

Intensive correction orders versus short prison sentence: A comparison of re-offending

Joanna JJ Wang and Suzanne Poynton

Aim: To compare reoffending rates between those who received an intensive correction order (ICO) and those who received short prison sentence (less than two years).

Method: Offenders' demographic characteristics, index offence characteristics, prior convictions and penalties, LSI-R score and re-offences were extracted from the Re-offending Database maintained by the NSW Bureau of Crime Statistics and Research. Using logistic regression model with inverse probability of treatment weighting, the effect of penalty choice on re-offending was estimated. Doubly robust estimation and bivariate probit model with an instrumental variable were also used to address potential model misspecification and endogeneity of penalty assignment. As a sensitivity analysis, separate modelling was performed for offenders who were in medium to high risk categories and the prison group was restricted to those with 6 months or less fixed term.

Results: There was a 11%-31% reduction in the odds of re-offending for an offender who received an ICO compared with an offender who received a prison sentence of up to 24 months. The bivariate probit model with an instrumental variable did not reveal a significant effect or evidence of endogeneity.

Conclusion: These results further strengthen the evidence base suggesting that supervision combined with rehabilitation programs can have a significant impact on reoffending rates.

Keywords: intensive correction order, re-offending, propensity score weighting, bivariate probit model.

INTRODUCTION

In 2010, the NSW Government abolished sentences of periodic detention and replaced them with a new sentencing option known as an Intensive Correction Order (ICO). Like periodic detention, an ICO is an alternative to a full-time custodial sentence and can only be issued if the court has already decided to impose a prison sentence of no more than 2 years in length and determined that the sentence should not be suspended. An ICO is served in its entirety in the community and includes supervision and monitoring by community corrections.

To be eligible for an ICO, an offender must be at least 18 years of age and not be charged with a prescribed sexual offence. An offender must also be deemed suitable by Corrective Services NSW (CSNSW). In assessing an offenders' suitability for an ICO, CSNSW is required to consider the following factors:

- the age and criminal history of the offender;
- the likelihood that the offender will re-offend;

- any risk associated with managing the offender in the community;
- the likelihood that the offender will commit a domestic violence offence;
- whether the offender will have suitable residential accommodation for the duration of an ICO;
- the offender's drug or alcohol dependency, and physical and mental health and,
- the availability of resources and interventions to address factors associated with the offender's criminal conduct

ICOs have three mandatory conditions with which an offender must comply; (1) completion of a minimum of 32 hours of work supervised by CSNSW, (2) participation in programs as directed by CSNSW and (3) drug testing and alcohol testing on work and program sites (and home if non-consumption of alcohol is imposed by the Court as an additional condition). The sentencing court may also impose additional conditions around employment, alcohol use, electronic monitoring and random home visits.

Box 1. Levels of supervision of ICOs

Level 1	Level 2	Level 3	Level 4
Curfew	Discretionary curfew	No curfew	No curfew
Electronic monitoring	Discretionary electronic monitoring	No electronic monitoring	No electronic monitoring
Minimum face-to-face contact with CSNSW supervisor: weekly.	Minimum face-to-face contact with CSNSW supervisor: fortnightly.	Minimum face-to-face contact with CSNSW supervisor: monthly.	Minimum face-to-face contact with CSNSW supervisor: six-weekly.

The level of supervision and conditions that were applicable to ICOs when they were introduced in 2010 are detailed in Box 1. Offenders started at Level 2 (except in the rare circumstance where electronic monitoring was mandated by the court) and could progress or ‘regress’ through these stages during the course of their sentence depending upon their compliance with order conditions. Revisions were made to this supervision model in March 2012 and further changes were made in April 2013. From April 2013 a standard service delivery model for all supervised orders (i.e. ICOs, supervised bonds, supervised suspended sentences, supervised parole) was adopted by community corrections. Within this new model, supervision level and intensity are determined by an offender’s risk/needs level (assessed by the Level of Service of Inventory – Revised (LSI-R); Andrews & Bonta, 1995) and the potential impact of any subsequent offending (determined by a Community Impact Assessment); rather than the specific order the offender was serving (for further details see Ringland & Weatherburn, 2013).

Previous research undertaken by the NSW Bureau of Crime Statistics and Research (BOCSAR) examined the impact of ICOs on re-offending. In this earlier study, reoffending rates for offenders who received an ICO between 1 October 2010 and 30 September 2012 were compared with 2 groups of matched offenders (1) offenders sentenced to a supervised suspended sentence over the same period and (2) offenders sentenced to a periodic detention order in the 2 years preceding the introduction of ICOs. In both these comparisons lower rates of reoffending were observed for the ICO group. An offender on an ICO had around 30 per cent less risk of re-offending from the time of index finalisation than an offender on periodic detention and a 33 per cent less risk of re-offending than an offender on a supervised suspended sentence. These differences were statistically significant after closely matching offenders on demographic and of offending variables. However, in the suspended sentence comparison the authors were also able to match on LSI-R scores and when this was done, there was no longer a superior effect of ICOs (Ringland & Weatherburn, 2013).

One possible reason for this result is that the supervision model for medium to high-risk offenders on ICOs closely resembled

the supervision model for medium to high-risk offenders serving other community-based orders; and it is these higher-risk offenders whom the evidence suggests benefit most from intensive supervision. A systematic review of community supervision undertaken by the Washington State Institute for Public Policy (see Drake, 2011) found that intensive supervision focused only on surveillance has no impact on reoffending rates but intensive supervision combined with treatment was found to reduce reoffending by about 10 per cent. However, even larger reductions in reoffending (almost 16 per cent) were observed amongst moderate to high-risk offenders who received supervision which adopted a Risk-Needs-Responsivity approach; that is treatment and supervision intensity which is determined by risk level (for further discussion of the RNR approach see Andrews & Bonta, 2003). If moderate to high-risk offenders on ICOs were receiving the same level of community corrections contact and treatment as those serving supervised suspended sentenced its unsurprising that no difference was found after controlling for risk level.

THE CURRENT STUDY

The aim of the current study is to extend the work undertaken by Ringland and Weatherburn (2013) by comparing recidivism rates of offenders who received an ICO with those sentenced to short (less than two years) prison sentences. NSW is currently experiencing unprecedented growth in imprisonment numbers; reaching an all-time high of 13,092 offenders in June 2017. This rise in prison numbers, combined with strong evidence that prison exerts little to no deterrent effect (for a review Nagin, Cullen & Jonson, 2009) has increased the urgency to find effective alternatives to imprisonment. A large number of prisoners currently in custody have been sentenced to terms of less than 2 years in duration and could therefore be eligible and potentially suitable for an ICO. This is supported by a recent statutory review undertaken by the NSW Sentencing Council (2016) which found that ICOs are underutilised and not uniformly applied across NSW (particularly in remote areas). Furthermore, a high proportion of these potentially suitable prisoners are released unconditionally upon sentence expiration after serving fixed prison terms of less than 6 months (almost

half of all persons sentenced to 2 years or less in prison in 2016; n=5,466). Offenders released unconditionally do not receive any support or supervision from CSNSW when in the community. Comparing outcomes for offenders sentenced to ICOs with those serving short prison sentences therefore has important policy implications. If ICOs are more effective than short prison sentences in addressing underlying causes of offending behaviour and reducing recidivism rates expanding their use would have a significant impact on the imprisonment growth rate in NSW.

