



# Screening juvenile offenders for further assessment and intervention

Don Weatherburn, Rachel Cush and Paula Saunders

*Several psychometric instruments have been developed to help identify juvenile offenders at risk of re-offending and determine the sorts of services or programs that might be useful in reducing that risk. The volume of juvenile offenders coming to the attention of police and courts, however, is usually too large to screen using detailed questionnaires. This crime and justice bulletin examines the scope for 'triaging' young offenders coming into contact with the criminal justice system, to identify those who ought to be referred for more careful assessment. Our results suggest that, while a large number of routinely collected data items are potential predictors of re-offending, reliable predictions can be made using information about school attendance/performance and past contact with the criminal justice system.*

## INTRODUCTION

Previous research has found high rates of re-offending 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 and 58 per cent of juveniles referred to a youth justice conference in NSW during 1999 had a further offence proved against them in a court within five years of their first caution or conference.

The high rate of juvenile re-offending 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 re-offending (National Crime Prevention 1999; Lipsey & Wilson 1998). Programs to reduce recidivism, however, can be quite expensive. Multi-systemic therapy (MST), one of the most widely used forms of intervention with young offenders and currently being trialled in Western Australia (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). This might not sound much; however, for jurisdictions dealing with large numbers of juvenile offenders, the aggregate costs of early intervention are potentially quite substantial. To put every juvenile who appears in the NSW Children's Court on an MST program, for example, would require an outlay of at least AUS\$43 million per year.<sup>1</sup>

Programs to reduce re-offending, of course, can save a lot of money. Aos et al. (2006) estimate that each placement on MST in the United States saves about US\$9,622 in criminal justice costs alone.<sup>2</sup> It is possible that substantial savings in criminal justice outlays (and lower rates of offending) could also be achieved in Australia through programs that seek to reduce juvenile offending before it becomes entrenched. The economic benefits of early intervention, however, do not obviate the need for careful targeting of intervention programs. After all, the investment in programs to reduce juvenile re-offending must be made up front, whereas the benefits may take several years to accrue.

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 re-offender 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. Both kinds of error can prove expensive. 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.

Most Australian state and territory governments accept the need for early intervention to reduce juvenile re-offending. The central policy problems have become what programs to support, how much funding to provide and how to identify people who might benefit from early intervention. Several statistical tools have been developed to assess the risk of re-offending amongst offender populations. Among young people, the Youth Level of Service/Case Management Inventory (YLS/CMI) is the most widely used. The YLS/CMI is a 42-item instrument designed to tap a range of static (e.g. prior criminal record) and dynamic (e.g. peer relations, drug use) factors known from past research to be related to recidivism. It has been the subject of extensive validation testing in Canada (Schmidt, Hoge & Gomes 2005) and 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. Involvement in crime for many juvenile offenders is just a transient process (Baker 1998; Moffitt 1993). It would be impractical and prohibitively expensive to administer the YLS/CMI to every juvenile making a first appearance

in court, let alone to every juvenile receiving a police caution or referred to a youth justice conference.<sup>3</sup> The ideal approach is 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. It is worth noting in this context that the addition of dynamic risk factor variables to risk prediction instruments may help in matching offenders to programs but, as Thompson (2005) has recently pointed out, it rarely does much to improve the predictive efficacy of instruments based on static risk factors.

The main aim of the study reported here was to assess whether it is possible to reliably identify juvenile recidivists from information routinely recorded by government agencies. It is hoped that the identification of such factors might assist either in targeting intervention programs or referring at-risk juvenile offenders for further assessment. In the next section, we briefly describe past research into predictors of juvenile re-offending before discussing the present study in greater detail.

## PAST RESEARCH

The literature on predictors of juvenile re-offending is too extensive to fully review here. Cottle, Lee and Heilbrun (2001) have conducted the most comprehensive meta-analysis to date of the international research literature on predictors of juvenile re-offending. They examined 23 studies involving 22 separate samples of offenders. The following table, adapted from Cottle et al. (2001, p. 385), shows the predictors of recidivism in juveniles in rank order of predictive strength.

Only a handful of Australian studies have looked at the predictors of juvenile re-offending and the factors examined in these studies do not include many of those referred to in Table 1. Coumarelos (1994) followed 33,900 juveniles in NSW from their first Children's Court appearance to their last. She found that age at first appearance and offence type

were both predictors of the number of subsequent court appearances. Younger offenders and offenders convicted of vehicle theft or burglary were more likely to re-offend than older offenders and offenders convicted of other offence types. Cain (1996) reanalysed data from the same cohort studied by Coumarelos (1994) and found that juveniles given more severe penalties were more likely to re-offend than those given less severe penalties, even after controlling for a range of other factors. This effect, however, was probably a consequence of unmeasured factors associated with the type of penalty imposed (e.g. offence seriousness, perceived prospects for rehabilitation) rather than the penalty itself.

Lynch et al. (2003) examined the offending histories of 1,503 young offenders who had been ordered to serve a supervised order in Queensland between 1 July 1994 and 30 June 1995, over a period of seven years. Bi-variate analyses indicated that gender, Indigenous status and whether the juvenile had ever been the subject of a care and protection order (i.e. been the subject of a child maltreatment notification) were all predictors of re-offending. Unfortunately, no multivariate analyses were conducted.

