

Recidivism Among Juvenile Offenders: An Analysis of Times to Reappearance in Court

**Carlos Carcach and
Simon Leverett**



**Australian Institute of Criminology
Research and Public Policy Series
No. 17**

© Australian Institute of Criminology 1999

ISSN 1326-6004

Apart from any fair dealing for the purpose of private study, research, criticism or review, as permitted under the *Copyright Act 1968* (Cwlth), no part of this publication may in any form or by any means (electronic, mechanical, microcopying, photocopying, recording or otherwise), be reproduced, stored in a retrieval system or transmitted without prior written permission. Inquiries should be addressed to the publisher.

National Library of Australia Cataloguing-in-Publication entry

Carcach, Carlos.

Recidivism among juvenile offenders: an analysis of times to reappearance in court.

Includes bibliographical references.
ISBN 0 642 24113 9.

1. Cohort analysis. 2. Juvenile recidivists - Australia.
I. Leverett, Simon. II. Australian Institute of Criminology. III. Title. (Series: Research and public policy series; no. 17).

364.360994

Published by the Australian Institute of Criminology
GPO Box 2944
Canberra ACT 2601
Tel: (02) 6260 9200
Fax: (02) 6260 9201
email: Front.Desk@aic.gov.au
<http://www.aic.gov.au>

Printed by Ausdoc on Demand
111 Wollongong Street, Fyshwick ACT

Foreword

The overwhelming majority of young people have no contact with the criminal justice system. Of those who do have contact in the form of a court appearance, the majority has only the one appearance. Indeed, the longer juveniles stay out of trouble, the less likely it is that they will reappear in court. However, a sizeable minority of juveniles do make several court appearances leading to conviction.

Between 1992 and 1997 35,947 young people appeared in New South Wales courts on a total of 71,560 occasions. The cohort analysed in this study comprises 5509 individuals who recorded a proven court appearance during the period from 1 July 1992 to 30 June 1993, while under the age of 18.

The main findings of the analysis leading to this report can be summarised as follows:

- 37.3 per cent of juvenile offenders in the cohort under analysis recorded a subsequent proven court appearance during the period under observation.
- The average time between consecutive court appearances for the offenders in the cohort was 17.9 months for the whole cohort.
- The intensity of offending among juvenile offenders in the cohort under study reaches its maximum at ages between 15 and 17 years. Young offenders in this age bracket have the highest risk of contact with the juvenile justice system.
- Programs which target young offenders who reappear relatively soon after their first court appearance may contribute to a reduction in recidivism and rates of juvenile crime generally.

Adam Graycar
Director, Australian Institute of Criminology
July 1999

Acknowledgments

The authors wish to express their gratitude to the New South Wales Department of Juvenile Justice for providing them with access to data from the Children's Court Information System. The authors also thank Mr Garth Luke, Consultant on Client Data Systems in the New South Wales Department of Juvenile Justice, for his comments to an earlier version of this paper.

Contents

Foreword	iii
<i>Adam Graycar</i>	
Acknowledgments	iv
Introduction	1
Problems Associated with Measuring Recidivism	3
Data and Methods	6
An Analysis of the Factors Associated with Reconviction	
Among Juvenile Offenders	11
Model and Modelling Issues	11
Discussion of Main Results	16
Conclusion	22
References	24

List of Tables and Figures

Table 1: Juvenile Offenders Recording Proven Court Appearances before New South Wales Children's Courts 1 July 1992 – 30 June 1993: Percentage Distribution, Percentage Reappearing in Court and Time to Reappearance During the Period 1 July 1992 – 30 June 1997 by Selected Characteristics	7
Table 2: Juvenile Offenders Recording a Proven Court Appearance 1 July 1992 – 30 June 1993: Estimated Regression Coefficients (Log-) Times to Further Court Appearance by Selected Variables	15
Figure 1: Graphical Representation of the Study Cohort	12
Figure 2: Juvenile Offenders Recording Proven Court Appearances before New South Wales Children's Courts 1 July 1992 – 30 June 1993: Probability Distribution of the Time Until a Subsequent Proven Appearance During the Period 1 July 1992 – 30 June 1997	13
Figure 3: Juvenile Offenders Recording a Proven Court Appearance 1 July 1992 – 30 June 1993: Months Until a Subsequent Proven Appearance by Gender	16
Figure 4: Juvenile Offenders Recording a Proven Court Appearance 1 July 1992 – 30 June 1993: Months Until a Subsequent Proven Appearance by Age	17

Figure 5: Juvenile Offenders Recording a Proven Court Appearance
1 July 1992 – 30 June 1993: Months Until a Subsequent Proven
Appearance by Number of Previous Proven Appearances and First
Penalty **19**

Figure 6: Juvenile Offenders Recording a Proven Court Appearance
1 July 1992 – 30 June 1993: Months Until a Subsequent Proven
Appearance by Type of Court **20**

Introduction

This report discusses the results from an analysis of times to recidivism among juvenile offenders appearing in New South Wales courts. We selected a cohort of juveniles who had a proven court appearance in New South Wales at any time between 1 July 1992 and 30 June 1993 and followed them up during 60 months until 30 June 1997.

The following points should be noted:

- Both first and repeat offenders were included in the cohort.
- For the purpose of this report, a *recidivist* is defined as any individual recording a subsequent proven appearance during the 60-month follow-up period.
- In this report the terms *first proven court appearance*, *first proven appearance* and *first recorded proved appearance* refer to the first proven appearance by a member of the cohort recorded during the period 1 July 1992 – 30 June 1993. A member of the cohort under study recording a proven appearance during the 1992–93 period may not necessarily have been a first-time offender, as he/she may have recorded proven court appearances prior to 1 July 1992.

Although the report touches on recidivism rates, its primary focus is on ***time to recidivism*** and the factors associated with that. The time elapsed between consecutive proven court appearances is a measure of the intensity of delinquent careers. Shorter times to recidivism imply more intense delinquent careers as well as a high rotation of a relatively low number of juvenile offenders through the juvenile justice system.

The specialised literature indicates that factors such as gender, age, previous court appearances and convictions, and general criminal record have an impact on the risk of recidivism among juvenile

offenders. This report examines the times elapsed between consecutive court appearances and how these times are affected by a number of individual variables observed at the time of the first appearance in court.

