RECIDIVISM AND THE JUVENILE OFFENDER

Carlos Carcach
Senior Research Analyst
Australian Institute of Criminology

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1. Introduction

Reducing juvenile crime is one of the biggest challenges facing society today. Juvenile crime is not as vast and unmanageable as the myths and misconceptions surrounding it suggest. The overwhelming majority of young people have no contact with the criminal justice system. Of those who have contact in the form of a court appearance, the majority has only the one appearance. A sizeable minority of juveniles has however several court appearances leading to conviction.

In Australia, knowledge about juvenile offenders and offending is limited. It is very little what it is known about the causes underlying juvenile engagement in crime. In addition, our knowledge about the characteristics and dynamics of juvenile offending is incomplete. It comes to no surprise that attempts to tackle the problem have a high risk of failure.

The recidivism of juvenile offenders and their offending patterns are among the most important issues relating to juvenile crime. Overseas research supports the popular conception that adult criminals begin their careers in the juvenile years. Therefore, understanding the factors underlying juvenile reoffending is crucial to the development of policies aimed at breaking the crime cycle. Assessment of offending patterns is another important component of the juvenile crime equation. If offending is specialised, knowledge of early types of offences may help to predict later offending and may be used to assist juvenile justice decision making. On the other hand, versatility in offending does not make the path of juvenile offending to be accurately predicted, which in turn makes control and prevention of juvenile crime a difficult task.

Few studies on recidivism have been published in Australia, and even fewer on the more specialised issue of juvenile reoffending. Moreover, offender specialisation is a neglected topic in the Australian literature, and our knowledge about careers of juvenile offending derives from research conducted overseas. The lack of proper data is perhaps the major obstacle for the absence of this type of research in Australia.

This paper discusses results from ongoing research on intensity of offending and patterns of offending among juvenile offenders. Intensity of offending is studied by examining the time elapsed between consecutive offences and the factors associated with it. The question as to whether offending patterns of juveniles remain specialists or tend to diversify over the length of their criminal careers is also examined.

The paper uses data for a cohort consisting of all juveniles who recorded at least one conviction during 1992-93, and investigates their offending careers over the five-year period up to 30 June 1977. The data used for this study were extracted from databases held as part of Children's Court Information System in the New South Wales Department of Juvenile Justice.

2. Is Juvenile Crime a Problem?

It is said that today's juvenile delinquent is tomorrow's criminal. Research from many countries tends to suggest that persons with a record of delinquency are at higher risk of committing crime as adults, but it also shows that a large majority of juveniles who come in contact with the justice system desist after the first contact.
Unlawful incidents committed by juveniles may result in them moving through one or more stages of the criminal justice system. Statistics on contacts between juveniles and the police are not available in Australia, so it is not possible to determine the "true" magnitude of juvenile crime. Official data only become available at the stage when a person is processed or charged with an offence by police.

Data in Mukherjee, Carcach and Higgins (1997) suggest that about 30 per cent of all persons charged with property offences and about 10 per cent of all the persons charged with violent offences are juveniles. Yet juveniles are about three and a half times more likely than adults to be charged with a property offence. On the other hand, juveniles are about half as likely than adults to be charged with a violent offence. These figures may suggest that juvenile crime is not as serious as public opinion suggests. What is more important, and in particular for property offences, these figures seem to indicate that juvenile offenders are more easily detected by police than their adult counterparts, a result that is consistent with previous findings (see for example Vandaele, 1978).

Once a juvenile has been charged with the commission of an offence, his/her case can be dealt with by the courts or some form of diversionary mechanism such as conferencing. Data published by the New South Wales Bureau of Crime Statistics and Research show that on average, 14,293 persons were charged in Children's Court appearances finalised during the period from 1992-93 to 1996-97 (Chilvers, 1998). Data in Cain (1996) show that 30.6 per cent of first-time juvenile offenders recording proven criminal appearances, accounted for 59.8 per cent of all proven criminal appearances at the New South Wales Children's Court during the period from 1986 to 1994. A total of 52,935 juvenile offenders recorded a proven court appearance during this period, or an average 5,882 a year. This suggests that on average 1,800 juvenile offenders recorded more than one proven court appearance each year during the 1986-94 period. The immediate conclusion to be drawn from these figures is that a relatively sizeable minority of juvenile offenders accounts for the majority of crimes attributed to persons under the age of 18 years.

The previous figures lead us to ask whether juvenile crime is as serious as public opinion seems to suggest. Based on official statistics, the most likely answer would be that it is not. We might say that what really happens is that we have a relatively small number of kids who are responsible for most of the crimes. Note however that given data limitations, we are talking about detected crimes dealt with by the courts. Research indicates that the majority of offences committed by juveniles are less serious than the ones committed by adults.

