Screening cautioned young people for further assessment and intervention

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Aim: To assess whether it is possible to screen juvenile offenders for recidivism risk from information readily available at the time of cautioning a young offender.

Method: Data on all 8,537 juveniles cautioned by police or courts in 2006 were analysed using logistic regression. The dependent variable in the logistic regression model was a binary variable measuring reoffending. The potential predictors included number of previous cautions, conferences or court appearances, jurisdiction issuing the caution (court vs. police), Indigenous status, gender, age at index caution, offence type, offence seriousness, prior violence, remoteness (ARIA) and social and economic disadvantage.

Results: The final model included prior contacts, jurisdiction issuing the index caution, Indigenous status and gender as predictors. The c-statistic (area under the ROC curve) when comparing predicted with observed values was 0.767, 95% confidence interval (0.757, 0.777). The model fit was confirmed by comparing predicted values from half the dataset with observed values from the other half.

Conclusion: It is possible to screen juveniles for future risk of reoffending from data readily available at the time they are cautioned.

Keywords: juvenile, reoffending, offence seriousness, screening, logistic regression

INTRODUCTION

Previous research has found high rates of reoffending amongst juveniles coming into contact with the Australian criminal justice system. Lynch, Buckman, and Krenske (2003) found that 79 per cent of juveniles placed on supervised orders in Queensland between 1994 and 1995 had progressed to the adult corrections system by 2002. Similarly, 71 per cent of Roberts' (2005) sample of West Australian juvenile offenders released from detention between 1997 and 2000 were reconvicted by a court or returned to prison within two years of release. Chen, Matruglio, Weatherburn, and Hua (2005) found that 68 per cent of the juvenile offenders who had their first appearance in the NSW Children's Court in 1995 had a further proven offence within the next eight years. Vignaendra and Fitzgerald (2006) found that 42 per cent of juvenile offenders cautioned by police or courts had a further offence proved against them in a court within five years of their first caution or conference.

The high rate of juvenile reoffending provides a strong argument for early intervention to reduce the risk of juvenile recidivism, an argument bolstered by the fact that a number of programs have been found to be effective at reducing juvenile reoffending (Lipsey & Wilson, 1998; National Crime Prevention, 1999). Programs to reduce recidivism are often quite expensive. Multi-systemic therapy (MST), one of the most widely used forms of intervention with young offenders (MacKenzie, 2002), was estimated by the Washington State Institute of Public Policy in 2006 to cost about US$4,264 per participant (Aos, Miller, & Drake, 2006). These costs are more than offset by the benefits in terms of reducing criminal justice outlays (Aos et al., 2006). The economic benefits of early intervention, however, do not obviate the need for careful targeting of intervention programs. There is little point placing juvenile offenders on rehabilitation programs if they are likely to cease offending anyway. Wherever possible, rehabilitation programs should be targeted at those who are most at risk of reoffending.

Two types of error arise in the process of selecting young offenders for placement on an early intervention program: 'misses' and 'false alarms'. A 'miss' occurs when a young offender is not identified as a likely reoffender and is therefore not placed on an early intervention program, but then turns out to be a recidivist. A 'false alarm' occurs when a young offender is incorrectly placed on an early intervention program. The costs associated with a 'miss' include the costs associated with crime and the processing of defendants through the criminal justice system that might otherwise have been avoided. The cost associated with a 'false alarm' is the money wasted when a juvenile offender, who would have ceased offending anyway, is subjected to unnecessary intervention. Several statistical tools have been developed for assessing risk of reoffending amongst offender populations. Among young people, the Youth Level of Service/Case Management Inventory (YLS/CMI) is the most widely used. The YLS/CMI has been adapted for use in Australia by Thompson and Pope (2005).

Because it is a tool for assessing criminogenic needs as well as risks, the YLS/CMI and its Australian equivalent, the YLS/CMI-AA, are valuable aids to decisions about what forms of intervention might reduce the risk of further offending. The initial decision confronted by courts and juvenile justice agencies dealing with young offenders making their first contact with the justice system, however, is not what forms of intervention to undertake but whether to intervene (in any substantial way) at all. The ideal approach would be to 'triage' young offenders coming into contact with the criminal justice system using a few objective and readily obtained indicators of risk, so that those in the higher risk categories can be referred for more thorough assessment. Weatherburn, Cush, and Saunders (2007) developed a screening tool for future offending based on data from juvenile offenders placed on a supervised order. They noted, however, that it would be preferable to screen juvenile offenders for future offending at an earlier point in time, such as when they are cautioned by police or referred to a Youth Justice Conference.[1]

The main aim of the study reported here was to assess whether it is possible to reliably identify juvenile recidivists from information readily available at the time of cautioning a young offender. To conduct this assessment we build a logistic regression model linking the risk of reoffending to a group of factors known or thought to predict that risk. Before conducting that analysis, however, we begin by way of background with a profile of juveniles cautioned by police and courts. The profile includes information on the age, gender, Indigenous status, location and level of disadvantage of those cautioned, as well as information on the number of previous cautions, conferences, or court appearances; and the number of subsequent cautions, conferences and court appearances over the ensuing three

years. To assist in understanding the gravity of any further offending, information on the most serious offence in the ensuing three years is also presented. The next section of the bulletin describes the dataset used in the analysis, the variables examined and the types of analysis undertaken.