The term *recidivism* refers to subsequent offending by a person who has been convicted of a prior offence. Understanding juvenile recidivism is crucial for the development of policy responses to the broader issue of juvenile crime and delinquency. Data show that a substantial minority of first-time juvenile offenders become recidivist and develop criminal careers. For example, in New South Wales, Coumarelos (1994) and Cain (1996) found that a little over 30 per cent of juvenile offenders had more than one court appearance during their juvenile years. Beresford (1993) found that 22 per cent of youth appearing before the Children's Court in Western Australia during 1991-92 had 5 or more appearances.

Few studies on recidivism have been published in Australia, and even fewer on the more specialised issue of juvenile re-offending. The studies by Coumarelos (1994) and Cain (1996) for New South Wales and those edited by Harding (1993, 1995) for Western Australia have specifically addressed the problem of juvenile recidivism. Examples of other Australian studies on recidivism, though not specific to juveniles, are in Broadhurst et al. (1988), Broadhurst and Maller (1990, 1991, 1992), Beresford (1993), Broadhurst and Loh (1995) and Harding and Maller (1997).

Problems Associated with Measuring Recidivism

Recidivism as defined in this study does not necessarily measure re-offending. It is known that, after a first proven court appearance, not all offenders who continue committing crimes are caught, and not all those who are caught are subsequently convicted. Data reported in Mukherjee and Reichel (forthcoming) indicate that, for every 100 offences of break and enter and attempted break and enter of dwellings, motor vehicle theft, robbery and assault allegedly committed in New South Wales during 1996, only 4 resulted in a criminal conviction. Only 53 per cent of offences are reported to the police (Carcach 1997) and it is estimated that only one-third of these offences are recorded by the police as crime (Criminal Justice Commission 1996).

The gap between true and known levels of crime widens at every stage of the process. This suggests that using rates of court reappearance, or times until reappearance, or any other measure of recidivism based on court data, would result in the underestimation of true recidivism rates and true times until reoffending.

Another difficulty in measuring recidivism has to do with whether the follow-up period is the correct one in terms of such factors as the aims of the study, the nature of offences under consideration, and the period of time in which most reappearances are expected to occur. Due in part to limitations with the data available, the exploratory nature and the generality of the analysis, this study uses a 5-year follow-up period.

Using such a relatively short follow-up period causes problems of a more technical nature for the analysis of times to recidivism. Times to reconviction are observed only for offenders recording a subsequent

proven appearance during the follow-up period. On the other hand, it is impossible to observe the times to reconviction for those juveniles who do not record a further proven court appearance while still under the jurisdiction of the juvenile justice system during the 5-year period. This does not mean that these juveniles may not record further proven court appearances at a time outside the period of observation. This results in the problem known as *censoring* in the specialised literature on duration analysis (refer to Schmidt & Witte 1988).

In New South Wales, the juvenile justice system deals with offenders aged up to 18 years. Cohort members who become older than 18 years during the 5-year follow-up period and who reoffend after this age will not be dealt with by the juvenile justice system. Technically speaking, they do not have the chance to become juvenile offenders again. Offenders who die or are transferred interstate at any time during the period of observation are in the same situation. These cases are known as *immune* in the specialised literature on survival analysis (see Maller & Zhou 1996). The presence of a large proportion of immune in the cohort may distort the conclusions from an analysis of times to recidivism.

It is important to clarify that the date of a subsequent court appearance is by no means used as a proxy for the date of re-offending. There is a lag between time of offending and the time an offender is dealt with by the court, which may have an important effect on recidivism rates for juvenile offenders. Due to the relatively low seriousness of the offences committed by most juveniles, they are not placed under detention awaiting court trial. Therefore it is possible for some of these juvenile offenders to engage in further offending and go undetected while waiting to appear in court. This has the net effect of underestimating recidivism rates and overestimating times to reoffend.

Another potential problem has to do with the seriousness of subsequent offences committed by juveniles relative to the offence at first proven court appearance. Cases where the offence at a subsequent appearance is more serious than the first proven appearance are given the same weight as those where the subsequent offence is less serious than the first. However, the relative seriousness of the offence at a subsequent court appearance may have an impact

on the probability of conviction. This may have profound implications for the analysis, since non-proven subsequent court appearances are not counted as cases of recidivism.¹

Notes

¹ Technically, non-proven subsequent court appearances are either censored or immune, depending on whether the person turns 18 years during the follow-up period.

Data and Methods

The data used in this study consisted of unit records extracted from the New South Wales Department of Juvenile Justice's Children's Court Information System (CCIS). The CCIS is a computer based criminal record system that has recorded details of each finalised appearance in the New South Wales Children's Court since 1982. Data were available for all court appearances for the period from 1 July 1992 to 30 June 1997, amounting to 71,560 appearances. According to current legislation in New South Wales, any offender aged between 10 and 18 years is defined as a juvenile.

The unit of analysis for this study was the offender. Data were processed to produce an offender based file containing information on all the court appearances for each offender. There were 35,947 distinct offenders appearing in the New South Wales Children's Courts at some time between 1 July 1992 and 30 June 1997, inclusive.

The cohort used for this study consisted of all the offenders aged 18 years or less who recorded *at least one proven court appearance* in New South Wales during the period from 1 July 1992 to 30 June 1993. This selection process resulted in a final sample of 5509 proven juvenile offenders.

These offenders were followed up to 30 June 1997 and those who recorded a subsequent conviction during this period while still being juveniles (i.e. aged 18 years or less) were classified as recidivists. The number of months elapsed since the first conviction was used as the main variable for analysis.

Table 1 summarises the main characteristics of the cohort under study in terms of a number of variables. It also shows the percentage of recidivists and some statistics associated with time until the subsequent proven court appearance.

