THE DLC CRIMINOLOGIST

Volume 2, Issue Number 1 April 2014

Welcome from David Farrington

Welcome to the first Newsletter of 2014! The DLC Executive Board hopes that you will find it interesting and (especially in the case of the three articles) stimulating and thought-provoking. As always, we are very grateful to Tom Arnold for putting together this Newsletter.

Our membership continues to be very healthy. As you will read in Arjan Blokland's report from the Membership Committee, we had 235 members at the end of 2013, and almost 200 have joined in 2014. Please encourage your colleagues to join the DLC!

Unfortunately, Joanne Savage had to step down as Executive counselor and Chair of the Program Committee for reasons of health, and we are very grateful to Elaine Doherty, who agreed to replace Joanne on the Executive Board. Elaine has been co-opted to the Board until November 2014, and she has been very energetic in putting together DLC panels for the ASC meeting in San Francisco. Relevant panels will be listed in the next Newsletter, which will be sent out before the ASC.

We have made some progress in moving carefully toward the founding of a DLC journal, and the Executive Board is very grateful to Adrian Raine and the Journal Committee for their work. Currently, Tara McGee and Paul Mazerolle are putting together a proposal for a new journal.

Please note the Call for Nominations for the two DLC Awards: the Life-Time Achievement Award and the Early Career Award. Please also note the Call for Nominations for the 2014 Election Slate of Officers.

As the DLC has developed, it has become apparent that our original constitution is in need of amendment. For example, the constitution says that the Nominations Committee should consist of 3 members, but we think that 7 is a more appropriate number. We are very grateful to Tara McGee for agreeing to chair a Constitution Review Committee.

We encourage all DLC members to submit news items to Tom Arnold for publication in the next Newsletter. Please tell us about your recent (2013-14) publications, grants, awards (etc.), and any other information of interest to DLC members (e.g. upcoming conferences). For example, DLC members might be interested in the Life History Research Society conference in Pittsburgh from May 7-10 (see www.lhrs2014.org), which I will be attending.

We will of course be holding another Open Meeting at the ASC in San Francisco in November. However, as an experiment, we are also going to host a social event (a party!) in a venue close to the conference hotel, on the Thursday night. The Executive Board is very grateful to Darrick Jolliffe for organizing this. More details and personalized invitations will be sent out to all paid-up members nearer the time.

As always, the Executive Board would very much welcome your suggestions about what activities the DLC should engage in to advance developmental and life-course criminology and criminal career research. We look forward to seeing you in San Francisco if not before!

Inside This Issue

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Joining the ASC Division of Developmental and Life-Course Criminology (DLC)

If you would like to join the American Society of Criminology (ASC) Division of Developmental and Life-Course Criminology (DLC), you first need to be a member of the ASC. When you join the ASC, be sure to check the box that says "Division of Developmental and Life-Course Criminology."

To learn more about the ASC, visit http://asc41.com/index.htm

To join the ASC and DLC division visit http://asc41.com/appform1.html

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Secretary/ Treasurer's Report

Tara Renae McGee
Secretary / Treasurer
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The Division continues to go from strength to strength. You can read about our climbing membership numbers in Arjan Blokland's report in this newsletter. This has had flow on effects for income for the Division. At the end of 2013 we had US$2240 in membership income. Some of these funds were expended on awards ($543.72), the Division's website ($134.87), and the printing of satchel inserts ($108.88). In the coming year we will once again have award expenses and will also be hosting a social event for members in San Francisco at the annual meeting.

At last year's annual meeting in Atlanta, the Division met to discuss a number of issues. The full minutes of the meeting are available on the Division website. The executive board of the Division for 2014 was officially announced and the chairperson, David Farrington, encouraged those attending the meeting to volunteer for roles within the Division. Rolf Loeber suggested that there may be a need for developing workshops on longitudinal methods and this is something that the Division will look into further.

At the conference itself, Joanne Savage arranged for a satchel insert to highlight the developmental and life-course panels throughout the conference and it was decided that we would do this annually.

The other main item that was discussed at the meeting was establishing a journal for the Division. Katherine Chabalko from Springer spoke at the meeting and was very encouraging in terms of the fit, high membership numbers within the Division, and high participation of members in DLC panels at the conference. At the time of the meeting, the journal sub-committee, headed by Adrian Raine had asked Alex Piquero to work with the sub-committee and Springer to develop a proposal. Since then, other commitments have prevented Professor Piquero from taking this forward and the proposal is now being led by myself and Professor Paul Mazerolle with institutional support from Griffith University. We will keep members updated with developments.

DLC Awards Committee Report

Call for Nominations

The DLC Awards Committee established two awards: The Life-Time Achievement Award and the Early Career Award. Nominations are now invited for the two 2014 Awards.

The Life-time Achievement Award recognizes an individual who has a record of sustained and outstanding contributions to scholarly acknowledge on developmental and life-course criminology.

The Early Career Award recognizes an individual (within 4 years after receiving the Ph.D. degree or a similar graduate degree) who has made a significant contribution to scholarly knowledge on developmental and life-course criminology in their early career.

Developmental and life-course criminology includes criminal career research. Nominees do not need to be DLC members. Nominators should submit an email specifying the contributions of the nominee to developmental and life-course criminology plus a vita of the nominee.

Send materials to

David P. Farrington
dpf1@cam.ac.uk
Chair of the DLC Awards Committee

by May 31, 2014.

