

**CRIMINAL TRAJECTORIES FROM ADOLESCENCE TO ADULTHOOD
IN AN ONTARIO SAMPLE OF OFFENDERS**

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INTRODUCTION

Since Blumstein et al. (1986) published their seminal work on criminal careers, the criminal career paradigm (CCP) has dominated the criminology literature. With an emphasis on longitudinal methodology and sophisticated mathematical approaches to model criminal trajectories, the CCP has made significant contributions to elucidating the nature and pattern of crime over time.

A criminal career is defined as “the longitudinal sequence of offending committed by an individual offender” (Blumstein et al., 1986, p. 12) that is characterized during a lifetime by three components: an initiation or onset, a termination or end, and a duration or career length (Blumstein et al., 1988). During their career, offenders may display changes and continuities in criminal activity on a variety of dimensions, including rate, type, timing, versatility, and severity. It is the pattern of transition and stability on these sorts of variables across different developmental periods as well as the underlying reasons for the observed patterns that is of interest to researchers, theoreticians, practitioners, and policy makers.

The CCP also implies that offenders vary on the dimensions of rate, type, severity, versatility, etc. The task for the CCP is to model the criminal offending data to take into account this inherent heterogeneity. Semi-parametric group-based trajectory analyses (Nagin, 2005) provide an ideal way to address this issue by estimating distinct unobserved (latent) trajectory groups based on longitudinal rates of offending. Drawing upon the notion of a criminal career, the two aims of the present study were to (a) describe the criminal trajectories of the Toronto sample on the dimensions of rate, type, versatility, and severity and (b) estimate distinct, latent criminal trajectories using current techniques of group-based trajectory analysis.

METHOD

Sample

The sample comprised 378 males who had been sentenced between 1986-1996 to one of two open custody young offender facilities in Toronto. Their mean age at the time of admission into the youth homes was 17.6 years ($SD = .85$). The mean age at first conviction was 15.5 years ($SD = 1.8$). The sample was, on average, 27.6 years ($SD = 2.6$) as of March 17, 2001, the time of the most recent follow-up.

Data

The official criminal data were derived from four sources: (a) the (Ontario) Ministry of Community and Social Services (MCSS) for Phase I young offender records; (b) the (Ontario) Ministry of Correctional Services (MCS) for Phase II young offender and adult records; (c) the Canadian Police Information Centre (CPIC) for youth and adult records; and (d) for additional young offender offences, the Predisposition Reports (PDR) maintained in the clinical files of the children’s mental health centre that operated the young offender facilities.

The criminal trajectories were tracked for an average of 12.1 years ($SD = 3.0$), from early adolescence into adulthood, with 73% of the sample being followed for 10 years or more. The criminal activity variable of interest was a count of *all* their unique court contacts, that is, all court contacts arising from a new set of charges. The task was to arrange the unique court contacts into a temporally sequenced order of criminal activity.

Coding

Criminal records were coded for a range of variables for each unique court contact, including disposition date, disposition received, sentence length in days, including both time given and time served, and offence type, based on the seriousness rating of the most serious offence (MSO) for each court contact. A number of variables were created to measure various dimensions of the criminal career concept, including frequency, rate, versatility, and severity.

Frequency was a simple count of the total number of unique court contacts amassed by each individual.

Rate was the frequency of court contacts committed in a given time period (e.g., a year) corrected by two variables, *time-at-risk* and the *age at offence-age at court contact time lag*. The statistical techniques we used for these adjustments are described in Day et al. (2007).

Offence Type denoted the types of offences that were committed, grouped into five offence type categories: property, violent, drug, sex, and “other” (e.g., administration of justice or “breach” offences, obstructing justice, traffic offences).

Versatility was measured with the Diversity of Offending Index score (D) (Sullivan et al., 2006) calculated as follows:

$$D = 1 - \sum_{m=1}^M p_m^2$$

“in which p equals the proportion of offences in crime category ‘m’” (p. 207). The D score was based on a count of the number of *different* offences committed at each conviction, across six broad offence types (property, violent, drug, sex, other, and breach), not just the MSO, even if the offences were included in the same broad offence type.

Severity was a measure of the seriousness of the offences taken from the MCS Statistical Reporting System User Manual (Ministry of the Solicitor General and Correctional Services, 1995). The severity ratings were ranked from 1 (murder/attempt) = most serious to 26 (unknown) = least serious.