We know little about the rates of offending among juveniles and how their rates compare to those of adult offenders. A study based on a school survey estimated the median burglary frequency rate of juveniles to be between 1 and 2 a year (Baker, 1998). Salmelainen (1995) estimated that juvenile theft offenders in detention commit burglary offences at a rate of 0.39 a week. Stevenson and Forsythe (1998) report median monthly frequency offending rates of 8.7 and 12.7 burglaries among adult and juvenile burglars serving prison terms. Using these results, a rough calculation shows that among juvenile burglars, those under detention offend at a frequency that is 106 times higher than school kids, who presumably are undetectable by the criminal justice system. Making the simplistic assumption that a similar ratio holds between frequency of offending of imprisoned adult burglars and those in the community, the latter would offend at a rate of 0.02 a week. From these results, the number of burglaries committed by juveniles can be grossly estimated at 40 per cent of all the burglaries occurring
during any year. Note however that on average, the income a juvenile derives from burglary is only 40 per cent the income generated by an adult burglar (Stevenson and Forsythe, 1998).

Juveniles make up about 10 per cent of the total population, so they are between 5 and 6 times more likely than adults to commit a burglary. Very rough calculations suggest that on a per capita basis, the cost of a juvenile burglary may be 2.4 times as high as a burglary committed by an adult. At least in the short-term, juvenile burglaries may have strong negative effects on communities. Note that burglary is the crime with the greatest potential to cause fear in the community (Bursik and Grasmick, 1993). All these arguments would lead to the conclusion that juvenile crime can be considered as a serious issue, both in terms of its magnitude and its immediate effects on society.

3. An Analysis of the Factors Associated with Times to Reconviction among Juvenile Offenders

This paper focuses on two interrelated aspects of the criminal careers of juveniles, namely times to recidivism and offending patterns. The data used for this study come from the databases of the Children's Court Information System (CCIS) held at the New South Wales Department of Juvenile Justice.

The CCIS is a computer based criminal record system that records details of each finalised appearance in the New South Wales children’s courts since 1982. Data were available for all court appearances for the period from 1 July 1992 to 30 June 1997, amounting to 71,560. 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 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% of youth appearing before the Children’s Court in Western Australia during 1991-1992 had 5 or more appearances.

Few studies on recidivism have been published in Australia, and even fewer on the more specialised issue of juvenile reoffending. The studies by Coumarelos (1994) and Cain (1996) for New South Wales and that 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).
Although the paper touches on recidivism rates, its primary focus is on **time to recidivism** and the factors associated with it. The length of 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 high rotation of a relatively low number of juvenile offenders through the juvenile justice system. The specialised literature indicates that factors such as sex, age, previous court appearances and convictions, and in general criminal record have an impact on the risk of recidivism among juvenile offenders (Tarling 1993, Gendreau, Little and Goggin 1996). This paper 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 proven appearance in court.

**Problems Associated with Measuring Recidivism**

Recidivism as defined in this study does not necessarily measure reoffending. It is known that not all offenders who after a first proven court appearance continue committing further crimes are caught, and not all those who are caught are convicted in Court. 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, results in underestimation of true recidivism rates and true times until reoffending.

Another problem with 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 a 5-year 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 Shmidt and 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 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 and 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 reoffending. 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, the net effect being underestimation of recidivism rates and overestimation of their 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. By virtue of the definition of recidivist used in this and other studies on recidivism, cases where the offence at a subsequent proven 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. The relative seriousness of the offence at a subsequent court appearance may have an impact on the probability of conviction. If this were the case, subsequent appearances associated with offences of a more serious nature than the first may have a higher chance of resulting in a conviction than other subsequent court appearances. This may have profound implications for the analysis since non-proven subsequent court appearances are not counted as recidivists1.

Data and Methods

The cohort used for the study on times to recidivism consists of all the offenders aged 18 years or less who recorded at least one conviction in New South Wales during the period from 1 July 1992 to 30 June 1993. This selection process resulted in a final sample of 5,509 proven juvenile offenders. Both first and repeat offenders are included in the cohort.

These offenders were followed up to 30 June 1997 and those who recorded a subsequent conviction during this period while still being juveniles (ie 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. A recidivist is defined as any individual recording a subsequent proven appearance during this follow-up period.

In this paper the terms first proven court appearance, first proven appearance and first recorded proved appearance refer to the first proven appearance recorded during the period 1 July 1992-30 June 1993 by a member of the cohort. A member of the cohort under study recording a proven appearance during the 1992-93 period may not necessarily be a first time offender, as him/her may have recorded proven court appearances prior to 1 July 1992.

Table 1 summarizes 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 a subsequent proven court appearance.

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 19972. The average time until a subsequent court appearance was 17.9 months3.