Recipients will receive their awards at the ASC meeting in November in San Francisco.

Nominations Committee Report

Jesse Cale
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Nominations committee report

Last year the nominations committee received one nomination for Chair, two nominations for Vice-Chair, one nomination for Secretary/Treasurer and four nominations for three Executive Counsellor positions. As such, the nominations committee did not have to vote on names to forward for the ASC election ballot because there were no more than two names for each available position.
It is in those cases where there are more than two nominees for a position that the nominations committee will vote and submit their recommendation on which two to forward to appear on the ASC election ballot. Given the fact that the nominations committee was not required to vote on nominees to forward to the ASC election ballot in 2013, the composition of the nominations committee will remain the same for 2014. We would like to strongly encourage members to forward nominations to the committee.

Jesse Cale, on behalf of the 2014 DLC Division Nominations Committee

Call for Nominations for the 2014 Election Slate of Officers

The DLC nominations committee is currently seeking nominations for the positions of Chair, Vice-Chair and one Executive Counselor who will chair the DLC program committee (each for a two-year term, from November 2014 to November 2016). The current holders of these posts are eligible for election.

Nominees must be current members (including student members) in good standing of the DLC. Self-nominations are accepted. Please send the names of nominees, the position for which they are being nominated, and a brief bio via email to

Jesse Cale
Chair, nominations committee
j.cale@unsw.edu.au

Nominations must be received by May 31, 2014 in order to be considered by the committee. All nominators should include a statement that the nominee is willing to serve if elected.

Membership Committee Report

Arjan Blokland
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Developmental and Life-course Criminology has gained a firm foothold in the hearts and minds of the criminological community, as is witnessed by the still increasing membership of the DLC-division. By the end of the year 2013 membership rose to 235, and as of March 2014, over 200 members have already paid their dues for the coming year.

The many student members joining the division are an encouraging sign that signifies that the DLC division is here to stay. The division is seeking to establish itself amidst the other divisions and within the ASC at large. As part of that effort, we encourage all members to notify their fellow researchers and those in their networks interested in developmental and life-course topics of the workings of the division and invite them to join.

New DLC Books

The following are new additions to the field of developmental and life-course criminology.

Beaver, Kevin M. (2013). Biosocial Criminology : A Primer. Dubuque, IA: Kendall/Hunt. ISBN: 1465218815

Besemer, Sytske (2012). Intergenerational transmission of criminal and violent behaviour. Leiden: Sidestone Press. http://www.sidestone.com/bookshop/intergenerational-transmission-of-criminal-and-violent-behaviour

Carrington, Peter J. Editor (2014). Applications of Social Network Analysis. Four-Volume Set. University of Waterloo, Canada: SAGE Publications Ltd. ISBN: 9781446260326 http://www.sagepub.com/books/Book239718?siteId=sage-us&prodTypes=any&q=Applications+of+Social+Network+Analysis&fs=1

Farrington, David P., Piquero, Alex R., & Jennings, Wesley G. (2013). Offending from Childhood to Late Middle Age: Recent Results from the Cambridge Study in Delinquent Development. New York: Springer.

Leverentz, Andrea M. (2014). The Ex-Prisoner's Dilemma: How Women Negotiate Competing Narratives of Reentry and Desistance, Rutgers University Press (Critical Issues in Crime and Society series). More details here: http://rutgerspress.rutgers.edu/product/Ex-Prisoners-Dilemma,5109.aspx

MacLeod, John F., Grove, Peter G. and Farrington, David P. (2012) Explaining Criminal Careers: Implications for Justice Policy. Oxford: Oxford University Press. This book is available free from Oxford University Press on open access and the link to the pdf is: http://fdslive.oup.com/www.oup.com/academic/pdf/openaccess/9780199697243.pdf

McGee, Tara Renae, Paul Mazerolle eds. (2015). 'Psychological, Developmental and Lifecourse Theories of Crime' in 'The Library of Essays in Theoretical Criminology' series, forthcoming 2015, Farnham: Ashgate Publishing.

Murray, Joseph, Bijleveld, Catrien C. J. H., Farrington, David P. and Loeber, Rolf (2014) Parental Incarceration and Child Development: Cross-National Comparative Studies. Washington, DC: American Psychological Association, in press.

Raine, Adrian (2013). The anatomy of violence: The biological roots of crime. New York: Pantheon / Random House; London: Allen Lane / Penguin

Raine, Adrian, & Glenn, Andrea L. (2014). Psychopathy: An Introduction to Biological Findings and Their Implications. New York: New York University Press.

Welsh, Brandon C., Braga, Anthony A., & Bruinsma, Gerben J. N. eds. (2013). Experimental Criminology: Prospects for Advancing Science and Public Policy. New York: Cambridge University Press.

Wright, John Paul, Tibbetts, Stephen G., & Daigle, Leah E. (2013). Criminals in the Making: Criminality Across the Life Course. 2nd Edition. Thousand Oaks, CA: Sage Publications.

Spread the Word!

Please send this newsletter to any of your colleagues who have an interest in developmental and life-course criminology. We would like to increase our membership so that we can build a larger DLC community of scholars.