RESULTS

Over the duration of the tracking period, the sample amassed a total of 4,964 unique court contacts. This amounted to an average of 13.1 court contacts for each offender ($SD = 9.6$). The average criminal career length was 8.4 years ($SD = 4.5$), from ages 15.5 to 23.9 years.

At What Age Does the Court Contact Rate Peak?

The age-crime curve that results from averaging the court contact histories, corrected for the offence-court contact time lag and time-at-risk, is plotted in Figure 1. The curve is unimodal and skewed and the offence rate peaks at age 17, gradually declining thereafter.

Average Age-Crime Curve Based on Individual Careers

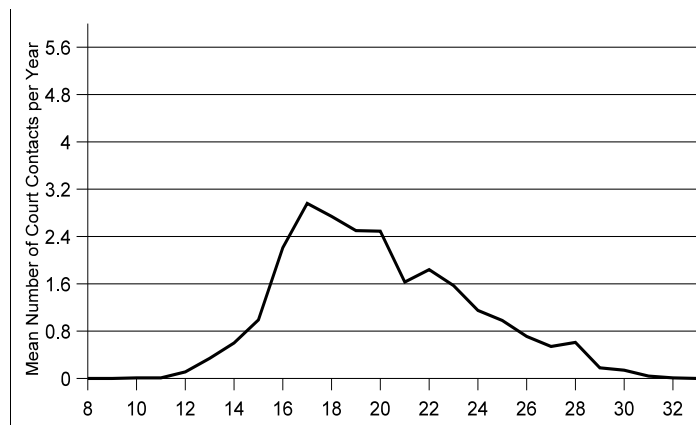


Figure 1

Age

Do Offenders Become More Versatile in their Offending Over Time?

This question was examined by calculating D scores for each individual by age. The results (see Figure 2) indicate that the diversity of offending increased sharply from ages 12 to 16 years, reached a plateau until age 20, and decreased until age 29. The second peak at age 30 reflects a high rate of diversity among a small subgroup of this sample.

Diversity (D) Scores by Age

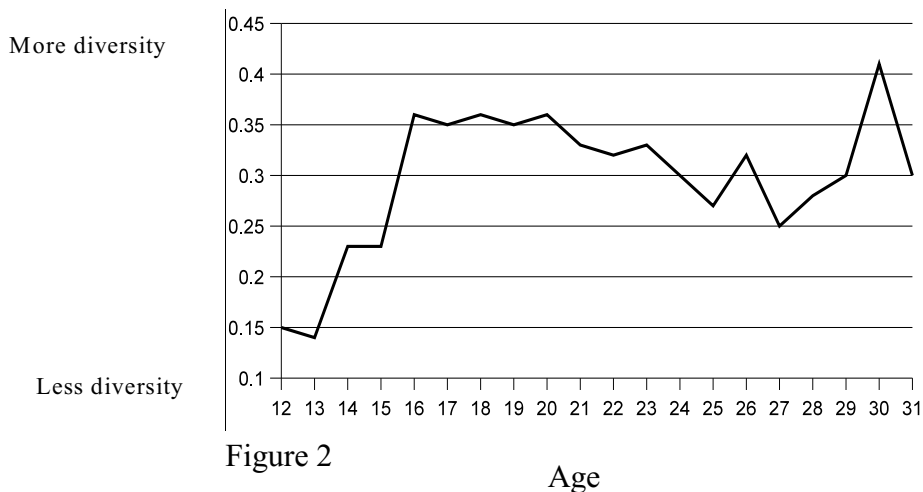


Figure 2

Are Some Offences More Common at Different Developmental Periods?

To address this question, a Relative Offence Type Involvement (ROTI) score was calculated for each individual at each age using the following formula:

$$ROTI_{ij} = \frac{r_{ij}}{\sum r_i} \times 100,$$

where r = age-specific court contact frequency, i = age category, and j = offence type. The ROTI score is based on *all* the different offences committed and is calculated as the total number of charges for each of five offence types (breaches were included in the “other” category) committed at a given age divided by the total number of charges incurred at that age. At each age, the scores across offence types sum to 100%.