Table 1: Juvenile Offenders Recording Proven Court Appearances before New South Wales Children's Courts 1 July 1992 – 30 June 1993: Percentage Distribution, Percentage Reappearing in Court and Time to Reappearance During the Period 1 July 1992 – 30 June 1997 by Selected Characteristics

	Percentage of Cohort	Percentage Recording a Reappearance	Average Time to Reappearance (Months)
Age at First Proven Court Appearance			
10	0.1	42.9	8.0
11	0.5	66.7	22.2
12	1.4	56.4	15.9
13	4.0	51.6	23.6
14	9.8	55.1	23.5
15	16.3	51.1	20.8
16	25.7	44.2	17.6
17	33.0	24.1	11.8
18	9.0	7.8	7.4
Gender			
Male	85.8	38.1	17.2
Female	14.2	30.8	22.4
Number of Previous Proven Court Appearances at the Time of the First Proven Court Appearance			
0	55.0	30.3	24.6
1	18.4	41.9	19.6
2	9.0	42.3	15.6
3	5.6	47.1	9.9
More than 3	11.9	52.3	8.7
Offence Type at First Proven Court Appearance			
Violent Offences	16.7	37.1	17.9
Property Offences	63.2	39.4	17.2
Drug Offences	6.0	24.6	18.4
Other Offences	14.2	31.5	17.9
Type of Penalty at First Proven Court Appearance			
Nominal Penalties	3.4	18.2	13.3
Unsupervised Orders	41.1	34.3	19.6
Fines	21.4	28.8	14.6
Supervised Orders	21.2	43.5	17.1
Community Service Order	7.5	48.5	11.0
Custodial Order	5.2	47.5	11.4
Area of Residence			
Eastern Sydney	15.8	39.0	16.1
Western Sydney	16.0	36.0	18.1
Southern Sydney	16.2	36.9	18.3
Hunter	10.6	40.4	15.8
Northern NSW	10.8	37.3	18.4
Western NSW	9.5	39.4	17.7
Southern NSW	13.9	35.2	19.8
Interstate/Unknown	7.0	30.7	19.7
Court Type at the Time of First Proven Court Appearance			
Specialist Children's Court	51.0	38.2	16.8
Other Court	49.0	35.9	19.2
Total	100.0	37.3	17.9

Table 1 shows that 37.3 per cent of the proven juvenile offenders included in the cohort recorded a subsequent court appearance on or before 30 June 1997. This percentage of recidivists is somewhat larger than the 30.3 per cent in Coumarelos (1994) and the 30.6 per cent of recidivists in Cain (1996). This difference is mainly due to the way these authors defined their samples.¹ The average time until a subsequent court appearance was 17.9 months.²

Multiple offences heard on different dates may result in overestimation of the recidivism rate and can affect the calculation of times to reconviction. An individual can be convicted on different dates for offences that occurred together (i.e. on the same date in the past). Proven appearances associated with these offences are expected to occur within short time intervals. This has the effect of “artificially” reducing the average time to recidivism for these particular offenders. A preliminary exploration of the data showed that 1.4 per cent of all the juveniles included in the cohort were associated with multiple offences heard on different dates, therefore the impact that these cases may have in the analysis is negligible.

According to Table 1, 75 per cent of the juveniles in the cohort were aged between 15 and 17 years. The low number of cases for those below 15 years of age precludes any comment on the apparently complex relationship between age at first proven court appearance³ and the time until recidivism.⁴

Males, who made up 86 per cent of the cohort, had higher recidivism rates and shorter times to a subsequent court appearance than females.

Repeat offenders comprised 45 per cent of the juveniles in the cohort. These offenders not only experienced higher recidivism rates than those offenders appearing for the first time during the period under observation, but also had lower times until a subsequent court appearance. Note that the time to a subsequent court appearance reduces with number of previous court appearances.

With regard to the type of penalty, Table 1 shows that:

- 85.3 per cent of the juveniles in the cohort received a supervised or unsupervised order, or a fine.⁵

- The levels of recidivism are higher for community service orders and supervised orders than for other penalties.⁶
- Times to re-offend among juveniles receiving custodial orders were lower than among those receiving other types of penalty, though here we are dealing with a relatively small number of juveniles who, in order to receive a custodial sentence, would have an established pattern of offending.

The majority of juveniles in the cohort appeared in court for property offences (63.2 per cent). Violent offences and drug offences made up 16.2 per cent and 6 per cent of the cohort respectively. Juveniles dealt with for property offences and violent offences had similar levels of recidivism. The recidivism rates for these offences were higher than for juveniles charged with drug and other offences. Note, however, that the differences in times to court reappearance according to offence type were not statistically significant.

Table 1 shows no statistically significant differences in the times to a subsequent proven court appearance according to area of residence.

Among the juveniles included as part of the cohort, those dealt with by a specialist children's court were marginally more likely to become recidivists than other juvenile offenders. Times to a subsequent appearance for juveniles dealt with by a specialist children's court were shorter than among juveniles dealt with by non-specialist courts.⁷

Notes

¹ Coumarelos aggregated data on court appearances over the period from 1982 to 1986, while Cain did it for the period from 1986 to 1994. Their recidivism rates effectively are averages over given periods of time, and as such they certainly mask any annual fluctuations in juvenile reoffending. The 37.3 per cent recidivism reported here is based on the court reappearances recorded during a five-year follow-up period by those offenders convicted during the 1992–93 financial year.

² The distribution of times until a proven court reappearance is highly skewed. The figures on times to recidivism included in Table 1 are based on the assumption of a log-normal distribution.

³ The data seem to suggest that among offenders aged 10 to 13 years, times to

recidivism increase with age. However this trend seems to reverse for ages 14 years and over.

⁴ The cohort under study differs in a number of aspects from the sample in Cain (1996). In terms of age structure, 32.1 per cent of the juveniles included in this study were aged 15 years or less at the time of their first proven court appearance, while this age group made up 38.4 per cent of the cases included in the study by Cain. A second difference relates to the age distribution of the recidivism rate. Recidivism rates for juveniles aged 10, 12 and 13 years are lower in our cohort than in Cain's sample. On the other hand, recidivism rates for the remaining age categories are higher in our cohort than in Cain's sample.

⁵ According to the figures in Table 4 of Cain (1996), 62.6 per cent of all the court appearances during the period from 1986 to 1994 resulted in either supervised or unsupervised orders, or fines. This percentage is lower than the one in this study because of different criteria used to define the samples. Cain's figures are in fact averages over a number of years, while ours refer to juveniles processed in a specific year (1992–93). It should be noted that the sample used in Cain's study included juvenile offenders who were *first* convicted of a criminal offence in the Children's Court on or after 1 January 1986 and who had reached the age of 18 years by the end of 1994 (p. 11).