Visit our web site at http://www.dlccrim.org

Employment and offending: A remaining challenge for life course criminology

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Introduction

The relation between (un-)employment and offending is a classical subject in the field of criminology. Since the mid nineteenth century (e.g., Von Mayr, 1867) associations between crime and economic circumstances, work and unemployment have been repeatedly demonstrated. Research reviews have shown that unemployed persons are overrepresented in prison statistics and in self-report crime figures (Box, 1987; Braithwaite, 1979; Lageson & Uggen, 2013).

Not surprisingly, the relation between employment and offending has drawn the attention of life-course criminologists. In their classical work "Crime in the Making", Sampson and Laub (1993) argued that getting a job can be a 'turning point' in the life-course of those who are embedded in a criminal career. In particular, getting a stable and high quality job could lead to a life without crime, because it leads to increased levels of informal social control and a 'stake in conformity'. Subsequent life-course studies (including Laub and Sampson's follow up study from 2003) confirmed the potential benefits of employment with regard to desistance in crime (see Lageson & Uggen, 2013; Van der Geest, 2011).

More generally, life-course criminology takes as a vantage point the view that the criminal career is one of many trajectories that individuals follow during their life span. That career unfurls simultaneously with other trajectories in life (e.g., educational, employment and relationship trajectories) and events and transitions in one trajectory influence development in another. According to life-course criminologists, the criminal career can only be fully understood as shaping and being shaped by important transitions in other life-course domains (Blokland & Nieuwbeerta, 2010; Piquero & Mazzerole, 2001).

An uninformed reader may have the impression that we know enough about the role of employment in criminal behavior over the life-course. However, for several methodological reasons that will be discussed later, our knowledge and insights are less certain than we would like them to be. We lack a complete understanding about the processes that link employment to offending. For example, what is the sequential timing of transitions in employment and the decision to desist from crime, and what are the social and psychological mechanisms that can explain the relation? Further, we lack precision in our knowledge: is the relation the same for everyone, or does it depend on someone's age, sex, IQ or other personal characteristics, and does it vary over societies and historical times? There is still a tremendous amount of work to do for life-course criminologists interested in the relation between employment and crime.

In the remainder of this contribution, I will address current insights in the domain of employment and offending. First, I will highlight five methodological issues that challenge the study of the relation: population heterogeneity, 'the intertwined-ness' of education and employment, causal ordering, effect heterogeneity, and contextual dependence. Following this, I will provide a brief overview of our current knowledge, including recent findings from the Netherlands. I will conclude by discussing future lines of research.

Five methodological issues in the study of employment and crime

A first methodological issue that hinders straightforward interpretation of many correlations is the fact that people are not randomly distributed over employment and education. Instead, there is strong heterogeneity among individuals in the probability of getting stable and well-paid jobs. People who have limited cognitive, social or physical abilities, who do badly at school, and people who grow up in adverse circumstances in the family or neighborhood will have a much higher chance of experiencing problems in the job market, losing jobs, and becoming dropouts. Many of these factors are also related to offending and criminal careers over the life-course (see e.g., Ellis, Beaver & Wright, 2009; Thornberry

& Krohn, 2003). This implies that part of the association between employment, education and offending is spurious, caused by underlying factors common to both.

In life-course criminology, this problem is often referred to as 'population heterogeneity', a term borrowed from the economic sciences (Nagin & Paternoster, 2000). It means that measured and unmeasured differences in the study population may account for associations between certain events in the life-course and the development of criminal careers. Several statistical techniques (e.g. growth curve or fixed effects modeling) are increasingly employed to deal with this problem (e.g., Apel & Sweeten, 2010; Fergusson, Horwood & Woodward, 2001; Paternoster, Bushway, Brame & Apel, 2003).

A second issue is the intertwinedness of employment and education. Educational factors are important determinants of employment opportunities and economic success, at the same time educational factors are also related to criminal behavior (see Gottfredson, 2001). One element of education that may be particularly important for employment as well as for criminal behavior is early school leaving or dropout. Over the life-course, lacking a school graduation will seriously deteriorate job opportunities and increase the chances of becoming unemployed for a long term. Other educational factors that may need to be taken into account are level of education, poor school achievement, low aspirations and weak commitment to education. Only a minority of the studies in the field have explicitly analyzed simultaneously employment as well as educational factors in relation to crime (e.g. Gottfredson, 1985; Monahan, Steinberg & Cauffman, 2013; Verbruggen, Van der Geest & Blokland, 2014).

In a sense, this issue overlaps with the issue of population heterogeneity. Many of the factors underlying the relation between employment and education are also associated with offending. However, educational trajectories start earlier in life, which means that the more distant causes of a trajectory that leads to unemployment and crime in adulthood may be found in the early educational careers of children and adolescents. Further, effects of employment and unemployment may well be different for various levels of education. For example, jobs at the lower educational levels of the market are more often temporary and uncertain, making their potential as a 'turning point' less obvious. On the other hand, unemployment may have fewer repercussions for people with higher education levels, due to the relatively better opportunities in the job market or the increased possibility of obtaining follow up education.

A third issue is the causal ordering of the relation. The association between employment (or education) and offending is usually interpreted as being (at least partly) indicative of a causal effect of the former on the latter. However, the causal ordering can be reversed, in the sense that offending also affects someone's chances in the job market or the education system. Breaking the law may lead to arrest and involvement in the criminal justice system, which can seriously harm employment possibilities. Incarceration often leads to the termination of a job; and having a criminal record may decrease the chance of being hired. For adolescents and young adults, offending and subsequent contact with the police may inhibit the possibility to finish an education, which may increase the probability of adult unemployment. In short, offending should not only be seen as the result of problems with employment or education, but also as a cause of them.