Chen et al. (2005) followed a cohort of 5,476 juveniles, who appeared in the NSW Children's Court for the first time in 1995, over a period of eight years. She found a pronounced (inverse) relationship between age at first proven offence and risk of re-offending. The number of court re-appearances for juveniles whose first court appearance occurred between the ages of 10 and 14 was about 23 per cent higher than for juveniles whose first court appearance occurred when they were between the ages of 15 and 16 and 44 per cent higher than individuals whose first court appearance occurred when they were 17 years or older. Chen et al. (2005) also found strong effects for Indigenous status and gender. The rate of re-appearance in court for males was twice that for females, while the rate of re-appearance for Indigenous juveniles was about 187 per cent higher than

**Table 1: Predictors of recidivism in juveniles (n = 15,265) by predictive strength**

Variable	Effect size (Zr)	Sample size (n)
Age at first commitment	-.346**	720
Age at first contact with the law	-.341**	1225
Non-severe pathology	-.305**	953
Family problems	-.277**	1054
Conduct problems	.255**	1667
Effective use of leisure time	-.233**	588
Delinquent peers	.204**	1525
Length of first incarceration	.187**	641
Number of out-of-home placements	.184**	424
Number of prior commitments	.174**	585
Type of crime	.159**	10267
Standardised achievement score	-.153**	506
Substance abuse	.149**	1111
Full-scale IQ score	-.142**	1756
History of special education	.130**	432
Risk assessment instruments	.118**	10353
History of abuse	.112*	9949
Gender (male)	.111**	9671
Verbal IQ score	-.111*	716
Single parent	.070**	10501
Severe pathology	.069	346
Race (minority)	.067**	10121
Socioeconomic status	.065**	10363
Number of prior arrests	.058**	10155
School attendance	-.048	299
Parent pathology	.047	529
Performance IQ score	-.031	491
School report of achievement	-.028	10025
History of treatment	.019	9366
Substance abuse	.014	9366

Note: Adapted from Cottle, Lee & Heilbrun (2001). Zr = weighted mean effect size, n = sample size on which estimate is based. \*p < .01. \*\*p < .001.

for non-Indigenous juveniles. Unlike Coumarelos (1994) and Cain (1996), Chen et al. (2005) found little effect of offence type on the risk of re-offending. Juveniles who committed ‘other’ offences had significantly lower rates of re-offending than juveniles who committed property or violent offences, but the difference was very small.

Thompson and Pope (2005) carried out an analysis of the psychometric properties of the YLS/CMI-AA on a

sample of 290 NSW juvenile offenders who had had the test administered to them over an 18-month period from mid-2001. The relationship between the YLS/CMI-AA scores and future offending was investigated with a sub-sample of 174 males who were followed up for a median period of 17 months (range: 6 to 32 months). Their analysis revealed a significant correlation (r = 0.28, p < .001, 2-tailed test) between risk of re-offending and each juvenile’s YLS/CMI-AA score.

Among the various sub-scales of the YLS/CMI-AA, the Prior and Current Offences domain produced the highest correlation (r = .32, p < .001, 2-tailed).

The most recent study of predictors of juvenile re-offending is that reported by Roberts (2005). She analysed data from a cohort of 259 juvenile offenders sentenced to detention in Western Australia between 1st January and 31st of December 2000. Re-offending was defined as a return to custody within two years. Bi-variate analyses indicated that being young at the time of the first detention order, having a history of drug use, being identified as needing treatment, having changed address three or more times and having inflicted self-harm were all significant predictors of re-offending. Significant protective factors included: living with both parents (prior to and on release from detention), strong family support, a positive attitude during detention and positive comments about education in detention. Multivariate analyses indicated that the key independent predictors of re-offending were younger age at first detention, substance use and negative attitude about education while in detention.

## THE PRESENT STUDY

The studies discussed above provide valuable information about juvenile offending but they also have their limitations. Coumarelos (1994), Cain (1996), Lynch et al. (2003) and Chen et al. (2005) only examined a limited range of predictive factors. Thompson and Pope (2005) examined a much wider range of risk factors but only had a modest sample of offenders and a limited follow-up period. Roberts (2005) did not control for past contacts with the criminal justice system and focussed on juvenile offenders sentenced to detention. Most young offenders facing a detention sentence would have already accumulated a substantial number of proven offences. Judgements about whether to refer a juvenile to early intervention ought, ideally, to be made much earlier in a juvenile criminal career.

Our main aim in this study was to assess whether it is possible to identify juveniles who are likely to re-offend from information routinely collected by government agencies that frequently deal with young people in trouble. There are three main points at which such an assessment might potentially be made. They are: (a) when police issue a warning or caution to a young offender, (b) when police refer a young offender to a youth justice conference, and (c) when a young offender is brought to court. Because the later an assessment for early intervention is carried out, the greater the risk that antisocial behaviour patterns will have become entrenched, it is probably better to screen young offenders at points (a) and (b) than at (c). Unfortunately in NSW, and perhaps other jurisdictions as well, very little information is collected on the characteristics of juveniles who have been warned or cautioned by police. Indeed, until recently in NSW, significant information about juvenile offenders was not collected until they received their first supervised order from the Children's Court and became the responsibility of the NSW Department of Juvenile Justice (DJJ). In this study, therefore, we examine re-offending amongst a sample of juvenile offenders previously given a supervised community-based court order by the NSW Children's Court.

## METHOD

### COHORT SELECTION

Long follow-up periods provide a more meaningful basis on which to assess re-offending than short follow-up periods, however the data held on young offenders on community based orders by DJJ is more extensive and reliable in recent years than it was 10 years ago. After consultation with staff from DJJ, the target population was defined as all (457) juvenile offenders who were placed on a supervised (community-based) order for the first time by the NSW Children's Court in the 2000/2001 financial year (known hereafter as the index court appearance). If a juvenile had more than one court

appearance resulting in a supervised order during this period, the index court appearance was deemed to be the first appearance. Because files for some offenders could not be found and in other cases were incomplete, usable data were obtained in relation to 392 offenders (86 per cent of the target population).

### DATA COLLECTION, VARIABLES AND DATA SOURCES

Re-offending was defined, for the purposes of this study, as a further proven offence committed within four years of the index court appearance. Data for this variable were obtained from ROD,<sup>4</sup> the NSW Bureau of Crime Statistics and Research re-offending database.