METHOD

The dataset consisted of data for all (n = 8,537) juveniles cautioned by police or courts in NSW in 2006. The data were drawn from the reoffending database maintained by the NSW Bureau of Crime Statistics and Research (Hua & Fitzgerald, 2006). Where a juvenile was cautioned more than once in that year, one of their cautions was selected at random. The 2006 caution for each juvenile is referred to as the *index caution*. The data available for each juvenile included the following:

- age at the date of the index caution
- age at first caution
- gender
- Indigenous status
- whether the index caution was issued by police or a court
- the offence type of the principal offence at the index caution
- the offence seriousness of the principal offence at the index caution as measured by the Median Sentence Ranking (see MacKinnell, Poletti, & Holmes, 2010 for a description of this ranking)
- the total number of previous cautions, Youth Justice Conferences or court appearances (prior to the index caution)
- the number of cautions, the number of Youth Justice Conferences and the number of proven court appearances in the three years after the date of the index caution (including those for offences committed as adults, for the juveniles who turned 18 within the three-year follow-up period)
- the offence type of the most serious offence at any caution, Youth Justice Conference or proven court appearance in the three years after the index caution
- whether the juvenile had been cautioned, conferenced or convicted for a violent offence[2] prior to the index caution
- social and economic disadvantage as measured by the Socio-Economic Index For Areas (SEIFA) of the juvenile's postcode at the date of the index caution[3]
- remoteness as measured by the Accessibility/Remoteness Index for Australia (ARIA) of the juvenile's postcode at the date of the index caution.[4]

The data analysis is presented in two sections. The first section presents a descriptive profile of the juveniles cautioned in NSW. The second section describes the development of a statistical model to predict which juveniles were likely to reoffend.

RESULTS

PROFILE OF THE JUVENILES CAUTIONED IN 2006

This section describes the juveniles cautioned in NSW in 2006 in terms of their age, gender, and Indigenous status, their previous contacts with the criminal justice system, and the remoteness and level of social and economic disadvantage of their postcode of residence.

Age, gender and Indigenous status

There were 8,537 juveniles cautioned in NSW in 2006. Eighty-eight per cent of the 8,537 cautions were issued by police and 12 per cent by courts. Table 1 shows the age and gender of the juveniles cautioned in 2006. Seventy-two per cent were male. Two-thirds were aged between 15 and 17.

Nearly a quarter (24%) were Indigenous Australians even though Indigenous Australians aged 10-17 make up only 4.25 per cent of the population aged 10-17.[5] The Indigenous juveniles had an average age of 14.5 at the time of the index caution, younger than the non-Indigenous juveniles who had an average age of 15.3. Forty-six per cent of the Indigenous juveniles were aged under 15 at the time of the index caution, compared with 29 per cent of the non-Indigenous juveniles.

Table 1. Age and gender of juveniles cautioned in 2006

| Age at index caution | Gender | | | | | |
| | Male | | Female | | Total* | |
	Number	%	Number	%	Number	%
9	4	0	1	0	5	0
10	45	1	8	0	54	1
11	137	2	19	1	156	2
12	250	4	93	4	346	4
13	553	9	240	10	800	9
14	964	16	469	20	1,437	17
15	1,303	21	537	23	1,844	22
16	1,474	24	535	23	2,014	24
17	1,417	23	450	19	1,881	22
Total	6,147	100	2,352	100	8,537	100

* Note: The total includes 38 juveniles of unknown gender.

Previous contacts with the criminal justice system

Seventy per cent of the juveniles cautioned in 2006 had no previous contact with the criminal justice system (i.e. no previous cautions, Youth Justice Conferences or court appearances). For the 30 per cent with some previous contact, the age difference between their first caution and the index caution was at most one year; 95 per cent were the same age when first cautioned and 5 per cent were one year younger.

Table 2 shows the frequency distribution of the number of previous contacts with the criminal justice system. It is clear that while most had none or few previous contacts, a small number had many previous contacts, up to a maximum of 23. Only seven per cent of the juveniles had more than two previous contacts.

Eight per cent of the total sample of juveniles had previously been cautioned, conferenced or convicted for a violent offence.

Table 2. Number of previous cautions, Youth Justice Conferences or court appearances for juveniles cautioned in 2006
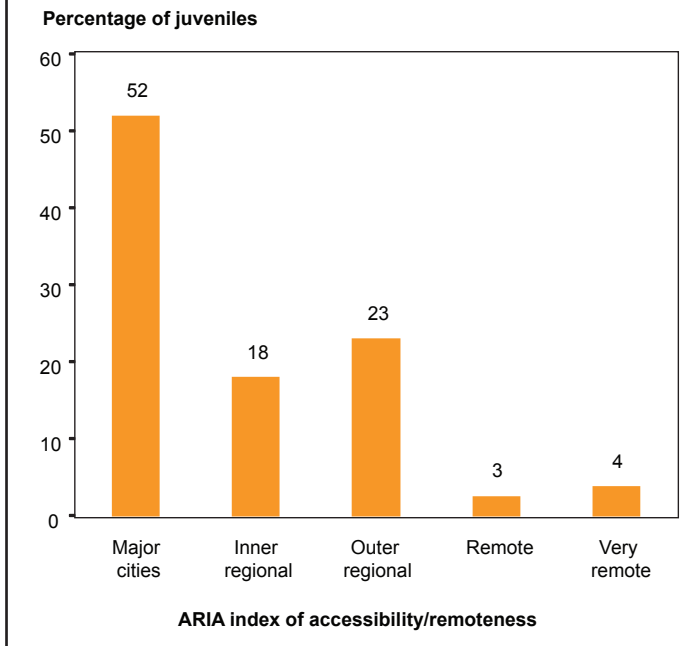
Number of previous contacts	Frequency	%	Cumulative %
0	5,984	70.1	70.1
1	1,415	16.6	86.7
2	557	6.5	93.2
3	222	2.6	95.8
4	129	1.5	97.3
5	80	0.9	98.2
6	57	0.7	98.9
7	30	0.4	99.3
8	19	0.2	99.5
9	13	0.2	99.6
10	6	0.1	99.7
>10	25	0.3	100.0
Total	8,537	100.0	100.0

Remoteness

The ARIA index is a measure of remoteness or accessibility used by the Australian Bureau of Statistics in its geographic classifications (Australian Bureau of Statistics, 2001). The categorisation of ARIA scores used here is as follows:

