.6, $p < 0.001$).

In contrast, some substances were associated with lower odds of mortality in the model. Cannabis was associated with reduced odds of death during the study period (OR = 0.8, 95% CI: 0.7–0.8, $p < 0.001$). Similarly, crack cocaine use (OR = 0.6, 95% CI: 0.4–0.7, $p < 0.001$) and powder cocaine (OR = 0.7, 95% CI: 0.6–0.8, $p < 0.001$) showed lower odds of mortality compared to individuals who did not use these substances. These findings should be interpreted cautiously, as they likely reflect differences in underlying drug use profiles within the cohort, particularly the higher mortality risk associated with opioid and benzodiazepine use, rather than indicating any protective effect of these substances.

Surprisingly, individuals who reported being drug-free at the time of assessment had higher odds of mortality than those who reported using drugs (OR = 1.4, 95% CI: 1.3–1.6, $p < 0.001$).

5.9 Social and structural vulnerability and mortality

Two variables reflecting social and structural vulnerability were included: employment engagement (coded as employed/in education versus not employed/not in education at the initial assessment) and housing stability (coded as stable versus unstable housing based on the reported living situation at the initial assessment).

Employment engagement was associated with lower mortality. Individuals employed or in education had reduced odds of death compared to those not employed or in education at the initial assessment (OR = 0.5, 95% CI: 0.4–0.6, $p < 0.001$).

Housing stability was also associated with mortality, with individuals in stable accommodation having lower odds of death compared to those experiencing housing instability (OR = 0.8, 95% CI: 0.8–0.9, $p < 0.001$).

5.10 Prison experience and mortality

Prison experience was included in the model as a binary variable indicating whether an individual reported experiencing imprisonment during the study period.

Unexpectedly, the model found no statistically significant association between prison experience and mortality (OR = 1.1, 95% CI: 0.96–1.2, $p = 0.170$). After adjusting for other factors, prison experience was not independently associated with mortality in this model.

5.11 Interaction terms

Two interaction terms were included in the model to assess whether relationships between selected variables and mortality varied by prison experience. There was a negative interaction between prison experience and heroin use (OR = 0.8, 95% CI: 0.7–0.95, $p = 0.01$). Although heroin use itself was associated with increased odds of mortality (see

above), this association was weaker among individuals with prison experience than among those without (see Table 5.3 below). This suggests that the association between heroin use and mortality is partially attenuated among those with prison experience within the cohort. One possible explanation is that imprisonment may interrupt high-risk drug use whilst also increasing contact with health services, thereby reducing risk among this subgroup. However, this finding should be interpreted with caution, as it does not imply that imprisonment is protective overall and may instead reflect differences in underlying risk or service engagement.

A second interaction term examined the relationship between prison experience and employment engagement. This interaction was statistically significant and positive (OR = 1.8, 95% CI: 1.3–2.5, $p < 0.001$). In the main model, engagement in employment or education was associated with lower mortality risk. However, this protective association was weaker among individuals who had experienced imprisonment (see Figure 5.1 below). This may suggest that prison experience acts as a constraint, limiting the protective effect of employment or education. For example, the benefits typically associated with employment, such as stability, income, or social integration, may be less accessible or less sustained among those with prison experience, thereby reducing the association with lower mortality. As with all interaction effects, this finding should be interpreted cautiously and may reflect differences in underlying vulnerability or structural disadvantage.

Taken together, these interaction effects suggest that prison experience modifies the associations between key risk and protective factors and mortality, rather than acting as a straightforward risk or protective factor in itself. Among individuals reporting heroin use, the association with mortality was weaker among those with prison experience, which may reflect differences in patterns of use, service contact, or underlying risk. In contrast, the protective association of employment or education was reduced among those with prison experience, suggesting that the benefits typically associated with social stability may be less accessible for people who have also been to prison.

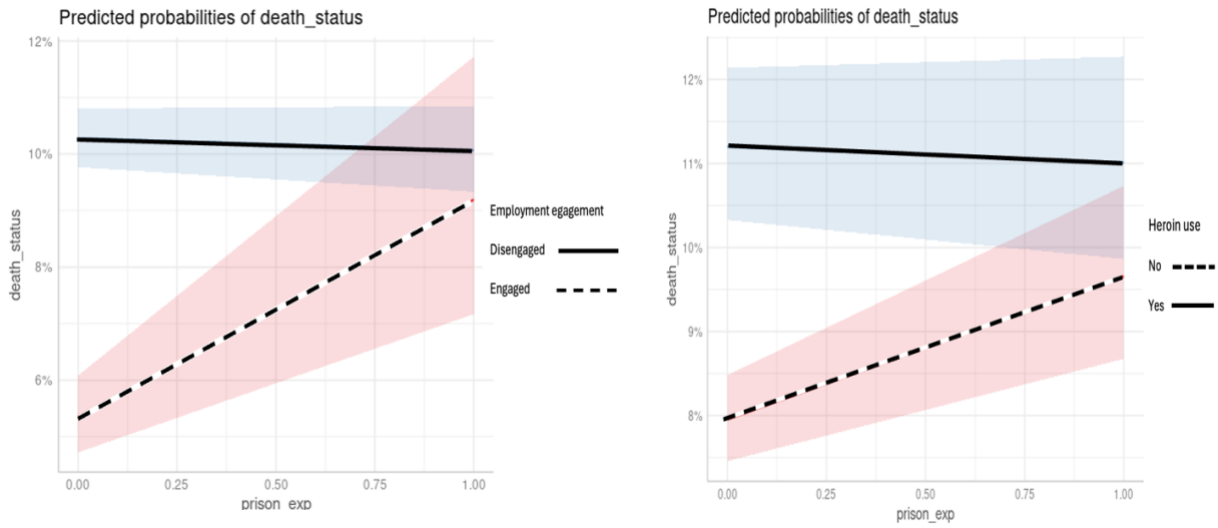


Figure 5.1: Interaction term prison experience x employment engagement(left) and prison experience x heroin use (right)

5.12 Model results

The complete results of the adjusted logistic regression model described earlier are presented here, showing the odds ratios, 95% confidence intervals, and p-values for each variable in the fully adjusted model. All estimates represent associations with mortality, holding all other variables in the model constant

Table 5.3: Logistic regression results for factors associated with mortality among people in drug treatment in Scotland, 2012-2015.

variable	O.R	95% CI	P value
Prison Experience	1.1	(0.96-1.2)	0.17
Age	1.1	(1.0-1.1)	<0.001
Male	1.2	(1.1-1.3)	<0.001
Heroin	1.5	(1.3-1.7)	<0.001
Cannabis	0.8	(0.7-0.8)	<0.001
Benzodiazepine	1.5	(1.3-1.6)	<0.001
Crack cocaine	0.6	(0.4-0.7)	<0.001
Drug free	1.4	(1.3-1.6)	<0.001
Cocaine	0.7	(0.6-0.8)	<0.001
Physical health	1.2	(1.1-1.3)	<0.001
Alcohol related health	1.5	(1.3-1.6)	<0.001
Employment engagement	0.5	(0.4-0.6)	<0.001
Housing Stability	0.8	(0.8-0.9)	<0.001
Prison x heroin	0.8	(0.7-0.95)	<0.01
Prison x Employment eng.	1.8	(1.3-2.5)	<0.001

5.13 Forest plot of adjusted models (Panels A-D)

To visualise the associations described above, adjusted odds ratios from the regression models are shown as forest plots in Figure 5.2. Panel A displays the results for the entire cohort (n = 26,298), while Panels B–D compare across CJS experience groups (see RQ 8 below).

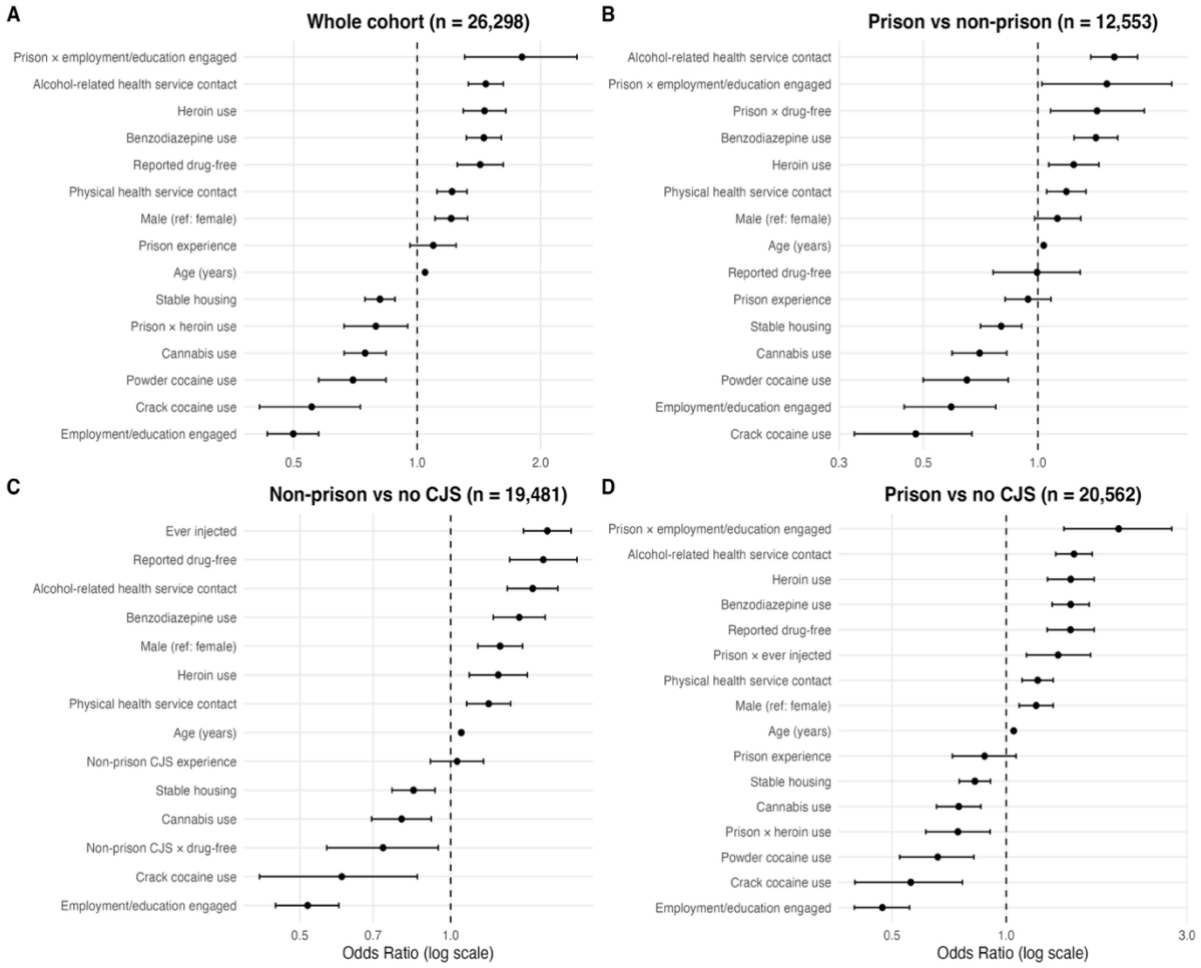


Figure 5.2: Forest plots of adjusted regression models examining factors associated with mortality (Panels A–D

5.14 Summary of key findings

Several key findings emerge from the model. First, prison experience itself was not independently associated with mortality once demographic, health, drug-use profiles, and social variables were accounted for. This may reflect the extent to which prison experience overlaps with other forms of disadvantage captured in the model, such as substance use, health needs, and social vulnerability, rather than indicating that it is unrelated to mortality risk. In this sense, the non-significant main effect likely reflects shared explanatory pathways rather than an absence of association. This is notable given the strong emphasis in the literature on post-prison mortality risk (see, for example, Graham et al. 2015). At the

cohort level, this implies that imprisonment alone, for this already vulnerable group, does not explain mortality risk once broader health and social vulnerabilities are considered. The interaction terms included provide further insight into these relationships. Although self-reporting heroin use at initial assessment was associated with increased odds of mortality in the overall model, the interaction between reporting heroin use and prison experience showed a decreased association with mortality. This finding contradicts expectations based on the well-established link between opioid use and drug-related death (van Amsterdam et al. 2021), raising questions about how imprisonment influences risk profiles within this cohort.

A similar unexpected association was observed among individuals who reported being drug-free at assessment. Rather than being linked to lower mortality risk, reporting drug-free status was associated with higher odds of death in the model, possibly reflecting complex patterns of drug use and abstinence, treatment engagement, or changes in drug tolerance related to their experience of the CJS. The model also emphasised the importance of broader social vulnerability. Although direct measures of deprivation were not available in the dataset, employment engagement and housing stability appeared to serve as proxies for social and economic disadvantage. Individuals employed or in education, and those living in stable accommodation, had lower mortality odds, suggesting that some form of stability may reflect broader protective social conditions (Aldridge et al., 2018; Tweed et al., 2022).

Taken together, these findings suggest that mortality within the drug treatment cohort is associated with a combination of substance use profiles, health vulnerabilities, and broader social disadvantage. However, this model considers the cohort as a whole and does not distinguish between different types of CJS experience. The following research question, therefore, examines whether these results differ across groups with prison experience, other forms of CJS contact, or no recorded justice involvement.

A further implication of these findings is that prison experience does not act as an independent determinant of mortality within this cohort, but rather as a modifying context through which other risk and protective factors are expressed. This is reflected in the absence of a significant main effect for prison experience, alongside the presence of statistically significant interaction terms. Taken together, this suggests that the relationship

between criminal justice contact and mortality is not uniform, but contingent on underlying health, substance use, and social conditions.

5.15 Research Question 8: What demographic, drug-use, health and social factors are predictive of mortality by CJS status?