Selection of independent (predictor) variables was guided by a review of past research into the predictors of juvenile re-offending but constrained by a number of practical considerations. These included the cost of manually collecting data from government files and the length of time required to obtain approval to link personal data held by one government agency with that held by another. Two NSW government agencies kindly agreed to provide additional information on the young offenders in our cohort: the NSW Department of Community Services (DoCs) and the NSW Department of Education and Training (DET). The following items of information were obtained from DJJ, DoCS and DET and linked to criminal justice data using matching software developed by the NSW Bureau of Crime Statistics and Research (Hua & Fitzgerald 2006). The identifiers employed to link the data were name, address and gender.

From DJJ<sup>5</sup>:

1. AGE:  
Age of young person at index court appearance
2. GEN:  
Gender
3. ATSI:  
Aboriginal and Torres Strait Islander status

4. NESP:  
Non-English speaking background parent/s
  5. ParDec:  
Whether the file recorded one or both parents of the young person as having died
  6. ParDiv:  
Whether the file recorded the parents of the young person as having divorced/separated
  7. LiveW:  
Whether the file recorded the young person as currently living with both natural parents
  8. ATSCH:  
Whether the file recorded the young person as attending school at time of their court appearance
  9. SUSEXP:  
Whether the file recorded the young person as having been suspended or expelled
  10. TRAUMA:  
Whether the file notes stated that the young person, their parent(s) or guardian(s) had been negatively affected by some event in the past five years (e.g. death of a family member, divorce/separation of parents, witness domestic violence, sexual or emotional abuse)
  11. DRUGUSE:  
Whether the file notes stated that the young person was a user of illicit drugs
  12. STABIL:  
The number of changes of address over the last five years
  13. DELPEER:  
Whether the file notes stated that the young person committed the offence in company with other juveniles or is known to associate with other delinquent or antisocial peers
- From DoCs:
14. NEGAB:  
Whether the young person had been the subject of a confirmed report of neglect and/or abuse prior to their index court appearance

15. OOHHC:

Whether the young person has been placed in out-of-home care prior to the index court appearance<sup>6</sup>

From DET:

16. BSTLIT:

Each offender’s year-three basic skills test score for literacy

17. BSTNUM:

Each offender’s year three basic skills test for numeracy

ROD was then used to obtain information on:

18. INDEXOFF:

The principal offence of which the young offender was convicted at their index court appearance

19. CJSCON:

The number of times the young offender had had contact with the criminal justice system (where contact was defined as a prior police caution, referral to a youth justice conference or conviction for an offence in a NSW court)

Table 2 are based solely on information recorded from DJJ files. Any inaccuracies in those files will therefore be reflected in Table 2 and subsequent analyses.

Table 2 reveals a depressing picture. One in five juveniles is less than 14 years of age. Indigenous juveniles are grossly overrepresented. Nearly one in ten of the offenders in the sample had a deceased parent. Only about thirty per cent were living with both natural parents. Nearly all are known to associate with delinquent peers (although it should be noted that almost 20 per cent of the sample was missing information on this variable). Only a third were still at school at the time they committed their index offence. More than a third had been suspended or expelled from school. Nearly one in five had been neglected or abused. Thirteen per cent were known to be drug users. More than

two thirds had changed address three or more times in the last five years and about one in seven had been placed in out-of-home care.

Table 3 shows the BSTLIT and BSTNUM scores for offenders included in the study compared to the NSW State averages. The literacy and numeracy scores of the sample are lower than those of the general population but not markedly so. This may appear surprising, but in nearly 40 per cent of the cases in our sample the BST numeracy and literacy scores were missing. If (as seems likely) those who failed to complete the basic skills tests in year three were of lower intellectual ability than those in our sample who completed the tests, the true difference between our sample and population norms on BST performance would be larger than is suggested by Table 3.

**ANALYSIS**

After some initial regrouping of variable values to boost cell sizes, chi-square ( $\chi^2$ ) tests were carried out to identify significant bi-variate predictors of re-offending. Significant (and two near-significant) predictors were then included in a logistic regression analysis to examine their joint effect on re-offending within the cohort. The predictive efficacy of the model was assessed using the Hosmer-Lemeshow test and ROC-statistic.

**RESULTS**

**SAMPLE DESCRIPTION**

Because there is little published information about the background characteristics of juvenile offenders coming before the NSW Children’s Court, we begin by describing the sample. Table 2 provides descriptive data on dichotomous variables. It should be noted that the percentages shown in

**Table 2: Sample characteristics on dichotomous variables**

<i>Variable</i>	<i>Frequency</i>	<i>%</i>	<i>% Missing</i>
Male	325	82.9	3.2
Aged less than 14 years	81	20.7	3.2
ATSI	54	14.1	5.2
NESP	131	35.3	8.4
Parent deceased	32	8.6	7.7
Parents divorced	213	52.6	6.7
Living with both natural parents	124	30.6	4.2
At school	127	33.5	6.4
Suspended or expelled	145	35.8	0
Experienced trauma	167	42.6	3.2
Associates with delinquent peers	298	90.9	19.0
Neglected or abused	68	17.3	3.2
Drug use	51	13.0	3.2
3+ address changes in 5 yrs	192	69.4	31.6
Placed in out-of-home care	57	14.5	3.2

**Table 3: BST performance**

	<i>BSTLIT</i>		<i>BSTNUM</i>	
	NSW	Sample	NSW	Sample
	49.2	44.5	52.1	47.6
Missing	N/A	154 (38%)	N/A	154 (38%)

Table 4 shows the offence distribution for the offender's index offence and (for the 71 percent who re-offended) principal offence at subsequent conviction. It can be seen that about a third (30 per cent) of juveniles receiving their first supervised order were convicted of a non-violent property offence (i.e. unlawful entry with intent/burglary/break and enter, theft and related offences, deception and related offences). Nearly half (46 per cent), however, were convicted of an offence against the person (homicide and related offences, acts intended to cause injury, sexual assault and related offences, dangerous or negligent acts endangering persons or robbery, extortion and related offences). There are no marked differences in the pattern of offending for index and second offences, although there appears to be a smaller proportion of robbery offences among those who re-offended. There is little evidence, in other words, that those who re-offend commit either less or more serious offences.

