



Government of South Australia
Department of Justice

office of crime statistics and research

Juvenile Offending Trajectories: A South Australian Study

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Executive Summary

This paper outlines the results of research conducted by OCSAR looking at patterns of offending for individuals aged between 10 and 20 years. The analysis was initially undertaken as part of a Feasibility Study for a Criminology Research Council (CRC) consultancy on the link between youth chronic offending and multiple service use. One component of the study was to determine an appropriate method for identifying groups of chronic and non-chronic juvenile offenders. As part of this process, we trialled the Semi-Parametric Group-based method (SPGM), which tests whether the offending population comprises a mixture of several groups with distinct criminal trajectories.

While the analysis indicated that the technique was useful in identifying distinct groups of offenders, the results were also very informative in terms of our understanding of juvenile offending. This paper details the key findings, including additional analyses in relation to Indigenous status.

Overall, using juvenile apprehension data from the 1984 birth cohort, the semi-parametric group-based method identified six distinct groups of offenders with different offending trajectories between the ages of 10 and 20. Two of these groups had very low frequency offending, two were moderate and two reflected chronic offending patterns, including early onset, high frequency and persistence into early adulthood. A profile of the individuals most likely to belong to these groups provided further evidence that the groups were distinct, with statistically significant differences identified according to sex, Indigenous status, age of onset, and the overall number and type of apprehension events.

Separate modelling of the Indigenous and non-Indigenous populations within the 1984 birth cohort found that a model consisting of five distinct groups was the best representation of the data for both populations. There were a number of similarities in the shape of the models in that both had one low, two moderate, one high and one very high frequency group. The main difference in the patterns of offending between Indigenous and non-Indigenous juvenile offenders related to the proportion most likely to be in each group, with the Indigenous model having a higher proportion of individuals in the moderate, high and very high groups. In addition, the patterns of onset and desistance for the moderate level groups also varied, with both moderate Indigenous groups involving early onset offending, with one group showing signs of persistence into adulthood, while the non-Indigenous model had both an early and a late onset group, with each group indicating desistance. However, it should be noted that there was a relatively large number of persons within the 1984 juvenile offending cohort for whom Indigenous status was unknown and their exclusion from the comparison of the Indigenous and non-Indigenous youths may have had some impact upon the final results.

Despite a number of limitations, the results are indicative of a juvenile offending population made up of a number of different types of offenders, which has implications for the policy and practice response to juvenile offending. The findings suggest that a range of different interventions may be required for young people involved in offending, not just according to levels of offending or Indigenous status, but also targeted at differences in offending patterns *within* Indigenous and non-Indigenous groups.

Background

Since the 1980s, much attention has been focussed on the notion of *criminal careers*; that is, how individual patterns of offending change over time. In this field of study, the focus is on offending trajectories, including the age of onset, escalation and de-escalation in offending rates, as well as patterns of persistence and desistance. More recently, developmental and life course criminology has built upon the concept of criminal careers to include the study of risk factors and life events that may impact upon these trajectories (Farrington 2003).

In attempts to explain variations in offending behaviour, including differences over time both within and between individuals, some researchers have suggested that the offender population is actually made up of a number of different groups, each with different patterns of offending through the juvenile years and into adulthood. In 1993, for example, Moffitt proposed two offending groups: life-course-persistent (who show early onset of antisocial behaviours and perseverance over the life course) and adolescent-limited (who engage in delinquent behaviour only during adolescence). As well as having a different pattern of offending, Moffitt argued that the risk factors associated with the offending behaviours of these two groups were also distinct, with life-course persistent offending more likely to be related to individual neurological characteristics and parenting issues, while adolescent limited offending is related to the influence of peers (1993). More recently, Fergusson et al (2000) identified four different offending trajectories - non offenders, moderate risk offenders, adolescent onset offenders and chronic offenders, noting that the last two groups correspond closely with those identified by Moffitt (1993).

A relatively new development in the analysis of criminal career patterns has been the use of the semi parametric group based method (SPGM) to develop a model of common criminal trajectories within a specified offending population (see Fergusson, Horward and Nagin, 2000). Developed by Nagin and Land (1993), the method aims to classify individuals into groups with similar criminal trajectory traits, using the SAS based procedure PROC TRAJ.¹ The main advantage of this approach is that it takes some of the subjectivity out of the classification process.

SPGM was recently used in research that developed a trajectory model of juvenile offending for a Queensland Birth Cohort (Livingston, 2005). The final model identified three distinct offending trajectories: adolescent-limited, adolescent-onset and chronic. Specifically, the chronic offending trajectory represented approximately 10% of the cohort, while being responsible for one-third of the offences committed by this group. Further analysis of the individuals in the cohort who were most likely to be in the chronic group found that they were twice as likely as other offenders to have progressed to adult offending.

As a result, SPGM was considered a potentially useful procedure for identifying groups of chronic and non-chronic juvenile offenders amongst a birth cohort in South Australia.

