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Monitoring trends in re-offending among offenders released from prison

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Internationally, governments are making renewed efforts to reduce rates of re-offending. Measuring progress against this objective is difficult because officially recorded reconviction rates are determined not only by the effectiveness of the criminal justice system in dealing with offenders, but also by the characteristics of offenders moving through the justice system. The Group Risk Assessment Model (GRAM) is a statistical technique designed to obtain more accurate estimates of trends in re-offending by adjusting for the characteristics of offenders coming through the justice system (see Smith & Jones 2008). This earlier work focussed only on offenders given non-custodial sanctions. The purpose of the current study was to extend GRAM to adjust for the characteristics of prisoners being released from the NSW adult prison system. A number of groups of prisoners were found to be at greater risk of reconviction within two years of release: younger offenders, Indigenous offenders, offenders released to parole (compared with those released without supervision), offenders who had served medium-length sentences (61-364 days, compared with those serving less than 61 days or greater than 364 days), offenders who had more prior convictions and offenders who had a prior conviction for a breach of a justice order, a non-aggravated violent offence or a theft offence. An application of the model revealed that, after adjusting for offender characteristics, there was no significant change in rates of re-offending among prisoners released in 2003 or 2004 when compared to prisoners released in 2002.

Keywords: Group Risk Assessment Model (GRAM), recidivism, re-offending, prediction, prisoners

INTRODUCTION

The NSW State Plan (NSW Government 2006) has focused attention on the problem of how to measure the overall impact of government efforts to reduce re-offending. The problem arises because re-offending is normally measured in terms of reconviction, yet the rate of reconviction is determined not only by the effectiveness of the criminal justice system in reducing re-offending, but also by the characteristics of offenders coming before the courts. If trends in reconviction are to be used to monitor trends in re-offending, a methodology must be developed to adjust for any changes in the characteristics of those offenders over time.

One way to measure improvements in re-offending is to develop a formula that predicts what the reconviction rate should be (based on the profile of offenders coming before the court system) and then compare the predicted to the observed reconviction rate. The UK Home Office has demonstrated the feasibility of this approach by adapting the Offender Group Reconviction Scale ([OGRS], Copas & Marshall 1998) to predict reconviction rates for both adult and juvenile offenders (see for example Cunliffe & Shepherd 2007; Whiting & Cuppleditch 2006). Overall, the models developed by the UK Home Office adequately discriminated recidivist from non-recidivist offenders and therefore provided a useful tool for monitoring trends in reconviction.

In previous research, Smith and Jones (2008) adapted the approach developed by the UK Home Office to the NSW setting. This method is called the Group Risk Assessment Model (GRAM). In the first stage of the development of GRAM, separate models were developed for offenders given non-custodial orders in adult or children's courts in 2002. Like the models developed by the UK Home Office, these NSW models adequately discriminated recidivist from non-recidivist offenders and therefore provided a useful means of monitoring trends in re-offending. An application of the models to the 2003 and 2004 offender cohorts revealed that the observed reconviction rates were not significantly different from

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the expected rates for offenders coming before adult and children's courts in 2002. The observed rate of re-offending was lower than expected for offenders convicted in children's courts in 2004 but not for offenders convicted in adult courts in 2004.

The earlier GRAM models were restricted to individuals given non-custodial sentences (Smith & Jones 2008). The purpose of the current bulletin is to apply the model to measure re-offending among offenders released from prison.

PAST RESEARCH

The literature on risk factors for recidivism among offenders released from prison is extensive. A full review of the relevant literature will not be undertaken in this bulletin. However, interested readers are referred to Gendreau, Little and Goggin (1996) for a very thorough meta-analysis, Makkai and colleagues (2004) for a review of international research, and Payne (2007) for an account of recidivism research carried out in Australia. The current discussion is limited to previous international studies that developed the methodology adopted here and gives a brief overview of some Australian literature to explain why certain factors were selected for analysis.