### BI-VARIATE RELATIONSHIPS WITH RE-OFFENDING

We turn now to examine the bi-variate relationships between the dependent variable (whether reconvicted of an offence within four years) and the independent variables listed above. There was no significant relationship between risk of re-offending and any of the following independent variables (at an alpha level of 0.05):

- GEN
- NESP
- ParDiv
- STABIL
- DRUGUSE
- BSTLIT
- BSTNUM

Tables 5 to 16 show the relationship between each independent variable and risk of re-offending for all cross-tabulations that were significant or nearly significant. The sample size in each table varies slightly from comparison to comparison because of missing values.

**Table 4: Index and second offence (for those who re-offended)**

<i>Offence type</i>	<i>Index offence (%)</i>	<i>Second offence (%)</i>
Homicide and related offences	.5	.9
Acts intended to cause injury	11.9	18.8
Sexual assault and related offences	4.1	.4
Dangerous or negligent acts endangering persons	2.3	2.2
Abduction and related offences	.3	.9
Robbery, extortion and related offences	27.2	11.7
Unlawful entry with intent/burglary/break and enter	10.1	14.8
Theft and related offences	19.2	26.0
Deception and related offences	1.0	.9
Illicit drug offences	7.0	6.7
Weapons and explosives offences	.5	0
Property damage and environmental pollution	4.1	1.8
Public order offences	4.1	4.9
Road traffic and motor vehicle regulatory offences	1.0	5.4
Offences against justice procedures/government security and/or government operations	6.2	4.0
Miscellaneous offences	.3	.4
N	386	223

**Table 5: Risk of re-offending by age**

<i>Age group</i>	<i>Re-offend?</i>		<i>N</i>
	<i>No (%)</i>	<i>Yes (%)</i>	
<14 yrs	17.3	82.7	81
14+ yrs	32.2	67.8	311
N	114	278	392

$\chi^2 = 6.89, df = 1, p = .005$

**Table 7: Risk of re-offending by living arrangements**

<i>Living with both natural parents?</i>	<i>Re-offend?</i>		<i>N</i>
	<i>No (%)</i>	<i>Yes (%)</i>	
No	25.4	74.6	264
Yes	36.3	63.7	124
N	112	278	388

$\chi^2 = 4.89, df = 1, p = .019$

**Table 6: Risk of re-offending by Aboriginal and Torres Strait Islander status**

<i>ATSI</i>	<i>Re-offend?</i>		<i>N</i>
	<i>No (%)</i>	<i>Yes (%)</i>	
No	30.0	70.0	330
Yes	18.5	81.5	54
N	109	275	384

$\chi^2 = 3.00, df = 1, p = .054$

**Table 8: Risk of re-offending by whether experienced trauma**

<i>Past trauma?</i>	<i>Re-offend?</i>		<i>N</i>
	<i>No (%)</i>	<i>Yes (%)</i>	
No	35.6	64.4	225
Yes	20.4	79.6	167
N	114	278	392

$\chi^2 = 10.73, df = 1, p = .001$

**Table 9: Risk of re-offending by whether previously placed in out-of-home care**

<i>Past out-of-home care?</i>	<i>Re-offend?</i>		<i>N</i>
	<i>No (%)</i>	<i>Yes (%)</i>	
No	31.0	69.8	335
Yes	17.5	82.5	57
N	114	278	392

$\chi^2 = 4.30, df = 1, p = .024$

**Table 10: Risk of re-offending by whether previously neglected/abuse**

<i>Past neglect or abuse?</i>	<i>Re-offend?</i>		<i>N</i>
	<i>No (%)</i>	<i>Yes (%)</i>	
No	31.2	68.8	335
Yes	19.1	80.9	57
N	114	278	392

$\chi^2 = 3.96, df = 1, p = .030$

**Table 11: Risk of re-offending by whether one or both parents deceased**

<i>Parent(s) deceased?</i>	<i>Re-offend?</i>		<i>N</i>
	<i>No (%)</i>	<i>Yes (%)</i>	
No	29.8	70.2	342
Yes	12.5	87.5	32
N	106	268	374

$\chi^2 = 4.32, df = 1, p = .025$

**Table 12: Risk of re-offending by whether at school when offence was committed**

<i>At school?</i>	<i>Re-offend?</i>		<i>N</i>
	<i>No (%)</i>	<i>Yes (%)</i>	
No	26.2	73.8	252
Yes	34.6	65.4	127
N	110	269	379

$\chi^2 = 2.93, df = 1, p = .087$

**Table 13: Risk of re-offending by whether suspended or expelled**

<i>Suspended or expelled?</i>	<i>Re-offend?</i>		<i>N</i>
	<i>No (%)</i>	<i>Yes (%)</i>	
No	35.6	64.4	247
Yes	17.9	82.1	145
N	114	278	392

$\chi^2 = 13.87, df = 1, p < .001$

**Table 14: Risk of re-offending by whether associates with delinquent peers**

<i>Associates with delinquent peers?</i>	<i>Re-offend?</i>		<i>N</i>
	<i>No (%)</i>	<i>Yes (%)</i>	
No	50.0	50.0	30
Yes	27.5	72.5	298
N	97	231	328

