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Establishing better cost estimates for Indigenous and non-Indigenous offender trajectories

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Acronyms and abbreviations

ABS	Australian Bureau of Statistics
AIC	Akaike information criterion
BIC	Bayesian information criterion
BLRT	bootstrap likelihood ratio test
CIB	Criminal Investigation Branch
CPIU/CIB	Child Protection Investigation Unit and Criminal Investigation Branch
DCCSDS	Queensland Department of Communities, Child Safety and Disability Services
DJAG	Queensland Department of Justice and Attorney-General
FTE	full-time equivalent
IMAC	Investigation Management and Control case management system
ITAS	Information Tasking Analysis System
QPRIME	Queensland Police Service Records and Information Management System
VLMR	Vuong-Lo-Mendell-Rubin likelihood ratio test

Abstract

The lifetime costs of offenders to the criminal justice system provide useful information to support implementation of innovative frameworks such as justice reinvestment and payment by outcome, as well as helping to assess the effectiveness of targeted prevention programs. However, few Australian studies have explored the longitudinal costs of offenders and no research has explored whether criminal justice system costs differ based on Indigenous status. This study used linked administrative data (contacts individuals born in 1983 and 1984 had with police, courts and corrections in Queensland) to determine how offending develops over the life course and how Indigenous status influences offending trajectories.

A narrow costing framework focused on direct criminal justice system costs used in service provision (police, courts, youth justice and corrections) was developed to establish unit cost estimates based on critical cost drivers (eg whether diverted, offence type, trials and sanction type). These cost estimates were modelled to assess the costs of individuals on different trajectories. Findings identified over half (53%) of the Indigenous population and 16 percent of the non-Indigenous population had moderate to chronic trajectories of offending. Because of the high levels of recontact, Indigenous offenders were on average more costly. These findings emphasise the need for innovative approaches such as justice reinvestment/payment-by-outcome to reduce Indigenous over-representation.

Executive summary

This project was undertaken to develop better unit cost estimates for the main criminal justice system practices and to assess the longitudinal costs of different types of offenders to the criminal justice system. Such information is important for weighing up different policy options aimed at reducing offending by different types of offenders. The three aims of the study were:

- to determine whether differences exist in the nature of offender trajectories over time based on Indigenous status;
- to assess the direct costs of criminal justice system practices based on critical cost drivers; and
- to apply the costs to the Indigenous and non-Indigenous offender trajectories and estimate the total direct criminal justice system costs for each trajectory group.

Method

A prospective longitudinal birth cohort was used in the study that included all individuals who were registered as being born in Queensland during 1983 and 1984 (*n*=83,371). To overcome issues with missing and inconsistent recording of information, Indigenous status was assigned using the multi-stage median algorithm. Of the whole birth cohort, one-quarter were found guilty of at least one offence between the ages of 10 and 31 years (excluding traffic offences). There were three research phases.

Phase 1: Identifying the number of offender trajectories

Latent class growth modelling was used during the first phase to model trajectories of the biennial offence counts from age 10–11 to 30–31 years, using Mplus software. A three-class model for both Indigenous and non-Indigenous Queenslanders was selected as the best-fitting model.

Phase 2: Assessing the direct costs of criminal justice system practices based on critical cost drivers

A primarily top-down costing framework was established which involved disaggregating agency expenditure (non-central operational costs directed to service delivery, excluding capital works) based on activities and outputs. A broad range of data was used to estimate resource allocation across activities and outputs, including financial and human resources data, administrative crime records, police activity and investigation management data, courts event data and interviews with frontline staff. The unit cost estimates for key transactions also considered critical cost drivers, including whether an individual was diverted by police to a caution or conference, the most serious offence type charged, whether court events included trials and the type of supervised sanction. The detailed methodology used to establish the unit cost estimates is provided herein.

Phase 3: Applying the costs to the Indigenous and non-Indigenous offender trajectories

The final phase involved modelling the cost estimates to determine costs based on individuals being identified in the cohort as Indigenous or non-Indigenous and their trajectory group in order to estimate the long-term direct criminal justice system costs for each group. To ensure that the costs in the study would be relevant and useful for contemporary policymaking, the patterns of contacts with the criminal justice system that occurred for the 1983–1984 birth cohort were projected as future criminal justice system contacts for a cohort that turned 10 in 2016–2017, using an approach similar to incidence-based costing (Larg & Moss 2011). The base year for the cost modelling is 2016–17, and hence all costs are reported in 2016–17 dollars, with costs projected into the future discounted at seven percent annually, consistent with guidelines from the Australian Government Department of Finance (Australian Government 2007).

Results

Number of offender trajectories

There were three trajectory groups for both Indigenous and non-Indigenous people in the cohort. There were low-rate and non-offender groups—which accounted for nearly one-half (46.6%) of people classified as Indigenous in the study (*M*=2.3 offences); compared to over four-fifths (83.8%) of those classified as non-Indigenous in the study (*M*=0.13 offences). There were adolescent onset (low for non-Indigenous and moderate for Indigenous) groups—which accounted for just over one third (38.3%) of those classified as Indigenous (*M*=25.1 offences) and one-tenth (13.6%) of those classified as non-Indigenous (*M*=6.08 offences). There were also early onset (chronic) groups, who began offending early and had high levels of offending over time. The early onset (chronic) group accounted for 15.1% of those classified as Indigenous in the study (*M*=107 offences), while this group accounted for 2.6% of those classified as non-Indigenous (*M*=46 offences). Therefore, it is apparent that those who were classified as Indigenous in the current study were more likely to have a moderate or chronic offending pathway than those classified as non-Indigenous, and these pathways represented a higher volume of offending.

Direct costs of criminal justice system practices based on critical cost drivers

Unit costs were estimated per police diversion (caution or conference) and based on the most serious offence type progressing to court, with court costs considering the different use and length of trials based on offence type and the different types of sanctions.

Costs of the Indigenous and non-Indigenous offender trajectories

Over one-half (53.4%, 1.5% of total birth cohort) of those who were classified as Indigenous in the current study were in the adolescent onset (moderate) or early onset (chronic) groups, which when modelled out accounted for 39.9% of total criminal justice expenditure. For those classified as non-Indigenous, 15.7% were in the adolescent onset (low) or early onset (chronic) groups and these individuals accounted for 55.4% of the projected criminal justice system costs. An Indigenous person in the early onset (chronic) offender group will cost an average of $380,097 in direct criminal justice system expenditure, more than five times the cost of a non-Indigenous person in this group (*M*= $74,798 by the time they turn 31 years old).

Implications

There are two main implications for policy and practice. First, the unit cost estimates and the estimates for the trajectory groups that were developed can both serve as key inputs or enablers for cost–benefit analyses or business cases that estimate the costs of changes to current responses in the criminal justice system, or that assess the benefits of prevention programs, interventions targeted at preventing reoffending, or innovative approaches such as justice reinvestment or payment by outcome. Moreover, the cost estimates of the different trajectory groups have been projected as future costs, with 2016–2017 used as the base year and costs discounted at seven percent annually. The estimates therefore represent the net present value of future costs and can be used to assess the likely benefits that may result from alternative criminal justice system pathways, programs and approaches.

Second, there is a need to reduce Indigenous over-representation in the criminal justice system by ensuring equitable processes at each stage of the criminal justice system and by better identifying the causes of over-representation. This would enable more focused efforts not only to prevent the onset of offending but also to encourage desistence from offending by Indigenous young people (Allard 2011). Indigenous people accounted for 2.8 percent of the cohort but 40 percent of total criminal justice system costs. The large proportion of those classified as Indigenous people who were in the adolescent onset and early onset (chronic) groups and the small proportion of individuals classified as non-Indigenous in the early onset (chronic) group would be ideal candidates for prevention activities. Innovative approaches including justice reinvestment and payment by outcome may prove to be effective investment frameworks. There are also a range of early-intervention, community-based, situational and criminal justice activities that could be considered which would reduce the risk factors for offending and enhance protective factors to prevent offending or reduce its reoccurrence (Allard 2011, 2010; Allen 2011; Clear 2011; KPMG 2018; Little & Allard 2011; Little et al. 2011; Ogilvie & Allard 2011).

Introduction

Indigenous over-representation in the criminal justice system remains one of Australia's most significant social justice and public policy issues. Despite the existence of justice agreements and plans in every jurisdiction, the gap between Indigenous and non-Indigenous Australians' representation in the system has continued to widen. Indigenous children are between three and 16 times more likely to be charged by police and seven to 10 times more likely to appear in a children's court than non-Indigenous children (Allard 2011). Indigenous children are 17 times more likely than non-Indigenous children to be under community supervision and 23 times more likely to be in detention, while Indigenous adults are 12 times more likely to be incarcerated than non-Indigenous adults (Australian Institute of Health and Welfare 2019; Productivity Commission 2018). Recently, it has been suggested that reducing Indigenous over-representation in detention and prison is likely to be incorporated as a key national priority in the Closing the Gap agenda, which aims to reduce Indigenous disadvantage (COAG 2018).

This project aims to estimate the long-term direct criminal justice system costs of offending by Indigenous and non-Indigenous young people. The findings from this analysis can inform future investments in prevention programs, other interventions designed to reduce reoffending, and innovative approaches such as justice reinvestment. The three aims of the project are:

- to determine whether differences exist in the nature of offender trajectories over time based on Indigenous status;
- to assess the direct costs of criminal justice system practices based on critical cost drivers; and
- to apply the costs to the Indigenous and non-Indigenous offender trajectories and estimate the total direct criminal justice system costs for each trajectory group.

The findings from the project will enhance understanding about the most appropriate ages at which to target interventions for young people who have offended or are at risk of offending. Estimating the cost to government criminal justice agencies of young adult offenders can inform when and how to make cost-effective investments to produce better outcomes for young people and to reduce the magnitude of long-term expenditure on the criminal justice system.

Offending over the life course

The criminal careers framework has been used extensively in the international literature and focuses on changes in offending over time, including initiation, desistence and career length (Blumstein, Cohen & Farrington 1988; Farrington & West 1990). Longitudinal studies from the United Kingdom (Jones, Nagin, & Roeder 2001), United States (Blumstein et al. 1988; D'Unger et al. 1998), Canada (LaCourse et al. 2003) and New Zealand (Fergusson, Horwood & Nagin 2000) indicate that:

- Offending peaks in the late teenage years.
- The peak onset age of offending is between eight and 14.
- The peak desistence age of offending is between 20 and 29.
- Early age of onset predicts a relatively long criminal career duration and the commission of relatively many offences.
- There is marked continuity in offending and antisocial behaviour from childhood into adulthood.
- A small fraction of the population commits a large fraction of all crimes.
- Different types of offences are committed at distinctly different ages.

Within this framework, research has modelled offender trajectories using techniques such as the semi-parametric group-based method (SPGM) to identify distinct groups based on variations in offending patterns over time (Nagin & Tremblay 2005). Piquero (2008) reviewed over 80 international studies that employed trajectory analysis and drew four main conclusions about offender-based trajectory studies. Research typically identifies:

- three to five offending groups;
- at least two groups—an adolescent-peaked group and a chronic group with early onset and high levels of offending;
- a late-onset chronic group that has onset during late adolescence and high levels of offending; and
- a low-rate, high-rate and moderate declining group.

Knowledge derived from these studies is particularly useful for understanding whether certain groups of offenders should be targeted and for determining the times when such interventions are most likely to be effective. Unfortunately, most of this research has not been able to explore the impact of race/ethnicity, both because subsamples are small and because there is no capacity to examine offending patterns on this basis (Broidy et al. 2015).

Several studies have explored the role of race/ethnicity on longitudinal offending patterns, which may condition patterns in important ways (Moffitt 1994). Findings from studies that have explored the composition of trajectory groups indicate that members of ethnic minority groups populate chronic groups, who initiate early and have sustained offending over time at significantly higher rates (Allard et al. 2013; Broidy et al. 2015; Livingston et al. 2008; Piquero & Buka 2002). For example, Broidy et al. (2015) found that Indigenous offenders were over 11 times more likely than non-Indigenous offenders to be chronic offenders. Other studies that have explored the nature and form of offending separately for different ethnic groups have found that members of ethnic minorities typically initiate offending at younger ages and have higher rates of offending than comparable trajectory groups of non-ethnic minority group members (Caudy 2011; Cohen, Piquero & Jennings 2010a; Ferrante 2013; Maldonado-Molina et al. 2009). It has been argued this reflects the unique structural contexts of ethnic minority group members (eg racism and poverty) and related exposure to key risk factors—for example, poor socialisation, development and parenting; attenuated family bonds; exposure to disadvantaged schools; and fewer employment opportunities. These factors can both foster early onset and preclude desistence (Haynie, Weiss & Piquero 2008; Moffitt 1993).

Costs of offending over the life course

Other criminal career research has estimated the costs of individuals on different offending trajectories (Allard, Chrzanowski & Stewart 2013, 2015; Allard et al. 2014; Cohen et al. 2010a, 2010b; Day & Koegl 2019; Piquero, Jennings & Farrington 2013). These studies have typically established estimates about how much each type of crime costs and have attached these costs to individual offenders, enabling the average costs of individuals on different offending trajectories to be established. Differences between the studies—such as the samples used and whether cost estimates for different types of crimes include tangible and/or intangible costs—have resulted in considerable variation in the estimated longitudinal costs of offenders. Indeed, each chronic offender has been estimated to cost between US$95,241 and US$17 million (Allard et al. 2013, 2104, 2015; Cohen et al. 2010a, 2010b; Day & Koegl 2019; Piquero et al. 2013). Only one study has explored costs based on race/ethnicity and found that African Americans were the most expensive out of any trajectory group, with each chronic offender costing an average of US$1.6 million (Cohen et al. 2010a).

These estimates are useful for promoting crime prevention and can provide information that can be used to help develop, justify and evaluate interventions and programs. However, there is a need to narrow the scope of cost analyses in order to develop more valid and reliable estimates about the different costs for individuals on different offender trajectories (Allard & Manning 2011). Adopting a narrower costing framework and focusing only on direct criminal justice system costs of offender trajectories enables governments to conduct cost-savings analyses, where they can consider both the likely impact of programs on offender careers given the target population and the monetary savings that are likely to result for government. Such analyses do not include the speculative, intangible cost savings that may result from reduced offending, or the savings for other stakeholders affected by offending (eg victims, offenders and wider society).

Two previous studies have assessed the direct criminal justice system costs of offender trajectories (Allard et al. 2014, 2013). Both of these studies used population-based administrative data that included all offending by individuals born in 1983 and 1984 (Allard et al. 2014) and 1990 (Allard et el. 2013). At the time of these studies the cohorts were aged 26 years (1983–84 cohorts) and 20 years (1990 cohort). Five offending trajectories were identified, including two chronic, one moderate and two low-rate trajectories. Costs were applied based on the transactions that individual offenders had with the criminal justice system and included police costs (eg average cost of time to caution, conference or process an individual to court), court costs (eg average cost of children's, magistrates, district, and supreme court finalisations) and supervision costs (eg average cost of facilitating a conference, community-based supervision and detention and/or incarceration). Findings from these studies indicated that about five percent of offenders in Queensland were chronic offenders who cost an average of $115,000 by the time they had turned 20 and $150,000 by the time they had turned 26. Moderate offenders accounted for about 10 percent of the cohorts and cost an average of $35,000 by the time they turned 20 years and $50,000 by the time they turned 26 years. Offenders in the low-rate groups accounted for 85 percent of offenders and, regardless of which age cohort they belonged to, were assessed as costing about $5,000 each.