The UK Home Office, which pioneered the methods presented here, analysed recidivism risk by pooling a sample of prison releasees with a sample of offenders who had commenced a community-based sanction. It is not possible on the basis of the published UK Home Office reports to identify offender characteristics that are specifically related to recidivism risk among prison releasees. However, there is no a priori reason to expect that the relationship between risk factors and recidivism would vary according to these two sub-populations of offenders. The characteristics included in the final OGRS model were age, gender, number of youth custody episodes, total number of court appearances, time since first conviction and the offence type for which they had been convicted (Copas & Marshall 1998). This model has been adapted over time by UK Home Office researchers and the most recent recidivism monitoring report included controls for age, gender, number of prior custodial episodes, the rate at which an offender builds up convictions, the length of an offender's criminal career, the type of offence for which the offender was convicted on the current ('index') occasion and the offender's total number of prior convictions (Cunliffe & Shepherd 2007). As suggested earlier, the validation checks on these statistical models suggested that they provided a good method for estimating the predicted rate of re-offending among offender cohorts.

Other jurisdictions have also employed this methodology to monitor trends in re-offending among different sub-groups. In Northern Ireland, researchers developed models to adjust for the characteristics of offenders sentenced to community-based sanctions and prison releasees separately (Francis, Harman & Humphreys 2005). The risk factors included in the final prison releasee model were: the rate at which offenders built up convictions, the principal offence that led to the index custodial episode, age at index offence, whether the offender had any convictions for violent offences prior to the index offence, whether the offender had any convictions for burglary offences prior to the index offence, length of time spent in custody and age at first conviction. However, the ability of this model to discriminate between recidivist and non-recidivist offenders was not clear from the published report.

In Australia, the existing research has not focussed on measuring trends in re-offending among prison releasees, but a number of studies have assessed correlates of recidivism amongst this group of offenders. A South Australian study found that men, younger people, those with a greater number of prior convictions, those imprisoned for a property offence and those identifying as Aboriginal or Torres Strait Islander had a higher likelihood of reconviction among a sample of offenders released from prison (Office of Crime Statistics and Research 1989).

In a series of studies carried out in Western Australia, Broadhurst and his colleagues found that the following characteristics were all related to risk of re-imprisonment: being unmarried, being unemployed, having lower levels of education and training, having financial difficulties, being male, being younger at time of release from prison and at their first episode of custody, having a longer adult offending record, having a history of escaping custody, receiving shorter custodial episodes and identifying as an Indigenous person (see Broadhurst & Maller 1990; 1991; Broadhurst et al. 1988). In Victoria, researchers found that prior offending history, age of onset of offending, age at release from prison and having a property offence as the most serious prior offence were all risk factors for reconviction or re-imprisonment (Holland, Pointon & Ross 2007; Ross & Guarnieri 1996).

Early work carried out by the NSW Department of Corrective Services focussed on risk factors for breaching parole orders and subsequently having these orders revoked. Dewdney and Miner (1976) studied trends in parole revocation among a small sample of parolees and found that having longer adult and juvenile offending history and having a history of prior breaches were predictive of subsequent parole failure. In a more comprehensive study, Gorta (1982) found that being unmarried, having a longer juvenile and adult offending history, being unemployed, having a housing problem and having substance abuse problems while on parole all increased the likelihood that parolees would have their parole revoked. In a later

study of risk factors for re-imprisonment among people released from NSW prisons in 1990, Thompson (1995) found that those with an increased risk of re-offending were younger offenders, those who had prior custodial history, those who had a higher security classification at the time of their release and those with an index custody episode for a property or violent offence.

Finally, in the most recently published Australian study, Jones et al. (2006) found that the groups of offenders released from custody who were at greater risk of re-offending were those who had experienced a greater number of prior custodial episodes, offenders who had prior convictions for drug offences, those who were younger at time of release from custody, Indigenous offenders, those who had their parole orders issued by the courts rather than the NSW Parole Authority, offenders who had spent less time in custody for their index conviction and offenders who had been imprisoned for violence, breaching justice orders or property offences.