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.
2 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.
Table 1: Offenders Recording Proven Appearances before New South Wales Children’s Courts
1 July 1992 – 30 June 1993, Selected Characteristics

Percentage Distribution, Percentage Reappearing in Court and Time to Second Reappearance During the Period from 1 July 1992 to 30 June 1997

<table>
<thead>
<tr>
<th>% of Cohort</th>
<th>Percentage Recording a Second Reappearance</th>
<th>Average Time to Reappearance (Months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.1</td>
<td>42.9</td>
</tr>
<tr>
<td>11</td>
<td>0.5</td>
<td>66.7</td>
</tr>
<tr>
<td>12</td>
<td>1.4</td>
<td>56.4</td>
</tr>
<tr>
<td>13</td>
<td>4.0</td>
<td>51.6</td>
</tr>
<tr>
<td>14</td>
<td>9.8</td>
<td>55.1</td>
</tr>
<tr>
<td>15</td>
<td>16.3</td>
<td>51.1</td>
</tr>
<tr>
<td>16</td>
<td>25.7</td>
<td>44.2</td>
</tr>
<tr>
<td>17</td>
<td>33.0</td>
<td>24.1</td>
</tr>
<tr>
<td>18</td>
<td>9.0</td>
<td>7.8</td>
</tr>
</tbody>
</table>

Gender

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<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Male</td>
<td>85.8</td>
<td>38.1</td>
</tr>
<tr>
<td>Female</td>
<td>14.2</td>
<td>30.8</td>
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</tbody>
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Number of Previous Recorded Proven Court Appearances at the Time of the First Proven Court Appearance

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<tbody>
<tr>
<td>0</td>
<td>55.0</td>
<td>30.3</td>
</tr>
<tr>
<td>1</td>
<td>18.4</td>
<td>41.9</td>
</tr>
<tr>
<td>2</td>
<td>9.0</td>
<td>42.3</td>
</tr>
<tr>
<td>3</td>
<td>5.6</td>
<td>47.1</td>
</tr>
<tr>
<td>More than 3</td>
<td>11.9</td>
<td>52.3</td>
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Offence Type at First Recorded Proven Court Appearance

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<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Violent Offences</td>
<td>16.7</td>
<td>37.1</td>
</tr>
<tr>
<td>Property Offences</td>
<td>63.2</td>
<td>39.4</td>
</tr>
<tr>
<td>Drug Offences</td>
<td>6.0</td>
<td>24.6</td>
</tr>
<tr>
<td>Other Offences</td>
<td>14.2</td>
<td>31.5</td>
</tr>
</tbody>
</table>

Type of Penalty at First Recorded Proven Court Appearance

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<thead>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Nominal Penalties</td>
<td>1.8</td>
<td>18.2</td>
</tr>
<tr>
<td>Unsupervised Orders</td>
<td>32.3</td>
<td>34.3</td>
</tr>
<tr>
<td>Fines</td>
<td>22.7</td>
<td>28.8</td>
</tr>
<tr>
<td>Supervised Orders</td>
<td>30.3</td>
<td>43.5</td>
</tr>
<tr>
<td>CSO</td>
<td>7.5</td>
<td>48.5</td>
</tr>
<tr>
<td>Custodial Order</td>
<td>5.1</td>
<td>47.5</td>
</tr>
</tbody>
</table>

Area of Residence

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<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Eastern Sydney</td>
<td>15.8</td>
<td>39.0</td>
</tr>
<tr>
<td>Western Sydney</td>
<td>16.0</td>
<td>36.0</td>
</tr>
<tr>
<td>Southern Sydney</td>
<td>16.2</td>
<td>36.9</td>
</tr>
<tr>
<td>Hunter</td>
<td>10.6</td>
<td>40.4</td>
</tr>
<tr>
<td>Northern NSW</td>
<td>10.8</td>
<td>37.3</td>
</tr>
<tr>
<td>Western NSW</td>
<td>9.5</td>
<td>39.4</td>
</tr>
<tr>
<td>Southern NSW</td>
<td>13.9</td>
<td>35.2</td>
</tr>
<tr>
<td>Interstate/Unknown</td>
<td>7.0</td>
<td>30.7</td>
</tr>
</tbody>
</table>

Court Type at the Time of the First Proven Appearance

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<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Specialist Children’s Court</td>
<td>51.0</td>
<td>38.2</td>
</tr>
<tr>
<td>Other Court</td>
<td>49.0</td>
<td>35.9</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>37.3</td>
</tr>
</tbody>
</table>

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 37.1 per cent recidivism reported here is based on the court reappearances recorded during a five-year follow-up period by those offenders first convicted during the 1992-1993 financial year. 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.
Multiple offences heard on different dates may result in overestimation of the recidivism rate and can affect the calculation of times to reconviction. A same individual can be convicted at different dates for offences that occurred together on a 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 to 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% of the juveniles in the cohort were aged between 15 and 17 years. The low number of cases in ages below 15 years precludes any comment on the apparently complex relationship between age at first proven Court appearance and the time until recidivism\textsuperscript{4,5}.

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

Forty five percent of the juveniles in the cohort consisted of repeat offenders. These offenders did not only experience 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 recidivism reduces with the number of previous court appearances.

With regard to the type of penalty, the figures in Table 1 indicate that 85.3 per cent of the juveniles in the cohort received a supervised or unsupervised order, or a fine\textsuperscript{6}. The levels of recidivism are higher for community service orders and supervised orders than for other penalties\textsuperscript{7}. According to Table 1, times to reoffend 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.

\textsuperscript{4} 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.

\textsuperscript{5} 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.

\textsuperscript{6} 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).

\textsuperscript{7} 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 rate 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.
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 there were no differences between times to court reappearance according to offence type.