To assess whether the associations identified in the full-cohort model varied by type of CJS contact, the same thematic method was used to develop three additional CJS cohort models based on the justice experience types outlined in Chapter Three. The first model compared individuals with prison experience to those with non-prison forms of CJS contact (n = 12,553), including individuals subject to Drug Treatment and Testing Orders, those referred through other criminal justice routes, or those reporting other forms of justice contact (Figure 5.2, Panel B). The second model contrasted individuals with non-prison CJS contact to those with no recorded CJS contact (n = 19,481; Figure 5.2, Panel C). The third model contrasted individuals with prison experience to those with no recorded CJS contact (n = 20,562; Figure 5.2, Panel D). Differences in sample size reflect both the restriction of the sample to relevant CJS groups and the exclusion of cases with missing data used in the regression models. While most of the following sections describing each model's findings will include the relative odds ratios and confidence intervals for that variable, the full tables of regression outputs are also available below.

5.16 Demographic factors and mortality by CJS status

Across all three CJS cohort models, age was consistently associated with higher mortality odds, with ORs of approximately 1.05 per additional year. This consistency across models indicates that the relationship between age and mortality does not differ meaningfully by CJS status. Given that increasing age is a well-established predictor of mortality, this finding primarily demonstrates that the models are behaving as expected rather than identifying a CJS-specific effect. It should also be noted that age was modelled as a linear term; a non-linear specification (e.g., inclusion of a squared term) may have captured more complex relationships between age and mortality risk, and omitting a squared term is a limitation.

Being male was significantly associated with increased mortality in the two models involving no recorded contact with the CJS, but not in the prison vs non-prison model. This suggests that the association between sex and mortality is more apparent when

comparing individuals with and without CJS contact, but less pronounced within CJS-exposed groups.

5.17 Substance-related health service contact and mortality by CJS status

Health-related service contact was consistently associated with mortality across all three CJS cohort models. In the prison versus non-prison CJS model, contact with drug-related physical health services was associated with increased mortality risk (OR = 1.2, 95% CI: 1.1–1.3, p = 0.005), whereas alcohol-related health service contact showed a stronger association (OR = 1.6, 95% CI: 1.4–1.8, p < 0.001).

A similar relationship was observed in the prison versus no recorded CJS contact model, with drug-related physical health contact associated with higher odds of mortality (OR = 1.2, 95% CI: 1.1–1.3, p < 0.001) and alcohol-related health contact with increased odds of death (OR = 1.5, 95% CI: 1.4–1.7, p < 0.001).

The non-prison versus no recorded CJS contact model also yielded similar results, with drug-related physical health contact remaining significantly associated with mortality (OR = 1.2, 95% CI: 1.1–1.3, p < 0.001). In this model, alcohol-related health contact remained strongly associated (OR = 1.5, 95% CI: 1.3–1.6, p < 0.001), indicating that individuals at elevated risk of mortality were consistently in contact with health services across all CJS experience groups, suggesting that contact with services alone was not sufficient to mitigate risk within this cohort.

5.18 Drug-taking profile and mortality by CJS status

Several drug-use variables were consistently related to mortality across the three CJS cohort models. Self-reported heroin use was associated with higher odds of mortality in the prison versus non-prison CJS model (OR = 1.2, 95% CI: 1.1–1.4, p = 0.005), and in the prison versus no recorded CJS contact model (OR = 1.5, 95% CI: 1.3–1.7, p < 0.001), as well as in the non-prison versus no recorded CJS contact model (OR = 1.2, 95% CI: 1.1–1.4, p = 0.001). Benzodiazepine use was also positively linked to mortality in all three models, with odds ratios ranging from 1.4 to 1.5. Taken together, these findings indicate

that opioid and benzodiazepine use are consistently associated with elevated mortality risk across all CJS groups.

Self-reported cannabis use was associated with lower mortality across all three models. It was linked to reduced odds of death in the prison versus non-prison CJS model (OR = 0.7, 95% CI: 0.6–0.8, $p < 0.001$), the prison versus no recorded CJS contact model (OR = 0.7, 95% CI: 0.7–0.9, $p < 0.001$), and the non-prison versus no recorded CJS contact model (OR = 0.8, 95% CI: 0.7–0.9, $p = 0.001$). Patients reporting consistent crack cocaine use showed a negative association with mortality across all three models, though the confidence intervals were slightly wider than those for cannabis. Powder cocaine use was negatively associated with mortality in the prison models, but was not included in the model comparing non-prison CJS contact with no recorded CJS contact. These associations should be interpreted cautiously, as they are unlikely to reflect protective effects of these substances. Instead, they may indicate differences in underlying risk profiles, including levels of dependency, patterns of service engagement, or co-occurring health and social vulnerabilities.

Drug-free status varied more across the models. It was not significantly associated with mortality in the prison versus non-prison CJS model (OR = 1.0, 95% CI: 0.8–1.3, $p = 0.971$), but was positively associated with mortality in the prison versus no recorded CJS contact model (OR = 1.5, 95% CI: 1.3–1.7, $p < 0.001$) and in the non-prison versus no recorded CJS contact model (OR = 1.5, 95% CI: 1.3–1.8, $p < 0.001$). Patients who reported being drug-free at the initial assessment were associated with increased mortality in models involving those with no recorded CJS contact, but this was not observed when comparing prison experience directly with non-prison CJS contact. This may reflect differences in how drug use is reported or experienced across groups, including possible underreporting among those with criminal justice involvement or increased risk following periods of abstinence and reduced tolerance. However, these interpretations cannot be confirmed with the current data and would benefit from a more qualitative approach to investigate the real reasons people report as drug-free across different CJ experienced groups.

Another difference between the models was the inclusion of patients who disclosed a history of injecting drugs during the study period. This variable was excluded from the prison versus non-prison CJS model but included as an interaction term in the prison versus no recorded CJS contact model, and as a main effect in the non-prison versus no

recorded CJS contact model, where it was associated with higher odds of mortality (OR = 1.6, 95% CI: 1.4–1.7, $p < 0.001$).

5.19 Social and structural vulnerability and mortality across CJS comparisons

Indicators of social and structural vulnerability consistently correlated with mortality across all three CJS cohort models. Employment engagement was linked to lower odds of mortality in the prison versus non-prison CJS model (OR = 0.6, 95% CI: 0.4–0.8, $p < 0.001$), in the prison versus no recorded CJS contact model (OR = 0.5, 95% CI: 0.4–0.6, $p < 0.001$), and in the non-prison versus no recorded CJS contact model (OR = 0.5, 95% CI: 0.4–0.6, $p < 0.001$).

Housing stability also remained negatively associated with mortality across all three models. In the prison-versus-non-prison CJS model, stable housing was associated with lower odds of mortality (OR = 0.8, 95% CI: 0.7–0.9; $p < 0.001$). The same association was observed in the prison versus no recorded CJS contact model (OR = 0.8, 95% CI: 0.8–0.9, $p < 0.001$) and the non-prison versus no recorded CJS contact model (OR = 0.8, 95% CI: 0.8–0.9, $p < 0.001$). These results suggest that engagement in employment or education, and having a stable residence, were among the most consistently associated with lower odds of mortality, indicating a protective relationship across the CJS cohort models

5.20 Criminal justice experience as a predictor of mortality

Criminal justice system (CJS) exposure was examined as a potential predictor of mortality across the three cohort models. In the fully adjusted models, CJS exposure variables were not significantly associated with mortality. Prison experience was not significantly associated with mortality in the prison versus non-prison CJS model (OR = 0.9, 95% CI: 0.8–1.1, $p = 0.401$) or in the prison versus no recorded CJS contact model (OR = 0.9, 95% CI: 0.7–1.1, $p = 0.182$). Likewise, non-prison CJS contact was not significantly associated with mortality in the non-prison-versus-no-recorded-CJS-contact model (OR = 1.0, 95% CI: 0.9–1.2, $p = 0.635$).

These findings indicate that, after accounting for demographic characteristics, substance use, health-related factors, and indicators of social vulnerability, CJS exposure is not independently associated with mortality in this cohort. This suggests that the relationship between CJS experience and mortality is largely explained by these co-occurring risk factors rather than by CJS exposure itself.

5.21 Interaction terms

Interaction terms were also included in each CJS cohort model to assess whether associations between selected predictors and mortality varied by CJS experience. In the prison versus non-prison CJS model (Figure 5.3), the interaction between prison experience and drug-free status was positively associated with mortality (OR = 1.4, 95% CI: 1.1–1.9, p = 0.013). In the main model, reporting being drug-free was associated with higher odds of mortality. The positive interaction suggests that this association is further increased among individuals with prison experience, indicating higher predicted probabilities of death in this subgroup.

Similarly, the interaction between prison experience and employment engagement was positively associated with mortality (OR = 1.5, 95% CI: 1.0–2.3, p = 0.037). Although employment engagement was associated with lower mortality risk in the main model, this interaction indicates that this protective association is reduced among individuals with prison experience.

Across the interaction terms, the results suggest that the association between key predictors and mortality varies by prison experience. In some cases, prison experience appears to attenuate associations with higher risk (e.g. heroin use), while in others it reduces the protective association of factors such as employment. These findings indicate that prison experience serves as a modifying context through which underlying risk and protective factors are expressed, rather than exerting a uniform effect on mortality.

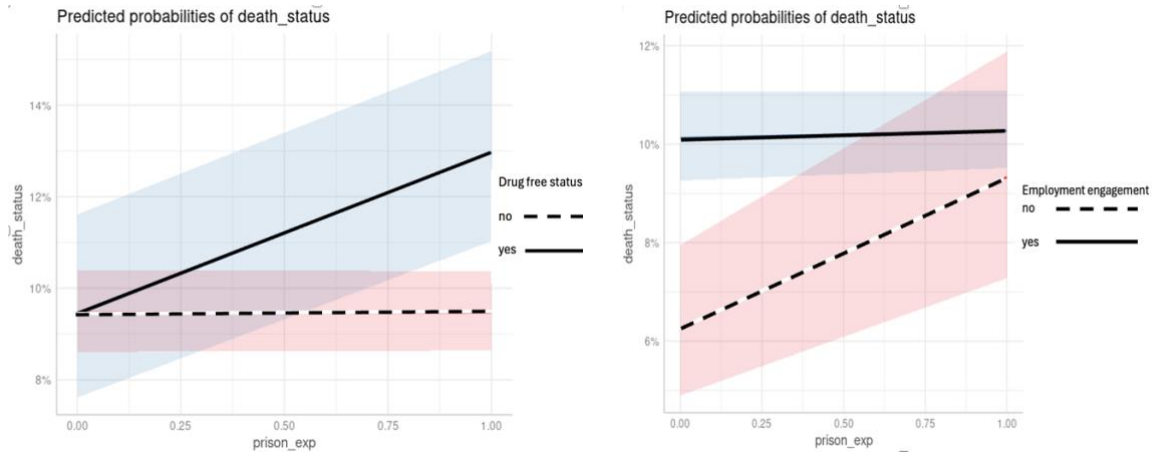


Figure 5.3: Prison vs non-prison experience - Interaction terms for prison experience x reporting as being drug free on initial assessment (left), and prison experience x being engaged in employment/education at initial assessment.

In the model comparing individuals with prison experience to those with no recorded CJS contact (see Figure 5.4), several interaction effects were observed that modify the interpretation of the main effects shown in the model output in Table 5.6.

The interaction between prison experience and employment engagement remained significant and more pronounced (OR = 2.0, 95% CI: 1.4–2.7, $p < 0.001$). While engagement in employment or education was associated with lower mortality in the main-effects model, Figure 5.4 (top left) shows that this protective association is substantially reduced among those with prison experience. In practical terms, although employment engagement is associated with lower overall mortality, this benefit appears to be attenuated in the context of imprisonment.

The interaction between prison experience and heroin use was negatively associated with mortality (OR = 0.7, 95% CI: 0.6–0.9, $p = 0.003$). As shown in Figure 5.4 (top right), heroin use remains associated with higher mortality overall; however, the magnitude of this association is attenuated among individuals with prison experience. This suggests that the excess risk associated with heroin use is lower for those who have experienced imprisonment than for those who have not, although this should not be interpreted as imprisonment being protective in and of itself for those who report to be heroin users in this cohort.

In contrast, the interaction between prison experience and ever having injected was positively associated with mortality (OR = 1.4, 95% CI: 1.1–1.7, p = 0.002). Figure 5.4 (bottom left) shows that individuals with a history of injecting and prison experience have higher predicted probabilities of death than those without such a history, suggesting that prison experience may exacerbate risk in this subgroup.

Taken together, these interaction effects show that the association between prison experience and mortality is not uniform but varies depending on underlying substance use profiles. Importantly, the figures illustrate how these interaction terms modify the baseline associations observed in the main effects, highlighting that the impact of both risk and protective factors differs across subgroups within the cohort.