$\chi^2 = 13.87, df = 1, p < .001$

**Table 15: Risk of re-offending by index offence**

<i>Offence type</i>	<i>Re-offend?</i>		<i>N</i>
	<i>No (%)</i>	<i>Yes (%)</i>	
Violent offences	28.4	71.6	74
Robbery/extortion	41.0	59.0	105
Break and enter	17.9	82.1	39
Other theft & deception	16.7	83.3	78
Drug offences	37.0	63.0	27
Justice procedure offences	37.5	62.5	24
Other offences	24.4	75.6	45
Total	114	278	392

$\chi^2 = 17.49, df = 6, p < .008$

**Table 16: Risk of re-offending by previous contact with the Criminal Justice System (CJS)**

<i>No. past CJS contacts</i>	<i>Re-offend?</i>		<i>N</i>
	<i>No (%)</i>	<i>Yes (%)</i>	
No previous contact	42.5	57.5	186
One previous contact	25.7	74.3	101
Two previous contacts	12.0	88.0	50
Three + prev. contacts	5.5	94.5	55
N	114	278	392

$\chi^2 = 38.68, df = 3, p < .001$

In no comparison does the number of cases excluded because of missing values exceed 20. The variable INDEXOFF has been reclassified into a smaller number of categories to boost cell sizes.

Tables 5 to 16 indicate that the risk of re-offending is significantly higher for juvenile offenders who:

- Are younger at their index court appearance
- Are of Aboriginal or Torres Strait Islander descent (borderline significant)
- Are not living with both natural parents
- Have experienced some form of trauma
- Have been placed in out-of-home care
- Have been the subject of a confirmed report of neglect or abuse
- Have one or both parents deceased
- Were not attending school at the time of the index court appearance (borderline significant)
- Have been suspended or expelled
- Associate with delinquent peers
- Have committed a theft or deception offence
- Have had more past contacts with the criminal justice system

## MULTIVARIATE ANALYSIS

Logistic regression analyses were carried out to determine which of the variables listed above exerts an independent effect on risk of re-offending. The variable CJSCON was converted into an indicator variable, with each value of the variable being compared to the lowest value. Values of INDEXOFF, on the other hand, were contrasted with the average effect over all offences. Thus positive odds ratios for the contrasts under INDEXOFF indicate higher than average risks of re-offending, while negative ratios indicate lower than average risks of re-offending. Because the chi-square values associated with ATSI and ATSCH were close to significance, these variables were included in the model. The variable DELPEERS was not included in the model because of the large number of missing values. Problems of multi-collinearity were found between the variables TRAUMA, OOHHC and NEGAB. Since OOHHC was found to be the strongest bi-variate predictor of re-offending, this variable was retained in the model and TRAUMA and NEGAB were dropped.

Table 17 shows the results of regressing the risk of re-offending against variables that were significantly related to that risk in the bi-variate analysis. All non-significant predictors have been removed from the model except age, which in the initial modelling stage (with all bi-variate predictors included) was found to be borderline significant (see Appendix for full model results).

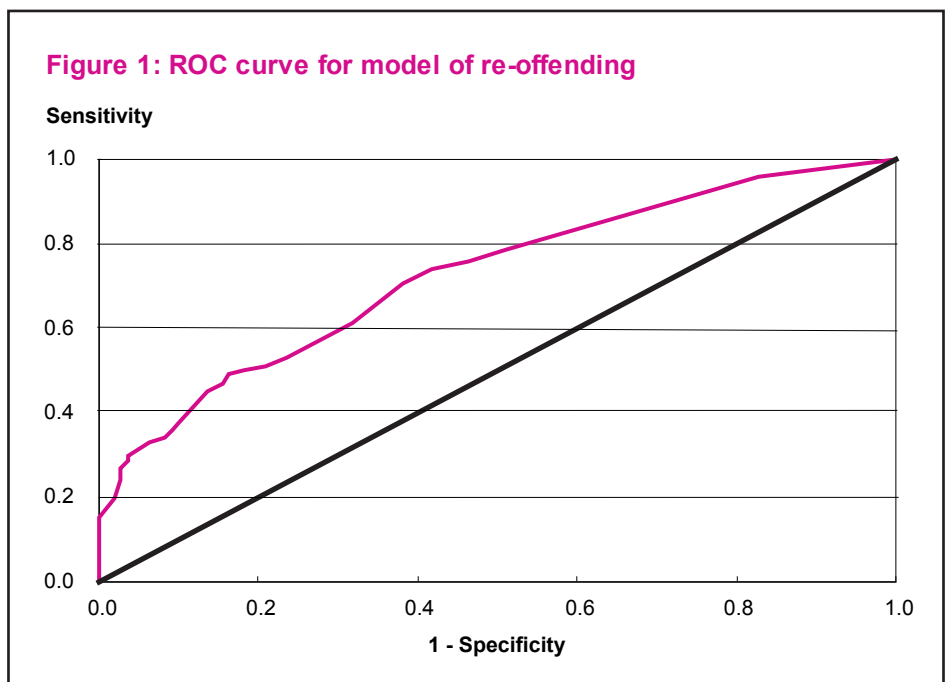
The Hosmer and Lemeshow test score indicates that the model is a satisfactory fit. Four variables are significant predictors of re-offending. Juvenile offenders placed on supervised orders were more likely to re-offend if they are 14 years of age or younger, were not at school at the time of their index offence, if they had been suspended or expelled from school or if they had a number of previous contacts with the criminal justice system.

Figure 1 shows the ROC curve associated with the model. The curve is obtained

**Table 17: Logistic regression model for risk of re-offending**

Variable	Significance	Odds ratio
14 or less	.024	2.253
Not at school	.012	1.969
Suspended or expelled	.038	2.017
CJSCON	.000	
One contact v no contact	.044	1.979
Two contacts v no contact	.002	4.643
Three + contacts v no contact	.001	10.259
Constant	.089	.640

Hosmer & Lemeshow = 4.57, df = 7, p = .71



by plotting (a) the proportion of young people in the sample correctly identified as recidivists (sensitivity) against (b) the proportion of offenders incorrectly identified as recidivists (1-specificity), across a range of threshold values used as a basis for classifying offenders as recidivists. The greater the area under the curve: the more accurate the model. The C-statistic (area under the curve) is .763.