THE CURRENT STUDY

The current study describes a model built to adjust for the characteristics of prisoners released from the NSW adult prison system to enable accurate estimates of trends in reconviction over time for prison releasees. Information on all prisoners released from NSW adult prisons in 2002 was extracted from the NSW Bureau of Crime Statistics and Research's Re-offending Database (ROD). Subsequent convictions in the two years after the index offence were observed to determine which members of the released prisoner cohort were convicted of a further offence. Drawing on the research reviewed above, we then modelled the relationship between a range of offender characteristics and risk of re-offending to obtain the model that was able to best discriminate between recidivist and non-recidivist offenders. After examining a variety of model diagnostics to determine the validity of the final model, the methodology was applied to compare the observed and predicted rates of reconviction among subsequent cohorts of released prisoners.

METHOD

SAMPLE DEFINITION

The NSW Department of Corrective Services supplies the Bureau with a regular extract of offender movements in and out of custody. These data are then linked to ROD to provide information on offences committed prior to and following episodes of custody. For the current study, data containing the characteristics of all offenders released from NSW adult prisons in 2002 were derived from ROD. Released prisoners were defined as all adult offenders who had served a custodial sentence in a NSW adult prison and who were released in 2002.[1] If offenders had more than one episode of custody in 2002, only their first release date was counted. This was defined as the 'index' prison release episode. Offenders who had missing values on any variable were excluded from the analysis (n=10), which resulted in a final sample size of 7277 released prisoners.

MEASURING RECONVICTION

Reconviction was defined as either a conviction in a NSW court for a further offence committed within two years of release from custody or as a breach of a parole order within two years of release from custody. While any subsequent court appearance could have been finalised after the two-year follow-up, the offence date must have fallen within this two-year period. Any conviction recorded during follow-up that related to an offence committed prior to the index release date was therefore not counted as a reconviction. Minor regulatory offences (such as parking or speeding infringements) were not counted as reconvictions. Breach of parole was considered to have occurred if a parolee was returned to custody within two years of the release date without having a new conviction recorded.[2]

EXPLANATORY VARIABLES

The following variables were included in the final model (see Table 1 for category values):

- **Age**: Age in years at index prison release date;
- **Indigenous status**: Whether the prisoner identified as being of Aboriginal or Torres Strait Islander descent at any custodial episode since July 2000[3];
- **Parole**: Whether the offender was released to parole supervision or unsupervised when released from prison;
- **Sentence length**: The number of days of continuous incarceration before being released from prison;
- **Number of convictions in previous eight years**: The number of prior convictions in the eight years preceding the prisoner's index release date.[4] A prior conviction was counted as a finalised court appearance where one or more offences were proven against the released prisoner[5];
- **Prior breach of justice order offence**: Whether the index conviction or one or more prior convictions was for breaching a justice order;
- **Prior non-aggravated violent offences**: Whether the index conviction or one or more prior convictions was for non-aggravated violent offences (consisting mostly of non-aggravated assault, non-aggravated sexual assault or non-aggravated robbery);
- **Prior theft offence**: Whether the index conviction or one or more prior convictions was for theft offences.

While a number of other variables were considered for inclusion in the final model, they were ultimately excluded because they were either highly correlated with other variables in the model or added little predictive ability when other risk factors were accounted for. These were:

- **Sex**: Sex of the released prisoner;
- **Offence range**: The number of different offence categories for which the released prisoner had been convicted in the eight years preceding their index release;
- **Prior custody**: Whether the released prisoner had one or more prior custodial sentences;
- **Prior aggravated violent offence**: Whether the released prisoner's index conviction or one or more prior convictions were for aggravated violent offences (such as aggravated assault, aggravated sexual assault, aggravated robbery, aggravated abduction or kidnapping and homicide); and
- **Prior drug offence**: Whether the released prisoner's index conviction or one or more prior convictions were for drug offences.[6]

STATISTICAL METHODS

The modelling strategy, the method for examining model adequacy and the approach to applying the method have been described in detail elsewhere (see Smith & Jones 2008) and are therefore only described briefly here. Chi-square tests of association were first carried out to explore the bivariate relationship between each of the potential explanatory variables and reconviction. Multivariate logistic regression models were then fitted to determine which combination of explanatory factors was most useful in predicting reconviction likelihood. Three automated modelling strategies were compared to determine which explanatory factors to include in the final models. These modelling strategies were stepwise regression, forward selection and backward elimination. Model adequacy was assessed using the Hosmer-Lemeshow test statistic and by observing the area under the Receiver Operating Characteristic (ROC) curve (see Hosmer & Lemeshow 2000). Once the final model had been developed on the 2002 sample, the parameter estimates from the 2002 model were used to predict the probability of reconviction within two years for individuals in the 2003 and 2004 offender cohorts. The predicted reconviction rate was defined as the mean of the individual predicted probabilities across all offenders in the cohort.