Valid and reliable estimates of the direct criminal justice system costs for individuals on different offending trajectories need to consider several factors that impact on cost. These factors include whether an individual is diverted, the type of offence they have committed, whether there is a trial, and the type and length of any supervised sanctions (Allard et al. 2013, 2014; Allard & Manning 2011). Existing cost estimates do not take into account these important factors that are likely to increase the cost of offending trajectories by Indigenous Australians. Members of this group are over-represented in serious offences such as violent offences (Allard 2010), have frequent and sustained contact with the criminal justice system, and are subjected to a higher number of non-diversionary practices (Allard, Chrzanowski & Stewart 2013, 2015).

Current study

The current study aims to produce valid and reliable direct criminal justice system cost estimates. It builds on previous research in three ways. First, the study will examine differences in offending trajectories, to age 31 years, for Indigenous and non-Indigenous Australians. No previous research has explored offender trajectories separately for Indigenous and non-Indigenous individuals using a population-based birth cohort. Second, the study will explore the direct costs of criminal justice system practices based on critical cost drivers, including diversion, offence type, whether there was a trial and the type of supervised sanction. Current Australian estimates are typically based on average costs at a broad level, and do not distinguish criminal justice system contacts based on these critical cost drivers. Third, the study will apply the cost estimates to the Indigenous and non-Indigenous offender trajectories and estimate total and average costs for each trajectory group. No previous research has assessed the costs of Indigenous and non-Indigenous offender trajectories, with previous research only applying average costs, rather than using cost estimates which reflect the type of offending as well as the volume of offending over young adulthood. This study will also use the historical patterns of contacts with the criminal justice system across the trajectory groups to estimate the net present value of future costs for a contemporary birth cohort who turned 10 in 2016–17.
This costing approach will enable the use of the cost estimates in current determinations of the cost-effectiveness of current criminal justice system interventions, as well as in the broader health and welfare system. It also means that the estimated costs of the trajectory groups produced by the current study will be more useful for those tasked with developing business cases that propose and provide justifications for innovations which aim to reduce offending.

Method

In this section, an overview of the longitudinal birth cohort that was used in this project will be provided, followed by an overview of the Queensland context which underpins the costs. The four phases involved in the research will then be outlined. First, this section describes the process used to establish the birth cohort. Second, it details the analytical strategy adopted to assess the number of offender trajectories. Third, it examines the costing framework that was used to produce unit cost estimates will be examined. Fourth, it presents the approach that was used to model the costs of offending patterns of trajectory group members into the future and to determine total net present value of the direct criminal justice system cost of offending.

Longitudinal birth cohort

The longitudinal birth cohort included all individuals registered as being born in Queensland during 1983 or 1984. There were 83,371 individuals in the research sample, of which 42,946 (51.51%) were male and 2,295 (2.75%) were classified as Indigenous people. About one-quarter (*n*=22,686, 27.1%) of individuals in the cohort had been found guilty at least once between the ages of 10 and 31 and in total they had committed 233,970 offences. The average age of onset for offending was 18.22 years (*SD*=4.68).

By the age of 31, four-fifths (*n*=1,844, 80.3%) of those in the identified Indigenous cohort had been found guilty of one or more offence, compared with one-quarter (*n*=20, 843, 25.7%) of those in the identified non-Indigenous cohort. Indigenous males were the most likely to be found guilty of an offence (87.5%), followed by Indigenous females (71.8%), non-Indigenous males (36.6%) and non-Indigenous females (14.2%). In terms of frequency of offending, individuals in the identified Indigenous cohort were charged with a larger number of offences (*M*=26.8, *SD*=44) than individuals in the identified non-Indigenous cohort (*M*=2.12, *SD*=11.9). On average, Indigenous males had the largest number of offences (*M*=38.1, *SD*=51.8), followed by Indigenous females (*M*=13.4, *SD*=26.9), non-Indigenous males (*M*=3.3, *SD*=15.3) and non-Indigenous females (*M*=0.8 offences, *SD*= 6.3). It should be noted that traffic infringements were excluded from the criminal justice system contacts for all cohorts.

For these offences, individuals had 90,087 criminal justice system events (Table 1). A criminal justice system event is a formal police caution, a youth justice conference (required under the *Youth Justice Act 1992* (Qld) for individuals aged 10–17 years) or a finalised youth or adult court appearance. Adult court appearances were used most frequently to respond to offending, with over one-fifth (21.9%) of the cohort having at least one adult court appearance. Formal police cautions were also frequently used to respond to offending behaviour, with 11 percent of the cohort having at least one caution. Youth court appearances and youth justice conferences were used less frequently with the total cohort. For this cohort, conferencing was only available in pilot mode and availability was restricted due to on geographical location. Indigenous Queenslanders in the cohort were over-represented in all criminal justice system events, particularly police cautioning and finalised youth and adult court appearances.

Table 1: Main criminal justice system events and sanctions experienced by members of the adolescent onset and early onset (chronic) offender groups based on whether classified as Indigenous or non-Indigenous

Finalised events	Indigenous			Non-Indigenous			Total		
	Distinct individuals	% of Indigenous	Events	Distinct individuals	% of non-Indigenous	Events	Distinct individuals	% of cohort	Events
Formal police caution	1,043	45.50	1,850	8,159	10.10	10,714	9,202	11.04	12,564
Youth justice conference	21	0.92	23	148	0.18	156	169	0.20	179
Youth court	818	35.60	3,750	2,122	2.60	5,079	2,940	3.53	8,829
Adult court	1,762	76.80	16,972	16,487	20.30	51,543	18,249	21.89	68,515

Individuals in the cohort were more likely to have received supervised orders as an adult rather than as a youth (Table 2). About five percent of the cohort received probation and parole as an adult, while just over two percent received community service or incarceration. Less than two percent of the cohort received probation or community service as a youth. When explored based on their identified Indigenous status, Indigenous people in the cohort were over-represented in each sanction type when their population was taken into account. They were 41 times more likely to have experienced youth detention and 17 times more likely to have experienced adult incarceration.

Table 2: Types of supervision experienced by members of the cohort across the life course by Indigenous status to age 31

Type of supervision		Indigenous cohort			Non-Indigenous cohort			Total		
		Distinct individuals	% Indigenous	Number of hours/days	Distinct individuals	% non- Indigenous	Number of hours/days	Distinct individuals	% of cohort	Number of hours/days
Youth justice	Community service (hours)	433	18.87	78,831	609	0.75	78,078	1,042	1.25	156,909
	Probation (days)	526	22.92	360,852	822	1.01	410,249	1,348	1.62	771,101
	Conditional programs (days)	7	0.30	625	10	0.01	1,730	17	0.02	2,355
	Youth detention (days)	254	11.07	47,500	219	0.27	18,567	473	0.57	66,067
Adult corrections	Community service (hours)	463	20.17	61,176	1692	2.09	217,407	2,155	2.58	278,583
	Probation and parole (days)	877	38.21	780,575	3,300	4.07	2,632,767	4,177	5.01	3,413,342
	Intensive corrections order (days)	100	4.36	26,952	316	0.39	93,518	416	0.50	120,470
	Incarceration (days)	602	26.23	829,843	1,222	1.51	1,176,916	1,824	2.19	2,006,759

Queensland context underpinning the costs

This section outlines the legislative context underpinning the contemporary diversionary options and sanctions that are most commonly applied to young people and adults in the criminal justice system in Queensland. It should be noted that these diversionary and sanction options were identified based on what took place in the 2016–17 financial year. Unit costs were estimated based on the current costs of these options and applied to patterns of criminal justice diversions, contacts and sanctions for the 1983/84 birth cohort. This required some minor reconciliation between the particular types of sanctions that were available to the birth cohort as adolescents and adults and those available in 2016–17, to ensure they matched in terms of seriousness and resource-intensiveness.

A major legislative change to the youth justice system in Queensland occurred in 2016. The *Youth Justice and Other Legislation (Inclusion of 17-year-old Persons) Amendment Act 2016* (Qld) included 17-year-olds in the definition of 'youth offenders', providing them with access to the youth justice system. However, the formal transfer of 17-year-olds from the adult system to the youth justice system did not come into effect until 12 February 2018. Hence, the criminal justice diversion options, police and court processes, and sanctions considered in this project do not take into account this change, and neither do the estimates of the costs of these processes. It is unclear what net effect this change will have on the average costs of these events, although it will, clearly, involve a transfer of aggregate costs from the adult criminal justice system to the youth justice system for the supervision of 17-year-olds.

Youth cautioning is governed by the legislative framework and processes for young people aged 10 to 16 that is provided in the *Youth Justice Act 1992* (Qld). According to the act, the decision to divert a child from formal court action is based on the discretion of the officer, with the decision taking into account:

> …the circumstances of the alleged offence; and the child's criminal history, any previous cautions administered to the child for an offence and, if the child has been in any other way dealt with for an offence under any Act, the other dealings. (*Youth Justice Act 1992* (Qld), s 11(2))

Youth conferences were restored as a diversionary option in Queensland on 1 July 2016 after being disbanded by the previous state government in 2013. Both court-referred and police-referred youth justice conferences were available as diversionary pathways in 2016–17. While originally youth justice conferencing was targeted at young people who had committed less serious offences, in its current implementation it can also be considered for young people who have committed violent offences. To be eligible for a youth justice conference, the young person must admit to committing the offence. The conference is organised and run by an accredited convener and the following persons are entitled to be present: the young offender (and their lawyer and/or family members or a nominated adult), a police officer, and the victim and their family and/or other support persons. If an agreement for redress of the offence is made, and the offender complies with the agreement, the young person cannot be prosecuted and the offence will not form part of the young person's criminal history.

When a young person is charged, appears in youth court and pleads or is found guilty, there are a number of frequently used sentencing options in Queensland that involve supervision:

- community service orders—a young person sentenced to community service must perform unpaid work for the number of hours specified by the court, which must be at least 20 hours and should be completed within 12 months. It is the responsibility of the department to organise this work and to arrange for the young person to be supervised while they are performing the tasks. A young person has to agree to perform community service.

- graffiti removal order—a young person can have a graffiti removal order made by the court (where aged 12 or over) for a set number of hours, or participation may occur through police referral or through agreement following a youth justice conference.
- probation order—a court can order that a young person be put on probation. This means that the young person will be supervised by an officer from the department for the period of time specified in the order. They must abide by the requirements of the order and not break the law. A young person has to agree to be on a probation order.
- supervised release order—young people are released from detention when they have served 70 percent of their detention order or after the length of time ordered by the magistrate or judge. After this time, the young person is supervised in the community on a supervised release order which is counted as part of the time they spend in detention.
- conditional release order—courts can immediately 'suspend' a detention order for up to three months. This is called a conditional release order. The court can only make this type of order if the young person has agreed to take part in a program of activities organised by the department. Programs may include work, schooling, counselling and participation in community activities. If a young person does not participate in the agreed activities then they may be brought back to court. The court may then order that the young person be returned to detention.
- conditional bail program—if the court believes that the young person is at risk of not following their bail conditions, the young person may participate in a conditional bail program. The order provides for help and support from a youth worker for up to 32 hours per week.
- detention order—a children's court magistrate can order that a young person be sent to a detention centre for up to a year. A higher court has the power to order detention for up to five years or longer depending on the seriousness of the offence. Young people sentenced to detention are required to spend between 50 and 70 percent of their detention period in a detention centre and the remainder back in the community under supervision on a supervised release order.

Once individuals in the cohort were aged 17 years or older, if they committed an offence they were subject to adult processes, and diversion to cautioning and conferencing were no longer available. Where an individual appears in adult court and pleads or is found guilty, the most frequently used sentencing options in Queensland that involve supervision are the following:

- community service order—courts can make an order for between 40 and 240 hours (usually within one year) of community service. This may be imposed in addition to a probation order.
- probation order—courts can make a probation order for between six months and three years (with or without a criminal conviction being recorded). This order is generally viewed as suitable for those who have committed less serious offences and who have limited criminal history.

- parole order—a parole order can be court-ordered or board-ordered. Court-ordered parole is given to offenders who are sentenced to three years or less for an offence or offences that are not sexual offences and not considered serious violent offences. If an individual is imprisoned for a sexual or serious violent offence, the court can set a date when parole can be considered by the Parole Board Queensland. The parole board can consider the suitability of board-ordered parole for the offender once they reach this date.
- intensive corrections order—courts can make this order for up to 12 months. It is seen as the equivalent of a jail sentence but is served in the community under intensive supervision. The order can require community service, attendance at a rehabilitation program or counselling, or bi-weekly contact with a community corrections officer, along with a range of other conditions. If the order is breached (ie the order conditions are not complied with), the offender is likely to be returned to prison to serve the time remaining under the order. This order is generally viewed as suitable for first- or second-time offenders who are convicted of more serious offences, or for those who have a higher risk of recidivism.

Research phases

Phase one: Establishing the birth cohort

The birth cohort that was used for this project was based on data that were linked for another project ('Understanding the relationship between mental illness and offending', an ARC Linkage project). The cohort was created by the Queensland Government Statistician's Office, Queensland Treasury, which is now an authorised data integration authority. Data was linked within (where applicable) and between datasets using probabilistic data linkage based on several fields: name, date of birth, gender, suburb, postcode, and internal departmental and/or jurisdictional identifiers. A unique identifier was assigned by the statistician's office to each individual in the following linked datasets:

- Registry of Births, Deaths and Marriages;
- youth justice records;
- corrections orders—community and custodial;
- police diversions—youth cautions and conferences;
- court finalisations—youth and adult;
- child safety;
- health; and
- domestic violence.

Given the large volume of administrative data, there were several inconsistencies in gender and Indigenous status of individuals within and across the datasets. Inconsistencies for gender were addressed by assigning gender based on the balance of probabilities. That is, an individual was assigned the gender that was most frequently recorded for them within and across all of the datasets. Where an individual had an equal number of each gender (male and female), their gender was assigned as 'missing'. After the 7,292 individuals (8.8% of the cohort) who had multiple or missing genders recorded had been assigned one, there was a total of nine individuals who did not have their gender recorded.

Missing and inconsistent Indigenous status was resolved using the multi-stage median algorithm (Christensen et al. 2014). This algorithm is a more conservative way of resolving inconsistencies in Indigenous status than other methods such as the 'ever' identifier. Given the data used to define the cohort, the linkage process is likely to have underestimated the overall Indigenous population size, and the linkage process may also have somewhat inflated the frequency of criminal justice system contacts in this group (see *Project limitations* for more detail).

The algorithm involved applying four key rules within each dataset and then across the linked dataset:

- If an individual only has missing records, their derived Indigenous status is 'missing'.
- If an individual only has one non-missing record, this is their derived status (either Indigenous or non-Indigenous).
- If an individual has two non-missing records and one is Indigenous, their derived status is Indigenous.
- If an individual has three or more non-missing records and two or more are Indigenous, their derived status is Indigenous.

For this project, all individuals registered by the Queensland Registry of Births, Deaths and Marriages as being born in Queensland during 1983 or 1984 were included (n=83,371). Each individual's offending records were examined for the purposes of the trajectory analyses, which included all offences for which they had received a formal police caution, attended a youth justice conference or made a youth court or adult court appearance between the ages of 10 and 31. Offending that resulted in a not guilty finding by a court were excluded. Additionally, all traffic and vehicle regulatory offences (ABS 2011: category 14) were excluded because most are dealt with by infringement notice but individuals may elect to have a court hearing. After excluding not guilty findings and traffic offences, there were 22,686 individuals who were responsible for 233,164 offences.