⁶ These figures are again different to those of Cain (1996). While Figure 3 in Cain's study shows neatly a positive association between severity of sanction and the level of recidivism, our results do not suggest that this was the case for the 1992–93 cohort. In particular, our recidivism rates for juveniles receiving custodial orders (48 per cent) and community service orders (48 per cent) are well below the rates obtained by Cain (79.3 per cent and 72.5 per cent respectively). Note however that the results of this study and Cain's study ***are not directly comparable due to differences in methodology.***

⁷ This result does not support the finding in Cain (1996) that children dealt with by non-specialist children's courts were 6 per cent more likely to appear for a second time than those dealt with by specialist children's courts. The results for our cohort suggest that juveniles dealt with by a specialist children's court are as likely to become recidivists as others. Note however that the results of this study and Cain's study ***are not directly comparable due to differences in methodology.***

An Analysis of the Factors Associated with Reconviction Among Juvenile Offenders

Table 1 enabled identification of factors that may have some potential to explain the **time elapsed between consecutive proven court appearances** among juvenile offenders in New South Wales. These results, however, may be incomplete, as they are based on separate analyses of the relationship between times to court reappearance and each variable. Juvenile recidivism is no doubt a complex phenomenon and it is certainly the result of many factors acting simultaneously. This section reports on the results from an analysis of times until a subsequent court appearance using survival analysis techniques.¹

Model and Modelling Issues

The main variable in this study is the time elapsed between consecutive proven court appearances among the 5509 juvenile offenders included in the cohort. Our interest is to assess the impact of a number of factors identified by theory on the time to reappearance in court.

Let n denote the number of juvenile offenders in the cohort and represent the recorded time to reappearance for the i -th juvenile offender as y_i . A number of variables thought to have an effect on time to reappearance, denoted as X_{i1}, \dots, X_{ip} , are observed for each juvenile in the cohort ($i = 1, \dots, n$). Conditional on the set of covariates X_{i1}, \dots, X_{ip} , times to reoffend, y_i , are distributed according to:

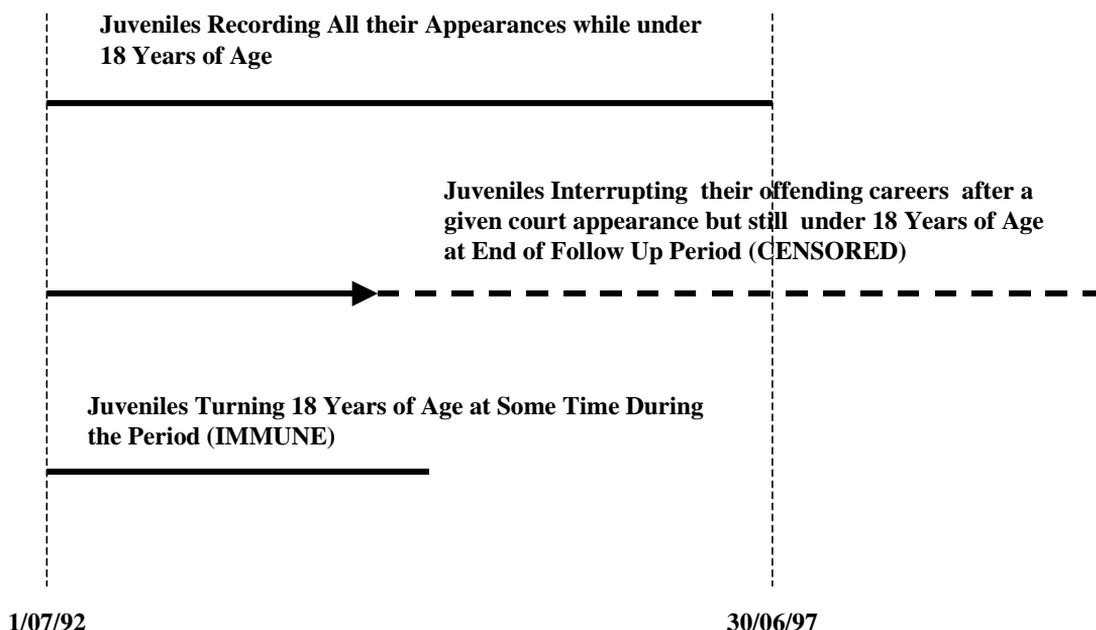
$$y_i | x_{i1}, \dots, x_{ip} \sim F(\beta_0 + \beta_1 x_{i1} + \dots + \beta_p x_{ip}, \sigma^2), i = 1, \dots, n, \quad (1)$$

where $F(\dots)$ represents a distribution with mean

$\beta_0 + \beta_1 x_{i1} + \dots + \beta_p x_{ip}$ and variance σ^2 . F is defined for positive values of the time to reappearance and gives the proportion of juvenile offenders in the cohort that will reappear no later than time t . This is the recidivism rate for a period of time with length t . The number of juvenile offenders recording further court appearances at time t as a proportion of the total cohort is denoted as f . Note that time to recidivism is defined as a function of a set of covariates. A third quantity of interest, denoted as $h(t)$, is the *hazard rate*, defined as the number of recidivists at time t as a proportion of the part of the cohort that has remained crime-free up to time t .

Some juvenile offenders may not record a further court appearance during the follow-up period. Some of these offenders can be under the age of 18 years after 30 June 1997, therefore still under the jurisdiction of the NSW juvenile justice system. So it is theoretically possible for these offenders to record further proven court appearances outside the observation period. Data on these offenders are *right censored*. Other juvenile offenders would turn 19 during the follow-up period, after

Figure 1: Graphical Representation of the Study Cohort

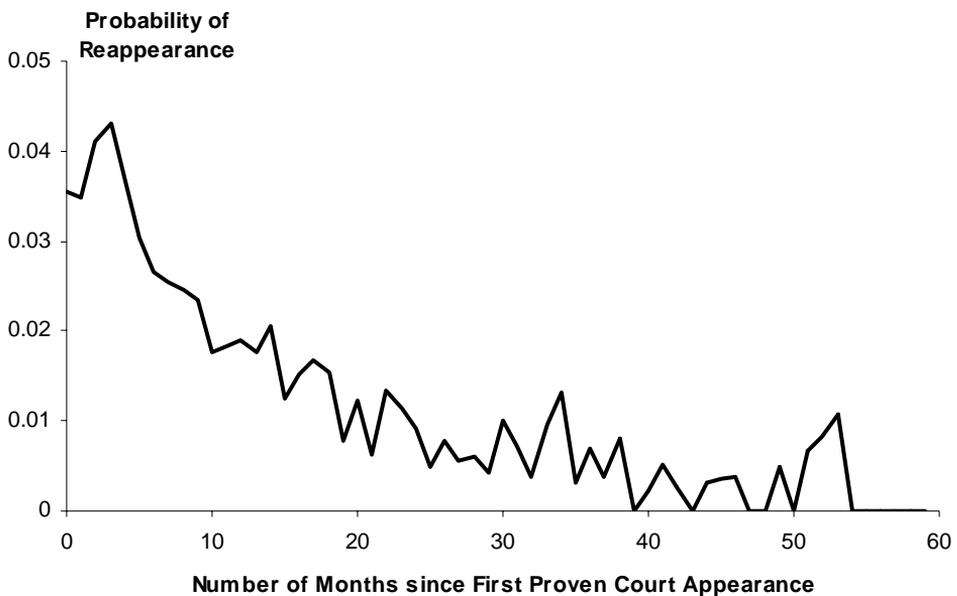


which any further offending would be dealt with outside the juvenile justice system. These cases are known as *immune* as they cannot become juvenile offenders any more (see Figure 1). An immediate consequence of censoring and immunity is that it is not possible to observe the “true” times to recidivism for some juvenile offenders.

