

CRIME AND JUSTICE BULLETIN

NUMBER 245 | FEBRUARY 2022

The effect of parole supervision on recidivism

Evann J. Ooi and Joanna Wang

AIM To estimate the causal impact of parole supervision on recidivism amongst offenders sentenced to short-term prison sentences.

METHOD Recidivism was compared between parolees and ex-inmates who were released from prison unconditionally. To measure the causal effect of parole supervision, this study used the variation in the sentencing severity of quasi-randomly assigned Local Court magistrates as an instrument of release on parole. This magistrate severity measure was used as an instrumental variable (IV) in a two-stage least squares (2SLS) model to measure the Local Average Treatment Effect (LATE) of parole supervision on recidivism. Three recidivism outcomes were measured: probability of re-conviction; probability of committing a personal, property, or serious drug offence; and probability of re-imprisonment. Each of these was assessed over two time periods: 12 and 24 months after release from prison. A range of tests suggested that the magistrate severity measure satisfies the criteria for a valid instrument.

RESULTS The IV estimates revealed that parolees are substantially less likely to re-offend than prisoners released unconditionally. The main results show that, for the marginal parolee, being released to parole reduces the likelihood of re-conviction within 12 months of release by 10.0 percentage points (a decrease of 17.5 per cent); reduces the likelihood of committing a personal, property or serious drug offence within 12 months of release by 10.3 percentage points (a decrease of 24.0 per cent); and reduces the likelihood of being re-imprisoned within 12 months of release by 5.0 percentage points (a decrease of 18.2 per cent). These reductions in recidivism were statistically significant and generally persisted 24 months after release from prison. Furthermore, the findings revealed statistically significant reductions in recidivism among parolees with an LSI-R score of Medium or above as well as below Medium, and Aboriginal and non-Aboriginal parolees.

CONCLUSION Parolees are substantially less likely to re-offend than prisoners released unconditionally and the reduction in recidivism persists 24 months after release from prison.

KEYWORDS

Parole

Recidivism/Re-offending

Prisoner

Evaluation

INTRODUCTION

Recidivism poses a significant problem for the criminal justice system and remains an ongoing concern in Australia and worldwide. In New South Wales (NSW), 42.4 per cent of adult prisoners are re-convicted of a new offence within 12 months of release from prison.¹ Even higher rates of re-offending on parole are reported in the United States (US), where about two-thirds of prisoners are re-arrested for a new crime within 3 years of release and three-quarters are re-arrested within 5 years (Durose, Cooper, & Snyder, 2014).

The causes of recidivism among ex-prisoners are complex. Risk factors include drug and alcohol dependence, unemployment, low levels of education, socio-economic disadvantage and history of mental health problems. Ex-prisoners also encounter a range of challenges post-release, including limited financial resources, limited support from family and friends and limited knowledge of social support and health services (Payne, 2007). Parole supervision is one of the key strategies employed by government to assist ex-inmates to re-integrate into society and help them remain lawful. In addition to monitoring and sanctioning those who breach their conditions of release, parole authorities facilitate access to treatment and behavioural programs to address parolees' criminogenic needs.²

Parole supervision in NSW

In NSW, the *Crimes (Sentencing Procedures) Act 1999* (NSW) and the *Crimes (Administration of Sentences) Act 1999* (NSW) establish different parole procedures for offenders serving a sentence of 6 months or less, more than 6 months but less than 3 years, and more than 3 years. Sentences of 6 months or less do not have a parole component and inmates are released from prison unconditionally. For sentences more than 6 months but less than 3 years, the court specifies a non-parole period which is the minimum time that an offender must spend in custody. At the expiry of the non-parole period, the offender is released on parole under conditions set by the sentencing court. For sentences in excess of 3 years, the sentencing court may impose a non-parole period but the State Parole Authority (SPA) ultimately determines an offender's release date and parole conditions. SPA may refuse to release an offender after his/her non-parole period has finished if it is satisfied that the release of the offender is not in the public interest. Factors that SPA must consider when deciding whether or not to release an offender include: the offender's criminal history; the likelihood of the offender being able to adapt to lawful community life; the likely effect on any victim of the offender being released and; reports provided to the SPA by the Probation and Parole Service.

Prior research

Previous research undertaken by BOCSAR has considered whether parole supervision, as it operates in NSW, reduces the risk of prisoners re-offending following release. Wan, Poynton, Doorn, & Weatherburn (2014) used propensity score matching to compare 2,019 offenders who were released on parole with offenders who were similar on observed characteristics (including demographics and prior criminal history) but were released unconditionally. The authors found that supervised offenders took longer to commit a new offence, were less likely to commit a new indictable offence and committed fewer offences than those who were released unconditionally.³ They also identified that more active parole supervision (that is, a higher level of contact with community corrections officers) reduces parolee recidivism but only if it is rehabilitation focused.

¹ Recidivism statistics were obtained from the NSW Bureau of Crime Statistics and Research (BOCSAR) website, which are available from https://www.bocsar.nsw.gov.au/Pages/bocsar_pages/Re-offending.aspx (accessed on 20/08/2021).

² Corrective Services NSW website: <https://correctiveservices.dcj.nsw.gov.au/csnswhome/reducing-re-offending/initiatives-to-support-offenders/employment-and-training/education-programs-and-services.html> (accessed on 20/08/2021).

³ In general, indictable offences are considered to be more serious criminal offences and harsher penalties can be imposed by the Local Court or higher courts. In NSW, indictable offences are governed by the *Crimes Act 1900* (NSW).

A later study by Stavrou, Poynton and Weatherburn (2016) examined whether recidivism varied by the type of parole release (board-ordered versus court-ordered parole) and whether rates of re-offending increased following the termination of the parole period. Results from the study's Cox proportional hazard regression models revealed that re-offending was lower for parolees released by the SPA compared with court-released parolees, after accounting for a range of explanatory variables.

The results from NSW are generally consistent with the international literature in showing reduced recidivism rates among parolees compared with prisoners released unconditionally, particularly in cases where discretion is applied by parole authorities and parolees are actively supervised. For example, a large cross-jurisdictional study from the Urban Institute (Solomon, Kachnowski, & Bhati, 2005) used data on 38,624 prisoners released in 1994 from 15 different US states to construct a multivariate logistic regression model for the probability of re-arrest within two years controlling for individual and community level characteristics. Two types of parole supervision were considered; discretionary release and mandatory release. In the US, prisoners released to supervision via discretionary release have been screened by a parole board or other authority to determine whether they are ready to return to the community. Mandatory release on the other hand, occurs when a prisoner has served his or her original sentence and serves the remaining balance of their sentence under supervision in the community. Solomon et al. found that the predicted probability of re-arrest for mandatory parolees and ex-inmates released unconditionally was identical after controlling for covariates. However, certain groups of offenders were found to respond better to mandatory parole supervision. For instance, women and individuals with no prior arrests appeared to benefit more from supervision than males and those with long criminal histories. Results also indicated that discretionary parolees were less likely to be re-arrested than mandatory parolees and unconditional releasees. However, the authors noted this difference was relatively small and "supervision may not be the chief reason for this difference in outcomes" (p. 10). It is also possible that some of the factors used to determine a discretionary release were not available in the data and thus not all differences between the groups of comparison were appropriately accounted for.

A similar study undertaken by Ostermann (2015) in New Jersey utilised Cox proportional hazards survival regression methods to compare time to first re-arrest for prisoners released unconditionally with those released to either discretionary or mandatory parole. Ostermann found that prisoners released unconditionally were more likely to be re-arrested and re-convicted than discretionary parolees. However, mandatory parole releases were not statistically different to ex-inmates released unconditionally or discretionary parole releases in terms of re-arrest or re-conviction. Ostermann (2013) further demonstrated that the difference in the predicted recidivism was substantially bigger if the time under active supervision was incorporated into the parole construct. Under this construct, recidivism cases were included only if parolees were actively being supervised at the time that they re-offended. Vito, Higgins, and Tewksbury (2017) similarly found parole supervision appeared to have a significant negative effect on re-incarceration rates in Kentucky using propensity score matching and weighted logistic regression.