Methodology

The study used Semi-parametric Group-based method (trajectory analysis) to identify distinct groups of juvenile offenders within the 1984 birth cohort in South Australia. The technique is designed to measure how offending behaviour changes or develops over time. Rather than simply analysing the total number of

¹ For a detailed description of the semi-parametric group based method, see Nagin, D.S., (2005) *Group-Based Modeling of Development* Harvard University Press.

offences per individual over a particular time period, the method considers the rate of offending at different ages or time periods. It then summarises any offending patterns within a specified data set, producing a model with one or more distinct criminal trajectories.

The study sample consisted of 3,344 individuals who were born in 1984 and who had been apprehended by police at least once between the ages of 10 and 17 years. Apprehension *events* were used as the unit of offending. Under this measure, all offences that occurred on the same day and for which a person was apprehended were counted as one apprehension event. It is acknowledged that ‘events’, as defined in this way, may slightly under-estimate the incidence of offending, because one person may have been involved in more than one criminal incident on the same day. However, this measure is considered preferable to the over-counting that would result if individual charges were used as the counting unit of offending, due to the fact that multiple charges are often laid for the one criminal incident. Apprehensions, rather than *proven guilty* events were chosen because the data are more readily available. While some may argue that a ‘proven guilty’ measure is more appropriate because only a person who has admitted to or been found guilty of an offence should be counted as an offender, a recent study by OCSAR found very little difference in the profile of juvenile offenders whether based on apprehension events or proven guilty events (Marshall and Wundersitz, 2006).

The 1984 birth cohort was chosen as this was the first cohort in South Australia to have had all their offending dealt with under the current juvenile justice system, which was introduced in 1994.

For this analysis the number of apprehension events per half year was calculated for every individual in the 1984 birth cohort from the age of 10 to 20. This gave 20 measurement periods over the ten year time frame. Although the emphasis was on juvenile offending patterns, the analysis was extended to include young adults up to the age of 20 years because we wanted to determine whether offending continued into these years. In addition, the greater the number of data points, the greater the likelihood of a more stable model.

The number of groups required in the model and the shape of the trajectory (eg linear, quadratic or cubic) were also specified. The main aim of the process was to produce the least complex model that adequately represents offending patterns over time from the original data. Because we had no prior knowledge regarding the most suitable number of groups, we initially created four models with three to six cubic trajectories respectively. We then compared the models to determine which one was the best, both statistically and practically.

A number of diagnostic tools are available to determine the best model, with the Bayesian Information Criterion (BIC) and the probability of group membership the most commonly used. The BIC is a statistic that provides a measure of the ‘fit’ of the model, taking into account the number of groups specified. The probability of group membership is determined after the model has been created. For every individual in the study, the procedure provides the probability of belonging to each of the groups specified. The person is then ‘assigned’ to the group for which they have the highest probability of group membership – ie the group they are most likely to belong to. The overall probability of group membership is the average of the highest probability scores for each individual. The more distinctive the modelled trajectories are, the higher the probabilities for group assignment will be. In general, the model with the highest BIC and a high probability of group membership is the model that has the optimum number of trajectories. A third diagnostic tool - the *odds of correct classification* (OCC) -which compares the average probability of group membership with the model estimate of group size, can also be used to check the model fit. Specifically, an OCC of less than five for any group within a model suggests that there is some instability within that model.

Results

Table 1 shows the BIC and average group membership probability of the four models produced by the Trajectory Analysis. As shown, the model with six groups has the highest (ie the least negative) BIC value. While it also has the lowest average probability of group membership, 0.85 is still relatively high. Alternatively, the five group model has the second highest BIC and a very high probability of group membership. For both five and six group models, the odds of correct classification were greater than 5, indicating a stable model. On the basis of these statistics, the five and six group models appear to fit the data best.

Number of groups in model	BIC	Average probability of group membership
3	-31978.57	0.97
4	-31531.41	0.96
5	-31295.73	0.95
6	-31155.07	0.85

Figure 1 shows the trajectory model for five groups. It includes two high frequency offending groups, two moderate groups that are differentiated on the basis of the age of onset of offending, and one very low frequency group.

As shown, the *Very Low* trajectory commences offending at approximately 15 years, peaks at 17 years (0.23 events per year) and reduces to zero offending by the age of 19.5 years.

In contrast, the *Moderate Early* trajectory commences offending and peaks much earlier (12 and 14.5 years respectively). The rate of offending is also much higher for this group, peaking at 0.9 events per year. While the level of offending reduces between the ages of 14.5 and 19.5, the trajectory does not reach zero in the time period depicted.

The *Moderate Late* trajectory commences at approximately the same age as the *Very Low* trajectory (15 years) and commences and peaks at much later ages than the *Moderate Early* trajectory (15 and 18 compared with 12 and 14.5 respectively). In addition, the *Moderate Late* trajectory has a much higher peak level of offending than the *Moderate Early* trajectory (1.24 events per year), and is still involved in offending at the rate of 0.84 events per year at the end of the period shown.

The remaining two trajectories have much higher rates of offending overall than the *Very Low* and *Moderate* trajectories. The *Very High* trajectory commences offending at the age of 10 years, rising sharply to peak at 3.6 events per year at the age of 14. Despite a steady decline, however, this trajectory still shows offending at the rate of 1.6 events per year at the end of the depicted period. In comparison, the *High* trajectory has a later start age (12.5 compared with 10 for the *Very High* group) and a later and lower peak (2.5 events per person at age 16), but a similar pattern between the ages of 16.5 and 19.5.