- Major cities (ARIA score 0 <= 0.20) – relatively unrestricted accessibility to a wide range of goods and services and opportunities for social interaction

Figure 1. ARIA index of postcode of residence for juveniles cautioned in 2006

Percentage of juveniles

ARIA index of accessibility/remoteness

Figure 2. SEIFA index of disadvantage of postcode of residence for juveniles cautioned in 2006
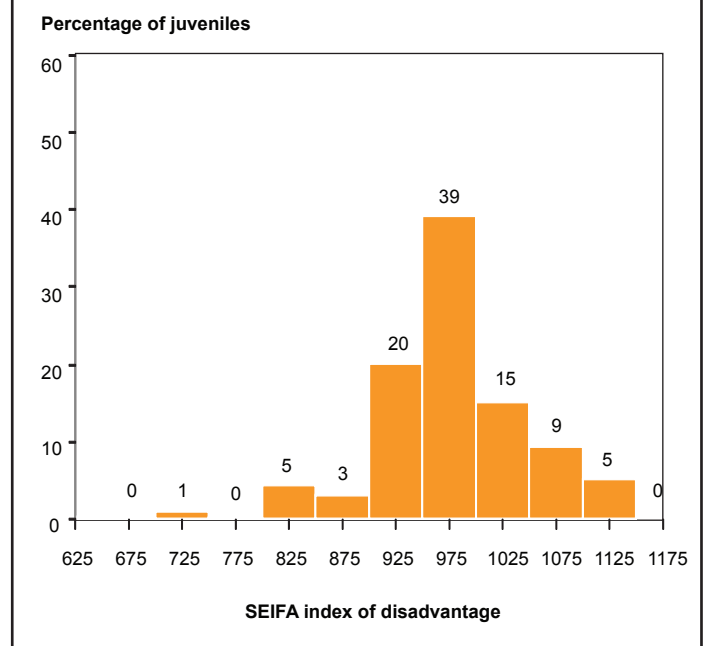
Percentage of juveniles

SEIFA index of disadvantage

- Inner regional (ARIA score greater than 0.2 to <=2.40) – some restrictions to accessibility of some goods, services and opportunities for social interaction

- Outer regional (ARIA score greater than 2.40 to <=5.92) – significantly restricted accessibility of goods, services and opportunities for social interaction

- Remote (ARIA score greater than 5.92 to <=10.53) – very restricted accessibility of goods, services and opportunities for social interaction

- Very remote (ARIA score greater than 10.53) – very little accessibility of goods, services and opportunities for social interaction.

Figure 1 shows the distribution of the ARIA index of the juveniles' postcodes of residence at the time of their index caution. It shows that 70 per cent lived in major cities and inner regional areas, areas that have good access to goods and services, and to opportunities for social interaction.

Social and economic disadvantage

The SEIFA index of relative socio-economic disadvantage measures social and economic disadvantage using information such as an area's average income and average unemployment (Australian Bureau of Statistics, 2003). The mean of the SEIFA index is 1,000. A value lower than 1,000 indicates an above-average level of disadvantage. Figure 2 shows the frequency distribution of the SEIFA index of the juveniles' postcodes of residence at the time of their index caution. The SEIFA index

values are grouped into bands of width 50 with the axis labels indicating the midpoint of these bands. For example, 39 per cent of the juveniles lived in areas with a SEIFA index between 950 and 1,000 (midpoint 975).

Seventy per cent of the juveniles lived in areas with a SEIFA index below 1,000, that is, in areas with an above-average level of disadvantage.

Reoffending

Reoffending was measured over a three-year period from the date of the index caution for each juvenile, including reoffending as adults for the juveniles who turned 18 during this follow-up period.

Fifty-two per cent of the juveniles cautioned in 2006 had at least one further contact in the three years after their index caution. Forty-two per cent of the juveniles cautioned in 2006 had at least one proven court appearance in the three years after their index caution. Nineteen per cent of the juveniles cautioned in 2006 had multiple types of recontact (i.e. a mix of cautions and/or conferences and/or court appearances).

Figure 3 shows the distribution of the juveniles' reoffending, separately for cautions, conferences, proven court appearances and their total.

It is clear that court appearances make up the bulk of the contacts for those with many contacts after their index caution. The maximum number of subsequent cautions is

Figure 3. Distribution of reoffending for cautions, conferences, proven court appearances and total contacts (n=8,537)
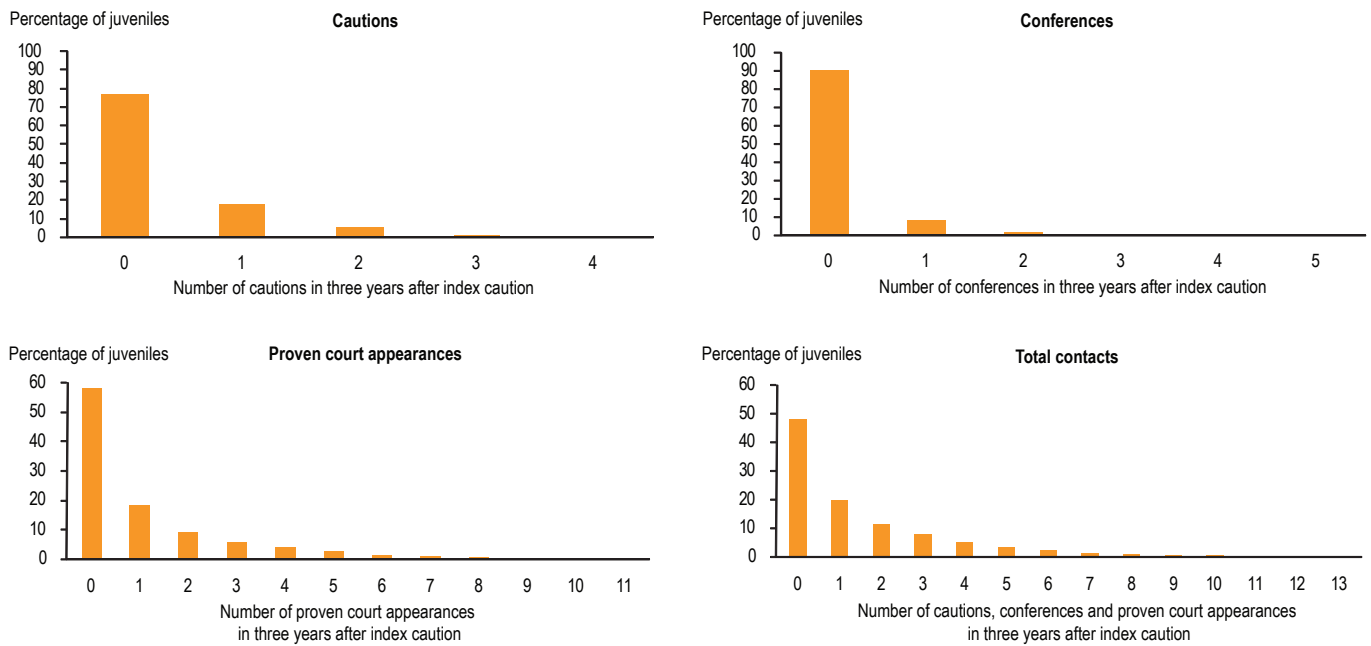
four, and of conferences, five, compared with a maximum of eleven subsequent proven court appearances. Proven court appearances accounted for 71 per cent of all contacts (by the 8,537 juveniles cautioned in 2006) in the three years after the index caution.