Table 1. Characteristics of distinct offenders released from a NSW adult prison in 2002 (n=7277) and the bivariate relationship between offender characteristics and reconviction within two years

Offender characteristic	*N (%)*	*Reconvicted (%)**
Age at release (mean=31.3, median=31)		
18-21	887 (12.2)	73.4
22-29	2717 (37.3)	67.8
30-39	2388 (32.8)	62.0
40+	1285 (17.7)	41.1
Indigenous status		
Non-Indigenous	5624 (77.3)	57.6
Indigenous	1653 (22.7)	76.2
Parole		
No	3313 (45.5)	58.7
Yes	3964 (54.5)	64.5
Sentence length		
60 days or less	1508 (20.7)	54.4
61-182 days	2575 (35.4)	68.7
183-364 days	1754 (24.1)	70.3
365 days or more	1440 (19.8)	46.9
Number of prior convictions in past 8 years		
One	913 (12.6)	20.9
Two to four	1681 (23.1)	45.3
Five to seven	1892 (26.0)	66.4
Eight to ten	1372 (18.9)	80.0
11 or more	1419 (19.5)	84.1
Prior breach offences		
None	3840 (52.8)	50.4
One or more	3437 (47.2)	74.7
Prior non-aggravated violent offences		
None	2697 (37.1)	45.9
One or more	4580 (62.9)	71.2
Prior theft offences		
None	2341 (32.2)	38.3
One or more	4936 (67.8)	73.0

** Chi-square test p-value was less than 0.0001 for all comparisons.*

RESULTS

RELATIONSHIPS BETWEEN EXPLANATORY VARIABLES AND RECONVICTION

The majority of released prisoners were male (90.8%). Table 1 shows the distribution of the other measured characteristics of the 2002 sample as well as the bivariate (or unadjusted) relationships between each of these characteristics and likelihood of reconviction within two years. The median age of offenders was 31 years, most were non-Indigenous, more than half were released to parole, more than half were serving sentences of six months or less and around one in five prisoners had more than ten prior convictions in the preceding eight years. Approximately half of the offenders had previously breached a justice order and approximately two-thirds had a prior non-aggravated violent and/or theft conviction. Chi-square tests of association indicated that reconviction was more likely for offenders who were: younger at release, Indigenous, released to parole, had a sentence length between 61 and 364 days, had more convictions in the previous eight years and had one or more prior convictions for a breach offence, a non-aggravated violent offence or a theft offence.

FINAL LOGISTIC REGRESSION MODEL

Table 2 shows the parameter estimates and associated odds ratio estimates for the final model of released prisoners. The model in Table 2 suggests that, after adjusting for all other characteristics in the model:

- Younger offenders had much higher odds of reconviction than older offenders released from prison;
- Indigenous offenders had higher odds of reconviction than non-Indigenous offenders released from prison;
- Offenders released to parole had higher odds of reconviction than those who were unsupervised at release[7];
- Prisoners who served between 61 and 364 days had higher odds of reconviction than those who served shorter or longer periods of time in custody;
- The odds of reconviction increased substantially as an offender's number of prior convictions increased; and
- Offenders who had one or more prior convictions for breaching a justice order, a non-aggravated violent offence or a theft offence had higher odds of reconviction.