METHOD

DATA SOURCES

The data for this study were drawn from the BOCSAR Re-offending Database (ROD; Hua & Fitzgerald 2006). ROD contains information on all persons whose criminal case was finalised in a NSW court since 1994, as well as cautions and youth justice conferences since 1998. The information includes detailed demographic characteristics, characteristics of the index court appearance, prior court appearances and penalties received. LSI-R data were obtained from Corrective Services NSW and linked to ROD using a range of person identifiers.

STUDY ELIGIBILITY CRITERIA

The group of interest in this study consisted of all adult offenders who received an ICO as a principal penalty in a NSW court between 1 October 2010 and 30 September 2012. These offenders were compared with offenders who received a principal penalty of a short (less than two years) prison sentence during the same period.

The ICO eligibility criteria outline previously were applied to both the ICO and short prison sentence samples. Accordingly, those less than 18 years of age, those who received a prison sentence longer than two years and those being sentenced for a prescribed sexual offence were excluded from our analyses.¹ Offenders who received a sentence of an ICO as well as a prison sentence, at the same court appearance were excluded from the study. Finally, it was possible that one offender may have multiple court appearances with the same or different sentence types during the period of interest. Only the first instance of each court appearance was considered for inclusion in the subsequent analysis.

After applying the selection criteria, eligible records comprised index court appearances of 1,266 offenders in the ICO group and 10,660 offenders in the short prison sentence group. Further, 1,181 (93.3%) and 6,497 (60.9%) of offenders had a valid LSI-R assessment score in the ICO and short prison sentence group, respectively.²

VARIABLES

Treatment variable

The treatment variable was whether the principal penalty was an ICO or short prison sentence less than two years.

Re-offending outcome

The index date was defined as the date of the index court finalisation relating to the ICO or short prison sentence. A re-offence was defined as any proven offence committed after the index date that resulted in a finalised court appearance. The re-offending outcome examined in the current study was:

- Re-offending within 24 months: whether there was a further proven offence committed within 24 months free time after the index date.

For the purpose of this study, breaches of custodial and community-based orders were not included as re-offences.

Explanatory variables

The primary method of analysis used is propensity score matching (see section titled Statistical Analyses below). We include a wide range of variables in the propensity score model that could influence treatment allocation (i.e. the penalty received). These variables include demographic characteristics, characteristics of the index court appearance, prior convictions and penalties received and LSI-R assessment score. Variables included in the propensity score model were also considered for inclusion in the re-offending model.

The explanatory variables considered for the propensity score models and the re-offending models are detailed below.

Demographic characteristics

- Gender: whether the offender was male or female.
- Indigenous status at index: whether the offender was identified as being of Aboriginal or Torres Strait Islander descent, or both, at index court appearance.
- Age: age of the offender at the time of the index court appearances, categorised as 18-20 years, 21-24 years, 25-29 years, 30-34 years, 35-39 years, 40-44 years and 45 years and over.
- Remoteness of residence: based on Accessibility Remoteness Index of Australia (ARIA; Australian Bureau of Statistics, 2001) with area categorised as major cities (0.00-0.20), inner regional (0.21-2.40), outer regional (2.41-5.92), remote (5.921-10.53) and very remote (10.531-15.00).
- Socio-Economic Index for Areas (SEIFA; ABS 2011b) disadvantage score of residence: divided into quartiles with the lowest being the most disadvantaged.

Index offence characteristics

- Jurisdiction: the jurisdiction in which the offender's index court appearance was finalised, Local Court or Higher Court (District/Supreme).
- Concurrent offences: the number of proven concurrent offences at the index court appearance.
- Index offence types: classified according to the Australian and New Zealand Standard Offence Classification (ANZSOC; ABS 2011a) and classified (yes/no) according to whether any proven offence at the index court appearance was a/an:
 - Serious violent offence (ANZSOC division 01, groups 0211, 0212, 0611, 0612)
 - Act intended to cause injury (ANZSOC division 02)
 - Dangerous or negligent act endangering persons (ANZSOC division 04)
 - Break and enter offence (ANZSOC division 07)
 - Theft offence (ANZSOC division 08)
 - Fraud offence (ANZSOC division 09)
 - Illicit drug offence (ANZSOC division 10)
 - Property damage offence (ANZSOC division 12)
 - Public order offence (ANZSOC division 13)
 - Traffic offence (ANZSOC division 14)
 - Drive while licence disqualified or suspended (ANZSOC group 1411)
 - Exceed the prescribed content of alcohol or other substance limit (ANZSOC group 1431)
 - Justice procedure offence (ANZSOC division 15): whether any proven offence at the index court appearance was a (yes/no):
 - Breach of custodial order offence (ANZSOC group 151)
 - Breach of community-based order (ANZSOC subdivision 152)
 - Breach of violence order (ANZSOC subdivision 1531).
 - Domestic violence offence: whether any proven offence at the index court appearance was domestic violence related.
 - Severity of index offence: whether any proven offence at the index court appearance was (yes/no):
 - Strictly indictable
 - Indictable.

Prior offence characteristics

- Prior court finalisations: the number of finalised court appearances for proven offences in the 5 years prior to the index court finalisation.
- Prior offence types: whether any proven offence in the 5 years prior to the index court finalisation was a/an (yes/no):
 - Serious violent offence (ANZSOC division 01, groups 0211, 0212, 061)
 - Act intended to cause injury (ANZSOC division 02)
 - Dangerous or negligent act endangering persons (ANZSOC division 04)
 - Break and enter offence (ANZSOC division 07)
 - Theft offence (ANZSOC 08)
 - Fraud offence (ANZSOC 09)
 - Illicit drug offence (ANZSOC division 10)
 - Property damage offence (ANZSOC division 12)
 - Public order offence (ANZSOC division 13)
 - Traffic offence (ANZSOC division 14)
 - Drive while licence disqualified or suspended (ANZSOC group 1411)
 - Exceed the prescribed content of alcohol or other substance limit (ANZSOC group 1431)
 - Justice procedure offence (ANZSOC division 15)
 - Breach of community-based order (ANZSOC subdivision 152)
 - Breach of violence order (ANZSOC group 1531).
- Prior penalty types: whether in the 5 years prior to index appearance the following penalties were received at a finalised court appearance (yes/no):
 - Imprisonment
 - Home detention
 - Periodic detention
 - Suspended sentence
 - Community service order
 - Bond
 - Driver's licence disqualification.

STATISTICAL ANALYSES**Propensity score methods**

Propensity scores represent the predicted probability of receiving treatment (in this instance the type of penalty received) given

a set of measured covariates and can be used to balance covariates between the treated and untreated groups to obtain an unbiased estimate of treatment effects (Rosenbaum & Rubin, 1983). Propensity scores are typically estimated through a multivariable logistic regression model with treatment type as the outcome variable.

These propensity scores can then be used to obtain a probability weight for each individual in order to create a pseudo-population in which the covariates and the treatment assignment are independent of each other. For those receiving treatment (ICO penalty), this weight is simply the inverse of the propensity score, known as the inverse probability of treatment weighting (IPTW). For those who did not receive an ICO, the weighting is the inverse of one minus the propensity score. Hence those who are underrepresented in the treatment group are given proportionally higher weights, while those who are highly represented are given lower weights.