The nature and extent of the contacts that each individual had with various criminal justice system practices and sanctions were also explored for the purposes of assigning costs. This involved assessing the number of formal police caution events, youth justice conference events, finalised youth court appearance events and finalised adult court appearance events that an individual had when aged between 10 and 31. Within each dataset, several offences could be finalised at one event, which was determined based on the police action date (caution or conference) or court finalisation date (youth or adult court). Additionally, the type and length of any youth justice sanctions (community service hours, probation days, conditional program days or youth detention days) or adult sanctions (community service hours, probation and parole days, intensive corrections order days, or incarceration days) that individuals received were assessed.

Phase two: Exploring the nature of the trajectory groups

To address the first aim of the project and explore whether there were differences in the nature of offending trajectories over time based on Indigenous status, separate datasets were created for the identified Indigenous and non-Indigenous cohorts. Latent class growth modelling was used to model trajectories for the biennial frequency of offences from when individuals were aged between 10 and 11 and between 30 and 31, using Mplus software. Biennial counts were used to constrain time observations and thus assist with model convergence. Trajectory analyses were performed on the Indigenous and non-Indigenous cohorts separately, examining trajectories for offending biennially within the two groups. A zero-inflated Poisson distribution was used for the latent class growth modelling as the offending counts were over-dispersed with an excess of zero offence count observations. Additionally, several individuals had biennial offence counts which exceeded 25. These outliers were re-scaled to have an upper limit of 25 offences in any two-year period to assist the trajectory modelling to converge. Consistent with prior research, model solutions with between two and five groups were examined, as this is the range of offending trajectory classes that has been found most commonly in the literature. The final number of trajectories for the model was determined based on a range of goodness of fit indicators, including entropy values, average class probabilities for most likely class membership, and parsimony considerations. All models were run allowing for both linear and quadratic growth terms.

Each individual's trajectory group membership was linked back to the main cohort dataset, enabling the nature of the identified Indigenous and non-Indigenous cohort trajectory groups to be compared. Each group was compared in terms of the average age of offending onset, the number and proportion of individuals and offences that were accounted for by each group, and the gender composition of each group.

Phase three: Developing unit cost estimates

The second aim of the project was to explore the direct costs of criminal justice system practices based on critical cost drivers. Estimating the costs of contacts or transactions across publicly funded systems is not straightforward. In particular, costs estimates can vary in the cost base used or in the types of costs that are considered in scope when determining the impacts of changes in system demand. In the private sector, there are more predictable relationships between supply and demand, which can make it easier to determine how short-run and long-run changes in demand will affect supply and the associated costs of service delivery or production. In the public sector, supply does not typically meet demand in a predictable way; in some cases, high demand can continue for many years with no commensurate change in supply. This can make services appear more efficient but potentially creates opportunity costs for employee time, or for service quality, scope or accessibility. This makes it difficult to determine how much the transactions within the criminal justice system cost, as estimates can vary according to the current funding arrangements or the current supply of services. This can also make it challenging to estimate how changes in offending contacts will affect the associated cost or supply of criminal justice system responses, with greater uncertainty particularly apparent in short-run changes in demand.

In this study a primarily top-down costing framework was used, which involved disaggregating agency expenditure directed to service delivery (excluding central and capital costs), based on activity and outputs, to produce unit cost estimates for key practices and sanctions. A top-down costing method generally involves allocating expenditures for a range of fixed and overhead costs which do not typically change in the short term when the system demand changes. The unit cost estimates presented in this report can therefore be considered as reflecting long-run impacts on demand, and thus are more likely to constitute an upper bound estimate of the cost of transactions across the criminal justice system. However, the expenditure cost bases used in these analyses focused primarily on non-central, recurrent service-delivery expenditure, and largely excluded central agency costs that were not directly related to service-delivery operations. Additionally, the analysis excluded capital works expenditure, but included recurrent costs associated with asset maintenance and depreciation as these related to service-delivery operations.

A range of critical cost drivers were considered when estimating the costs of criminal justice system transactions, including:

- whether an individual was diverted by police to a caution or conference;
- the most serious offence type for an individual;
- whether there was a trial; and
- the type of supervised sanction.

The following subsections provide an overview of the methods used to produce the unit cost estimates for each of the agencies. Different approaches were used to disaggregate police, courts, youth justice and corrections expenditure based on activity.

Police unit cost estimates

Unit cost estimates for police processes that are used to respond to offending were assessed by apportioning relevant expenditure based on the relative time and focus of police operational activity. 'Offending events' form the basis of the cost estimates for police services in this study. An offending event was defined as all offences related to an individual within an identified police occurrence or incident. As police often deal with multiple offences relating to an offender at one point in time, unit cost estimates were calculated on the basis of the most serious offence charged within each offending event. The use of an offending event as the unit of cost estimation reflects the fact that the costs of individual offences are rarely additive; most commonly, a range of offences related to an individual within an incident will be detected, investigated and prosecuted using a combined set of police resources, providing economies of scale which reduce the resources that would be associated with providing policing responses to any of the offences individually. It is also true that police resources may be combined to detect and investigate multiple offenders linked to the same occurrence or incident. However, as most assessments of the relative costs or benefits of criminal justice interventions consider the impacts of interventions on individuals, it was considered that unit costs would be most useful if estimated for individual offenders. Unit cost estimates were produced for police processes based on the action type that was associated with the offending event (caution, conference, court and other), and then, for those that had a court action, on the basis of the most serious offence finalised. Unfortunately, costs for police prosecutions were not able to estimated, due to a lack of relevant data on prosecution time across offending event types.

Police unit cost estimates for events on the basis of police action type

The five steps outlined below were used to calculate unit cost estimates for offending events on the basis of police action type (caution, conference, court and other). See Table 3 for details.

Step 1: Counting the number of offending events in 2016–2017

The numbers of offending events during 2016–2017 were explored using Queensland Police Service Records and Information Management System (QPRIME) cross-sectional data. Actions were classified as caution, conference, court or 'other', which included infringements, fines and diversions to counselling. For this time period, QPRIME data included 528,469 offences. Traffic offences that resulted in an infringement action were excluded. The most serious offence for each offending event (occurrence) was determined using the National Offence Index (ABS 2009b). For each offending event, the action selected corresponded to the most serious offence within an offending event, noting that multiple offences within an offending event may be associated with different actions. In total, there were 348,063 offending events in 2016–17.

Step 2: Estimating mean general duties officer time (hours) allocated to offending events leading to different action outcomes, and the proportion of time allocated to police processes leading to each type of action

- The average length of time that police officers dedicated to events actioned through a caution, conference, court or 'other' was assessed using a sample of 2016—2017 Information Tasking Analysis System (ITAS) data. ITAS data were obtained for a sample of 16 police stations that were selected because their use of the system would result in more valid estimates of time dedicated to various functions. Stations selected were: Aurukun, Biloela, Cairns, Fortitude Valley, Ipswich, Kingaroy, Logan Central, Maryborough, Mt Isa, Normanton, Rockhampton, Roma, Toowoomba, Townsville, Upper Mount Gravatt, and Winton. This data was linked to QPRIME data on the basis of occurrence numbers that were referenced in the ITAS activities data. Linking the ITAS data to the QPRIME data provided information about the length of time general duties officers directed towards activities per offending event. Activity time was summed based on the most serious offence per offending event in QPRIME. Officers can dedicate time to one activity type (eg administration), but that activity could be relevant to work on multiple occurrences or offending events. Where there were multiple events (occurrences) recorded against the length of time directed towards activities in ITAS, the time was divided by the number of linked occurrences or events to avoid overestimating the length of time taken. The mean length of time for general duties activities related to offending events was then calculated for each action type.
- The proportion of time that general duties officers directed towards each police action type was estimated by calculating the total general duties activity time per action type, which involved multiplying the number of offending events by the mean general duties officer time. To then determine the proportion of general duties time that was allocated to offending events across action types, the total general duties time per action type was divided by the total estimated general duties time for all action types.

Step 3: Estimating the proportion of investigative, forensics and specialist resources allocated to police processes leading to each action type

These resources were estimated using data from three areas: investigative—Child Protection Investigation Unit and Criminal Investigation Branch (CPIU/CIB); forensics; and specialist investigative functions. For each area, the proportion of time directed towards events actioned through a caution, conference, court or 'other' was estimated. The proportion of time that CPIU/CIB, forensics and specialist areas devoted to offending events across the four action types was estimated based on the proportion of offending events that involved these areas within each action type. These assessments were made by linking two datasets used by specialist areas to record their activities with the relevant occurrence and offending information from QPRIME. CPIU/CIB and a range of specialist areas within Queensland Police Service (eg Homicide Group, Fraud Group and Cyber Crime Group) use the Investigation Management and Control case management system (IMAC) to record and manage activities

related to investigations. The Forensics Register is used to record and manage forensic examination activity linked to investigations, and includes the total time taken to complete each forensic examination. The 2016–2017 IMAC data and Forensics Register data were linked to QPRIME data, using the relevant occurrence identifiers referenced in the activity datasets. This enabled identification of the proportion of all occurrences in a given year within each of the action types (ie caution, conference, court or other) that involved CPIU/CIB, forensics and specialist time.

Step 4: Determining relevant police expenditure

The relevant police expenditure was determined by examining the functions associated with police expenditure for regional operations—covering general duties and CPIU/CIB officers—and for specialist operations. Queensland Police Service expenditure for 2015–16 was inflated (1.6%) to reflect 2016–17 dollar values, and then apportioned to various functions based on the number of full-time equivalent (FTE) staff who were employed in various areas. In order to ensure that the expenditure reflected the direct crime management functions of police as much as possible, the proportion of expenditure that was estimated to be directed toward community engagement, district and regional senior management, and road policing was excluded from the regional and specialist operations budgets. The cost base for the police cost estimates related to general duties ($733,269,926), CPIU/CIB investigative functions ($148,144,282), forensics ($70,980,441), specialist area investigative functions ($87,717,661), and other ($470,049,720), which included Policelink, training and development, communications, legal services and the like.

Step 5: Estimating costs for police processes associated with each action type

Expenditure related to general duties functions were then allocated across action types according to how much total general duties time was estimated to be directed towards offending events within each of the action type areas. For CPIU/CIB, a similar process was used: the distribution of total activity time across offending events leading to particular action types was used to allocate expenditure for regional investigative functions across the action types. The same process was used to allocate the expenditure associated with forensics and specialist functions, drawing on forensics and specialist activity data to determine the distribution of their time across action types. The total expenditures allocated from each of these functions were then summed for each action type, and divided by the total number of offending events within each action type grouping to produce a cost per offending event.

Table 3: Police unit cost estimates for caution, conference, court and other events

Police action	Number of events 2016/2017	Mean general duties officer time (hours)	Proportion of time for area				Proportion of budget for area					Total allocated from budgets to action type	Cost per offending event resulting in action type
			General duties (%)	CPIU/CIB (%)	Forensics (%)	Specialist (%)	General duties expenditure time	CPIU/CIB expenditure	Forensics expenditure	Specialist expenditure	Other expenditure		
Caution	10,463	1.80	1.70	9.38	2.56	0.00	$12,439,056	$13,901,366	$1,815,417	$0	$7,973,837	$36,129,676	$3,453
Conference	1,658	1.55	0.23	2.15	0.53	0.00	$1,703,468	$3,180,499	$377,229	$0	$1,091,978	$6,353,174	$3,832
Court	278,745	2.93	86.90	84.17	94.73	100.00	$637,188,035	$124,686,202	$67,241,154	$87,717,661	$408,458,123	$1,325,291,173	$4,754
Other	57,197	2.17	11.17	4.30	2.18	0.00	$81,939,368	$6,376,215	$1,546,641	$0	$52,525,783	$142,388,007	$2,489
Total							**$733,269,926**	**$148,144,282**	**$70,980,441**	**$87,717,661**	**$470,049,720**		

Police unit cost estimates on the basis of most serious offence finalised in court

Police costs for actions that were progressed to court were then estimated for different offence types. Events that resulted in court action were costed based on offence type for two reasons: first, because of the extent to which this practice was used; and second, because there was more variation in the length of time that police spent per offending event that resulted in court (*M*=2.93, *SD*=3.07), than there was for events that resulted in a caution (*M*=1.8, *SD*=2), conference (*M*=1.55, *SD*=2.52) or other action (*M*=2.17, *SD*=2.9).

These costs were estimated by following the six steps outlined below (see also Table 4).

Step 1: Counting the number of offending events

The number of offending events during 2016–2017 that resulted in court were explored using 2016–2017 QPRIME cross-sectional data, based on the most serious offence which was determined using the National Offence Index (*n*=278,745).

Step 2: Disaggregating general duties expenditure based on the distribution of general duties officer time across offence types

The mean general duties officer time (hours) was examined according to the most serious offence per offending event that resulted in court action (using ITAS data for the 16 police stations linked to QPRIME data). Activity time in ITAS that was recorded against multiple offending events was divided evenly according to the number of linked occurrences (to avoid double-counting any activity time related to multiple offending incidents), and also by the number of offenders linked to an occurrence (to avoid double-counting any activity time related to multiple offenders).

The proportion of general duties officer time allocated across the most serious offence types was then calculated by multiplying the number of offending events by the mean general duties officer time for each offence type. The result was divided by the total general duties officer time directed towards all offence categories.

The general duties expenditure allocated to court actions ($637,188,035; Table 3) was then disaggregated based on the proportion of general duties officer time allocated across each most serious offence type. The total general duties expenditure for each offence type was divided by the number of offending events within that offence type to produce an average general duties cost per offending event for each offence type.

Step 3: Disaggregating CPIU/CIB expenditure based on median CPIU/CIB investigation time for each offence type

The median length of time (hours) that CPIU/CIB spent on events that resulted in a court action was assessed based on most serious offence. The median rather than the average was used, as the measures of central tendency indicated that CPIU/CIB activity time was heavily positively skewed across offending events—that is, a small number of offending events accrued a very large volume of investigative hours). To determine median CPUI/CIB hours, the IMAC activity data recorded by CPUI/CIB investigators was linked to QPRIME data (for recorded activities that had QPRIME occurrence reference numbers linked to investigative activities). Based on the associated offending data, a median length of CPUI/CIB time was estimated for each most serious offence type for those offending events in 2016–17 that resulted in court action. In cases where the same activity time in IMAC was associated with multiple occurrences, this activity time was divided evenly across the linked occurrences. Investigative activity time for an occurrence was also divided evenly by the number of offenders linked to the occurrence.

The proportion of CPIU/CIB time that was allocated across the offence types was then estimated by multiplying the median time (hours) by the number of offending events with each offence type that were linked to CPIU/CIB activity data (within those offending events that led to court action). The total estimated CPUI/CIB time allocated to each offence type was then divided by the total CPIU/CIB time directed to all events, to determine the relative proportion of time allocated across offence types.

CPIU/CIB expenditure for court actions ($124,686,202; Table 3) was disaggregated based on the distribution of CPIU/CIB time across offending events according to the most serious offence, with the result then divided by the number of offending events with each offence type to produce an average cost of CPIU/CIB expenditure for each offence type (for offending events that proceeded to court).

Step 4: Disaggregating forensics expenditure based on median forensics testing time for each offence type

Data were obtained from the Forensics Register, which records information about all forensic examinations that are undertaken as part of Queensland Police Service investigations. From this data, the total length of time directed towards forensic examinations was linked to QPRIME offending data using the occurrence reference identifier to determine the median length of time that was spent on forensics testing based on most serious offence per offending event for occurrences in 2016–17.