Figure 1: Trajectory Analysis - five group model of 1984 juvenile apprehension cohort

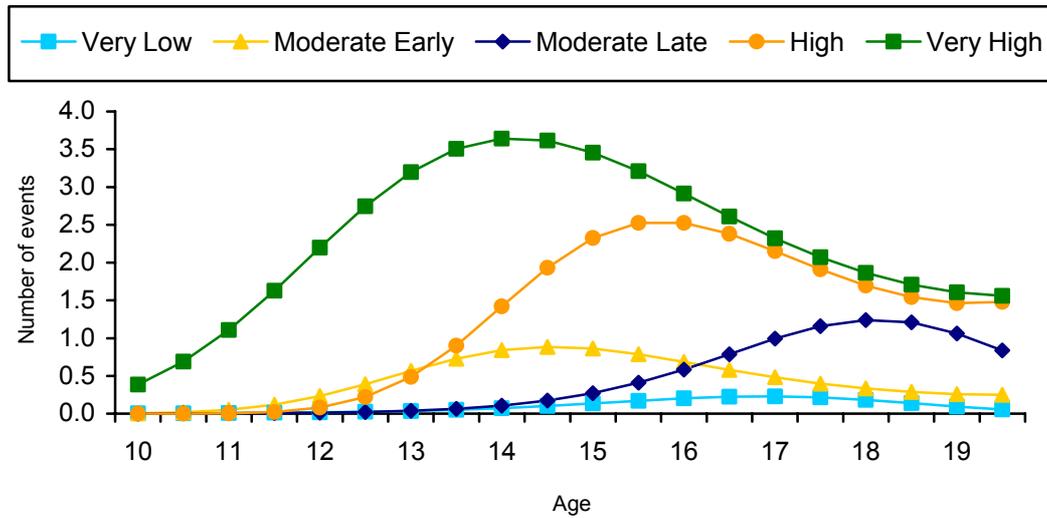
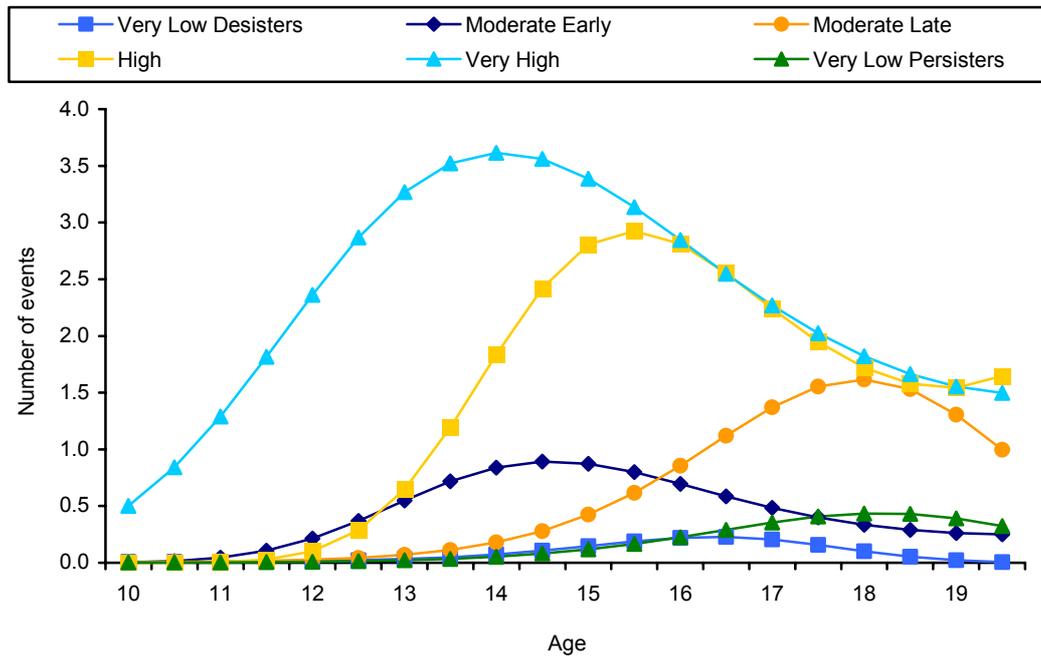


Figure 2 shows the trajectory model for six groups. This model is very similar to the five group model, with one major difference - it has two very low groups differentiated according to whether the offending behaviour persists into the early adult years. In this model, the *Very Low Desister* trajectory commences offending at about age 14, peaking at 0.23 events per year between the age of 16.5 and 17 years and then decreasing to 0 events by the age of 19. The *Very Low Persister* trajectory also commences at age 14, but in contrast to the Desister pattern, it peaks later and at a higher rate (0.39 events per year between the age of 19 and 19.5 years), with offending continuing to the end of the period depicted. As with the five group model, the *Moderate Early* trajectory in the six group model commences offending at age 12 and peaks at 14.5 years (at the very similar rate of 0.89 events per year), while the *Moderate Late* trajectory commences at about 14.5 years and peaks much later than *Moderate Early* at 1.6 events per year at the age of 18. Despite a steady decrease in the rate of offending between the age of 18 and 19.5 years, the *Moderate Late* trajectory still shows offending continuing into the early adult years. Again, as with the five group model, the *High* and *Very High* trajectories are characterised by early onset of offending (ages 10 and 12.5 respectively) and a sharp rise in the early years, peaking at ages 14 (3.6 events per six month period) and 16 (2.9 events) respectively.