These unbalanced weights can have the disadvantage that extreme weights can emerge when a treated individual has a very low propensity score. Such extreme weights increase the variability of the estimated treatment effect. It is suggested in the literature to use stabilised weights as an alternative to the conventional weights (Robins, Hernán, & Brumback, 2000; Cole & Hernan, 2008). In the treatment group, stabilised weights divide the marginal probability of treatment by the propensity score and for the control group, stabilised weights divide one minus the marginal probability of treatment by one minus the propensity score. An additional strategy to address the problems with very large weights is to use trimmed or truncated weights, in which weights are set to less extreme values (Lee, Lessler, & Stuart, 2011). In this study, we combined both methods by performing truncation after stabilising the IPTW. Weights that exceed the 1st and 99th percentiles are set to those quantile values.

One of the key assumptions of propensity score methods is exchangeability, or no unmeasured confounding. Unfortunately this assumption cannot be formally tested (Cole & Hernan, 2008). Instead, theoretical arguments need to be made as to how the study has collected all important confounders. Another assumption is the correct specification of the propensity score model, which may be unverifiable. However, it is suggested that one should focus on assessing whether weighting using the estimated propensity score induced balance of covariates between treated and control subjects (Austin & Stuart, 2015).

We check balance on observed covariates to ensure that weighting helps correct for selection. We use a weighted simple regression model for continuous covariates, where the covariate is the dependent variable and the dichotomous treatment variable is the independent variable. A weighted simple logistic regression model is used for a binary covariate and a weighted

multinomial logistic regression for categorical covariates. If weighting by the inverse of propensity scores removes imbalances, then the regression coefficients from those models should not be statistically significant (Guo & Fraser, 2015).

One of the assumptions underpinning propensity score methods (known as the positivity assumption) is that all subjects must have a nonzero probability to receive either treatment. Put another way, there can be no subset of subjects for whom the probability of treatment is either zero or one. Methods for assessing the validity of the positivity assumption include determining the mean stabilised weight and minimum and maximum weights (Cole and Hernan, 2008). It is suggested that if the mean of the stabilised weight is far from one or if there are very extreme values, then this can indicate non-positivity.

To guard against possible misspecification of the propensity score model, we also performed doubly robust (DR) estimation to estimate the causal effect of treatment. DR estimation combines IPTW with regression modelling of the relationship between covariates and outcome for each treatment group in such a way that, as long as either the propensity score model or the outcome regression models are correctly specified, the treatment effect is correctly estimated, if there are no unmeasured confounding (Robins, 2000; Bang & Robins 2005). DR estimation was conducted in SAS using the DR macro (Jonsson Funk, Westreich, Davidian, & Weisen, 2007). The difference between the DR estimates for the treatment groups represents the difference of the average predicted probability of the outcome between the treated and untreated.

BIVARIATE PROBIT MODEL WITH INSTRUMENTAL VARIABLE

The success of propensity score methods depends upon the assumption of no unmeasured confounding, or endogeneity. Endogeneity occurs when an explanatory variable is correlated with the error term and it can arise as a result of omitted variables. In the present case, there might be unmeasured factors such as offender characteristics that correlate with both the choice of penalty and the risk of re-offending. Endogeneity would cause bias in the estimate of the treatment effect of an ICO penalty on re-offending. We used an Instrumental Variable (IV) approach to consistently estimate the impact of ICO penalty on re-offending. The IV method involves finding an observable variable (known as an instrument) that is correlated with the choice of penalty but is uncorrelated with the error term or any unobserved factors that affect the risk of re-offending.

In recent years a number of scholars have exploited the variation across judges in sentencing severity as an instrument (Green & Winik; 2010; Weatherburn & Moffatt, 2011; Di Tella & Schargrodsky, 2013; Henneguelle, Monnery & Kensey, 2016). We follow the same strategy in the present study. Although

there are clear criteria regarding eligibility for an ICO (viz. the offender must be 18 years at the time of the offence; must be facing a prison sentence of two years or less; and must be deemed suitable for an ICO by a parole officer), there is no legal obligation on a sentencing court to see advice on the suitability of an offender for an ICO or to impose an ICO on an offender who meets the relevant criteria. Our assumption is that, conditional on other covariates, the choice between an ICO or a short prison sentence in these circumstances will be driven to a large extent by whether the sentencing court favours a harsher (prison) or more lenient (ICO) penalty.

To construct the instrument we divide the count of ICOs imposed by each magistrate by the total number of ICO and prison sentences imposed by that same magistrate/judge during the specified study period. This instrument was included in a bivariate probit model that jointly models the penalty choice and re-offending outcome, both of which are dichotomous. More specifically, the first equation models the relationship between the probability of re-offending and penalty choice and a wide range of control variables. The second equation links the probability of an offender receiving an ICO against the instrument and control variables. A bivariate normal distribution is assumed for the error terms with correlation coefficient ρ . A negative ρ would indicate that those offenders who received an ICO are less likely to re-offend. A likelihood ratio test of the correlation between the error terms of the two equations in the bivariate

probit model provides an endogeneity test for penalty choice (Knapp & Seaks, 1998). Failing to reject the null hypothesis of zero correlation favours the decision that penalty choice is exogenous in the model for re-offending.

The bivariate probit model was implemented in STATA using the biprobit module.

RESULTS

ICOS VS IMPRISONMENT: OFFENDER PROFILE

Table 1 shows the results from a multivariable logistic regression model comparing characteristics relating to offenders who received an ICO and prison sentence (of up to 24months). Overall, those who received ICOs were different from those who received prison sentences in terms of offender demographic characteristics, index offence characteristics, prior criminal history and prior penalties received. The model had excellent discrimination ability (AUC=0.87). Compared to those who received a prison sentence, those who received ICOs were:

- more likely to be younger;
- more likely to reside in major cities and less disadvantaged areas;
- less likely to have a current theft, drug, justice procedures or breach of violence order offences;

Table 1. Logistic regression models predicting an intensive correction order versus short prison sentence under two years

Demographic characteristics		Odds ratio (95% confidence interval)	p-value
Gender (Ref = male)	Female	0.94 (0.74, 1.20)	0.611
Indigenous status at index (Ref = no)		0.80 (0.62, 1.04)	0.097
Age		0.98* (0.98, 0.99)	<0.001
Jurisdiction (Ref = Local court)	Higher court	1.00 (0.68, 1.47)	0.985
Remoteness/ARIA of residence (Ref = major cities)	Inner regional	0.68* (0.56, 0.82)	<0.001
	Outer regional	0.29* (0.23, 0.36)	<0.001
	Remote	0.04* (0.01, 0.15)	<0.001
	Very remote	0.29* (0.11, 0.74)	0.010
SEIFA of residence (Ref = quartile 1)	Missing	1.19 (0.28, 5.01)	0.811
	Quartile 2	1.02 (0.85, 1.23)	0.810
	Quartile 3	1.21* (1.00, 1.47)	0.045
	Quartile 4	1.34* (1.07, 1.68)	0.010
Index appearance			
Number of concurrent offences		0.98 (0.96, 1.00)	0.078