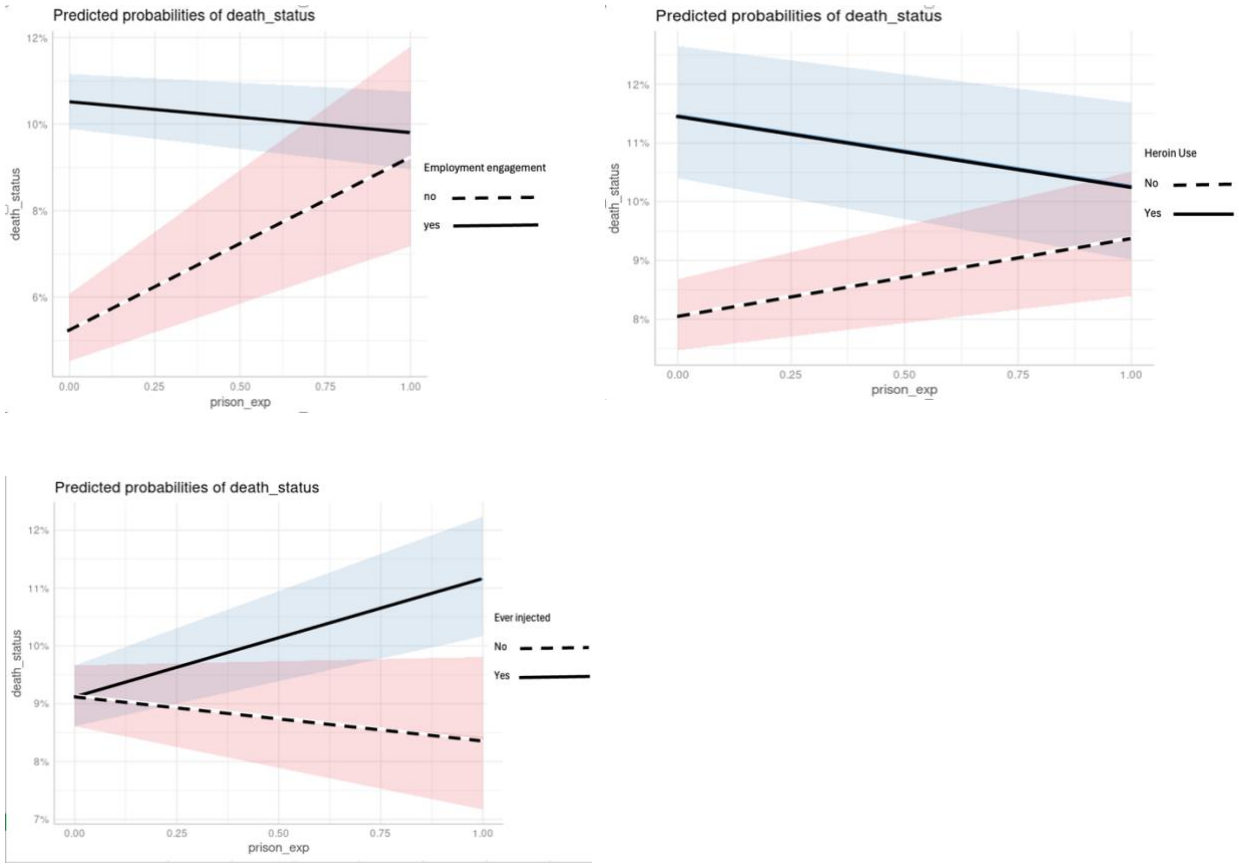


Figure 5.4: Prison vs no recorded CJS experience Interaction terms showing prison experience x engagement in employment/education at initial assessment (top left), prison experience x self-reported heroin use (top right), and prison experience x having ever self-reported a history of injecting across the study period (bottom left).

In contrast, the non-prison versus no recorded CJS contact model included only one interaction term, between non-prison CJS contact and drug-free status (see Figure 5.5). This interaction was negatively associated with mortality (OR = 0.7, 95% CI: 0.6–0.9, p =

0.017), indicating that the association between drug-free status and mortality varies by non-prison CJS experience.

As shown in Figure 5.5 below, among individuals reporting being drug-free at initial assessment, those with non-prison CJS contact had lower predicted probabilities of death than those with no recorded CJS contact. In contrast, among those who were not drug-free, mortality risk remained relatively stable across levels of non-prison CJS contact. Overall, this interaction suggests that non-prison CJS contact is associated with a narrowing of the mortality risk gap between drug-free and non-drug-free individuals. Compared with the prison models, the non-prison model showed fewer overall interaction effects.

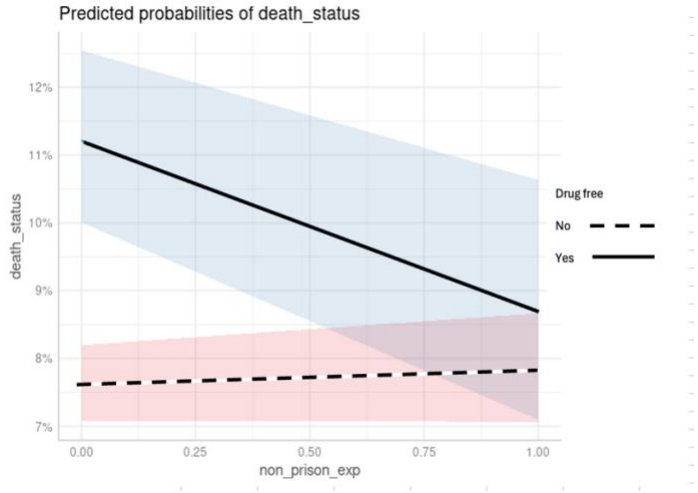


Figure 5.5: Interaction term non-prison experience x drug free

5.22 Model results

The complete results of the three adjusted logistic regression models described above, including the interaction terms, are presented in Tables 5.4–5.6 below. These tables show the estimated odds ratios (O.R.), 95% confidence intervals (95% CI), and p-values for each variable in the final models. The models comprise the prison-versus-non-prison CJS contact model, the non-prison-versus-no-recorded-CJS-contact model, and the prison-versus-no-recorded-CJS-contact model.

Table 5.4: Logistic regression results for factors associated with mortality among people in drug treatment in Scotland (prison experience vs non-prison CJS contact, n = 12,553).

variable	O.R	95% CI	P value
Prison Experience	0.9	(0.8-1.1)	0.401
Age	1.04[39]	(1.03-1.04)	<0.001
Male	1.1	(0.98-1.3)	0.098
Heroin	1.2	(1.1-1.5)	0.005
Cannabis	0.7	(0.6-0.8)	<0.001
Benzodiazepine	1.4	(1.2-1.6)	<0.001
Crack cocaine	0.5	(0.3-0.7)	<0.001
Drug free	1.0	(0.8-1.3)	0.971
Cocaine	0.7	(0.5-0.8)	<0.001
Physical health	1.1	(1.1-1.3)	0.005
Alcohol related health	1.6	(1.4-1.8)	<0.001
Employment engagement	0.6	(0.4-0.8)	<0.001
Housing Stability	0.8	(0.7-0.9)	<0.001
Prison x drug free	1.4	(1.1-1.9)	0.013
Prison x employment engagement	1.5	(1.0-2.3)	0.036

[39] Odds ratios are rounded to one decimal place except where values are close to 1, in which case two decimal places are reported to preserve precision.

Table 5.5: Logistic regression results for factors associated with mortality among people in drug treatment in Scotland (non-prison experience vs no recorded CJS contact, n = 19,481).

variable	O.R	95% CI	P value
Non-prison Exp.	1.0	(0.9-1.2)	0.635
Age	1.05	(1.04-1.06)	<0.001
Male	1.3	(1.1-1.4)	<0.001
Heroin	1.2	(1.1-1.4)	0.001
Cannabis	0.8	(0.7-0.9)	0.001
Benzodiazepine	1.4	(1.2-1.5)	<0.001
Crack cocaine	0.6	(0.4-0.9)	0.007
Drug free	1.5	(1.3-1.8)	<0.001
Ever injected	1.6	(1.4-1.7)	<0.001
Physical health	1.2	(1.1-1.3)	<0.001
Alcohol related health	1.5	(1.3-1.6)	<0.001
Employment engagement	0.5	(0.4-0.6)	<0.001
Housing Stability	0.8	(0.8-0.9)	<0.001
Non-Prison exp. x drug free	0.7	(0.6-0.9)	0.017

Table 5.6: Logistic regression results for factors associated with mortality among people in drug treatment in Scotland (prison experience vs no recorded CJS contact, n = 20,562).

variable	O.R	95% CI	P value
Prison Experience	0.9	(0.7-1.1)	0.182
Age	1.04	(1.03-1.05)	<0.001
Male	1.2	(1.1-1.3)	<0.001
Heroin	1.5	(1.3-1.7)	<0.001
Cannabis	0.7	(0.7-0.9)	<0.001
Benzodiazepine	1.5	(1.3-1.7)	<0.001
Crack cocaine	0.6	(0.4-0.8)	<0.001
Drug free	1.5	(1.3-1.7)	<0.001
Cocaine	0.7	(0.5-0.8)	<0.001
Physical health	1.2	(1.1-1.3)	<0.001
Alcohol related health	1.5	(1.4-1.7)	<0.001
Employment engagement	0.5	(0.4-0.9)	<0.001
Housing Stability	0.8	(0.8-0.9)	<0.001
Prison x employment engagement	2.0	(1.4-2.7)	<0.001
Prison x heroin	0.7	(0.6-0.9)	0.003
Prison x ever injected	1.4	(1.1-1.7)	0.002

5.23 Summary of findings by CJS status

Overall, the CJS cohort models showed more similarities than differences in the factors linked to mortality across CJS groups, likely because the study cohort already faced increased vulnerability related to being problem drug users during a drug-related death crisis (Public Health Scotland, 2022; National Records of Scotland, 2023).

Age remained consistently associated with mortality across all models, with each additional year associated with higher odds of death (OR = 1.04). This association was similar across models, indicating little variation by CJS status and reflecting a general relationship between age and mortality rather than a CJS-specific effect. Several health and substance-related variables also showed stable elevated ORs regardless of the type of criminal justice experience, as contact with drug-related health services (OR = 1.2) and alcohol-related health services (OR = 1.5) were consistently linked to higher odds of mortality across all models. This supports existing evidence that individuals with substance

dependence often have multiple, complex health needs contributing to an increased risk of death (Aldridge et al., 2018; Tweed et al., 2022).

Drug-use variables also exhibited similar results across the models, with self-reported heroin use associated with increased odds of mortality (ORs approximately between 1.2 and 1.5), while benzodiazepine use similarly showed consistently elevated odds (ORs = 1.4–1.5). This aligns with existing evidence linking opioid and benzodiazepine use, as well as broader patterns of polydrug use, with a higher risk of drug-related death, particularly in the context of Scotland's polydrug crisis (NRS 2022; Ciesluk et al., 2024; van Amsterdam et al., 2021; PHS 2022). However, polydrug use was not directly modelled in the present analysis, and these associations should therefore be interpreted with this limitation in mind.

Conversely, cannabis use (OR = 0.7–0.8) and crack cocaine use (OR = 0.5–0.6) were associated with lower mortality risk in most models. These associations are unlikely to reflect protective effects of these substances. Instead, they may reflect differences in underlying risk profiles within the cohort, including variation in drug use profiles, levels of dependence, or engagement with services. For example, individuals reporting these substances may differ from those using opioids or benzodiazepines in ways not fully captured by the model, including the severity or stability of their substance use and broader social circumstances.

Indicators of social and structural vulnerability are consistently linked to mortality. Employment or engagement in education was associated with significantly lower odds of death (OR = 0.5), and stable housing was linked to reduced mortality (OR = 0.8) across all models. These findings suggest that broader social stability is among the most consistent factors associated with decreased mortality risk within the cohort and align with wider evidence that severe social exclusion, such as unemployment, unstable housing, and substance dependence, is strongly linked to poor health outcomes and early death (Aldridge et al., 2018; Tweed et al., 2022). Although CJS involvement is emphasised in the literature (for example, see Binswanger et al., 2007; Graham et al., 2015; Merrall et al., 2010; Wildeman and Andersen, 2020), and in the research questions for this thesis, the justice exposure variables were not independently associated with mortality in any of the CJS cohort models.

With p-values set at the commonly accepted threshold of $p = 0.05$, prison experience showed no significant association with mortality in either the prison-versus-non-prison model or the prison-versus-no-recorded-CJS model. Additionally, the non-prison contact variable was not significantly associated with mortality compared with those with no recorded CJS involvement. This differs from research highlighting elevated mortality risk following release from prison, which often compares individuals to the general population and focuses on short-term post-release overdose risk rather than longer-term mortality within treatment cohorts (Binswanger et al., 2013; Graham et al., 2015). In contrast, the present analysis compares individuals within a high-risk treatment population, allowing for a more nuanced assessment of how different forms of CJS experience relate to mortality within an already vulnerable group.

Although most mortality-related vulnerabilities were similar across groups, some differences were observed across the CJS cohort models. For example, a history of injecting drugs during the study period emerged as a significant predictor of mortality in the non-prison versus no-recorded CJS model (OR = 1.6). As in the full cohort model above (see Table 5.3), another notable difference is that individuals who reported being drug-free at the time of initial assessment had an increased risk of mortality rather than a reduction (OR = 1.5). Rather than lowering risk, reportedly being drug-free was associated with higher odds of mortality among individuals with no recorded CJS contact (OR = 1.5). Unexpectedly, however, it was not linked to mortality when prison experience was directly compared with non-prison CJS contact. This finding is important because increased overdose risk among people with justice experience is often connected to loss of tolerance during prison (Bird & Hutchinson, 2003). However, the current findings suggest that this relationship cannot be explained solely by exposure to the CJS. As shown in Figure 5.5, the interaction indicates that the association between drug-free status and mortality varies by CJS exposure. Among individuals who were not drug-free, mortality risk was similar regardless of non-prison CJS contact. However, among those reporting being drug-free, individuals with no recorded CJS contact had higher predicted probabilities of death, whereas those with non-prison CJS contact had lower predicted probabilities. This pattern is reflected in the negative interaction term (OR = 0.7).

Taken together, these findings suggest that the overall mortality risk profile was largely similar across CJS groups. Mortality seemed to be more strongly linked to underlying

health vulnerabilities, substance use profiles, and indicators of social disadvantage than to the type of criminal justice contact experienced.

5.24 Conclusion

This chapter addressed research questions 6, 7, and 8 to explore the relationship between CJS contact and mortality among individuals in drug treatment in Scotland.

