Research Report

The impact of proceeds of crime action on offending trajectories

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Key terms

Corrections profile	The number of days spent in custody and number of custody episodes.
Exposure	Time spent in the community where there is capacity to offend (as opposed to time spent in custody). Used interchangeably with 'opportunity to offend'.
Forfeiture	Refers to the permanent loss of property derived from a proceeds of crime action.
Offence seriousness	Based off the National Offence Index, which is a national ordinal ranking of offence categories according to perceived seriousness. The National Offence Index allows for the identification of a principal offence in the instance of multiple offences.
Offending	Offences that the Queensland Police Service has recorded, and related to a specific person.
Offending profile	The number, frequency, and seriousness of offending.
Opportunity to offend	Time spent in the community where there is capacity to offend (as opposed to time spent in custody). Used interchangeably with 'exposure'.
Referred individuals	People who the Queensland Police Service has referred to the Crime and Corruption Commission's proceeds of crime team for consideration for asset restraint and forfeiture.
Restraint	Refers to when a temporary hold is placed on property to prevent the owner selling or otherwise disposing of it.
Restraint date	The date when the restraint order is filed in court, which is the first time that a referred individual becomes aware that the Crime and Corruption Commission is taking proceeds of crime action.
Socio-demographic	One or more variables from the list sex, ethnicity, country of birth, age (and a range of calculated age variables). Sociodemographic profile refers to the combination of these variables.

Acknowledgements

Executive Summary

In Queensland, the Crime and Corruption Commission (CCC) is responsible for administering the civil proceeds of crime regime under the *Criminal Proceeds Confiscation Act 2002* (Qld). In part, the legislation operates under the assumption that confiscating the proceeds of crime is an effective tool to deter crime. However, empirical research has not tested this assumption in Australia or overseas. The project sought to address this gap in knowledge in the scientific literature. Specifically, the aim was to examine the impact of proceeds of crime action on offending trajectories. This project was the first in a series of projects to progressively build knowledge on proceeds of crime action.

We identified 1339 individuals who were referred to the CCC between 2008 to 2020 for potential asset confiscation. The majority were male, born in Australia, had committed serious offences, and almost all were involved with matters related to drug offences. Of the entire sample, 42% progressed to asset restraint, which is the first court order that freezes assets. Of those who had assets restrained, 81% progressed to asset forfeiture which is the second court order that permanently confiscates assets. We linked the CCC's data holdings about those individuals with administrative data from the Queensland Police Service and Queensland Corrective Services.

The individuals' offending trajectories – which are patterns of offending across time – identified four distinct trajectories in the sample. The trajectory groups were distinguished by the onset, peak, and frequency of offending across the study period. The statistical analyses undertaken on this dataset suggest asset restraint deters individuals from reoffending in the short to medium term, and the way this unfolds depends on the type of offending trajectory.

There were certain findings which raised questions about the detection of serious and organised crime, which was not the focus of this study but discussed in this report as important avenues for future research. We identified trends that suggest age and asset value at restraint is decreasing, which may reflect a broader shift in detection that is occurring. Organised criminals are typically older and commence their criminal careers later in life. This raises questions about who is detected by law enforcement agencies, currently and in the future – for example, do these individuals sit at the 'higher-ranks' of criminal organisations and acquire the most profit from crime? As criminal organisations become more professionalised and grow in size and complexity, there could be a trend towards younger individuals undertaking 'lower-rank' roles which are easier to detect by law enforcement.

We recommend the following avenues for future research on the impact of proceeds of crime action:

- The psychology of proceeds of crime confiscation at the individual-level. A better understanding of the psychology of asset confiscation will provide opportunities to determine how and under what conditions it best operates to deliver maximum results.

- The impacts of proceeds of crime confiscation at the network-level. Conceptually, this is important to understanding the extent of proceeds of crime impact as the nature of organised crime is inherently social, in that it involves the coordination of illegal activities with other criminals. As previously stated, who these individuals are in terms of their ranks within criminal organisations is important to understanding impact.
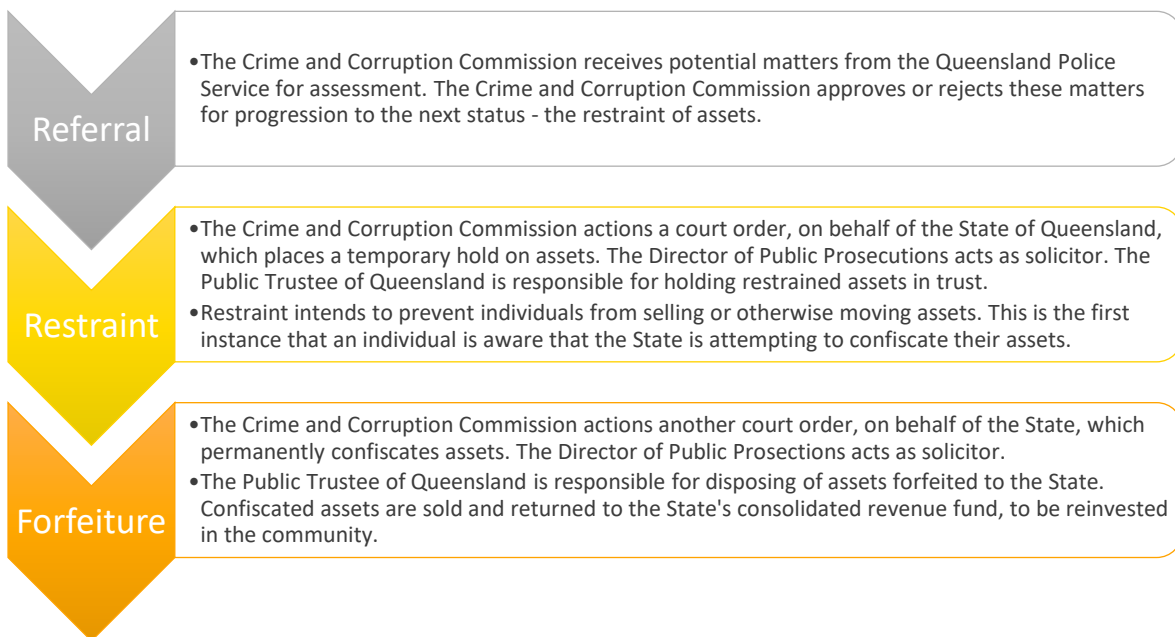
Introduction

Serious and organised crime causes considerable harm to society through the distribution of illegal goods and services. It is difficult to detect as offences tend to be characterised by a high degree of planning and organisation, coordination with an established network of criminals, and the use of sophisticated methods and techniques (Rickards 2016). The Australian Institute of Criminology estimates that the social and economic costs of serious and organised crime in Australia in 2020-21 was between $24.8 billion and $60.1 billion (Smith & Hickman 2022). Given that it involves illicit trade, financial profit is considered a key reason why individuals choose to engage in this type of crime (Dixon 2002).

About the Crime and Corruption Commission's proceeds of crime function

Proceeds of crime (PoC) schemes aim to attack the profitability of serious and organised crime by confiscating the assets gained from illicit activity. This has been adopted as a law enforcement strategy to combat organised crime by many jurisdictions including those across Europe, the United States, and Australia (Atkinson, Mackenzie & Hamilton-Smith 2017). In Queensland, the Crime and Corruption Commission (CCC) is responsible for administering the civil PoC regime under the *Criminal Proceeds Confiscation Act 2002* (Qld) (CPC Act). Under the non-conviction-based civil confiscation scheme in the CPC Act (Chapter 2), assets can be confiscated on reasonable suspicion of someone having engaged in serious crime-related activity. Alternatively, assets can be confiscated under the serious drug offender confiscation scheme (Chapter 2A) when a court has made a serious drug offender order against an individual because they were convicted of a specific qualifying offence.

The CCC works closely with other criminal justice system entities to identify and confiscate assets derived from crime. The process undertaken at the CCC, in broad terms, is illustrated in Figure 1.

Figure 1. The process of proceeds of crime action at the Crime and Corruption Commission

Referral
- The Crime and Corruption Commission receives potential matters from the Queensland Police Service for assessment. The Crime and Corruption Commission approves or rejects these matters for progression to the next status - the restraint of assets.

Restraint
- The Crime and Corruption Commission actions a court order, on behalf of the State of Queensland, which places a temporary hold on assets. The Director of Public Prosecutions acts as solicitor. The Public Trustee of Queensland is responsible for holding restrained assets in trust.
- Restraint intends to prevent individuals from selling or otherwise moving assets. This is the first instance that an individual is aware that the State is attempting to confiscate their assets.

Forfeiture
- The Crime and Corruption Commission actions another court order, on behalf of the State, which permanently confiscates assets. The Director of Public Prosections acts as solicitor.
- The Public Trustee of Queensland is responsible for disposing of assets forfeited to the State. Confiscated assets are sold and returned to the State's consolidated revenue fund, to be reinvested in the community.

A central tenet of PoC confiscation schemes is to deter and prevent crime. One assumption underlying the legislation in Australia is that removing the financial benefits of crime is an effective tool for deterrence (Skead *et al.* 2020). For example, Section 4(2) of the CPC Act states that the purpose of the legislation is to "deter persons from committing serious criminal offences, including by increasing the financial risk associated with committing serious criminal offences". As the administrator of the PoC regime in Queensland, the CCC has a responsibility to ensure the effectiveness of the legislation's objectives, under Section 4(2) of the *Crime and Corruption Act 2001* (Qld) (CC Act) and Chapters 2 and 2A of the CPC Act.[1] Our current assessment of effectiveness is limited to measures of the annual number and value of restraints and forfeitures. These figures communicate a broad notion of influence, but do not inform on the full extent of its impact.

For this reason, this project seeks to better understand the influence of PoC actions on offending. It is part of a program of research on PoC action from several different perspectives. The business need for a PoC impact measure was identified in a previous research report by the CCC (Crime and Corruption Commission 2020). This chapter provides an overview of the theoretical framework and insights from the scientific literature that informed the current research. Finally, we provide an outline of this project and structure of this report.

Theoretical framework

The theoretical framework for the project was deterrence theory, which focuses on the role of punishment in discouraging crime (Nagin 2018). According to this theory, the decision to engage in crime is influenced by the perceived costs and benefits of doing so. It is assumed that individuals will act in a way that maximises benefits and minimises costs. Punishment deters crime by modifying the cognitions of this decision-making process – it intends to increase the perceived costs or minimise the perceived benefits of crime. From this perspective, PoC confiscation schemes are a form of punishment that deters crime by minimising the financial benefits (Bartels 2010).

The application of deterrence theory means there are notable limits to what can be achieved by this project (see Text Box 1). These limits and the current state of international research on PoC confiscation and organised crime are considered next.

> **Text box 1: Theoretical scope of project**
>
> This project explored the influence of PoC actions on deterrence, with the following parameters:
>
> - New knowledge on specific deterrence, not general deterrence. Specific deterrence refers to the experience of punishment and the effect it has on discouraging individuals from reoffending in future. The other type of deterrence is general deterrence, which is the beyond the scope of this project. General deterrence refers to the threat of punishment which discourages offending amongst would-be offenders (Nagin 2018).
>
> - New knowledge on impact at the individual-level, not at the criminal network-level. Deterrence is underpinned by cognitive models of decision-making, in that it focuses on modifying cognitions to change behaviour (Paternoster 2018). Hence, it is psychological in nature and at the individual-level of inquiry. PoC confiscation schemes are likely to have other proposed impacts that are beyond this level of inquiry (whether that is their criminal network, or any other social or geographic grouping). These are outside the scope of this project.