Table 2. Final logistic regression model predicting reconviction within two years for offenders released from a NSW adult prison in 2002 (n=7277)

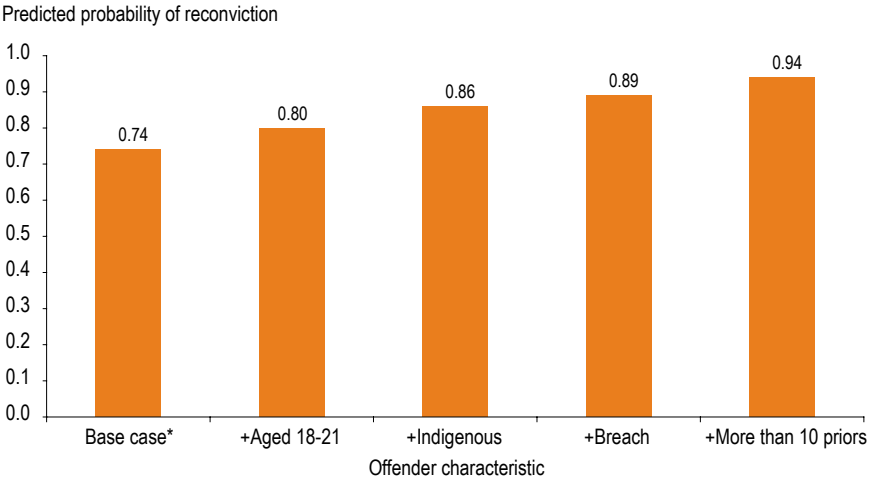
Characteristic	*Parameter estimate (standard error)*	*Odds ratio (95% confidence interval)*
Intercept	-2.031 (0.113)	
Age at release (years)		
40+*		1.00
30-39	0.327 (0.081)	1.39 (1.18, 1.62)
22-29	0.326 (0.082)	1.39 (1.18, 1.63)
18-21	0.642 (0.109)	1.90 (1.54, 2.35)
Indigenous status		
Non-Indigenous*		1.00
Indigenous	0.434 (0.071)	1.54 (1.34, 1.78)
Parole		
No*		1.00
Yes	0.368 (0.064)	1.45 (1.28, 1.64)
Sentence length		
60 days or less*		1.00
61-182 days	0.270 (0.076)	1.31 (1.13, 1.52)
183-364 days	0.310 (0.089)	1.36 (1.15, 1.62)
365 or more days	-0.155 (0.096)	0.86 (0.71, 1.04)
Number of prior convictions in past 8 years		
One*		1.00
Two to four	0.666 (0.104)	1.95 (1.59, 2.39)
Five to seven	1.238 (0.113)	3.45 (2.77, 4.31)
Eight to ten	1.724 (0.129)	5.61 (4.36, 7.22)
11 or more	1.870 (0.137)	6.49 (4.96, 8.49)
Prior breach offences		
None*		1.00
One or more	0.252 (0.062)	1.29 (1.14, 1.45)
Prior non-aggravated violent offences		
None*		1.00
One or more	0.263 (0.062)	1.30 (1.15, 1.47)
Prior theft offences		
None*		1.00
One or more	0.607 (0.067)	1.84 (1.61, 2.09)

** Reference category*

Figure 1 shows the marginal effect of each of these risk factors on the likelihood that a released prisoner will be convicted in court within two years of their release. The base (or median) case was set to the median value for each variable. In this study, the base case was an offender who was aged between 30 and 39 years at release, was non-Indigenous, was released to parole supervision, was sentenced to between 61 and 182 days in custody, had between five and seven prior convictions, had no prior convictions for breaching justice orders but had one or more convictions for a non-aggravated violent offence and for a theft offence.

The model estimates that 74 per cent of offenders with these characteristics would be reconvicted within two years of release. As Figure 1 shows, this risk increases: to 80 per cent for offenders who are like the median case on all characteristics but are also aged between 18 and 21 years at release; to 86 per cent if they are also Indigenous; to 89 per cent if they also have one or more prior convictions for breaching justice orders; and to 94 per cent if they have more than ten prior convictions for any offence

Figure 1: Marginal effect of each additional risk factor for reconviction



* *Base case is an offender who: was aged 30-39 at release, was non-Indigenous, was released to parole supervision, was sentenced to 61-182 days in custody, had five to seven prior convictions, had no prior breaches but had one or more non-aggravated violent and one or more theft offences.*

Model adequacy

The Hosmer-Lemeshow test statistic was not statistically significant, which indicates that there was no significant deviation between observed and expected frequencies within each of the ten partition groups ($\chi^2(8)=12.8$, $p=0.120$; see Technical Appendix for further details of model adequacy).