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 court were shorter than among juveniles dealt with by non-specialist courts.

**A Model for Time to Reconviction**

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.

The main variable in this study is the time elapsed between consecutive proven court appearances among the 5,509 juvenile offenders included in the cohort. Our interest is to assess the impact that a number of factors identified by theory have 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 \( x_{i1}, \ldots, x_{ip} \), are observed for each juvenile in the cohort \( (i = 1, \ldots, n) \). Conditional on the set of covariates \( x_{i1}, \ldots, x_{ip} \), times to reoffend, \( y_i \), are distributed according to:

\[
y_i \mid x_{i1}, \ldots, x_{ip} \sim F(\beta_0 + \beta_1 x_{i1} + \ldots + \beta_p x_{ip}, \sigma^2), i = 1, \ldots, n,
\]

where, \( F(\ldots) \) represents a distribution with mean \( \beta_0 + \beta_1 x_{i1} + \ldots + \beta_p x_{ip} \) and variance \( \sigma^2 \). \( F \) is assumed to be defined for positive values of the time to reappearance. \( F \) gives the proportion of juvenile offenders in the cohort that will reappear no later than time \( t \). This is the

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

9 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.
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 is the hazard rate, denoted as $h(t)$, 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 years old during the follow up period after 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.

**Figure 1:** Graphical Representation of the Study Cohort

This paper only deals with the problem of censoring. 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 nonnegative. Its distribution may have a long right tail, which reflects the fact that while many offenders record a proven court reappearance quickly, others may do it only after long periods of time. The lognormal, Weibull and Pareto are among the distributions that accommodate 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 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 is for him/her to reappear in court.

Define the dichotomous variable $C_i$ 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

\[
L = \prod_{i=1}^{n} \left[ F(\beta_0 + \beta_1 x_{i1} + \ldots + \beta_p x_{ip}) \right]^C \left[ 1 - F(\beta_0 + \beta_1 x_{i1} + \ldots + \beta_p x_{ip}) \right]^{1-C}
\]  

(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 \( \beta_0, \beta_1, \ldots, \beta_p \) are estimated by the values of \( \beta_0, \beta_1, \ldots, \beta_p \) that maximize 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 recidivism (Tarling, 1993). Cain (1995) in his study on juvenile recidivism found recidivism to be associated with similar variables in addition to type of court and first penalty. 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 covariates\(^{10}\) (refer to Table 1).

\( ^{10} \) 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.
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: Estimated Regression Coefficients**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juvenile is a Male</td>
<td>0.030**</td>
</tr>
<tr>
<td>Age at First Proven Court Appearance During Period of Study</td>
<td>0.123**</td>
</tr>
<tr>
<td>Quadratic Term for Age</td>
<td>-0.005**</td>
</tr>
<tr>
<td>Number of Previous Proven Appearances at the Time of the First Proven Court Appearance During Period of Study</td>
<td>0.036**</td>
</tr>
<tr>
<td>Penalty at First Proven Court Appearance - CSO</td>
<td>0.072**</td>
</tr>
<tr>
<td>Penalty at First Proven Court Appearance – Supervised Order</td>
<td>0.035**</td>
</tr>
<tr>
<td>Number of Previous Proven Appearances-Supervised Order Interaction</td>
<td>-0.013**</td>
</tr>
<tr>
<td>Number of Previous Proven CSO Order Interaction</td>
<td>-0.021**</td>
</tr>
<tr>
<td>Intercept</td>
<td>-6.293</td>
</tr>
<tr>
<td>Scale</td>
<td>0.105</td>
</tr>
<tr>
<td>Scaled Deviance</td>
<td>171.5</td>
</tr>
</tbody>
</table>
Discussion of Main Results

(a) Age at First Recorded 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 reoffend increases until the age of 14 after which it declines (see Figure 2).

Figure 2: New South Wales Juvenile Offenders Recording a Proven Court Appearance During 1992-93

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 and Anderson, 1998). As a result, their likelihood of further contacts with the juvenile justice system increases.11

(b) Gender and Recidivism

After controlling for the effect of other factors included as part of the model, times to reoffend among males are only 3 per cent longer than the times to reoffend 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 indicate that gender does not contribute to explain differences in time elapsed between subsequent court appearances.

11 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, one year increase in age results in a geometric increase in the time to recidivism.
Figure 3: New South Wales
Juvenile Offenders Recording a Proven Court Appearance During 1992-93
Months until a Subsequent Proven Appearance by Gender

(c) Specialist Children Courts and Recidivism

The figures in Table 1 suggested 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 4 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, which is a small difference to be considered as substantively relevant.

Figure 4: New South Wales
Juvenile Offenders who had their First Proven Court Appearance During 1992-93
Months until a Subsequent proven Appearance by Type of Court

These results suggest that type of court is not a significant factor in explaining juvenile times to recidivism.
(d) **Number of Previous Proven Court Appearances and First Penalty**

The history of contacts with the justice system is perhaps the best predictor for recidivism (see Maltz 1984, Schmidt and White 1984 and 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, whether the first penalty was a Community Service Order (CSO) or a Supervised Order (SO) was associated with reduced times to recidivism. The analysis also found that the effect of the first penalty has on times 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 type of penalty affects differently the times to recidivism of juvenile offenders as the number of previous appearances increases.