In both models, the trajectory analysis identified two distinct groups that could potentially be characterised as *chronic* offenders (eg High and Very High), as shown by their high frequency of offending, early onset and continuation throughout their juvenile years. It also identified three to four groups (depending upon the model specified) that could be classified as *non chronic*.

Figure 2 Trajectory Analysis - six group model of 1984 juvenile apprehension cohort



Determining Desistance

As shown in both the five and six group models, the trajectories of the high frequency offending groups and, to a lesser extent, the Moderate High group demonstrate a substantial de-escalation in offending rates in the late adolescent years. While this may indicate that chronic offenders actually reduce their offending rates from the age of 14 or 15, it should be noted that the trajectory model was developed without taking into account time where an individual was not free to offend. It is possible that the apparent de-escalation in the rate of offending shown by the High and Very High Groups reflects a ‘stepping up’ of the response of the criminal justice system. For example, at the ages of 15 years or more young offenders may be more likely to be remanded in custody and/or to receive a period of detention or intensive supervision, and so the time available for them to offend (so called ‘street time’) is limited. This, in turn, will impact upon the number of events for which they can be apprehended.

Group size

The modelling process produces an estimate of group size (ie the proportion of the sample who fall within each of the specified groups) at the time the model is created. However, the proportion of individuals in each group can also be derived by actually assigning individuals to the group for which he/she has the highest probability of membership. Tables 2 and 3 show the two different estimates of group size for the five and six group models respectively. The closer the two figures are, the greater the accuracy of the model.

As shown, in both models, the very low groups are the largest. In the five group model the Very Low group accounts for 80.4% of the 1984 juvenile apprehension cohort (based on highest probability of group membership). In the six group model, the Very Low Desister and Very Low Persister groups make up 63% and 21% of the cohort respectively which means that, in combination, they account for 84% of the offending

cohort. At the other end of the scale, in both models the Very High group makes up less than 1% of the cohort, while the High group in the six group model accounts for approximately 2%.

Table 2 Estimates of group size for the five group model		
Group	Model estimate of group size (%)	Estimate based on highest group membership probability (%)
Very Low	78.9	80.4
Moderate Early	6.8	6.1
Moderate Late	11.0	10.3
High	2.5	2.4
Very High	0.8	0.9

Table 3 Estimates of group size for the six group model		
Group	Model estimate of group size	Estimate based on highest group membership probability
Very Low Desister	58.2	63.0
Very Low Persister	25.6	21.2
Moderate Early	7.1	6.6
Moderate Late	6.5	6.4
High	2.0	2.0
Very High	0.7	0.7

The preferred model

Statistically, both the five and six group models are good representations of the 1984 apprehension event cohort data. In practical terms, however, it is felt that the six group model is a better representation because it is able to differentiate the large group of low level offenders into two smaller groups that differ on the basis of desistance/persistence into adult offending.

Profile of six group model

Some researchers have questioned the use of the group-trajectory approach to identify distinct types of offenders. In particular, Sampson and Laub (2003) have criticised the trend in criminology to ‘reify’ such groups when they are, in fact, only approximations or *models* of actual data. Therefore, to further assess the usefulness of the six group model and its ability to identify discrete groups, individuals ‘assigned’ to each of the six groups on the basis of their highest probability of group membership were profiled according to sex, Indigenous status and number, type and timing of offending.

As indicated in Table 4, as could be expected, males made up the majority in all groups, with the percentage of males ranging between 70% (Very Low Desister group) and 90% (Moderate Late group). These

differences were statistically significant². However, the percentage of males in each of the groups did not increase with increasing frequency of offending, with the Very Low Persister and Moderate Late groups having a higher percentage of males than the High group (87% and 90% compared with 83%). It is noted that the Moderate Early group had the second lowest percentage of males (77%).

The six trajectory groups are also clearly delineated according to Indigenous status, with the percentage of Indigenous persons within each group rising with increasing frequency of offending. As shown in Table 4, the percentage of Indigenous persons rose from 4.3% in the Very Low Desister group, up to 8.8% and 15.9% for the Moderate Early and Moderate Late groups respectively, then increasing up to 48.0% in the Very High trajectory.

Group*	Number	% of offending cohort*	% Male	% Indigenous
Very Low Desister	2108	63.0	70.4	4.3
Very Low Persister	710	21.2	87.3	6.1
Moderate Late	215	6.4	89.8	8.8
Moderate Early	220	6.6	77.3	15.9
High	66	2.0	83.3	21.2
Very High	25	0.7	88.0	48.0

* assignment to group based on highest probability of group membership

An examination of the patterns of offending for the individuals assigned to each of the six groups also confirms that the analysis has identified distinct groups. As shown in Table 5, the average number of apprehension events as a juvenile increased substantially from the Very Low groups to the Very High groups. For example, the average number of events as a juvenile for individuals assigned to the *Very Low* group was 1.25, compared with 7.25 for the *Moderate Early* group and 36.94 for the *Very High* group. These differences are statistically significant³.