Eleven per cent of the juveniles cautioned in 2006 had more than three conferences or proven court appearances in the three years after the index caution and this 11 per cent accounted for 51 per cent of all further conferences and proven court appearances. This highlights the importance of targeting juvenile reoffenders. A small reduction in the number of repeat offenders can be expected to have a significant effect on the overall volume of juvenile contacts with the criminal justice system.

Offence type of subsequent offence

Figures 4 and 5 show the offence type of the most serious offence in the three years after the index caution. Offence types are categorised according to the major Australian Standard Offence Classification (ASOC) categories (Australian Bureau of Statistics, 2008). Table 3 lists these offence categories, showing the short title used in Figures 4 and 5.

Figure 4 includes offences for juveniles who had any further contact, that is, a further caution, Youth Justice Conference or proven court appearance, in the three years after the index caution. (The offence type was missing for 2 of these 4,455 juveniles.)

Table 3. Major Australian Standard Offence Classification offence categories

No.	Short title	Category
1	Homicide	Homicide and related offences
2	Cause injury	Acts intended to cause injury
3	Sexual assault	Sexual assault and related offences
4	Endanger persons	Dangerous or negligent acts endangering persons
5	Abduction	Abduction, harassment and other offences against the person
6	Robbery	Robbery, extortion and related offences
7	Break & enter	Unlawful entry with intent/burglary, break and enter
8	Theft	Theft and related offences
9	Fraud	Fraud, deception and related offences
10	Drug	Illicit drug offences
11	Weapons	Prohibited and regulated weapons and explosives offences
12	Property damage	Property damage and environmental pollution
13	Public order	Public order offences
14	Traffic	Traffic and vehicle regulatory offences
15	Against government	Offences against justice procedures, government security and government operations
16	Miscellaneous	Miscellaneous offences

Figure 4. Offence type of most serious subsequent offence for juveniles who had at least one further contact (n=4,453)
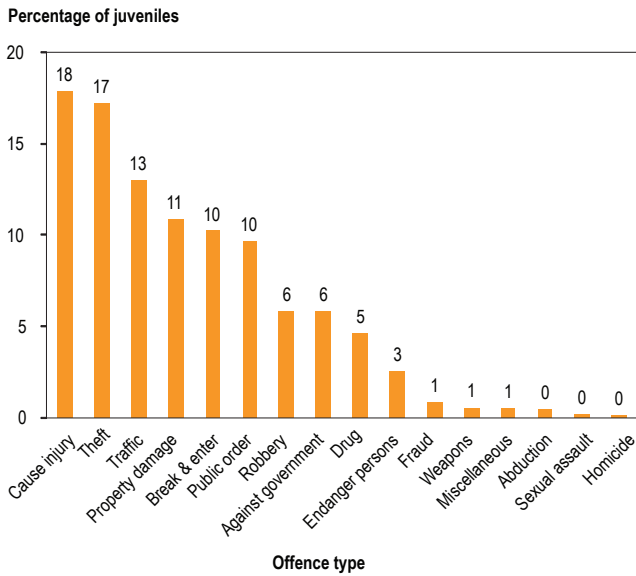
Percentage of juveniles

Offence type

Figure 5. Offence type of most serious subsequent offence for juveniles who had a further conference or proven court appearance but no further caution (n=2,516)
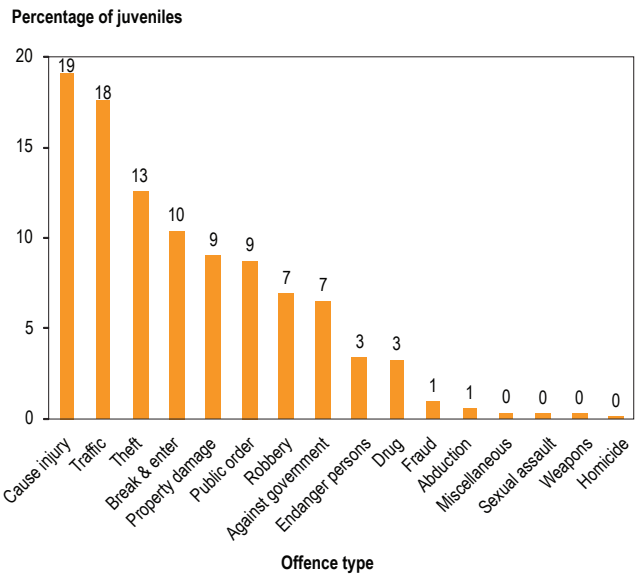
Percentage of juveniles

Offence type

Figure 5 includes offences only for those juveniles who had a further Youth Justice Conference or proven court appearance but no further caution. (The offence type was missing for 1 of these 2,517 juveniles.)