Note that among those with 4 or more previous court appearances, there is virtually no difference in the time elapsed between the first and a subsequent appearance, a result that holds for both Community Service Orders and Supervised Orders (see Figure 5).

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**Figure 5:** New South Wales

Juvenile Offenders who had their First Proven Court Appearance During 1992-93

Number of Months until a Subsequent Proven Appearance by Number of Previous Proven Court 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 lower 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 Community Service and Supervised Orders are in influencing his/her rate and intensity of offending.

4. Patterns of Juvenile Offending: Specialisation or Versatility

This section examines offence specialisation among juvenile offenders in New South Wales. Two main research questions are addressed here. The first refers to whether juvenile offenders tend to commit the same type of offence, or to consistently switch between offences over the course of their offending careers. The second question is whether patterns of juvenile offending remain stable or change over a career. Understanding the offence patterns of juvenile offenders is relevant to the study of criminal careers, and ultimately to policies for the control of juvenile crime.

Studies of specialisation or versatility in offending shed light on the number of dimensions underlying delinquent behaviour. If there are several underlying processes leading to delinquency, then offending should be versatile rather than specialised. Offenders would tend to commit many different types of offences during their careers, and knowledge of the type of offence committed on one occasion would not help to predict the type committed on another.

Specialisation occurs when a single underlying process drives offending. Offenders would tend to continue committing the same type of offence during their careers, and knowledge of the type of offence committed on one occasion would help to predict the type committed on another.

Data on offences committed on different occasions can be arranged by type of offence to produce what is known as a transition matrix. Wolfgang et al. (1972) were the first to use transition matrices to assess specialisation in offending. Transition matrices indicate the probability that an offender committing a given type of offence on one occasion will commit another offence of the same or different type on the next occasion. These probabilities are known as transition probabilities, and they are used to assess the degree of specialisation over the course of delinquent careers.

Transition matrices are constructed by using long-term average probabilities of moving from one type of offence to another over a delinquent career. They are often used to assess whether juvenile offenders are escalating in their offending, that is whether they are

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12 Transition matrices are based on the assumption that movements between types of offences over the course of a delinquent career obey a Markov chain process. In other words, the probability of committing a given type of offence at any period of time depends only on the type of offence committed during the previous time period.
progressing from less serious to more serious types of offence; or de-escalating. Alternatively, escalation can also occur if the probability of moving to a more serious offence increases over successive occasions (Farrington et al. 1988).

In Australia, knowledge about careers of juvenile offenders derives from findings from research conducted overseas. Some studies support the hypothesis of a tendency towards specialisation (Wolfgang et al. 1972, Cohen 1986, Stander et al. 1989, and Lattimore et al. 1994). Other studies report on a weak evidence of offence specialisation, particularly among persistent juvenile offenders (Rojek and Erickson 1982, Smith and Smith 1984, Tracy et al. 1985, Cohen 1986, Farrington, Snyder and Finnegans 1988). Specialisation has been found to be strong for property offences, but weak for violent offences.

The results of most studies of specialisation reported in the literature must not be considered as conclusive and should be treated with caution due to problems with the specification of crime categories and the portion of delinquent career examined (Tracy and Kempf-Leonard 1996). Ideally, the classification scheme for offences should result in mutually exclusive crime categories. The proportion of the criminal career investigated is important because the definition of criminal career provides for the designation of subsequences, such as when different stages of crime involvement are considered.

Coumarelos (1994) and Cain (1996) addressed the issue of offence specialisation in their studies of juvenile recidivism in New South Wales. Using data on all proven court appearances during a given period. Cain (1996) compared offences at the first and last proven court appearances among recidivist juveniles between 1986 and 1994. He found that for 40 per cent of the recidivist offenders, the offence at the last appearance was more serious than the offence at the first appearance, whereas both offences had a similar degree of seriousness for 20 per cent of these offenders. He obtained similar results when comparing the first and the most serious proven offence. Cain's results suggest that among persistent juvenile offenders, there is a tendency towards progressively moving from violent offending to theft/property offences. He concludes that "… theft and property offences, such as break and enter, are the "norm" to which adolescent offenders progressively shift the longer such individuals are involved in juvenile crime" (p. 55-58).

Court-based offending data are notoriously incomplete in respect of measuring re-offending. 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 with the net effect of underestimation of recidivism rates and overestimation of their times to reoffend. On the other hand, it may be argued that those recording previous court appearances may be more likely to be picked up for similar offences in the future.