The relationship is probably reciprocal (Thornberry & Christensen, 1985). Lack of employment may set a negative cycle in motion in which unemployment increases criminal involvement, which in turn further increases the chance of remaining unemployed. In life-course criminology, such a process is referred to as 'cumulative disadvantage' (Sampson & Laub, 1997). More generally, the life-course perspective sees different trajectories in life as reciprocally linked, with events and transitions in one trajectory influencing development in another (Blokland & Nieuwbeerta, 2010).

It is also possible that getting a job is the result of an ongoing maturational or reform process. Life-course criminologists increasingly acknowledge the potential of 'agency' in the desistance process (Laub & Sampson, 2003), which may be temporarily placed before turning points like marriage or getting a job. A conscious or unconscious decision to desist from crime may be taken before someone actually builds a conventional life including education or employment, or may facilitate the acquisition of a stable job (see LeBel, Burnett, Maruna & Bushway, 2008).

A fourth issue is effect heterogeneity related to characteristics like age, sex, and ethnicity. These

demographics are not empty control variables, but may have substantial moderating effects on the relation between employment and offending. Young and old people, males and females, and migrants and non-migrants strongly differ in their educational histories, job market opportunities, and average involvement in crime. This means that employment and unemployment may have different relative effects for various categories of people.

More importantly, work and education may have different meaning or intrinsic value for different demographic categories. For example, having a job during adolescence, when most people go to school or college, has a different meaning than during adulthood when a job is often necessary to earn a living. More generally, effects of employment may be dependent on their 'social timing'. Social timing means that the effects of a transition depend on the extent to which the timing at which that transition occurs is viewed as normative according to conventional standards. Social timing can refer to calendar age, but also to the ordering of transitions within a single or multiple trajectories. For example, the consequences of losing a job are likely to depend on whether or not a person still lives at the parental home, or has a household of his or her own.

Further, employment and education may have a different role in male and female identities (see e.g., Nordenmark, 1999). On average, men seem to attach more value and obtain more self-esteem from what they achieve in their jobs, while, on average, women attach more value to their personal relationships. In addition, females more often have the responsibility for children in single households and losing a job may have more devastating effects on the lives of these mothers. The consequences of losing a job may also be different for ethnic minorities who are often find themselves in a less advantaged position in society and can be subject to social stereotypes that employers may hold about ethnic categories. In the past, some studies on the relation between employment and offending have been sensitive to the role of age (e.g., Uggen, 2000). Attention to sex and ethnic differences in the relation between employment, education and crime has been very scarce (exceptions are Uggen & Kruttschnitt, 1998; Verbruggen, Van der Geest & Blokland, 2014).

A fifth issue is contextual dependence of the relation between employment and crime. Job markets vary greatly between societies and over historical periods, with periods of stability and periods of crisis where there are high levels of unemployment. Adding to this, societies differ in their welfare systems and it is well possible that different social support arrangements for the unemployed impact the way in which unemployment influences crime.

Sampson & Laub and other life-course criminologists acknowledged the importance of context in their concept of 'historical timing'. They noted that life-courses are embedded in the larger socio-economic structure of an historic period. In particular, periods of economic recession, leading to the foreclosure of local businesses and factories, increased educational demands for workers, and changes in social security that increase or decrease the monetary consequences of unemployment, determine the effects and social timing of transitions in education and employment (Laub & Sampson, 2003).

A brief overview of findings about transitions in employment and offending

There is an extant literature on the association between employment and crime on a macro-level, and cross-sectional studies on the association between employment and official or self-reported offending (for overviews, see Box, 1987; Braithwaite, 1979; Lageson & Uggen, 2013; Raphael & Winter-Ebner, 2001). In comparison, a smaller number of studies has examined longitudinal individual-level data on the effect of employment on (desistance from) crime. These life-course studies mostly aimed to test whether employment reduces offending, and for whom.

Several of these studies have tried to control for the problem of population heterogeneity by collecting quasi-experimental data or employing specific statistical models, for example fixed-effects models and propensity score matching (e.g., Apel & Sweeten, 2010; Paternoster, Bushway, Brame & Apel, 2003). Most of these studies concluded that employment is associated with reduced offending, or conversely, that unemployment is associated with an increase in offending. For example, Fergusson, Horwood & Woodward (2001), who used a fixed-effects model, showed that unemployment was associated with an increased risk of criminal behavior in young adults. MacKenzie and De Li (2002), who studied a sample of probationers, showed that employment was associated with a reduction in crime compared to those who remained unemployed. In a sample of Finnish recidivists, transitioning from

unemployment into employment was the strongest predictor for desistance from crime: employment reduced the estimated rate of convictions by 40 percent (Savolainen, 2009). Van der Geest, Bijleveld & Blokland (2011) followed a Dutch sample of high-risk men up to age 32, and found that employment was significantly related to a reduction in crime among the most active offender groups.