In both Figures 4 and 5 the three most frequently occurring offence types are *cause injury*, *theft* and *traffic*. These three offence types accounted for nearly half the subsequent offences (48% of all subsequent offences; 49% when cautions were excluded from subsequent contacts).

The *cause injury* offences were predominantly *serious assault resulting in injury* (43% of all *cause injury* offences; 47% when cautions excluded) and *common assault* (42% of all *cause injury* offences; 38% when cautions excluded).
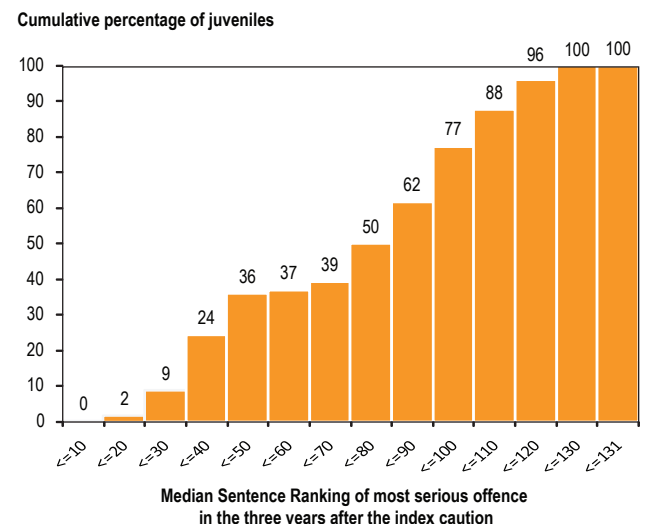
More than half the *theft* offences were either *theft from retail premises* or *theft (except motor vehicles), not elsewhere classified* (i.e. theft not covered by other specified theft offences). About one-fifth were *illegal use of a motor vehicle* (19% of all *theft* offences; 23% when cautions were excluded). More than one-tenth of the theft offences were *receive or handle proceeds of crime* (13% of all *theft* offences; 16% when cautions were excluded).

Three offences accounted for about 90 per cent of the *traffic* offences (whether or not cautions were included). They were *exceed the prescribed content of alcohol or other substance limit*, *drive without a licence* and *drive while licence disqualified or suspended*.

Offence seriousness of subsequent offence

The Median Sentence Ranking is an offence seriousness ranking of offences based on median statutory maximum penalties. It ranks the ASOC offences from 1 to 131 where *murder* has a ranking of 1 and *graffiti* a ranking of 131 (MacKinnell, Poletti, & Holmes, 2010).

Figure 6. Offence seriousness of most serious subsequent offence for juveniles cautioned in 2006 who had at least one further contact (n=4,453)

Cumulative percentage of juveniles

Median Sentence Ranking of most serious offence in the three years after the index caution

For the juveniles who had a caution, conference or proven court appearance in the three years after the index caution, Figure 6 shows the cumulative frequency distribution of the Median Sentence Ranking of their most serious subsequent offence.

It can be seen from Figure 6 that the reoffending includes some quite serious offences with more than a third ranked in the top 50 offences on this offence seriousness scale. (The offence with a Median Sentence Ranking of 50 is *theft of intellectual property*. Other examples of offences in the top 50 are *theft of a motor vehicle* with a Median Sentence Ranking of 30 and *serious assault resulting in injury* with a Median Sentence Ranking of 41.)

PREDICTING REOFFENDING

Logistic regression was used to develop a model to predict whether or not a juvenile would reoffend. The dependent variable in the model was a binary variable measuring reoffending. It was defined to be equal to one if the juvenile had at least one subsequent conference or proven court appearance in the three years after their index caution, and zero otherwise (note that a juvenile whose only subsequent contact was one or more further cautions was not defined to be a reoffender). The potential predictors were drawn from the data described earlier. All were converted to two-category variables taking values of zero or one (generally indicating the absence or presence of the specified characteristic).

The potential predictors considered were:

- the number of previous cautions, conferences or court appearances – three variables: one vs. none, two or three vs. none, four or more vs. none

- jurisdiction issuing the index caution – court vs. police

- Indigenous status – Indigenous vs. non-Indigenous

- gender – male vs. female

- age at index caution – age 15+ vs. younger

- offence type of the principal offence at the index caution – various contrasts such as theft vs. other

- prior violence (i.e., whether previous cautions, conferences or court appearances included a violent offence) – yes vs. no

- offence seriousness of the principal offence at the index caution – Median Sentence Ranking ≤ 80 vs. Median Sentence Ranking > 80

- remoteness (ARIA) – various contrasts such as major city vs. other

- social and economic disadvantage (SEIFA) – SEIFA index of disadvantage < 950 vs. SEIFA index of disadvantage ≥ 950.

The bivariate relationships of each of the predictors with the dependent variable are shown in the Appendix.

The model was built using a stepwise procedure, adding predictors one at a time. (Note that, if included, only one offence type or ARIA predictor was added at any one time, given that each contrast consisted of a specified value versus any other value of the variable). Variables with a strong bivariate relationship with the dependent variable were added first. (However, the order of entry did not affect the final model.) The likelihood ratio test was used to compare models as each new predictor was added to the model. If the new predictor added no predictive value it was dropped. Simplicity was also a factor in determining the final model. Given the objective of identifying a means of determining suitable juveniles for intervention, a simpler model was preferred to a model with additional factors which did little to improve the predictive power of the model.