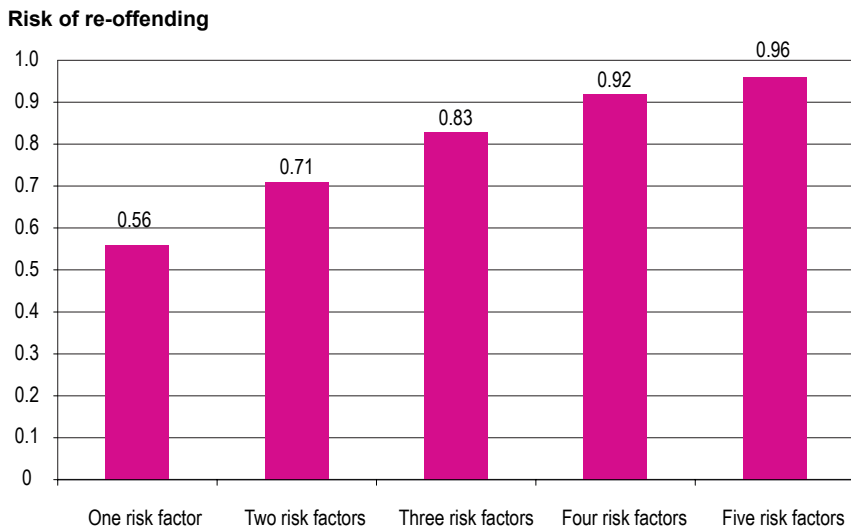
Figure 2 uses the model shown in Table 17 to illustrate the cumulative effect of different factors on the risk of re-offending. The risk of re-offending within four years for a young person within the sample who has only one risk factor (e.g. an offender who was over 14 years of age, who was still attending school at the time of the offence, who had

not been expelled or suspended from school but who had only one prior contact with the criminal justice system ) is 0.56.

If the same person is not in school at the time of the offence (two risk factors), their risk of re-offending within four years rises to 0.71. If, in addition, they have been suspended or expelled from school (three risk factors), the risk of reconviction rises to 0.83. If they have also had two prior contacts with the justice system (four risk factors), their risk of reconviction within four years rises to 0.92. Finally, if in addition to these characteristics they are less than 14 years at the time of their index court appearance (five risk factors), their risk of re-offending within four years rises to 0.96.



**Figure 2: Cumulative effect of risk factors on re-offending risk**



## DISCUSSION

The base rate of re-offending amongst our sample of juvenile offenders on supervised orders is clearly very high. Seventy-one per cent of our sample of juveniles receiving their first supervised order was reconvicted of a further offence within four years. A large proportion of our sample was young and Indigenous. Many had lost a parent. Only a minority were living with both natural parents. Nearly one in five had been neglected or abused. About one in seven had been placed in out-of-home care. Only a third were still at school at the time they committed their index offence. More than a third had been suspended or expelled from school. More than two-thirds had changed address three or more times in the last five years. More than one in ten had problems with illicit drugs. As we saw in the introduction, these are all factors that have been found in previous research to be markers of re-offending.

The objective of this study was to determine whether it is possible to predict which young people will re-offend from information routinely collected by government. A large number of routinely recorded factors were found to be associated with the risk of further offending. These included: being under

14 years of age, being of Aboriginal or Torres Strait Islander descent, not living with both natural parents, having experienced some form of trauma, having been placed in out-of-home care, having been the subject of a confirmed report of neglect or abuse, having one or both parents deceased, not attending school at the time of the index court appearance, having been suspended or expelled from school, having been convicted of a theft offence and having had several prior contacts with the justice system. The key risk factors are those associated with school attendance/behaviour and past contact with the criminal justice system. Not being at school, having been suspended or expelled from school and having had several prior contacts with the criminal justice system all independently increase the likelihood of another conviction. Once these factors have been taken into account, the other bi-variate markers of recidivism provide no additional assistance in identifying the juveniles who will re-offend.

The model developed here shows that it is possible to determine which juveniles will re-offend with a fair degree of accuracy using only information routinely collected by government. Hosmer and Lemeshow (2000, p. 169) classify C-statistics between 0.7 and 0.8 as 'acceptable',

those between 0.8 and 0.9 as 'excellent' and those above 0.9 as 'outstanding'. The C-statistic associated with the ROC curve in Figure 1 is 0.763, which puts it in the 'acceptable' range. As we have already noted, only four factors are required to predict juvenile re-offending at this level of accuracy: the age of a juvenile offender, whether or not the juvenile is at school at the time of the index offence, whether or not the juvenile has been suspended or expelled from school at the time of the index offence and the number of prior contacts the juvenile has had with the justice system. These items of information are all routinely recorded in the files of the NSW Department of Juvenile Justice.

In order to use information about predicted risk of re-offending as a basis for action, it would help to be able to group offenders into categories (e.g. moderate, high, very high) according to their predicted risk of re-offending. If our sample were split into thirds, in terms of estimated risk, those with a predicted probability of re-offending of 0.63 or below would fall into the moderate risk category, those with a predicted probability of re-offending between 0.63 and 0.84 would fall into the high risk category, and those with a predicted probability of re-offending greater than 0.84 would fall into the very high risk category. There may be good policy reasons, however, not to divide offenders into three equal groups. It is important to remember, after all, that lowering the threshold for classifying a young person as a likely re-offender will increase the number of 'hits', but it will also increase the number of 'false alarms'. If the cost of a 'false alarm' is expensive (whether in financial or social terms), it may make sense to set a higher threshold for 'very high risk' offenders. Conversely, if the cost of a 'miss' is deemed to be high, it may be sensible to set a lower threshold for 'very high risk'.