However, despite the fact that several studies have shown an effect of employment on crime, empirical evidence is not conclusive. The effect is often found to be conditional, sometimes absent, and in some cases even opposite to what would be expected. An example of such a counterintuitive result is the study by Horney, Osgood & Haen Marshall (1995) who examined short-term variation in offending over a three-year period in a sample of convicted offenders. Surprisingly, they found that men committed slightly more property crimes during months they were employed, possibly indicating that a workplace can provide new opportunities for offending. Another counterintuitive result was reported in a recent study from Norway (Skardhamar & Savoilainen, 2012). This study analyzed monthly data on offending and employment, drawn from administrative data, to arrive at more precise conclusions about the causal ordering between job entry and desistance. It appeared that for the majority of offenders, decreasing levels of offending occurred in time already before the offenders got employed. Offending decreased during or just after the moment that the offenders became employed for only one active offender trajectory group that consisted of about 2% of the sample.

The research literature further suggests that the effects of employment on crime are conditional on job characteristics. In particular, job quality and satisfaction appear to be important moderators of the effect of employment on crime. Crutchfield and Pitchford (1997) showed that young adults employed in primary labor market jobs are less likely to engage in crime, compared to young adults employed in secondary labor market jobs. Van der Geest, Bijleveld & Blokland (2011) reported that regular employment was more strongly associated with reduced offending than job agency employment. Wadsworth (2006) reported that the subjective experience of having a good job in particular predicted desistance from crime, more strongly than higher wages or job stability. These findings are in line with the notion from informal social control theory (Sampson & Laub, 1993) that not a social bond itself, but its quality promotes desistance.

Not surprisingly, age also appears to condition the effect of employment on crime. Most notably, Uggen (2000) found in a study among ex-prisoners, that work had significant effects on reducing reoffending only for those who were aged 27 years or over. In their contribution to the recent volume on Dutch research on employment, education and crime, Verbruggen, Van der Geest & Blokland (2014) found that the effect of employment on reducing re-offending increased with age in their simple of high-risk respondents in the Netherlands. They concluded that there is a watershed around the age of about 25 years, after which the effect became significant, while it is absent before that age. In the same volume, Palmen, Hilverda, Blokland & Meeus (2014) illustrated the importance of social timing. Their results suggests that employment reduced offending for young adults only when they were 'early settlers', having a complete family package of their own house, a partner, and one or more children.

In the past, scholars have speculated that for adolescents, the transition from education to employment is 'off-timed', resulting in deleterious rather than beneficial effects. Empirical support for this, however, has been mixed. Studies from the 1980s and 1990s generally found that (part-time) employment during adolescence was indeed associated with relatively more offending (e.g., Greenberger & Steinberg, 1986; Bachman & Schulenberg 1993). Several researchers considered the possibility that the association is explained by population heterogeneity. Gottfredson (1985) took several background characteristics, including educational status, into account, and found that the association between adolescent offending and higher levels of delinquency became insignificant after controlling for these characteristics. Ploeger (1997) found that delinquent adolescents were already more strongly inclined to work during their teenage years than their non-delinquent counterparts, but also that there was still an aggravating effect of adolescent employment on delinquency. More recently, several scholars used more sophisticated methods (fixed effects, trajectory analysis) and found that the effects of working during adolescence were mainly due to population heterogeneity (Paternoster, Bushway, Brame & Apel, 2003; Apel, Paternoster, Bushway & Brame, 2006; Apel, Bushway, Brame, Haviland, Nagin & Paternoster, 2007). Working may actually decrease offending among those who had already high levels of delinquency before employment.

These findings about employment and offending for young people are mirrored in Dutch studies in the recent volume on employment, education and crime. Having a part-time job appeared to be related to higher levels of delinquency among young and older adolescents (Ruschoff, Kretschmer, Dijkstra & Veenstra, 2014; Weerman, 2014) and young adults (Blokland, 2014). However, in line with the findings of Ploeger and Apel et al., those who made an early transition from education to a full-time job, were relatively delinquent while still in school, but decreased their levels of delinquency once they had a job. The results further suggested that this may be particularly the case for relatively older students (18 or 19 year olds), while for 17 year olds education seemed to be more beneficial than employment.

Only a few studies have examined whether the effect of employment on crime differs between men and women, and between individuals with different ethnic backgrounds. Studies examining the relationship between employment and crime typically use male samples. Uggen and Kruttschnitt (1998) conducted one of the few studies that explicitly compared the effect of employment on crime for men and women, and found that employment was more strongly associated with reduced offending for women than for men. In contrast, Giordano, Cernkovich & Rudolph (2002), in a study on gender and desistance, found no effect of employment on crime, neither for men or women. Gottfredson (1985) reported that working during adolescence is related to violence among males, and to violence, vandalizing and drug use among females who are in junior high school, but again for both sexes these effects were accounted for by pre-existing differences between workers and non-workers.

In the recent Dutch volume on employment, education and crime, special attention was given to gender differences in the effect of employment on offending. Results from various contributions suggested that effects were stronger for males than for females. Blokland (2014) showed that intensive work during young adulthood was only related to higher levels of offending among males. At the same time, the results of Weerman (2004) suggest that full-time employment for early school leavers has the strongest reducing effects on crime for males. The most striking support for a stronger effect for males was reported by Verbruggen, Van der Geest & Blokland (2014) in their follow-up study of pupils from a juvenile justice institute. They found that the reducing effects of employment on offending were substantial and significant for males but not for females.

Also few studies have compared the effect of employment on crime between individuals with different ethnic backgrounds. One study suggested that unemployment is associated with more arrests for minority youths in particular (Thornberry & Christenson, 1984). Wang, Mears & Bales (2010) found that African American ex-prisoners who were released into areas with high levels of unemployment had higher levels of violent re-offending, while this was not the case for Caucasian ex-prisoners. Some of the Dutch results suggest that effects of employment may be stronger for ethnic minorities (Blokland, 2014; Weerman, 2014), but the findings on ethnic differences are not yet conclusive.