Relative Offence Type Involvement (ROTI) Scores by Age for Five Offence Types

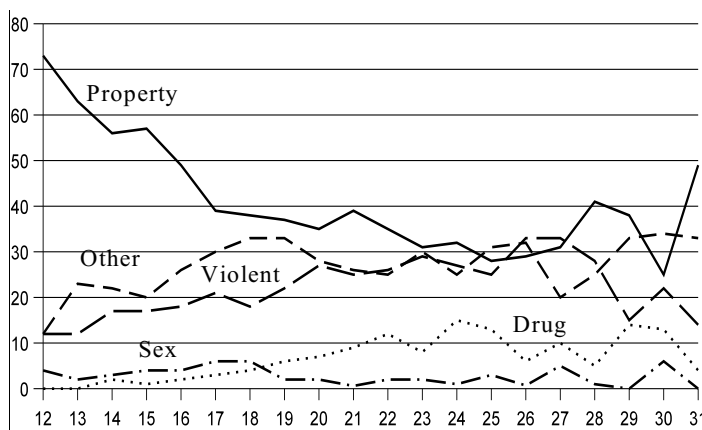


Figure 3

The pattern of scores in Figure 3 yields four interesting results. First, the relative involvement in property offences was much higher in early adolescence than at any other period. Second, as the D scores reached their peak at ages 16 to 20 years, the relative involvement in property offences decreased and involvement in violent and “other” types of offences increased. Third, sexual offences were primarily committed during adolescence and, fourth, drug offences were primarily an adult pursuit.

Do Offences Become More Severe over Time?

A quadratic equation was fit to the severity by age data to generate the curve presented in Figure 4 (actual and predicted values are shown). As indicated by the curve, the severity level peaks at about age 24, where a lower score denotes greater severity.

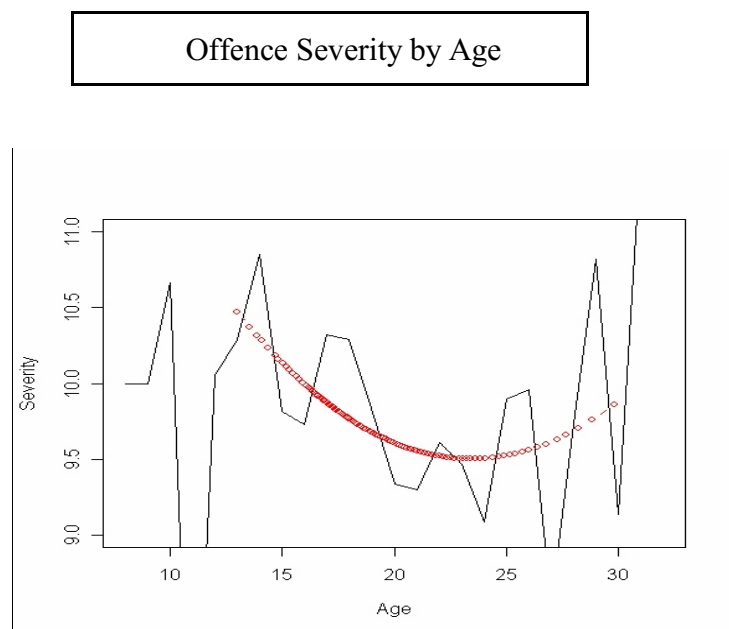


Figure 4

Semi-Parametric Group-Based Trajectories: Making Sense of Heterogeneity

Criminal trajectories were estimated using a semi-parametric group-based trajectory model, a special application of the finite mixture modeling framework. This framework assumes that the sample comprises a finite number of unobserved (latent) groups. Because the criminal activity variable takes the form of an event count, we modeled the data as variations on the Poisson process. We first tested the homogeneity of the court contact variable and found that the data were such that it would be better to use a mixture model. Our Poisson model will be:

$$\log(\lambda_{it}^k) = \beta_0^k + \beta_1^k \text{Age}_{it} + \beta_2^k \text{Age}_{it}^2 + \beta_3^k \text{Age}_{it}^3$$

where the parameter λ_{it}^k is the predicted rate of court contacts for individual i at age t given membership in group k . Following the method described by Blokland et al. (2005), the β parameters were estimated by the method of maximum likelihood under the assumption that, within trajectory groups, the number of court contacts followed a Poisson process with rate parameter λ_{it}^k . The model was applied using PROC TRAJ, a SAS-based procedure described by Jones et al. (2001).