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[1] The Director of Public Prosecutions has responsibility for Chapter 3 conviction-based restraints and forfeitures.

Insights from scientific research

We conducted a series of literature reviews to inform our research inquiry. We did not identify any empirical studies which examined the impacts of PoC confiscation on criminal activity. The limited empirical research on PoC regimes, more broadly, has been raised in numerous reviews (Atkinson *et al.* 2017; Bartels 2010; Skead *et al.* 2020). We summarise the insights drawn from other empirical research on deterrence theory, crime prevention programs, and organised crime.

The nature of PoC confiscation as a punishment is unique to the criminal justice system, as it focuses on minimising the perceived benefits of crime. In contrast, punishment typically involves increasing the perceived costs of crime (e.g. imprisonment). We did not locate any empirical studies in the deterrence literature which examined this distinction in punishment and its direct effects on offending. The focus of research has instead been on testing the different theoretical mechanisms of punishment originally proposed by philosophers Bentham and Beccaria in the 1700s (Nagin 2018; Paternoster 2018).[2] This line of inquiry is beyond the scope of the project.

Empirical evaluations of crime prevention programs, however, suggest that programs which seek to deter crime have mixed effectiveness (Grabosky 1996; McCord 2003). For example, youth bootcamps gained popularity as a specific deterrence intervention in the late 1990s but, according to empirical research, these programs did not impact reoffending (Meade & Steiner 2010). Rigorous program evaluations are required to ensure crime interventions produce the desired effects and are fit for purpose. Some programs have unintentionally produced harm such as increases to crime, displacing crime to other areas, and fostering creative adaptations to avoid detection (Grabosky 1996; McCord 2003). By measuring offending levels in response to asset confiscation, the current project is an important step towards evidence-based practice and identifying whether these actions produce the intended effects.

> **Text box 2: The do no harm principle**
> The 'do no harm principle' in criminology attests that an intervention should not produce more harm than delivering no intervention. As stated by McCord (2003), "unless social programs are evaluated for potential harm as well as benefit… the choice of which social programs to use will remain a dangerous guess" (p.17).

The scientific literature on serious and organised crime is limited but growing. Of relevance to this project, recent research suggests that individuals who engage in serious and organised crime have different trajectories of offending compared to typical criminal careers. According to the age-crime curve, offending over the life course is typically a bell curve which rises and peaks in the teenage years and then declines from the late teens or early twenties onwards (Blumstein & Cohen 1987; Macleod, Grove & Farrington 2012). In contrast, individuals who engage in organised crime are more likely to be adult-onset offenders with limited or no official offending history (Francis *et al.* 2013; Morgan & Payne 2021). Often, they possess a specialised skillset which is likely to give them an advantage in avoiding detection (Kleemans & Van Koppen 2020). Recent research also suggests there is heterogeneity in offending amongst individuals who are members of organised crime groups. At least four distinct types of offending trajectories have been identified which were differentiated by their onset, peak and frequency of offending (Francis *et al.* 2013; Morgan & Payne 2021; Van Koppen *et al.* 2010). In research, trajectories are patterns of individual behaviour across time. Understanding the offending trajectories demonstrated by individuals who are the subjects of PoC confiscation

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[2] Deterrence theory lists three mechanisms of punishment, which explain how punishment deters crime. Certainty refers to the likelihood of detection and punishment. Celerity refers to the timeframe between the commission of a crime and the experience of punishment. Severity refers to the harshness of the penalty imposed after the commission of a crime. Hence, punishment deters crime because it is certain, quick, or severe.

actions is therefore important to understanding impact. As the legislation is intended for serious and organised crime, it is expected that offending trajectories will be commensurate with this literature.

The aim and objectives of this project

The overall aim of this project is to examine the impact of PoC actions on offending trajectories. As trajectories measure behaviour over time, they are useful for analysing responses to certain events (such as a decrease in offending in response to asset restraint).

Specifically, the objectives of the project are to:

- Measure the characteristics and offending trajectories demonstrated by individuals referred to the CCC PoC unit.
- Estimate the influence of PoC action on offending trajectories using statistical modelling.
- Generate insights and recommendations for future research and practice on PoC confiscation.

To this end, the forthcoming chapters outline the research methods undertaken by the project, the descriptive characteristics of referred individuals and their patterns of offending, the influence of PoC actions on offending trajectories, and the discussion and recommendations stemming from this project.

Method

Data linkage of secondary sources was the research method for this project. It brings together different sources of data on the same group of individuals to create a richer dataset (Sanmartin *et al.* 2017). Other names in the scientific literature which are interchangeable include 'record linkage' and 'data matching'. In criminology, data linkage often combines administrative data from multiple agencies in the criminal justice system. We used CCC data to identify individuals who were referred to the PoC business unit and requested their offending histories from the Queensland Police Service (QPS) and custodial histories from Queensland Corrective Services (QCS). The project used a longitudinal design by constructing offending trajectories – that is, the rates of offending which occurred across time. The CCC's Human Research Ethics Advisory Panel (HREAP) reviewed and provided advice on the project. This section describes the sample and data linkage process, the measurement of key variables, and the data analysis strategy.

Identifying the sample, linking the data

The sample was individuals referred to the CCC's PoC business unit between 1 January 2008 to 31 December 2020 ('the study period'). Individuals were identified from an administrative dataset maintained by the PoC unit to track and report on the outcome of matters. The QPS refers matters to the unit for assessment and development by the financial investigation teams. The first assessment involves decision-making on whether matters should be subject to confiscation action. Hence, individuals in the CCC PoC dataset included people named in matters which did and did not progress to asset restraint.

The CCC's Research and Analytics unit performed data linkage between CCC, QPS, and QCS data, applying the following steps:

1. Extracted names and dates of birth of individuals who were the subject of PoC matters from internal records.

2. Matched individuals on the basis of name (surname, first name) and date of birth with their unique identifiers used by law enforcement agencies in Queensland. This was undertaken by our unit to facilitate the data requests, using our access to a secure database.

3. Offending data was requested from QPS and QCS by providing the list of names, dates of birth, and the unique identifiers used by law enforcement.

Individuals were excluded from data requests: if 1) they were under 18 at the time the PoC matter was received by the unit; or 2) date of birth could not be confirmed with internal records to calculate age at time matter was received. [3]

Measurement of analysis variables

PoC action

The CCC PoC dataset contained information about the PoC matters that individuals were involved with during the study period. This dataset was restructured from the administrative data collected by the PoC unit (which was also used to identify the sample and perform the data linkage). The project team inspected the raw administrative dataset for research purposes with the CCC Crime Division stakeholders. Specifically, the utility of each variable was assessed against the research aims and

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[3] Offending data received on included individuals who were under 18 at the time of offence or custodial episode was deleted at time of receipt by the CCC and excluded from analysis.

objectives, its data quality and completeness (e.g. degree of missingness). The main variables for analysis were:

- **Restraint status**, to classify individuals for analysis (at least one restraint during the study period versus no restraint). Restraint data also included date of occurrence and value of assets. Restraint was the main point of 'intervention' in group-based trajectory modelling that classified individuals who received and did not receive PoC action. It is the first point that an individual is aware that the State is attempting to confiscate assets.

- **Forfeiture status**, to classify individuals for analysis (at least one forfeiture during the study period versus no forfeiture). Forfeiture data also included date of occurrence and value of assets. In the group-based trajectory modelling, we were interested to see whether the progression from restraint to forfeiture status improved or changed the effects of PoC action.

Offending

The data requested from the QPS informed individual offending during the study period. The main variables for analysis were:

- **Offending trajectories**, the primary outcome for the group-based trajectory models (see next section). Annual offence counts were constructed by calendar year across the study period (and by time since restraint/referral for a follow-up analysis, described at the end of this chapter).

- **Type of offence**, for descriptive purposes. Type of offence was measured using the Queensland Police Classification. Categories include offences against the person, offences against property, and other offences (e.g. drug offences, traffic and related offences).

- **Offence seriousness**, for descriptive purposes. This was measured using the National Offence Index (NOI) (Australian Bureau of Statistics 2018). Scores were reverse coded so that higher scores reflected greater offence seriousness (Fuller, Morgan & Brown 2018). We calculated and reported two medians. The first was the seriousness of the individuals' principal offence (most serious offence) in the study period. The second was the seriousness of the individuals' entire offending across the study period. A high level of seriousness was interpreted as a median score sitting in the top third of potential scores which was 123-185 (e.g. homicide, serious drug offences such as trafficking, weapon offences), moderate seriousness for a score between 62-122 (e.g. fraud offences, theft offences), and low seriousness for a score between 1-61 (e.g. minor drug offences, minor traffic and driving offences).

Custody

The data requested from QCS informed on custodial episodes during the study period. The main variables for analysis were:

- **Exposure to the community**, to control for time spent in custody in the group-based trajectory models. Adding exposure to the statistical model accounts for any time that the person has spent with no (or very limited) opportunity to offend, because they are in a prison or secure mental health facility. It is important to include an exposure variable so that time in prison, for instance, is not mistaken for deterrence. Annual exposure scores were constructed by calendar year across the study period (and by time since restraint/referral for a follow-up analysis). Annual scores ranged from 0 (no exposure to community) to 1 (full exposure to community).

- **Time in custody**, for descriptive purposes.

- **Number of custody episodes**, for descriptive purposes.

Data analysis

We used a range of descriptive statistics, bivariate statistics, and multivariate statistics to answer the research questions:

- Descriptive statistics (measures of central tendency, frequencies) and plots were used to describe the characteristics of all referred individuals, individuals with restrained assets, and individuals with forfeited assets.

- Bivariate statistics were used to examine differences in characteristics of individuals with and without restrained assets during the study period. Chi-square examined associations between asset restraint and categorical variables. T-tests examined associations between asset restraint and continuous variables. The Wilcoxon rank sum test examined associations between asset restraint and count variables. The level of statistical significance was set at 5%.

- Bivariate statistics were also used to examine any differences in characteristics of individuals with and without forfeiture of assets. Specific tests were applied in the same manner as above.

- Multivariate statistics were used to model offending trajectories and examine the impact of asset restraint and forfeiture (group-based trajectory modelling, see below).

About group-based trajectory modelling

We chose the group-based trajectory modelling framework to describe the offending trajectories of referred individuals and to examine the impact of PoC action on offending trajectories (Nagin 2009) for the following reasons:

- It is well established that criminals vary in the rate, onset, and peaks in offending throughout their criminal careers (Nagin 2009). In layperson terms, criminals differ greatly to each other in offending patterns. This means that common statistical modelling frameworks are not the best 'tool' to analyse the behaviour of criminals, as those tools are better suited to populations that demonstrate more homogeneity.

- Group-based trajectory modelling is able to manage and incorporate this heterogeneity in the statistical analysis by assigning individuals into different 'trajectory groups'. The trajectory groups represent the different types of trajectories identified in the data which are distinguished by the onset, peak, and frequency of offending.