The proportion of forensics time allocated to each offence type (based on the most serious offence within the offending event) was assessed based on the relative length of forensics time allocated across each most serious offence category. Forensics expenditure for court actions ($67,241,154; Table 3) was distributed across offence types based on the proportion of time that forensics devoted to offending events within each most serious offence type.

Expenditure was apportioned based on the relative length of forensics time allocated to each offence category and then divided by the number of offending events within each offence category in 2016–2017, to produce an average forensics cost per most serious offence per event.

Step 5: Allocating specialist expenditure according to offence type

For offending events that proceeded to court, a slightly different approach was used to apportion specialist costs to different offence types. Specialist expenditure for court actions ($87,717,661; Table 3) was disaggregated based on specific functions (measured by FTE associated with different functions) within specialist areas. These expenditures were then applied to specific offence categories that were most relevant to those specialist functions. Seven specialist areas were considered:

- Intelligence and covert services were estimated to comprise 34.7 percent of specialist expenditure. These were determined to be relevant to all offences and expenditure was thus allocated evenly across all offending event types, leading to an average of $109 applied to each offence.
- Counterterrorism resources were estimated to comprise 7.67 percent of specialist expenditure (based on relative FTE). This total expenditure was divided by the total number of offending events with the most serious offence charges recorded as offences against justice procedures, government security and government operations. This resulted in an average of $112 in specialist costs being applied to each of these offending events.
- Special Emergency Response Team responses were estimated to comprise 9.16 percent of specialist expenditure. This expenditure was split in half and allocated both to drug offences, leading to an additional $109 cost per this type of offending event, and to acts intended to cause injury, leading to an additional $326 per this type of offending event.
- Child Safety and Sexual Crime Group were estimated to constitute 10.84 percent of specialist expenditure. When the expenditure was divided by the total number of offending events with sexual assault and related offences as the most serious offence, this led to $5,404 being applied to each sexual assault and related offence.
- Drug and Serious Crime Group were estimated to comprise 16.73 percent of specialist expenditure. Taking into account the number of drug-offence offending events, a cost of $398 was applied to each drug offence.
- Fraud and Cyber Crime Group constituted 11.48 percent of specialist expenditure. After distributing this across all offending events with fraud offences as the most serious offence, this led to a cost of $908 being applied to each fraud offence.
- Homicide Group were estimated to comprise 9.42 percent of specialist expenditure. When distributed across all offending events where the most serious offence was homicide or a related offence, this led to an additional cost of $67,712 being applied to each homicide or related offence.

Step 6: Estimating the cost of offending events for different 'most serious offence' types

The cost per offending event for each offence type was calculated by summing the relevant cost of general duties expenditure per offending event, the cost of CPIU/CIB expenditure per offending event, the cost of forensics expenditure per offending event and the cost of specialist expenditure per offending event.

Table 4: Calculation of police unit cost estimates for police activity leading to court by offence type (2016–17 dollars)

Most serious offence	Number of offending events	Disaggregating general duties expenditure based on general duty officer time				Disaggregating CPIU/CIB expenditure based on median CPIU/CIB investigative time				
		Mean general duties officer time (hours)	Percent of general duties officer time allocated across MSO (%)	Proportion of general duties expenditure for court actions	Cost of general duties expenditure per offending event based on general duty officer time	Median CPIU/CIB time (hours)	Number of offending events CPIU/CIB court action	Proportion of CPIU/CIB time across MSO (%)	Proportion of CPIU/CIB expenditure for court actions	Cost of CPIU/CIB expenditure for court actions per offending event
Homicide and related offences	122	5.30	0.08	$529,680	$4,342	25.50	64	2.47	$3,078,181	$25,231
Acts intended to cause injury	12,322	3.83	6.07	$38,675,494	$3,139	8.00	1,467	17.75	$22,135,743	$1,796
Sexual assault and related offences	1,759	3.48	0.79	$5,019,037	$2,853	16.50	501	12.50	$15,591,779	$8,864
Dangerous or negligent acts endangering persons	3,384	4.12	1.79	$11,430,383	$3,378	6.00	192	1.74	$2,172,834	$642
Abduction, harassment and other offences against the person	398	2.09	0.11	$680,670	$1,710	12.25	75	1.39	$1,732,891	$4,354
Robbery, extortion and related offences	1,254	3.16	0.51	$3,247,499	$2,590	11.50	536	9.32	$11,626,169	$9,271
Unlawful entry with intent/ burglary, break and enter	11,422	1.91	2.80	$17,858,914	$1,564	3.85	2,596	15.14	$18,871,620	$1,652
Theft and related offences	43,494	2.11	11.78	$75,070,821	$1,726	3.00	3,598	16.33	$20,358,999	$468

Fraud, deception and related offences	11,088	1.88	2.68	$17,091,056	$1,541	3.00	650	2.95	$3,677,974	$332
Illicit drug offences	36,848	2.92	13.87	$88,358,422	$2,398	3.92	1,956	11.59	$14,449,721	$392
Prohibited and regulated weapons and explosives offences	2,257	2.28	0.66	$4,210,499	$1,866	5.08	250	1.92	$2,396,970	$1,062
Property damage and environmental pollution	8,050	2.77	2.87	$18,287,176	$2,272	3.30	374	1.87	$2,327,874	$289
Public order offences	20,569	2.70	7.14	$45,478,448	$2,211	2.00	361	1.09	$1,361,793	$66
Traffic and vehicle regulatory offences	54,030	2.95	20.53	$130,811,042	$2,421	2.25	166	0.56	$704,473	$13
Offences against justice procedures, government security and government operations	60,183	3.66	28.30	$180,349,093	$2,997	2.71	808	3.31	$4,127,504	$69
Miscellaneous offences	106	1.03	0.01	$89,800	$847	3.17	12	0.06	$71,673	$676

Calculation of police unit cost estimates for police activity leading to court by offence type (Table 4 continued) (2016–17 dollars)

Most serious offence	Number of offending events	Disaggregating Forensics expenditure based on median forensic testing time				Specialist expenditure		
		Median forensic hours	Number of offending events Forensic court action	Percent of forensic time across MSO (%)	Proportion of forensic expenditure for court actions	Cost of forensic expenditure for court actions per offending event ($)	Cost of specialist expenditure per offending event	Cost per offending event
Homicide and related offences	122	365.00	69	7.42	$4,989,393	$40,897	$67,822	$138,291
Acts intended to cause injury	12,322	20.00	1,213	7.15	$4,806,141	$390	$435	$5,761
Sexual assault and related offences	1,759	70.00	372	7.67	$5,158,776	$2,933	$5,513	$20,163
Dangerous or negligent acts endangering persons	3,384	30.00	199	1.76	$1,182,715	$350	$109	$4,479
Abduction, harassment and other offences against the person	398	121.25	55	1.96	$1,321,144	$3,319	$109	$9,493
Robbery, extortion and related offences	1,254	30.00	278	2.46	$1,652,235	$1,318	$109	$13,288
Unlawful entry with intent/burglary, break and enter	11,422	30.00	1,871	16.54	$11,119,897	$974	$109	$4,299
Theft and related offences	43,494	25.00	2,344	17.27	$11,609,228	$267	$109	$2,570
Fraud, deception and related offences	11,088	30.00	217	1.92	$1,289,694	$116	$1,018	$3,007
Illicit drug offences	36,848	25.33	3,465	25.86	$17,390,069	$472	$617	$3,879
Prohibited and regulated weapons and explosives offences	2,257	32.92	498	4.83	$3,247,513	$1,439	$109	$4,476
Property damage and environmental pollution	8,050	20.00	418	2.46	$1,656,197	$206	$109	$2,876
Public order offences	20,569	15.00	94	0.42	$279,335	$14	$109	$2,400
Traffic and vehicle regulatory offences	54,030	28.75	106	0.90	$603,739	$11	$109	$2,555
Offences against justice procedures, government security and government operations	60,183	20.00	236	1.39	$935,078	$16	$221	$3,302
Miscellaneous offences	106	0	0	0	$0	$0	$109	$1,633

Court unit cost estimates

Court unit costs for finalised offences were estimated based on principal offence type, taking into account the proportion of cases that resulted in a trial and the number of other court events related to that offence (eg application, call over, mention, committal, hearing, sentence or review). Court costs were sourced from the Queensland Department of Justice and Attorney-General (DJAG). Unfortunately, additional court costs such as legal aid services and police prosecution services could not be included. There were seven steps taken to estimate the costs. These steps are outlined below and detailed in Table 5.

Step 1: Calculating the total time for trials (hours):

- number of trial events—the number of trial events was assessed based on data provided by DJAG and includes the number of jury trials and judge-only trials.
- mean length of time for trials (hours)—the mean length of time for trials was drawn from estimates provided by DJAG. The DJAG data provided the average number of days that trials lasted and these were multiplied by the number of work hours available in a day (7.25) hours. As no data were available for public order offences, traffic offences or miscellaneous offences, these were estimated as 7.25 hours (the *minimum* length of time taken for any other trial).
- total time for trials (hours)—the length of time dedicated to trials based on principal offence type during 2016–2017 was assessed by multiplying the number of trial events by the mean length of time for trials.

Step 2: Estimating the number of other court events (excluding trials) related to finalised offences

- The number of other court events—excluding trials that were finalised with an adjudicated outcome—was estimated for each principal offence type. This involved taking the number of court events (eg application, call over, mention, committal, hearing, sentence or review) relating to lodgements during 2016–2017 and multiplying this number by the proportion that were estimated to be finalised. The proportion estimated to be finalised was assessed as the number of defendants finalised (ABS 2018) divided by the number of lodgements according to DJAG data for 2016–2017.

Step 3: Estimating total time allocated to other court events (excluding trials):

- The time available for other court events was calculated by subtracting the total time taken for trials (66,152 hours) from the total judicial time that was available (208,800 hours or 116 FTE; Productivity Commission 2018).
- The average time available per other court event was assessed by dividing the time available for other court events (142,648 hours) by the total estimated number of court events related to finalised offences (816,529).
- The length of time dedicated to other court events was calculated by multiplying the estimated number of court events (excluding trials) by the average time available per court event (0.175 hours) for each principal offence.

Step 4: Estimating the total court time for each offence type (hours)

The length of court time for each offence category was calculated by adding the total time for trials (hours) and the total time for other court events (hours).

Step 5: Estimating court costs per offence category

The cost of each offence category was estimated by multiplying the total court time (hours) for each finalisation, according to the principal offence, by the cost per hour. The cost per hour was estimated using the total direct costs of running the children's, magistrates, district and supreme courts during 2016–2017 ($115,440,826; DJAG data) divided by the number of judicial hours that were available (208,800), equalling $552.88. The total direct costs of court operations included judicial salaries, registry costs, and recording and transcription costs but excluded the cost of central agency policy support.

Step 6: Counting the number of events finalised in 2016/2017

The number of finalised court cases during 2016–2017 was determined from ABS data (ABS 2018).

Step 7: Estimating the cost per principal offence finalised

The cost per principal offence finalised was assessed by dividing the cost per offence category (according to the most serious charge in each finalised offence) by the number of matters within each offence category that were finalised during 2016–2017.

Table 5: Calculation of court unit cost estimates for principal offences finalised in court (2016–17 dollars)									
Principal offence	Number of trial events	Mean length of time for trials (hours)	Total time for trials (hours)	Estimated number of court events (excluding trials) related to finalised offences	Total time for court events, excluding trials (hours)	Total time for trials and other court events (hours)	Cost per offence category ($)	Number of events finalised 2016/2017	Cost per principal offence finalised ($)
Homicide and related offences	64	47.3	3,029.92	1,448	314.97	3,344.89	1,849,317	94	19,674
Acts intended to cause injury	321	20.4	6,539.57	59,907	13,031.79	19,571.36	10,820,567	9,289	1,165
Sexual assault and related offences	537	24.1	12,964.52	15,856	3,449.14	16,413.66	9,074,743	1,387	6,543
Dangerous or negligent acts endangering persons	33	17.5	578.99	29,209	6,353.98	6,932.97	3,833,082	7,551	508
Abduction, harassment and other offences against the person	36	14.9	535.05	7,706	1,676.22	2,211.27	1,222,563	589	2,076
Robbery, extortion and related offences	91	16	1,451.45	8,702	1,892.89	3,344.34	1,849,008	612	3,021
Unlawful entry with intent/burglary, break and enter	80	17.3	1,380.40	32,085	6,979.64	8,360.04	4,622,080	4,278	1,080
Theft and related offences	60	15.5	930.9	113,897	24,776.33	25,707.23	14,212,951	17,316	821
Fraud, deception and related offences	42	33.9	1,422.02	28,478	6,194.92	7,616.93	4,211,231	3,634	1,159
Illicit drug offences	61	16.3	995.06	140,482	30,559.59	31,554.66	17,445,860	22,496	776
Prohibited and regulated weapons and explosives offences	7	7.3	50.75	29,723	6,465.78	6,516.53	3,602,843	4,734	761
Property damage and environmental pollution	36	12.3	443.7	31,484	6,848.84	7,292.54	4,031,883	4,111	981
Public order offences	12	7.3	87	58,103	12,639.27	12,726.27	7,036,071	12,656	556
Traffic and vehicle regulatory offences	0	7.3	–	156,570	34,059.22	34,059.22	18,830,580	52,647	358
Offences against justice procedures, government security and government operations	24	29	696	91,422	19,887.24	20,583.24	11,380,013	18,857	603
Miscellaneous offences	10	7.3	72.5	11,457	2,492.32	2,564.82	1,418,033	2,015	704

Youth justice unit cost estimates

Unit cost estimates were produced for the main types of youth community-based orders, for youth justice conferences and for youth detention. Data on 2016–2017 youth justice expenditure from the *Report on government services* (Productivity Commission 2018) was disaggregated based on activity and outputs categories derived from data provided by the Queensland Department of Communities, Child Safety and Disability Services (DCCSDS). The approaches used to produce the estimates are detailed below.

Youth community-based orders

Youth community-based orders were grouped according to their relative resource-intensiveness based on assessment of contemporary policy documents. The order types were:

- community service orders and graffiti removal orders;
- probation orders and supervised release orders; and
- conditional release orders and conditional bail programs.

Unit costs were estimated by following three steps:

Step 1: Estimating the relative resource-intensiveness of orders based on four interviews with youth justice service area managers or supervisors

Youth justice informants were asked about time allocated across each of the three order types to:

- intake and assessment;
- ongoing contacts during intervention and maintenance periods;
- time taken to deal with order breaches; and
- time allocated to closing or finalising orders.

Estimates related to the length of time the informant devoted to an activity and did not include time spent by others. For example, police also devote time to order breaches. The average cost of this time is recorded under police unit cost estimates described as 'offences against justice procedures, government security and government operations' (Table 4; Table 5).

Estimates of total time allocated across the order types were then calculated for a 12-month period. These calculations took into account the fixed and variable costs incurred over a typical 12-month period for each order type, including estimates of the fraction of orders that would result in serious breaches.

To calculate a resource-intensiveness weighting for each order type, the average 12-month cost for the order type was divided by the sum of the average costs for the three different types of orders. The relative weightings for resource intensiveness were:

- 0.05 for community service orders and graffiti removal orders;
- 0.12 for probation orders and supervised release orders; and
- 0.83 for conditional release orders and conditional bail programs.