The Bayesian Information Criterion (BIC) was used to determine that the optimal number of latent groups was three (BIC = -9956.54). Using the maximum likelihood estimate to obtain coefficients (β), where $k = 3$, we derived the following results:

$$\begin{aligned} \log(\lambda_{it}^1) &= -41.62 + 5.76\text{Age}^1 + -0.25\text{Age}^2 + 0.00\text{Age}^3 \\ \log(\lambda_{it}^2) &= -30.12 + 4.27\text{Age}^1 + -0.19\text{Age}^2 + 0.00\text{Age}^3 \\ \log(\lambda_{it}^3) &= -25.66 + 3.43\text{Age}^1 + -0.14\text{Age}^2 + 0.00\text{Age}^3 \end{aligned}$$

Assignment of group membership was based on the *posterior probability* of individual i 's membership in group k (see Nagin, 2005 for a discussion of the posterior probability). The actual and predicted group trajectories for the three-group model are presented in Figure 5.

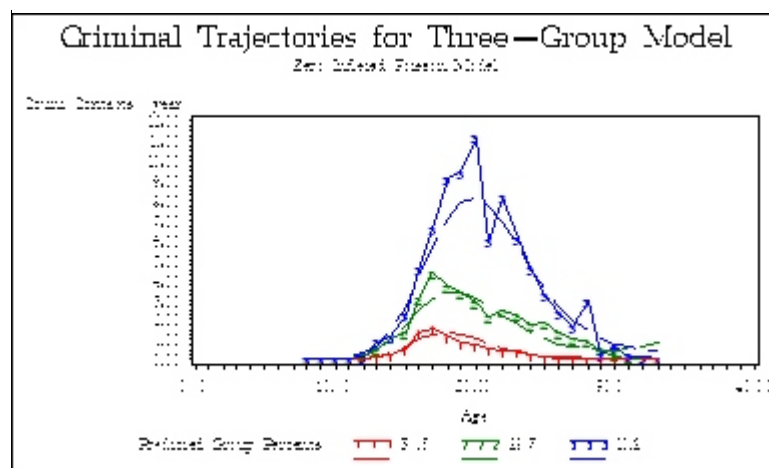


Figure 5

Group 1 (Low Rate) comprised 59.5% of the sample. For individuals following the LR trajectory, the average number of (corrected) court contacts was 8.8 ($SD = 5.5$). Their average criminal career length lasted for 6.7 years, from ages 16.0 to 22.7 years. This trajectory group also spent the least amount of time in secure custody, having been sentenced, on average, to a total of 299.90 days ($SD = 353.91$).

Group 2 (Moderate Rate) comprised 29.6% of the sample. The average individual in the MR trajectory incurred 35.0 (corrected) court contacts ($SD = 15.3$). Their average criminal career lasted for 11.3 years, beginning at age 14.8 and ending at age 26.1 years. This trajectory group was sentenced, on average, to a total of 1,284.3 days ($SD = 935.3$) in secure custody.

Group 3 (High Rate) comprised 10.8% of the sample. For individuals following the HR trajectory, the average number of (corrected) court contacts was 80.9 ($SD = 38.3$). Their average criminal career lasted for 10.1 years, beginning at age 14.6 and ending at age 24.7 years. This trajectory group also spent the most amount of time in secure custody, having been sentenced, on average, to a total of 3,026.3 days ($SD = 1,957.9$).

DISCUSSION

The aims of this study were to describe the nature and pattern of criminal offending over time on the dimensions of rate, type, diversity, and severity and to estimate latent criminal trajectory groups using current techniques of group-based trajectory analysis. The results for the various criminal career dimensions are generally congruent with findings from other longitudinal studies. First, the aggregated age-crime curve generated for the Toronto sample resembles the classic age-crime curve reported in many studies (Blumstein et al., 1988). Second, while the rate of offending decreased into adulthood, the diversity and severity of offending increased, followed by a moderate decline. This increase in diversity and severity is an interesting finding that may reflect either a “normative” delinquent trend, like the age-crime curve, or an atypical pattern that is in need of further investigation.