The six groups also differed in terms of the *type* of offending as a juvenile - that is, the number of juvenile events where the most serious charge was an *offence against the person*⁴ or an *aggravated offence*⁵. In particular, persons assigned to the *High* and *Very High* groups were more likely than the other groups to have these types of offences listed as the most serious charge within the apprehension event. For example, persons in the *Very High* group had an average of 4.81 *offence against the person* events as a juvenile and the *High* group had an average of 2.75 events, compared with an average of 1 *against the person* event for both *Moderate* groups, and 0 and 0.25 for the *Very Low Desister* and *Very Low Persister* groups respectively. While *aggravated* events were much less common overall for the offending cohort, the *Very High* and *High* groups averaged 1.25 and 1

² $\chi^2=112.34$, $df=5$, $p<.001$

³ Kruskal-Wallis, $\chi^2=1527.93$, $df=5$, $p<.001$

⁴ Kruskal-Wallis, $\chi^2=757.91$, $df=5$, $p<.001$

⁵ Kruskal-Wallis, $\chi^2=490.99$, $df=5$, $p<.001$

aggravated event respectively, compared with 0.25 for the *Moderate Late* group and 0 for the *Moderate Early* and both *Very Low* groups.

In relation to age, the average age of onset for the *Moderate Early*, *High* and *Very High* groups was younger than the other groups (10 and 13 years, compared with 15 and 16)⁶. Conversely, those in the *Very Low Desister* group were younger than the other groups at their last event recorded before the end of 2004⁷. It is interesting to note that the average age for the last event for all groups except the *Very Low Desister* and *Moderate Early* groups was 19. That is, these groups are characterised by continuation of offending into early adulthood.

Group	Average*				
	No. of events (as a juvenile)	No. of Against person events**	No of Aggravated events**	Age at first event	Age at last event before 31/12/04
Very Low Desister	1.25	0.00	0.00	15.8	16.00
Very Low Persister	1.75	0.25	0.00	16.0	19.00
Moderate Late	7.0	1.00	0.25	15.0	19.25
Moderate Early	7.25	1.00	0.00	13.0	17.75
High	20.19	2.75	1.00	13.0	19.25
Very High	36.94	4.81	1.25	10.8	19.25

*Trimean = (25th percentile + 2(50th percentile) + 75th percentile) / 4

**where the most serious charge within the event

Summary

Overall, using juvenile apprehension data from the 1984 birth cohort, the semi-parametric group-based method identified six distinct groups of offenders with different offending trajectories between the ages of 10 and 20, including two that reflected chronic offending patterns. A profile of the individuals most likely to belong to these groups provided further evidence that the groups were distinct, with statistically significant differences identified according to sex, Indigenous status, age of onset, and the overall number and type of apprehension events.

⁶ Kruskal-Wallis, $\chi^2=578.92$, $df=5$, $p<.001$

⁷ Kruskal-Wallis, $\chi^2=1499.2$, $df=5$, $p<.001$

Differences between Indigenous and Non-Indigenous Youth

As indicated in the previous section, the trajectory analysis of juvenile apprehension data from the 1984 birth cohort, the trajectory analysis identified five or six distinct and useful offending trajectories, including two that reflected chronic offending patterns. However, the analysis also indicated that Indigenous youth are highly over-represented in the trajectory groups characterised by moderate to high frequency, early onset and more serious offending. Specifically, Indigenous young people made up 48% of persons most likely to be in the Very High Group, despite representing only 6% of the 1984 birth cohort who had at least one apprehension as a juvenile.

Given the disparity in group membership according to Indigenous status, the question arises whether Indigenous persons have different patterns of offending compared with non-Indigenous youth. To investigate this we undertook a trajectory analysis on the 1984 birth cohort where the Indigenous and non-Indigenous populations were modelled separately. The results are summarised below.

There were 231 Indigenous and 2,799 non-Indigenous individuals within the 1984 juvenile apprehension cohort. Indigenous status was not recorded for 332 or 9.9% of individuals, who were subsequently excluded from further analysis. In general, persons whose Indigenous status was unknown were a very homogenous group, characterised by low frequency, late onset offending. It is acknowledged that the exclusion of these persons may impact upon the analysis, and that the following results should therefore be treated with caution.

The analysis followed the same procedure as that outlined for the entire 1984 juvenile apprehension cohort. For both the Indigenous and non-Indigenous populations, several models consisting of three to six groups were created, and the results assessed for statistical and practical significance. As shown in Tables 6 and 7, for both Indigenous and Non-Indigenous groups, the model with six groups had the highest (ie the least negative) BIC value and a high to very high average probability of group membership (0.93 and 0.84 respectively). Alternatively, the five group model has the second highest BIC and a very high probability of group membership (0.93 and 0.95 for the Indigenous and non-Indigenous models respectively). Based on these statistics, the five and six group models appear to fit the data best.