Research Question 6 examined whether mortality rates varied by CJS experience. Overall, mortality was broadly similar across individuals with no recorded CJS contact, non-prison CJS contact, and prison experience. However, the nature of mortality differed between groups. Individuals with CJS experience were more likely to die from drug-related causes, and these deaths more often involved multiple substances, particularly benzodiazepines, methadone, and cocaine. This suggests that while the likelihood of death was comparable across groups, those with CJS experience experienced deaths which were linked to drug use.

Research Question 7 examined which factors were associated with mortality in the cohort. The findings indicate that mortality is shaped by a combination of demographic characteristics, substance use, health needs, and broader social circumstances. Associations with age and sex largely reflect established population patterns rather than cohort-specific effects. Health service contact was consistently linked to mortality, suggesting that those at greatest risk are already known to services and highlighting the concentration of complex and unmet health needs where people might be seen, but still slip through the gaps.

Substance use profiles were also important. Heroin and benzodiazepine use were associated with increased risk, consistent with wider evidence on opioid and sedative-related harm, particularly in the context of polydrug use. In contrast, associations between other substances and lower mortality are unlikely to reflect protective effects and may instead reflect differences in underlying risk profiles and levels of dependency.

A notable finding was that individuals reporting being drug-free at treatment entry had a higher mortality risk. This suggests that reported abstinence at a single time point may not reflect stability, but instead capture periods of transition, relapse risk, or reduced tolerance.

It may also reflect strategic reporting, particularly among those with CJS involvement, where disclosing ongoing drug use may be perceived as risky.

Indicators of social and structural vulnerability, particularly employment engagement and housing stability, were among the most consistently associated factors with mortality. This highlights how closely mortality risk within this population is tied to broader conditions of social disadvantage.

Research Question 8 examined whether these associations varied by type of CJS contact. Across models, patterns were broadly consistent, with similar factors associated with mortality regardless of justice exposure. Importantly, CJS contact was not independently associated with mortality after accounting for other factors. Within this already highly vulnerable cohort, this suggests that the relationship between justice involvement and mortality is largely explained by overlapping health needs, substance use, and social disadvantage, rather than by justice exposure itself.

Some variation between groups was observed, including the role of injecting drug use and differences in how factors such as drug-free status and employment engagement related to mortality across CJS categories. Interaction effects indicated that CJS experience may modify how risk and protective factors operate, rather than directly driving mortality.

Overall, these findings suggest that mortality among individuals in drug treatment in Scotland is more strongly associated with underlying vulnerability and social disadvantage than with the type of CJS contact experienced. Criminal justice involvement appears to shape how risks are experienced, but does not independently explain mortality within this population.

6 Concluding discussion

6.1 Introduction

This thesis has highlighted the fact that Scotland has one of the highest rates of drug-related deaths in Europe, which has never been fully explained. In an effort to better understand the factors that contribute to mortality amongst drug users, this study focuses on a cohort of individuals seeking treatment or support for their drug use. It shows that a high proportion of this group have experienced a range of social and structural disadvantages, including chronic and early patterns of drug use, unstable housing and homelessness, unemployment, and poor physical and mental health. It also shows that many of these individuals had come into contact with the criminal justice system (CJS). However, current methods of recording justice contact amongst those seeking drug treatment fall short and fail to fully capture the extent of it, never mind examining in detail what risks these individuals face and whether these risks differ depending on the nature of their CJS experience. Amongst this very vulnerable cohort, over one in ten died, with many of these deaths contributing to Scotland's record-high number of drug-related deaths (DRDs). The extent to which different aspects of vulnerability contributed to mortality outcomes across those with and without CJS contact was explored in detail. This thesis addresses a major gap by using linked administrative data to better understand the intersection between different types of vulnerability, criminal justice contact, and mortality amongst a drug-using population, and what this means for how services and systems respond.

This final chapter brings together the key findings of the thesis and reflects on what they mean for how we measure, understand, and respond to people in drug treatment who have had contact with the CJS. It serves as both the discussion and the conclusion of the thesis. I will begin by revisiting the aims outlined at the start of the thesis and explaining why this research was necessary, while reflecting on how the analysis developed across the previous chapters. Following this, I will consider what all of this means, not just for understanding that we have been undercounting the number of individuals in drug treatment with CJS experience, but also for understanding why this matters in the context of the various vulnerabilities they face, and how those with more complex vulnerability profiles suffer worse mortality outcomes. However, before doing so, I will consider the thesis's journey.

This research was developed originally to focus on post-custodial mortality in Scotland. However, as outlined in Chapters 1 and 3, substantial delays in accessing the Scottish Prison Service (SPS) data, made worse by the COVID-19 pandemic, meant the original design could not be delivered in full. The project was therefore re-scoped to examine mortality outcomes among people in drug treatment who also had criminal justice contact.

The final study focused on individuals in Scotland who entered drug treatment between 2012 and 2015. I used linked data to explore the prevalence of CJS contact and how this contact was associated with high-risk drug-taking behaviours and/or sociodemographic profiles. I then examined how differences in CJ contact, drug use, health, and social factors were associated with mortality.

The statistical analysis presented in Chapter 5 examines associations with mortality across the cohort. It compares the characteristics of people who died, disaggregated by CJS status, with those who did not, during the study period. Mortality is modelled as a binary outcome, and additional models compare individuals across different types of CJS experience (prison, non-prison CJS contact, or no CJS contact). This makes it possible to explore how patterns of vulnerability differ across groups and how these are associated with mortality.

The research had three main objectives:

- To develop a more accurate estimate of the prevalence of CJ contact amongst those seeking treatment for problematic drug use.
- To assess and explore the demographic, drug-use, health and social profile of individuals seeking drug treatment, and how this differs by CJ status.
- To examine mortality outcomes amongst individuals seeking drug treatment by CJ status, and how this is shaped by demographic, drug-use, health and social factors.

This concluding discussion is organised thematically. It starts by summarising the issue raised in Chapter 3, which concerns how criminal justice contact is measured and why current methods underestimate its true prevalence in the treatment population. It then places this group within the wider context of Scotland's drug-related death crisis, arguing that these are already high-risk individuals regardless of justice involvement. This forms the basis for understanding how CJ contact seems to influence vulnerability, with justice-involved groups exhibiting higher levels of risk across various areas, including injecting

drugs, polydrug use, poor health, housing instability, and unemployment. The discussion draws on the findings of Chapters 4 and 5 to illustrate how differences in disadvantage are reflected in causes of death and the model results.

I then consider where opportunities to intervene may have been missed, particularly for people with CJS contact who tended to start using drugs and seek help at a younger age, but were more likely to enter treatment through justice pathways than health services. I will also discuss the surprising finding that there was a statistically significant positive association between those who reported being drug-free at initial assessment for drug treatment and higher odds of mortality, including among those with prison experience and those with no CJ contact.

I will then outline what this thesis contributes to the understanding of CJS contact in the context of drug treatment, including a more inclusive measurement approach and new insights into how justice involvement intersects with mortality. Finally, this concluding discussion reflects on the implications of the findings for how risk is understood, how services are designed, and how public health and justice systems can work together more effectively to reduce preventable deaths.

6.2 Redefining what counts as CJS contact

One of the most important contributions of this study is that it provides a more detailed and inclusive picture of CJ contact among people in drug treatment. In doing so, it challenges some assumptions that have shaped how this group is understood nationally. Existing figures from Public Health Scotland, based mainly on referral source and legal status recorded in the SDMD, suggest that just over a quarter of people in treatment have had contact with the CJS. However, this study shows that when a broader range of indicators was used, including prison status, multiple referral pathways, and other CJS-related fields, this proportion rose to over half (52.6%).

This matters because how CJS contact is recorded directly shapes who is visible to services and policymakers. If half of the treatment population has experience of the justice system, and this is not being routinely identified, then policies aimed at reducing drug-related harms may be overlooking a large part of the population they are supposed to support. As

is often said in policy circles, “what gets measured gets managed”, and if people with justice involvement are not being counted, they are unlikely to be adequately catered for.

Undercounting affects how the service need is understood. People in drug treatment are already a highly vulnerable group, they are accessing support because their drug use has reached a level of such concern that they have had to seek help. In the context of Scotland’s ongoing drug death crisis, this alone indicates significant risk. When criminal justice contact is added to that picture, it often brings further, well-documented forms of exclusion, including housing instability, stigma, low health literacy, and disrupted care resulting from movement in and out of justice settings. Suppose these overlapping vulnerabilities are not recognised in service design. In that case, there is a real risk that interventions will miss those most at risk, offering responses that fail to reflect the complexity of their lives.

Finally, these findings highlight the need to look beyond formal pathways and static categories to understand the relationship between justice involvement and health outcomes. As later sections will show, people with CJS experience are not only more likely to face structural disadvantage and health-related vulnerability, but also more likely to die from causes tied to these overlapping risks. Knowing how many people in treatment have had justice contact, and what that experience looks like, is a necessary starting point for any serious attempt to reduce avoidable deaths in this population.

6.3 A vulnerable cohort to begin with

As discussed throughout the thesis, this cohort was already at high risk of poor outcomes, not simply because they use drugs, but because they are doing so in the context of an everchanging drug market, where drug availability, strength, and composition are constantly shifting (Dickie, Arnot and Reid, 2017; McAuley, Matheson and Robertson, 2022; National Records of Scotland, 2023; Ciesluk et al., 2024; Marland et al., 2024). This is not a general sample of people who use drugs, but a treatment-seeking population, many of whom report long-term use stretching back to adolescence (see Chapter 4). Polydrug use is widespread, injecting is common, and both physical and mental health problems are frequently reported at the point of assessment — all of which are well established within the literature as likely to increase the risk of premature death (Jones, Mogali and Comer,

2012; McPhee, Brown and Martin, 2013; Tweed et al., 2018; National Records of Scotland, 2023; Family et al., 2025).

However, these risks are not independent or randomly distributed. Instead, they tend to cluster within individuals and across populations, forming what Rhodes (2002) describes as a “risk environment”, where harm is shaped by the interaction between individual behaviour and broader social, economic, and policy contexts. The patterns observed within this cohort therefore reflect not just individual vulnerability, but the cumulative effects of structurally produced risk.

Alongside these health-related vulnerabilities, many individuals experience unstable housing, long-term unemployment, and persistent stigma (Aldridge et al., 2018; Cooper and McCulloch, 2023; McPhee and Sheridan, 2021). These conditions are not incidental but are central to how vulnerability is produced and sustained. In this sense, indicators such as unstable housing, unemployment, and disrupted care are not simply background characteristics but measurable expressions of what Wacquant (2009) describes as the joint operation of workfare and prisonfare, in which support and sanction come as one and vulnerability is systematically produced. So here, welfare and penal systems increasingly operate together to regulate marginalised populations, while Western (2006) highlights how labour market exclusion and criminalisation reinforce long-term structural disadvantage. In the Scottish context, this is reflected in the concentration of imprisonment and social harm within the most deprived communities (Houchin, 2005), where multiple forms of disadvantage already coexist.

This accumulation of disadvantage can be understood through Nixon’s (2011) concept of “slow violence”, where harm is produced gradually through sustained exposure to poverty, stigma, and institutional neglect. In this sense, the mortality outcomes of the most vulnerable, as observed in this cohort, are not episodic but the result of long-term processes that shape life trajectories and accumulate in ways that increase the likelihood of premature mortality.

Crucially, these vulnerabilities exist before and often independently of any contact with the criminal justice system. In this context, it is less surprising that overall mortality rates are

similar across CJS groups. As shown in Chapter 5, just over 11% of the cohort died during the study period, with similar proportions found among those with prison experience, non-prison CJS contact, and no recorded CJS involvement. The key point is not that CJS contact is irrelevant, but that mortality risk in this population is already high across the board. This elevated baseline risk makes it difficult to determine the independent effect of justice contact without considering the broader conditions in which it occurs.

This is reflected in the regression analysis presented in Chapter 5, which demonstrates that mortality is more consistently associated with substance use profiles, health-related needs, and indicators of social and structural vulnerability than with criminal justice experience itself. Once these factors are considered, CJS contact is not independently associated with mortality. This supports the interpretation that justice involvement should be viewed within a broader context of disadvantage, rather than as a single explanatory factor.

To understand what drives these deaths, it is therefore necessary to consider the structure of the cohort. As outlined in Chapter 4, this is not a demographically even population. The majority are men, the median age at assessment is in the mid-thirties, and the most common age at death falls between 35 and 44. This reflects a concentration of mortality within what would typically be considered a low-risk age group. These are not deaths associated with ageing, but premature deaths occurring in mid-life, often from preventable causes. This is consistent with broader evidence on inclusion health populations, in which mortality is heavily concentrated among socially excluded groups (Aldridge et al., 2018).

Although geographic variation is included in the analysis, this study was unable to directly incorporate area-level measures of deprivation such as the Scottish Index of Multiple Deprivation (SIMD). This represents a limitation, given the well-established relationship between deprivation, drug-related harm, and mortality in Scotland (Hanlon et al., 2005; McPhee et al.,, 2019; Public Health Scotland, 2022a; National Records of Scotland, 2023). In the absence of SIMD data, the analysis relies on individual-level indicators of structural vulnerability, including employment status, housing stability, and experiences of homelessness, which together serve as a proxy for social exclusion and cumulative disadvantage.

Taken together, these findings demonstrate that mortality in this cohort is shaped by the accumulation and interaction of multiple forms of vulnerability. Criminal justice contact

sits within this broader system, reflecting and often intensifying these conditions, rather than acting as a discrete or independent cause of death.