In another way, the observed trajectory of type, versatility, and severity of offending may reflect a marked developmental shift as these young people negotiate the transition from adolescence to adulthood, a time when life paths become more sharply focused (Johnson et al., 2004). As the Toronto sample reached late adolescence, they became more physically mature, perhaps more menacing, threatening, and deeply entrenched in a criminal lifestyle, possibly due to an involvement in street gangs (Thornberry, 2005). This trend may reflect a narrowing of options for them in terms of engagement in legitimate employment and academic opportunities.

According to developmental theory, involvement in serious antisocial behaviour during adolescence, particularly if it begins at an early age, is protracted, and involves contact with the justice system, may lead to a disruption in normative developmental processes, bringing about a premature transition from adolescence into adulthood and a concomitant redefinition of roles and contexts (e.g., being processed as a “criminal,” making court appearances, and spending a great deal of time with police, correctional, and probation officers) (Johnson et al., 2004). It also

impedes the young person's ability to accomplish the developmental tasks of adolescence, such as completing school, developing positive peer relations, and forming a healthy and integrated sense of self, referred to as “adaptational failure” (Masten & Coatsworth, 1998). The cumulative impact is a continued disruption in normative developmental functioning that can interfere with the person's ability to develop the requisite skills to assume the socially accepted roles and expectations of adulthood. This process can result in an increased likelihood of maintaining criminal activity into adulthood, as opportunities for completing high school and entering the labour force diminish. This entrenchment in a criminal lifestyle may be particularly acute for members of the HR group who showed the deepest involvement in criminal activity.

However, caution must be exercised in describing these outcomes as developmental trajectories are meant to be understood as probabilistic not deterministic (Dumas & Nilson, 2003). Considerable plasticity in adaptation and adjustment allows for both continuity and discontinuity in developmental outcomes. This opens up the possibility for rehabilitative efforts to provide missed opportunities for youth in contact with the justice system to facilitate their positive growth and development. Ideally, such intervention strategies are informed by a thorough understanding of developmental trajectories of offending behaviour. As well, this characterization may only apply to a relatively small number of cases. For example, based on the results of our group-based trajectory analyses, the majority of the offenders in the Toronto sample followed a LR course whose involvement in criminal activity was significantly less than members of either the MR or HR groups. This issue could be a focus for further investigation.

REFERENCES

- Blokland, A. A. J., Nagin, D.S., & Nieuwbeerta, P. (2005). Life span offending trajectories of a Dutch conviction cohort. *Criminology*, *43*, 919-954.
- Blumstein, A., Cohen, J., & Farrington, D. P. (1988). Criminal career research: Its value for criminology. *Criminology*, *26*, 1-35.
- Blumstein, A., Cohen, J., Roth, J., & Visher, C. (1986). *Criminal careers and “career criminals”* (Vols. 1 & 2). Washington, DC: National Academy Press.
- Day, D. M., Bevc, I., Duchesne, T., Rosenthal, J., Rossman, L., & Theodor, F. (2007). Comparison of adult offense prediction methods based on juvenile offense trajectories using cross-validation. *Advances and Applications in Statistics*, *7*, 1-46.
- Dumas, J. E. & Nilson, W. J. (2003). *Abnormal child and adolescent psychology*. NY: Allyn and Bacon.
- Johnson, L. M., Simons, R. L., & Conger, D. D. (2004). Criminal justice system involvement and continuity of youth crime. *Youth & Society*, *36*, 3-29.

- Jones, B. L., Nagin D. S., & Roeder, K. (2001). A SAS Procedure based on mixed models for estimating developmental trajectories. *Sociological Methods & Research*, 29, 374-393.
- Masten A. S. & Coatsworth, J. D. (1998). The development of competence in favorable and unfavorable environments: Lessons from research on successful children. *American Psychologist*, 53, 205-220.
- Ministry of the Solicitor General and Correctional Services. (1995). *Statistical Reporting System User Manual*. Statistical Services, Correctional Services Division, North Bay, Ontario.
- Nagin, D. S. (2005). *Group-based modeling of development*, Cambridge, MA: Harvard Press.
- Sullivan, C. J., McGloin, J. M., Pratt, T., Piquero, A. R. (2006). Rethinking the “norm” of offender generality: Investigating specialization in the short-term. *Criminology*, 44, 199-233.
- Thornberry, T. P. (2005). Explaining multiple patterns of offending across the life course across generations. *Annals of the American Academy of Political and Social Science*, 602, 156-195.