

# Can we predict escalation in offending seriousness?

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## Key Points

- There is perhaps an assumption among the general public that offenders tend to escalate in seriousness as they develop in their criminal career. Few criminologists, however, have attempted to understand how seriousness of offending increases, remains stable or decreases over the criminal life-course .
- Using the Offenders Index data for England and Wales, we compare different methods to examine whether there are specific sub-groups of offenders with distinct seriousness trajectories. We find one large and two small groups of offenders with distinctive patterns of crime seriousness that vary by age and according to their criminal justice histories.
- Growth mixture models provide the best approach for studying escalation in offending seriousness rather than the more usual group-based trajectory models.
- This work has important policy considerations in terms of how to identify and selectively target a small group of potentially dangerous offenders who exhibit high escalation in crime seriousness.

## Escalating crime seriousness

The term 'escalation' has different meanings in criminological literature. Some authors use the term in relation to the frequency of offending and study the extent to which the rate or incidence of offending increases or decreases over time. While others define escalation as a tendency to move from less serious to more serious offence types as their criminal career develops. In this paper, we adopt the second definition and refer to escalation in terms of increasing crime seriousness.

There has been surprisingly little quantitative research in this area, with most of the work focusing on crime type 'switching'. This type of work focuses on the tendency for offenders to switch the type of offending they participate in either within a specific 'cluster' of offences, or between different crime clusters. However, it is also important to understand more specifically how crime seriousness develops over the course of the criminal career in order to determine whether it is possible to identify and intervene with very small groups of dangerous offenders within the offender population.

Previous work in this area by Liu et al (2011) examined two types of crime escalation process – escalation associated with experience of the criminal justice process and escalation associated with age and maturation.



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These researchers found that aging was associated with de-escalation; in other words, as offenders got older their crime seriousness was likely to reduce. They also found that increasing conviction occasions (measured in terms of number of court appearances) was associated with escalation in crime seriousness. These two processes appear to work against each other.

## Finding different sub-populations of offenders

A criticism of previous work is that it did not consider that there may be different sub-populations of offenders with different processes of crime escalation. In this paper we test different approaches to finding sub-populations of offender based on crime seriousness. In recent years, group-based trajectory models have become increasingly popular as a method for finding sub-populations in data. This technique assumes

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that, within any population, there are a number of underlying sub-populations with different time-based trajectories.

Using offenders as an example of a population, this means that we would expect to find several sub-groups of offenders who display different patterns of offending over time. Within the field of criminology, relatively little work has been done to estimate trajectories of crime severity in the context of increasing age and conviction history.

There are, however, alternative statistical methods that could be used to find sub-populations of offenders. Growth curve models and growth mixture models are techniques that are commonly used in some areas of research. These are also designed to study and model repeated observations of data over time, and are able to take account of variation in offending seriousness both within individuals (i.e. the way each person's behaviour changes over time) and between individuals (i.e. the way that people vary from each other over time).

Another new area that we develop in this paper is to examine the effect of time spent in prison on crime escalation. To do this we examine the cumulative custodial sentence awarded on conviction, so we measure the cumulative sentence length up to the point of the subsequent conviction. This means that we are exploring offender sub-populations based on three types of escalation process – escalation associated with experience of the criminal justice process (number of times convicted), escalation associated with age and maturation, and escalation associated with time spent in prison.

### Data used in the analysis

The dataset used for this analysis is the Offenders Index for England and Wales. We use a 1 in 13 sample of all offenders who were born in 1953 and followed through to 1999. The dataset contains details of all standard list offences for which an offender (from age 10, the age of criminal responsibility) in this jurisdiction is found guilty and sentenced in a court in England or Wales. All offenders with only a single court appearance were removed from the data, as were those who were convicted for the first time after age 37. The final dataset consisted of 4,831 offenders, of which 89% (4,288) were male.

We define a 'conviction' as a distinct court appearance where an offender had been found guilty of one or more offences. We define 'seriousness' to be the maximum seriousness score for all offences at each conviction. We model the individual sequence of seriousness scores from the first conviction over the total number of convictions.

We include two covariates in the model that are 'time-constant': **gender** and **age of onset** (or age at first conviction). A further four covariates are included in the model that are 'time-varying' (i.e. they may change over time):

- **Order of conviction** - the number of current and prior convictions provides a partial indication of the effect of criminal justice experience on escalation.
- **Age at conviction** – this is measured at date of sentence and assesses the effect of maturation on escalation.
- **Number of offences** – this is the number of separate offences at each conviction and is expected to be associated with crime seriousness.
- **Custodial sentence** – the cumulative custodial sentence length (in years) up to but not including the current conviction occasion is a proxy measure for time spent in prison.

### Methods used to measure escalation in crime seriousness

We grouped the most common statistical approaches used to study developmental trajectories into three distinct types of method according to the assumptions that underpin them. The three methods we compare are: 'linear mixed-effects modelling', 'group-based trajectory modelling' and 'growth mixture models'.

Linear mixed effects models (LME) are a well-developed and popular statistical approach to analysing longitudinal data. They assume that there is a normal distribution of crime seriousness within the population and every individual offender has their own 'growth curve' in terms of change in offending seriousness over time. This enables us to estimate both the overall growth or trajectory of crime seriousness within individuals and the amount of variation between individuals over time.

Mixture modelling aka group-based trajectory modelling (GBTM) assumes that the offender population is composed of a mixture of distinct groups defined by their developmental trajectories. Thus, instead of assuming that there is a normal distribution of crime seriousness amongst the offender population, it assumes that there is a finite number of groups (or latent classes) and each individual has a probability of belonging to a specific trajectory class. Thus, variability between individuals is represented through the varying probabilities of class membership.