Table 6 BIC and Average Group Membership Probability of **Indigenous** Trajectory Models

Number of groups in model	BIC	Average probability of group membership
3	-3337.18	0.98
4	-3299.95	0.95
5	-3282.22	0.93
6	-3220.04	0.93

Table 7 BIC and Average Group Membership Probability of **Non-Indigenous** Trajectory Models

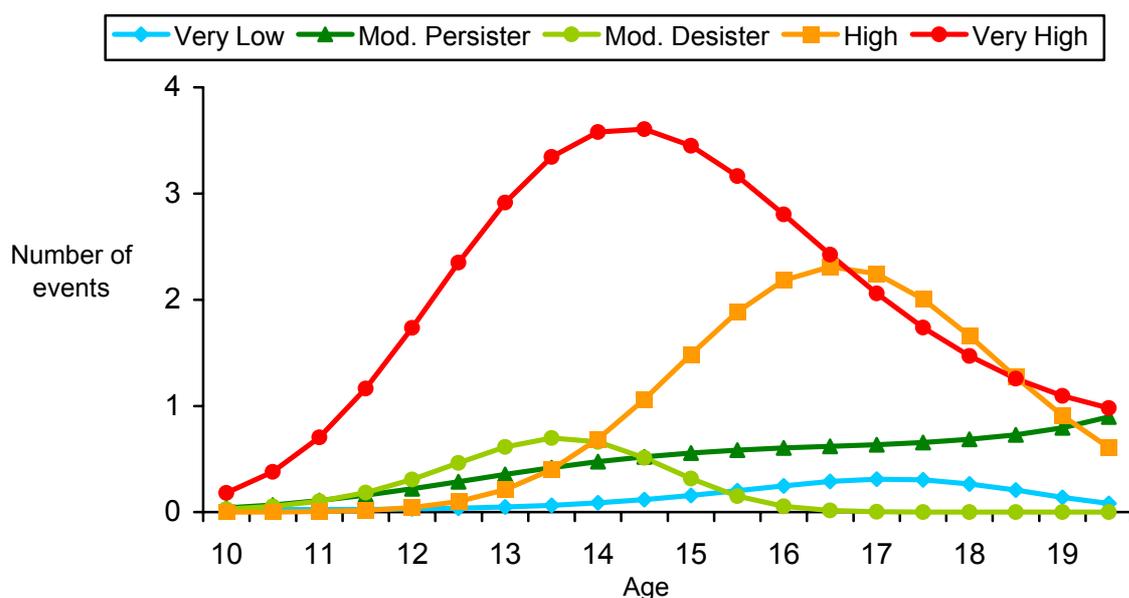
Number of groups in model	BIC	Average probability of group membership
3	-26991.02	0.97
4	-26602.64	0.96
5	-26432.74	0.95
6	-26317.26	0.84

The preferred models

Statistically, in terms of the BIC and the average probability of group membership, both the five and six group models are good representations of the Indigenous and non-Indigenous populations within the 1984 juvenile apprehension cohort. However, the scores for the Odds of Correct Classification diagnostic for the Indigenous and non-Indigenous six group models were less than 5 for one group within each model. Given that this suggests a degree of instability within the six group models, the five group model was selected as the best model for both the Indigenous and non-Indigenous populations (see Figures 3 and 4).

Both Indigenous and non-Indigenous five group models were further assessed by profiling the individuals ‘assigned’ to each of the five groups on the basis of their highest probability of group membership. Significant differences were found between the five Indigenous groups according to the number of criminal events charged against them as a juvenile⁸, the number of events where an offence against the person was the major charge⁹, the number of events where an aggravated offence was the major charge¹⁰ and the age of onset¹¹. Significant differences were also found between the five non-Indigenous groups according to the same criteria¹². Overall, these differences suggest that the groups identified in the model are distinct.

Figure 3: Trajectory Analysis - five group model of **Indigenous** 1984 juvenile apprehension cohort



⁸ Kruskal-Wallis, $\chi^2=144.37$, $df=4$, $p<.001$

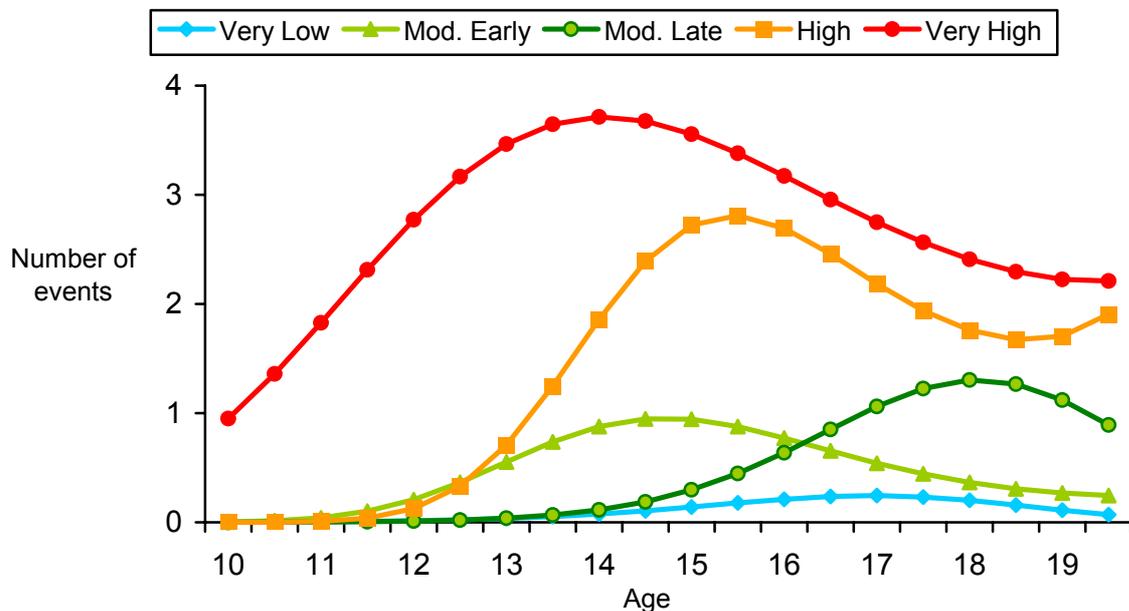
⁹ Kruskal-Wallis, $\chi^2=69.31$, $df=4$, $p<.001$