Application of the model

Table 3 shows the observed and predicted reconviction rates, the difference between observed and predicted reconviction rates, as well as the corresponding 95 per cent confidence intervals for the 2003 and 2004 cohorts of offenders released from prison. The predictions were based on the estimates derived from the final 2002 model. Table 3 also shows the observed reconviction rate and corresponding 95 per cent confidence intervals for the 2002 cohort of released prisoners. No predicted reconviction rates are presented for 2002 because the estimates were derived from the 2002 data.

Table 3. Predicted and observed rates of reconviction among the 2002, 2003 and 2004 offenders released from a NSW adult prison, based on the estimates derived from the final 2002 logistic regression model

Year	N	*Observed reconviction rate (95% confidence interval)*	*Predicted reconviction rate (95% confidence interval)*	*Difference between predicted and observed reconviction rates (95% confidence interval)*
2002	7277	61.84 (60.72, 62.95)	N/A	N/A
2003	6935	60.85 (59.70, 61.99)	61.71 (60.56, 62.84)	0.86 (-0.77, 2.48)
2004	7127	61.75 (60.62, 62.87)	61.45 (60.31, 62.57)	-0.30 (-1.90, 1.29)

In the 2003 cohort of offenders released from prison, the observed proportion reconvicted within two years was slightly below the proportion predicted to re-offend based on the model. In the 2004 cohort of offenders released from prison, the observed proportion reconvicted within two years was slightly above the proportion predicted to re-offend based on the model. However, because the confidence intervals around the difference between observed and predicted reconviction rates include zero for both the 2003 and 2004 cohorts, it is concluded that these differences were not statistically significant. The evidence therefore suggests that reconviction rates did not change between 2002 and 2003, or between 2002 and 2004. Incidentally, these are the same conclusions that would have been drawn had we simply compared the actual reconviction rates between 2002 and 2003 (observed difference between proportions 0.99, 95% confidence interval –0.63 to 2.61) and between 2002 and 2004 (observed difference 0.09, 95% confidence interval -1.51 to 1.68).

SUMMARY AND DISCUSSION

The aim of this investigation was to apply the techniques developed in previous work by the authors (Smith & Jones 2008) to measure changes in rates of re-offending in an Australian cohort of released prisoners. As with many other investigations of this nature, the strongest independent predictor of reconviction was the number of times the offender had been convicted in the past. The odds of reconviction for an adult released prisoner who had 11 or more prior convictions were more than six times greater than a released prisoner with only one prior conviction. The analyses also revealed that several other characteristics made significant independent contributions to the predicted likelihood of reconviction. These were: being younger at release, being Indigenous, having been released to parole supervision (as opposed to unsupervised release), having served between two and 12 months in prison (rather than a longer or shorter sentence) and having had a prior conviction for breaching a justice order, a non-aggravated violent offence or a theft offence. Offenders who had all of these risk factors were estimated to have a 94 per cent chance of reconviction within two years of release. Both the internal validation and cross-validation procedures (some of which are presented in the Technical Appendix) demonstrated that the model was able to adequately discriminate recidivist from non-recidivist released prisoners.

There were some differences between the final model of reconviction for the released prisoner sample presented in this study and the final model of the offenders given non-custodial sanctions in adult courts presented in Smith and Jones (2008). In the current analysis, data were not available for the index offence(s) that led to their incarceration. Index offence variables controlled for in the previous study included offence type, court jurisdiction and the number of concurrent offences at the index court appearance. However, in the current study, data were available on incarceration-related factors such as sentence length and whether the offender was released on parole. Even though index offence-related variables that were significant predictors of recidivism among the non-custodial group could not be included here, the model for the custodial group provided an acceptable level of discrimination (see Technical Appendix).