A major limitation of the above studies is that they all rely on regression models and propensity score methods to control for any differences between inmates released to parole and inmates released unconditionally. These methods only include observable variables (such as demographic characteristics and prior offending history) as controls in the model or in matching individuals. Information relating to other factors associated with recidivism, such as employment, social support and anti-social personality traits, is often unavailable and therefore impossible to control for in regression models. This has the potential to introduce bias in the treatment estimates. As such, these types of studies (known as observational studies) preclude causal interpretations of results. A notable exception is a study by Kuziemko (2013) investigating the effect of a reform in Georgia (known as the 90 per cent reform) that eliminated parole for certain offenders. Kuziemko used a difference-in-differences strategy to compare recidivism outcomes before and after the reforms for a group of inmates subject to the "90 per cent reforms" and a control group not affected by the reform. She found that inmates who had no option to be released to parole accumulated a greater number of disciplinary infractions, completed fewer prison rehabilitative programs and re-offended at higher rates than inmates who were able to still apply for parole. Another more recent study by Zapryanova (2020) estimated the causal effect of the length of time

spent in prison and the length of time spent on parole on recidivism using an instrumental variable (IV) approach. Among prisoners released on parole, the author did not find any evidence that the length of time spent on parole significantly affects recidivism.

Current study

The current study aims to address the problem of omitted variable bias identified in previous research by using an IV approach to compare recidivism outcomes for inmates who were released to parole with those who were released from prison unconditionally. An IV approach generates an unbiased estimate of the treatment effect and in so doing allows us to establish whether there is a causal effect of parole supervision on recidivism.

METHOD

Data

The data source used in this study is BOCSAR's Re-offending Database (ROD). ROD contains all finalised NSW criminal court appearances (including the offence, penalty and court finalisation dates), and the start and end dates of all NSW custodial episodes since 1994. ROD also includes offender-level demographic information such as Aboriginality, age and gender, as well as offender scores on the Level of Service Inventory – Revised (LSI-R).⁴ Additionally, ROD contains information about the judicial officer and court for each finalised criminal court appearance.

The sample pool used in this study was all adult offenders who received a full-time prison sentence in a NSW Local Court and who were released from prison between January 2010 and March 2019. To measure offending post-release, details of all proven offences after the custody end date were extracted from ROD, including information on the date and type of re-offence(s), as well as any subsequent penalties imposed by the court. The sample pool was limited to Local Court appearances because the majority of prison penalties imposed by judges in the District Court are longer than 6 months in duration and therefore include a parole period.⁵ Only Local Court appearances and the associated offenders presided over by a magistrate who had imposed a prison sentence in at least 10 Local Court matters were included in the sample. This was to allow for variation in magistrate sentencing decisions when calculating the instrumental variable.⁶ The analysis data contained 60,569 finalised court appearances, 35,384 ex-inmates, 209 magistrates and 142 Local Courts.⁷

Empirical approach: Instrumental variables (IV) model

Consider the following ordinary least squares (OLS) regression model, which estimates the impact of parole supervision on recidivism:

$$R_i = \beta_0 + \beta_1 P_i + \beta_2 X_i + \varepsilon_i \quad (1)$$

where R_i is the recidivism of ex-inmate i and ε_i is the error term. To measure recidivism within 12 or 24 months of release from prison, three outcomes are used:

4 The LSI-R is a predictive tool that assesses an offender's risk of recidivism and identifies their criminogenic needs. Offenders are given a score between 0 and 54, where higher scores indicate a greater probability of recidivism. The LSI-R scores are categorised into the following risk-levels: Low (0-13), Low/Medium (14-23), Medium (24-33), Medium/High (34-40) and High (41-54).

5 In the sample, there were a total of 18,418 finalised court appearances in the District Court. Among them, 1,978 did not have a non-parole period.

6 There were 78 magistrates who had less than 10 finalised cases. Also, there were 50 court finalisations where the magistrate identifier was missing and these were removed from the analysis data.

7 In the sample, 22,471 individuals (37.10 per cent of the sample) appear once, 12,913 individuals (21.32 per cent of the sample) appear twice, and 25,185 individuals (41.58 per cent) appear in 3 or more instances.

1. Probability of 're-conviction': a binary variable equal to one if the ex-inmate commits any new and proven offence and zero otherwise. Re-conviction does not include breach of order offences;⁸
2. Probability of committing a personal, property or serious drug offence: a binary variable equal to one if the ex-inmate commits a new and proven personal, property or serious drug offence and zero otherwise;⁹ and;
3. Probability of re-imprisonment: a binary variable equal to one if the ex-inmate is re-imprisoned for a new and proven offence and zero otherwise.

The binary variable P_i is equal to one if individual is sentenced to a prison term of greater than 6 months in totality (i.e., the court fixes a non-parole period) and zero if individual is sentenced to a fixed term prison penalty. As previously mentioned, prison sentences of 6 months or more in NSW include a parole component and therefore most inmates who are sentenced to prison penalties of this length would be released to parole (hereafter, these inmates are referred to as parolees). Offenders receiving a sentence of less than 6 months would be released from prison unconditionally. Thus, the coefficient of interest is β_1 , which measures the impact of parole supervision on recidivism. However, in an OLS regression framework, offenders receiving long prison sentences are likely to systematically differ from offenders receiving a fixed term of imprisonment in unobserved characteristics related to recidivism. Consequently, OLS estimates of β_1 are likely to be biased due to omitted variables.

The vector X_i includes a wide range of ex-inmate characteristics as control variables. These include demographic information (Aboriginality, sex, age and location of residence at index court finalisation), LSI-R score at the time of release from prison, and a comprehensive history of prior offending (prior prison sentences and finalised criminal court appearances, whether or not the ex-inmate has a juvenile offending record, and the types of prior offences committed). The vector X_i also includes offence types and bail status at index court finalisation.

To address the problem of omitted variable bias, the empirical approach in this study uses magistrate severity as an instrument in a two-stage least squares (2SLS) model. Put simply, an IV model measures the causal effect of a treatment (parole supervision) on an outcome (recidivism) by exploiting a third factor (an instrument) that is both correlated with the treatment and unrelated to the outcome of interest. The instrument proposed in this study is the proclivity of magistrates to sentence offenders to prison sentences with a non-parole period, where most inmates are released on parole supervision at the end of this period. In the NSW Local Court, magistrates are assigned to criminal matters based on existing workload and the availability of a magistrate as criminal matters are listed for hearing. Within a court, criminal matters are allocated to available courtrooms and magistrates are assigned to rooms on a rotational basis. At courts with multiple rooms, the assignments are typically not published until the prior day (Williams & Weatherburn, 2020). As a consequence of this procedure, magistrates cannot selectively choose which criminal matters they hear and the assignment of criminal matters to magistrates is unrelated to case and defendant characteristics (as discussed further below when assessing the validity of the instrument).¹⁰ The inclusion of this instrument in the 2SLS model generates estimates of the Local Average Treatment Effect (LATE). This can be interpreted in this study as the average causal effect of parole supervision on re-offending among those who would have received a different prison penalty had their matter been assigned to a more (or less) lenient magistrate (that is, the 'marginal' parolee).

8 Breach of order offences are defined as offences against justice procedures, government security and government operations, which is outlined in the Australian and New Zealand Standard Offence Classification (ANZSOC) 2011 available here: <https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1234.0Main+Features12011?OpenDocument> (accessed: 11 May 2021).

9 Personal, property or serious drug offences including the following ANZSOC (2011) offence categories: homicide and related offences, acts intended to cause injury, sexual assault and related offences, abduction and kidnapping, robbery, extortion and related offences, unlawful entry with intent, theft and related offences, fraud, deception and related offences, the import, export, dealing, trafficking, manufacture and/or cultivation of illicit drugs.