The final model included prior contacts, jurisdiction issuing the index caution, Indigenous status and gender as the predictors. Table 4 shows the parameter estimates for the model.

Model adequacy

Goodness of fit was assessed by the Hosmer-Lemeshow statistic and the area under the ROC curve (Hosmer & Lemeshow, 2000). The Hosmer-Lemeshow statistic compares observed and predicted values for groups of predictor values. The c-statistic, the area under the ROC curve, is a measure of concordance of the observed and predicted values; it ranges between 0.5 (no better than chance prediction) and 1.00 (perfect prediction).

Table 4. Model for predicting reoffending within three years

Variable	Parameter estimate	Standard error	*p*
Constant	-1.81	0.06	<.001
Prior contacts			
1 vs. 0	0.99	0.07	<.001
2-3 vs. 0	1.71	0.10	<.001
4+ vs. 0	2.18	0.21	<.001
Court vs. police	1.02	0.10	<.001
Indigenous vs. non-Indigenous	1.26	0.06	<.001
Male vs. female	1.06	0.06	<.001

Deviance = 9325.4 (df = 8,322)

Area under ROC curve: c-statistic = 0.767, 95% confidence interval (0.757, 0.777)

Hosmer-Lemeshow statistic = 5.67 (p = .34)

As can be seen from the Hosmer-Lemeshow statistics below Table 4, there is no significant difference between the number of reoffenders predicted by the model and the number observed. The c-statistic also indicates that the model is satisfactory (Hosmer & Lemeshow, 2000). Collinearity of the predictors was assessed by the Variance Inflation Factor (VIF). A VIF which is substantially greater than one (e.g. greater than five) is an indicator of a potential collinearity problem. All predictors had VIF values less than 1.3.

Model misspecification was checked using Stata's linktest command.[6] There was no indication of model misspecification from this test.

A final test of the model was carried out by splitting the dataset into two separate datasets by sorting the data by case number, numbering the records and putting odd-numbered records in one data set and even-numbered in another. The model was fitted to one of the data sets and its predicted values were then used to predict the observations in the other dataset. The c-statistic (area under the ROC curve) for comparing the observed values in the second dataset with the predicted values from the first dataset was 0.760 with 95% confidence interval (0.746, 0.774), very similar to that for the full dataset.

Odds ratios and predicted probabilities of reoffending

Figure 7 shows the odds ratios from the final model and the confidence intervals for the predictors.

All predictors have odds ratios greater than two. The largest is for four or more prior contacts compared with none. The large confidence interval for this predictor's odds ratio results from there being a relatively small number of juveniles in the dataset with four or more prior contacts.

The effects of the predictors on the probability of reoffending are also illustrated in Figure 8. This figure shows the changes in the probability of reoffending for prior contacts, jurisdiction issuing the caution and Indigenous status. For each predictor there is a base case indicating the values of the other predictors that are held constant while the specified predictor's value changes. The base case consists of typical values for the jurisdiction issuing the index caution (police), gender (male) and Indigenous status (non-Indigenous), and the mean number of prior contacts (one).

For example, Figure 8 shows that for a non-Indigenous male cautioned by police, the probability of reoffending increases from 0.32 if he has no prior contacts to 0.81 if he has four or more prior contacts.

'Miss' and 'false alarm' rates

It may be of interest to examine the 'miss' and 'false alarm' rates using the observed and predicted values for this dataset (based on the final model presented in Table 4). As stated earlier, a 'miss' occurs when a juvenile is not identified as a reoffender, but does reoffend. A 'false alarm' occurs when a juvenile is identified as a reoffender, but does not reoffend. Suppose that the criterion for intervention is set at a 90 per cent chance of reoffending. Ninety-three per cent of the juveniles in the dataset who had at