Could our predictions of juvenile re-offending be improved (without carrying out a full risk-needs assessment on every offender referred to court)? Many of the factors that we found to be non-significant predictors of recidivism

in the current study were probably not well recorded in DJJ files at the time our cohort of offenders appeared in court. It was somewhat surprising, for example, to find no effects for substance abuse given the evidence reviewed in the introduction. Better measurement of such factors might improve the accuracy of our predictions. The data currently being collected on juvenile offenders by DJJ is of much higher quality than the data we were able to retrieve on offenders who received their first supervised order from a NSW court in the year 2000/2001. DJJ now also collect a much wider range of information on young offenders than they collected on our cohort of offenders. This suggests that there would be some advantage in repeating the present study at a later date with a more recent cohort of young offenders and a wider range of predictor variables.

There is one final point to note before concluding. Although the present study provides information that is of practical assistance in optimising the use of scarce early intervention resources, the fact that it was based on juveniles receiving supervised orders is a significant limitation. As we noted earlier, the ideal time to be making judgements about early intervention is at the point of first contact with the justice system. More than half of the offenders in our sample had already had some form of contact with the justice system. Seventeen per cent had had two or more previous contacts. There is clearly a need for research into early indicators of recidivism amongst those who are being cautioned or who are making their first appearance at a youth justice conference, or a court.

## ACKNOWLEDGEMENTS

We would like to express our gratitude to Ms Jenny Mason (Director General, NSW Department of Juvenile Justice), Mr Trevor Fletcher (Deputy Director General, Department of Education and Training) and Dr Neil Shepherd (Director General, Department of Community Services) for permitting access to the

data required for this study. Special thanks are also due to: Mr Eric Heller-Wagner and Ms Melissa Clarence at the NSW Department of Juvenile Justice for arranging access to and helping us in the interpretation of data from juvenile justice files; Ms Jenny Bargen and our independent reviewers for commenting on an earlier draft of this article; Dr Max Smith at the NSW Department of Education and Training for providing linked data on basic skills test performance; and Ms Fay Kitto from the NSW Department of Community Services for providing linked data on out-of-home care and child neglect/abuse.

## NOTES

1. Based on the assumption that US\$4,264 = AUS\$4,847 and on the fact that about 9,000 juveniles appear in the NSW Children's Court each year.
2. It should be noted, however, that recent meta-analyses have produced mixed findings about the efficacy of MST at reducing offending (Curtis, Ronan, & Borbuin 2004; Littell 2005; Welsh & Farrington 2006).
3. In 2005, nearly 3,000 young offenders made their first appearance in court. A further 889 were referred to a youth justice conference and 8,655 received a police caution. Source: NSW Bureau of Crime Statistics and Research 2006 unpublished data.
4. Further information on the contents and reliability of ROD can be obtained from Weatherburn, Lind and Hua (2003) and from Hua and Fitzgerald (2006).
5. The range of data collected from DJJ files was much larger than this, but the incomplete nature of the records meant much of this information could not be used.
6. Note that the assumption underlying inclusion of this variable is not that placement in out-of-home care increases the risk of re-offending but that it might be a useful marker of other problems that increase the risk of re-offending.

## REFERENCES

- Aos, S., Miller, M. & Drake, E. 2006, *Evidence-based Public Policy Options to Reduce Future Prison Construction, Criminal Justice Costs, and Crime Rates*. Olympia, WA: Washington State Institute of Public Policy.
- Baker, J. 1998, *Juveniles in Crime: Participation Rates and Risk Factors*, General Report Series, NSW Bureau of Crime Statistics and Research, Sydney.
- Cain, M. 1996, *Recidivism of Juvenile Offenders in New South Wales*, NSW Department of Juvenile Justice, Sydney.
- Chen, S., Matruglio, T., Weatherburn, D. & Hua, J. 2005, *The transition from juvenile to adult criminal careers*, Crime and Justice Bulletin no. 86, NSW Bureau of Crime Statistics and Research, Sydney.
- Cottle, C.C., Lee, R.J. & Heilbrun, K. 2001, 'The prediction of criminal recidivism in juveniles: A Meta-Analysis', *Criminal Justice and Behaviour*, vol. 28 no. 3, pp. 367-394.
- Coumarelos, C. 1994, *Juvenile offending: predicting persistence and determining the cost-effectiveness of intervention*, General Report Series, NSW Bureau of Crime Statistics and Research, Sydney.
- Curtis, N., Ronan, K. & Borbuin C. 2004, Multisystemic treatment: A meta-analysis of outcome studies. *Journal of Family Psychology*, vol. 18, no. 3, pp. 411-419.
- Hosmer, D.W. & Lemeshow, S. 2000, *Applied Logistic Regression* (2nd Ed.). New York: John Wiley & Sons, Inc.
- Hua, J. & Fitzgerald, J. 2006, *Matching court records to measure re-offending*, Crime and Justice Bulletin no. 95, NSW Bureau of Crime Statistics and Research, Sydney.
- Lipsey, M.W. & Wilson, D.B. 1998, 'Effective intervention for serious juvenile offenders: A synthesis of research.' In R.L. Loeber & D.P. Farrington (Eds.), *Serious & violent juvenile offenders: Risk factors and successful interventions*, Thousand Oaks: CA. Sage.

Littell, J.H. 2005, Lessons from a systematic review of the effects of multisystemic therapy. *Children and Youth Services Review*, vol. 27, pp. 445-463.

Lynch, M., Buckman, J. & Krenske, L. 2003, *Youth justice: Criminal trajectories*, Trends and Issues in Crime and Criminal Justice, no. 265, Australian Institute of Criminology, Canberra.