10 Using the variation in sentencing stringency among quasi-randomly assigned judges as an instrument has been used in other studies within criminal justice, such as Dobbie, Goldin & Yang (2018); Arnold, Dobbie & Yang (2018); and Bhuller, Dahl, Løken, & Mogstad (2020). A similar approach has also been used in NSW to study the impact of bail refusal on sentencing outcomes and offending on bail (Rahman, 2019).

In the 2SLS specification, equation (1) outlined previously is the second-stage model. The first-stage model is:

$$P_i = \alpha_0 + \alpha_1 Z_{j(i)} + \alpha_2 X_i + v_i \tag{2}$$

where $Z_{j(i)}$ is the severity of magistrate j assigned to individual i 's index criminal court matter. Magistrate severity is calculated using a residualised, "leave-out" measure of sentencing decisions controlling for court and time fixed effects. The residualised measure is used to generate the mean rate that magistrate j sentences offenders to prison terms with a specified non-parole period in all matters where a prison penalty was imposed, excluding the matter involving individual i , or $Z_{j(i)}$:

$$Z_{j(i)} = \left(\frac{1}{n_j - n_{ij}} \right) \left(\sum_{k=0}^{n_j} (\bar{P}_{ik}) - \sum_{c=0}^{n_{ij}} (\bar{P}_{ic}) \right) \tag{3}$$

where n_j is the number of criminal matters assigned to magistrate j and n_{ij} is the number of criminal matters of individual i assigned to magistrate j . This magistrate severity measure is used as an instrumental variable in the first-stage regression outlined in equation (2) to predict whether the offender is sentenced to prison with a non-parole period. The standard errors are two-way clustered at the individual and magistrate level.

Assessing the instrument

A number of assumptions must be satisfied in order for the magistrate severity measure to be considered a valid IV. These assumptions are instrument relevance, random assignment of cases to magistrates, monotonicity and the exclusion restriction. This section presents empirical support for these first three assumptions.

Instrument relevance: First-stage relationship

A criterion for the validity of magistrate severity as an instrument is that the variation in the magistrate severity measure is strongly related to the likelihood of being sentenced to a prison term of greater than 6 months (i.e., the first-stage relationship described in equation (2)). Table 1 presents the results from regressing magistrate severity on the likelihood of being sentenced to more than 6 months. Column 1 does not include any additional variables. These control variables are subsequently added to the model in column 2. The estimates reveal that there is a strong first-stage relationship. The coefficient in column 1 is large and statistically significant at the 1 per cent level and is relatively stable upon including the full set of controls (column 2).

Table 1. Instrumental variables first-stage results: Magistrate severity and non-parole period

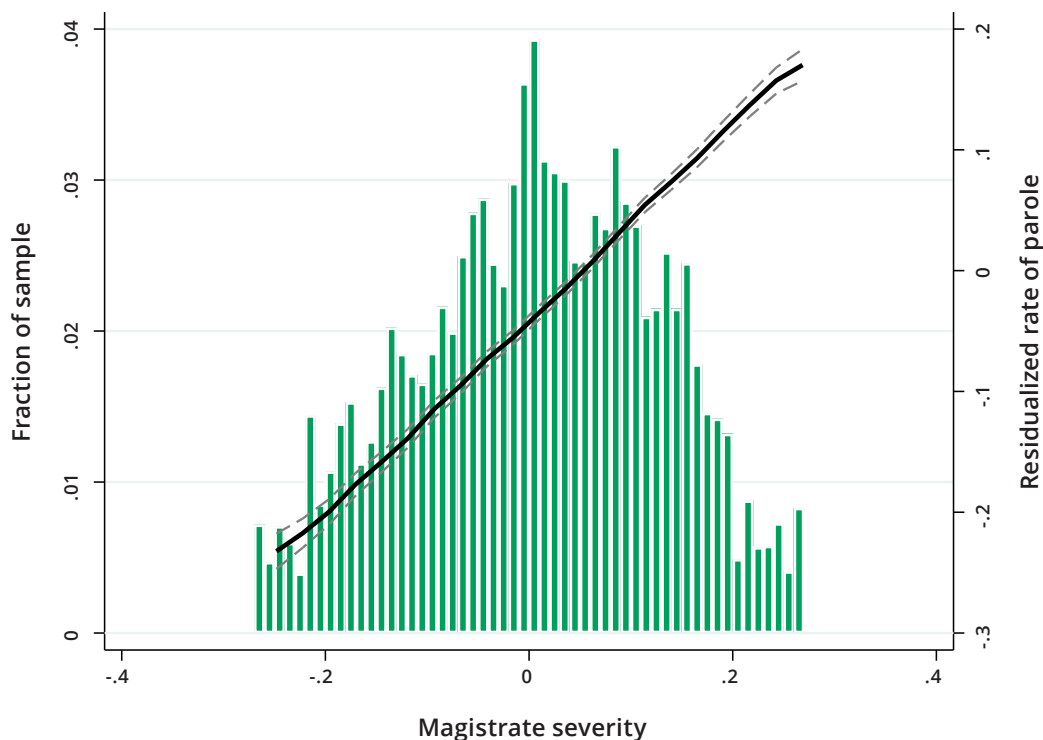
	No controls (1)	Full controls (2)
Parole supervision	0.745*** (0.028)	0.651*** (0.027)
<i>Controls</i>		
Demographics	No	Yes
Offences at index court finalisation	No	Yes
Prior offending history	No	Yes
<i>N</i>	60,569	60,569
<i>Number of magistrates</i>	209	209

Note. Robust standard errors two-way clustered at the offender and magistrate level are reported in brackets. Each regression includes fixed effects for court location, and month and year of court finalisation.

*** $p < .01$, ** $p < .05$, * $p < .10$.

Figure 1 provides an illustration of the variation in the relationship between magistrate severity and the likelihood of being sentenced to more than 6 months, controlling for court-by-time fixed effects. It is apparent from the figure that the rate of being sentenced to prison with a non-parole period is positively correlated with the magistrate severity measure, which supports the existence of the first-stage relationship.

Figure 1. The distribution of magistrate severity and the first-stage relationship



Instrument validity: Random assignment of magistrates and assessment of monotonicity assumption

Another criterion for the validity of magistrate severity as an instrument is that the assignment of cases to magistrates is unrelated to defendant and case characteristics. In other words, the assignment of cases to magistrates should occur at random. To assess this assumption, a variety of defendant and case characteristics, such as offender demographics, index offence type and prior offending history, are regressed on the magistrate severity measure in an OLS regression. If cases are assigned to magistrates at random, there should not be an empirical relationship between the defendant and case characteristics and the measure of magistrate severity. The model controls for court-by-time fixed effects and includes two-way clustered standard errors at the individual and magistrate level.

The OLS estimates shown in Table 2 suggest that criminal matters are assigned to magistrates randomly. While the joint *F*-test statistic is quite large (joint *p*-value = 0.013) and gender and a binary variable for indictable offence are statistically significant at 5 per cent, the magnitude of each of the coefficients throughout column 1 are very small. Ideally, a strict test of randomisation requires that the joint *F*-test and all individual coefficients are not statistically significant but the very small size of the coefficients suggests that case characteristics are not correlated with the measure of magistrate severity.

Table 2. Regression of the magistrate severity instrumental variable on defendant and case characteristics

	Magistrate severity (1)
Aboriginal	0.00009 (0.001)
Male	0.003** (0.002)
Age at index court finalisation	-0.00008 (0.00008)
At least one violent offence	0.002 (0.002)
At least one property offence	-0.002 (0.002)
At least one domestic violence offence	-0.00003 (0.002)
At least one drug offence	-0.0009 (0.002)
At least one traffic offence	0.001 (0.002)
At least one indictable offence	0.005** (0.002)
Juvenile at first contact	-0.002 (0.001)
Number of prior finalised criminal court appearances	0.0001 (0.0001)
Number of prior prison sentences	-0.00004 (0.0002)
Prior proven violence offence past 5 years	-0.001 (0.001)
Prior proven property offence past 5 years	-0.001 (0.001)
Prior proven domestic violence offence past 5 years	-0.00005 (0.001)
Prior proven drug offence past 5 years	-0.001 (0.001)
Prior proven traffic offence past 5 years	0.0005 (0.001)
<i>N</i>	60,569
Joint <i>F</i> -test statistic	32.440
<i>p</i> -value	0.013

Note. Robust standard errors clustered at the individual and magistrate level are reported in brackets.