The growth mixture models (GMM) approach is a combination of the previous two approaches. Like GBTM, it attempts to identify groups or sub-populations of offenders based on their trajectories of crime seriousness; but it differs from this model because it relaxes the assumption that everyone allocated to a specific group or latent class does not vary from others within the same group. Thus, like LME, it allows each individual to have their own growth curve within the latent class.

## Results

Table 1 shows the characteristics of the final sample by gender and number of court conviction appearances. While the most common number of court appearances is two for both males and females, around 20% of offenders had eight or more convictions.

**Table 1: Offenders Index 1953 birth cohort: number of court conviction appearances by gender from 1963 to 1999**

No. of conviction appearances	Male (N)	Female (N)	Total offenders	
			Freq.	%
2 convictions	1368	292	1660	34
3 convictions	736	88	824	17
4 convictions	493	62	555	12
5 convictions	350	23	373	8
6 convictions	218	23	241	5
7 convictions	187	14	201	4
8+ convictions	936	41	977	20
Total (%)	4288 (89%)	543 (11%)	4831	100

Diagnostic results indicated that the GBTM and GMM models provided a better goodness-of-fit to the data than the LME model. A three-class solution was found to be the preferred outcome for both the GBTM and the GMM models; however, the three-class GMM provided the best fit for the data overall. The results of this model are summarized in Table 2.

The three classes of offender consisted of one large class containing 92% of the offenders, and two smaller classes each with 4% of the offenders. In the model, the covariates for sex, number of offences and length of custodial sentence were assumed to have a common effect across all classes. Table 2 shows that females had a significantly lower crime seriousness score compared to males across all classes and the effect of time spent in custody was small and non-significant. The larger the number of offences within each conviction occasion, the more likely the conviction was to be serious.

Class 1, which contains the majority of offenders, has the smallest intercept which indicates that these individuals had the lowest estimate of crime seriousness at age 10.

Members of this class significantly de-escalate their offending seriousness with age (from age 18 only) and escalate with their experience of criminal justice. The coefficients for order of conviction and age at conviction from age 18 are very similar but with different signs. Therefore, the contradictory effects highlight that offenders with one conviction a year on average will show de-escalation, whereas those with a large number of convictions will show escalation. The degree of variance within this group (shown by the random

effects) is very small. On average, members of this group had a low crime seriousness level which remained relatively constant over time but with a tendency to de-escalate with increasing age.

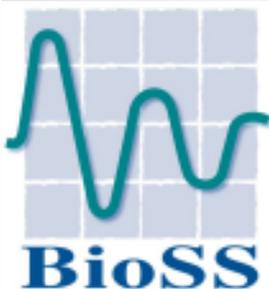
The intercept for Class 2, consisting of a small sub-set of 4% of offenders, lies between the other two intercepts and indicates that the mean level of crime seriousness at age 10 was moderate. Age is a strong driver of de-escalation up to age 17 and dominates the effect of escalating with their criminal justice experience. From age 18 onwards, however, the effect of age and order of conviction are the same size but with different signs, which shows increasing escalation only as long as the number of distinct convictions is greater than one on average. The variation between individuals within this class, shown by the random effects, is larger than it was for Class 1. On average, members of this class tended to start with a high seriousness level in early adolescence which de-escalated quickly between age 14-16 and then continued to gently de-escalate with age.

**Table 2: Growth mixture model with three-class solution**

	Class 1 (92%)	Class 2 (4%)	Class 3 (4%)
Intercept	3.926*	7.688*	14.050*
Order of conviction	0.010*	0.027*	-0.039
Age at conviction			
≤17	-0.002	-0.216*	-0.584*
18+	-0.012*	-0.027*	0.041*
Random effects			
Intercept	0.039	0.130	3.990
Order of conviction	0.012	0.041	1.261
Common effect			
Sex (female)	-0.123*		
Number of offences (log)	0.252*		
Length of custodial sentence	-0.002		

Note: \*Significance at the 5% level

Class 3, which contains the final 4% of offenders, has the largest intercept which indicates that this group had the highest crime seriousness level at age 10. De-escalation is very strong up to age 17, but from age 18 onwards there is a small but positive escalation effect. The effect of criminal justice experience is not significant. Although this is a very small group, it shows substantial variation between the offenders. This Class seems to consist of groups of offenders who were involved in highly serious crimes either at an early age (10-16) or at a later stage in life (age 35 onwards) or both.



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## Conclusions

This paper explores the existence of different sub-populations of offenders in terms of the seriousness of their crimes. It contributes some important policy implications on how to identify and selectively target a small group of potentially dangerous offenders.

In general, most offenders in this sample were likely to be involved in crimes with a relatively low and stable level of crime seriousness. Moreover, offenders who start with a relatively high level of crime seriousness at an early age have a tendency to de-escalate with age. In policy terms, it is important for criminal justice professionals to focus on persistent offenders – those who receive a large numbers of convictions over a short period of time – as these individuals are most likely to escalate their crime seriousness.

This paper also identifies a small and highly diverse group of offenders who display high seriousness in crime. For this type of offender, monitoring could be worthwhile as they are generalists in offending and more likely to be involved in occasional high serious crimes in between other offences compared to the other two types of offenders. They can be identified by early offending which escalates rapidly in seriousness at a young age.

Further work is needed to examine whether offenders belonging to each class may share some common crime patterns in terms of the specific types of offences involved. A future study could focus on the examination of each class of offender by considering various features of their criminal career, such as age at onset, type of first crime, sequence of crimes, length of criminal career and diversity of offending.

Further details on the analysis conducted in this paper can be found in Francis and Liu (2015).

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