This report deals with the problem of censoring only. Methods that do not account for censoring, such as logistic or probit regression, can give severely distorted results when applied to censored data. Time to reappearance is positive. Its distribution may have a long right tail, which reflects the fact that, while many offenders tend to record proven court reappearances quickly, others may do so only after long periods of time. The log-normal, Weibull and Pareto are among the distributions appropriate to this type of data.

Figure 2 illustrates the long-tailed distribution of times to reappearance. It shows the distribution of the risk associated with time until a subsequent proven appearance for the whole cohort. The

Figure 2: Juvenile Offenders Recording Proven Court Appearances before New South Wales Children’s Courts 1 July 1992 – 30 June 1993: Probability Distribution of the Time Until a Subsequent Proven Appearance During the Period 1 July 1992–30 June 1997



graph shows that the risk of a subsequent court appearance decreases with the number of months elapsed since the first proven appearance. The longer a juvenile manages to keep him/herself out of trouble the less likely it is for him/her to reappear in court.

Define the dichotomous variable equal to 1 if the *i*-th juvenile offender in the cohort records a further court appearance; 0 otherwise.

The likelihood function for all the juvenile offenders in the cohort is given by:

$$L = \prod_{i=1}^n \left[f(\beta_0 + \beta_1 x_{i1} + \dots + \beta_p x_{ip}) \right]^{C_i} \left[1 - F(\beta_0 + \beta_1 x_{i1} + \dots + \beta_p x_{ip}) \right]^{(1-C_i)} \quad (2)$$

The first term gives the contribution that juvenile offenders reappearing in court make to the likelihood function, whereas the second term measures the contribution due to non-recidivists.

The unknown parameters $\beta_0, \beta_1, \dots, \beta_p$ are estimated by the values of $\beta_0, \beta_1, \dots, \beta_p$ that maximise the logarithm of the likelihood function. Estimation of these parameters requires specification of a distribution for the random variable measuring time to court reappearance.

Alternative specifications for the distribution of times to reappearance were tested. Predictive ability was the main criterion used to choose among candidate specifications. Covariates for inclusion in the model were defined in terms of the factors included in Table 1. It should be noted that selection of explanatory variables is limited by the type of items for which data are available from the databases held as part of the Children's Court Information System.

Previous studies, though not specific to juveniles, have identified gender, age, offence and criminal history as the key correlates of reconviction (Tarling 1993). Cain (1996), in his study on juvenile recidivism, found recidivism to be associated with similar variables, as well as type of court and first penalty. In this study, criminal history was approximated from the number of previous proven court appearances at the time of the first proven appearance during the 1992-93 period.

A log-normal specification proved to be the most adequate to describe the relationship between time to reappearance and its explanatory variables. Two separate data sets were randomly created from the

records in the cohort. The first data set, known as the *training sample*, was used to identify the model that provided the best fit to the data. Selection of covariates and determination of their levels was made in terms of theoretical relevance and contribution to goodness of fit. A first model was fitted with dummy variables defined for all the categories for each of the candidate covariates² (refer to Table 1).

A quadratic term for age was included in the model as the preliminary analysis from the figures in Table 1 suggested the possibility of a nonlinear effect of age on time to recidivism. Entering relevant interactions as part of the model enabled us to assess the differential effects due to the combined action of two or more variables. The simultaneous effect of criminal history and previous penalty was of particular relevance to this study.

The second sample, known as the *validation sample*, was used to assess the predictive ability of the model fitted on the *training sample*, and it was also used to compute the estimated times to recidivism for a number of cases of interest.

The estimated regression coefficients for the selected model, together with their standard errors, are shown in Table 2.

Table 2: Juvenile Offenders Recording a Proven Court Appearance 1 July 1992 – 30 June 1993: Estimated Regression Coefficients (Log-) Times to Further Court Appearance by Selected Variables

Variable	Coefficient
Juvenile is a Male	0.030**
Age at First Proven Court Appearance During Period of Study	0.123**
Quadratic Term for Age	-0.005**
Number of Previous Proven Appearances at the Time of the First Proven Court Appearance During Period of Study	0.036**
Penalty at First Proven Court Appearance – CSO Interaction	0.072**
Penalty at First Proven Court Appearance – Supervised Order Interaction	0.035**
Number of Previous Proven Appearances – Supervised Order Interaction	-0.013**
Number of Previous Proven CSO Order Interaction	-0.021**
Intercept	-6.293
Scale	0.105
Scaled Deviance	171.5

** $p < 0.01$

Discussion of Main Results

The estimated regression coefficients shown in Table 2 were used to estimate the times to re-offend for juvenile offenders possessing several categories of interest. These times to recidivism were estimated using the validation sample.

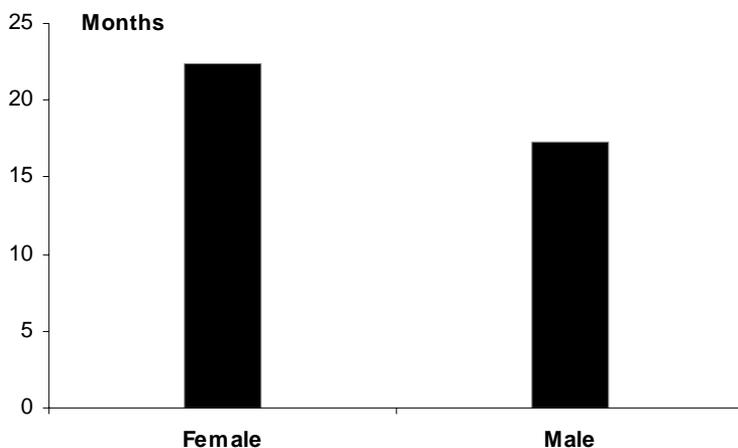
The figures in Table 2 indicate that a complex process drives time to recidivism. Two major groups of factors are identifiable from the model. The first group encapsulates the effect of demographic characteristics, more specifically age at the first proven court appearance during the period of observation and gender.