MacKenzie, D.L. 2002, 'Reducing the criminal activities of known offenders and delinquents.' In L.W. Sherman, D.P., Farrington, B.C. Walsh & D.L. MacKenzie, (Eds), *Evidence-Based Crime Prevention*, New York: Routledge.

Moffitt, T.E. 1993, 'Adolescence-limited and life-course-persistent antisocial behaviour: A developmental taxonomy', *Psychological Review*, vol. 100, no. 4 pp. 674-701.

National Crime Prevention 1999, *Pathways to prevention: Developmental and early intervention approaches to crime prevention in Australia*, National Crime Prevention, Attorney General's Department, Canberra.

Roberts, L. 2005, *Single versus Repeat Juvenile Detainees*, Report prepared for the West Australian Department of Justice, Crime Research Centre, University of Western Australia, Perth.

Schmidt, F., Hoge, R.D. & Gomes, L. 2005, 'Reliability and validity analyses of the Youth Level of Service /Case Management Inventory', *Criminal Justice and Behaviour*, vol. 32, no. 3, pp. 329-344.

Thompson, A.P. 2005, 'Risk-need assessment with juvenile offenders: Past, present and future.' In M. Katsikitis (Ed.), *Proceedings of the 40<sup>th</sup> APS Annual Conference* pp. 343-347, The Australian Psychological Society Ltd., Melbourne, Victoria.

Thompson, A.P. & Pope, Z. 2005, 'Assessing juvenile offenders: Preliminary data for the Australian Adaptation of the Youth Level of Service/Case Management Inventory (Hoge & Andrews, 1995)', *Australian Psychologist*, vol. 40, pp. 207-214.

Vignaendra, S. & Fitzgerald, J. 2006, *Re-offending among young people cautioned by police or who participated in a youth justice conference*, Crime and Justice Bulletin no. 103, NSW Bureau of Crime Statistics and Research, Sydney.

Weatherburn, D., Lind, B. & Hua, J. 2003, *Contact with the New South Wales court and prison systems: The influence of age, race and gender*, Crime and Justice Bulletin no. 78, NSW Bureau of Crime Statistics and Research, Sydney.

Welsh, B. & Farrington, D. 2006, 'Effectiveness of family-based programs to prevent delinquency and later offending', *Psicothema*, vol. 18, no. 3, pp. 596-602.

## APPENDIX

**Table 18: Logistic regression model for risk of re-offending (all predictors)**

Variable	Significance	Odds ratio
14 or less	.098	1.890
ATSI	.497	1.360
One or both parents not natural	.471	1.220
Placed in out-of-home care	.602	1.295
One or both parents deceased	.363	1.809
Not at school	.014	2.038
Suspended or expelled	.038	1.820
CJSCON	.000	
One contact v no contact	.044	1.854
Two contacts v no contact	.002	5.685
Three + contacts v no contact	.001	12.176
INDEXOFF	.522	
Robbery/extortion	.252	.752
Break and enter	.526	1.310
Other theft and deception	.261	1.442
Drug offences	.221	.600
Justice procedure offences	.569	.759
Other offences	.490	1.323
Constant	.130	.570

Hosmer & Lemeshow = 3.655, df = 8, p = .89

## Other titles in this series

- No.108 The psychosocial needs of NSW court defendants
- No.107 The relationship between head injury and violent offending in juvenile detainees
- No.106 The deterrent effect of higher fines on recidivism: Driving offences
- No.105 Recent trends in property and drug-related crime in Kings Cross
- No.104 The economic and social factors underpinning Indigenous contact with the justice system: Results from the 2002 NATSISS survey
- No.103 Reoffending among young people cautioned by police or who participated in a Youth Justice Conference
- No.102 Child sexual assault trials: A survey of juror perceptions
- No.101 The relationship between petrol theft and petrol prices
- No.100 Malicious Damage to Property Offences in New South Wales
- No.99 Indigenous over-representation in prison: The role of offender characteristics
- No.98 Firearms and violent crime in New South Wales, 1995-2005
- No.97 The relationship between methamphetamine use and violent behaviour
- No.96 Generation Y and Crime: A longitudinal study of contact with NSW criminal courts before the age of 21
- No.95 Matching Court Records to Measure Reoffending
- No.94 Victims of Abduction: Patterns and Case Studies
- No.93 How much crime does prison stop? The incapacitation effect of prison on burglary
- No.92 The attrition of sexual offences from the New South Wales criminal justice system
- No.91 Risk of re-offending among parolees
- No.90 Long-term trends in property and violent crime in NSW: 1990-2004
- No.89 Trends and patterns in domestic violence
- No.88 Early-phase predictors of subsequent program compliance and offending among NSW Adult Drug Court participants
- No.87 Driving under the influence of cannabis: The problem and potential countermeasures
- No.86 The transition from juvenile to adult criminal careers
- No.85 What caused the recent drop in property crime?
- No.84 The deterrent effect of capital punishment: A review of the research evidence
- No.83 Evaluation of the Bail Amendment (Repeat Offenders) Act 2002
- No.82 Long-term trends in trial case processing in NSW
- No.81 Sentencing drink-drivers: The use of dismissals and conditional discharges
- No.80 Public perceptions of crime trends in New South Wales and Western Australia
- No.79 The impact of heroin dependence on long-term robbery trends
- No.78 Contact with the New South Wales court and prison systems: The influence of age, Indigenous status and gender
- No.77 Sentencing high-range PCA drink-drivers in NSW
- No.76 The New South Wales Criminal Justice System Simulation Model: Further Developments
- No.75 Driving under the influence of cannabis in a New South Wales rural area
- No.74 Unemployment duration, schooling and property crime
- No.73 The impact of abolishing short prison sentences
- No.72 Drug use monitoring of police detainees in New South Wales: The first two years
- No.71 What lies behind the growth in fraud?