The 0.05 weighting was based on an estimated average cost of $2,608.83 for 12 months (including a fixed cost for intake of $54.01 and monthly costs for supervision of $142.6, breaches $3.55, staff supervision $59.56 and travel time $7.19). The 0.12 weighting was based on an estimated average cost of $6,121.72 for 12 months (including a fixed cost for pre-sentence reports, intake and assessment of $1,008.79 plus monthly costs for supervision of $319.79, breaches $3.55, staff supervision $94.3 and travel time $8.43). The 0.83 weighting was based on an estimated average cost of $44,168.41 for 12 months (including a fixed cost for pre-sentence report of $586.49 plus monthly costs for supervision of $3,146.99, breaches $3.55, staff supervision $474.1 and travel time $7.19).

Step 2: Applying the relative resource-intensiveness weightings to the volume of orders and their relative length

The relative resource-intensiveness weightings were applied to the annual number of young people on each order type and to the average length of the orders (based on data obtained from DCCSDS) to allocate total expenditure on youth justice orders ($74,804,694; Productivity Commission 2018) across the three order types. Taking into account the volume and length of orders and their relative resource-intensiveness, the estimated total resource split across the order types was:

- 0.05 for community service orders and graffiti removal orders ($3,785,269);
- 0.63 for probation orders and supervised release orders ($47,378,874); and
- 0.32 for conditional release orders and conditional bail programs ($23,640,551).

The resource split for community service orders and graffiti orders was calculated as 0.05 resource intensiveness × 115.83 (average duration of orders) × 466 (average daily number of young people on orders). The resource split for probation orders and supervised release was calculated as 0.12 resource intensiveness × 275 (average duration of orders) × 1,047 (average daily number of young people on orders). The resource split for conditional release orders and conditional bail program was calculated as 0.83 resource intensiveness × 111.24 (average duration of orders) × 179 (average daily number of young people on orders).

Step 3: Dividing the relevant expenditure by the estimated total days for each order type in 2016–17

Allocated expenditure for each order type was divided by the estimated annual number of young person-days spent on that order type to obtain a cost per day. The average costs per day calculated were:

- $22 for community service orders and graffiti removal orders ($3,785,269÷170,090=);
- $124 for probation orders and supervised release orders ($47,378,874÷382,155); and
- $362 for conditional release orders and conditional bail programs ($23,640,551÷65,335).

Youth justice conferences

The cost of a youth justice conference during 2016–2017 was assessed using the total recurrent expenditure for this purpose outlined in the Report on government services (Productivity Commission 2018) ($13,563,100). This total expenditure was divided by the total number of conferences that were held (*n*=1,196; DCCSDS data), equalling $11,340 per conference.

Youth detention

The cost of youth detention was assessed for the Brisbane Youth Detention Centre during 2016–2017. Total expenditure ($58,153,386; DCCSDS data) was divided by the total number of bed days that were provided (*n*=38,829; DCCSDS data) to produce a cost of $1,498 per day.

Adult corrections unit cost estimates

Unit cost estimates were produced for the main types of adult community-based orders and adult incarceration as a cost per day. These estimates were based on information and data relating to 2016–2017 that were provided by Queensland Corrective Services. The methods used are outlined below.

Adult community-based orders

The main types of adult community-based orders were grouped based on their resource-intensiveness discerned from contemporary policy documents. The three order types were:

- community service orders;
- probation orders and parole orders; and
- intensive corrections orders.

Unit costs were then estimated by following three steps.

Step 1: Estimating the relative length of time dedicated to orders

Community corrections case managers from different area offices were interviewed and asked about the time they dedicated to the following activities across each of the order types:

- intake and assessment of clients;
- ongoing contact with clients, and other services on behalf of clients, in the intervention and maintenance phase;
- time taken dealing with serious breaches of orders; and
- time taken to close files.

The variation in time allocated to clients with different risk profiles was also examined through the interviews, as was as the distribution of different levels of risk across the different order types. Taking into account the fixed and variable time allocated to different orders over a typical 12-month period across the different order types—and accounting for risk distribution within probation and parole orders—an average cost for each order was estimated.

Resource-intensiveness weightings were calculated by dividing the average 12-month cost for the relevant order type by the sum of the average costs for the three different order types. The relative weighting for resource intensiveness were:

- 0.14 for community service orders;
- 0.25 for probation orders and parole orders; and
- 0.61 for intensive corrections orders.

The 0.14 weighting was based on an estimated $584.34 average cost for 12 months (including an estimated fixed cost for induction and closing file as $82.14, and monthly costs for supervision/intervention of $28.07, court/travel time $7.86 and breach time $5.92). The 0.25 weighting was based on an estimated $1,062.12 average cost for 12 months (including estimated fixed costs for induction, assessment and closing file, and monthly costs for supervision/intervention, supervisor time, district manager time, court/travel time and breach time). These estimates were calculated taking into account the different lengths of time spent on activities and subsequent costs based on the risk levels of offenders (low, standard, enhanced and intensive). The 0.61 weighting was based on an estimated $2,563.24 average cost for 12 months (including estimated fixed costs for induction, assessment and closing file of $285.58, and monthly costs for supervision/intervention of $129.98, supervisor time $23.52, district manager time $23.63, court/travel time $7.23 and breach time $5.44).

Step 2: Splitting relevant expenditure according to relative resource-intensiveness

Adult community corrections expenditure ($63,942,231) was allocated to each order type by applying the relative resource-intensiveness weighting to the total number of days offenders were on orders of that type during 2016–17. (Resource allocation to community service orders equalled 0.14×1,029,303, to probation and parole equalled 0.25×6,337,321, and for intensive corrections orders equalled 0.61×68,354.) The resource split was:

- 0.08 for community service orders ($5,122,632.41);
- 0.90 for probation and parole ($57,327,370.06); and
- 0.02 for intensive corrections orders ($1,492,228.68).

Step 3: Dividing the expenditure allocated to order types by total order days

To obtain a cost per day, the allocated expenditure for each order type was divided by the estimated annual number of days offenders were on orders of that type during 2016–2017. The average costs per day were:

- $5 for community service orders ($5,122,632.41÷1,029,303);
- $9 for probation and parole orders ($57,327,370.06÷6,337,321); and
- $22 for intensive corrections orders ($1,492,228.68÷68,354).

Adult incarceration

The cost of adult incarceration in 2016–2017 was assessed by dividing the total cost of prison incarceration in Queensland ($532,650,171; Queensland Corrective Services data) by the estimated number of days of incarceration that were provided (based on the daily average number of prisoners; 8,034×365=2,932,410; Queensland Corrective Services data). This produced an estimate of $182 per prisoner per day.

Phase four: Applying costs to the patterns of offending and modelling future costs

The third aim of the project was to apply the direct criminal justice system cost estimates to the offender trajectories in the identified Indigenous and non-Indigenous cohorts and estimate total and average criminal justice system costs for each trajectory group. For the purposes of the economic modelling, the offending patterns and contacts that individuals in the 1983–1984 registered birth cohort had with police, courts, youth justice and adult corrections were used to model future costs. In the police system, costs were modelled on the basis of the most serious offence in each offending event. In the court system, costs were modelled based on the most serious charge in each court finalisation. In the youth justice and corrections systems, costs were modelled based on the types of sanctions (either community-based orders or detention/incarceration) that were applied and the length of those sanctions.

The registered birth cohort data that formed the basis for this study cover the years from 1993 through to 2014, from age 10 through to age 31. Once a base year for estimating cost is determined, differences in dollar values for costs occurring in different years can be accounted for when estimating costs that occur over time, with inflation used to increase historical costs to the dollar value of the base year. Discounting is used to account for the diminishing value of base-year dollar values in future years (Australian Government 2007). In cost–benefit analyses, future costs and benefits are estimated as this allows current policy decisions to be made on the basis of potential future costs incurred or avoided for relevant target populations.

To ensure that the costs in the study would be relevant and useful to contemporary policy decision-making, the patterns of contacts with the criminal justice system that occurred for the 1983–1984 birth cohort were projected as future criminal justice system contacts for a cohort that was aged 10 in 2016–17. This projection used an approach that is similar to incidence-based costing, an approach that has been used to estimate the lifetime costs of risk factors or health conditions in health economics analyses (Larg & Moss 2011). This approach naturally assumes that criminal justice system processes and practices have remained fairly constant over the past two decades and will remain relatively stable into the future. Thus, where there have been major changes in policy over this period the costs estimates may have less applicability.

The base year for the cost modelling is 2016–17, and hence all costs are reported in 2016–17 dollars, with costs projected into the future discounted at seven percent annually, consistent with guidelines from the Australian Government Department of Finance (Australian Government 2007).

Assuming individuals were aged 10 in 2016–2017, costs were applied based on how old individuals would be when police action is taken (caution or conference) or when the earliest court date takes place (date formed for youth and date finalised for adults). The type and length of any youth justice sanctions (community service hours, probation days, conditional program days or youth detention days) or adult sanctions (community service hours, probation and parole days, intensive corrections order days or incarceration days) were applied based on the age the individual would be when the order or detention commences. The discounted future costs were then summed to estimate the net present value of future costs for each offending trajectory group. Cost estimates were calculated for each individual in the cohort and used to assess the total cost of each identified Indigenous and non-Indigenous trajectory group, and the average cost of individuals within each identified Indigenous and non-Indigenous trajectory group.

Results

In this section, the results of the project are presented in three subsections to address the three aims of the project. First, the nature of the offending trajectories for the identified Indigenous and non-Indigenous cohorts will be reported. Second, the cost estimates that were produced for the main events and types of sanctions in Queensland will be highlighted, based on critical cost drivers including whether an individual was diverted, the offence type, whether there was a trial, and the type of supervised sanction if any. Third, the total cost and average individual cost in each of the offending trajectories for the Indigenous and non-Indigenous cohorts will be examined. These costs are based on modelling the offence histories into the future and estimating the net present value of future costs.

Indigenous and non-Indigenous offending trajectory groups

The first aim of the project sought to explore whether there were differences in the nature of offending trajectories over time based on classified Indigenous status in the 1983–1984 registered birth cohort. This aim was addressed by exploring the number of trajectory groups for the identified Indigenous and non-Indigenous cohorts in the registered birth cohort, the average age of offending onset, whether there were differences based on the proportion of total cohort offending that was accounted for by individuals in the groups, and the gender composition of the groups. As described in the *Method* section, models with two to five trajectories were created for the identified Indigenous and non-Indigenous cohorts, as these are the numbers of offending trajectory classes most commonly found in the literature, with linear and quadratic terms enabled for each model run.

The goodness of fit parameters for the two to five class solutions for the growth trajectories in both the identified Indigenous and non-Indigenous cohorts can be seen Table 6. The best solution was considered the model that had relatively low log-likelihood, Akaike information criterion (AIC) and Bayesian information criterion (BIC) values, and where the Vuong-Lo-Mendell-Rubin (VLMR) likelihood ratio test and the parametric bootstrap likelihood ratio test (BLRT) p values indicated significantly improved fit from the model with K–1 classes, where K refers to the number of classes specified in the model. High entropy values and high average class probabilities for most likely class membership, where values approaching 1 indicated low classification error (Nagin 1999; Piquero, 2008) were also considered in selecting the best class solution for the growth trajectories. Lastly, the final model was selected consistent with the principle of parsimony, which requires that the model with the least number of groups should be selected unless the inclusion of additional groups significantly enhances the explanatory power of the model (Fergusson et al. 2000).

Table 6: Goodness of fit parameters for trajectory growth models from two to five classes				
Latent class growth models for Indigenous cohort				
Number of classes	2	3	4	5
Parameters	10	14	18	22
Log-likelihood	–47,756.0	–45,122.4	–43,911.6	–43,205.5
AIC	95,531.98	90,272.73	87,859.21	86,454.94
BIC	95,589.36	90,353.07	87,962.51	86,581.19
VLMR	–55,497.3***	–47,756***	–45,122.4**	–43,911.6
BLRT	–55,497.3***	–47,756***	–45,122.4***	–43,911.6***
Entropy	0.819	0.934	0.905	0.9
Average class probabilities for most likely class membership	0.979, 0.943	0.976, 0.983, 0.961	0.960, 0.942, 0.926, 0.968	0.905, 0.959, 0.916, 0.921, 0.959
Latent class growth models for non-Indigenous cohort				
Number of classes	2	3	4	5
Parameters	10	14	18	22
Log-likelihood	–278,667	–252,628	–248,911	–246,223
AIC	557,354.3	505,283.5	497,857.5	492,489.7
BIC	557,447.3	505,413.7	498,024.9	492,694.3
VLMR	–310,088	–272,050***	–252,628	–248,948*
BLRT	–310,088***	–272,050***	–252,628***	–248,948***
Entropy	0.685	0.902	0.891	0.874
Average class probabilities for most likely class membership	0.949, 0.936	0.945, 0.910, 0.978	0.938, 0.855, 0.868, 0.972	0.958, 0.912, 0.833, 0.882, 0.825

***statistically significant at $p<0.001$, **statistically significant at $p<0.01$, * statistically significant at $p<0.05$
Note: AIC=Akaike information criterion, BIC=Bayesian information criterion, BLRT=bootstrap likelihood ratio test, VLMR=Vuong-Lo-Mendell-Rubin likelihood ratio test

It was determined that for both the non-Indigenous and Indigenous cohorts, the optimum model was the three-class solution. This was indicated by a range of goodness of fit parameters, including relative AIC and BIC values, the BLRT, the VLMR test, and entropy and classification error. Examination of the composition of the four- and five-group models for those identified as non-Indigenous Australians indicated that these models did not aid interpretation because two groups in the four-group model comprised less than three percent of the population, while two groups in the five-group model comprised less than one percent of the population, indicating evidence of class collapsing (Masyn 2013). Consequently, the model with the smallest number of groups was selected as it had greater interpretability (Fergusson et al. 2000). In addition, the quadratic form of the trajectory was found to have significantly greater explanatory power than the linear form for all classes in each cohort, and thus the results presented reflect the quadratic solution.

The three offender trajectories produced by the models for the identified Indigenous and non-Indigenous cohorts are presented in Figure 1, which displays the estimated marginal mean offence numbers of each trajectory group from age 10 to 31 years.