Gender, age and times to recidivism

After controlling for the effect of other factors included as part of the model, times to re-offend among males are only 3 per cent longer than the times to re-offend among females, a difference too small to be considered of any substantive relevance (see Figure 3).

Once female juvenile offenders have been convicted for the first time, their time until a subsequent proven court appearance is not very different from the time for male juvenile offenders. These results

Figure 3: Juvenile Offenders Recording a Proven Court Appearance 1 July 1992 – 30 June 1993: Months Until a Subsequent Proven Appearance by Gender



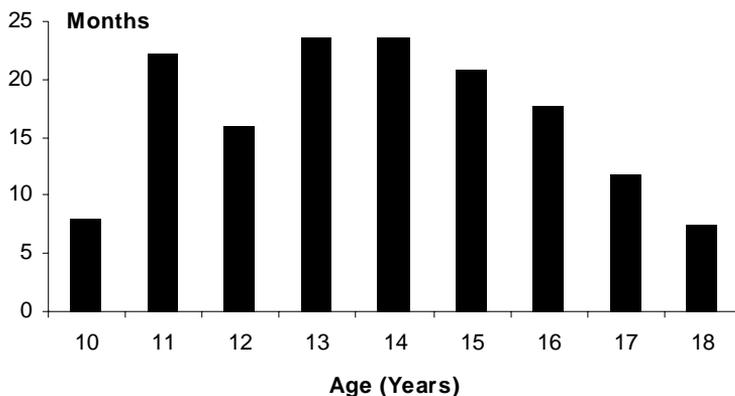
indicate that gender does not contribute to explain differences in time elapsed between subsequent court appearances.

As expected, the age at which juveniles experienced their first proven court appearance during the period makes an impact on their time to a further proven court appearance. After controlling for the effect of the other variables included in the model (i.e. gender, number of previous proven court appearances, type of penalty and type of court) time to re-offend increases until the age of 14, after which it declines (see Figure 4).

These results suggest that, among juvenile offenders, intensity of offending achieves a maximum at ages between 15 and 17 years, when factors such as maturation and peer influence exercise a strong influence on delinquent behaviour (see Matsueda & Anderson 1998). As a result, their likelihood of further contacts with the juvenile justice system increases.

The effect of age at first proven court appearance on recidivism is of a nonlinear nature. On the one hand, for each additional year of age, the time to a subsequent proven appearance declines by 12.3 per cent. However, due to the presence of a quadratic age term in the model, a one-year increase in age results in a geometric increase in the time to recidivism.

Figure 4: Juvenile Offenders Recording a Proven Court Appearance 1 July 1992 – 30 June 1993: Months Until a Subsequent Proven Appearance by Age



Note that the effect that age (at first proven appearance during the period under study) may have on the time to recidivism is no doubt mediated by the intensity and nature of the contacts the juvenile offender may have had with the justice system. A term for the interaction between age and the number of previous proven appearances was considered when developing the model. This term was negative and statistically significant ($p < 0.05$), however it did not add any explanatory power, so it was excluded from the final model. The fact that this interaction was negative, given the signs of the age and criminal experience coefficients, supports the notion that as juveniles experienced their first proven appearance during the period at higher ages, their intensity of offending increases and their time to a further proven appearance declines.

Experience with the juvenile justice system

The second set of factors identified by the model as having an impact on times to recidivism was associated with the juveniles' actual experiences with the juvenile justice system.

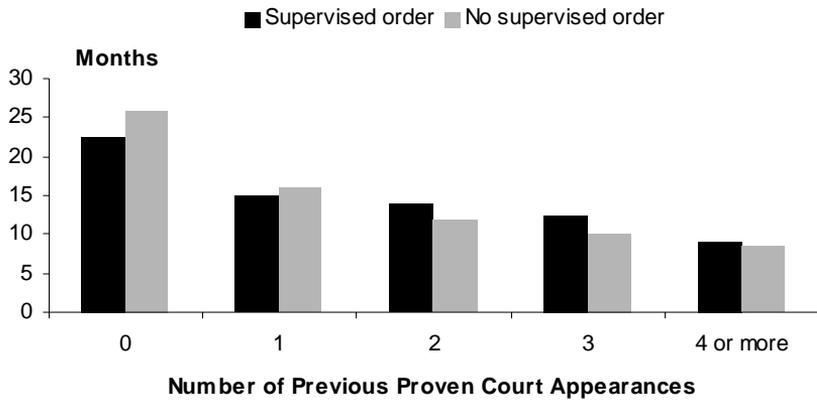
The history of contacts with the justice system is perhaps the best predictor for recidivism (see Maltz 1984; Schmidt & Witte 1984, 1988; Copas 1995). The multivariate analysis indicated that, after controlling for other factors (i.e. gender, age at first court appearance and type of court), time to recidivism decreased with number of previous court appearances. Contrary to expectations, when the first proven appearance during the study period led to a Community Service Order (CSO) or a Supervised Order (SO), the time to recidivism was shorter than for other types of penalty. The analysis also found that the effect of the first penalty on time to recidivism varied with the number of previous proven appearances.

Figure 5 shows predicted times to recidivism according to type of first penalty. Perhaps the most salient result from this analysis is that the effect that type of penalty has on times to recidivism of juvenile offenders depends upon the number of previous appearances.

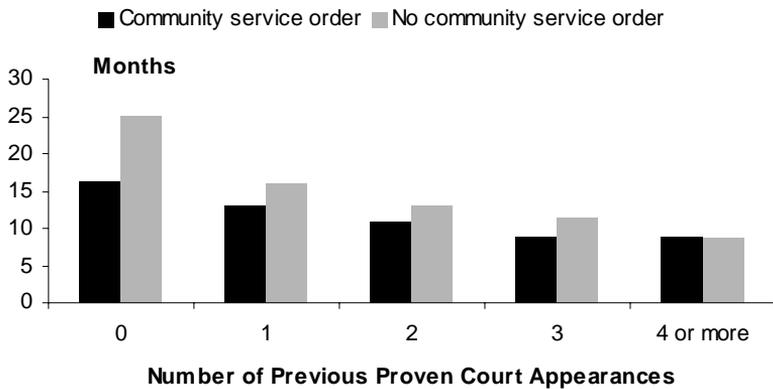
Note that, among those with 4 or more previous court appearances, the time elapsed between the first and a subsequent appearance is virtually unaffected by the nature of their first penalty—a result that holds for both Community Service Orders and Supervised Orders (see Figure 5).