With regard to the reverse causal ordering, several studies are available about the effects of offending on employment. Several studies have found that ex-prisoners relatively often become unemployed or get low-skilled jobs (e.g., Raphael, 2007). Some studies suggest that the association is at least partly due to population heterogeneity (Holzer et al., 2003; Van der Geest, 2011), or to reluctance of ex-offenders to search for employment (Apel & Sweeten, 2010). However, there are also studies that report a substantial and significant effect over and above self-selection effects (Kling, 1999; Western & Beckett, 1999). In line with this, several studies have reported that job applicants who report conviction, or a history of incarceration, are less likely to be hired (Jacobs & Crepet, 2008; Boone, 2011). Studies using an experimental design in which a criminal history or incarceration was reported or not in an application letter have supported this finding (Buikhuisen and Dijksterhuis, 1971; Pager, 2007). Interestingly, this effect appeared to be much stronger for black men compared to white men (Pager, 2007).

Directions for future research

It is evident that there is already a wealth of literature available, but also that more research is warranted on the association between employment and offending. First of all, findings about employment and offending are in need of replication. Many studies have been conducted on limited samples of the population, in particular ex-offenders. Replication of findings are needed in high-risk, medium risk as well as low risk samples, and also in samples of adolescents, early adults, adults, men, women, and people from various ethnic backgrounds.

In general, future studies ideally would be longitudinal in nature, to control for population heterogeneity as much as possible and to identify the characteristics that confound the relation between employment and offending. Longitudinal studies can also help to gain insight into the causal direction of the association between employment and crime. These studies should investigate what comes first: increases or decreases in offending or getting or losing a job. More generally, longitudinal research can focus on life-course transitions, and link trajectories in crime with job market careers and also with transitions and trajectories in education and personal relationships. Longitudinal analyses are also able to distinguish the effects of different transitions, like those from school to employment, or from a job to unemployment. It is therefore imperative that we investigate transitions rather than cross-sectional associations.

One possibility to achieve this would be to employ large-scale register data to increase statistical power to analyze detailed combinations of employment types, education levels and criminal justice contacts. If such register data are available (like they are in the Netherlands, see e.g. the contribution by Traag et al. in the Dutch volume), they also enable us to identify effects for small but high-risk subgroups in the population, for example previously incarcerated women. Further, register data, if one has good access to them, may also be very useful to analyze longitudinal patterns in employment and offending in the lives of people over long periods of time. To collect similar longitudinal data on this using interviews or surveys would be costly and time-consuming, and register data may be a feasible alternative. Register data may also be used to get more insight into the societal and historical contexts of the relation. A good example of the latter possibility is provided by Mesters, Bijleveld & Huschek (2014) in the recent volume on employment, education and crime. The authors used register data they collected for a multiple generation sample, to study the effects of unemployment levels in society on offending levels of families in different historical periods. Their findings suggest that the effect of unemployment levels on offending was weaker in the period before 1950 (including the period of the Great Depression in the 1930s) than in the period afterwards.

At the same time, we also need data collected through surveys or interviews, in order to get more detailed information about personal characteristics, life circumstances, life events, personality, informal social control, routine activities, health, and self-reported offending. Long-term longitudinal cohort studies remain crucial to identify the conditions in which employment is related to offending and the persons for whom this is the case. Such studies are able to measure the quality of the available jobs, the importance attached to these jobs by employees, the consequences of these jobs and also the available resources, support and welfare for those who lack regular employment. They can also link employment and offending to achievements and experiences in education.

Detailed longitudinal data are needed to test mechanisms and processes hypothesized by various theoretical perspectives on employment and offending. At the moment, we know very little about moderators and mediators in the relation between employment and offending (and vice versa). Is employment related to offending because it leads to more informal control, less strain or changes in routine activities? Or, is the relation between employment and offending reflective of a desistance effect that is already set in motion by an internal change in future orientation and personal identity? Only detailed data, collected in person, can provide answers on questions like these.

It would be important that data to test theories are collected with sufficient intensity, i.e. with shorter time intervals than usually are employed (often one year). One possibility is to revisit respondents more often than usual, for example within periods of several months, or to call them in between to track whether important changes have occurred (see Blokland, 2014). Another possibility is to use life history calendars to reconstruct life events and situations in short periods of time (see e.g. Horney, Osgood & Haen Marshall, 1995).

Lastly, qualitative studies on the relation between employment and offending might offer important possibilities to study the processes that are taking place. Such studies may also provide insight into the differential meaning that employment may have for different parts of the population, for example for adolescents and adults, males and females, and for ethnic minorities. And they can give voice to the opinions and experience of the people concerned.

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Special Section – Group Trajectory Modeling

This issue contains a special section on trajectory modeling, with articles by David Day and Torbjørn Skardhamar.

Introduction - by David Day

Developmental life-course (DLC) criminology is concerned with the nature and pattern of criminal behavior over the life span, including its onset, course, and desistance, as well as the factors that influence its progression over time. In these regards, criminal trajectory research fits well within the DLC framework and has made important contributions to our understanding of crime across human development. As a concept and a methodology, criminal trajectory research is concerned with:

1) charting and describing multiple courses of criminal activity across age or time at the level of the individual;

2) describing the characteristics of individuals within and across trajectory groups;

3) identifying developmental predictors (i.e., risk and protective factors) of trajectory group membership; and

4) examining the consequences of following certain trajectories.