- Creating groups based on the similarity of behaviour patterns over time is a valid and reliable statistical method. It is part of a class of statistical modelling called 'finite mixture modelling' which assumes that any population of interests contains a finite number (or mixture) of subgroups.

We used extensions of group-based trajectory modelling to examine the impact of PoC action on offending trajectories. In summary, this incorporated the following features:

- Exposure level to the community based upon custodial history, so that time in prison is not mistaken for deterrence.

- A test on whether restraint status was a statistically significant 'predictor' of trajectory shape. A predictor is a factor which explains why a trajectory takes a particular shape. Through the lens of deterrence theory, if restraint status is associated with a reduced rate of reoffending compared to no-restraint, it is assumed there is a deterrence effect.

Text box 3: More detail about group-based trajectory modelling

More detail about group-based trajectory modelling is provided in Appendix 1, including important information about how the base models were selected from the data and a description of our sensitivity analyses.

The full technical results of the group-based trajectory modelling are reported in Appendix 2 and 3. We ran two types of models based upon different definitions of time:

- The main analysis defines time according to calendar year. We classified this as the main analysis because all individuals in the sample were able to be included in the analysis. Hence, the main analysis made the best use of available data.

- The 'time-adjusted' follow-up analysis defines time according to years since restraint/referral. It is useful for examining offending before and after restraint. A subsample was eligible, as it required at least five years of data before and after the dates of restraint/referral. Individuals whose assets were restrained in the years 2013 to 2015 were eligible. Individuals with a no-restraint status were eligible if referral occurred at the same time-period. This definition of time is more commonly used in the scientific literature to analyse responses to certain events. In life course criminology, in which group-based trajectory modelling is often used, age is a central feature of the research inquiry and is thus used to model time (Nagin & Odgers 2010).

Characteristics of referred individuals

This chapter reports on the characteristics of referred individuals in two sections:

- First, we summarise the characteristics of referred individuals and discuss the trends we identified in the data.

- Second, we describe the offending trajectories of referred individuals identified from the group-based trajectory model. We describe the defining features of the individuals with these trajectories (i.e. the trajectory groups).

Describing the referred individuals

We identified 1339 referred individuals from PoC matters the CCC received between 1 January 2008 and 31 December 2020.[4] Out of the referred individuals, 564 (42%) progressed to asset restraint.[5,6] From asset restraint, 459 out of the 564 individuals (81%) progressed to asset forfeiture.[7,8]

Of the 1339 referred individuals, 69 (5%) were involved in more than one matter during the study period (range 1-3 matters per individual), and 225 (17%) were involved in matters which included more than one individual (range 1-5 individuals per matter).

The sociodemographic, offending, and custodial characteristics of the 1339 referred individuals are reported in Table 1. In summary:

- The majority were male and born in Australia.

- Almost all were subjects of matters relating to drug offences.

- Two in every three had spent time in custody.

- Looking at the most serious or principal offence committed by referred individuals during the study period, it was, on average, at a high level of seriousness (Median = 167).

- Looking at all offences committed by referred individuals during the study period, the average seriousness was at a low level (Median = 52).

The major trends we identified in the data are reported in the next subsections. For clarity, we focus on the findings that provide the most insight into the referred individuals. We do not report on all descriptive analyses undertaken.

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[4] This is smaller than the number of individuals the QPS referred to the CCC. Individuals were excluded if: 1) they were under 18 at the time the PoC matter was received by the unit, 2) date of birth could not be confirmed with internal records to calculate age at time matter was received.

[5] There are several reasons why a referral may not proceed to restraint. For example, where available evidence does not satisfy the legislative requirements or reasonable prospects of success, the individual has insufficient assets, or for another reason it is not in the public interest to progress the matter.

[6] Individuals may be referred to the CCC for more than one PoC matter over time, meaning that it is possible for individuals to have their assets restrained on more than one occasion. Four individuals had their assets restrained twice in the study period.

[7] There are several reasons why a matter may not proceed from restraint to forfeiture status. Following restraint, individuals or interested third parties may provide additional evidence or information which in the result, do not support reasonable prospects of success or for another reason would justify proceeding to forfeiture in the public interest. If a matter proceeds to trial, and individual may also be successful in avoiding asset forfeiture.

[8] As it is possible for individuals to be named in more than one matter over time, it is possible for individuals to have their assets forfeited on more than one occasion. Two individuals had their assets forfeited twice in the study period.

Table 1**.** Descriptive characteristics of referred individuals (n=1339)

Variable		
Sociodemographic	**Number**	**%**
Average age at time of referral in years*	38.96 (11.21)	
Sex		
Total male	1140	85
Total female	183	14
Country of birth		
Total born in Australia	1007	75
Total born outside Australia	273	20
Total deceased in the study period	33	2
Offending	**Median number**	**Range**
All offences	9	1-163
Offences against person	1	1-12
Offences against property	2	1-163
Other offences	8	1-120
Drug offences	5	1-113
Traffic and related offences	3	1-33
Offence seriousness		
Average score for most serious offence	167	1-185
Average score across all offences	52	1-167
Custodial	**Median number**	**Range**
Days spent in custody*	813.63 (819.01)	
Number of custody episodes	1	1-12

Note. Sociodemographic variables are reported as the number with that characteristic and its percentage of total sample. Offending variables are reported as the median number of offences in the study period and the range. We excluded scores of 0 offences when calculating the median. Offence seriousness was measured using the NOI and reported as the median score. The scores were reversed, so that higher scores indicated a greater level of seriousness with a maximum possible score of 185. Custodial variables are reported as mean number of days in custody, and median number of custody episodes with range. *Reported as mean (standard deviation).
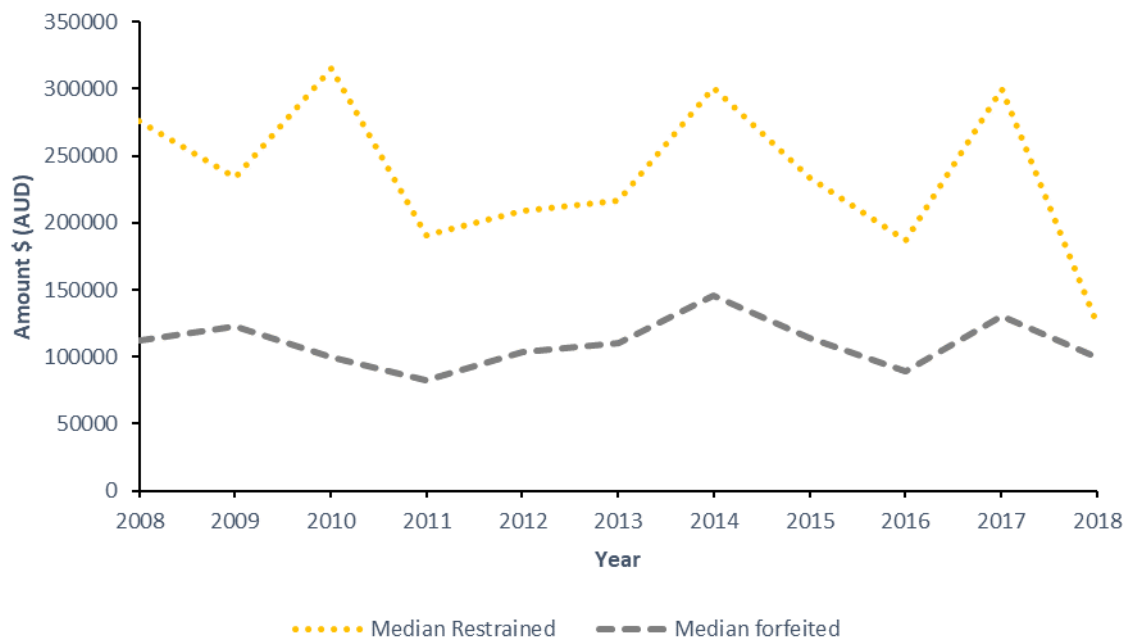
Exploring trends related to asset value

Overall, individuals had median asset values of:

- $234 419.60 at restraint status (range $14 500 – $15 800 000)
- $110 536.70 at forfeiture status (range $7000 – $11 900 000)

We identified a trend in asset value per individual over time. Upon visual inspection of the data, we identified that forfeiture value appeared to be stable and restraint value fluctuated over time, with the difference between the two growing smaller by the end of the study period (Figure 2).[9] Although it is beyond the scope of the project to test directly, a potential reason for this trend is a change to the type of assets typically restrained. Some assets are more complex than others to recover, which increases the time and work involved for that matter and may decrease the likelihood of recovering that asset. The CCC has become more aware of this risk over time, and this trend could be explained by a priority to restrain asset types with lower complexity, such as cash.

Figure 2. Change in asset value per individual over time

Exploring trends related to age

In conducting our analyses, we observed a decline in age over time which was worthy of dedicated exploration.

In 2008, the median age at the time of referral was 37.41 years old. In 2020, the median age at the time of referral had reduced to 34.35 years old. This decline in age we observed in the dataset – at least in part – could reflect a gradual shift in the age profile of individuals detected by the criminal justice system for serious and organised crime, who are then referred to the CCC for potential PoC action. We note the following:

- The scientific literature reports that individuals involved with organised crime tend to be older and commence their criminal career later in life (Vere van Koppen, De Poot & Blokland 2010; Morgan & Payne 2021). Development of a specialised skill set, access to suppliers and clients, access to transnational contacts and engaging trustworthy co-offenders are integral to organised

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[9] Forfeiture values were time-lagged by 2-years to account for the average time difference between restraint and forfeiture in the same matters.

crime operations and these connections usually become available later in life (Kleemans & De Poot 2008; Vere van Koppen & De Poot 2013).

- If the age of individuals who are earning money through crime is decreasing, this might be explained by the professionalisation of organised crime. From a practitioner perspective, younger individuals could be increasingly performing roles or jobs that make up the 'lower-ranks' of criminal organisations, meaning that they are more visible and easier to detect by the criminal justice system (Esoimeme 2020).

Given the above information, we were interested in whether there was a connection between age and restraint value over time. The median restraint value per individual decreased by $86 867 during the study period. We plotted this decline against the median age of individuals at the time of restraint (Figure 3). Visually, the results show that age and restraint value per individual had similar trends over time. We did not find a direct statistical association between age at time of restraint and restraint value ($r = 0.06$, $p = 0.15$). It is possible that these two are unrelated or alternatively a more fine-grained statistical analysis is necessary, which is beyond the scope of this project. Future research is warranted to test this question directly.