Figure 5: Juvenile Offenders Recording a Proven Court Appearance 1 July 1992 – 30 June 1993: Months Until a Subsequent Proven Appearance by Number of Previous Proven Appearances and First Penalty

(a) Whether or not a Supervised Order was imposed



(b) Whether or not a Community Service Order was imposed



Among juvenile offenders with none or one previous proven appearances, those on whom a Supervised Order was imposed tended to experience shorter times to recidivism than offenders receiving penalties *other than* Supervised Orders or Community Service Orders. For juvenile offenders having 2 or 3 previous proven

appearances, Supervised Orders were associated with longer times to recidivism than *other* types of penalty (see Figure 5a).

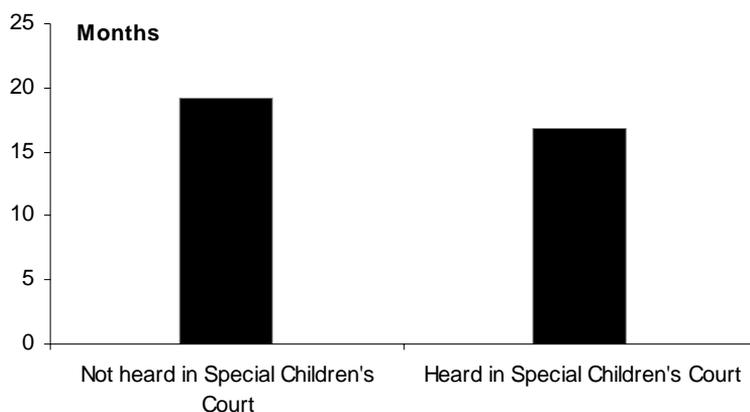
Community Service Orders were less effective than *other* penalties in increasing the time to recidivism among juvenile offenders having less than 4 previous proven court appearances (see Figure 5b).

These results suggest that the longer the delinquency career of a juvenile offender, the less effective court penalties are in influencing his/her rate and intensity of offending.

Table 1 indicated that juvenile offenders dealt with by a specialist children's court were not only more likely to reappear but also experienced shorter duration before a subsequent proven court appearance.

Figure 6 shows that, after controlling for the effect of the other variables included in the model, the times to recidivism among juveniles having their matter heard in a specialist court were only 3 per cent shorter than among other juveniles. This is a small difference to be considered as substantively relevant. These results suggest that, among juvenile offenders, the type of court does not affect time to recidivism.

Figure 6: Juvenile Offenders Recording a Proven Court Appearance 1 July 1992 – 30 June 1993: Months Until a Subsequent Proven Appearance by Type of Court



Juvenile contacts with the justice system are undoubtedly the result of social and economic processes taking place in the communities where juveniles perform their routine activities. One central finding of the pioneering study by Shaw and McKay (1944) was that the pattern of community juvenile crime rates was related to the same ecological processes that gave rise to the socio-economic structure of areas. This enabled them to establish a causal linkage between social disorganisation and juvenile crime. Bursik and Grasmick (1993) argued that, given the theoretical connection between the process of rapid ecological change and the social disorganisation framework, juvenile crime is better explained within a control-theoretic approach. Their basic argument is that, when communities are exposed to processes of rapid change, heterogeneity impedes and obstructs the development of the primary relationships that are necessary for the establishment of institutions pertaining to internal control. This has a negative effect on effective socialisation, leading to increased rates of juvenile crime. As a consequence, the justice system, which intervenes at the final stage of the process leading juveniles to commit crime, can only play a very limited role in the prevention and control of delinquency.

Notes

¹ Survival techniques are used in the analysis of duration data. In our case, the dependent variable is the (natural logarithm of) time until a subsequent proven court appearance, and the explanatory variables are defined in terms of the factors included in Table 1.

² For each variable, a category was selected as the “baseline”. In this way the impact that the remaining categories had on time to reappearance was assessed relative to the “aliased” category.

Conclusions

Recidivism among juvenile offenders is affected by multiple factors, ranging through early developmental issues, personal characteristics that remain stable over the entire life, the social and economic environment surrounding individuals, the age of onset to delinquency, the length and intensity of delinquent careers, and the responses of the justice system.

This report has focused on one aspect of juvenile recidivism, namely the time to re-offend. Lower times to re-offend imply more intense delinquent careers and also higher re-offending rates.

The probability of court reappearance declines as the time juvenile offenders manage to keep themselves out of trouble increases. Note that, given the nature of the data used for this study, it was impossible to determine whether this result is due to individuals effectively managing to keep themselves delinquency-free or to their success in going undetected while engaging in delinquent behaviour.

A history of previous proven appearances contributes to reduce the time to court reappearance and therefore to increase recidivism rates. Our findings indicate that, once juveniles have experienced a relatively large number of court appearances, the type of penalty imposed on them by the courts makes no impact on their times to re-offend.

Supervised Orders appear to have a positive effect in the recidivism of juveniles with 2 and 3 previous proven appearances. On the other hand, Community Service Orders seem to be less effective than other penalties in reducing recidivism, irrespective of the length of the delinquent career.

Juvenile offenders who experience a first proven court appearance at ages over 14 years experience shorter times to re-offend than juveniles

appearing in court at younger ages. This is an important finding as it suggests that patterns of juvenile offending change dramatically around the age of 14, perhaps due to the influence of delinquent peers (Patterson et al. 1989; Matsueda & Anderson 1998).

The analysis of juvenile recidivism based on court data offers only a partial picture of such a complex issue. The roots of criminal offending are complex and cumulative, and they are embedded in social as well as personal histories (National Crime Prevention 1999). A growing body of research evidence suggests that economic and social stress affect crime by disrupting the parenting process (Weatherburn & Lind 1998). There is also evidence of the relationship between crime and drug use (Corman & Mocan 1996; Baumer et al. 1998).