6.4 Health and drug use: Risk shaped by context

The drug-use profiles among justice-involved individuals reflect a broader trend in Scotland's drug-related deaths, which are mainly driven by polydrug use, especially combinations of opioids, benzodiazepines, and gabapentinoids. This so-called "toxic triad" has been widely documented in the literature as significantly increasing overdose risk (Jones, Mogali and Comer, 2012; Baird, Fox and Colvin, 2014; Evoy et al., 2021; McAuley, Matheson and Robertson, 2022). Although heroin and methadone remain prevalent, it is the interaction between substances, particularly benzodiazepines such as etizolam and drugs like pregabalin, that has heightened mortality risk during the study period (Jones, Mogali and Comer, 2012; Baird, Fox and Colvin, 2014; on behalf of the Scottish Diabetes Research Network (SDRN) Epidemiology Group et al., 2021; Family et al., 2025).

Another contribution of this thesis is that it illustrates that exposure to these high-risk drug combinations is not evenly distributed across this treatment-seeking population. Both CJS-experienced groups, particularly those with prison contact, were more likely to report use of these substances. Chapter 4 showed a higher prevalence of heroin use among those with prison experience (PR = 1.4), alongside similar elevations in benzodiazepine use (PR = 1.5) and substantially higher prevalence of gabapentinoid use (PR = 2.4). Elevated use of other high-risk substances, including crack cocaine, was also more common among those with CJS contact. These patterns indicate that the most hazardous forms of drug use are concentrated within particular subgroups rather than being evenly distributed across the treatment population.

These findings must also be situated within a changing policy context. From the early 2010s, prescribing guidelines in Scotland were tightened to reduce the availability of benzodiazepines and gabapentinoids (Chapter 2), partly due to concerns around dependence and misuse (Hurding and MacBride-Stewart, 2013; McAuley, 2019). Although intended as a harm reduction measure, this shift had unintended consequences, which were that as prescribing declined, many turned to unregulated street alternatives, particularly benzodiazepines such as etizolam, which have since been strongly linked to rising

mortality. This has been described as “consumption roulette,” where individuals dependent on these substances are exposed to drugs of unknown strength and composition (McAuley, 2019). From a risk environment perspective (Rhodes, 2002), this represents a shift in the structural conditions shaping drug-related vulnerability and the resulting harm, increasing exposure to risk independently of individual intent or behaviour. These changes are likely to be spread across institutional contexts, disproportionately affecting those moving between prison, community supervision and treatment, where prescribing continuity and access to care are often disrupted.

The descriptive findings from Chapter 5 further illustrate how this translates into mortality outcomes. Individuals with CJS experience were more likely to have multiple substances recorded as contributory causes of death (prison PR = 1.4; non-prison PR = 1.2), and those with prison experience were more likely to have benzodiazepines implicated. Cocaine-related deaths were also more prevalent among those with non-prison CJS contact (PR = 2.7). Overall, drug-related deaths were more common among individuals with CJS experience, particularly those with prison histories (PR = 1.5), compared to those with no recorded contact. These findings indicate that while overall mortality rates are similar across groups, the actual risk profiles themself differs, with justice-experienced individuals more exposed to high-risk drug combinations.

The regression analysis presented in Chapter 5 was designed to examine how these risks are structured, rather than simply whether they exist. This was implemented in two stages. First, a full cohort model estimated associations between individual characteristics and mortality across the entire sample. Within this model, heroin and benzodiazepine use were independently associated with increased odds of death (heroin OR = 1.5, 95% CI: 1.3–1.7; benzodiazepines OR = 1.5, 95% CI: 1.3–1.6), consistent with existing evidence linking these substances to overdose risk (Evoy et al., 2021; McAuley, Matheson and Robertson, 2022; Scottish Drugs Deaths Taskforce, 2022).

Second, subcohort models stratified by criminal justice experience were used to examine whether these associations operated differently across groups. This approach revealed that risk is not uniform across the cohort but varies with CJ experience type. In this sense, the full model captures average associations, while the subcohort analyses identify how these associations are experienced across groups.

At the same time, some findings appear counterintuitive at first glance. Reporting crack cocaine (OR = 0.6, 95% CI: 0.4–0.7) and powder cocaine use (OR = 0.7, 95% CI: 0.6–0.8) was associated with lower odds of mortality. Similarly, individuals recorded as drug-free at the point of assessment had higher odds of death (OR = 1.4, 95% CI: 1.3–1.6). Rather than contradicting established evidence on drug-related harm, these findings point to the importance of context, specifically in this case, being the conditions under which drug-taking profiles are identified and acted upon.

One possible explanation is that individuals who disclose high-risk drug use at assessment are more visible to services and therefore more likely to receive intervention. Disclosure may trigger access to opioid substitution therapy, naloxone distribution, or additional support, creating a short-term protective effect. In contrast, individuals who present as "drug-free" may be less visible to services, potentially reflecting recent abstinence, loss of tolerance, or disengagement from structured support, all of which may increase vulnerability to fatal overdose. This aligns with evidence that engagement with treatment services, particularly through health-led pathways, is associated with reduced mortality risk (Pierce et al., 2015).

This distinction between behaviour and visibility highlights a broader point: risk is shaped not only by which substances are used but also by how individuals are positioned within systems of care and control. From a risk environment perspective, these findings suggest that vulnerability is produced through the interaction between substance use, institutional context and service engagement, rather than through individual risk profile alone.

Taken together, the full-cohort and subcohort modelling indicate that drug-related mortality is structured through multiple, overlapping pathways rather than coming down to a single cause. Justice involvement itself does not operate as a direct cause of mortality but as an indicator of exposure to environments in which high-risk drug use, disrupted care, and reduced service visibility meet. This aligns with Wacquant's account of the concentration of marginality within penal and welfare systems, Rhodes' emphasis on structurally produced risk environments, and Western and Nixon's accounts of cumulative, institutionally mediated disadvantage over time. Mortality in this cohort is therefore best understood as the outcome of these layered processes, rather than the result of isolated risk profiles.

The next section builds on this by examining how social and economic conditions further structure and intensify these risks.

6.5 Socioeconomic vulnerabilities

Socioeconomic marginalisation is a well-documented driver of both criminal justice contact and drug-related harm. Existing evidence, including within the Scottish context, highlights how housing instability, unemployment, and deprivation intersect to increase vulnerability among people who use drugs (Peck and Plant, 1986; Miller, 2016; Aldridge et al., 2018; Weaver and Jardine, 2022; Cooper and McCulloch, 2023; Lowrie et al., 2023). Within this study cohort, structural disadvantage was widespread but most acute among those with a history of involvement with the criminal justice system (CJS), particularly imprisonment.

In Chapter 4, housing instability emerged as one of the clearest markers of this inequality. A history of homelessness was reported by 40.6% of those with prison experience, compared to 25.1% of those with non-prison CJS contact and just 12.1% for those with no recorded contact. This corresponds to prevalence ratios of 3.4 and 2.1, respectively, indicating a steep gradient in exposure to homelessness across justice groups. Broader measures of housing instability, including living with other drug users, in temporary accommodation, or in institutional settings, followed a similar pattern, with nearly half (46.8%) of the prison group reporting unstable accommodation at assessment, compared to 14.3% and 8.3% in the non-prison and no-contact groups.

These differences are not merely descriptive; they reveal that the conditions most strongly linked to risk are unevenly spread across the cohort. Housing, in this context, is not just a background variable but a fundamental part of the risk environment. As demonstrated in previous research, unstable housing is linked to higher exposure to drug-related harm, diminished continuity of care, and increased mortality (Aldridge et al., 2018; Tweed et al., 2022a; Roberts et al., 2023). The findings in Chapter 4 show that these risk environments are disproportionately concentrated among those with prison experience, indicating that justice involvement is closely connected to patterned exposure to structurally harmful conditions rather than functioning as an isolated risk factor.

The analysis around employment engagement supports this interpretation, with individuals with prison experience more likely to be unemployed and nearly twice as likely to have never worked (PR = 1.8). They are also overrepresented in categories indicating marginal attachment to the labour market, including those needing support to find employment. Taken together with the housing findings, these point to a clustering of disadvantage across multiple areas, where exclusion from stable housing and employment tend to occur together rather than independently.

The regression analysis in Chapter 5 shows how these structural conditions translate into mortality risk. Engagement in employment or education was associated with substantially lower odds of death (OR = 0.5), while stable housing was also associated with reduced mortality (OR = 0.8, 95% CI: 0.8–0.9). Similar patterns were observed across CJS groups, indicating that the structural factors identified descriptively in Chapter 4 remain strongly associated with mortality, even after accounting for other variables. However, the interaction terms indicate that these relationships do not operate the same across groups. While engagement in employment or education was associated with lower odds of mortality overall, this protective effect was significantly reduced among those with prison experience (OR = 1.8 for the interaction term). This suggests that the benefits typically associated with employment or education are not equally experienced by justice-experienced individuals. In effect, employment does not allow for the same level of protection within this group, pointing to the persistence of structural disadvantage even where markers of stability are present.

Similar, though weaker, patterns were observed in the non-prison group. These findings demonstrate that the same variables identified descriptively in Chapter 4 remain strongly associated with mortality after accounting for other factors. In this sense, the analysis traces a consistent pathway across chapters: structural disadvantage is first observed as unevenly distributed, and then shown to be statistically associated with mortality outcomes.

Importantly, these associations exist alongside the finding that criminal justice experience itself is not independently associated with mortality once these structural and health factors are included in the model. This reinforces the interpretation that justice involvement operates less as a direct causal factor and more as a marker of concentrated vulnerability.

The relevance of justice contact lies in how it is experienced alongside housing instability, exclusion from work and education, and health needs, rather than in its independent effect.

This is where the theoretical framework developed earlier becomes important for interpretation. Wacquant's concept of the joint operation of "workfare" and "prisonfare" offers a way to understand why these forms of disadvantage cluster so tightly among justice-involved populations. As he argues, welfare and penal systems increasingly function as interconnected mechanisms for regulating marginalised groups, producing conditions in which instability in housing, employment and access to support is not incidental but systematically reproduced. The patterns observed in this study, particularly the concentration of homelessness and labour market exclusion among those with prison experience, are consistent with this account of structurally organised marginality.

Building on this, Rhodes' risk environment framework helps explain how these structurally produced forms of disadvantage translate into patterned exposure to harm. From this perspective, housing instability and unemployment are not simply correlates of drug use but key components of environments that shape exposure to risk. The findings in this thesis support this interpretation: individuals are not equally exposed to risk, but are differentially positioned within environments that increase or mitigate harm. The concentration of unstable housing and labour market exclusion among justice-experienced groups therefore represents a concentration of risk environments, which in turn helps explain the observed differences in drug-related mortality profiles. These environments are not static but are experienced over time, which is where Western's work becomes important.

Western's work extends this by showing how sustained exposure to these conditions accumulates over time. The simultaneous presence of unstable housing, unemployment, poor health, and repeated institutional contact seen in this cohort mirrors the patterns he highlights among people leaving prison, where disadvantage accumulates and reinforces itself. The regression results in Chapter 5, especially the differences in the effects of employment engagement across groups, reflect this dynamic: even when individuals are engaged in work or education, the protective effects are uneven, indicating that labour market participation alone does not counteract the effects of accumulated disadvantage.

Nixon's concept of slow violence captures the temporal dimension of this process. The housing instability, unemployment and service disruption captured in this study do not

typically produce immediate catastrophic outcomes. Instead, they operate through gradual erosion of stability, increasing exposure to harm over extended periods. The elevated mortality risk observed among those experiencing these conditions can therefore be understood not as the result of discrete events, but as the cumulative outcome of sustained exposure to structurally harmful environments.

Taken together, these findings show that the vulnerabilities identified in this study are neither randomly distributed nor analytically independent. They cluster within particular groups, are reproduced across institutional contexts, and are consistently associated with mortality outcomes. Across Chapters 4 and 5, the analysis demonstrates how these vulnerabilities are first patterned across the cohort and then shown to structure mortality risk. The theoretical frameworks of Wacquant, Rhodes, Western and Nixon provide a coherent explanation for this pattern: vulnerability is produced through the interaction of welfare, penal and health systems, accumulates over time, and manifests in measurable forms such as housing instability and labour market exclusion.

The implication is that mortality in this cohort cannot be understood through individual behaviour or justice contact alone. It is the product of structurally generated and institutionally layered disadvantage, observable across multiple domains and sustained across the life course.

6.6 Missed opportunities and early contact

The findings from this study suggest that key opportunities for earlier engagement with drug treatment services may have been missed, particularly among individuals with CJ contact. The data show that people in both the non-prison and prison CJS groups began using drugs at younger ages than their counterparts with no CJS contact. The median age of first use was 16 in the no-CJS group, compared to 15 for those with non-prison and prison CJS contact. The same pattern is observed across the trajectory of use, with earlier onset of problematic use (22 vs 20 and 19) and earlier help-seeking (26 vs 24 and 23, respectively). This indicates that individuals with CJ contact were visible to services at an earlier stage in their drug use journey.

Despite this earlier onset and earlier contact, many were not referred to treatment through health services. As shown in Chapter 3, only a small proportion of those with prison

experience entered treatment via health pathways, with justice referrals dominating across both CJ groups. This raises an important contradiction: individuals who begin using earlier, and who are already in contact with healthcare systems, are not entering treatment through those systems. Instead, access to treatment appears to be mediated through contact with the criminal justice system.

The patterns of prior health service use further reinforce this point. Chapter 4 showed that individuals with CJ contact had substantial engagement with mental health, alcohol, and general health services prior to entering treatment, often at levels comparable to or higher than those with no CJ contact. This suggests that these individuals were not hidden from services. Rather, they were repeatedly visible, but that visibility did not translate into intervention.