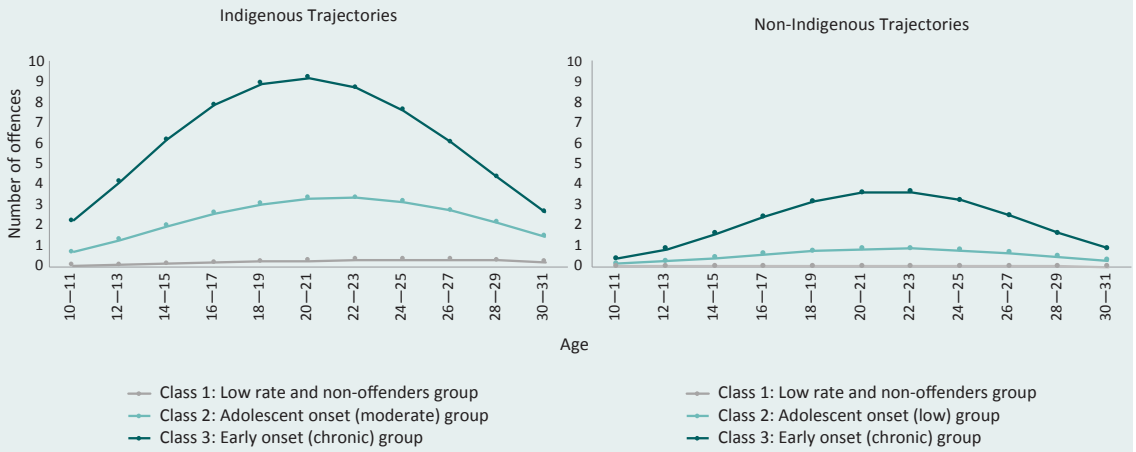
For the Indigenous model:

- Individuals in group 1 had either low levels of offending or no offending between the ages of 10 and 31. Nearly one-half of the identified Indigenous cohort were in group 1 (46.6%), with each individual averaging 2.26 offences (*SD*=2.68) when aged 10 to 31. Given the offending pattern over time, group 1 is labelled 'low rate and non-offenders'.
- Group 2 had adolescent onset offending (*M*=15.05 years old, *SD*=3.32) which continued into adulthood and peaked between the ages of 20 and 25. Just over one-third (38.3%) of the identified Indigenous cohort who were born in 1983–1984 were in group 2, which averaged 25.16 offences (*SD*=16.13) between the ages of 10 and 31. This group is labelled 'adolescent onset (moderate)'.
- Group 3 had early onset (*M*=13.2 years, *SD*=2.84) and high levels of offending (*M*=107.77 offences when aged 10 to 31, *SD*=62.4), with offending peaking when individuals were aged 20 or 21 years old. This group included 15.1 percent of the identified Indigenous cohort and is labelled 'early onset (chronic)'.

For the non-Indigenous model:

- Over four-fifths (83.8%) of individuals identified as non-Indigenous were in group 1, who had either low levels of offending or no offending when aged 10 to 31 (*M*=0.13 offences when aged 10 to 31, *SD*=0.38). Group 1 is therefore labelled 'low rate and non-offenders'.
- Group 2 had adolescent onset of offending (*M*=18.26 years old, *SD*=4.5) which continued into adulthood and peaked at ages 20 to 23. Just over one-tenth (13.6%) of the identified non-Indigenous cohort were in group 2, averaging 6.08 offences when aged 10 to 31 (*SD*=5.43). Therefore, group 2 is labelled 'adolescent onset (low)'.
- Group 3 had early onset (*M*=16.22 years old, *SD*=4.18) and high levels of offending (*M*=46.01 offences when aged 10 to 31, *SD*=56.47), with offending peaking when aged 20 to 23 years old. This group included 2.6 percent of the identified non-Indigenous cohort and is labelled 'early onset (chronic)'.

Figure 1: Estimated marginal means for three-group trajectory models for Indigenous and non-Indigenous cohorts



The number of offences committed by members of each cohort for each trajectory group are presented in Table 7. Those identified as part of the Indigenous cohort were less likely to be members of the low rate and non-offenders group than those identified as part of the non-Indigenous cohort (46.6% vs 83.8%), but the combined offending of these groups accounted for less than five percent of total offences. Individuals in the adolescent onset groups accounted for 14.3 percent of the population, but 38.1 percent of offences. Members of the early onset (chronic) groups represented only 2.9 percent of individuals in the birth cohort but accounted for 57.2 percent of offences. Those identified as members of the Indigenous cohort who were in the early onset (chronic) group represented a very small proportion of the population (0.4%) but accounted for 16 percent of all offences.

Table 7: Number of individuals and offences committed by members of each trajectory group

Trajectory group		Individuals			Offences		
		N	% of Indigenous or non-Indigenous	% of total population	N	% of Indigenous or non-Indigenous offences	% of total offences
Indigenous cohort	Low rate and non-offenders	1,070	46.6	1.3	2,417	3.9	1.0
	Adolescent onset (moderate)	878	38.3	1.1	22,093	35.7	9.4
	Early onset (chronic)	347	15.1	0.4	37,397	60.4	16.0
	Total	**2,295**	**100**	**2.8**	**61,907**	**100**	**26.5**
Non-Indigenous cohort	Low rate and non-offenders	67,954	83.8	81.5	8,690	5.1	3.7
	Adolescent onset (low)	11,029	13.6	13.2	67,066	39.0	28.7
	Early onset (low)	2,093	2.6	2.5	96,307	56.0	41.2
	Total	**81,076**	**100**	**97.2**	**172,063**	**100**	**73.5**

The gender compositions of the identified Indigenous and non-Indigenous cohort offender trajectories are presented in Table 8. Females were more likely to be in the low rate and non-offenders groups than males. Two-thirds (64.7%) of the identified Indigenous female cohort and nine-tenths (92.4%) of the identified non-Indigenous female cohort were low rate and non-offenders, compared with one-third (31.5%) of the identified Indigenous male cohort and three-quarters (75.7%) of the identified non-Indigenous male cohort. Conversely, males were more likely to be in the adolescent onset and early onset (chronic) offending groups.

Nearly one-half (46.6%) of the identified Indigenous male cohort and one-fifth (20.4%) of the identified non-Indigenous male cohort were in the adolescent onset groups, compared with one-quarter (28.3%) of the identified Indigenous female cohort and 6.4 percent of the identified non-Indigenous female cohort. One-fifth (21.9%) of the identified Indigenous male cohort and 3.9 percent of the identified non-Indigenous male cohort were in the early onset (chronic) groups, compared with seven percent of the identified Indigenous female cohort and 1.2 percent of the identified non-Indigenous female cohort.

Table 8: Gender composition of Indigenous and non-Indigenous offender trajectory groups

	Trajectory group	Female	% of females in Indigenous or non-Indigenous cohort	Male	% of males in Indigenous or non-Indigenous cohort	N[a]
Indigenous	1. Low rate and non-offenders	675	64.7	395	31.5	1,070
	2. Adolescent onset (moderate)	295	28.3	583	46.6	878
	3. Early onset (chronic)	73	7.0	274	21.9	347
	Total	**1,043**	**100**	**1,252**	**100**	**2,295**
Non-Indigenous	1. Low rate and non-offenders	36,381	92.4	31,566	75.7	67,954
	2. Adolescent onset (low)	2,530	6.4	8,497	20.4	11,029
	3. Early onset (low)	462	1.2	1,631	3.9	2,093
	Total	**39,373**	**100**	**41,694**	**100**	**81,076**

a: Nine individuals had a missing gender (7 non-Indigenous individuals in the adolescent onset (low) group, and 2 non-Indigenous individuals in the early onset (chronic) group)

Cost estimates for main offending events and sanctions in Queensland

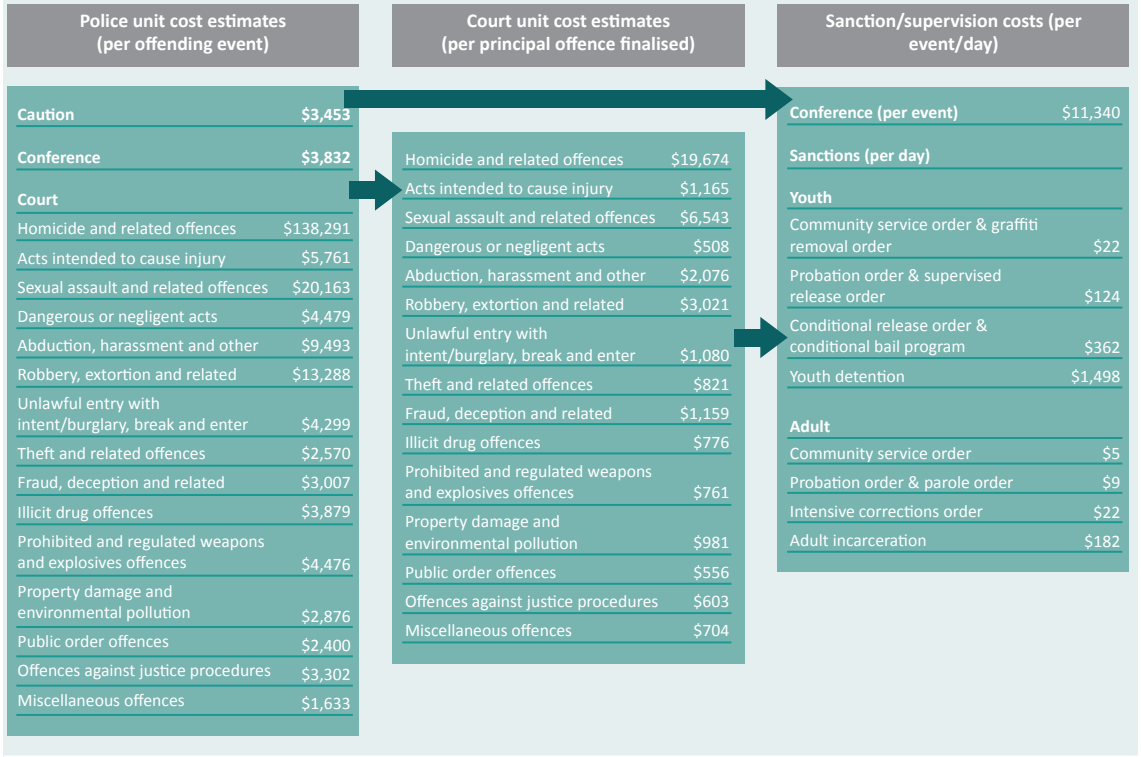
The second aim of the project sought to assess the direct costs of criminal justice system practices based on critical cost drivers, including whether an individual was diverted, the offence type, whether there was a trial, and the type of supervised sanction, if any. Costs were estimated using the steps outlined above under *Developing unit cost estimates* and are reported below in Figure 2.

For offending events that resulted in police diversion, the cost of a caution was slightly less than the cost of a youth justice conference (though it should be noted that this only reflects the police time allocated to the youth justice conference). There was considerable variability in the cost of offences that police progressed to court. Traffic and vehicle regulatory offences expenses were excluded as they were not assessed as offending by those in the 1983/1984 cohort.

The highest-cost offences included homicide ($138,291), sexual assault and related offences ($20,163) and robbery, extortion and related offences ($13,288). These offence types were more costly as they involved considerably more CPIU/CIB investigative time. The high cost of specialist services and forensic testing also contributed to the cost of homicide offences. Similarly, the highest-cost principal offences finalised in court were homicide and related offences ($19,674) and sexual assault and related offences ($6,543). These offences were more expensive because they had higher proportions of cases going to trial, with relatively longer trial lengths.

Youth community-based orders were more expensive than adult corrections orders, with youth community service orders costing over four times as much as adult community service orders. Youth probation was estimated as costing over 12 times as much as adult probation, which is likely to reflect at least in part the different service models applied in the youth and adult community corrections contexts. Conditional release orders and the conditional bail program were the most expensive youth community-based order types ($362/day), while intensive corrections orders were the most costly adult community-based orders ($22/day), reflecting the cost associated with the additional supervision and/or program time that these orders required. Youth justice conferences were assessed as costing $11,340 per conference held, which reflects the full cost of holding a conference (note however that the cost of police time is covered in the cost of police processes ending in conference actions). Youth detention was assessed as costing over eight times as much as adult incarceration

Figure 2: Unit cost estimates for police actions, court finalisations and youth and adult sanctions (2016–17 dollars)



Costs of Indigenous and non-Indigenous offending trajectories

The third aim of the project was to apply the costs to the offender trajectories of the identified Indigenous and non-Indigenous cohorts and estimate total and average costs for each of the trajectory groups. As noted in the *Method section*, criminal justice system contacts for the historical cohort were projected as future costs for a cohort who turned 10 in 2016–17, and a net present value of total future costs was estimated, with future costs discounted at seven percent annually. As presented in Table 9, most individuals in the low rate and non-offender group for each cohort (82.8%) were associated with very low levels of criminal justice expenditure (combined total of 4.7% of total cost). On the other hand, individuals in the adolescent onset and early onset groups accounted for small proportions of the population but high levels of criminal justice expenditure.

Table 9: Net present value (2016–17 dollars) of criminal justice system contacts by individuals in the Indigenous and non-Indigenous offender trajectories from age 10 to 31 years

Trajectory group		Individuals			Cost			
		N	% of Indigenous or non-Indigenous	% of total population	Average individual cost ($)	Total group cost ($)	% of Indigenous or non-Indigenous cost	% of total cost
Indigenous cohort	1. Low rate and non-offenders	1,070	46.6	1.3	2,980	3,188,345	1.7	0.7
	2. Adolescent onset (moderate)	878	38.3	1.1	57,806	50,753,239	27.3	11.1
	3. Early onset (chronic)	347	15.1	0.4	380,097	131,893,751	71.0	28.8
	Total	**2,295**	**100**	**2.8**	**80,974**	**185,835,335**	**100**	**40.6**
Non-Indigenous cohort	1. Low rate and non-offenders	67,954	83.8	81.5	267	18,112,599	6.7	4.0
	2. Adolescent onset (low)	11,029	13.6	13.2	8,783	96,868,753	35.7	21.2
	3. Early onset (low)	2,093	2.6	2.5	74,798	156,552,496	57.7	34.2
	Total	**81,076**	**100**	**97.2**	**3,349**	**271,533,847**	**100**	**59.4**

Over one-half of the identified Indigenous cohort (53.4%; 1.5% of the total population) were in the adolescent onset (moderate) or early onset (chronic) groups. Individuals in these two groups accounted for 39.9 percent of criminal justice expenditure, with each individual costing an average of $57,806 or $380,097 respectively by the time they turned 31 years old.

In contrast, individuals in the identified non-Indigenous cohort who were in the adolescent onset (low) and early onset (chronic) groups accounted for 15.7 percent of the total population and 55.4 percent of total costs. Individuals in the identified non-Indigenous cohort in the early onset (chronic) group were 2.5 percent of the population but accounted for one-third of total costs (34.2%). Each individual in this group cost an average of $74,798 by the time they turned 31 years old.

The costs incurred in 2016–17 dollars, with no discounting applied, were explored at each age for individuals in the identified Indigenous and non-Indigenous trajectory groups. This approach may assist in identifying the age groups that crime prevention activities are best targeted to, in order to most efficiently prevent reoffending. Figure 3 and Figure 4 present the average costs per individual in the three trajectory groups by age for members of the identified Indigenous and non-Indigenous cohorts.

While Indigenous individuals in the two main offender trajectory groups cost more at each age than non-Indigenous individuals in the comparable offender trajectory groups, the groups reflected similar patterns over time. Chronic Indigenous offenders began to cost the criminal justice system significant amounts earlier in the life course than non-Indigenous offenders, reflecting the use of costly youth justice sanctions. The peak cost for Indigenous chronic offenders was when they were aged 16, and for non-Indigenous chronic offenders when they were aged 17. However, it should be noted that it is at these ages that costly community-based supervision and youth detention would be used, and that for many individuals the onset of offending would occur much earlier in the life course.

It should be noted that the gap in cost at age 18 is likely to reflect, first, an administrative artefact in the data sources used for this analysis, in terms of the calendar or financial years in which contacts with the criminal justice system were recorded, and, second, the counting methods used in this study to determine age at contact. All sentenced days for an individual were counted in the year in which the sentence began, so total sentence costs are counted within the year the sentence commenced. While many chronic-offending young people who are sentenced to youth detention may be moved to adult correctional facilities during the course of their sentence after they turn 17, it is possible that not many commence a new sentence at age 18.