The juvenile justice system by itself cannot provide all the answers to the problem of juvenile offending, nor can it provide the solution. Once juveniles begin to offend, the juvenile justice system and the general community must provide them with incentives to stay out of trouble for a sufficiently long time to minimise their risk of re-offending. Juvenile crime is a problem that needs to be tackled even before the manifestation of delinquent behaviours. Multifaceted interventions aimed at enhancing parental and community ability to exercise social control are crucial in this respect.

Juvenile offending is one area where there is lack of properly set up statistical systems to assist public policy. The Australian Institute of Criminology has been, during the last 17 years, collating and distributing statistics about persons in juvenile corrective institutions classified by jurisdiction, gender, age and Aboriginality. Although useful in providing information about the size and composition of the population of juveniles under detention, data from this collection need to be expanded in order to enable full and proper understanding of the processes giving rise to the incarceration of juvenile offenders. Recidivism is one issue about which no answers can be obtained from an analysis of the data in this collection.

The New South Wales Department of Justice's Children's Court Information System and the data held at the Crime Research Centre of the University of Western Australia are fine examples of the type of collections required to support research on the complex issues surrounding juvenile offending.

References

- Baumer, E., Lauritsen, J., Rosenfeld, R. & Wright, R. 1998, "The influence of crack cocaine on robbery, burglary and homicide rates: A cross-city longitudinal analysis", *Journal of Research in Crime and Delinquency*, vol. 35, no. 3, pp. 316-40.
- Beresford, Q. 1993, "Going off the rails: A profile of serious and repeat juvenile offenders and policy responses in Western Australia", *Criminology Australia*, vol. 5, Australian Institute of Criminology, Canberra, pp. 7-12.
- Broadhurst, R. G. & Loh, N. S. 1995, "Rearrest probabilities for the 1984-1993 Western Australian population: A survival analysis", *Journal of Quantitative Criminology*, vol. 11, pp. 289-313.
- Broadhurst, R. G. & Maller, R. A. 1990, "The recidivism of prisoners released for the first time: Reconsidering the effectiveness question", *Australian and New Zealand Journal of Criminology*, vol. 23, pp. 88-103.
- 1991, "Estimating the numbers of terms in criminal careers from one-step probabilities of recidivism", *Journal of Quantitative Criminology*, vol. 7, pp. 275-90.
- 1992, "An analysis of the recidivism of sex offenders in Western Australian prisons", *British Journal of Criminology*, vol. 32, pp. 54-80.
- Broadhurst, R. G., Maller, R. A., Maller, M. G. & Duffecy, J. 1988, "Aboriginal and non-Aboriginal recidivism in Western Australia: A failure rate analysis", *Journal of Research in Crime and Delinquency*, vol. 25, pp. 83-108.
- Bursik, R. J. & Grasmick, H. G. 1993, *Neighborhoods and Crime: The Dimensions of Effective Community Control*, Lexington Books, New York.
- Cain, M. 1996, *Recidivism of Juvenile Offenders in New South Wales*, New South Wales Department of Juvenile Justice, Sydney.
- Carcach, C. 1997, *Reporting Crime to the Police*, Trends and Issues in Crime and Criminal Justice, no. 68, Australian Institute of Criminology, Canberra.
- Copas, J. 1995, "On using crime statistics for prediction", in *Interpreting Crime Statistics*, ed. M. A. Walker, Clarendon Press, Oxford, pp. 175-206.
- Corman, H. & Mocan, N. H. 1996, *A Time-Series Analysis of Crime and Drug Use in New York City*, Working Paper 5463, National Bureau of Economic Research Inc., Cambridge, Massachusetts.
- Coumarelos, C. 1994, *Juvenile Offending: Predicting Persistence and Determining Cost-Effectiveness of Interventions*, New South Wales Bureau of Crime Statistics and Research, Sydney.
- Criminal Justice Commission 1996, *The Nature of General Police Work*, Research Paper Series, vol. 3, no. 2, CJC, Brisbane.
- Harding, R. W. (ed.) 1993, *Repeat Juvenile Offenders: The Failure of Selective Incapacitation in Western Australia*, Crime Research Centre, University of Western Australia, Perth.

- 1995, *Repeat Juvenile Offenders: The Failure of Selective Incapacitation in Western Australia*, second edn, Crime Research Centre, University of Western Australia, Perth.
- Harding, R. W. & Maller, R. A. 1997, "An improved methodology for analyzing age-arrest profiles: Applications to a Western Australian offender population", *Journal of Quantitative Criminology*, vol. 13, pp. 349-72.
- Lloyd, Ch., Mair, G. & Hough, M. 1994, *Explaining Reconviction Rates: A Critical Analysis*, Home Office Research Study no. 136, HMSO, London.
- Maltz, M. D. 1984, *Recidivism*, Academic Press, London.
- Matsueda, R. L. & Anderson, K. 1998, "The dynamics of delinquent peers and delinquent behaviour", *Criminology*, vol. 36, pp. 269-308.
- Maller, R. & Zhou, X. 1996, *Survival Analysis with Long-term Survivors*, John Wiley & Sons, Chichester.
- Mukherjee, S. & Reichel, P. (forthcoming), "Bringing to justice", in *Global Report on Crime and Justice*, ed. G. Newman, United Nations Centre for International Crime Prevention (UNCICP), Oxford Press.
- National Crime Prevention 1999, *Pathways to Prevention: Developmental and Early Intervention Approaches to Crime in Australia*, Attorney-General's Department, Canberra.
- Patterson, G., DeBaryshe, B. & Ramsey, E. 1989, "A developmental perspective on antisocial behaviour", *American Psychology*, vol. 44, pp. 329-35.
- Shaw, C. R. & McKay, H. D. 1944, *Juvenile Delinquency and Urban Areas*, University of Chicago Press, Chicago.
- Schmidt, P. & Witte, A. D. 1984, *An Economic Analysis of Crime and Justice: Theory, Methods and Applications*, Academic Press, Orlando.
- 1988, *Predicting Recidivism Using Survival Models*, Springer-Verlag, New York.
- Tarling, R. 1993, *Analysing Offending: Data, Models and Interpretations*, HMSO, London.
- Weatherburn, D. & Lind, B. 1998, *Poverty, Parenting, Peers and Crime-prone Neighbourhoods*, Trends and Issues in Crime and Criminal Justice no. 85, Australian Institute of Criminology, Canberra.