*** $p < .01$, ** $p < .05$, * $p < .10$.

In this study, the exclusion restriction assumption is that magistrates only influence recidivism outcomes through the likelihood of being sentenced to a prison term of greater than 6 months. While the estimates in Table 2 indicate that criminal matters are assigned to magistrates at random, this could still be violated if the assignment of magistrates impacts recidivism via channels other than sentencing severity. Although it is not possible to directly test, the exclusion restriction assumption is reasonable in the context of this study. Criminal matters in the Local Court are typically finalised sooner than in the higher courts, which limits the extent of interaction between the magistrate and defendant.¹¹ Consequently, this reduces the likelihood that magistrate assignment impacts recidivism through different channels. Nevertheless, a possible violation of the exclusion restriction assumption is that magistrates can influence recidivism outcomes by sentencing offenders to different prison sentence lengths. Specifically, the exclusion restriction in the IV model assumes that the longer prison sentences imposed by the stricter magistrates would have a specific deterrent effect which is independent of parole supervision. To assess this possibility, a further sensitivity analysis is presented in the results section below, which provides IV estimates for “short” prison sentences (i.e., prison sentences of up to 12 months).

An additional assumption of the IV model in this study is that the impact of magistrate assignment on the probability of being sentenced to a prison term of greater than 6 months is monotonic across offenders. If the monotonicity assumption is satisfied, this implies that magistrate severity is related to the likelihood of being sentenced to a prison term of greater than 6 months among sub-groups of offenders. The monotonicity assumption ensures that the IV estimates can be interpreted as the average causal effect among offenders who could have received a different incarceration penalty had their matter been assigned to a different magistrate (that is, the LATE). Table 3 displays the first-stage estimates among the inmate sub-groups of interest; specifically, ex-inmates with an LSI-R score of Medium and above (column 1) or below Medium (column 2), and Aboriginal (column 3) and non-Aboriginal offenders (column 4). Each column includes the full set of control variables and fixed effects for court, and month and year of court finalisation. The first-stage estimates for each sub-group of ex-inmates throughout Table 3 are all sizeable and positive, which is consistent with the monotonicity assumption.

Table 3. IV first-stage results by sub-group: Monotonicity check

	LSI-R Medium or above (1)	LSI-R below Medium (2)	Aboriginal (3)	Non-Aboriginal (4)
Parole supervision	0.619*** (0.029)	0.714*** (0.034)	0.649*** (0.032)	0.650*** (0.031)
<i>Controls</i>				
Demographics	Yes	Yes	Yes	Yes
Offences at index court finalisation	Yes	Yes	Yes	Yes
Prior offending history	Yes	Yes	Yes	Yes
<i>N</i>	45,860	14,709	27,282	33,287
<i>Number of magistrates</i>	209	209	209	209

Note. Robust standard errors are two-way clustered at the offender and magistrate level and are reported in brackets. The results in each column include the full set of control variables and fixed effects for court, and month and year of court finalisation.

*** $p < .01$, ** $p < .05$, * $p < .10$

¹¹ For instance, during the period July 2018 to June 2019, the median number of days between first appearance to sentence after a guilty plea is 28 days in the Local Court. In contrast, in the District Court, the median number of days between first appearance to sentence following sentence committal or trial committal is 182 and 306 days, respectively, over the same period. Criminal court statistics are available on the NSW BOCSAR website: https://www.bocsar.nsw.gov.au/Pages/bocsar_publication/Pub_Summary/CCS-Annual/Criminal-Court-Statistics-Jun-2020.aspx (accessed: 10 October 2021).

RESULTS

Descriptive statistics

Table 4 summarises the characteristics of the sample. The sample included 38,879 inmates released onto parole (column 1) and 21,690 inmates who were released from prison unconditionally (column 2). Each row in the table contains the group mean for each characteristic. The associated standard error is displayed in brackets. Column 3 calculates the difference between parolees and ex-inmates released unconditionally for each characteristic.

Panel A contains information regarding offender demographics. Both the parolee and unconditional release groups had similar proportions of Aboriginal and male offenders; roughly 45 per cent were Aboriginal and nearly 90 per cent were male. Their average age was also similar (approximately 40 years) but parolees were slightly younger. Slightly less than half of parolees (46.1 per cent) and ex-inmates released unconditionally (45.9 per cent) resided in an urban area at their index court finalisation.

Panel B describes the types of offences that parolees and ex-inmates released unconditionally were charged with at their index court finalisation. Unsurprisingly, ex-inmates released on parole commit relatively more serious offences. Nearly half of parolees were charged with at least one violent offence (47.6 per cent) compared to 32.8 per cent of ex-inmates released unconditionally. Parolees were also 9.4 percentage points more likely to be charged with at least one domestic violence (DV) offence, 8.7 percentage points more likely to be charged with at least one traffic offence and 10.8 percentage points more likely to be charged with at least one indictable offence. Other descriptive statistics in Panel B indicate that parolees were more likely to be bail refused at finalisation (4.0 percentage point difference) and have approximately 2 more proven concurrent charges. As expected, parolees were also sentenced to longer prison sentences than those released unconditionally.

Next, Panel C summarises the prior offending history of each group. Although parolees and ex-inmates released unconditionally had a similar average number of prior prison sentences and prior finalised criminal court appearances, parolees were slightly more likely to have been a juvenile at their first known contact with the criminal justice system. Further, parolees were 5.5 percentage points more likely to have an LSI-R score of Medium or above. Offenders with an LSI-R score of Medium or above are typically considered to be at greater risk of recidivism. A greater proportion of parolees had at least one prior proven DV and traffic offence in the 5 years prior to the index court finalisation compared with prisoners released unconditionally. Conversely, parolees were less likely to have had at least one proven violent, property or drug offence in the 5 years prior to index court finalisation.

Table 4. Descriptive statistics: Parolees and ex-inmates released from prison unconditionally

	Parolees (1)	Released unconditionally (2)	Difference (3)
<i>Panel A. Demographics</i>			
Aboriginal	0.452 (0.003)	0.448 (0.003)	0.004
Male	0.895 (0.002)	0.887 (0.002)	0.008***
Age	39.564 (0.050)	40.671 (0.067)	-1.017***
Urban residence	0.461 (0.003)	0.459 (0.003)	0.002
<i>Panel B. Offences at index court finalisation</i>			
At least one violent offence	0.476 (0.003)	0.328 (0.003)	0.148***
At least one property offence	0.381 (0.002)	0.387 (0.003)	-0.006
At least one domestic violence offence	0.342 (0.002)	0.248 (0.003)	0.094***
At least one drug offence	0.150 (0.002)	0.148 (0.002)	0.002
At least one traffic offence	0.257 (0.002)	0.170 (0.003)	0.087***
Indictable offence	0.920 (0.001)	0.812 (0.003)	0.108***
Bail refused at finalisation	0.624 (0.002)	0.537 (0.003)	0.040***
Proven concurrent charges	5.406 (0.029)	3.543 (0.025)	1.863***
Prison sentence length (months)	12.360 (0.023)	4.803 (0.030)	7.557***
<i>Panel C. Prior offending history</i>			
Number of prior prison sentences	3.248 (0.022)	3.715 (0.030)	-0.467***
Number of prior finalised criminal court appearances	11.096 (0.041)	11.596 (0.057)	-0.500***
Juvenile at first contact	0.464 (0.003)	0.452 (0.003)	0.012***
LSI-R Medium or above at release	0.777 (0.002)	0.722 (0.003)	0.055***
Prior violent offence past 5 years	0.580 (0.003)	0.594 (0.003)	-0.014***
Prior property offence past 5 years	0.497 (0.003)	0.564 (0.003)	-0.067***
Prior domestic violence offence past 5 years	0.392 (0.002)	0.326 (0.003)	0.066***
Prior drug offence past 5 years	0.353 (0.002)	0.388 (0.003)	-0.035***
Prior traffic offence past 5 years	0.496 (0.003)	0.462 (0.003)	0.034***
<i>N</i>	38,879	21,690	

Note. Standard errors are reported in brackets.