Figure 7. Odds ratios and confidence intervals for model predicting reoffending within three years
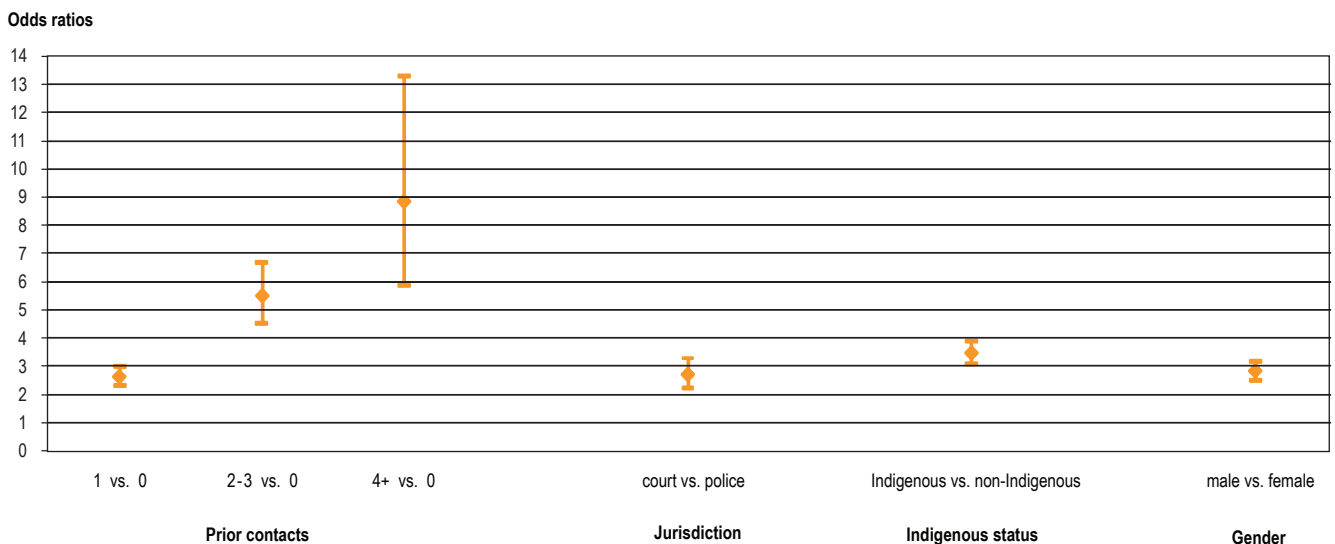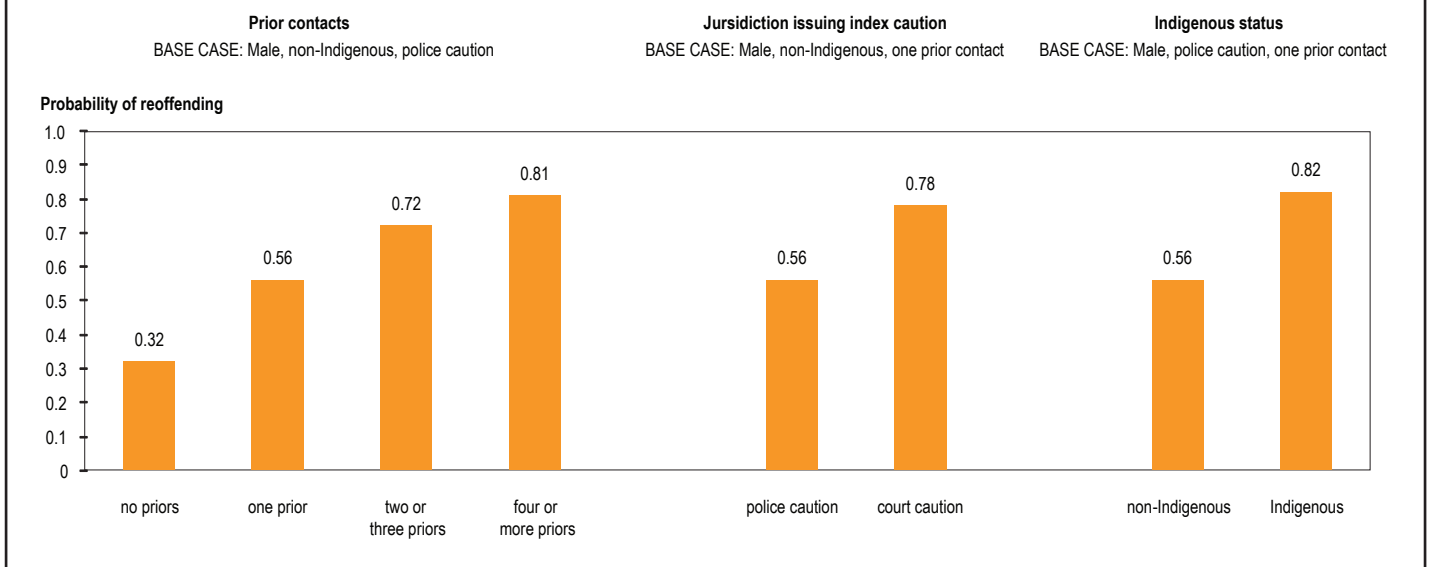
Figure 8. Changes in probability of reoffending associated with changes in predictor values

Prior contacts
BASE CASE: Male, non-Indigenous, police caution

Jursidiction issuing index caution
BASE CASE: Male, non-Indigenous, one prior contact

Indigenous status
BASE CASE: Male, police caution, one prior contact

Probability of reoffending

least a 90 per cent probability of reoffending did in fact reoffend and seven per cent did not. So the 'false alarm' rate is seven per cent. In other words, seven per cent of those targeted would be incorrectly placed on an early intervention program. However, the 'miss' rate would be 86 per cent, because 86 per cent of the juveniles who did reoffend had a predicted probability of reoffending of less than 90 per cent.

Table 5 shows miss and false alarm rates for a range of different criterion probabilities of reoffending. Also shown, for each criterion probability of reoffending, is the number of juveniles who would have qualified for intervention in the dataset used for analysis ('targeted'), and the number of hits, misses, false alarms and correct rejections, defined as follows:

- hit   targeted, did reoffend
- miss   not targeted, did reoffend
- false alarm   targeted, did not reoffend
- correct rejection   not targeted, did not reoffend.

Note that the model shown in Table 4 was based on data for 8,329 juveniles because data were missing for one or more predictors for 208 juveniles. Of the 8,329 juveniles shown in Table 5, 3,697 did reoffend and 4,632 did not reoffend (using the reoffending definition used in the model-fitting, that is, a further conference or proven court appearance).

The high 'miss' rates indicate that, for these data, there were many juvenile offenders who had low probabilities of reoffending but did reoffend. The 'false alarm' rates are much lower than the 'miss' rates, indicating that a substantial proportion of those with high probabilities of reoffending did reoffend. There is, necessarily, a trade-off between these two rates. Another factor to be considered is the capacity of the intervention program. Table 5 shows that there are substantial increases in the numbers of juveniles qualifying for intervention as the criterion probability decreases. The decision about the criterion probability is also likely to be influenced by the costs of the intervention and of further criminal justice contacts, and the effectiveness of the intervention.

Table 5. Miss and false alarm rates for selected probabilities of reoffending (n=8,329)

Criterion probability of reoffending	Targeted for intervention	Hits	Misses	False alarms	Correct rejections	Miss rate	False alarm rate
≥70%	1,552	1,307	2,390	245	4,387	65%	16%
≥75%	1,236	1,071	2,626	165	4,467	71%	13%
≥80%	1,107	964	2,733	143	4,489	74%	13%
≥85%	677	617	3,080	60	4,572	83%	9%
≥90%	559	518	3,179	41	4,591	86%	7%
≥95%	195	184	3,513	11	4,621	95%	6%

DISCUSSION

The typical juvenile cautioned by the police or courts is male, non-Indigenous, lives in a major city, is aged between 15 and 17 and lives in a socio-economically disadvantaged area. The vast majority of those cautioned have had either no prior contact with the criminal justice system (70%) or, at most, one or two contacts (23%). Fewer than 10 per cent have had a prior contact with the criminal justice system for a violent offence. A large proportion (52%), however, will over the next three years have at least one more contact with the criminal justice system. One in five will have only one further contact with the criminal justice system but a substantial proportion will be cautioned, referred to a conference or taken to court several times. Twenty-one per cent of those who are cautioned, for example, will have at least three further criminal justice contacts over the next three years. Those who do have further contacts with the criminal justice system are, on the whole, not being picked up for minor (e.g. public order) offences. The most common subsequent offence was a violent offence, mostly assaults. Other common reoffences included theft and driving offences.