One interesting difference between the released prisoner and the non-custodial adult court models was that gender was not a significant predictor of reconviction in the released prisoner sample. Among the cohort of adult offenders given non-custodial sanctions, on the other hand, women were found to be at a much lower risk of reconviction than men. In 2006-2007, the national rate of imprisonment for women was 22.7 per 100,000 and was much higher for men at 305.7 per 100,000 (Steering Committee for the Review of Government Service Provision 2008). The reason gender was not a predictor of reconviction for released prisoners may be that, once offending has reached the threshold resulting in incarceration (which is higher for females than males), the differences between male and female offenders disappear.

In the current study of released prisoners, both the comparison of the actual reconviction rates across time (e.g. from 61.84% in 2002 to 61.75% in 2004) and the difference between the observed 2004 reconviction rate and the predicted 2004 reconviction rate (61.45%) suggested no change in reconviction rates from 2002 to 2004. The same was found for the comparison between 2002 and 2003 reconviction rates. Since the adjusted and unadjusted reconviction rates both showed no change over time, the benefit of adjusting for the characteristics of offenders may not be entirely clear. It should be noted, however, that adjustment does sometimes reveal a change in re-offending not evident from a simple comparison of unadjusted reconviction rates. An example of this was given in Smith and Jones (2008). The benefits of adjusting for offender characteristics may become more apparent in studies of released prisoners when changes in re-offending are examined over longer time periods than were examined here.

The limitations of the approach taken in the current research and the caution required when applying the model were discussed in detail in previous research (Smith & Jones 2008). However, it is important to outline some of the key considerations arising from this research. First, this model does not account for all of the characteristics of released prisoners coming before the courts in a given year. Significant changes in the unmeasured characteristics of released prisoners could produce spurious variations in observed reconviction rates within any given year. This said, to have an adverse impact, the omitted variables would have to be strongly related to reconviction but unrelated to any variables controlled for in the model. In the short-term at least, this seems highly unlikely.

Second, while having a lower observed rate of reconviction relative to predicted rate of reconviction would be consistent with the hypothesis that the criminal justice system has succeeded in reducing re-offending, it is also possible that factors exogenous to the justice system (e.g. improved economic conditions or changes in illicit drug markets) could account for, or contribute to, such a reduction. While this possibility cannot be ruled out, if these exogenous factors exert any influence over rates of re-offending, it would probably be over the longer term. The adjustment methodology described here is only intended for monitoring trends in re-offending over the short-term. Indeed, if either Government programs

or any other external factors succeed in making released prisoners less likely to re-offend, the relative contribution of different offender characteristics to the risk of reconviction may change over time. Hence, the model will be periodically recalibrated to account for the potentially dynamic nature of reconviction propensity.

Third, as noted by Smith and Jones (2008) on the prediction of re-offending among offenders given non-custodial orders, the instrument developed here has been designed to predict reconviction likelihood amongst groups of people and it is not intended to identify whether an individual is likely to re-offend within a given time period. The models developed here use a probabilistic methodology to estimate whether an offender will be reconvicted within 24 months. It is inevitable that false positives will sometimes occur, whereby offenders who are predicted to re-offend do not go on to re-offend. This might be acceptable if the model were used to triage an individual into a more in-depth risk assessment or into treatment programs designed to reduce their likelihood of re-offending. However, there are both ethical and moral objections to be taken into account when making sentencing, parole or release decisions that could significantly disadvantage an individual based only on the probability of reconviction derived from a statistical model.

Finally, the model presented here has been shown to effectively discriminate between recidivists and non-recidivists for large sub-groups of offenders. However, the model may not effectively discriminate between recidivists and non-recidivists within some sub-groups, particularly within small sub-groups of offenders (e.g. child sex offenders). The model presented here should only be used to focus on the whole population of offenders released from adult prisons. If estimates are required for specific sub-groups of released prisoners, it is strongly recommended that new models be built and tested using the methodology implemented here rather than relying on the coefficients derived from the model presented in this bulletin.

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NOTES

1. Unsentenced prisoners were excluded from the analysis.

2. Breach of parole was defined in this way because the Bureau does not hold data on parole breaches. This is due to the fact that parole matters go before the NSW Parole Authority and are not recorded on the Bureau's regular criminal court data collection.