Table 1. Logistic regression models predicting an intensive correction order versus short prison sentence under two years

Demographic characteristics		Odds ratio (95% confidence interval)	p-value
Type of offence/s (Ref = no)	Serious violent	1.05 (0.81, 1.36)	0.729
	Act intended to cause injury	1.16 (0.89, 1.52)	0.284
	Dangerous or negligent act endangering persons	1.11 (0.85, 1.45)	0.460
	Break and enter	0.94 (0.66, 1.32)	0.703
	Theft	0.57* (0.44, 0.73)	<0.001
	Fraud	1.15 (0.85, 1.56)	0.376
	Illicit drug	0.74* (0.57, 0.95)	0.020
	Property damage	0.95 (0.73, 1.25)	0.726
	Public order	0.85 (0.67, 1.09)	0.203
	Traffic	1.07 (0.77, 1.50)	0.689
	Drive while licence disqualified	1.15 (0.85, 1.56)	0.367
	Exceed the prescribed content of alcohol	1.06 (0.81, 1.40)	0.656
	Offence against justice procedure	0.68* (0.53, 0.87)	0.002
	Breach of custodial order	2.24* (1.67, 3.01)	<0.001
	Breach of community-based order	0.88 (0.68, 1.15)	0.357
	Breach of violence order	0.66* (0.45, 0.97)	0.036
	Strictly indictable offence	1.72* (1.10, 2.69)	0.018
	Indictable offence	0.56* (0.44, 0.73)	<0.001
Domestic violence related offence	0.82 (0.61, 1.13)	0.235	
Criminal history			
Prior court appearances	Number of court appearances with proven offence in prior 5 years	0.93* (0.88, 0.99)	0.026
Penalty in prior 5 years (Ref = no)	Imprisonment	0.59* (0.48, 0.74)	<0.001
	Home detention	1.18 (0.57, 2.43)	0.651
	Periodic sentence	1.26 (0.89, 1.79)	0.186
	Suspended sentence	1.07 (0.87, 1.32)	0.505
	Community service order	1.27* (1.05, 1.54)	0.015
	Bond	1.02 (0.84, 1.24)	0.826
	Drivers licence disqualification	0.69* (0.52, 0.93)	0.014
Offences proven in prior 5 years (Ref = no)	Serious violent	0.97 (0.78, 1.22)	0.809
	Act intended to cause injury	1.05 (0.84, 1.31)	0.675
	Dangerous or negligent act endangering persons	1.12 (0.88, 1.43)	0.351
	Break and enter	0.93 (0.69, 1.25)	0.610
	Theft	0.91 (0.73, 1.12)	0.363
	Fraud	1.45* (1.10, 1.91)	0.008
	Illicit drug	0.92 (0.75, 1.13)	0.425
	Property damage	0.99 (0.81, 1.21)	0.905
	Public order	0.91 (0.75, 1.12)	0.387
	Traffic	1.25 (0.95, 1.65)	0.108
	Drive while licence disqualified	1.13 (0.89, 1.44)	0.321
	Exceed the prescribed content of alcohol	1.32* (1.05, 1.65)	0.019
	Offences against justice procedures	1.00 (0.80, 1.25)	0.998
	Breach of community-based order	1.13 (0.89, 1.43)	0.327
Breach of violence order	1.07 (0.82, 1.38)	0.621	
LSI-R			
Risk level category (Ref = Low)	Medium-low	0.76* (0.62, 0.93)	0.008
	Medium	0.28* (0.22, 0.36)	<0.001
	Medium-high	0.12* (0.08, 0.17)	<0.001
	High	0.12* (0.06, 0.22)	<0.001
	Missing	0.05* (0.04, 0.06)	<0.001
AUC	0.87		

- less likely to have indictable offence;
- more likely to have breached a custodial order or have a strictly indictable offence;
- less likely to have a higher number of court appearances with proven offences in the previous 5 years;
- more likely to have prior offences of fraud or exceeding the prescribed content of alcohol or other substance limit;
- less likely to have received a prior prison sentence;
- more likely to have prior penalty of community service order;
- less likely to have prior penalty of a driver licence disqualification;
- less likely to be in higher LSI-R risk categories.

REOFFENDING FOLLOWING A PRINCIPAL PENALTY OF AN ICO OR SHORT PRISON SENTENCE

Logistic regression model with propensity score adjustment

Presented in Table 2 are the odds ratio (OR) estimates and 95% confidence intervals (CI) estimated from three models of reoffending:

1. naïve logistic regression model without IPTW,
2. logistic regression model with IPTW,
3. logistic regression model with trimmed stabilised IPTW.

Our results showed that within 24 months free time from the index finalisation, 36 per cent of those who received an ICO and 60 per cent of those who received prison sentence up to 24 months had re-offended. As shown in Table 2, there was a statistically significant 31 per cent and 27 per cent reduction in the odds of re-offending for those who received an ICO as their principal penalty compared with those who received a short prison sentence under the logistic regression model with IPTW

and the model with trimmed stabilised IPTW, respectively. This effect was marginally insignificant in the naïve logistic regression model with estimated reduction of 11 per cent.

Characteristics associated with a higher odds of re-offending included: identifying as an Aboriginal or Torres Strait Islander at the index court appearance; having a proven theft, domestic violence, breach of public order or an indictable offence at the index court appearance; a greater number of court appearances with proven offences in the 5 years prior; having prior offences for break and enter, dangerous or negligent act endangering persons, theft, illicit drug, breach of public order or against justice procedures offences and having prior penalty of imprisonment. Re-offending was also more likely to occur among those in higher LSI-R risk categories. On the other hand, those offenders who were female, older, lived in outer regional areas or a prior community service order were less likely to re-offend (Table A1).

In general, parameter estimates across the three logistic regression models were fairly consistent, with a few discrepant cases. Estimates from the logistic regression model with trimmed stabilised IPTW were more closely aligned with estimates obtained from the naïve logistic model. This was due to some large weights when deriving IPTW. The average weight given to each offender who received an ICO was 8 with a maximum weight of 328 while the average trimmed stabilised weight was 0.92 with a maximum weight of 11.

P-values for checking balance on observed covariates based on trimmed stabilised weights are presented in Table A3 in the Appendix. None of the p-values were statistically significant at the 5 per cent level. This suggests the specification of the propensity score resulted in a weighted sample with comparable balance across the ICO and prison groups. The mean of trimmed stabilised weight was equal to 0.99 with standard deviation equal to 0.64. The minimum and maximum weights were 0.20 and 11.1, respectively. There was no evidence of non-positivity of the propensity score model.

Table 2. Logistic regression models predicting re-offending outcome for offenders who received an ICO as a principal penalty or prison sentence up to 24 months

	Naïve logistic regression	Logistic regression with IPTW	Logistic regression with trimmed stabilised IPTW
ICO as principal penalty	0.89 (0.76, 1.04)	0.69* (0.55, 0.97)	0.73* (0.58, 0.93)

Table 3. Bivariate probit model for re-offending between offenders who received an intensive correction order versus offenders who received a short prison sentence

	Un-truncated		Truncated	
	Marginal effect	p-value	Marginal effect	p-value
ICO as principal penalty	0.031	0.378	0.030	0.413

As a robustness check, we also obtained results from DR estimation where the treatment effect is correctly estimated as long as either the propensity score model or the outcome regression models are correctly specified. Due to the non-collapsibility of the OR, it is not meaningful to compare the DR estimate of the OR to that from logistic regression models with IPTW adjustment previously. Hence in Table A4 in the Appendix, we reported the DR estimate of the risk ratio. There was an estimated 14 per cent reduction in the risk of re-offending for those who received an ICO compared to those offenders who received a short prison sentence obtained from DR estimation and the estimate was significant at 5 per cent.