Figure 3. Change in age and restraint value over time
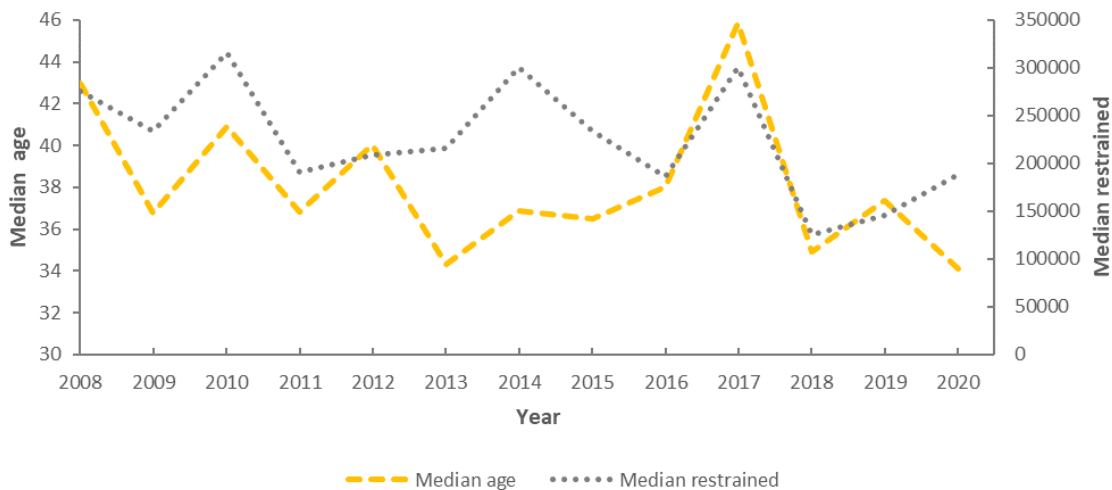
Last, we identified statistical associations between age and restraint and forfeiture statuses. This type of statistical analysis examines the relationship between two variables, it does not examine change in any of these variables over time. We identified the following findings:

- A statistical association was detected between age and restraint status, $t(1337) = -3.22$, $p = 0.01$. Individuals with a restraint status were 2.12 years older, on average, than individuals with a no-restraint status.[10] The statistical difference detected was small and unlikely to be of practical significance.

- A statistical association was also detected between age and forfeiture status, $t(1337) = -3.67$, $p<.001$). Individuals with a forfeiture status were 2.52 years older, on average, than individuals with a no-forfeiture status.[11] Similar to the finding above, the statistical difference detected was small and unlikely to be of practical significance.

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[10] Individuals with a restraint status were significantly older at 33.05-years-old (SD = 12.21) than individuals with a no-restraint status at 30.93-years-old (SD = 11.66).

[11] Individuals with a forfeiture status were significantly older at 33.48-years-old (SD = 12.23) than individuals with a no-forfeiture status at 30.96-years-old (SD = 11.69).

Exploring offending and corrections profile

Before conducting the group-based trajectory modelling, we explored differences between the offending and corrections profiles based upon restraint and forfeiture statuses, to help build knowledge about the sample of referred individuals.

The following were statistically associated with restraint status: [12]

- Individuals with a restraint status had a principal offence seriousness score that was statistically greater by one point than the score of individuals with no-restraint, z = -2.42, p = 0.02.[13] While statistically significant, the score difference is small and unlikely to be of practical significance.

- Individuals with a restraint status spent statistically longer in custody by 273.61 days than individuals with a no-restraint status, t(1336) = -6.61, p<.001.[14]

The above findings may suggest that individuals with a restraint status have a more serious offending and corrections profile than individuals with a no-restraint status. The seriousness of the offence is relevant to the assessment of value and risk for taking restraint actions at the CCC.

The results based upon forfeiture status followed a similar pattern:

- Individuals with a forfeiture status had a principal offence seriousness score that was statistically greater by one point than individuals with no-forfeiture status, z = -2.47, p = 0.01.[15]

- Individuals with a forfeiture status spent more time in custody that was statistically greater by 304.68 days than individuals with no-forfeiture status, t(1336) = -7.10, p<.001.[16]

We examine offending using a more sophisticated method in the following section.

Describing referred individuals' offending trajectories

Group-based trajectory modelling provided insight into the trajectories of offending demonstrated by the 1339 individuals referred to the CCC for PoC action. The base model indicated there were **four trajectories of offending** over the 13-year study period which were distinguished by the onset, frequency, and peaks in offending. The number and shape of trajectories are reported in Figure 4 and described in-text. The technical findings which informed the selection of the base model is reported in Appendix 2.

The group-based trajectory modelling assigns individuals in our dataset to one of the four offending trajectories. This is the trajectory type the individual was most likely to fit, statistically. We use the term 'trajectory group' to discuss the findings about individuals assigned to each trajectory. We report the descriptive characteristics of each trajectory group in this section and consult these again in the next chapter, when interpreting the findings on the impact of PoC action.

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[12] Restraint status was not statistically associated with total offence count (z = 1.74, p = 0.08) nor offence seriousness across all offences (z = -0.01, p = 0.99).

[13] For individuals with a restraint status, the median seriousness score for the principal offence was 167. For individuals with a no-restraint status, the score was 166.

[14] For individuals with a restraint status, the mean number of days in custody was 670.29 (SD = 863.8). For individuals with a no-restraint status, the mean number of days in custody was 396.68 (SD = 649.60).

[15] For individuals with a forfeiture status, the median seriousness score for the principal offence was 167. For individuals with a no-forfeiture status, the score was 166.
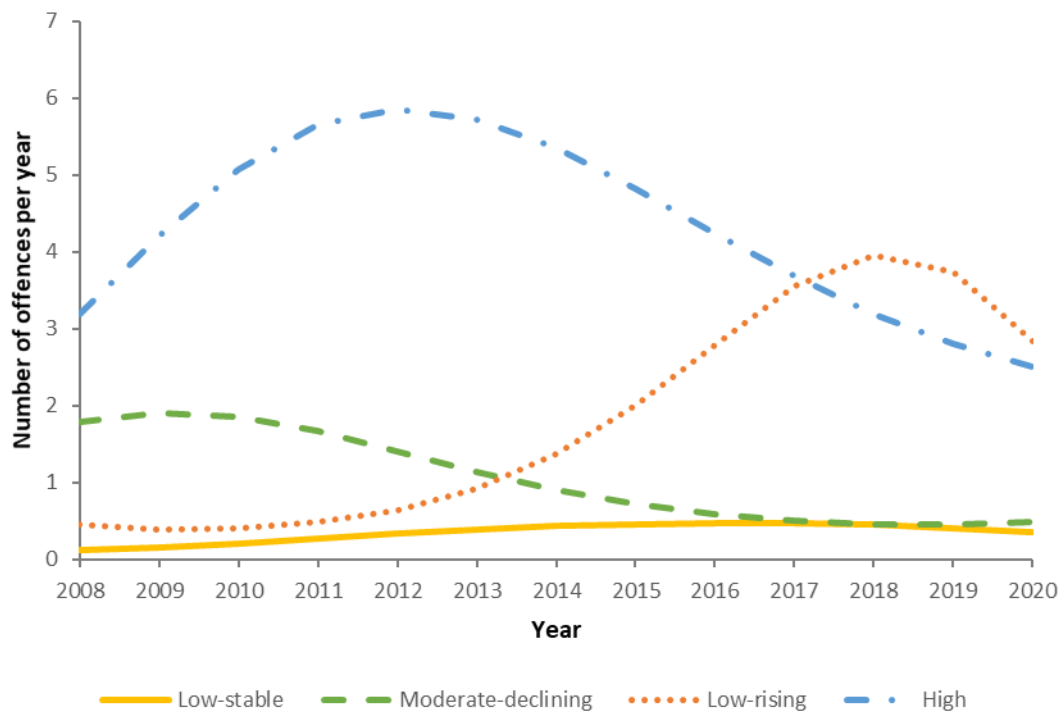
[16] For individuals with a forfeiture status, the mean number of days in custody was 712.17 (SD = 867.66). For individuals with a no-forfeiture status, the mean number of days in custody was 407.49 (SD=673.24).

Figure 4. The offending trajectories identified amongst the 1339 referred individuals, for offences detected by the Queensland Police Service between 2008 and 2020

Of the 1339 referred individuals in the sample:

- 51% were members of a **low-stable offending trajectory** (Figure 4), which trended around zero expected offences per year for the 13-year study period. This was the most common trajectory amongst referred individuals, at half of the sample. These individuals were, on average, in their mid-thirties at the start of the study period in 2008.

- 22% were members of a **moderate-declining offending trajectory** (Figure 4), which commenced the study period at around two offences per year, but declined to around zero expected offences per year by the end of the 13-year study period. These individuals were also likely to be in their mid-thirties at the start of the study period.

- 19% were members of a **low-rising offending trajectory** (Figure 4), which trended around zero offences per year at the start of the study period, peaking at four offences per year towards the end of the study period before declining again. On average, these individuals were in their mid-twenties at the start of the study period.

- 8% were members of a **high offending trajectory** (Figure 4), which started and finished the study period at about three offences per year, but peaked in the middle of the study period at about six offences per year. On average, these individuals were in their mid-to-late twenties at the beginning of the study period. This was the rarest pattern of offending amongst referred individuals.

These findings support the limited empirical research on offending in serious and organised crime. Specifically, the number of groups and the shape of the trajectories were reminiscent of longitudinal work on:

- 3007 individuals affiliated with Australian organised crime groups (from ages 14 to 40), identified through law enforcement intelligence (Morgan & Payne 2021).

- 4112 individuals convicted of an offence associated with involvement in organised crime (from ages 10 to early 40s) in the United Kingdom (Francis *et al.* 2013).
- 854 individuals involved in organised crime (from ages 12 to mid-40s) in the Netherlands (Van Koppen *et al.* 2010).

The similarity of our results offers confidence that the sample of 'referred individuals' used in this study is consistent with other samples of organised crime offenders identified via other methods domestically and overseas.

The descriptive characteristics of each trajectory group are reported in Table 2. These will be referred to again in the next chapter, as this information aids in the interpretation of the results on impact of PoC action.

Table 2. Descriptive characteristics of trajectory groups

Variable	Low-stable	Moderate-declining	Low-rising	High
% of the sample (n=1339)	**51**	22	19	8
Asset restraint and forfeiture				
% who had assets restrained	41	**50**	38	37
Mean asset value ('000s)	**642**	433	226	313
Median asset value ('000s)	**289**	234	134	150
% who had assets forfeited	33	**45**	28	28
Mean asset value ('000s)	**291**	207	125	245
Median asset value ('000s)	**114**	113	90	111
Offending – Count (QPS measure)				
Median number of offences	4	13	20	**49**
Median number of offences excluding traffic	3	10	15	**41**
Offending – Count by type (QPS measure)				
Median number of offences against person	0	0	0	**1**
Median number of offences against property	0	0	1	**8**
Median number of other offences	4	11	18	**37**
Drug offences	2	6	8	**14**
Traffic and related offences	0	2	5	**8**
Offence seriousness (NOI measure)[a]				
Median rating of most serious offence	166	167	167	167
Median rating across all offences	60	44	44	59
Corrections (QCS measure)				
Median time spent in custody (days)	0	536	183	**1211**
Median number of custody episodes	0	1	1	**5**
% who had zero days in custody	53	20	27	7
Sociodemographic variables				
% who are male	84	92	85	84
Median age at beginning of study period	34	34	26	28
Median age at the date of restraint	**42**	39	35	36
% who are born in Australia	73	83	84	85
% who died during the study period	2	**5**	1	1

Note. Numbers in bold text are intended to draw the readers' attention to features that characterise certain trajectory groups. [a]Seriousness was measured using the National Offence Index. The scores were reversed, so that higher scores indicated a greater level of seriousness with a maximum score of 185.