The main objective of this study was to determine whether it is possible to predict which young people cautioned by police will reoffend, using information readily available at the time young offenders are cautioned. It was found that the risk of further offending could be predicted from the number of previous contacts, whether the caution was issued by police or a court, Indigenous status and gender. Prior contacts have the greatest influence on the probability of reoffending. In the typical case, a change from no prior contacts to four or more prior contacts increases the predicted probability of a further conference or court appearance from 0.32 to 0.81.

There are at least two ways in which the information contained in this report might be used in practice. One approach would be to embed the model developed here in a spreadsheet, give it a user-friendly interface and allow those performing the screening assessment (e.g. police) to enter the relevant details of a young offender and thereby obtain information on the probability of a further contact with the criminal justice system. Juveniles whose estimated risk of re-contact was judged to be higher than some threshold could then be referred for further assessment and, if desired, some form of support or treatment. The threshold could be set in a way that maximised the referral of high risk young offenders while at the same time adjusting the flow of referrals to the available resources for screening and assessment. Another approach would be to set up some simple manual scoring system based on the offender characteristics found in this bulletin to be the most important predictors of

reoffending (number of prior contacts, gender, Indigenous status and jurisdiction issuing caution). Juveniles whose scores exceed some critical value could then be referred for further assessment and intervention. The first method is more cumbersome but potentially less likely to result in 'missed' and/or 'unwarranted' referrals. The second method is less cumbersome but potentially more likely to result in 'missed' and/or 'unwarranted' referrals.

There is one final point which deserves emphasis. The patterns of reoffending found among juveniles given a police caution are in part a product of policing policy (i.e. who police choose to caution). If police issue warnings to most offenders and limit cautions to juveniles at significant risk of reoffending, rates of reoffending among those cautioned will tend to be high. If they choose to caution juveniles who are not at risk of reoffending, rates of reoffending among those cautioned will tend to be low. If access to treatment and support is made contingent on some criterion, such as a specified number of contacts with the criminal justice system, police may be tempted to lower the threshold for a caution. This would result in a form of net widening. In other words, a large number of juveniles may end up being referred for assessment and intervention that are not at significant risk of reoffending. Care must be exercised to ensure this does not occur. It may be worth considering a risk assessment process that takes into account any contact a young person may have had with welfare authorities or any behavioural problems that might have been identified at school. These factors have also been found to be strong predictors of juvenile reoffending (Cottle, Lee, & Heilbrun, 2001).

NOTES

1. Under Part 5 of the *Young Offenders Act 1997*, police and the courts can refer young offenders to a Youth Justice Conference. Conferencing involves the young person, their support people, police, victims, a convenor and others discussing the offence and working out a way for the young person to pay reparation to the victim.

2. A violent offence is defined as an offence in one of the following Australian Standard Offence Classification (ASOC) offence categories (Australian Bureau of Statistics, 2008): 01 – Homicide and related offences; 02 – Acts intended to cause injury; 03 – Sexual assault and related offences; 06 – Robbery, extortion and related offences.

3. The SEIFA index is derived from census data (Australian Bureau of Statistics, 2003).

4. The Accessibility/Remoteness Index of Australia (ARIA) was developed by the Commonwealth Department of Heath

and Aged Care and the National Key Centre for Social Applications of Geographic Information Systems (see, for example, Commonwealth Department of Health and Aged Care, 2001).

5. Projected Experimental Estimated Resident Australian Indigenous Population by RCMG region, age groups - at 30 June 2010.

6. This test uses the linear predicted value (e.g. y) and the linear predicted value squared (y^2) as predictors to rebuild the model. The test's assumption is that, if the model is properly specified, one should not be able to find any additional predictors that are statistically significant except by chance. Hence y should be a statistically significant predictor (because it is the predicted value from the model) but y^2 should not have much predictive power except by chance. Its significance would indicate a possible specification error.

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APPENDIX

Table A1. Bivariate relationships of predictor variables with dependent variable (reoffending)

Predictor variable	χ^2	Degrees of freedom	*p*
Previous contacts:			
- one vs. none	211.1	1	<.0001
- two or three vs. none	407.9	1	<.0001
- four or more vs. none	346.0	1	<.0001
Caution issuer – court vs. police	368.6	1	<.0001
ATSI – Indigenous vs. non-Indigenous	712.0	1	<.0001
Gender – male vs. female	397.8	1	<.0001
Age at index caution – 15+ vs. younger	11.8	1	.0010
Offence type of principal offence at index caution:			
- theft vs. other	24.3	1	<.0001
- violent vs. other	0.1	1	.7733
- drug vs. other	0.7	1	.3982
- weapon vs. other	2.5	1	.1107
Prior violence – yes vs. no	308.8	1	<.0001
Offence seriousness of principal offence at index caution:			
- Median Sentence Ranking - ≤80 vs. >80	25.6	1	<.0001
Remoteness (ARIA):			
- city vs. other	6.9	1	.0088
- inner regional vs. other	0.1	1	.7133
- outer regional vs. other	2.8	1	.0970
- remote vs. other	9.0	1	.0027
SEIFA index of disadvantage - <950 vs. ≥950	44.8	1	<.0001