3. For 101 offenders, Indigenous status was unknown and they were included in the non-Indigenous group for all analyses

4. This eight-year period was selected because ROD contains court appearance records beginning in 1994. Eight years was therefore the maximum time available to observe the conviction history for the 2002 cohort.

5. By definition, all offenders must have had at least one prior offence. However, some offenders were found to have no prior offences on ROD. This can occur because their index custody episode began prior to the earliest ROD records (January 1994) or because they had been convicted in a non-NSW court. Prisoners who had no priors were therefore combined with the group who had one prior conviction.

6. One notable omission from the list of possible explanatory variables is the offender's most serious index offence. It was not possible to easily identify this offence because the information is not included in the data extract received from the Department of Corrective Services and it is not possible to cross-reference individual release episodes with particular court appearances. However, while the evidence shows that offence type is a significant predictor of re-offending, previous work by the current authors has found that the effect sizes are not large (Jones et al. 2006; Smith & Jones 2008).

7. This does not indicate that being on parole caused these prisoners to re-offend at a higher rate. This difference is largely attributable to the number of people who breach their parole orders and are subsequently brought back to custody.

8. The 'training' and 'holdout' samples refer to a cross-validation procedure whereby the entire sample is randomly split into two separate 50 per cent samples. The model is then fitted to the training sample and the coefficients from that model are used to derive predicted probabilities of reconviction among the holdout sample. If the model is strong, the observed and predicted probabilities of reconviction among the holdout sample should align closely.

TECHNICAL APPENDIX

Several other means of assessing the adequacy of the models were employed in addition to the Hosmer-Lemeshow test statistic. Previous research by the current authors has described these methods in more detail (see Smith & Jones 2008). The area under the curve (AUC) statistic and corresponding 95 per cent confidence intervals derived from the four validation procedures are shown in Table A1. The AUC statistics ranged between 0.76 and 0.79 for each of these methods, which indicates that the model performed well on both internal validation and cross-validation checks. The AUC statistics also suggest that the model provided an acceptable level of discrimination (Hosmer & Lemeshow 2000). Table A2 shows that the observed and predicted rates of reconviction were very similar for most of the sub-groups. There was some discrepancy between the observed and predicted rates of reconviction among the released prisoners with two prior drug convictions (among the holdout sample[8]) and the released offenders aged 25-28 years (again among the holdout sample). Some variation was expected for the custodial sample because the number of offenders within some of the sub-groups was small. Overall, however, the concordance between the predicted and observed reconviction rates was very accurate, which suggests that the model generally performs well among sub-groups of both the training and holdout samples.

Table A1. Area under the curve (AUC) statistics and 95% confidence intervals for the four methods of obtaining predicted probabilities of reconviction among the offenders released from a NSW adult prison in 2002 (n=7277)

	N	*AUC (95% CI)*
Internal validation process		
Full sample of 2002 data	7277	0.772 (0.761, 0.783)
Full sample of 2002 data, leave-one out	7277	0.769 (0.757, 0.780)
Cross-validation process		
50% training sample of 2002 data	3639	0.756 (0.740, 0.773)
50% holdout sample of 2002 data	3638	0.787 (0.772, 0.802)

Table A2. Observed and predicted rates of reconviction for selected sub-groups of the training (n=3639) and holdout (n=3638) samples from the cohort of offenders released from a NSW adult prison in 2002

	Training sample			*Holdout sample*		
	N	*Observed*	*Predicted*	*N*	*Observed*	*Predicted**
Number of prior drug convictions						
0	1967	55.9	55.0	1956	55.3	55.5
1	909	62.5	64.0	906	64.8	62.7
2	387	73.1	71.4	420	77.6	72.4
3+	376	72.6	75.4	356	79.2	76.2
Age						
18-21	444	72.1	72.1	443	74.7	73.6
22-24	536	63.8	66.7	531	69.9	67.5
25-28	632	66.3	64.3	663	71.9	66.4
29-32	647	66.3	64.1	650	64.9	61.8
33-39	727	59.0	60.6	719	60.1	60.8
40+	653	43.6	43.6	632	38.4	42.1

* *Predicted rates of reconviction for the holdout sample were derived from the training sample model of reconviction.*

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