*** $p < .01$, ** $p < .05$, * $p < .10$.

Unadjusted recidivism rates among parolees and ex-inmates released unconditionally

The unadjusted rates for parolees and ex-inmates released unconditionally for each of the three recidivism outcomes is displayed in Table 5. Columns 1 and 2 contain the proportion of parolees or ex-inmates released unconditionally who re-offended within 12 or 24 months. Column 3 calculates the difference in the unadjusted recidivism rates between parolees and ex-inmates released unconditionally.

Starting with Panel A, we see that a smaller proportion of parolees re-offended within 12 months of release compared with prisoners released unconditionally. Amongst parolees (column 1 of Panel A), 51.6 per cent were re-convicted of a new, proven offence of any type, 36.6 per cent committed a personal, property or serious drug offence, and 26.6 were re-imprisoned. In contrast, 57.0 per cent of ex-inmates released unconditionally (column 2 of Panel A) were re-convicted of any new offence, 42.9 per cent committed a personal, property or serious drug offence, and 27.5 per cent were re-imprisoned within 12 months of release.

There is a similar pattern of results for recidivism within 24 months of release from prison (Panel B). Parolees were 2.9 percentage points less likely to be re-convicted and 4.1 percentage points less likely to commit a personal, property or serious drug offence than ex-inmates released unconditionally (column 3). However, after 24 months, both parolees and ex-inmates released unconditionally have almost identical rates of re-imprisonment.

The unadjusted rates in Table 5 do not account for any systematic differences between groups on factors related to offending behaviour. To measure a causal relationship between parole supervision and recidivism, the next section presents IV estimates using variation in magistrate severity as an instrument.

Table 5. Descriptive statistics: Unadjusted recidivism rates for parolees and ex-inmates released from prison unconditionally

	Parolees (1)	Released unconditionally (2)	Difference (3)
<i>Panel A. Recidivism within 12 months of release</i>			
Re-conviction	0.516 (0.003)	0.570 (0.003)	-0.054***
Personal, property or serious drug offence	0.366 (0.002)	0.429 (0.003)	-0.063***
Re-imprisonment	0.266 (0.002)	0.275 (0.003)	-0.009**
<i>N</i>	38,879	21,690	
<i>Panel B. Recidivism within 24 months of release</i>			
Re-conviction	0.670 (0.003)	0.699 (0.003)	-0.029***
Personal, property or serious drug offence	0.513 (0.003)	0.554 (0.004)	-0.041***
Re-imprisonment	0.318 (0.003)	0.313 (0.003)	0.005
<i>N</i>	32,889	19,423	

Note. Standard errors are reported in brackets. Panel A includes offenders released from prison until 31 March 2019, and panel B includes offenders released up until 31 March 2018.

*** $p < .01$, ** $p < .05$, * $p < .10$.

Main results: IV (2SLS) estimates of the effect of parole supervision on recidivism

Table 6 displays the IV (2SLS) results comparing recidivism rates for parolees and ex-inmates released unconditionally for the full sample. Panels A and B include recidivism within 12 and 24 months of release from prison, respectively. Each row presents the IV estimates of the effect of parole supervision for each of the three recidivism outcomes. The control variables are progressively added to the IV specification in columns 1 to 3. The IV model in column 1 includes ex-inmate demographics only. Offence characteristics at index court finalisation are added to the specification in column 2 and prior offending history is included in column 3. Overall, the results presented in Table 6 indicate that parolees are substantially less likely to re-offend than ex-inmates released unconditionally.

Table 6. Instrumental variable (2SLS) results for the effect of parole supervision on recidivism

	No controls (1)	Partial controls (2)	Full controls (3)
<i>Panel A. Recidivism outcomes within 12 months of release</i>			
Re-conviction	-0.077*** (0.027)	-0.063** (0.026)	-0.100*** (0.024)
Personal, property or serious drug offence	-0.085*** (0.024)	-0.071*** (0.023)	-0.103*** (0.022)
Re-imprisonment	-0.040 (0.026)	-0.028 (0.025)	-0.050** (0.024)
<i>N</i>	60,569	60,569	60,569
<i>Panel B. Recidivism outcomes within 24 months of release</i>			
Re-conviction	-0.046* (0.027)	-0.040 (0.025)	-0.087*** (0.024)
Personal, property or serious drug offence	-0.044 (0.028)	-0.036 (0.026)	-0.080*** (0.024)
Re-imprisonment	-0.006 (0.031)	0.004 (0.030)	-0.027 (0.028)
<i>N</i>	52,312	52,312	52,312
<i>Controls</i>			
Demographics	Yes	Yes	Yes
Offences at index court finalisation	No	Yes	Yes
Prior offending history	No	No	Yes

Note. Robust standard errors are two-way clustered at the offender and magistrate level are reported in brackets. The outcome variable is listed in each row. Each regression includes fixed effects for court location, and month and year of release from prison and court finalisation. Panel A includes offenders released from prison until 31 March 2019, and panel B includes offenders released up until 31 March 2018.

*** $p < .01$, ** $p < .05$, * $p < .10$.

Beginning with Panel A, across each of the IV specifications, parolees are significantly less likely to re-offend within 12 months of release compared with those released unconditionally. The size of the reduction in recidivism is relatively stable across columns 1 to 3. After including the full set of control variables (column 3), relative to ex-inmates released unconditionally, parolees are 10.0 percentage

points less likely to be re-convicted of any offence, which is an 18 per cent decrease from the mean; 10.3 percentage points less likely to commit a personal, property or serious drug offence, which is a 24 per cent decrease from the mean; and 5.0 percentage points less likely to be re-imprisoned, which is an 18 per cent decrease from the mean. Each of these reductions is statistically significant.

The reductions in recidivism among parolees are still apparent 24 months after release from prison (see Panel B). However, the IV estimates in Panel B are smaller, which suggests that the impact of parole supervision is slightly diminished after 24 months post-release. The results in column 3 indicate that parolees are significantly less likely to be re-convicted of any offence (8.7 percentage points) and significantly less likely to commit a personal, property or serious drug offence (8.0 percentage points) within 24 months of release compared with prisoners released unconditionally. Parolees are also 2.7 percentage points less likely to be re-imprisoned 24 months after discharge than prisoners released unconditionally, but this difference is not statistically significant.^{12, 13}

Recidivism among ex-inmate sub-groups

The results presented in Table 6 indicate that, for the full sample, being released on parole significantly reduces the likelihood that an ex-inmate will re-offend compared with those released unconditionally. Next, Table 7 presents IV results for the impact of parole supervision on recidivism among different sub-groups. Specifically, columns 1 and 2 display the findings for ex-inmates with an LSI-R score of Medium or above and an LSI-R below Medium, respectively. Offenders with an LSI-R of Medium or above are typically considered to be at greater risk of recidivism. Columns 3 and 4 present the results by Aboriginality. The results in each column include the full set of control variables.

Panel A of Table 7 contains the IV results for recidivism within 12 months of release from prison. Beginning with column 1, high-risk parolees are 8.6 percentage points less likely to be re-convicted and are 11.7 percentage points less likely to commit a personal, property or serious drug offence compared with high-risk ex-inmates released unconditionally. Both these reductions are statistically significant at 1 per cent. High-risk parolees are also less likely to be re-imprisoned (4.8 percentage points), but the reduction is not statistically significant. Furthermore, the results in column 2 of Panel A indicate that parolees with an LSI-R below Medium are less likely to re-offend for each outcome. The reduction in re-conviction (14.3 percentage points), personal, property or serious drug offending (6.9 percentage points), and re-imprisonment (6.4 percentage points) among parolees with an LSI-R below Medium is large and statistically significant at 1 or 5 per cent.