Beginning with the seminal publication by Nagin and Land (1993), group-based trajectory research has spawned a multitude of studies and a wealth of information about the criminal trajectories and generated considerable discussion and debate about the methodology and the meaning of trajectory "groups." However, there is still a great deal more work to be done.

The following two articles provide a brief overview of the criminal trajectory literature in terms of the context, theory, and methods of trajectory research (Day) and some of the controversies and contentious issues about the group-based trajectory approach (Skardhamar).

Reference

Nagin, D. S. & Land, K. C. (1993). Age, criminal careers, and population heterogeneity: Specification and estimation of a nonparametric, mixed Poisson model. Criminology, 31, 327-362.

Criminal Trajectories: A brief overview

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The nature and time course of criminal behavior

Continuity and change are a hallmark of development (Sroufe, 1979) and developmental researchers interested in capturing the unfolding undulations over time in the manifestation of traits, behaviors, experiences, and characteristics have embraced trajectories as both a concept and a methodology. For the past 25 years, the notion of developmental trajectories in general, and criminal trajectories in particular, have become important areas of investigation for researchers. Especially those interested in the development of behavioral phenomena like crime. A search of PsycInfo indicates a dramatic increase in the number of published articles that refer to developmental trajectories. For example, 49 articles were found in the 110 year period from 1880-1989, while 3,442 article were found in the 25 year period from 1990-2014.

The notion of a developmental trajectory maps well onto the conceptualization of growth and maturation put forth by researchers interested in a broad array of behavioral phenomena (Nagin & Odgers, 2010a; Curran & Willoughby, 2003). The study of trajectories cuts across many disciplines and subspecialties, such as developmental psychology, developmental psychopathology, developmental criminology, life-course criminology, sociology, developmental systems, and the risk and resilience literature.

Over the course of one's life, we may speak of trajectories of brain volume growth (Shaw, Kabani, Lerch, Eckstrand, Lenroot, Gogtay et al., 2008), handedness in infancy (Michael, Babik, & Sheu, 2014), language skill development (Farkas & Beron, 2003), bullying experiences (Reijntjes, Vermande, Goossens, Olthof, van de Schoot, Aleva, & van der

Meulen, 2013), physical aggression (Brame, Nagin, & Tremblay, 2001), social and emotional development (Miers, Blöte, deRooij, Bokhorst, & Westenberg, 2013), self-esteem (Hirsch & DuBois, 1991), social competence (Monahan & Steinberg, 2011), and symptoms of mental illness like depression (Costello, Swendsen, Rose, & Dierker, 2008) and anxiety (Feng, Shaw, & Silk, 2008).

In the realm of criminality, researchers have examined trajectories for a range of variables, including police contacts (Brame, Bushway & Paternoster, 2003), arrests (Natsuaki, Ge, & Wenk, 2008), court appearances (Livingston, Stewart, Allard, & Griffith, 2008), self-reported offenses (Fergusson, Horwood, & Nagin, 2000), convictions, generally (Bloland, Nagin, & Nieuwbeerta, 2005), and convictions for specific offense types, including violent (Bersani, Nieuwbeerta, & Laub, 2009), nonviolent (Sampson & Laub, 203), and sex offenses (Freiburger, Marcum, Iannacchione, & Higgins, 2012).

Over the course of their criminal "careers," offenders may display changes and continuities in criminal activity on various dimensions, including rate, type, timing, versatility, and severity. In broad terms, a criminal trajectory represents the course, progression, or evolution of criminal activity on such dimensions over age or time at the level of the individual. Trajectory researchers are interested in how the topography of crime unfolds across a developmental landscape, to measure the peaks and valleys as well as the factors that influence its progression.

Moreover, it is known that offenders comprise a diverse and varied population (Wolfgang, Figlio, & Sellin, 1972). The trajectory approach allows for variation in the topography of crime and, as a statistical tool, seeks to aggregate individuals into homogeneous latent (i.e., unobserved or unmeasured) classes who follow similar trajectories that are heterogeneous across trajectory groups (Muthén & Muthén, 2000).

The trajectory model stands in contrast to growth curve modeling in which a sample is expected to follow a single, homogeneous pattern of rate of change over time. It is focused on person-centered analysis of behavior, versus variable-centered, such as ANOVA or regression approaches. Trajectory models help explain continuity and change over time. The study of criminal trajectories is well suited to further the goal of developmental science of mapping the course and etiology of outcomes in the context of criminal behavior.

Advances in the developmental study of crime have been driven by a wave of seminal longitudinal studies that includes the Cambridge Study of Delinquent Development (CSDD; Farrington, & West, 1990), the Dunedin Multidisciplinary Health and Development Study (Silva, 1990), and the Pittsburgh Youth Study (PYS; Loeber, Farrington, Stouthamer-Loeber & Van Kammen, 1998), the Denver Youth Study (DYS; Huizinga, Wylie Weiher, Espiritu & Esbensen, 2003) and the Rochester Youth Development Study (RYDS; Thornberry, Lizotte, Krohn, Smith & Porter, 2003) (collectively funded by the US Office of Juvenile Justice and Delinquency Prevention as the Causes and Correlates Studies) in concert with important technical advances in the statistical analysis of longitudinal data at the level of the individual (Nagin & Land 1993).