Taken together, these findings point to a systemic disconnect. Individuals with the earliest onset of drug use and the highest levels of service contact are not entering treatment at the point of first need, but only after coming into contact with the criminal justice system. This is not simply a missed opportunity for prevention, but reflects how access to support is structured across systems. As Wacquant argues, welfare and penal institutions increasingly operate in tandem, with support often delivered through systems of control rather than independently. In this context, it is not incidental that treatment access is routed through justice pathways; it reflects a broader pattern in which intervention is triggered by institutional contact rather than clinical need.

This helps explain why early contact with services does not constitute early intervention. From a risk-environment perspective (Rhodes), the issue is not only whether individuals encounter services but also whether those environments are configured to respond effectively to risk. In this study, early indicators of vulnerability, including early drug use, mental health contact, and help-seeking, do not appear to lead to stabilising intervention. Instead, individuals remain within environments characterised by fragmented provision and uncoordinated responses, where need is recognised but not acted upon.

Over time, this lack of response contributes to the accumulation of disadvantage. As shown across Chapters 4 and 5, the same individuals who experience early onset and delayed intervention are also those most likely to experience unstable housing, unemployment, and high-risk drug use, all of which are associated with increased mortality. Western’s work

helps situate this process, showing how repeated contact with institutions without effective support can produce cycles of instability, in which individuals move between services without achieving sustained stability. In this study, early exposure to services does not interrupt risk trajectories, but instead coincides with prolonged periods of unmanaged vulnerability.

Nixon's concept of slow violence offers a way to understand the consequences of these missed opportunities. The gap between first drug use, initial service contact, and eventual entry into treatment represents a period in which harm accumulates incrementally. Each missed referral, each fragmented service interaction, and each delay in accessing care contribute to a gradual worsening of health and social conditions. These processes are not immediately visible as system failures, but their cumulative effects are reflected in the elevated mortality observed within this cohort.

The result is a group who begin using drugs earlier, who seek help at a younger age, and who are repeatedly in contact with services, yet still only enter treatment through justice involvement. This is not only inefficient but harmful as it delays access to care, increases the likelihood of disengagement, and contributes to the accumulation of risk over time. It also highlights a limitation in the current understanding of early intervention. Rather than focusing solely on individual readiness, these findings suggest that early intervention must also be understood in terms of system responsiveness. In the absence of coordinated and proactive responses, early contact with services does not reduce risk; instead, it becomes part of a longer journey of unmet need and escalating harm.

Crucially, the context in which a drug use intervention takes place is not neutral. When access to treatment is provided through the CJS, it is often accompanied by conditions of compliance and the threat of sanctions for non-compliance. In this setting, drug use is not merely a health issue but also a potential source of punishment, which has significant implications for how individuals engage with services and report their substance use. When disclosing ongoing drug use could result in negative consequences such as disciplinary action, restrictions on progression, or removal from programmes, individuals may be motivated to present themselves as abstinent, regardless of their actual level of use.

This suggests that some of the "missed opportunities" identified in this study may not be merely failures of referral or coordination, but could also be influenced by the conditions

under which support is provided. When treatment is embedded within systems of control, honesty about ongoing needs may be discouraged rather than encouraged. In this context, pathways into care are not only delayed but also shaped by the perceived risks of disclosure. This offers an important perspective for interpreting the findings in the next section, where reporting as "drug-free" at assessment is linked to increased mortality. Rather than indicating reduced risk, such reporting may, in some cases, reflect strategic engagement with systems where support and sanctions are closely intertwined.

6.7 The 'drug-free' paradox

One of the more unexpected findings in the regression models in Chapter 5 was the statistically significant link between reporting as "drug-free" at the point of initial assessment and increased odds of mortality. Specifically, in the full cohort model, individuals recorded as drug-free had increased odds of death (OR = 1.4, 95% CI: 1.3–1.6) compared to those who did not die. Importantly, this was not a small proportion of the cohort, as around one-fifth of individuals in both the prison and no-CJS groups reported being drug-free at assessment (21.9% and 18.9%, respectively), with a slightly higher prevalence in the prison group (PR = 1.2).

At face value, this finding appears counterintuitive because it might be expected that individuals reporting no current drug use would be at lower risk of death. Instead, for people in drug treatment in Scotland between 2012 and 2015, the opposite is observed. This challenges assumptions about the protective effect of being drug-free, suggesting that this variable is capturing something different from actual abstinence. It is also noteworthy that his relationship is not uniform across groups, as the interaction terms show that the association between reporting as drug-free and mortality varies depending on CJ experience. Among those with prison experience, the interaction indicates an association with higher odds of mortality (OR = 1.4, 95% CI: 1.1–1.9), whereas among those with non-prison CJS contact, the interaction is negative (OR = 0.7, 95% CI: 0.6–0.9), suggesting that the meaning and consequences of "drug-free" status differ across legal contexts.

One possible explanation is that "drug-free" status does not consistently reflect actual abstinence, but may instead reflect strategic reporting. People in prison might claim to be drug-free to avoid disciplinary consequences, negative parole decisions, or restrictions on

progression. Similarly, those in community settings may underreport ongoing use due to fears of stigma, removal from programmes, or conditional access to treatment. In this sense, reporting could be influenced by the institutional context of the assessment, rather than solely by individuals' real drug use. The prison × drug-free interaction in Table 5.4 above supports this interpretation by showing that, in the prison versus non-prison comparison, the association between reported 'drug-free' status and mortality was stronger among those with prison experience than among those with non-prison CJS contact. This suggests that the meaning of being recorded as "drug-free" may differ across justice contexts, and that reporting may be shaped by coercive or punitive assessment environments.

This interpretation aligns with the broader finding across this thesis that interaction with services is structured by systems of control as well as care. Where access to support is conditional or perceived as such, individuals may adapt their responses accordingly. What is recorded as "drug-free" may therefore reflect not an absence of risk, but a mismatch between reported behaviour and lived reality. In this context, risk becomes partially obscured within administrative data, raising important questions about how vulnerability is measured and interpreted by professionals. Wacquant's account of the linking of welfare and penal systems helps explain why this misalignment is systematically produced rather than accidental, while Rhodes' risk environment framework highlights how institutional contexts shape both behaviour and its visibility within data.

A second, not mutually exclusive, explanation is that some individuals are genuinely abstinent at the point of assessment but remain physiologically and socially vulnerable. Periods of abstinence, whether following imprisonment, detoxification, or self-managed cessation, are associated with reduced tolerance and increased risk of overdose, particularly during transitions back into drug use (Bird et al., 2015:1622). However, the fact that this association is observed not only among those with prison experience but also among those with no recorded CJS contact suggests that the issue extends beyond post-release risk. Rather than being confined to prison transitions, "drug-free" status may indicate a broader moment of instability, where individuals are between states of use, between services, or between systems of support, which reduces their visibility for potential life-saving interventions. From a risk-environment perspective, this reinforces the point that risk is not determined solely by substance use, but by the conditions in which individuals are situated. In contexts of unstable housing, poor mental health, or limited

support, the absence of current drug use may coincide with heightened vulnerability rather than reduced risk.

Over time, these dynamics contribute to the accumulation of risk described elsewhere in this thesis. As Western's work suggests, individuals move through a series of institutional encounters without achieving sustained stability, while Nixon's concept of slow violence captures how harm emerges gradually through gaps in support, misrecognition of need, and delayed intervention. Taken together, these findings suggest that being "drug-free" at assessment should not be interpreted as a straightforward indicator of reduced risk, but as a point of heightened uncertainty shaped by transitions, structural vulnerability, and the conditions under which individuals engage with systems of care and control. Given both its prevalence within the cohort and its consistent association with increased mortality, this represents a critical point for intervention. Individuals reporting as drug-free at assessment, particularly within coercive or justice-linked pathways, should be understood as at heightened risk rather than stable, requiring targeted and proactive support.

6.8 Original contributions of this research

This thesis makes a significant and original contribution to criminology and public health by presenting the first population-level analysis in Scotland to explore how different types of criminal justice (CJS) contact intersect with mortality among people in drug treatment. Using linked administrative data, this study is, to the best of my knowledge, the first to combine the Scottish Drug Misuse Database (SDMD) with National Records of Scotland (NRS) mortality records to investigate mortality outcomes by justice experience across a full treatment population. In doing so, it demonstrates the analytical potential of linked administrative data to capture complex life journeys across systems, allowing the examination of service contact, vulnerability, and mortality. This represents a methodological contribution in its own right, demonstrating how data linkage can reveal forms of disadvantage and institutional overlap that often remain hidden within single-source datasets.

While earlier studies have mainly concentrated on post-custodial mortality and often viewed justice involvement as a binary (prison vs no prison), this thesis presents a more nuanced typology of CJS contact. By differentiating between no CJS contact, non-prison contact (e.g., arrest, community sentences), and prison experience (including those

currently in custody or referred from custody), the analysis offers a more comprehensive and realistic understanding of how justice systems intersect with drug treatment populations. This approach reveals a notably higher prevalence of CJS involvement than is typically captured in national statistics, indicating that over half of those in treatment had some form of justice contact. It underscores significant limitations in existing data systems and demonstrates that the way CJS contact is operationalised largely determines who is visible within research, policy, and service contexts design.

The thesis further adds new empirical evidence on how demographic, health, drug use, and socioeconomic characteristics are spread across these CJS categories. It shows that individuals with CJS experience, especially those with prison histories, are disproportionately exposed to multiple overlapping vulnerabilities, including high-risk polydrug use, injecting, unstable housing, long-term unemployment, and disrupted engagement with healthcare. These conditions do not happen independently but tend to co-occur within individuals, shaping both lived experiences and mortality outcomes. By examining these patterns across Chapters 4 and 5, the analysis shows how structural disadvantage is unevenly spread across the cohort and is statistically linked to mortality, emphasising the importance of understanding risk as cumulative and relational rather than isolated.

Analytically, the study advances previous work by combining full cohort logistic regression with subcohort and interaction-based analyses stratified by CJS experience. This enables the identification of both overall associations with mortality and differences in how these associations operate across various groups. The findings indicate that mortality is more consistently linked to substance use patterns, health needs, and indicators of social and structural vulnerability than to CJS contact itself. At the same time, the interaction effects show that the relationship between aspects of people's lives commonly considered protective in the literature, such as employment or engagement with services, and mortality is not uniform but varies with individuals' positions within systems of disadvantage. In this sense, justice involvement is not an independent predictor of death but an indication of different exposures to conditions that influence both risk and the effectiveness of potential 'protective' factors.

The thesis also makes an important contribution to research on drug use, treatment, and drug-related mortality. It challenges dominant assumptions within policy and practice that

equate reduced or absent drug use with reduced risk and that drug-free deaths after prison are likely due to loss of tolerance. The finding that individuals recorded as “drug-free” at assessment are more likely to die highlights the limitations of relying on behavioural indicators alone to assess vulnerability. Instead, the analysis shows that such variables may reflect transitional states, non-disclosure, or system-related pressures, rather than stability. This has important implications for how risk is identified within both treatment and custodial settings, suggesting that current assessment practices may obscure rather than reveal vulnerability. Similarly, the findings on early contact demonstrate that individuals with the earliest onset of drug use and substantial engagement with health services often do not access treatment until they come into contact with the criminal justice system. This points to a structural failure in early intervention, in which services respond reactively to a crisis rather than early to avoid worsening outcomes down the road.

In doing so, the thesis offers a conceptual contribution to public health criminology. Rather than treating criminal justice contact as a causal factor, it reframes it as part of a broader, structurally produced vulnerability. Drawing on insights from across the analysis, and informed by the theoretical frameworks of Wacquant, Rhodes, Western, and Nixon, the findings show how risk is produced through the interaction of welfare, health, and penal systems, accumulates over time, and is partially obscured within administrative processes. This challenges more individualised or event-based explanations of mortality and instead situates death within longer trajectories of disadvantage, institutional contact, and missed opportunities for intervention.

6.9 Limitations

While this study makes an original and significant contribution to understanding the intersection of drug treatment, criminal justice contact, and mortality in Scotland, several limitations should be acknowledged when interpreting the findings.

6.9.1 No survival analysis was possible

The analysis did not account for time to death or how long people were at risk so all deaths, whether shortly after assessment or years later, were treated the same. Time-to-event approaches, such as survival analysis, could not be used. As a result, the study could not explore how risks may have changed over the follow-up period, or whether timing played a role in outcomes.

6.9.2 The analysis was based on a single treatment episode per person

Only the final recorded treatment episode for each person was used in the analysis. Although many individuals had multiple episodes in the Scottish Drug Misuse Database (SDMD), the study was not designed to track people over time. This means the analysis could not capture changes in housing, employment, or drug use between episodes, and could not assess how risk factors might accumulate or change over time.

6.9.3 Measurement and reporting limitations in key variables

Several key variables in the SDMD are based on self-report at the point of assessment and may be influenced by the context in which that assessment takes place. This is particularly relevant for variables such as “drug-free” status, which may reflect underreporting or strategic disclosure rather than actual abstinence. As a result, some measures may not fully capture individuals’ current risk level. While this limitation is itself informative, highlighting how vulnerability may be obscured within administrative systems, it also introduces uncertainty in interpreting these variables as direct indicators of substance use or stability.

6.9.4 Circularity concerns and missing data affected which variables could be included

Some variables were excluded from the model because of circularity. For instance, referral source and legal status were also used to define CJS contact and could not be included again without skewing the outcomes. For other variables, such as employment and housing status, missing data were a limiting factor. These fields were not consistently completed for individuals assessed while in prison, leading to the exclusion of these cases from the multivariable model. Over 3,200 individuals, including a significant proportion with prison experience, were omitted due to missing data. This selective absence of information likely caused an underestimation of the link between structural disadvantage and mortality, especially among those most affected.