Columns 3 and 4 separate the results by Aboriginal and non-Aboriginal ex-inmates, respectively. Starting with column 3, within 12 months of release, Aboriginal parolees are less likely to be re-convicted (10.9 percentage points), are less likely to commit a personal, property or serious drug offence (14.4 percentage points), and are less likely to be re-imprisoned (6.5 percentage points) than Aboriginal ex-inmates released unconditionally. These reductions are statistically significant. Non-Aboriginal parolees are also less likely to re-offend (column 4). They are 8.7 percentage points less likely to be re-convicted, 6.0 percentage points less likely to commit a personal, property or serious drug offence, and 3.9 percentage points less likely to be re-imprisoned. However, only the reductions in re-conviction and personal, property or serious drug offending are statistically significant.

12 Table A1 in the appendix displays the corresponding OLS estimates. Each row represents the outcome variables and controls are added progressively from columns 1 to 3. Panels A and B include recidivism within 12 and 24 months of release from prison, respectively. Overall, the OLS estimates shown in Table 6 indicate that parolees are less likely to re-offend than ex-inmates released unconditionally. However, the magnitude of the OLS estimates are consistently smaller for each recidivism outcome compared with the IV estimates in Table 6. This is especially the case for the effect of parole supervision on re-imprisonment; while the OLS coefficients suggest that there is no significant difference in the likelihood of re-imprisonment within 12 or 24 months after release (column 3), the IV estimates indicate a reduction in re-imprisonment among parolees, particularly within 12 months of release. The difference in the magnitude of the estimates is likely due to bias from unobserved variables affecting the OLS coefficients.

13 In the appendix, Table A2 contains estimates of the impact of parole supervision on each recidivism outcome within 12 months of 'free time' post-release. Measuring 'free time' accounts for any time spent in custody following release from prison and includes ex-inmates who have effectively spent 12 months in the community after release from prison. Overall, the IV estimates in Table A2 are very similar to those presented in Table 6; that is, being released on parole reduces the likelihood an ex-inmate will re-offend.

Panel B displays the results for recidivism within 24 months of release from prison for each sub-group. In general, the reductions in recidivism observed within one year of release persist in the longer term across the various sub-groups of parolees. High-risk parolees (column 1) are less likely to be re-convicted (6.3 percentage points) and less likely to commit a personal, property or serious drug offence (9.5 percentage points) relative to ex-inmates released unconditionally and these reductions are statistically significant at 5 per cent. While high-risk parolees are also 1.6 percentage points less likely to be re-imprisoned 24 months after release than those released unconditionally, the difference is not statistically significant. Parolees with an LSI-R below Medium (column 2) are also less likely to re-offend in the longer term; the reductions in re-conviction (17.1 percentage points) and re-imprisonment (5.6 percentage points) are statistically significant. They are also less likely to commit a personal, property or serious drug offence (5.3 percentage points), but the difference is not statistically significant.

Columns 3 and 4 of Panel B contain the IV results for Aboriginal and non-Aboriginal ex-inmates, respectively, for recidivism within 24 months of release. Once more, there are large and statistically significant reductions in recidivism among Aboriginal and non-Aboriginal parolees. In particular, the reductions in the probability of re-conviction or committing a personal, property or serious drug offence for both Aboriginal and non-Aboriginal parolees are large and statistically significant. While both Aboriginal and non-Aboriginal parolees are also less likely to be re-imprisoned 24 months after release than those released unconditionally, the differences are not statistically significant.

Table 7. Instrumental variable (2SLS) results by sub-group: parolees and ex-inmates released unconditionally

	LSI-R Medium or above (1)	LSI-R below Medium (2)	Aboriginal (3)	Non-Aboriginal (4)
<i>Panel A. Recidivism outcomes within 12 months of release</i>				
Re-conviction	-0.086*** (0.028)	-0.143*** (0.044)	-0.109*** (0.034)	-0.087*** (0.032)
Personal, property or serious drug offence	-0.117** (0.027)	-0.069** (0.034)	-0.144*** (0.032)	-0.060** (0.026)
Re-imprisonment	-0.048 (0.031)	-0.064** (0.030)	-0.065* (0.036)	-0.039 (0.025)
<i>N</i>	45,860	14,709	27,282	33,287
<i>Panel B. Recidivism outcomes within 24 months of release</i>				
Re-conviction	-0.063** (0.026)	-0.171*** (0.048)	-0.076** (0.031)	-0.090*** (0.032)
Personal, property or serious drug offence	-0.095** (0.028)	-0.053 (0.041)	-0.097** (0.039)	-0.063** (0.031)
Re-imprisonment	-0.016 (0.035)	-0.056* (0.034)	-0.053 (0.042)	-0.004 (0.030)
<i>Controls</i>				
Demographics	Yes	Yes	Yes	Yes
Offences at index court finalisation	Yes	Yes	Yes	Yes
Prior offending history	Yes	Yes	Yes	Yes
<i>N</i>	39,665	12,647	23,577	28,735

Note. Robust standard errors are two-way clustered at the offender and magistrate level and are reported in brackets. The outcome variable is listed in each row. The results in each column include the full set of control variables and fixed effects for court location, and month and year of release from prison and court finalisation. Panel A includes offenders released from prison until 31 March 2019, and panel B includes offenders released up until 31 March 2018.

*** $p < .01$, ** $p < .05$, * $p < .10$.

Robustness check: IV (2SLS) results for the effect of parole supervision on recidivism for prison sentences of up to 12 months

To measure the causal impact of parole supervision on recidivism, the IV model outlined in equation 2 uses the variation in the sentencing severity of quasi-randomly assigned magistrates as an instrument of release on parole. However, stricter magistrates are both more likely to sentence offenders to prison sentences with a non-parole period and to longer prison sentences. Consequently, if there exists a relationship between sentence length and recidivism (which is independent of parole supervision), the IV estimates presented in Table 6 would reflect both the influence of sentence length and parole supervision on recidivism.

Table 8. Instrumental variable (2SLS) results for the effect of parole supervision on recidivism with ‘short’ sentences

	Recidivism within 12 months of release (1)	Recidivism within 24 months of release (2)
<i>Panel A. Recidivism outcomes for sentences up to 12 months</i>		
Re-conviction	-0.085*** (0.024)	-0.055** (0.024)
Personal, property or serious drug offence	-0.078*** (0.022)	-0.065*** (0.024)
Re-imprisonment	-0.041* (0.023)	-0.022 (0.026)
<i>N</i>	47,242	47,242
<i>Panel B. Recidivism outcomes for sentences between 3 and 9 months</i>		
Re-conviction	-0.063* (0.034)	-0.026 (0.032)
Personal, property or serious drug offence	-0.078** (0.035)	-0.036 (0.035)
Re-imprisonment	-0.025 (0.036)	-0.019 (0.037)
<i>N</i>	20,819	20,819
<i>Controls</i>		
Demographics	Yes	Yes
Offences at index court finalisation	Yes	Yes
Prior offending history	Yes	Yes

Note. Robust standard errors are two-way clustered at the offender and magistrate level are reported in brackets. The outcome variable is listed in each row. The results in each column include the full set of control variables and fixed effects for court location, and month and year of release from prison and court finalisation.

*** $p < .01$, ** $p < .05$, * $p < .10$.

In order to exclude the possibility that sentence length confounds a causal relationship between parole supervision and recidivism, Table 8 presents IV results for offenders who received short prison sentences only. Specifically, Panel A contains IV estimates for ex-inmates sentenced to prison for up to 12 months and Panel B displays the estimates for ex-inmates sentenced to prison for between 3 and 9 months.

Columns 1 and 2 of Table 8 display the IV estimates for recidivism within 12 and 24 months of release, respectively. The IV results presented throughout Table 8 include the full set of control variables. If sentence length does not influence the recidivism outcomes, the IV estimates for ex-inmates with 'short' sentences should be consistent with the main results presented in Table 6.