¹⁰ Kruskal-Wallis, $\chi^2=64.55$, $df=4$, $p<.001$

¹¹ Kruskal-Wallis, $\chi^2=58.39$, $df=4$, $p<.001$

¹² Kruskal-Wallis, number of events as juvenile $\chi^2=1143.62$, $df=4$, $p<.001$; number of offences against the person as most serious event $\chi^2=559.15$, $df=4$, $p<.001$; number of aggravated offences as most serious event $\chi^2=299.26$, $df=4$, $p<.001$; age of onset $\chi^2=395.78$, $df=4$, $p<.001$

Figure 4: Trajectory Analysis - five group model of **Non-Indigenous** 1984 juvenile apprehension cohort



Indigenous and non-Indigenous model comparison

As shown in Figures 3 and 4, both Indigenous and non-Indigenous trajectory models were characterised by a very low offending frequency group, two moderate groups, one high and one very high frequency group. While the *Very Low*, *High* and *Very High* groups are relatively comparable, the moderate trajectories differ according to age of onset and the patterns of desistance or persistence. Another important difference between the Indigenous and non-Indigenous models is the proportion of individuals allocated to each group on the basis of highest probability of group membership. The differences and similarities between the two models are discussed in more detail below.

Very Low groups

As indicated, both the Indigenous and non-Indigenous five group trajectory models for the 1984 juvenile apprehension cohort have a very low group with a very similar shape, to which most of the relevant Indigenous or non-Indigenous population are likely to belong. This trajectory is characterised by late onset (approximately 15 years), very low level offending, that peaks at age 17 and desistance by the age of 19.5 years.

However, as shown in Table 8, a lower proportion of Indigenous offenders were most likely to be in this group (59% compared with 81% for non-Indigenous) and the average number of juvenile apprehension events for Indigenous persons assigned to this group was slightly higher (1.8 compared with 1.3). A major difference between the Indigenous and non-Indigenous *Very Low* groups was the proportion with at least one serious event. Over half of Indigenous individuals in this group had at least one serious apprehension event as a juvenile, compared with only 35% for non-Indigenous persons. Finally, the average age of onset was slightly younger for the Indigenous group (15 years compared with 16 years for individuals in the non-Indigenous *Very Low* group).

Table 8 Very Low Groups: Indigenous and Non-Indigenous model comparison		
Very Low Group characteristics	Indigenous	Non-Indigenous
Group size*	59%	81%
Average number of events as a juvenile	1.8	1.3
% with at least one serious event	56%	35%
Average age at first event	15	16

*Based on highest probability of group membership

Moderate Groups

In terms of frequency of offending from the ages of 10 to 20, both Indigenous and non-Indigenous models had two moderate groups. As shown in Table 9, based on the offending characteristics of the individuals most likely to belong to these groups, all four groups were characterised by an average number of juvenile apprehension events in the five to seven range, and all four had a high percentage of individuals with at least one serious event as a juvenile (ranging from 77% for Indigenous *Moderate Early Desister* group up to 94% for the Indigenous *Moderate Early Persister* group).

The main difference between the Indigenous and non-Indigenous models in relation to the moderate groups is that the two Indigenous moderate groups both involved early onset of offending, commencing at approximately 13 years, while the non-Indigenous model has both an early and a late onset group (commencing at about 13 and 15 years respectively). In addition, while both non-Indigenous moderate trajectories showed signs of desistance, the Indigenous *Moderate Early Persister* trajectory clearly shows a pattern of persistence, even escalation, into the early adult years.

Finally, the percentage of persons most likely to belong to these groups also varies. As shown, 16% of the Indigenous group fell within the *Moderate Early Persister* group, while half that percentage (8%) fell within the *Moderate Early Desister* group. So, even though the frequency of offending per six month period was relatively low, a higher percentage of Indigenous youth in the Moderate groups were likely to continue with their offending than to desist. In contrast, for non-Indigenous youth, while both Moderate groups show signs of desistance, a higher percentage were 'late starters' (11% in the *Moderate Late* group compared with 6% in the *Moderate Early* group).