Figure 3: Average costs in 2016–17 dollars (not discounted) per individual in the Indigenous cohort trajectory groups by age

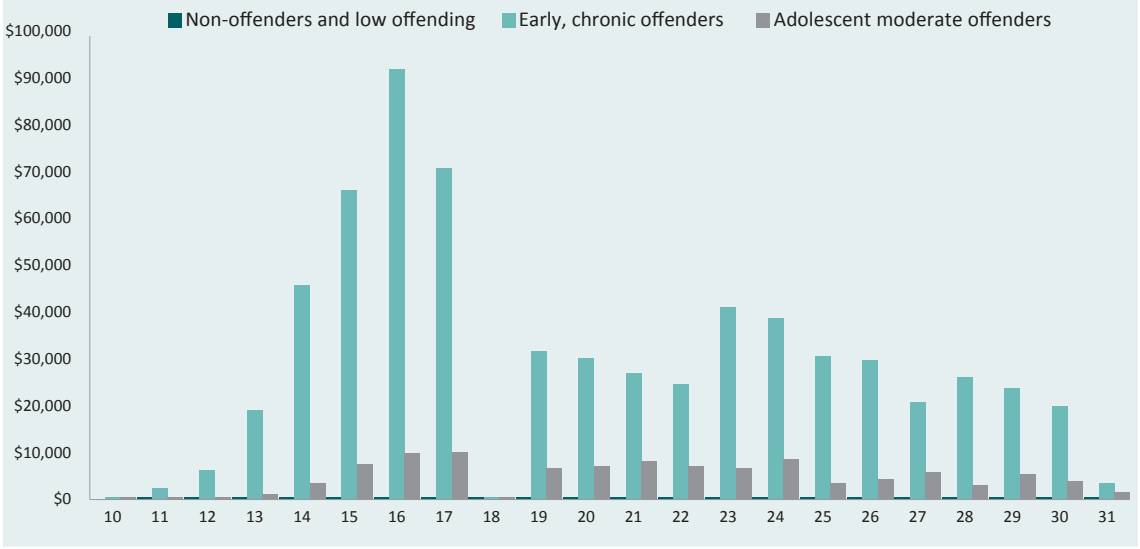
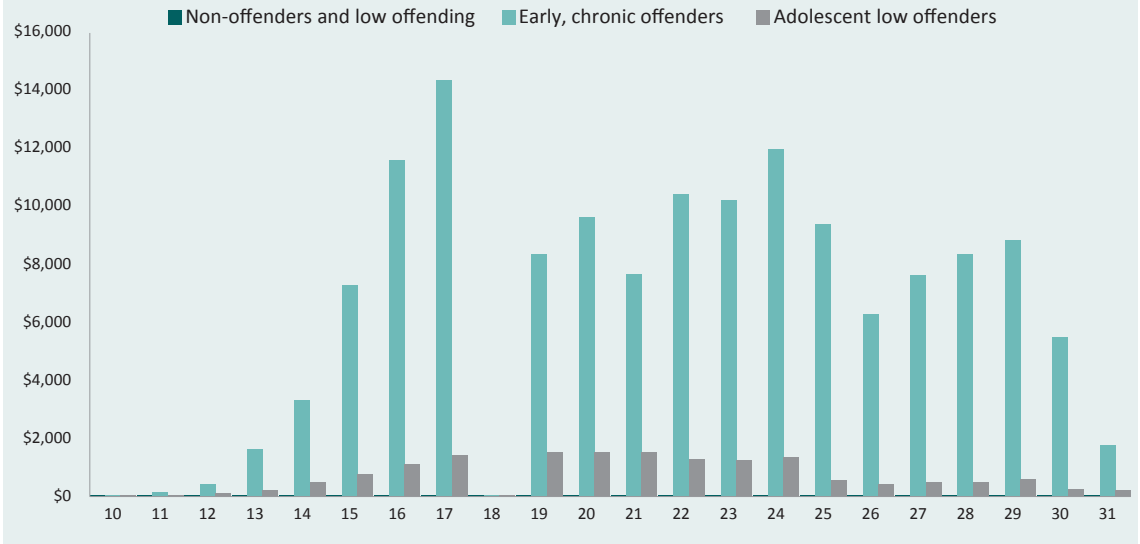


Figure 4: Average costs in 2016–17 dollars (not discounted) per individual in the non-Indigenous cohort trajectory groups by age



Discussion

In this section, an outline of the rationale for the project will first be presented. Second, the findings of the project will be summarised in the context of past findings. Third, the policy implications arising from the project will be discussed. Fourth, the limitations of the research will be reported. The section will conclude by outlining directions for future research.

Project rationale

This project assessed the longitudinal costs of identified Indigenous and non-Indigenous offender trajectories, based on the direct criminal justice system costs of practices that are used to respond to offending. The three aims of the project were:

- to determine whether differences exist in the nature of offender trajectories over time based on Indigenous status;
- to assess the direct costs of criminal justice system practices based on critical cost drivers; and
- to apply the costs to the Indigenous and non-Indigenous offender trajectories and estimate a net present value of potential future costs for individuals within each of these offending trajectory groups.

No previous Australian study has assessed the longitudinal costs of offender trajectories based on ethnicity. International research has typically adopted a broad scope of costs including, for example, victim costs, costs associated with lost productivity, and intangible costs. This research adopted a narrower costing framework by including only direct criminal justice system costs, and estimated these based on critical cost drivers such as whether an individual was diverted, offence type, whether there was a trial, and the nature and length of sanctions. In this way, the current study aimed to produce more valid and reliable estimates of the longitudinal costs of offending. These estimates also have enhanced utility, with lifetime costs being modelled as future costs for a cohort aged 10 years in 2016–17, based on linked historical data, to produce a net present value of the direct criminal justice costs of offending (from ages 10 to 31) for Indigenous and non-Indigenous groups with different patterns of offending behaviour.

As estimated future costs, these estimates can therefore serve as a key input or enabler to future initiatives, such as:

- cost–benefit analyses or business cases that are designed to assess the potential benefits of prevention programs;
- interventions to reduce reoffending; and
- innovative approaches such as justice reinvestment and payment by outcome.

These types of initiatives appear to be particularly pertinent for the Indigenous cohort, given the finding of this study that an overwhelming majority of this cohort have contact with criminal justice agencies over their adolescence and young adulthood.

Summary of findings

Consistent with the conclusions reached in Piquero's (2008) review of trajectory research, three trajectory groups were identified for the Indigenous and non-Indigenous cohorts in this study. Findings were largely consistent with other previous research that has explored the offender trajectories of entire cohorts, with most individuals in the low rate or non-offender groups and with members of ethnic minority groups represented in offending groups at higher rates. Those individuals also have an earlier age of onset for offending and more frequent and sustained offending than those who are not members of ethnic minority groups (Allard et al. 2013, 2014; Broidy et al. 2015; Cohen et al. 2010a, 2010b; Livingston et al. 2008; Piquero & Buka 2002).

The low rate and non-offender group in each cohort was found to account for the largest proportion of each cohort and the lowest proportion of offending, with nearly one-half (46.6%) of the identified Indigenous cohort and 83.8 percent of the identified non-Indigenous cohort in this group accounting for 4.7 percent of offending in total.

Over one-third (38.3%) of the identified Indigenous cohort were in the adolescent onset group, compared with one-tenth (13.6%) of the identified non-Indigenous cohort. Indigenous members of the adolescent onset (moderate) group typically began offending earlier in life than non-Indigenous members of the adolescent onset (low) group, with an average offending onset age of 15.1 compared with 18.3 for non-Indigenous Australians. Indigenous cohort members in the adolescent onset group also typically committed more offences than non-Indigenous cohort members classified in this group, committing 25.16 offences between the ages of 10 and 31 compared with 6.08 offences. In total, Indigenous members of the adolescent onset (moderate) group accounted for 1.1 percent of the entire cohort and 9.4 percent of offences. In comparison, non-Indigenous members of the adolescent onset (low) group accounted for 13.2 percent of the entire cohort and 28.7 percent of offences.

Similarly, a higher proportion of the identified Indigenous cohort (15.1%) than the identified non-Indigenous cohort (2.6%) were members of the corresponding early onset (chronic) offending trajectory group. Indigenous members of that group typically had an earlier offending onset age than non-Indigenous members, with an average offending onset age of 13.2 years compared with 16.2 years. Indigenous members of the early onset (chronic) offending trajectory also typically committed more offences than non-Indigenous members of this group, committing an average of 107.77 offences when aged 10 to 31 compared with 46.10 offences. In total, Indigenous members of the early onset (chronic) group accounted for 0.4 percent of the entire cohort and 16 percent of offences. Comparatively, non-Indigenous members of the early onset (chronic) group accounted for 2.5 percent of the entire cohort and 41.2 percent of offences.

When costs were applied to the trajectory groups, the findings were largely consistent with previous research. The chronic offender trajectory groups were found to account for a disproportionate amount of direct criminal justice system expenditure. The identified Indigenous and non-Indigenous offenders in these groups made up 2.9 percent of the study population but accounted for 63.2 percent of total expenditure. Based on this analysis, an Indigenous chronic offender will cost on average $380,097 by age 31 years, while a non-Indigenous chronic offender will cost on average $74,798 over the same time period. Just over one-tenth of the cohort (14.3%) were in an adolescent onset group but they accounted for one-third (32.3%) of expenditure. On average, each Indigenous adolescent onset offender will cost $57,806, while each non-Indigenous adolescent onset offender will cost $8,784 by the time they turn 31.

This analysis suggests there is considerable churn in the system, with many individuals having repeat contact. On average, each individual who was classified as Indigenous and who was in the early onset (chronic) group had seven finalised youth court appearances. In the adult court, those identified as Indigenous who were in the adolescent onset and early onset (chronic) groups had an average of nine and 21 finalised adult court appearances respectively. Individuals in the chronic offender groups also spent considerable time being supervised on orders. In the chronic offender groups, those identified as Indigenous spent an average of 10 years and those identified as non-Indigenous spent an average of four years on community-based orders and in detention/prison between the ages of 10 and 31.

The notable differences in cost between chronic offenders in the Indigenous cohort and those in the non-Indigenous cohort ($380,097 and $74,798 respectively) appear to derive in large part from the greater frequency and length of youth justice sanctions for the Indigenous chronic-offending cohort, in particular probation orders and detention. The greater frequency of these sanctions may be in part a function of the greater churn or frequency of contact with the criminal justice system for the Indigenous chronic offender cohort over their young adult life, compared to the equivalent non-Indigenous cohort. It may also derive from a somewhat greater rate of violent offending by members of the Indigenous cohort, which may affect their eligibility for diversionary options or particular sanction types, and can also affect the length of sanctions.

Additionally, over four-fifths (82.8%) of the cohort were in the low rate and non-offending groups, and they accounted for 5.1 percent of total costs. While not important in terms of overall cost, each individual in the identified Indigenous cohort cost an average of $2,980, compared with each individual in the identified non-indigenous cohort costing an average of $267. To some extent, this difference can be explained by the larger proportion of the selected Indigenous cohort who have at least one recorded offence: 57.8 percent of Indigenous and 11.3 percent of non-Indigenous individuals in the low rate or non-offender groups have one or more offence.

Policy implications

The findings from this project indicate that, while the identified Indigenous cohort accounted for a small proportion (2.8%) of the total cohort examined in this study, it accounted for a large proportion (40%) of direct criminal justice system expenditure. When the criminal justice costs are averaged out across the total identified Indigenous cohort, there is an average cost of $80,974 in direct expenditure over young adulthood for each Indigenous person, while for each identified non-Indigenous person the average estimated cost is $3,349. Over one-half (53.4%, *n*=1,225) of the identified Indigenous cohort were allocated to the two chronic offender trajectory groups, and on average each individual will cost $149,100 over their young adulthood. In comparison, 16.2 percent (*n*=3,122) of the identified non-Indigenous cohort were allocated to the two chronic offender groups, and on average will cost $19,313 over their young adulthood. The significant criminal justice costs over young adulthood suggest that there is a need to address the risk and protective factors for offending to prevent initial and ongoing contact with the criminal justice system, particularly for Indigneous Australians.

These findings lend considerable support for additional resources to be allocated towards reducing ongoing engagement with the criminal justice system for Indigenous offenders, especially from early in life, given the average age of contact with the criminal justice system across the Indigenous offending trajectory groups. There are a range of innovative initiatives in Queensland by the Department of Child Safety, Youth and Women which aim to reduce offending, such as Talking Families, Triple P: Positive Parenting Program, and The First 1000 Days. Additional initiatives are being delivered which are specifically focused on Indigenous children and youth who are at risk of offending, such as the Our Way strategy and Aboriginal and Torres Strait Islander Family Wellbeing Services. Given the high cost of many Indigenous offenders over young adulthood, there are likely to be a range of programs or interventions that could be used to cost-effectively reduce offending and reoffending.

Place-based approaches such as justice reinvestment may be appropriate, although these remain relatively untested in the Australian context. This approach is gathering traction in Australia and internationally, and involves using ‘justice mapping’ or ‘prisoner geographies’ to redirect a proportion of criminal justice system budgets to the communities that generated costly offenders (Allen, 2011; Brown, Schwartz & Boseley 2012; Clear 2011; Guthrie, Adock & Dance, 2011; House of Commons 2009; Queensland Government 2011; Schwartz 2010; Young & Solonec 2011).

The Maranguka Justice Reinvestment Project is a trial of the justice reinvestment approach to reducing offending in the town of Burke, New South Wales. The project has been underway since 2013. The trial was initiated in response to concerns about high rates of offending and imprisonment among young Aboriginal people in the community. It has led to a range of community-led and community-focused initiatives, but has focused in particular on creating a range of 'circuit-breakers' to reduce young peoples' repeated contact with the criminal justice system for minor offences and order breaches. A recent impact evaluation found that this project was associated with:

- a 23 percent reduction in police-recorded incidents of family violence;
- a 31 percent increase in year 12 student retention rates; and
- a 38 percent reduction in the top five juvenile offence categories; and
- for adults, a 14 percent reduction in bail breaches and a 42 percent reduction in days spent in custody (KPMG 2018).

The impact evaluation also estimated that the estimated cost-savings in the criminal justice and non-criminal justice sectors were five times greater than the cost of the trial (KPMG 2018). On the basis of these findings, there appears to be a strong case for further trials of this type of justice reinvestment approach, particularly in Indigenous communities with high concentrations of young people involved with the criminal justice system. More information on the trial is available at http://www.justreinvest.org.au/justice-reinvestment-in-bourke/.

While the findings of this study suggest that more needs to be done to reduce both initial and ongoing contact by Indigenous Australians with the criminal justice system, the complexity of achieving these outcomes should not be underestimated. Indeed, interventions and programs which aim to reduce Indigenous over-representation in the criminal justice system need to ensure that they are relevant and culturally appropriate, with local solutions developed through true collaboration with local leaders and the community. Programs should have a well developed program logic, detailing the mechanisms through which the program aims to reduce offending and the impacts of different contexts. Such programs may have short-term goals—such as aiming to increase protective factors and reduce risk factors for offending—which may result in reductions in offending over the longer term. Programs also need to ensure that time frames are appropriate to achieve the goals, some of which may be intergenerational in nature. Moreover, while there are a plethora of agencies that are typically providing services to close the gap on Indigenous disadvantage, these need to be provided in a coordinated, joined-up and holistic way.