Court data, and in particular those used in this study, provide information on the most serious offence at each recorded appearance. This may impose relatively serious constraints to the use of court data in this type of studies, the major one being the confounding of offences. A juvenile may record several charges for a single court appearance, however only the most serious of these charges is recorded in the statistics. This problem is not unique to court data, as can be appreciated from overseas studies using arrest records (Stander et al. 1989; Lattimore, Visher and Linster 1994). Evidence from overseas indicates that as high as 80 per cent of juvenile offenders who appear in court are charged with one offence only (Farrington, Synder and Finnegans 1988).
Research on delinquent careers and in the most specific issue of specialisation in offending is restricted by the lack of adequate data. The ideal data set should consist of longitudinal observations on individuals and their contacts with the criminal justice system. In Australia, such data are seldom available. Court-based data, despite all their imperfections are still useful to study specialisation.

The following types of offence were considered in this study:

- Violent offences (homicide, assault, sexual assault and extortion),
- Robbery,
- Break and enter,
- Motor vehicle theft,
- Other theft,
- Drug offences (possession, trafficking and producing/manufacturing), and
- Offences other than above.

This classification scheme for offences results in more or less mutually exclusive crime categories. Since this study does not aim at answering questions regarding scatation or graduation in offending, but rather the more static issue of specialisation vs versatility, these more or less discrete categories are adequate.

A transition occurs when a juvenile offender records consecutive proven court appearances. The maximum observed number of proven court appearances for a single individual was 26 and the minimum number was 1. This study examined offenders’ passages from the first up to the sixth proven court appearances, giving rise to a maximum of five transitions. The decision to trace specialisation to the sixth offence was conditioned by sample size considerations.

Transition matrices were constructed from data on the number of individuals at consecutive court appearances classified by type of offence. For example, Table 1 shows that a juvenile who was convicted for a violent offence at his/her first proven court appearance, has a 31.6 per cent chance of being convicted for the same type of offence at his/her next proven court appearance.

The literature reports on several methods to estimate specialisation in offending. The two more commonly used measures of specialisation are based on the Adjusted Standardised Residual (ASR) (Haberman 1979), and the Forward Specialisation Coefficient (FSC) developed by Farrington (1986). This paper uses the ASR to assess specialisation of offending.

The ASR is calculated from the difference between the observed and expected count for each cell in the diagonal of a transition matrix. Specialisation is assessed from a test of whether the observed ASR is significantly different from its value under the hypothesis of no

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13 Matrices became sparse after the sixth transition.
14 The Forward Specialisation Coefficient (FSC) for the transition from offence i to offence j is given by the following expression: FSC(i,j) = [n(i,i) - n(j)n(i)/n] / [n(i)/n - n(j)n(i)/n], where n(i,i) is the observed frequency in a diagonal cell, n(j) is the column total, n(i) is the row total, and n is the total number of observations. The FSC is only appropriate for the diagonal elements and takes a value between 0 and 1. It is zero when there is complete versatility in offending and 1 when there is complete specialisation.
specialisation, which is zero. Rejection of this hypothesis would lead to the conclusion that offenders tend to be specialised¹⁵.

Our second research question has to do with the temporal stability in patterns of juvenile offending. We answer this question by assessing whether the transition probabilities remain unchanged across proven court appearances¹⁶.

The Issue of Specialisation

Our results point toward both specialisation and versatility in juvenile offending. While violent and motor vehicle offenders tend to remain specialists over the course of their delinquent careers, the versatility of juveniles sentenced for the remaining offences tends to increase over time.

Figures 6a to 6f show the values of the specialisation measure for each of the seven types of offences included in the study. Transitions are represented in the horizontal axis. The horizontal reference line shows the value above which the specialisation measure is statistically significant at the 5% level. Transitions with values above this line indicate specialisation in offending, while those with values below the reference line are indicative of versatility in offending. Note that no graph has been included for the group of other offences. The obvious heterogeneity of the illegal behaviours contributing to this group makes any assessment of specialisation in offending meaningless.

The Adjusted Standardised Residual (ASR) provides a measure to test whether an element of the transition matrix is less or greater than would be expected by chance, that is whether a type of offence committed is independent of the type of offence committed on the previous occasion. The ASR is not intended to compare the criminal careers of offenders according to their intensity of offending. Moreover, the ASR should not be interpreted as a measure of scalation/graduation of offending. Its only purpose is to serve as a criterion to assess whether the observed data are consistent with specialized or versatile criminal careers.

In general, our results support the hypothesis that there is an initial tendency towards specialisation among juvenile offenders, in particular for violent offences, break and enter, motor vehicle theft and other theft. Note that as the number of proven court appearances increases, the level of specialisation among violent, motor vehicle theft and other theft offenders tends to decline. On the other hand, break and enter offenders tend to stay as specialists as they progress in their criminal careers.

Drug offenders tend to remain specialists until after the fifth proven court appearance when they begin to diversify their offending.

¹⁵ The Adjusted Standardised Residual (ASR) for the transition from offence i to offence j is given by the following expression: \[ \text{ASR}_{i,j} = \frac{n(i,j) - n(i)n(j)/n}{\sqrt{(n(j)n(i)/n)(1- n(i)/n)(1- n(j)/n)}} \] where \( n(i,j) \) is the observed frequency, \( n(j) \) is the column total, \( n(i) \) is the row total, and \( n \) is the total number of observations. The ASR is distributed as a standard normal with zero mean and unity variance.