Beginning with Panel A, the results indicate that parolees with sentences of up to 12 months are less likely to re-offend across each of the outcomes measured within 12 and 24 months of release. Although magnitude of the estimates is relatively smaller, the results in Panel B suggest that parolees with sentences between 3 and 9 months are also less likely to re-offend. While the smaller estimates presented in Panel B could be due to the shorter length of parole supervision, the sample size in Panel B is considerably reduced as well. Overall, the estimates presented in Table 8 are consistent with the main IV results presented in Table 6. That is, the range of estimates presented throughout these analyses indicate that parolees are less likely to re-offend than ex-inmates released unconditionally.

DISCUSSION

The aim of this study was to estimate the causal effect of parole supervision on the risk of recidivism. In order to deal with omitted variable bias, the study adopted an IV approach using variation in the sentencing severity of quasi-randomly assigned magistrates as an instrument. A wide range of factors likely to have influenced treatment choice and recidivism were included in both the first and second stage equations. The IV approach identified the Local Average Treatment Effect, which is the causal effect of parole supervision on recidivism among those who would have received a different prison penalty had their matter been assigned to a more (or less) lenient magistrate. The IV analyses showed that marginal parolees were significantly less likely to be re-convicted; to commit a personal, property or serious drug offence; and, to be re-imprisoned within 12 and 24 months of release from prison compared with those released unconditionally. The size of the effect of parole supervision on re-offending found in this study is particularly impressive considering the risk of detection amongst parolees is potentially higher. Further, given that only a small proportion of all offences come to the attention of authorities the impact on actual re-offending rates, in level terms, would be higher. A sensitivity check with 12 months of 'free time' post-release (see appendix Table A2) ruled out the possibility that the observed effect was due to parolees having less time in the community and therefore reduced opportunities to re-offend.

The sub-group analysis provides further insights into the impact of parole supervision on recidivism. Firstly, for personal, property and serious drug offending, the results indicated a larger reduction in recidivism for offenders with an LSI-R score of Medium or above than those with an LSI-R below Medium. This pattern was observed at both 12 and 24 months after release from prison. This result suggests that, at least for more serious offending, supervision of parolees at high risk of re-offending produces larger reductions in recidivism than those at lower risk. This result is consistent with existing evidence for the Risk Needs Responsivity (RNR) approach, which suggests it is higher risk offenders who benefit most from intensive supervision (Drake, 2011), and also aligns with prior NSW research showing intensive correction orders (which involve high levels of community supervision) to be more effective for offenders in the Medium to High-risk LSI-R categories (Wang & Poynton, 2017). Secondly, the impact of supervision was generally greater for Aboriginal ex-inmates than for non-Aboriginal ex-inmates. This was true for almost all recidivism outcomes within 12 and 24 months of release (the one exception being re-conviction within 24 months). Developing effective supervision strategies and approaches for this group is particularly important as high rates of recidivism have been identified as one of the key drivers of Aboriginal over-representation in custody.

Overall, the findings of this study are largely consistent with other similar studies. For instance, Wan et al. (2014) found that the proportion of prisoners who recorded at least one new proven indictable offence after release from custody was significantly lower (by 5.2 percentage points) for those who were supervised compared with a matched group who received no supervision. The effect found in their study was similar in magnitude to our OLS results, which in turn was smaller than our IV estimates. This difference in magnitude may reflect the fact that OLS and propensity score matching methods are unable to account for unobserved variables and as a result, potentially underestimate the true size of the supervision effect. Similarly, the natural experiment analysed by Kuziemko (2013) found that recidivism rates for inmates, who lost parole eligibility as a result of the 90 per cent Georgia reforms, increased by 4 percentage points in the year after the reform was introduced relative to the control group. Again, this result was smaller in size than we estimated in the current study but may not be directly comparable given jurisdictional differences in parole systems.

As the main results indicate that parole supervision reduces recidivism, a follow-up question is which components and features of supervision have the greatest impact. In a systematic literature review, Drake (2011) found that intensive supervision focussed only on surveillance has no effect on re-offending rates, but intensive supervision combined with cognitive behavioural or social learning interventions reduced the rate of re-offending by around 10 per cent. An even larger reduction was found among moderate to high-risk offenders who received supervision that adopted an RNR approach. This type of supervision targets offenders' criminogenic needs, and utilises interventions commensurate with an offender's risk of recidivism and abilities (Andrews & Bonta, 2003). Similarly, Wan et al. (2014) found that more active supervision can reduce parolee recidivism but only if it is focused on rehabilitation. These authors found no significant difference between high-level and low-level compliance-focused contacts while under supervision. A limitation of the current work is that information on the level and type of supervision received by parolees included in the study was not available which meant that the question as to what features of supervision are most effective could not be explored. Inclusion of all parolees regardless of whether they were actively supervised may also mean that the results underestimate the impact of supervision.

It is clear from the current results that continued investment in post-release supervision is warranted. The evidence presented in this study indicates that being released to parole supervision reduces recidivism, at least among marginal parolees. However, simply increasing the overall rate at which offenders are supervised in the community is an expensive policy option. For this reason, it is essential that research in this field not only establishes that parole supervision "works" but also attempts to understand why it works, for whom and under what conditions. This will help to further inform and develop strategies to increase the marginal benefits of community supervision for high-risk offenders. Enhanced supervision that incorporates cognitive behavioural therapy (CBT) based activities that parole officers can undertake with supervised offenders does not appear to be sufficient on its own (Ooi, 2020). Combining active, rehabilitation-focused supervision with custodial or post-release programs that target specific needs of offenders, such as housing and employability, may be more promising policy options (Ooi, 2021). Any future parole reforms should however be implemented in such a way that allows for robust and rigorous evaluation of both outcomes and process to be undertaken.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the contribution of the anonymous referees, Ilya Klauzner, Stewart Boiteux, Suzanne Poynton and Sara Rahman for providing valuable feedback and comments, Florence Sin for desktop publishing, and Alana Cook for assisting with the research.