Bivariate probit model

Table 3 and Table A2 shows the results of the bivariate probit model using a magistrate's proclivity to issue an ICO as the instrumental variable. Significant characteristics associated with a higher likelihood of re-offending include: being male, identifying as Aboriginal or Torres Strait Islander; having a proven theft or domestic violence related offence at the index court appearance; a greater number of court appearances with proven offences in the previous 5 years; having prior offences of break and enter, dangerous or negligent acts endangering persons, theft, illicit drug, breach of public order or against justice procedures; and being in higher LSI-R risk categories. The coefficient of penalty choice was 0.099 with a marginal effect of 0.031 and not statistically significant. The value of the coefficient of correlation ρ is -0.107 and was not significant, hence there was not enough evidence to suggest penalty choice is endogenous.

To assess whether the constructed IV is a strong instrument for penalty choice, we performed a linear regression model for the probability of receiving an ICO as a function of the instrumental variable (proportion of ICOs given by each magistrate) and all other covariates. The instrumental variable coefficient was positive and highly significant. The F statistic ($F = 1024$) was well above the rule-of-thumb threshold of 10 suggested in the literature (Staiger & Stock, 1997).

As a sensitivity analysis, we also repeated the modelling procedure after removing all cases dealt with by magistrates/judges who dealt with fewer than 10 cases in the specified time period (this is labelled 'Truncated' in Table 4). There were no substantial changes in the parameter estimates. The marginal effect for penalty choice was 0.030 and non-significant.

Supplementary analysis

Further supplementary analyses were undertaken for a restricted offender cohort. Firstly, to assess whether the effect of an ICO is greater for higher risk offenders the study population was restricted to offenders with medium to high LSI-R risk categories and re-offending outcomes compared for the prison

and ICO groups. Secondly, offenders in the prison group who were released to parole would have received some form of supervision from community corrections after their index custodial episode. It is possible that, at least for medium to high risk offenders, the supervision received by these offenders would have closely resembled the treatment of offenders in the ICO group. Given this, the prison group was restricted further to only include offenders serving a fixed prison term of 6 months or less who would have received no supervision or treatment from community corrections post release.

Hence we performed separate analyses of the impact of an ICO on risk of reoffending for the following groups:

1. Medium to high LSI-R risk offenders: ICO vs short prison sentence up to 2 years
2. ICO vs fixed prison sentence up to 6 months
3. Medium to high LSI-R risk offenders: ICO vs fixed prison sentence up to 6 months.

Results from these supplementary analyses are presented in Appendix Table A5. Since there was no evidence of endogeneity from the bivariate probit model with IV, we only reported the results from the three logistic regression models and the doubly robust estimation as a variation within the propensity score methods.

First we compared ICO with a short prison sentence of up to 2 years amongst only offenders in who were assessed as medium to high on the LSI-R. This analysis found a 20 to 30 per cent reduction in the odds of re-offending estimated from the logistic regression models and a 13 per cent reduction in the risk estimated using doubly robust methods. Most of these estimates were not statistically significant. The magnitude of the reduction was similar to that found in the ICO versus short prison sentence comparison for offenders in all risk categories. We then compared ICO with fixed prison sentences of up to 6 months. Here we found, an estimated 25 to 43 per cent reduction in the odds of re-offending for offenders in all risk categories; and further, an estimated 33 to 35 per cent reduction for offenders in medium to high risk LSI-R categories. The doubly robust estimation also showed a significant 19 per cent and 16 per cent reduction in the risk of re-offending for group 2 and group 3, respectively.

DISCUSSION

The aim of this study was to examine whether the risk of re-offending was lower among offenders placed on ICOs than comparable offenders given a short prison sentence of less than 2 years. In order to deal with issues of selection bias, a variety of statistical methodologies were employed, including inverse propensity score weighting (with doubly robust estimation as a variation) and bivariate probit model with an instrumental

variable. A wide range of factors likely to have influenced penalty choice and/or re-offending were included in the propensity score model and the outcome regression model. These analyses showed that, after controlling for other factors, offenders who received an ICO had significantly lower rates of re-offending than offenders who received a short prison sentence. Using IPTW to weigh offenders we found a 31 per cent reduction in the odds of re-offending for those who received an ICO as their principal penalty compared with the short prison group (27 per cent reduction with trimmed stabilised IPTW). Even larger reductions in reoffending were observed when the prison group was restricted to offenders serving a fixed prison term of 6 months or less; that is, those who received no supervision or treatment post release. In this supplementary analysis we found reductions in the odds of re-offending, in favour of the ICO group, of between 25 and 43 per cent for offenders in all risk categories and between 33 and 35 per cent for offenders in the medium to high LSI-R risk categories.

The success of propensity score based methods relies on several important assumptions, one of which is the correction specification of the propensity score model, which is unverifiable. Hence a doubly robust estimation was performed to guard against possible misspecification of the propensity score model. The results from the doubly robust estimation generally confirm the significant reductions in the risk of re-offending noted above. Another limitation of the propensity score methods is there might be some unmeasured factors associated with both re-offending and penalty choice, which would lead to omitted variable bias. To address this issue, we employed an instrumental variable approach in a bivariate probit model where we allowed correlation between the unobserved error terms in the model for penalty choice and the outcome model for re-offending. There was no evidence of endogeneity since the correlation between the error terms in the equations for re-offending and penalty choice was non-significant. In this case, it is valid to estimate separate individual models (as was done in the IPTW analysis).

One limitation of the data used here is the relatively large number of offenders in the prison sample who did not have a valid LSI-R. Only LSI-R assessments undertaken within 12 months prior to and 3 months post the index court appearance were included in the analysis because many of the items in the LSI-R are dynamic and require regular reassessment. CSNSW regularly assesses offenders serving a community-based order, particularly where a pre-sentence report is required. However, the resource intensive nature of the 54-item LSI-R and the fact that few services can be delivered to offenders who in custody for a short time means that (re)administration of the LSI-R for fixed term prisoners is not a priority. The LSI-R score, and in particular changes in this score, is as an important predictor of recidivism (see Raynor, 2007; Vose, Lowenkamp, Smith & Cullen, 2009). Further, the level of supervision and treatment

CSNSW provides is heavily dependent upon this risk rating. Closely matching offenders on this covariate is therefore essential when quantifying the effectiveness of various penalties. Future research should attempt to replicate the current findings as more extensive LSI-R data become available.