6.9.5 Important variables were missing from the dataset

Although the dataset was large and population-based, it lacked some key indicators that would have added depth to the analysis, including trauma history, mental health diagnoses,

socioeconomic deprivation (e.g. SIMD scores), and access to informal support. Instead, the study relied on proxy measures such as accommodation type and employment status. This limits the ability to capture the context in which people lived fully, and the factors that may have shaped their outcomes.

6.9.6 Drug-related deaths were not separated from other causes

The outcome used in this study was all-cause mortality. While many of the deaths in this cohort are likely to be drug-related, it was not possible to isolate drug deaths as a separate outcome. This was partly due to sample size and the need to avoid circularity in modelling. As a result, the analysis may mask significant differences between types of deaths, and findings cannot be directly compared to studies that focus specifically on drug-related deaths (DRDs).

6.9.7 COVID-related delays and data access barriers shaped the final design

The study's original aim to explore post-custodial mortality using linked SPS data had to be abandoned due to delays in accessing the data, further exacerbated by the COVID-19 pandemic. As a result, the project was re-scoped to use only data from the SDMD and NRS. This meant the final study could not focus on deaths following release from prison, as initially intended, and placed some limits on how CJS contact could be measured.

6.9.8 Findings are specific to the Scottish context

The cohort provides near-complete coverage of individuals entering NHS-funded drug treatment in Scotland between 2012 and 2015. Still, the results may not be generalisable to those outside the treatment system or other national contexts. The structure of health and justice services in Scotland, along with policy differences particularly around drug treatment and sentencing, may limit the applicability of the findings elsewhere.

6.9.9 Limited detail on the nature and timing of criminal justice contact

Although this study develops a more inclusive measure of CJS contact, it does not capture the timing, frequency, or sequencing of justice involvement. It is not possible to distinguish between recent and historical contact, repeated exposures, or duration of incarceration. These factors are likely to shape both service engagement and mortality risk. Their absence

limits the ability to fully understand how different forms of justice contact influence outcomes over time.

6.10 Policy implications and recommendations

The findings from this study have clear implications for how Scotland responds to drug-related deaths, particularly among people with experience of the criminal justice system (CJS). While this research does not show that CJS contact directly predicts mortality, it reveals how justice involvement coincides with structural and health-related vulnerabilities. These vulnerabilities, especially among those with prison experience, should shape how support is structured across public health and justice systems.

6.10.1 Interventions should move beyond binary definitions of justice involvement

CJS contact is often treated as a yes/no category in policy and routine data. However, this study shows that not all justice contact is the same. People with a history of prison experience displayed higher rates of high-risk drug use (including heroin, injecting, and polydrug use). They were more likely to face housing instability and long-term exclusion from the labour market. These are overlapping and compounding risks, and support needs to be designed accordingly. Pre-release planning should include proactive, structured pathways for health care continuity, housing, and community reintegration, not just one-off harm reduction advice or naloxone kits.

6.10.2 People with non-custodial CJS contact must not be overlooked

Non-prison groups made up a significant proportion of the treatment population and faced distinct but serious vulnerabilities, including unstable housing, earlier drug use, and limited service engagement. These individuals often fall through the cracks because they are less visible in systems designed around post-prison care. Contact points such as arrest, diversion, or community sentences should be used as opportunities for early intervention. Embedding health screening, mental health assessment, and alcohol/drug support within community justice settings is essential, and justice social workers need the tools to act as sustained care coordinators, not just referral agents.

6.10.3 Improve data linkage and justice status recording

This study exposed the limitations of how justice involvement is currently identified in administrative data. Narrow definitions, such as referral source alone, vastly undercount people with CJS experience. Better integration between justice and health systems, including consistent recording of justice status and structured data sharing at key transition points (e.g. arrest, release, sentencing), would allow services to identify and support high-risk individuals more accurately. This is particularly relevant when tracking service disengagement or non-disclosure, both of which are shown here to be associated with mortality.

6.10.4 Structural risk factors must be treated as core to intervention design

Housing instability, unemployment, and social disconnection are not side issues — they are central to understanding who dies and why. The evidence from this study shows clear associations between structural disadvantage and mortality, particularly among those with prison histories. However, these vulnerabilities were under-recorded, especially among people assessed in prison (another risk of working with administrative data not originally collected for research). This reinforces the need to redesign assessments and service entry points so that social need is systematically identified and addressed rather than treated as secondary to clinical risk.

6.10.5 Redefine how we understand risk in service settings

Services often define risk in terms of immediate overdose, but many factors contributing to deaths are gradual and systemic: fractured care pathways, stigma, isolation, and unsupported abstinence. Some of the most surprising findings in this study, such as the increased mortality among people who reported being “drug-free” at assessment, reveal how disengagement, silence, or fear of punishment might be relevant to understanding vulnerability. A broader model of risk is necessary, one that recognises not only what drugs individuals take, but also the context in which they do (or don’t) disclose them, the gaps within systems, and the long-term effects of instability and stigma.

6.10.6 Early intervention and health system responsibility

A key implication of these findings is that early intervention must be understood as a responsibility of the health system, not as something deferred until criminal justice contact occurs. This study shows that individuals with CJS experience were visible to services at an earlier stage in their drug use journey and had prior contact with mental health, alcohol, and general health services. However, this contact did not result in a timely referral or treatment, at least as far as the available data can see although it is entirely possible people entered treatment earlier and dropped out. This indicates that opportunities for intervention are being missed within existing health pathways. Policy responses should therefore focus on strengthening referral mechanisms at the point of first contact, particularly within primary care, emergency departments, and mental health services. Early indicators of risk, including early onset drug use, repeated service contact, and co-occurring health needs, should trigger proactive engagement with treatment services, rather than relying on justice involvement as the point of entry.

6.10.7 Reducing punitive conditionality within treatment pathways

The findings also highlight the need to critically examine the role of conditionality and punitive responses within treatment and justice-linked services. Where access to support is perceived as contingent on compliance, abstinence, or disclosure, individuals may adapt their behaviour accordingly, including underreporting ongoing drug use. This is not simply an issue of individual dishonesty but reflects how systems shape what can be safely disclosed. Approaches that penalise continued use, whether through disciplinary sanctions, removal from programmes, or restricted access to support, risk driving disengagement and obscuring need. A public health approach requires services to respond to ongoing use as an indicator of need rather than non-compliance, ensuring that honesty is met with support rather than sanction. This has implications across both justice and community settings, where the boundaries between care and control remain blurred.

6.10.8 Reframing “drug-free” status as a marker of risk

Given both its prevalence and its association with mortality, reporting as “drug-free” at assessment should be treated as a potential marker of heightened risk rather than stability. Around one in five individuals in this cohort reported being drug-free at assessment, and this status was consistently associated with increased odds of death. This suggests that

current assessment frameworks may misclassify vulnerability, particularly where abstinence is assumed to indicate reduced risk. Policy and practice should move towards more nuanced interpretations of this category, recognising that it may reflect recent abstinence, loss of tolerance, disengagement from services, or non-disclosure in response to perceived consequences. Individuals reporting as drug-free, particularly within justice-linked or otherwise conditional settings, should be prioritised for follow-up, support, and risk assessment, rather than being assumed to require less intensive intervention.

6.10.9 Strengthening support at points of transition

The findings also reinforce the importance of transitions as critical points of risk. Periods such as release from prison, discharge from treatment, or movement between services are associated with heightened vulnerability, particularly where continuity of care is not maintained. The association between "drug-free" status and mortality further suggests that these transitional moments may involve reduced tolerance alongside ongoing structural and social vulnerability. Policy responses should therefore prioritise continuity of care across institutional boundaries, including coordinated release planning, immediate access to treatment and support services, and sustained follow-up in the community. Responsibility for care should not end at the point of transition, but instead extend across systems to ensure that individuals are not left unsupported during periods of heightened risk.

6.11 Concluding remarks

This thesis set out to better understand the relationship between criminal justice (CJ) contact and mortality among people in drug treatment in Scotland, a population already at high risk of early death. It began from a shared concern across public health and criminology, which is that people who use drugs, especially those with experience of the CJ system, face higher and often overlapping vulnerabilities. However, much of the existing research has relied on narrow definitions of justice involvement, often focusing on prison release or treating CJ contact as a binary category. This has limited the ability to fully understand how justice contact interacts with wider experiences of disadvantage and mortality.

By linking the Scottish Drug Misuse Database (SDMD) with mortality records from the National Records of Scotland (NRS), this study developed a more nuanced typology of CJ contact, distinguishing between prison experience, non-prison CJ involvement, and no known justice contact. This provided a more accurate account of justice involvement within the treatment population and showed that over half of the cohort had some form of CJ experience, significantly higher than estimates based on routine national reporting. In doing so, the study demonstrates how existing data systems tend to undercount justice involvement and, as a result, risk overlooking a large proportion of those most at risk of harm.

The statistical analysis presented in Chapter 5 examined mortality as a binary outcome across the full cohort and then explored how associations with mortality differed across CJ groups through additional models and interaction terms. This approach enabled the identification of both overall relationships with mortality and variation in how these relationships operate across different forms of justice experience. The findings show that mortality is more consistently associated with substance use, health-related need, and indicators of social and structural disadvantage than with CJ contact itself. Once these factors are taken into account, justice involvement is not independently associated with mortality; instead, it reflects a concentration of exposure to conditions that elevate risk.

However, this finding should be understood alongside the descriptive analysis presented in Chapter 4, which shows that these risk factors are not evenly distributed across the cohort. Instead, they are disproportionately concentrated among those with CJ experience, especially among those who reported prison experience during the study period. Individuals in the prison group were more likely to report high-risk drug use, including benzodiazepines and heroin, injecting, and polydrug use, as well as much higher levels of housing instability, homelessness, and long-term exclusion from the labour market. These forms of disadvantage do not occur in isolation but tend to co-occur within the same individuals, creating a concentration of vulnerability in this subgroup. Those with non-prison justice experiences during the study period also showed higher prevalence of the same vulnerabilities, though at a lower rate than those with prison experience.
When considered together, Chapters 4 and 5 show that although CJ contact is not an independent predictor of mortality, it is closely linked to the clustering of conditions that increase mortality risk. The regression models show that these conditions, rather than justice contact itself, account for variation in mortality, while the descriptive findings

demonstrate that exposure to these conditions is much more common among those with CJ experience, particularly those who have been imprisoned.

These factors were not only more prevalent but were also strongly associated with mortality in the models. The interaction effects further show that these relationships do not operate uniformly across the cohort. In particular, characteristics typically considered protective, such as engagement in employment or education, did not function in the same way for those with prison experience, suggesting that the benefits of these factors are shaped and, in some cases, limited by broader structural conditions. In this sense, justice involvement operates as a marker of concentrated vulnerability, identifying groups who are more likely to be exposed to the combination of health, social, and structural factors that increase the likelihood of premature death.

These findings complicate more straightforward interpretations of risk. They suggest that mortality in this population cannot be explained by justice contact alone, nor by individual behaviour in isolation. Instead, it reflects the accumulation and interaction of disadvantage across health, social, and institutional domains. Justice involvement forms part of this wider configuration. It does not simply reflect existing vulnerability but may intensify it, through disruption to housing, employment, relationships, and continuity of care. In this sense, contact with the CJ system is best understood not as a direct cause of death, but as an indicator of deeper and more persistent forms of structural disadvantage.

Another significant contribution of the study is its insight into service contact and system response. Individuals with CJ experience tended to start using drugs earlier, seek help at a younger age, and have prior contact with various health services. However, this contact did not seem to lead to ongoing engagement with treatment, as many individuals entered treatment later in the study period through justice pathways rather than healthcare. While the data cannot fully account for previous treatment episodes or disengagement, this indicates that earlier contact with services did not result in timely or effective intervention. This implies that people are visible to services but are not being actively engaged at the earliest point of needing help. The findings, therefore, highlight not only individual vulnerability but also system gaps, where early opportunities for intervention are missed or delayed.

Some of the most unexpected findings reinforce this point. The association between reporting as “drug-free” at assessment and increased odds of mortality, observed in the full cohort model and varying across CJ groups, highlights the limitations of relying on surface indicators of behaviour to assess risk. Instead of indicating stability, “drug-free” status may reflect transitional periods, reduced tolerance, disengagement from services, or non-disclosure shaped by the conditions under which assessment takes place. This suggests that vulnerability is not always visible within administrative data and may, in some cases, be actively obscured by the way services are structured.

Overall, the findings of this thesis highlight the importance of a more integrated and context-aware public health approach. Reducing mortality in this population requires more than clinical interventions alone; it also demands attention to structural conditions that influence risk, such as housing instability, exclusion from the labour market, fragmented care, and interactions between health and justice systems. Additionally, it calls for a change in how risk is understood, from focusing solely on individual behaviour to recognising how vulnerability is created, accumulated, and reproduced through systems over time.

Ultimately, this study shows that many of the individuals who die within Scotland’s drug crisis are not unknown to services, but they are not effectively supported by them. Addressing this requires earlier, coordinated, and non-punitive responses that recognise the complexity of people’s lives and the environments in which risk is created.