Impact of proceeds of crime action on offending trajectories

Extensions of group-based trajectory modelling were applied to examine the impact of PoC action on offending trajectories. We focused on restraint status in these analyses, as this is the point of intervention that distinguishes referred individuals who receive, and who do not receive, PoC action. Notably, we observed that restraint status was statistically associated with a lowered rate of offending than no-restraint status. Through the lens of deterrence theory, the findings suggest asset restraint deters individuals from reoffending in the short to medium term. This effect was tested for and observed in the four offending trajectory groups, which were first reported in the previous chapter. We report the main findings for a layperson audience in the main text of this chapter. The technical results are reported in full in Appendix 2.

This chapter also reports the follow-up analyses we conducted to examine impact using a different definition of time, that was based upon years since asset restraint or referral. These 'time-adjusted' analyses were conducted on a sub-sample of eligible individuals (n=345) whose restraint status occurred in the years 2013-2015. For those with no-restraint status, this point in time was based upon the date of referral. Overall, the findings support the main analysis. The visual plots produced from this analysis are useful to understand the trajectories in relation to time since restraint/referral. The technical results are reported in full in Appendix 3.

Finally, the chapter concludes with a note about asset forfeiture and what was achievable to examine in this project.

Text box 4: The inference of impact

The impact of asset restraint on offending trajectories was examined in this project using statistical modelling – specifically, group-based trajectory modelling. Hence, it is more accurate to state that the impact of asset restraint was **estimated** using a statistical modelling procedure on administrative data that informed on levels of offending. In technical terms, this statistical procedure tests whether restraint status is a 'predictor' of trajectory shape. If restraint status is a statistically significant predictor of trajectory shape, we infer that asset restraint impacts that offending trajectory. The visual plots are used to understand the nature of this statistical association – that is, how trajectory shape differs based upon restraint versus no-restraint status. The results are interpreted through the lens of deterrence theory, which is the theoretical framework for this research.

Impact of restraint status on the low-stable offending trajectory

Of the 676 individuals assigned to the low-stable trajectory group, 276 (41%) progressed to restraint during the study period. This low-stable trajectory was the most common trajectory amongst the 1339 individuals in the entire sample. The main analysis indicated that restraint status was a statistically significant predictor of trajectory shape (estimate = -0.33, p<.001).

Figure 5 visually reports the nature of this effect. Individuals with a restraint status had a reduced rate of offending compared to individuals with a no-restraint status. Through the lens of deterrence theory, this finding suggest that asset restraint deters individuals from reoffending.

Figure 5. Impact of restraint status on the low-stable offending trajectory
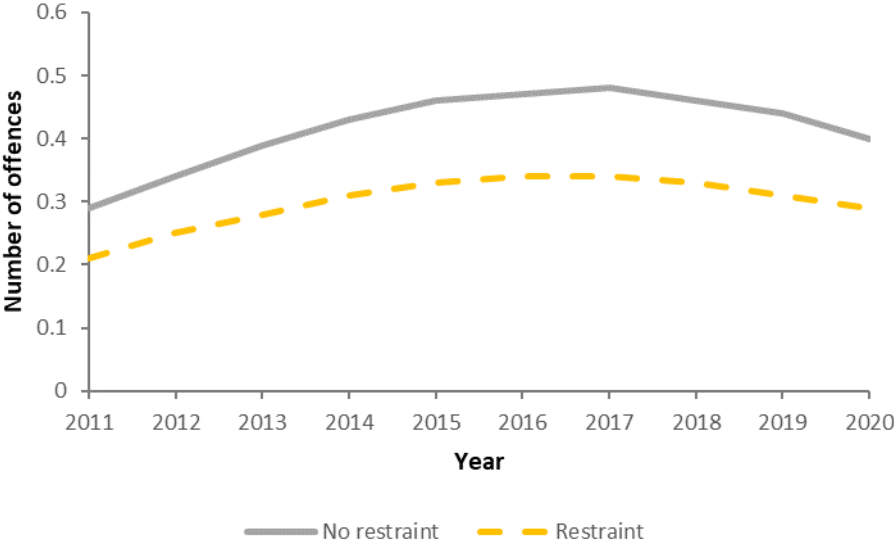
Visually, the difference appears small in magnitude. However, the effect has practical significance. The descriptive characteristics of this trajectory group in relation to the other groups are summarised here to assist with interpretation. These characteristics are reported in full in Table 2 (in the previous chapter). The characteristics provide insight into this 'type' of offender and how they respond to asset restraint:

- On average, this type of offender was the oldest and had committed the least number of offences over the study period and spent the least time in custody. This type of offender exclusively committed drug offences and had the highest value of assets.

- These characteristics are similar to those documented in the scientific literature on individuals involved with organised crime (Francis *et al.* 2013; Kleemans & De Poot 2008; Morgan & Payne 2021). It is likely that this type of offender is more careful or sophisticated in their approach given the lower rate of detection.

We obtained similar results from the time-adjusted analysis.[17] Restraint status was a statistically significant predictor of trajectory shape (Appendix 3). The time-adjusted analysis was able to show offending leading up to and after restraint (Figure 6). Asset restraint was associated with a subsequent decline in offending compared to no-restraint.

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[17] We identified an offending trajectory with a similar shape to the low-stable trajectory from the main analysis. This occurred in the model selection process; the technical details are reported in full in Appendix 3.

Figure 6. Impact of restraint status on a comparable low-stable trajectory from the time-adjusted model
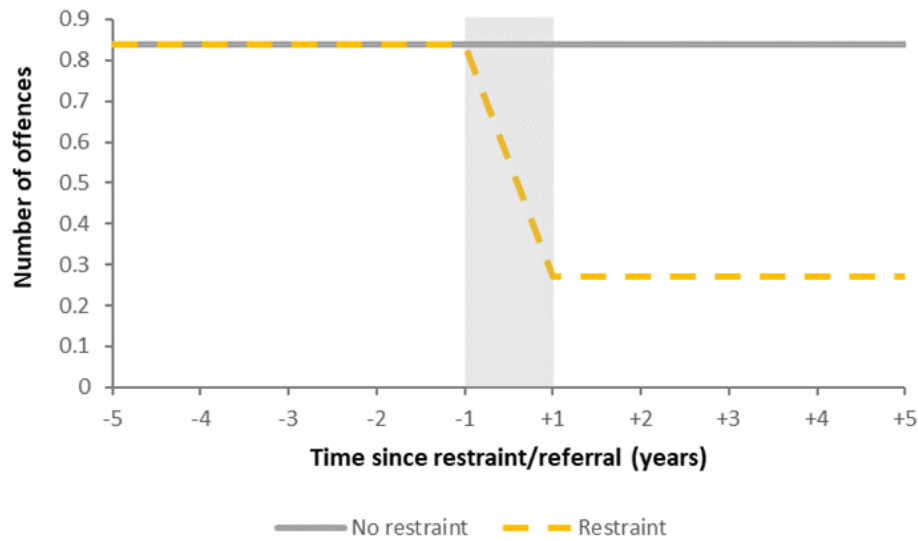
Impact of restraint status on the moderate-declining offending trajectory

Of the 301 individuals assigned to this moderate-declining trajectory group, 153 (51%) progressed to asset restraint during the study period. The main analysis indicated that restraint status was a statistically significant predictor of trajectory shape (estimate = -0.56, p<.001). Figure 7 visually reports the nature of this effect. Individuals with a restraint status had a reduced rate of offending compared to individuals with a no-restraint status, which suggests there is a deterrent effect.

Figure 7. Impact of restraint status on the moderate-declining trajectory
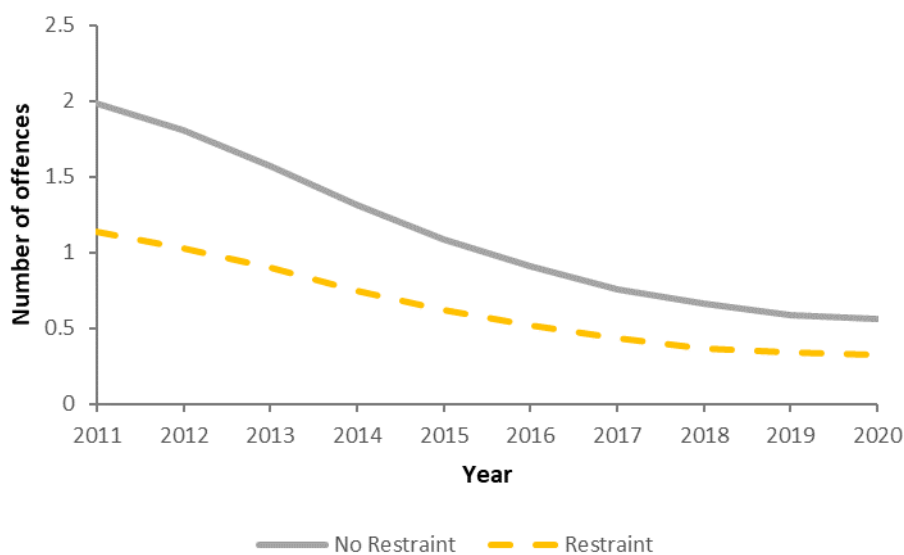
We offer the following interpretation, based upon visual inspection of the characteristics of this trajectory group in relation to the other three reported in Table 2:

- On average, this type of offender committed both drug and traffic offences. They had committed the second-least number of offences and were the second oldest at asset restraint. They had the second highest value of assets.

- This pattern of characteristics is similar to the low-stable group, reported previously. This pattern of characteristics is therefore similar to the scientific literature on organised crime (Francis et al. 2013; Kleemans & De Poot 2008; Morgan & Payne 2021). The main point of difference is that this trajectory had a moderate peak in offending towards the beginning of the study period. The low-stable trajectory, reported previously, did not have any such peaks.

Comparable results were obtained from the time-adjusted analysis.[18] Restraint status was a statistically significant predictor of trajectory shape (Appendix 3). The time-adjusted visual plot showed that offending rose in the five years leading up to asset restraint/referral (Figure 8). Restraint status was associated with a faster decline in offending compared to no-restraint. By the five years post-restraint/referral, the offending rate appeared to be similar across restraint statuses and had reduced to zero.

Figure 8. Impact of restraint status on a comparable moderate-declining trajectory from the time-adjusted model

Impact of restraint status on the low-rising offending trajectory

Of the 257 individuals assigned to this low-rising trajectory group, 96 (37%) progressed to asset restraint during the study period. The main analysis indicated that restraint status was a statistically significant predictor of trajectory shape (estimate = -0.27, p<.001). Figure 9 reports the visual nature of this effect, which suggests there is a deterrence effect. Individuals with a restraint status had a peak in offending but this was lower than the peak for individuals with a no-restraint status. Both declined towards the end of the study period, but restraint status was associated with a lower rate of offending than no-restraint.