Table 9 Moderate Groups: Indigenous and Non-Indigenous model comparison				
Moderate Group characteristics	Indigenous		Non-Indigenous	
	Mod. Early Persister	Mod. Early Desister	Mod. Early	Mod. Late
Group size*	16	8	6	11
Average number of events as a juvenile	7.3	6	7.3	6
% with at least one serious event	94	77	91	82
Average age at first event	13	13	13	15

*Based on highest probability of group membership

High Groups

Table 10 shows the characteristics of individuals most likely to belong to the *High* groups within the Indigenous and non-Indigenous five group models. As indicated, both groups demonstrated early onset of offending (14 years and 13 years for Indigenous and non-Indigenous respectively), and all individuals in both groups had at least one serious apprehension event as a juvenile. The main differences between the groups was the slightly lower average number of events as a juvenile for the Indigenous *High* group (15 compared with 20 for non-Indigenous) and the much higher percentage of Indigenous individuals that were likely to belong to this group (10% of Indigenous persons born in 1984 who had at least one apprehension event, compared with 2% of non-Indigenous).

The shape of the Indigenous and non-Indigenous *High* trajectories also varied slightly. As shown in Figures 3 and 4, the non-Indigenous trajectory commenced earlier than the Indigenous trajectory, had a sharper escalation in the rate of offending and an earlier and higher peak. The non-Indigenous *High* trajectory was also characterised by an upward turn at the ages of 19 and 19.5, while the Indigenous trajectory continued to decline from about the age of 17 years. However, as indicated, it is not known what impact that periods of remand in custody, detention or intensive supervision may have on these patterns of desistance.

High Group characteristics	Indigenous	Non-Indigenous
Group size	10	2
Average number of events as a juvenile	15	20
% with at least one serious event	100	100
Average age at first event	14	13

*Based on highest probability of group membership

Very High Groups

The characteristics of persons most likely to belong to the Indigenous and non-Indigenous *Very High* frequency offending groups are detailed in Table 11. These individuals had a similar profile, with an average of 33 and 44 juvenile apprehension events for Indigenous and non-Indigenous respectively and a very young average onset age (11 and 10 years respectively). In addition, all persons belonging to these groups had at least one serious apprehension event between the ages of 10 and 17.

As with the *High* groups, a major difference between the Indigenous and non-Indigenous *Very High* trajectories is the proportion of individuals that are most likely to belong to these groups. Only a very small percentage of the non-Indigenous individuals in the 1984 juvenile offending cohort were in the *Very High* group (0.4%) compared with 7% for the Indigenous *High* group.

In relation to trajectory shape, as shown in Figures 3 and 4, the Indigenous *Very High* group had a sharper rise and a correspondingly sharper decline to one apprehension event per six month period, compared with two apprehension events for the non-Indigenous *Very High* group.

Table 11 Very High Groups: Indigenous and Non-Indigenous model comparison		
Very High Group characteristics	Indigenous	Non-Indigenous
Size (based on highest probability)	7	0.4
Average number of events as a juvenile	33	44
% with at least one serious event	100	100
Average age at first event	11	10

Summary

Separate modelling of the Indigenous and non-Indigenous populations within the 1984 birth cohort found that a model consisting of five distinct groups provided the best representation of the data for both populations. There were a number of similarities in the shape of the models in that both had one low, two moderate, one high and one very high frequency group. Overall, the main difference in the patterns of offending between Indigenous and non-Indigenous juvenile offenders related to the proportion most likely to be in each group with the Indigenous model having a higher proportion of individuals in the moderate, high and very high groups. In addition, the patterns of onset and desistance for the moderate level groups also varied, with both moderate Indigenous groups involving early onset offending, with one group showing signs of persistence into adulthood, while the non-Indigenous model had both an early and a late onset group, with each group indicating desistance. However, it should be noted that there was a relatively large number of persons within the 1984 juvenile offending cohort for whom Indigenous status was unknown and their exclusion from the comparison of the Indigenous and non-Indigenous youths may have had some impact upon the final results.

It is also stressed that the trajectory analysis produces a model or approximation of the data. While the models discussed in this report had a high probability of group assignment, indicating the existence of distinct offending patterns, which was also confirmed in the profile analysis, there may still be some individuals who do not fit well into any group. Classifying individuals on the basis of trajectory analysis results must therefore proceed with caution. Furthermore, the analysis did not take into account any time periods where individuals in the study were unable to offend, for example any periods of detention or intensive supervision.

Conclusion

Despite a number of limitations, the results are indicative of a juvenile offending population made up of a number of different types of offenders, which has implications for the policy and practice response to juvenile offending.

While much is known about the risk and protective factors associated with offending behaviour in general, as suggested by Moffitt (1993), the existence of several groups of offenders with distinct criminal trajectories indicates that different factors or processes may be associated with these different offending behaviours. This finding is important in the development of any criminal justice response to offending behaviour. It may be that a range of different interventions are required for young people involved in offending, not just according to levels of offending or Indigenous status, but also targeted at differences in offending patterns *within* Indigenous and non-Indigenous groups.

Further research is therefore required to understand the etiology of the different criminal trajectories. For example, why does one group of early onset offenders desist in their offending during adolescence, and another group persist into adulthood? What individual, family, peer and community characteristics are acting as risk or protective factors for the young people in these groups? Answers to these questions will enable the criminal justice system, and the range of service agencies dealing with young people to provide more appropriate responses to juvenile offending.

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