¹⁶ Temporal stability of offending patterns is determined by testing the hypothesis that transition probabilities are stationary. A statistical procedure to perform this test was proposed by Goodman (1962).
Figure 6: Measure of Offence Specialisation

(a) VIOLENT OFFENCES
(b) ROBBERY
(c) BREAK & ENTER
(d) MOTOR VEHICLE THEFT
(e) OTHER THEFT
(f) DRUG OFFENCES
Stability of Offending Patterns

Our results indicate that patterns of juvenile offending tend to remain stable over time. This implies that the probabilities of moving from one type of offence to another do not change as juveniles develop their delinquent career. Table 1 contains the probabilities that a juvenile who has a proven court appearance for a specific offence on one occasion will have a proven court appearance for the same or any other offence on a subsequent occasion.

Table 3: NEW SOUTH WALES, Chances that a Juvenile Appearing in Court for a Given Offence will Appear in Court for the Same or Other Type of Offence\textsuperscript{17}

<table>
<thead>
<tr>
<th>Current Proven Court Appearance</th>
<th>Subsequent Proven Court Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Violent Offences</td>
<td>Violent Offences</td>
</tr>
<tr>
<td>Violent Offences</td>
<td>28.3</td>
</tr>
<tr>
<td>Robbery</td>
<td>18.2</td>
</tr>
<tr>
<td>Break &amp; Enter</td>
<td>14.0</td>
</tr>
<tr>
<td>MVT</td>
<td>14.8</td>
</tr>
<tr>
<td>Other Theft</td>
<td>16.3</td>
</tr>
<tr>
<td>Drug Offences</td>
<td>11.3</td>
</tr>
<tr>
<td>Other Offences</td>
<td>18.7</td>
</tr>
</tbody>
</table>

Table 3 shows that juveniles having a current proven court appearance for violent offences have a 28.3 per cent chance of having a subsequent proven court appearance for the same type of offence. The chance is 7.7 per cent for robbery, 26.3 per cent for break and enter, 19.5 per cent for motor vehicle theft, 25.9 per cent for other theft, 17 per cent for drug offences, and 36.1 per cent for other offences.

Among offenders recording a proven court appearance for robbery, there is a 18.2 per cent chance of a subsequent appearance for violent offences such as assault or homicide. However, note that there is a fair amount of chance for these offenders to move in the direction of less specialised careers soon after the second consecutive robbery-related court appearance.

Note that among juveniles having a current proven court appearance for break and enter, there is a 17.8 per cent chance that the subsequent proven court appearance will relate to other theft, and a 29.6 per cent chance that it will relate to other offences.

Among drug offenders, the chance of a subsequent court appearance related to break and enter is 13 per cent, whilst there is a chance of 16.4 per cent that it will relate to other theft, and 34 per cent for other offences.

The figures shown in Table 3 could also be used to answer the question as to whether there is a progression from trivial to more serious acts during the delinquent careers of juvenile offenders in New South Wales. If the probability of moving from a less serious to a more serious offence exceeds the probability of moving from the more serious to the less serious offence then we can talk of escalation in the seriousness of offences.

\textsuperscript{17} This is the limiting transition matrix derived under stationarity.
Data suggest a trend towards escalation among juvenile offenders in New South Wales. For all the types of offence, excluding violent offences and robbery, the probability of moving to a less serious offence exceeds that of moving in the opposite direction. As an example, Table 1 shows that the chance of an offender appearing in court for "other theft" (less serious) given that his/her previous appearance was for break and enter (more serious) is 13.5 per cent. On the other hand his/her chance of appearing in court for break and enter given that the previous appearance was for "other theft" is 17.8 per cent.

As expected, violent offences do not conform to the de-escalation trend. As shown by the figures in Table 1, the probability of recording a court appearance for a violent offence given a previous appearance for an offence in any of the other groups always exceeds the probability of an event in the opposite direction. This result is consistent with our previous findings about the trend for versatility over time. As juveniles appearing in court for offences other than a violent offence progress through their delinquent careers, their chance to commit a violent offence increases. This pattern tends to remain stable over time.

The transition matrix shown in Table 3 can also be used to make a very rough assessment of the relationship between drugs and crime. Figure 5 indicated that drug offenders tend to commit other types of crime only after they have reached a certain stage of their delinquent careers. Whether other types of offender tend to commit drug crimes is relevant to the debate about a causal relationship between drugs and crime. The figures in Table 1 show that the chance of a court appearance for drug offences given a previous appearance for any other type of offence is always less than the chance of a transition in the opposite direction. Our findings can only be considered as indicative of a possible causal link between drugs and crime and suggest the need for further research on this issue.

5. Policy Implications

Recidivism among juvenile offenders is affected by multiple factors, ranging from 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 paper has focused on two aspects of juvenile recidivism, namely the time to reoffend and whether juvenile offenders develop specialised offending careers, or not. Lower times to reoffend imply more intense delinquent careers and also higher reoffending rates. Moreover, if the delinquent careers of these juvenile offenders are specialised, then knowledge about previous offences may help to predict later offending. On the other hand, versatile juvenile offending makes future offending highly unpredictable.