Project limitations

Despite the potential importance of the findings, they should be interpreted in light of five main limitations. First, the study used administrative data, which only included individuals who were registered as being born in Queensland, and do not include offending that is not reported to police or attributed to an offender. Inconsistencies in the demographic information that were recorded for individuals across and within the administrative datasets were resolved by assigning gender based on the balance of probabilities and Indigenous status using the multi-stage median algorithm. This algorithm resulted in the classification of 2,295 people as having Indigenous cultural heritage. While this approach may reduce the likelihood of incorrectly identifying as Indigenous someone who has had contact with the criminal justice, child protection, community or inpatient mental health systems—for example, due to administrative error—it may potentially undercount Indigenous people who did not identify as Indigenous, or who had no contact with those systems and who were either not registered at birth or not registered as Indigenous at birth.

Other sources suggest that the number of Indigenous persons in the birth cohort may be an underestimate, with the *ABS Estimates and Projections* (2009a) suggesting that there may have been 4,970 Indigenous people. When inconsistencies in the recorded Indigenous status of a person were resolved using a less conservative approach (based on the 'ever' identifier, where individuals were recorded as Indigenous if they had ever self-identified as Indigenous in any of the databases) there were 4,821 individuals who were classified as Indigenous. When the 'ever' identifier was used, the proportions and frequency of offending changed slightly, with 24.4 percent (19,183/78,550) of non-Indigenous Queenslanders having recorded offences (*M*=1.83 offences, *SD*=11.13) and 72.7 percent (3,504/4,821) of Indigenous Queenslanders having recorded offences (*M*=18 offences, *SD*=11.13).

The approach used to identify individuals of Indigenous status was conservative and likely under-identified and/or enumerated the denominator population. The results in this report should therefore be considered indicative rather than exact representations of Indigenous offending rates. When applying these results to the broader Indigenous population, the under-identification of Indigenous people in the cohort and the resulting potential inflation of the frequency of offending in this cohort should also be considered.

Second, while the study took migration into account in the sample by only including individuals who were born in Queensland, it was not able to take into account cohort attrition (through population mobility interstate) and this may have led to some variation in the number of trajectory groups identified (Eggleston, Laub & Sampson 2004).

Third, exposure time for offending (ie time not in prison) was not considered when assessing the number of trajectories. Looking at the number of days available to offend when individuals in each offender trajectory group are aged 10 to 31 years old, Indigenous members of the chronic offenders group were incarcerated 23.3 percent of the time, while non-Indigenous members of the chronic offenders group were incarcerated 5.8 percent of the time. Indigenous members of the adolescent onset group were incarcerated 3.7 percent of the time, while non-Indigenous members of the adolescent onset group were incarcerated 0.3 percent of the time. While taking exposure time into account may have impacted on the number of groups identified, we did not take this into account as we were interested in quantifying and costing an individual's actual interactions with the criminal justice system rather than their propensity to offend.

Fourth, the cost of each offender trajectory was assessed based on the direct criminal justice expenditure relating to the contacts that individuals within that group had with the system. This cost was then discounted by seven percent annually to estimate a total net present value of the future costs of offending in each trajectory group. Using the historical contacts data to project future costs assumes that criminal justice policies and processes have remained relatively stable over the past two decades and will remain relatively stable into the future. Where there have been substantial changes to policies or processes over the past two decades, the projected patterns of contact and associated estimated costs have more uncertainty attached to them. Furthermore, the costs of sentenced days were counted in the year in which the sentence commenced, rather than the years in which the sentenced days were undertaken, which may have led to a degree of overestimation of the lifetime costs of correctional sanctions when annual discounting is applied.

Additionally, these cost estimates were produced taking into account critical cost drivers, including whether an individual was diverted, the most serious offence type actioned by police to court, the principal offence finalised in court which took into account the proportion that had trials, and the nature and length of any youth justice or adult corrections sanction. However, other cost drivers may also have had an impact on the estimates produced but were not able to be explored, such as offender location (eg remote area vs major city) and whether the offender pleaded guilty.

Fifth, there are several limitations relating to the information that was available to assess unit costs. Police costs were estimated based on the length of time that general duties officers recorded against offending events in ITAS, CPIU/CIB, the length of time specialist officers recorded in IMAC, and the length of time forensics staff recorded in the Forensics Registrar. These time estimates rely on the assumption that officers have reliably and accurately entered the activities that they undertake, the length of time and the event (occurrence number). Only activities that were linked to an occurrence in ITAS, IMAC or the Forensics Registrar and had a police action in QPRIME (ie caution, conference, court or other) were included in the assessment of the average or median time for offending events. Those offending events where an offender had not been identified or charged were necessarily excluded from the assessment, as offending events were defined through their linkage to an offender.

Court costs were estimated based on the length of time devoted to trials and other court events based on principal offence type. The length of time that trials took was estimated by the Queensland Department of Justice and Attorney-General, who reported number of days based on court registrar diaries. Other court events (eg application, call over, committal or hearing) were all allocated the same length of time. Whether these events differed substantially in the length of time that they took, and whether different types of events are disproportionately distributed based on principal offence type—which would result in differences in cost estimates—is not known.

Directions for future research

Additional research that explores the costs of offender trajectories and how individuals within each trajectory group can be prospectively identified is clearly needed to promote the use of this evidence within policymaking environments. Such research should consider using a bottom-up costing framework to produce more fine-grained cost estimates that reflect not only the short-run opportunity costs associated with changes in criminal justice system demand but also wider economic and social costs that would facilitate cost–benefit analyses.

Additional research that assesses the intangible costs of crime (eg fear of crime and costs to victims) will help researchers and policymakers better understand the full scope of societal costs incurred by offending events.

The need for additional research which predicts future offending and differentiates offender trajectory groups based on risk factors is also essential to further assist the targeting of costly crime-prevention programs (Allard 2015).

Conclusion

Understanding offending patterns over the life course of the different trajectory groups promotes long-term thinking about appropriate responses to offending, and the potential use of more resource-intensive prevention, early-intervention and criminal justice system programs to reduce offending and reoffending. Multiple intervention points (including intergenerational interventions like working with the children of prisoners) can be identified to prevent the initiation of offending, to prevent reoffending, and to encourage desistence from offending. These intervention points are not restricted to early intervention and can occur at all points in the life cycle; however, there are clearly social and economic benefits to reducing the harms of offending early in life, for victims and offenders and for broader society. In addition, many of these interventions may not directly target offending but may instead target risk factors outside the criminal justice system that are known to be associated with offending, such as mental health and child protection interventions and school engagement programs. While many of these programs and interventions may appear costly, they may be cost-effective when the magnitude of long-term criminal justice systems costs are considered.

References

URLs correct as at February 2020

Allard T 2011. Indigenous young people and the justice system: Establishing an evidence base. In A Stewart, T Allard and S Dennison (eds) *Evidence based policy and practice in youth justice*, 28-44. Sydney: Federation Press

Allard T 2010. *Understanding and preventing indigenous offending.* Research brief no. 9. Sydney: Indigenous Justice Clearinghouse

Allard T et al. 2014. The monetary cost of offender trajectories: Findings from Queensland (Australia). *Australian and New Zealand Journal of Criminology* 47: 81–101

Allard T, Chrzanowski A & Stewart A 2015. Integrating criminal careers and ecological research: The importance of geographic location for targeting interventions towards chronic and costly offenders. *Crime & Delinquency*. DOI: 10.1177/0011128714568187

Allard T, Chrzanowski A & Stewart A 2013. *Targeting crime prevention: Identifying communities that generate chronic and costly offenders.* Research and public policy series no. 123. Canberra: Australian Institute of Criminology. https://aic.gov.au/publications/rpp/rpp123

Allard T & Manning M 2011. Establishing an evidence base: Economic analysis. In A Stewart, T Allard and S Dennison (eds) *Evidence based policy and practice in youth justice, 187-205.* Sydney: Federation Press

Allen R 2011. Justice reinvestment and the use of imprisonment: Policy reflections from England and Wales. *Criminology & Public Policy* 10: 617–627

Australian Bureau of Statistics (ABS) 2018. *Criminal courts, Australia 2016–2017.* ABS cat. no. 4513.0. Canberra: ABS

Australian Bureau of Statistics 2011. *Australian and New Zealand Standard Offence Classification (ANZSOC) 2011.* cat. no. 1234.0. Canberra: ABS

Australian Bureau of Statistics 2009a. *Estimates and projections, Aboriginal and Torres Strait Islander Australians.* ABS cat. no. 3238.0. Canberra: ABS

Australian Bureau of Statistics 2009b. *National Offence Index.* ABS cat. no. 1234.0.55.001. Canberra: ABS

Australian Government 2007. *Best practice regulation handbook*. Canberra: Commonwealth of Australia

Australian Institute of Health and Welfare (AIHW) 2019. *Youth justice in Australia 2017–2018.* AIHW cat. no. JUV 129. Canberra: AIHW

Blumstein A, Cohen J, Das S & Moitra S 1988. Specialization and seriousness during adult criminal careers. *Journal of Quantitative Criminology* 4: 303–345

Blumstein A, Cohen J, & Farrington D 1988. Longitudinal and criminal career research: Further clarifications. *Criminology* 26: 57–74

Broidy L et al. 2015. Life-course offending pathways across gender and race/ethnicity. *Journal of Developmental and Life-Course Criminology* (1)2: 118–149

Brown D, Schwartz M & Boseley L 2012. Promise of justice reinvestment. *Alternative Law Journal* 32: 96–102

Caudy M 2011. Assessing racial differences in offending trajectories: A life-course review of the race–crime relationship (Doctoral thesis). Department of Criminology, University of South Florida

Christensen D et al. 2014. Evidence for using an algorithm in resolving inconsistent and missing Indigenous status in administrative data collections. *Australian Journal of Social Issues* 49: 423–553

Clear T 2011. A private-sector, incentives-based model for justice reinvestment. *Criminology & Public Policy* 10: 585–608

Council of Australian Governments 2018. *COAG statement on the closing the gap refresh.* 12 December 2018. Canberra: COAG

Cohen MA, Piquero AR & Jennings WG 2010a. Monetary costs of gender and ethnicity disaggregated group-based offending. *American Journal of Criminal Justice* 35: 159–172

Cohen MA, Piquero AR & Jennings WG 2010b. Studying the costs of crime across offender trajectories. *Criminology & Public Policy* 9: 279–305

Day DM & Koegl CJ 2019. The monetary costs of criminal trajectories for a sample of offenders in Ontario, Canada. *Journal of Developmental and Life Course Criminology*: 5(2) 203–219. https://doi.org/10.1007/s40865-019-00105-8

D'Unger A, Land K, McCall P & Nagin D 1998. How many latent classes of delinquent/criminal careers? Results from mixed Poisson regression analyses. *American Journal of Sociology* 103: 1593–1630

Eggleston E, Laub J & Sampson R 2004. Methodological sensitivities to latent class analysis of long-term criminal trajectories. *Journal of Quantitative Criminology* 20(1): 1–26

Farrington DP & West DJ 1990. The Cambridge study in delinquent development: A long-term follow-up of 411 London males. In HJ Kerner and G Kaiser (eds). *Criminality: Personality, behaviour, life history*. Berlin: Springer-Verlag: 115–138

Fergusson D, Horwood L & Nagan D 2000. Offending trajectories in a New Zealand birth cohort. *Criminology* 38(2): 525–551

Ferrante A 2013. Assessing gender and ethnic differences in developmental trajectories of offending. *Australian and New Zealand Journal of Criminology* 46(3): 379–402

Guthrie J, Adcock F & Dance P 2011. Exploring the feasibility of justice reinvestment in the Australian Capital Territory. Australian Institute of Aboriginal and Torres Strait Islander Studies workshop report

Haynie DL, Weiss HE & Piquero A 2008. Race, the economic maturity gap, and criminal offending in young adulthood. *Justice Quarterly* 25(4): 595–622

House of Commons 2009. *Cutting crime: The case for justice reinvestment. First report of session 2009–2010.* London: The Stationery Office Limited

Jones B, Nagin D & Roeder K 2001. A SAS procedure based on mixture models for estimating developmental trajectories. *Sociological Methods and Research* 29(3): 374–393

KPMG 2018. *Maranguka justice reinvestment project: Impact assessment.* Report for Maranguka and Just Reinvest NSW. Sydney: KPMG

LaCourse E, Nagin D, Tremblay R, Vitaro R & Class M 2003. Developmental trajectories of boys' delinquent group membership and facilitation of violent behaviours during adolescence. *Development and Psychopathy* 15: 183–197

Larg A & Moss JR 2011. Cost-of-illness studies: A critical guide to evaluation. *Pharmacoeconomics* 29(8): 653–671

Little S & Allard T 2011. Preventing reoffending: System responses. In A Stewart, T Allard and S Dennison (eds), *Evidence based policy and practice in youth justice.* Sydney: Federation Press: 152–168

Little S, Allard T, Chrzanowski A & Stewart A 2011. Diversion of Aboriginal and Torres Strait Islander young people in Queensland: The impact, use and alternatives to existing diversionary measures in addressing Indigenous over-representation. Report for Queensland Government.

Livingston M, Stewart A, Allard T & Ogilvie J 2008. Understanding juvenile offending trajectories. *Australian & New Zealand Journal of Criminology* 41(3): 345–363. https://doi.org/10.1375/acri.41.3.345

Maldonado-Molina M, Piquero A, Jennings W, Bird H & Canino, G 2009. Trajectories of delinquency among Puerto Rican children and adolescents at two sites. *Journal of Research in Crime and Delinquency* 46: 144–181

Masyn KE 2013. Latent class analysis and finite mixture modeling. In TD Little (ed), *The Oxford handbook of quantitative methods: Volume 2: Statistical analysis*: 551–611. New York, NY: Oxford University Press

Moffitt TE 1994. Natural histories of delinquency. In EGM Weitekamp and H Kerner (eds), *Cross-national longitudinal research on human development and criminal behavior*: 3–61. Dordrecht: Kluwer Academic Publishers

Moffitt TE 1993. Adolescent-limited and life-course persistent antisocial behaviour: A developmental taxonomy. *Psychological Review* 100: 674–701

Nagin D 1999. Analyzing developmental trajectories: A semiparametric, group-based approach. *Psychological Methods* 4(2): 139–157

Nagin D & Tremblay R 2005. What has been learned from group-based trajectory modelling? Examples from physical aggression and other problem behaviours. *The Annals of the American Academy of Political and Social Sciences* 602: 82–117

Ogilvie J & Allard T 2011. Preventing reoffending: Therapeutic interventions. In A Stewart, T Allard and S Dennison (eds) *Evidence based policy and practice in youth justice,134-151.* Sydney: Federation Press

Piquero AR 2008. Taking stock of developmental trajectories of criminal activity over the life course. In A Liberman (ed) *The long view of crime: A synthesis of longitudinal research*: 23–78. New York: Springer

Piquero AR & Buka S 2002. Linking juvenile and adult patterns of criminal activity in the Providence cohort of the National Collaborative Prenatal Project. *Journal of Criminal Justice* 30: 259–272

Piquero AR, Jennings WG & Farrington D 2013. The monetary costs of crime to middle adulthood: Findings from the Cambridge study in delinquent development. *Journal of Research in Crime and Delinquency* 50: 153–74

Productivity Commission 2018. *Report on government services 2018*. Canberra: Productivity Commission

Queensland Government 2011. *Justice Futures 2012–2015 summary: Growing community, family, opportunity and justice for Aboriginal and Torres Strait Islander Queenslanders.* Queensland: Queensland Government

Schwartz M 2010. Building communities, not prisons: Justice reinvestment and Indigenous over-representation. *Australian Indigenous Law Review* 14: 1–17

Young W & Solonec T 2011. Epidemic incarceration and justice reinvestment. *Indigenous Law Bulletin* 7: 15–21

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