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[18] We identified an offending trajectory with a similar shape to the moderate-declining trajectory from the main analysis. This occurred in the model selection process; the technical details are reported in full in Appendix 3.
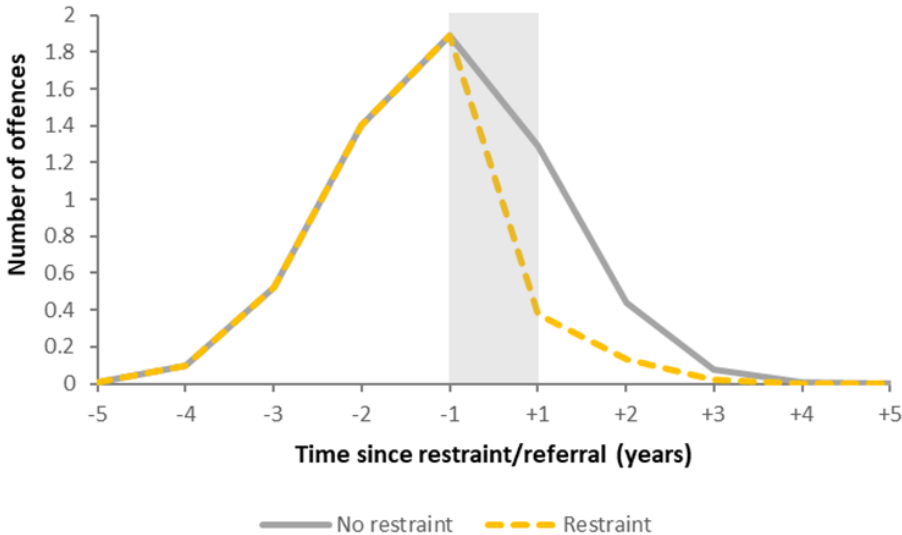
Figure 9. Impact of restraint status on the low-rising trajectory
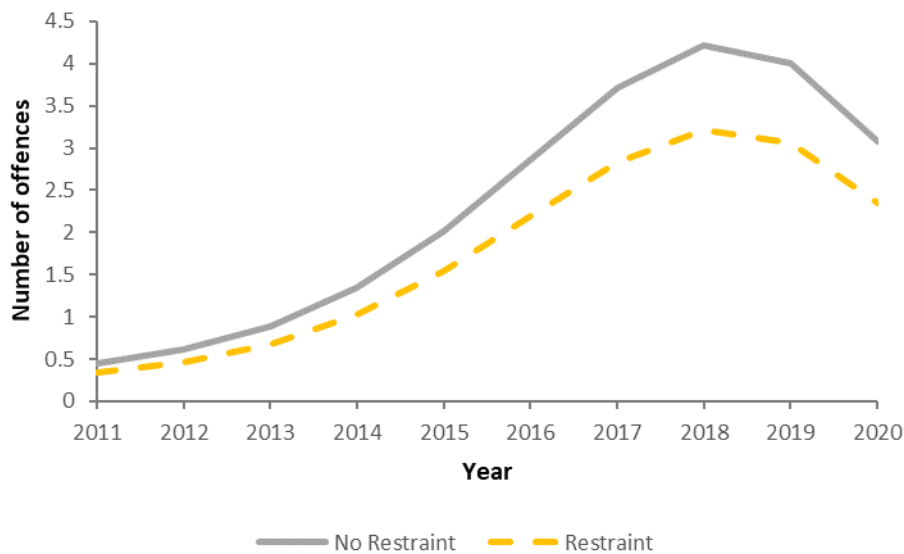
The characteristics of the low-rising trajectory group, in relation to the other groups reported in Table 2, are noted here to aid interpretation of this deterrence effect:

- This type of offender was the youngest in age at restraint and had the lowest value of assets. We note the trend reported in the previous results chapter, which concerned the average decline in age and value of assets at restraint over time. From a practitioner perspective, this raises questions on whether the professionalisation of serious and organised crime explains why younger individuals with lower value assets are being detected by the system. Younger individuals could be joining criminal enterprises that are becoming more sophisticated and increasing in size, by performing lower rank jobs with higher visibility. We discuss this later in the report as an avenue for future research.

- It is possible this trajectory indicates a more recent trend of the criminal justice system. This trajectory peaked and declined towards the end of the study period, suggesting that asset restraint was likely to occur in the second half of the study period.

Comparable results were obtained from the time-adjusted analysis,[19] and informed how this trajectory was shaped in respect to time since restraint/referral. Restraint status was a statistically significant predictor of trajectory shape (Appendix 3). Figure 10 shows that no-restraint status was associated with a rise in offending, with a gradual decline starting from about three years post-referral. In contrast, restraint status was associated with a rise in offending which stopped and declined at the point of restraint. The difference in the rate of offending between restraint statuses was maintained up until the five years post-restraint/referral.

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[19] We identified an offending trajectory with a similar shape to the low-rising trajectory from the main analysis. This occurred in the model selection process; the technical details are reported in full in Appendix 3.

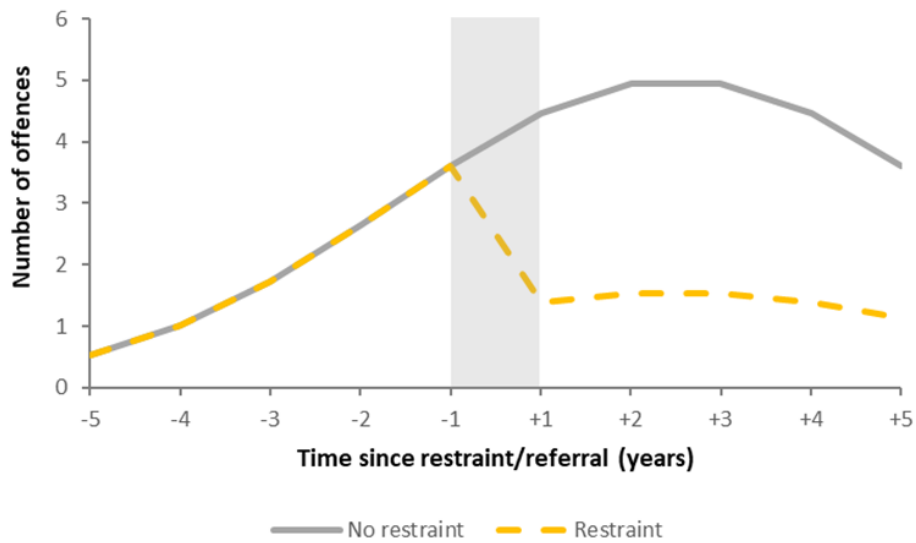Figure 10. Impact of restraint status in a comparable low-rising trajectory from the time-adjusted model

Impact on the high offending trajectory

Of the 105 individuals assigned to this high trajectory group, 39 (37%) progressed to asset restraint during the study period. This high offending trajectory was the rarest trajectory identified in the entire sample of 1339 individuals. The main analysis indicated that restraint status was a statistically significant predictor of trajectory shape (estimate = -0.37, p<.001). Figure 11 reports the visual nature of this effect, which suggests a deterrence effect is associated with restraint. Individuals with a restraint status had a peak and gradual decline in offending, but this was at a lowered rate to the no-restraint status.

Figure 11. Impact of restraint status on the high offending trajectory
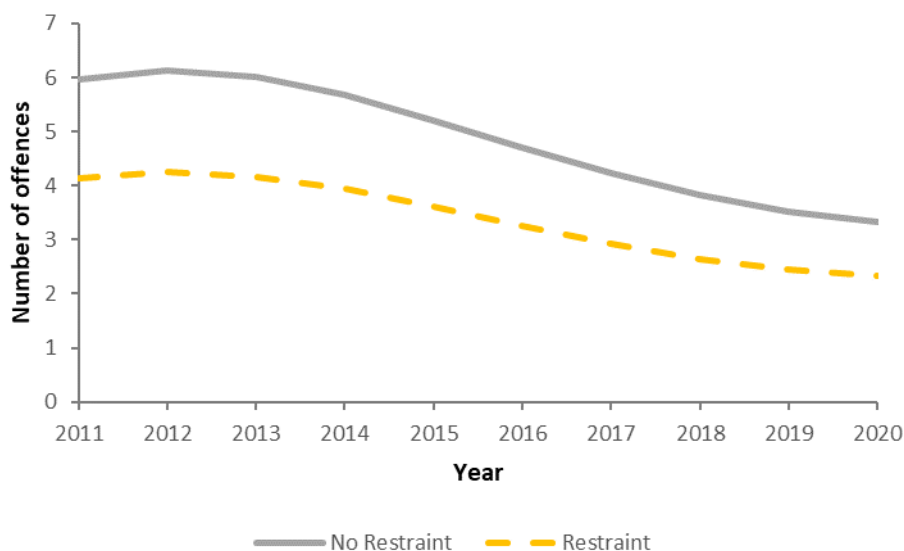
The characteristics of this high trajectory group, in relation to the other groups reported in Table 2, are noted here to aid interpretation of this deterrence effect:

- This type of offender committed the most offences. Offences on average did not focus exclusively on one or two types of offending. Offences were committed against person, property, and other categories, including drugs and traffic. This type of offender was the second youngest and had the second lowest asset value.

- This deviates from the typical individual who is involved in organised crime groups, as described in the scientific literature (Francis et al. 2013; Kleemans & De Poot 2008; Morgan & Payne 2021). It was a rare trajectory of offending in this dataset, identified in 8% of the entire sample of 1339 individuals.

The findings of the time-adjusted analysis support the main analysis.[20] Restraint status was a statistically significant predictor of trajectory shape (Appendix 3). Restraint statuses showed a similar rise in offending leading up to the year prior to asset restraint/referral (Figure 12). Restraint status was associated with a steeper decline in offending than no-restraint status. Both reduced to similar levels of offending at five years post restraint/referral.

Figure 12. Impact of restraint status in a comparable high offending trajectory from the time-adjusted model

Asset forfeiture

In broad terms, individuals who received the PoC 'intervention' were distinguished by the point of asset restraint, when individuals first become aware that the State is attempting to confiscate their assets. We sought to explore whether progressing to forfeiture status increases the deterrent effects, over and above the first point of restraint. However, in our sample the majority of individuals who had a restraint went on to have their assets forfeited (81% of individuals with a restraint). Estimating the differential impact on 'restraint with no forfeiture' versus 'restraint with a forfeiture' in each of the four trajectory groups, would require a much larger sample size than this study. This remains an important question, but one that we cannot answer at this time.

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[20] We identified an offending trajectory with a similar shape to the high offending trajectory from the main analysis. This occurred in the model selection process; the technical details are reported in full in Appendix 3.

## Concluding remarks

Our results suggest that commencing PoC action on an individual reduces their expected level of offending in the short and medium term. Our observation period is too short to indicate whether there is a long-term effect, and we cannot detect whether having a forfeiture status alters or sustains the deterrent effect in this sample size. The previous chapter demonstrates that offending is heterogenous amongst referred individuals, with four distinct trajectory groups identified. The findings in this chapter extend those results, by providing evidence that asset restraint is associated with a deterrence effect in the four 'types' of offenders. The deterrence effects, although similar in that there is an association with reduced offending, follow slightly different paths in response to asset restraint. Expressed differently, the impact of PoC action on offending is not homogenous – the responses differ based upon the 'type' of offender. Importantly, the results of this chapter produced findings which again raised questions about detection by the criminal justice system and the professionalisation of serious and organised crime. We discuss the implications of the findings more broadly in the next chapter.

Discussion and recommendations

The aim of this study was to examine the impact of PoC actions on offending trajectories. We identified individuals who were referred to the CCC for asset confiscation over a 13-year period using administrative data collected by the PoC unit. Offending and custodial data on these individuals were requested from other criminal justice entities. We identified four different types of offending trajectories over the 13-year period and examined the impact of PoC actions on each of these trajectories. Overall, the analyses we conducted suggest that PoC action deters reoffending in the short to medium term. As this is scientific research, there are important caveats to consider when interpreting the findings.