The results presented above further strengthen the evidence base suggesting that supervision combined with rehabilitation programs can have a significant impact on reoffending rates, and further, that programs targeting offenders at high risk of re-offending produce larger reductions in re-offending than those targeting offenders at medium or low risk (see Andrews & Bonta, 2003; Aos, Miller & Drake, 2006; Drake, 2011). A review of ICOs undertaken by the NSW Sentencing Council in September 2016 found that ICOs are currently underused and not targeting the offenders who could most benefit from supervision and treatment. The most significant barrier to the effective utilisation of ICOs identified in this review was the mandatory community service work requirement. This has led to disparity in the use of ICOs across NSW and the exclusion of individuals for whom intervention could potentially benefit (e.g. offenders with cognitive impairments, mental illness, substance dependence, homelessness or unstable housing) (NSW Sentencing Council, 2016). The council recommended that ICOs, as well as home detention and suspended sentences, be replaced with a new more flexible community-based custodial order. The order should still include work and intervention requirements but these could be options for the court to impose rather than mandated, and their scope increased to include other activities, such as drug and alcohol treatment. An order of this nature would be more accessible to a wider range of offenders and ensure community-based custodial penalties are better tailored to individual need and risk. Reforms based on these recommendations are currently being implemented by the NSW Government and will be evaluated by the NSW Bureau of Crime Statistics and Research.

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NOTES

- 1 Sexual offence refers to sexual assault and related offences (under ANZSOC 03, 0311, 0312).
- 2 A valid LSI-R assessment is one that occurred 12 months prior or 3 months post the index finalisation date.

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APPENDIX

Table A1. Logistic regression models predicting re-offending outcome for offenders who received an ICO as a principal penalty or prison sentence up to 24 months

		Naïve logistic regression	Logistic regression with IPTW	Logistic regression with trimmed stabilised IPTW
ICO as principal penalty		0.89 (0.76,1.04)	0.69* (0.55, 0.97)	0.73* (0.58, 0.93)
Demographic characteristics				
Gender (Ref = male)	Female	0.78* (0.67, 0.91)	0.74* (0.52, 1.00)	0.78* (0.66, 0.92)
Indigenous status at index (Ref = no)		1.30* (1.14, 1.48)	0.83 (0.60, 1.16)	1.19* (1.02, 1.39)
Age		0.98* (0.98,0.99)	0.98* (0.97, 0.99)	0.98* (0.97, 0.98)
Jurisdiction (Ref = Local court)	Higher court	0.66* (0.48, 0.92)	0.93 (0.43, 2.00)	0.70 (0.47, 1.02)
Remoteness/ARIA of residence (Ref = major cities)	Inner regional	1.00 (0.88, 1.14)	1.07 (0.82, 1.39)	1.07 (0.92, 1.23)
	Outer regional	0.84* (0.74, 0.96)	0.83 (0.61, 1.13)	0.86* (0.75, 0.99)
	Remote	0.98 (0.76, 1.28)	0.68 (0.36, 1.26)	0.92 (0.67, 1.25)
	Very remote	0.81 (0.57, 1.16)	1.33 (0.53, 3.33)	0.94 (0.62, 1.43)
	Missing	0.70 (0.21, 2.31)	1.25 (0.37, 4.30)	0.75 (0.31, 1.81)
SEIFA of residence (Ref = quartile 1)	Quartile 2	1.18* (1.05, 1.32)	1.34* (1.01, 1.77)	1.19* (1.04, 1.36)
	Quartile 3	0.97 (0.85, 1.10)	1.02 (0.77, 1.36)	0.97 (0.84, 1.13)
	Quartile 4	1.14 (0.95, 1.35)	1.15 (0.85, 1.58)	1.14 (0.94, 1.39)
Index appearance				
Number of concurrent offences		1.00 (0.99, 1.01)	1.00 (0.99, 1.02)	1.00 (0.99, 1.01)
Type of offence/s (Ref = no)	Serious violent	1.08 (0.93, 1.26)	1.04 (0.71, 1.51)	1.05 (0.88, 1.24)
	Act intended to cause injury	0.99 (0.84, 1.15)	1.35 (0.96, 1.90)	1.06 (0.89, 1.26)
	Dangerous or negligent act endangering persons	0.80* (0.66, 0.98)	0.68 (0.45, 1.02)	0.74* (0.59, 0.92)
	Break and enter	1.24* (1.02, 1.52)	1.15 (0.70, 1.89)	1.24 (0.99, 1.56)
	Theft	1.83* (1.59, 2.09)	2.19* (1.59, 3.03)	1.91* (1.64, 2.22)
	Fraud	0.94 (0.77, 1.15)	1.48 (0.98, 2.25)	1.05 (0.84, 1.30)
	Illicit drug	1.13 (0.97, 1.32)	0.77 (0.51, 1.14)	1.04 (0.87, 1.24)
	Property damage	1.02 (0.88, 1.18)	0.96 (0.67, 1.36)	1.00 (0.85, 1.18)
	Public order	1.25* (1.09, 1.44)	1.34 (0.95, 1.90)	1.29* (1.10, 1.51)
	Traffic	1.07 (0.85, 1.35)	1.10 (0.71, 1.72)	1.09 (0.85, 1.39)
	Drive while licence disqualified	1.19 (0.95, 1.49)	1.27 (0.83, 1.96)	1.21 (0.94, 1.55)
	Exceed the prescribed content of alcohol	0.95 (0.78, 1.16)	1.02 (0.70, 1.50)	0.93 (0.75, 1.16)
	Offence against justice procedure	1.25* (1.08, 1.44)	1.30 (0.89, 1.88)	1.23* (1.04, 1.45)
	Breach of custodial order	0.79* (0.66, 0.95)	0.82 (0.53, 1.26)	0.81* (0.66, 1.00)
	Breach of community-based order	0.88 (0.75, 1.02)	1.00 (0.68, 1.47)	0.91 (0.76, 1.08)
	Breach of violence order	1.01 (0.82, 1.24)	0.88 (0.52, 1.49)	1.02 (0.81, 1.29)
	Strictly indictable offence	1.06 (0.71, 1.56)	0.80 (0.36, 1.77)	1.12 (0.72, 1.75)
Indictable offence	1.22* (1.03, 1.44)	1.28 (0.92, 1.79)	1.28* (1.06, 1.54)	
Domestic violence related offence	1.27* (1.06, 1.52)	1.05 (0.71, 1.55)	1.21* (1.00, 1.47)	
Criminal history				
Prior court appearances	Number of court appearances with proven offence in prior 5 years	1.15* (1.11, 1.19)	1.13* (1.04, 1.22)	1.15* (1.09, 1.20)

Table A1. Logistic regression models predicting re-offending outcome for offenders who received an ICO as a principal penalty or prison sentence up to 24 months