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 a juvenile has 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 reoffend.

Supervised Orders appear to have a positive effect in reducing 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 for the first time appear in court at ages over 14 years experience shorter times to reoffend 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 and Anderson 1998).

The analysis of recidivism based on court data portrays a partial picture of such a complex issue as juvenile recidivism. 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 and Lind, 1998). There is also evidence of the relationship between crime and drug use (Corman and Mocan, 1996, Baumer et al. 1998).

The results from this study indicate that violent and property juvenile offenders tend to specialize. At least 65 per cent of all juvenile offenders commit the most specialised offences of violence, burglary, motor vehicle theft and other theft. This suggests the possibility of accurately predicting the delinquent careers of a significant portion of juvenile offenders. There is a 28 per cent chance that a juvenile offender appearing in court for a violent offence will reappear for a violent offence in the future, and a chance of 20 per cent that an offender of motor vehicle theft will reappear in court for the same offence. Chances of reoffending are 26 per cent for burglary and other theft.

Among drug offenders, the level of specialisation tends to decrease as the number of proven court appearances increases. Our results suggest that juvenile offenders appearing in court for a drug offence will continue to do so until the fifth consecutive appearance, when they will begin to appear for violent and property offences. Although no inferences about a causal relationship between drugs and other offences can be drawn from this study, our results point towards the conclusion that any link between drugs and crime is dependent upon the length of time a juvenile spends as a drug offender. It is only after a certain period of drug delinquency that juveniles start committing other offences. Note however that no causal relationship between drugs and crime can be inferred from the results of this study.

Important policy implications derive from our findings. Since juvenile offending tends to be specialist for the most serious offences of violence, break and enter, other theft and motor vehicle theft, the frequency and path of court convictions are highly predictable. Properly designed and managed interventions aimed at diverting juvenile offenders who are at the early stages of their criminal careers from further engagement in crime would be expected to result in sensible declines in the rates of juvenile crime and delinquency. Juvenile conferencing is already under operation in New South Wales (Department of Juvenile Justice, 1999).

Community based programs aimed at providing juvenile offenders with opportunities to enhance their educational attainment and performance, as well as their employment prospects may have a positive impact in dealing with offending behaviour. There is the need to support the families of juvenile offenders who are at the early stages of their criminal careers as well as those with more persistent patterns of offending, in their efforts to help their children to get out of crime. Support on parenting skills aimed at enhancing parent's abilities to provide their children with skills for self-control is of foremost importance in this respect.
The formal role of the juvenile justice system cannot be neglected, in particular when dealing with persistent violent and property offenders. A sentencing policy oriented towards incapacitation of juvenile violent and property offenders would reduce the supply of juvenile violent offenders by at least 28 per cent and that of property offenders by at least 46 per cent over the potential length of the delinquent careers. Such a potential reduction in crime must undoubtedly be weighed against the costs associated with the detention of juveniles. Incapacitation policies should be pursued as a last resort, only after community based mechanisms may have proved not successful.

A second policy implication arises from the fact that juvenile offenders charged with drug offences tend to become versatile after a given number of proven court appearances. An immediate consequence of this is that the reduced predictability of the delinquent careers of these juveniles which in turn complicates judicial decisions regarding sentencing options. Given the relative unpredictability of offending among juveniles charged with drug offences, rehabilitative sentencing in the form of mandatory drug treatment may help in breaking the drug-crime cycle that seems to develop after the fourth proven court appearance. Specialist drug courts may have a potential for success in this area (Makkai 1998).

A third set of policy options refers to the result of versatility in offending among juveniles charged with offences grouped in the miscellaneous category named other offences. Our results show that these juveniles tend to start committing violent, property or drug offences only after they have had 3 proven court appearances for an offence in the miscellaneous group. These miscellaneous offences are arguably minor in terms of their seriousness when compared to the other types of offence included in this study. What it is relevant as a policy issue is the fact that soon after a period of minor offending during their delinquent careers, in average 54 months, these offenders turn to more serious crimes. Community-based programs coupled with tougher sentencing policies aimed at incapacitating persistent violent and property offenders, together with mandatory treatment for drug offenders may have a deterrent effect among minor offenders who are at the early stages of their delinquent careers. Rigorous evaluation is required in order to ascertain the impact of any policy aimed at reducing juvenile crime.

A number of data issues have been mentioned through this paper. The limitations of court data in analyzing juvenile offending careers have been discussed extensively. These problems are not unique to Australian researchers. The literature shows that researchers from other latitudes face similar problems regarding data sources. Longitudinal data are the ideal source for the study of offending careers. Properly matched police, court and corrections data such as those held by the Western Australian Crime Research Centre or the Office of Crime Statistics of South Australia have an enormous potential to support research in this important area.

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18 Current figures on the cost of keeping a juvenile under detention are not available. According to data published in Potas, Vining and Wilson (1990), the cost of incarceration per juvenile was $82,679 during the 1986-87 financial year.

19 Carcach and Leverett (forthcoming) have estimated the average length of time between proven court appearances to be 17.9 months.
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