We note the following limitations of the study, which concern the measurement of offending trajectories. First, the measure was restricted to offending detected by the police. This is a common limitation in criminology research. Second, the professionalisation of serious and organised crime means that detection is becoming increasingly difficult. This type of offending has lower visibility across a wide geographical context, which is likely to have impacted our measure. Last, the measure was restricted to offending detected within the state of Queensland. Given the jurisdictional landscape of the criminal justice system in Australia, it was not feasible to request interstate police data beyond the QPS in the project timeline.

Despite the challenges of research in serious and organised crime, there are notable strengths of this study. These include a longitudinal study design and use of a comparison group to estimate the influence of PoC action. These methodological features increase our confidence in the study findings. This chapter discusses the main insights derived from the findings and our recommendations for future research and evidence-based practice at the CCC.

Insights from the findings

Deterrence theory attests the experience of punishment deters crime. It suggests that once detected and punished, an individual will modify their decision-making for future crime (Paternoster 2018). In support of this, asset restraint was statistically associated with a reduced rate of offending across the analyses.[21] The CPC Act was implemented with an objective to deter crime (Dixon 2002). These findings, in part, support the deterrence assumption behind this legislation as asset restraint was associated with a specific deterrence effect. Any effects on general deterrence are beyond the scope of this project. Our results support the 'do no harm' principle in relation to crime prevention, as it appears to decrease not increase crime.[22] However, we are unable to comment whether PoC action produces any displacement effects of crime or fosters any creative adaptations to avoid detection. In the context of organised crime, examining an individual's criminal network could potentially inform on these impacts.

The CPC Act is intended for serious and organised crime, and our results provide insight into the individuals referred for confiscation. The individuals in our sample were characterised by a high level of offence seriousness, as indicated by their principal offence in the study period. It is likely that this offence triggered a referral by police. As expected, there was heterogeneity in offending demonstrated over time. The group-based trajectory modelling identified four distinct trajectories which were distinguished by offending frequency and peak over the study period. Notably, the number and shapes of these trajectories were similar to the offending trajectories reported in the literature on organised crime (Francis *et al.* 2013; Morgan & Payne 2021; Van Koppen *et al.* 2010). The similarity of these results offers confidence that the sample of referred individuals in this study is

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[21] We cannot comment on the role that forfeiture may or may not have, over and above the effect of restraining assets. This is an area for future focus.

[22] We note that we did not use any other outcome measure to observe harmful impacts of PoC action on respondents.

consistent with other studies of individuals involved in organised crime. This project extends past research by providing evidence which suggests PoC action deters reoffending amongst individuals who are involved in serious and organised crime.

There were certain findings that raised questions about the detection of serious and organised crime, although we note that this was not the focus of our study. We discuss these as avenues for future research. We observed a trend in the dataset that median age at the time of referral was declining. In the group-based trajectory modelling, we then identified two trajectory groups characterised by relatively younger age and asset value at the time of restraint. The peak of one of these trajectories occurred in the second half of the study period. The findings raise questions on whether there is a gradual shift occurring in the profile of individuals detected by law enforcement agencies for serious and organised crime, some of which are then referred to the CCC for asset confiscation. As discussed in the previous results chapters, the scientific literature reports that individuals involved with organised crime tend to be older and commence their criminal career later in life (Vere van Koppen, De Poot & Blokland 2010; Morgan & Payne 2021). The professionalisation of serious and organised crime may explain this shift if it is occurring. For example, as criminal organisations grow in size and complexity, younger individuals could be taking on jobs that sit at 'lower-ranks' which are easier to detect by law enforcement (Esoimeme 2020). Future research is warranted to directly examine this type of question, such as whether the system is capturing offenders who have the most power and incur the most profit in criminal organisations.

Recommendations

We recommended the following avenues for future research on the impacts of PoC action:

- Future research to unpack the psychology of PoC confiscation (at the individual-level). Deterrence theory attests the reduction in reoffending we identified following asset restraint relies on psychological processes (Nagin 2018). A better understanding of the psychology of asset confiscation will provide opportunities to determine how and under what conditions it best operates to deliver maximum results. This is a central tenet of impact evaluations in the criminal justice system to inform resource allocation decisions (Gertler 2016). Furthermore, this research could inform potential impacts on general deterrence, that is the effect on 'would-be offenders'.

- Future research to understand the impacts of PoC confiscation at the network-level. Conceptually, this is an important step to understand the full impact of PoC actions as the nature of organised crime is inherently social, as it involves the coordination of illegal activities with other criminals. As stated in the previous section, who these individuals are in terms of their ranks within criminal organisations is important to understanding impact. The way these criminal networks operate, as well, are likely to be disrupted by PoC confiscation actions.

Concluding remarks

Notably, this research has generated new knowledge on PoC confiscation. The legislation in Australia is built upon the assumption that asset confiscation will have a deterrent effect. This is the first empirical study to test this assumption. Our findings support and extend the scientific literature on serious and organised crime. Asset restraint was associated with lowered rates of offending across the analyses conducted. The findings also raise questions about the professionalisation of serious and organised crime and whether the system is detecting the most serious offenders. The project provides recommendations for future research on PoC confiscation.

Appendix 1: Technical information about group-based trajectory modelling

For interested readers, this section provides detail on the analysis methods for group-based trajectory modelling (GPTM). The application involved two stages:

1. Select the base model to inform on the number and shape of offending trajectories.

2. Estimate the impact of PoC action (i.e. restraint status) on offending trajectories.

Stage 1 – Selection of the base model

The base model estimated the number and shape of offending trajectories based upon the frequency of offences detected by QPS per year. For the main analysis, the model was estimated on 13 annual observation points (2008-2020). Importantly the 'groups' that the model identifies are not true representations; they are useful approximations. GBTM is a powerful data reduction tool, where we reduce the data into more manageable (and statistically meaningful) groups, so that we can generate insights from large datasets, while retaining important variability or nuance on our data.

Identifying the base model is an iterative process. That is, it is repeated several times to determine which specification of the model best fits the data. This is based upon testing: first, the number of distinct trajectories in the data; and second, the shape or form of these trajectories. GBTM does not determine the number of distinct trajectories, instead this is introduced by the researcher using domain knowledge, and all plausible options are compared in a systematic way and then assessed for model fit (Nagin 2009).

In comparing the plausible models to identify the best fitting model, we used various tools:

- The model's Bayesian Information Criterion (BIC), which increases as model fit improves while penalising for an increase in number of trajectories.

- The resulting groupings' odds of correct classification to their trajectory group, and the average probability of assignment.

- Visual inspection of the trajectory plot to observe how well the model trajectory shapes fit the observed data.

- Visual inspection of within-group offender trajectories of every individual, to assess the degree of within-group similarity of trajectories.

It is the combination of the above that guides the final model selection.

Stage 2 – Estimate impact of proceeds of crime action

To estimate the impact of PoC action (restraint status) on offending trajectories, the base model was extended in two ways. First, we added 'opportunity to offend' variables to the model as exposure variables to account for the periods where a person was imprisoned[23] within each year of the study period. Second, we added restraint status to the model as a covariate.[24] This variable predicts the shape of offending trajectories according to whether one's asset restraint occurred. Offending trajectories, therefore, may be presented in three different ways — the trajectory of the group based on:

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[23] Or in a small proportion of cases, resided in a secure mental health facility.

[24] A time-varying covariate is a variable that may change value at any time throughout the study period. This is distinct from variables that can be added as a time-stable covariate such as *mother's education level*, *sex*, or *IQ.*

1. All trajectory group members.
2. Trajectory group members who have no restraint across the study period.
3. Trajectory group members who have a restraint that year, or any year before that year, across the study period.[25]

Sensitivity analyses

It is important to test whether the results are unduly affected by or 'sensitive to' certain features of the dataset. If our results 'are not sensitive to' a certain feature of the dataset, we may infer that the results are valid and reliable in that respect. We conducted sensitivity analyses for the main analysis only, not for the time-adjusted models.

We tested the impact of the following four conditions (in four separate models) by removing:

- All individuals who died throughout the study period (as they will have zero observations post-death, which may incorrectly represent as 'desistance').

- All individuals who were aged under 18 at the start of the study period (as they will have missing observations pre-18, which may incorrectly represent as 'late-onset').

- All individuals who were linked to a matter that had more than one person listed in the source data (as the source data may list multiple people for a single matter, but not all of those persons were listed on court documents).

- All traffic offences.

To test the impact for each of the models adapted as per the above four conditions, we did the following, and compared the result with that of the base model (which was generated using all referred individuals):

- Visually inspected the resulting trajectory plot.

- Inspected the BIC values.

- Added to the model where or not a restraint date was listed as a time-stable covariate, to check that the significant effect observed for the base model continued to exist, and the observed relationship was in the same direction as for the base model.

For all four conditions, each of the three checks led us to conclude the base model estimated from all referred individuals was 'not sensitive to' the exclusion of those four conditions. On that basis, we retained all referred individuals in the base model and assessed it to be a valid representation of the study dataset.

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[25] For instance, a person who had a restraint date in 2011 will have [restraint = 0 for 2008, 2009, and 2010], but will have [restraint = 1 for every year between 2011 and 2020]. This is on the basis that once a person has a proceeds of crime action made against them, they become aware of their vulnerability to the activity, which arguably brings about a deterrent (or otherwise adaptive) effect from that point onwards. Future research may wish to account for the deterrent effect degrading or ameliorating over time. Developing such a measure was outside the scope of the current project.

Appendix 2: Technical information about the main group-based trajectory model

Selection of the base model

We identified four distinct trajectory groups of offending over the study period (as reported in the main text). When testing different models, the BIC value continued to reduce as more groups were added. The decision between a four-group and five-group solution was not clearly discerned from the statistical and visual features of the models. That is, for each solution, the average posterior probability for each group was comparable for each solution, and the odds of correct classification exceeded the recommended number (5). Further, each solution appears to fit the data on visual inspections of the plot of trajectory groups, and the intra-group consistency of individual trajectory shapes. Table 1 reports the fit indices for both solutions.

Table 1. Fit statistics comparing the four-group and five-group solution for the main analysis

	Average posterior probability[a]	Odds of correct classification[b]
Four group solution (2 2 2 2)		
Group 1 (*n* = 693)	.95	18.81
Group 2 (*n* = 248)	.95	90.45
Group 3 (*n* = 294)	.95	60.23
Group 4 (*n* = 104)	.99	786.59
BIC = -30469.27 (N = 17394) BIC = -30450.04 (N = 1338)		
Five group solution (2 2 2 2 2)		
Group 1 (*n* = 90)	.96	366.99
Group 2 (*n* = 342)	.93	39.37
Group 3 (*n* = 567)	.94	22.17
Group 4 (*n* = 247)	.94	65.53
Group 5 (*n* = 93)	.97	447.86
BIC = -29783.79 (N = 17394) BIC = -29759.43 (N = 1338)		

[a]Ideally, this should be 7 for all groups. [b]This is calculated based on posterior probabilities, and should exceed 5

In these circumstances, domain knowledge and other considerations become important to model selection (Nagin 2009). The base model was selected as a four-group solution over the five-group solution for the following reasons:

- The QPS data has the limitations of administrative law enforcement data – it is not a precise measure of offending; it should be treated as a proxy for offending that has limitations. A more precise measure may be treated with more confidence.