REFERENCES

- Andrews, D. A., & Bonta, J. (2003). *The psychology of criminal conduct (3rd ed.)*. Cincinnati, OH: Anderson.
- Arnold, D., Dobbie, W., & Yang, C. S. (2018). Racial bias in bail decisions. *The Quarterly Journal of Economics*, 133(4), 1885-1932.
- Bhuller, M., Dahl, G. B., Løken, K. V., & Mogstad, M. (2020). Incarceration, recidivism, and employment. *Journal of Political Economy*, 128(4), 1269-1324.
- Bonta, J., & Andrews, D. A. (2007). Risk-need-responsivity model for offender assessment and rehabilitation. *Rehabilitation*, 6(1), 1-22.
- Drake, E. (2011). "What works" in community supervision: Interim report (Document No. 11-12-1201). Retrieved 18 June 2021 from Washington State Institute for Public Policy website: <http://www.wsipp.wa.gov/ReportFile/1094>.
- Dobbie, W., Goldin, J., & Yang, C. S. (2018). The effects of pretrial detention on conviction, future crime, and employment: Evidence from randomly assigned judges. *American Economic Review*, 108(2), 201-40.
- Durose, M. R., Cooper, A. D., & Snyder, H. N. (2014). Recidivism of prisoners released in 30 States in 2005: Patterns from 2005-2010. Retrieved 29 June 2021 from the US Bureau of Justice Statistics website: <https://bjs.ojp.gov/content/pub/pdf/rprts05p0510.pdf>.
- Kuziemko, I. (2013). How should inmates be released from prison? An assessment of parole versus fixed-sentence regimes. *The Quarterly Journal of Economics*, 128(1), 371-424.
- Ooi, E.J. (2020). *The impact of the Practice Guide for Intervention (PGI) on recidivism among offenders serving a community-based order* (Crime and Justice Bulletin No. 229). Retrieved 18 June 2021 from NSW Bureau of Crime Statistics and Research website: <https://www.bocsar.nsw.gov.au/Publications/CJB/2020-Report-PGI-on-recidivism-among-offenders-serving-community-based-order-CJB229.pdf>.
- Ooi, E.J. (2021). *Vocational training in NSW prisons: Exploring the relationship between traineeships and recidivism* (Crime and Justice Bulletin No. 239). Retrieved 01 December 2021 from NSW Bureau of Crime Statistics and Research website: <https://www.bocsar.nsw.gov.au/Publications/CJB/2021-Report-Vocational-training-in-NSW-prisons-CJB239.pdf>.
- Ostermann, M. (2013). Active supervision and its impact upon parolee recidivism rates. *Crime & Delinquency*, 59(4), 487-509.
- Ostermann, M. (2015). How do former inmates perform in the community? A survival analysis of rearrests, reconvictions, and technical parole violations. *Crime & Delinquency*, 61(2), 163-187.
- Payne, J. (2007). *Recidivism in Australia: findings and future research*. Australian Institute of Criminology, Research and Public Policy Series No. 80.
- Rahman, S. (2019). *The marginal effect of bail decisions on imprisonment, failure to appear, and crime* (Crime and Justice Bulletin No. 224). Retrieved 22 August 2021 from NSW Bureau of Crime Statistics and Research website: <https://www.bocsar.nsw.gov.au/Publications/CJB/2019-Report-Bail-decisions-on-imprisonment-CJB224.pdf>.
- Solomon, A. L., Kachnowski, V. & Bhati, A. (2005). *Does parole work? Analyzing the impact of postprison supervision on re-arrest outcomes*. Washington: Urban Institute.
- Stavrou, E., Poynton, S. & Weatherburn, D. (2016). *Parole release authority and re-offending* (Crime and Justice Bulletin No. 194). Sydney: NSW Bureau of Crime Statistics and Research. <https://www.bocsar.nsw.gov.au/Publications/CJB/Report-2016-Parole-release-authority-and-reoffending-cjb194.pdf>

Vito, G. F., Higgins, G. E., & Tewksbury, R. (2017). The effectiveness of parole supervision: Use of propensity score matching to analyze reincarceration rates in Kentucky. *Criminal Justice Policy Review*, 28(7), 627-640.

Wan, W. Y., Poynton, S., Doorn, G. & Weatherburn, D. (2014). *Parole supervision and reoffending* (Trends & Issues in Crime and Criminal Justice No. 485). Canberra: Australian Institute of Criminology. Retrieved 18 June 2021 from Australian Institute of Criminology website: <https://www.aic.gov.au/publications/tandi/tandi485>.

Wang, J. J. & Poynton, S. (2017). *Intensive correction orders versus short prison sentence: A comparison of re-offending* (Crime and Justice Bulletin No. 207). Retrieved 18 June 2021 from NSW Bureau of Crime Statistics and Research website: <https://www.bocsar.nsw.gov.au/Publications/CJB/2017-Report-Intensive-correction-orders-versus-short-prison-sentence-CJB207.pdf>.

Williams, J., & Weatherburn, D. (2020). Can Electronic Monitoring Reduce Reoffending? *The Review of Economics and Statistics*, 1-46.

Zapryanova, M. (2020). The effects of time in prison and time on parole on recidivism. *The Journal of Law & Economics*, 63(4), 699-727.

APPENDIX

Comparison with OLS estimates of the effect of parole supervision on recidivism

Table A1 displays the OLS estimates of the effect of parole supervision on recidivism in comparison with ex-inmates released unconditionally. Each row represents the outcome variables and controls are added progressively from columns 1 to 3. Panels A and B include recidivism within 12 and 24 months of release from prison, respectively. Overall, the OLS estimates shown in Table A1 indicate that parolees are less likely to re-offend than ex-inmates released unconditionally. However, the magnitude of the OLS estimates are consistently smaller for each recidivism outcome compared with the IV estimates in Table 6. This is especially the case for the effect of parole supervision on re-imprisonment; while the OLS coefficients suggest that there is no significant difference in the likelihood of re-imprisonment within 12 or 24 months after release (column 3), the IV estimates indicate a reduction in re-imprisonment among parolees, particularly within 12 months of release. The difference in the magnitude of the estimates is likely due to bias from unobserved variables affecting the OLS coefficients.

Table A1. OLS results for the effect of parole supervision on recidivism

	No controls (1)	Partial controls (2)	Full controls (3)
<i>Panel A. Recidivism outcomes within 12 months of release</i>			
Re-conviction	-0.052*** (0.005)	-0.032*** (0.005)	-0.057*** (0.005)
Personal, property or serious drug offence	-0.051*** (0.005)	-0.034*** (0.005)	-0.055*** (0.005)
Re-imprisonment	0.0003 (0.004)	0.011** (0.004)	-0.004 (0.004)
<i>N</i>	60,569	60,569	60,569
<i>Panel B. Recidivism outcomes within 24 months of release</i>			
Re-conviction	-0.028*** (0.005)	-0.013** (0.005)	-0.045*** (0.005)
Personal, property or serious drug offence	-0.031*** (0.006)	-0.017*** (0.006)	-0.045*** (0.005)
Re-imprisonment	0.014*** (0.005)	0.024*** (0.005)	0.005 (0.005)
<i>N</i>	52,312	52,312	52,312
<i>Controls</i>			
Demographics	Yes	Yes	Yes
Offences at index court finalisation	No	Yes	Yes
Prior offending history	No	No	Yes

Note. Robust standard errors are two-way clustered at the offender and magistrate level are reported in brackets. The outcome variable is listed in each row. Each regression includes fixed effects for court location, and month and year of release from prison and court finalisation. Panel A includes offenders released from prison until 31 March 2019, and panel B includes offenders released up until 31 March 2018.

*** $p < .01$, ** $p < .05$, * $p < .10$.

IV (2SLS) estimates of the effect of parole supervision on recidivism within 12 months of 'free time' post-release

The IV estimates presented in Table A2 consider the impact of parole supervision on each recidivism outcome within 12 months of 'free time' post-release. These free time recidivism outcomes account for any time spent in custody following release from prison and includes ex-inmates who have effectively spent 12 months of 'free time' in the community. This is to account for any differences in the opportunity to commit a new offence arising from parolees being returned to custody for technical breaches of their order. For each re-offending outcome in Table A2, the IV estimates are very similar to those presented in Panel A of Table 6, although slightly smaller in magnitude. That is, in column 3, parolees are less likely to be re-convicted, less likely to commit a new and proven personal, property, or serious drug offence, and less likely to be re-imprisoned within 12 months of 'free time' relative to those released unconditionally. Each of these reductions is statistically significant at the 1 or 5 per cent level. In summary, the IV estimates displayed throughout this study indicate that being released on parole reduces the likelihood an ex-inmate will re-offend in comparison with similar ex-inmates released unconditionally.

Table A2. Instrumental variable (2SLS) results for the effect of parole supervision on recidivism within 12 months of 'free time' post-release

	No controls (1)	Partial controls (2)	Full controls (3)
Re-conviction	-0.058** (0.028)	-0.043* (0.026)	-0.079*** (0.024)
<i>N</i>	59,919	59,919	59,919
Personal, property or serious drug offence	-0.056** (0.028)	-0.041 (0.026)	-0.073*** (0.025)
<i>N</i>	55,428	55,428	55,428
Re-imprisonment	-0.059 (0.036)	-0.044 (0.033)	-0.071** (0.029)
<i>N</i>	43,199	43,199	43,199
<i>Controls</i>			
Demographics	Yes	Yes	Yes
Offences at index court finalisation	No	Yes	Yes
Prior offending history	No	No	Yes

Note. Robust standard errors are two-way clustered at the offender and magistrate level are reported in brackets. The outcome variable is listed in each row. Each regression includes fixed effects for court location, and month and year of release from prison and court finalisation.

*** $p < .01$, ** $p < .05$, * $p < .10$.