		Naive logistic regression	Logistic regression with IPTW	Logistic regression with trimmed stabilised IPTW
Penalty in prior 5 years (Ref = no)	Imprisonment	1.40* (1.24, 1.58)	1.38* (1.02, 1.87)	1.42* (1.23, 1.64)
	Home detention	0.93 (0.55, 1.59)	0.47 (0.09, 2.42)	0.80 (0.37, 1.69)
	Periodic sentence	1.01 (0.78, 1.32)	0.62 (0.35, 1.08)	0.93 (0.68, 1.26)
	Suspended sentence	1.08 (0.95, 1.23)	1.26 (0.95, 1.66)	1.10 (0.95, 1.28)
	Community service order	0.81* (0.71, 0.93)	0.78 (0.60, 1.02)	0.80* (0.69, 0.94)
	Bond	0.97 (0.86, 1.09)	0.79 (0.60, 1.04)	0.97 (0.84, 1.11)
	Drivers licence disqualification	0.94 (0.78, 1.15)	0.94 (0.64, 1.39)	0.94 (0.76, 1.16)
Offences proven in prior 5 years (Ref = no)	Serious violent	1.02 (0.89, 1.16)	1.01 (0.76, 1.35)	0.97 (0.83, 1.13)
	Act intended to cause injury	1.08 (0.94, 1.24)	1.22 (0.89, 1.69)	1.13 (0.97, 1.33)
	Dangerous or negligent act endangering persons	1.21* (1.03, 1.43)	1.22 (0.86, 1.74)	1.25* (1.03, 1.52)
	Break and enter	1.26* (1.06, 1.49)	1.65* (1.08, 2.51)	1.29* (1.06, 1.56)
	Theft	1.34* (1.18, 1.46)	1.55* (1.16, 2.08)	1.40* (1.21, 1.62)
	Fraud	1.11 (0.93, 1.34)	0.96 (0.64, 1.45)	1.04 (0.84, 1.28)
	Illicit drug	1.34* (1.19, 1.52)	1.22 (0.89, 1.68)	1.34* (1.16, 1.55)
	Property damage	1.07 (0.95, 1.20)	0.85 (0.65, 1.10)	1.03 (0.90, 1.18)
	Public order	1.15* (1.02, 1.29)	1.68* (1.29, 2.19)	1.23* (1.08, 1.41)
	Traffic	1.05 (0.89, 1.25)	1.11 (0.74, 1.67)	1.10 (0.91, 1.34)
	Drive while licence disqualified	1.13 (0.97, 1.33)	1.26 (0.91, 1.74)	1.14 (0.95, 1.37)
	Exceed the prescribed content of alcohol	0.95 (0.81, 1.10)	1.11 (0.82, 1.50)	0.93 (0.78, 1.11)
	Offences against justice procedures	1.27* (1.10, 1.46)	1.59* (1.17, 2.17)	1.33* (1.14, 1.55)
	Breach of community-based order	0.87 (0.76, 1.01)	0.69* (0.49, 0.96)	0.81* (0.69, 0.96)
	Breach of violence order	0.87 (0.75, 1.01)	0.84 (0.58, 1.21)	0.86 (0.72, 1.02)
LSI-R				
Risk level category (Ref = Low)	Medium-low	1.74* (1.37, 2.20)	1.58* (1.17, 2.12)	1.77* (1.32, 2.39)
	Medium	3.23* (2.55, 4.09)	2.80* (2.03, 3.87)	3.30* (2.47, 4.41)
	Medium-high	4.19* (3.22, 5.45)	3.50* (2.18, 5.63)	4.32* (3.14, 5.95)
	High	5.41* (3.72, 7.87)	7.97* (3.63, 17.48)	6.12* (3.98, 9.40)
	Missing	2.56* (2.03, 3.23)	2.09* (1.49, 2.93)	2.62* (1.97, 3.48)

Table A2. Bivariate probit model for re-offending between offenders who received an intensive correction order versus offenders who received a short prison sentence

		Un-truncated		Truncated	
		Marginal effect	p-value	Marginal effect	p-value
ICO as principal penalty	0.031	0.378	0.030	0.413	
Demographic characteristics					
Gender (Ref = male)	Female	-0.047	0.001	-0.045	0.002
Indigenous status (Ref = no)	Indigenous at index	0.050	<0.001	0.050	<0.001
Age		-0.004	<0.001	-0.004	<0.001
Jurisdiction (Ref = 'Local court')	Higher court	-0.080	0.010	-0.054	0.108
Remoteness/ARIA of residence (Ref = major cities)	Inner regional	0.002	0.880	0.003	0.813
	Outer regional	-0.027	0.033	-0.026	0.042
	Remote	0.004	0.881	0.004	0.887
	Very remote	-0.034	0.310	-0.033	0.335
	Missing	-0.074	0.532	-0.076	0.527
SEIFA of residence (Ref = quartile 1)	Quartile 2	0.030	0.007	0.033	0.004
	Quartile 3	-0.006	0.619	-0.004	0.732
	Quartile 4	0.022	0.191	0.026	0.121
Index appearance					
Number of concurrent offences		0.000	0.606	0.000	0.601
Type of offence/s (Ref = no)	Serious violent	0.015	0.313	0.010	0.482
	Act intended to cause injury	-0.005	0.748	-0.003	0.824
	Dangerous or negligent act endangering persons	-0.042	0.027	-0.042	0.028
	Break and enter	0.041	0.029	0.041	0.030
	Theft	0.113	<0.001	0.116	<0.001
	Fraud	-0.013	0.498	-0.014	0.474
	Illicit drug	0.022	0.125	0.022	0.140
	Property damage	0.006	0.672	0.006	0.695
	Public order	0.038	0.003	0.038	0.004
	Traffic	0.013	0.544	0.016	0.477
	Drive while licence disqualified	0.032	0.127	0.031	0.144
	Exceed the prescribed content of alcohol	-0.011	0.543	-0.012	0.544
	Offence against justice procedure	0.043	0.002	0.042	0.003
	Breach of custodial order	-0.047	0.006	-0.047	0.007
	Breach of community-based order	-0.022	0.123	-0.024	0.097
	Breach of violence order	0.003	0.870	0.008	0.692
	Strictly indictable offence	0.007	0.852	-0.020	0.632
	Indictable offence	0.041	0.012	0.044	0.008
	Domestic violence related offence	0.045	0.009	0.042	0.015

Table A2. Bivariate probit model for re-offending between offenders who received an intensive correction order versus offenders who received a short prison sentence

		Un-truncated		Truncated	
		Marginal effect	p-value	Marginal effect	p-value
Criminal history					
Prior court appearances	Number of court appearances with proven offence in prior 5 years	0.024	<0.001	0.024	<0.001
Penalty in prior 5 years (Ref = no)	Imprisonment	0.067	<0.001	0.065	<0.001
	Home detention	-0.010	0.852	-0.010	0.851
	Periodic sentence	0.003	0.906	0.008	0.758
	Suspended sentence	0.016	0.187	0.015	0.232
	Community service order	-0.038	0.003	-0.038	0.003
	Bond	-0.004	0.708	-0.003	0.789
	Drivers licence disqualification	-0.012	0.520	-0.013	0.490
Offences proven in prior 5 years (Ref = no)	Serious violent	0.003	0.788	0.003	0.835
	Act intended to cause injury	0.016	0.225	0.017	0.215
	Dangerous or negligent act endangering persons	0.033	0.031	0.031	0.047
	Break and enter	0.042	0.007	0.040	0.011
	Theft	0.058	<0.001	0.058	<0.001
	Fraud	0.017	0.315	0.017	0.336
	Illicit drug	0.057	<0.001	0.058	<0.001
	Property damage	0.012	0.305	0.009	0.430
	Public order	0.027	0.016	0.030	0.008
	Traffic	0.010	0.549	0.011	0.507
	Drive while licence disqualified	0.025	0.104	0.023	0.134
	Exceed the prescribed content of alcohol	-0.009	0.535	-0.008	0.605
	Offences against justice procedures	0.047	<0.001	0.048	<0.001
	Breach of community-based order	-0.025	0.071	-0.025	0.068
Breach of violence order	-0.027	0.052	-0.026	0.066	
LSI-R					
Risk level category (Ref = Low)	Medium-low	0.112	<0.001	0.107	<0.001
	Medium	0.252	<0.001	0.250	<0.001
	Medium-high	0.301	<.0001	0.297	<0.001
	High	0.337	<0.001	0.328	<0.001
	Missing	0.209	<0.001	0.206	<0.001
Value of ρ		-0.107	0.111	-0.109	0.114