- The 'flat' trajectory group in the four-group solution (n = 693), lost a considerable number of its members in the five-group solution, where the corresponding 'flat' trajectory group comprised only 567 members.

- Visually, the four-group solution offers the smallest number of groups to represent the trajectories. The main features of the trajectories are reflected in the four-group solution. This means that adding another trajectory to the solution (in the five-group solution) does not appear to any additional value in identifying and distinguishing between trajectory groups. Notably, the five-group solution brings another low-level group, the validity of which is undermined by reason 1, above.

- The four-group solution is similar to recent Australian research on organised crime offenders offending trajectories (Morgan and Payne, 2021).

After selecting the number of trajectory groups, further exploration identified that the polynomial specification that offered the best fitting trajectory shape was one trajectory with one curve (quadratic polynomial term), and three trajectories each with two curves (cubic polynomial term)

Estimation of proceeds of crime impact

In our dataset, an individual may have PoC action at any point in time over the 13-year observation period. Therefore, restraint status by year was added to the model as a time-varying covariate (as opposed to a time-stable covariate) to test whether restraint status significantly predicted a group's trajectory shape. As stated in Appendix 1, exposure to the community was accounted for in these analyses. Table 2 reports the model estimates. Restraint status was a significant predictor of trajectory shape in each group.

Table 2. Parameter estimates for the model with a time-varying covariate of restraint status, controlling for exposure to the community.

Parameter	Estimate	SE	p value
Low-stable trajectory			
Intercept	-2.15	0.14	<.001
Linear	0.29	0.04	<.001
Quadratic	-0.02	0.00	<.001
Restraint status	-0.33	0.07	<.001
Moderate-declining trajectory			
Intercept	0.33	0.09	<.001
Linear	0.29	0.06	<.001
Quadratic	-0.06	0.01	<.001
Cubic	0.00	0.00	<.001
Restraint status	-0.56	0.05	<.001
Low-rising trajectory			
Intercept	-0.50	0.16	<.01
Linear	-0.53	0.08	<.001
Quadratic	0.14	0.01	<.001
Cubic	-0.01	0.00	<.001
Restraint status	-0.27	0.05	<.001
High trajectory			
Intercept	0.94	0.08	<.001
Linear	0.39	0.05	<.001
Quadratic	-0.05	0.01	<.001
Cubic	0.00	0.00	<.001
Restraint status	-0.37	0.05	<.001

Appendix 3: Technical information about the time-adjusted group-based trajectory model

Selection of the base model

A four-group solution was selected for the base model, as reported in the main text. Similar to the main analysis, the BIC value continued to reduce as more groups were added to the model. The decision between the number of groups was not clearly discerned from the statistical features of the models. That is, for each solution, the average posterior probability for each group was comparable for each solution, and the odds of correct classification exceeded the recommended number (5). Table 1 reports the fit indices for both four-group and five-group solutions.

Table 1. Fit statistics comparing the four-group and five-group solution for the time-adjusted analysis

	Average posterior probability[a]	Odds of correct classification[b]
Four group solution (2 2 2 2)		
Group 1 ($n = 57$)	.97	145.31
Group 2 ($n = 61$)	.92	47.27
Group 3 ($n = 218$)	.94	9.50
Group 4 ($n = 9$)	1.00	243428.40
BIC = -5488.30 (N = 3450) BIC = -5471.03 (N = 345)		
Five group solution (2 2 2 2 2)		
Group 1 ($n = 135$)	.93	18.97
Group 2 ($n = 109$)	.96	49.79
Group 3 ($n = 44$)	.87	46.52
Group 4 ($n = 46$)	.95	113.68
Group 5 ($n = 11$)	.98	1265.65
BIC = -5314.21 (N = 3450) BIC = -5292.33 (N = 345)		

[a]Ideally, this should be 7 for all groups. [b]This is calculated based on posterior probabilities, and should exceed 5

The inspection of the visual plots between the four-group and five-group solution provided guidance on model selection. The key features of the trajectories emerged in the four-group solution; the five-group solution did not introduce a substantially different trajectory. When this occurs, the smallest number of groups is preferred (Nagin 2009). The plots for the four-group and five-group solution are provided in Figures 1 and 2 of this appendix for visual comparison.

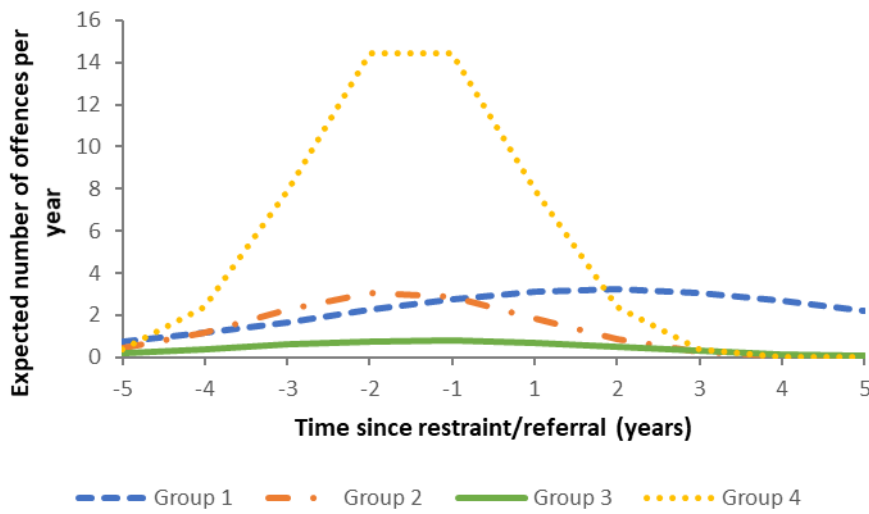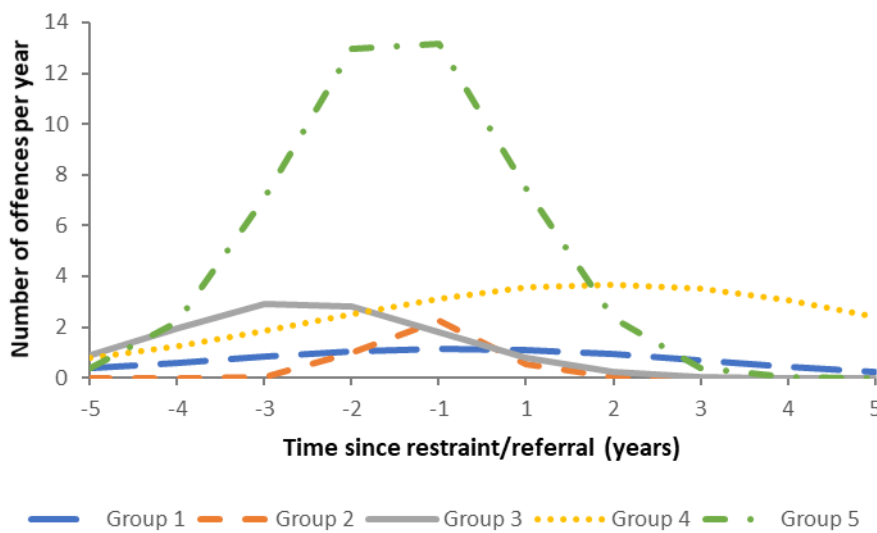Figure 1. Four-group solution for time-adjusted model

Figure 2. Five-group solution for time-adjusted model

After selecting the number of trajectory groups, further exploration identified that the polynomial specification that offered the best fitting trajectory shape was one flat trajectory (intercept only), and three trajectories each with one curve (quadratic polynomial term).

About the four trajectory groups

The descriptive characteristics of the four trajectory groups from the time-adjusted model are reported in this Appendix (Table 2) as they are not reported in the main text.

Table 2. Descriptive characteristics of trajectory groups in the time-adjusted model

Variable	Low-stable	Low-varying	Low-rising	Rising-falling
% of the **time adjusted** sample (**n=345**)	28	46	21	5
Asset restraint and forfeiture				
% who had assets restrained	29	34	51	**61**
Mean asset value ('000s)	453	**508**	345	363
Median asset value ('000s)	**308**	292	191	191
% who had assets forfeited	24	29	46	**56**
Mean asset value ('000s)	229	**274**	205	197
Median asset value ('000s)	105	**170**	119	149
Offending – Count (QPS measure)				
Median number of offences	7	4	16	**38**
Median number of offences excluding traffic	5	4	13	**32**
Offending – Count by type (QPS measure)				
Median number of offences against person	0	0	0	0
Median number of offences against property	0	0	1	**7**
Median number of other offences	6	4	15	**28**
Drug offences	3	3	7	**10**
Traffic and related offences	2	0	2	**3**
Offence seriousness (NOI measure)[a]				
Median rating of most serious offence	166	167	167	167
Median rating across all offences	59	66	48	**84**
Corrections (QCS measure)				
Median time spent in custody (days)	87	176	728	**1007**
Median number of custody episodes	1	1	2	2
% who had zero days in custody	41	39	9	**0**
Sociodemographic variables				
% who are male	93	84	91	**100**
Median age at beginning of study period	31	**35**	28	29
Median age at the date of restraint	36	**40**	33	34
% who are born in Australia	80	74	88	**61**
% who died during the study period	2	3	3	0

Note. Findings in bold text are intended to draw the readers' attention to features that characterise certain trajectory groups. [a]Seriousness was measured using the National Offence Index. The scores were reversed, so that higher scores indicated a greater level of seriousness with a maximum score of 185.

Estimation of proceeds of crime impact

In our time-adjusted dataset, an individual may have PoC action at the middle of the observation period, with annual observation points, from 1 year +/- the PoC date of restraint, to 5 years +/- the PoC date of restraint. Restraint status was added to the model as a time-stable covariate to test whether restraint status significantly predicted a group's trajectory shape. As stated in Appendix 1, exposure to the community was accounted for in these analyses. Restraint status was a significant predictor of trajectory shape in each group. The estimates are reported in Table 3.

Table 3. Parameter estimates for the model with a time-varying covariate of restraint status, controlling for exposure to the community.

Parameter	Estimate	SE	p value
Trajectory group 1 (low-stable)			
Intercept	-0.17	0.08	0.03
Restraint status	-1.14	0.23	<.001
Trajectory group 2 (low-varying)			
Intercept	-7.75	1.04	<.001
Linear	3.40	0.43	<.001
Quadratic	-0.34	0.04	<.001
Restraint status	-1.22	0.30	<.001
Trajectory group 3 (low-rising)			
Intercept	-1.34	0.18	<.001
Linear	0.79	0.07	<.001
Quadratic	-0.05	0.01	<.001
Restraint status	-1.17	0.11	<.001
Trajectory group 4 (rising-falling)			
Intercept	-1.75	0.23	<.001
Linear	1.68	0.09	<.001
Quadratic	-0.15	0.01	<.001
Restraint status	-0.74	0.14	<.001

In this study, we were able to use results of the time-adjusted models to confirm the results identified in the main analyses, on three bases:

- The number of trajectory groups identified was the same (four)
- The shapes of the trajectory groups were broadly comparable, even though time is treated differently across the two analyses
- The profiles of the two sets of trajectory groups were similar.

In regard to the third point, across the two sets of trajectory groups, the first two groups were older, had higher asset values restrained, had lower offending history and less time spent in custody, relative to the third and fourth trajectory groups.

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