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8 Appendix A – SMR 25a Form

*This form should be used only to assist you in keying information directly onto the Scottish Drug Misuse Database. It **MUST NOT** be mailed to ISD. Such action constitutes a breach of the Data Protection Act 2018*

SMR25a ASSESSMENT REPORT *Introduced April 2008*

1) PERSONAL DETAILS

First Name ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ Surname ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Date of Birth ☐☐☐☐☐☐☐☐

Local Ref ☐☐☐☐☐☐☐☐ Gender Male ☐ Female ☐ City/Town _____

CHI Number ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ Postcode ☐☐☐☐☐☐☐

ETHNIC GROUP

White

Scottish ☐ Other British ☐ Irish ☐ Other White ☐ *(specify)* _____

Asian, Asian Scottish or Asian British

Indian ☐ Pakistani ☐ Bangladeshi ☐ Chinese ☐ Other Asian ☐ *(specify)* _____

Black, Black Scottish or Black British

African ☐ Caribbean ☐ Other Black ☐ *(specify)* _____

Mixed Background

Any *(specify)* _____

2) PRESENTING INFORMATION (OF THIS EPISODE)

MAIN SOURCE OF REFERRAL

Self ☐

Health
- GP ☐
- Primary Care ☐
- Mental Health ☐
- Other ☐

Social work
- Criminal Justice ☐
- Child and Family ☐
- Other ☐

Criminal Justice ☐
- DTTO ☐
- Arrest Referral ☐
- Drug Court ☐
- Prison ☐
- Other ☐

Voluntary service ☐

Education ☐

Housing ☐

Other *(specify)* _____

CO-OCCURING HEALTH ISSUES

Tick all that apply

- Drug related physical health ☐
- Mental health ☐
- Alcohol ☐
- Other (specify) _____

3) CURRENT CONTACT WITH THIS SERVICE / REFERRAL TO OTHER SERVICES

Institution code ☐☐☐☐☐

Contact name/worker name _____

Date contact first made (this episode only, include letter/phone referrals) ☐☐/☐☐/☐☐☐☐

Date first appointment offered ☐☐/☐☐/☐☐☐☐

Date this assessment completed (if assessment not completed, date last seen) ☐☐/☐☐/☐☐☐☐

Is client being actively treated/cared for by this agency? Yes ☐ No ☐

If no, please provide reason (tick all that apply)
- Received required support ☐
- Unplanned discharge ☐
- Disciplinary discharge ☐
- In prison ☐
- Deceased ☐
- Currently on agency waiting list ☐

Date of Discharge ☐☐/☐☐/☐☐☐☐

Other (specify) _____

Has client been referred to another drug treatment of rehabilitation service? Yes ☐ No ☐

If yes, please provide details
- Name _____ Institution Code ☐☐☐☐☐ Date of referral ☐☐/☐☐/☐☐☐☐
- Name _____ Institution Code ☐☐☐☐☐ Date of referral ☐☐/☐☐/☐☐☐☐

Has client been referred to a moving on/reintegration service Yes ☐ No ☐

If yes, *please provide details*
- Employability of similar ☐
- Education/training ☐
- Housing ☐
- Social Work ☐
- Other *(specify)* _____

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4) PREVIOUS CONTACT WITH SERVICES

Previous contact with any drug treatment services Yes ☐ No ☐

If yes, year of last contact ☐☐☐☐

Age when help first sought ☐☐ years

5) AGE PROFILE

Age when first started using illicit drugs ☐☐ years

Age at onset of problem illicit drug use ☐☐ years

6) PRESCRIPTION DRUGS PROFILE - Give details of current prescription related to treatment of addiction

Is the client currently on prescription? Yes ☐ No ☐ Not known ☐

Details verified? Yes ☐ No ☐

	Drug name	Daily dosage (mg)
Main drug		
Drug 2		
Drug 3		
Drug 4		
Drug 5		

7) ILLICIT DRUGS PROFILE (PAST MONTH) - Including solvents & OTC medicine taken inappropriately

Used in past month? Yes ☐ *show details* No ☐ *go to section 8*

		Route(s) e.g. IV/ IM/ smoke/ swallow/ inhale/ snort How often i.e. daily/ most days/ weekends/ weekly/ fortnightly/ monthly				In a 'typical' drug using day	
	Drug name	Main route	How often	Other route	How often	Quantity e.g. mg/ ml/oz/binge	Spend £
Main Drug							
Drug 2							
Drug 3							
Drug 4							
Drug 5							

8) INJECTING/ SHARING DETAILS

EVER	Yes	No	IN THE PAST MONTH	Yes	No
Injected	☐	☐	Injected	☐	☐
If no go to section 9					
Always used new equipment first	☐	☐	Always used new equipment first	☐	☐
Used a needle or syringe that someone else has used	☐	☐	Used a needle or syringe that someone else has used	☐	☐
Lent someone else a needle or syringe which client has used	☐	☐	Lent someone else a needle or syringe which client has used	☐	☐
Used the same spoon, filter or water as someone else	☐	☐	Used the same spoon, filter or water as someone else	☐	☐

Age first injected ☐☐ years

9) BLOOD BORNE VIRUSES

Ever tested for:	Yes	No	Date of last test (m m y y y y)
Hepatitis B	☐	☐	☐☐☐☐☐☐
Hepatitis C	☐	☐	☐☐☐☐☐☐
HIV	☐	☐	☐☐☐☐☐☐

	Yes	No
Has client been at risk since last test?	☐	☐
Has client **completed** a course of vaccination for Hep B?	☐	☐

10) ALCOHOL PROFILE (PAST MONTH)

Consumed alcohol? Yes ☐ *show details* No ☐ *go to section 11*

How often did client have an alcoholic drink?

Every day	☐	5 - 6 days per week	☐
3 - 4 days per week	☐	1 - 2 days per week	☐
2 - 3 days per month	☐	about one day a month	☐

In a typical day how many units did the client usually have? ☐☐ units

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11) SOCIAL PROFILE (CURRENT)

ACCOMMODATION

- Owned/ Rented ☐
- Supported accommodation (drug related) ☐
- Residential rehabilitation ☐
- In prison ☐
- Homeless - Temporary/ Unstable accommodation/ Hostel ☐
- Homeless - Roofless ☐
- Other (*specify*) _____

LEGAL SITUATION
Tick all that apply

- None ☐
- Case pending ☐
- DTTO ☐
- On probation/ subject to supervision order ☐
- In Prison ☐
- Other *(specify)* _____

LIVING SITUATION
Tick all that apply

- With spouse/ partner ☐
- With parents ☐
- Alone ☐
- Other (*specify*) _____

LIVING WITH OTHER DRUG USERS

- Yes ☐
- No ☐
- Did not wish to answer ☐

HAS CLIENT BEEN IN PRISON IN PREVIOUS 12 MONTHS?

Yes ☐ No ☐ Did not wish to answer ☐

How long since release _____

Name of Prison of release _____

EMPLOYMENT/ EDUCATION

- Employed (paid or unpaid) ☐
- Support into employment ☐
- Unemployed ☐
- Never employed ☐
- Long term sick/ disabled ☐
- School ☐
- Excluded from school ☐
- Full time education/ training ☐
- In Prison ☐
- Other *(specify)* _____

DRUG USE FUNDED BY
Tick all that apply

- Employment ☐
- Crime ☐
- Debt ☐
- Benefits ☐
- Sex work ☐
- Did not wish to answer ☐
- Other *(specify)* _____

12) DEPENDENT CHILDREN

Does client have dependent children — Yes ☐ No ☐

If yes provide age of each child in table

Is client or their partner pregnant? — Yes ☐ No ☐

Please provide ages	Child one	Child two	Child three	Child four	Child five	Child six
Living with own children						
Own children living elsewhere						
Living with partner's children						

13) LOCAL USE 1 2 3 4 5 6 7 8 9 ☐☐☐☐☐☐☐☐☐

9 Appendix B – SMR 25b Form

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SMR25b FOLLOW-UP REPORT *Introduced April 2008*

1) PERSONAL DETAILS

First Name ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ Surname ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Date of Birth ☐☐/☐☐/☐☐☐☐

Local Ref ☐☐☐☐☐☐☐ Gender Male ☐ Female ☐ City/Town _____

CHI Number ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ Postcode ☐☐☐☐ ☐☐☐

2) CO-OCCURING HEALTH ISSUES (AT THIS REVIEW)

Tick all that apply

Drug related physical health ☐ Mental health ☐ Alcohol ☐ Other (specify) _____

3) CURRENT CONTACT WITH THIS SERVICE / REFERRAL TO OTHER SERVICES

Institution code ☐☐☐☐☐

Contact name _____

Date of client review (if no review has been completed, date last seen) ☐☐/☐☐/☐☐☐☐

Is client being actively treated/cared for by this agency? Yes ☐ No ☐

If no, please provide reason (tick all that apply)

- Received required support ☐
- Unplanned discharge ☐
- Disciplinary discharge ☐
- In prison ☐
- Deceased ☐
- Currently on agency waiting list ☐

Date of Discharge ☐☐/☐☐/☐☐☐☐

Other (specify) _____

Has client been referred to another drug treatment of rehabilitation service? Yes ☐ No ☐

If yes, please provide details Name _____ Institution Code ☐☐☐☐☐ Date of referral ☐☐/☐☐/☐☐☐☐

Name _____ Institution Code ☐☐☐☐☐ Date of referral ☐☐/☐☐/☐☐☐☐

Has client been referred to a moving on/reintegration service Yes ☐ No ☐

If yes, *please provide details*

- Employability of similar ☐
- Education/training ☐
- Housing ☐
- Social Work ☐

Other *(specify)* _____

4) PRESCRIPTION DRUGS PROFILE - Give details of current prescription related to treatment of addiction

Is the client currently on prescription? Yes ☐ No ☐ Not known ☐

Details verified? Yes ☐ No ☐

	Drug name	Daily dosage (mg)
Main drug		
Drug 2		
Drug 3		
Drug 4		
Drug 5		

5) ILLICIT DRUGS PROFILE (PAST MONTH) - Including solvents & OTC medicine taken inappropriately

Used in past month? Yes ☐ *show details* No ☐ *go to section 6*

	Drug name	Route(s) e.g. IV/ IM/ smoke/ swallow/ inhale/ snort How often i.e. daily/ most days/ weekends/ weekly/ fortnightly/ monthly				In a 'typical' drug using day	
		Main route	How often	Other route	How often	Quantity e.g. mg/ ml/oz/binge	Spend £
Main Drug							
Drug 2							
Drug 3							
Drug 4							
Drug 5							

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6) INJECTING/ SHARING DETAILS

IN THE PAST MONTH

	Yes	No
Injected	☐	☐
Always used new equipment first	☐	☐
Used a needle or syringe that someone else has used	☐	☐
Lent someone else a needle or syringe which client has used	☐	☐
Used the same spoon, filter or water as someone else	☐	☐

7) BLOOD BORNE VIRUSES

Ever tested for:	Yes	No	Date of last test (m m y y y y)
Hepatitis B	☐	☐	
Hepatitis C	☐	☐	
HIV	☐	☐	

	Yes	No
Has client been at risk since last test?	☐	☐
Has client **completed** a course of vaccination for Hep B?	☐	☐

8) ALCOHOL PROFILE (PAST MONTH)

Consumed alcohol? Yes ☐ *show details* No ☐ *go to section 9*

How often did client have an alcoholic drink?

Every day	☐	5 - 6 days per week	☐
3 - 4 days per week	☐	1 - 2 days per week	☐
2 - 3 days per month	☐	about one day a month	☐

In a typical day how many units did the client usually have?

☐☐ units

9) SOCIAL PROFILE (CURRENT)

ACCOMMODATION

Owned/ Rented	☐
Supported accommodation (drug related)	☐
Residential rehabilitation	☐
In prison	☐
Homeless - Temporary/ Unstable accommodation/ Hostel	☐
Homeless - Roofless	☐

Other (*specify*) _____

LEGAL SITUATION
Tick all that apply

None	☐
Case pending	☐
DTTO	☐
On probation/ subject to supervision order	☐
In Prison	☐

Other (*specify*) _____

LIVING SITUATION
Tick all that apply

With spouse/ partner	☐
With parents	☐
Alone	☐

Other (*specify*) _____

LIVING WITH OTHER DRUG USERS

Yes	☐
No	☐
Did not wish to answer	☐

HAS CLIENT BEEN IN PRISON IN PREVIOUS 12 MONTHS?

Yes ☐ No ☐ Did not wish to answer ☐

How long since release _____

Name of Prison of release _____

EMPLOYMENT/ EDUCATION

Employed (paid or unpaid)	☐	School ☐
Support into employment	☐	Excluded from school ☐
Unemployed	☐	Full time education/ training ☐
Never employed	☐	In Prison ☐
Long term sick/ disabled	☐	Other (*specify*) _____

DRUG USE FUNDED BY
Tick all that apply

Employment	☐	Benefits	☐
Crime	☐	Sex work	☐
Debt	☐	Did not wish to answer	☐

Other (*specify*) _____

10) DEPENDENT CHILDREN

	Yes	No
Does client have dependent children	☐	☐
If yes provide age of each child in table Is client or their partner pregnant?	☐	☐

Please provide ages	Child one	Child two	Child three	Child four	Child five	Child six
Living with own children						
Own children living elsewhere						
Living with partner's children						

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11) KNOWN INTERVENTIONS SINCE LAST REPORT AT THIS OR OTHER AGENCIES

FOR DRUG MISUSE

- Structured preparatory & motivational interventions ☐
- Residential detoxification ☐
- Community based detoxification ☐
- Specialist prescribing ☐
- GP Prescribing ☐
- Structure psychosocial intervention ☐
- Structure day programme ☐
- Residential rehabilitation ☐
- Needle Exchange ☐

Other structured intervention *(specify)*

_____

OTHER INTERVENTIONS

- Structured alcohol intervention ☐
- Physical Health ☐
- Mental Health ☐
- Employability or similar ☐
- Education/training ☐
- Volunteering ☐
- Housing ☐
- Social work ☐

CHILDCARE INTERVENTIONS

- Nursery/Creche/After school club ☐
- Respite Care ☐
- Family support ☐

Has Local authority become involved since last report — Yes ☐ No ☐

If yes provide age of each child in table

Have any of the children had a Statutory Child Protection intervention by SWS?

Yes ☐ No ☐ Unknown ☐

Child looked after by Local authority (Please provide ages)	Child one	Child two	Child three	Child four	Child five	Child six
At home with parent(s)						
With kinship carer(s)						
Child looked after and accommodated						