Table A3. Unweighted and weighted (based on trimmed stabilised IPTW) proportions (for categorical variables) and means (for continuous variables) and p-values for checking balance on observed covariates based on trimmed stabilised IPTW

		Unweighted (%)		Weighted (%)		p-value
		ICO	short prison	ICO	short prison	
ICO as principal penalty						
Demographic characteristics						
Gender (Ref = male)	Female	9.6	11.2	11.5	11.9	0.86
Indigenous status at index (Ref = no)		7.4	22.7	17.4	20.1	0.36
Age		32.7	33.1	33.4	33.3	0.66
Jurisdiction (Ref = Local court)	Higher court	14.2	5.9	8.4	7.0	0.25
Remoteness/ARIA of residence (Ref = major cities)	Inner regional	17.7	16.0	20.5	19.5	0.59
	Outer regional	9.6	19.2	25.0	22.0	0.32
	Remote	0.2	3.3	1.6	3.5	0.30
	Very remote	0.4	1.7	1.4	1.9	0.71
	Missing	2.0	19.0	0.2	0.2	0.85
SEIFA of residence (Ref = quartile 1)	Quartile 2	26.3	32.1	32.6	31.4	0.73
	Quartile 3	26.7	22.5	25.6	23.0	0.29
	Quartile 4	17.9	9.4	9.3	10.5	0.14
Index appearance						
Number of concurrent offences		3.2	4.3	4.3	4.3	0.81
Type of offence/s (Ref = no)	Serious violent	20.3	21.9	23.2	21.8	0.59
	Act intended to cause injury	25.4	36.1	35.3	35.5	0.94
	Dangerous or negligent act endangering persons	9.2	7.1	6.8	7.0	0.89
	Break and enter	4.3	8.9	6.1	7.4	0.40
	Theft	8.5	25.1	18.5	22.3	0.17
	Fraud	8.8	7.4	8.8	7.6	0.45
	Illicit drug	11.6	13.2	11.9	13.0	0.60
	Property damage	7.1	13.7	13.7	13.3	0.88
	Public order	8.5	16.7	16.9	16.0	0.74
	Traffic	39.5	24.2	26.4	26.9	0.85
	Drive while licence disqualified	27.7	17.2	20.7	19.1	0.45
	Exceed the prescribed content of alcohol	19.5	9.5	12.0	11.4	0.71
	Offence against justice procedure	32.2	47.8	48.7	48.0	0.82
	Breach of custodial order	16.4	12.9	16.7	14.5	0.26
	Breach of community-based order	12.5	19.1	23.4	19.7	0.19
	Breach of violence order	5.8	15.1	15.3	14.9	0.87
	Strictly indictable offence	10.3	3.6	5.0	4.5	0.55
	Indictable offence	70.1	84.5	81.7	82.9	0.57
	Domestic violence related offence	11.6	23.7	23.6	23.4	0.94
	Criminal history					
Prior court appearances	Number of court appearances with proven offence in prior 5 years	2.3	3.4	3.1	3.3	0.20

Table A3. Unweighted and weighted (based on trimmed stabilised IPTW) proportions (for categorical variables) and means (for continuous variables) and p-values for checking balance on observed covariates based on trimmed stabilised IPTW

		Unweighted (%)		Weighted (%)		p-value
		ICO	short prison	ICO	short prison	
Penalty in prior 5 years (Ref = no)	Imprisonment	15.6	45.6	33.7	38.2	0.15
	Home detention	1.0	0.7	1.0	0.7	0.61
	Periodic sentence	5.1	3.1	3.9	3.3	0.57
	Suspended sentence	30.7	32.1	35.0	33.0	0.48
	Community service order	22.0	15.7	17.8	17.1	0.74
	Bond	42.7	52.9	52.6	53.3	0.80
	Drivers licence disqualification	45.3	39.1	36.3	40.5	0.13
Offences proven in prior 5 years (Ref = no)	Serious violent	18.4	32.8	29.3	29.9	0.83
	Act intended to cause injury	31.9	49.5	48.1	47.7	0.91
	Dangerous or negligent act endangering persons	10.9	12.0	12.0	11.4	0.73
	Break and enter	5.7	17.2	12.6	13.5	0.73
	Theft	17.5	37.4	31.2	33.3	0.49
	Fraud	8.0	9.6	9.2	9.1	0.92
	Illicit drug	14.9	27.1	26.8	25.6	0.69
	Property damage	18.2	30.8	28.3	29.1	0.78
	Public order	18.6	37.2	33.5	34.5	0.75
	Traffic	52.0	46.4	44.5	47.6	0.29
	Drive while licence disqualified	31.0	25.5	25.3	26.4	0.63
	Exceed the prescribed content of alcohol	27.3	19.3	18.7	21.3	0.18
	Offences against justice procedures	35.9	53.4	50.1	51.2	0.71
	Breach of community-based order	18.2	22.6	23.2	22.8	0.87
Breach of violence order	11.5	21.0	22.7	20.4	0.38	
LSI-R						
Risk level category (Ref = low)	Medium-low	39.7	10.7	16.2	15.1	0.92
	Medium	21.5	24.9	24.8	24.5	0.57
	Medium-high	4.3	16.5	20.6	14.1	0.12
	High	0.9	4.8	4.6	3.9	0.81
	Missing	6.7	39.1	26.1	35.2	0.94

Table A4. Adjusted risk ratio comparing the risk of re-offending in offenders who received an ICO to those who received a short prison sentence

	Adjusted risk ratio (95% CI)	p-value
DR estimation	0.86* (0.77, 0.97)	0.01

Table A5. Adjusted odds ratio (logistic regression models) and risk ratio (DR estimation) for comparing the risk of re-offending in subgroups of offenders

	Group 1	Group 2	Group 3
Naïve logistic model	0.805 (0.622, 1.041)	0.747* (0.597, 0.936)	0.653* (0.455, 0.938)
Logistic model with IPTW	0.699* (0.504, 0.970)	0.574* (0.439, 0.751)	0.667* (0.446, 0.997)
Logistic model with trimmed stabilised IPTW	0.731 (0.508, 1.051)	0.618* (0.475, 0.803)	0.665* (0.444, 0.996)
DR	0.867 (0.714, 1.051)	0.807* (0.721, 0.902)	0.842* (0.737, 0.964)

Note. Group 1 refers to comparing ICO with short prison sentence up to 2 years among offenders in medium to high LSI-R risk categories.
 Group 2 refers to comparing offenders who received ICO with those who received fixed prison sentence up to 6 months.
 Group 3 refers to comparing ICO with fixed prison sentence up to 6 months among offenders in medium to high LSI-R risk categories.

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