The study of criminal trajectories has opened up new ways of investigating the past, present, and future of criminal offenders. Informed by rich developmental theories of crime, the accumulated body of literature has generated a wealth of information about criminal behavior, brought about new insights on crime from a developmental perspective, challenged old ideas, and fostered new research questions for examination in future investigations. As both a concept and statistical technique, trajectory analysis has become an important tool for "charting and understanding" (Nagin, 2011, p. 53) the progression of criminal activity over the life course.

Trajectory models

As a concept, criminal trajectory modeling has enabled researchers to explore the relationship between age and crime and to examine variations of the classic "age-crime curve" (Hirschi & Gottfredson, 1983). Trajectory research has been useful to test theoretical models (Brame, Paternoster, & Piquero, 2012; Sullivan & Piquero, 2011; cf. Skardhamar, 2010). In this regard, the most frequently cited theoretical model is Moffitt's dual taxonomy (1993, 2006). Below, I provide a very brief thumbnail sketch of this model and describe supportive evidence from the trajectory literature.

Moffitt (1993) proposed that young people follow one of two trajectories of antisocial behaviour, life-course persistent (LCP) or adolescence-limited (AL). A small number of youth (about 5% – 10%) appear to follow the LCP trajectory, usually initiating their problem behavior in early childhood. It is proposed that their high offending rates are a result of a confluence of biopsychsocial factors, including neurological problems, experiences of abuse and neglect, poor parental monitoring and supervision, and community disadvantage. In later childhood and adolescence, they have problems due to school truancy, school failure, and delinquent peer association. With the passage of time, it is thought that these risk factors carry their own momentum through a cascade of cumulative risk, affecting multiple domains of the person's life (e.g., family, social, academic, employment), leading the individual to become ensnared in a criminal lifestyle and a life-long, persistent pattern of criminality.

A larger number of youth are thought to follow the AL trajectory. These youth experience relatively normal development until about age 15, at which time a striving for personal independence and association with like-minded individuals leads them to mimic the antisocial lifestyle of their delinquent peers. It is proposed that this group experiences few developmental risk factors and lives a normal childhood. As adolescents, no longer children but not yet entitled to the rights and freedoms of adulthood, they experience a "maturity gap" that fuels some, usually minor, forms of antisocial behavior. The criminal acts of the AL group are often relatively mild in nature and their "criminal careers" are of short duration, usually terminating within several years of onset when opportunities for postsecondary education and job prospects become available. These taxonomic distinctions are useful because they suggest different etiological factors and different outcomes for those following each of the two distinct trajectories.

Support for Moffitt's (1993) theory has been provided by a number of trajectory studies (e.g., Moffitt, 2006; Nagin, Farrington, & Moffitt, 1995; Piquero & Brazina, 2001; van Domburgh et al., 2009), including female-specific samples (Odgers, Moffitt, Broadbent, Dickson, Hancox et al. 2008). Chung, Hill, Hawkins, Gilchrist, and Nagin (2002), for example, found that their chronic trajectory group (of five trajectory groups generated by their analyses), comprising 7% of their community sample, was characterized by a childhood onset of aggressive behavior and a persistence of offending into adulthood, similar to Moffitt's LCP group. Their late-onset group, comprising about 14% of their community sample, showed an adolescence-onset of antisocial behavior. Contrary to Moffitt's model, however, this group persisted in their offending into adulthood (see also Moffitt et al., 2002). Similarly, Fergusson et al. (2000) identified a chronic group, comprising 6.3% of their community sample. As predicted by Moffitt, this group was characterized by a high degree of childhood personal and environmental adversity and risk factors. An adolescent-onset group of offenders also was extracted from their sample. The support for Moffitt's theory notwithstanding, both studies generated more than the two trajectory groups predicted by the model. This point highlights the "work in progress' nature of the dual taxonomy model, which, although elegant and parsimonious, is incomplete. Further work is needed to extend taxonomic models to match the accumulating empirical evidence (DeLisi & Piquero, 2011). Put another, Moffitt's early work was theoretical. Once researchers began working out the mathematical means of generating trajectory groups, more than two groups were extracted from samples, including the low-level chronic (Nagin et al., 1995), and adult onset (Zara & Farrington, 2009) groups. But these were empirical results and new theories followed after more trajectories than predicted by Moffitt's theory were identified.

Methods of trajectory modeling

A statistical approach for deriving trajectories from person-centered analyses of longitudinal data, commonly referred to as semiparametric group-based trajectory modeling (GBTM), was first described by Nagin and Land (1993). Using conviction data from the CSDD, Nagin and Land demonstrated how a special application of finite mixture modeling (McLachlan & Peel, 2000) may be employed to identify clusters of individuals who show similar patterns of offending over time, referred to as trajectories. These trajectories, like clusters in a cluster analysis but in a "trajectory space" (Maldonado-Molina, Piquero, Jennings, Bird, & Canino, 2009, p. 177), reflect a latent or underlying heterogeneity among the sample with respect to their criminal activity. The data rely on some dimension of offending activity sampled over age or time, such as rate or severity. To provide a more precise indicator

of an individual's rate of offending, the data may be adjusted for both street time, that is, the time the individual was not incarcerated, and so was at large to offend (Piquero, Blumstein, Brame, Haapanen, Mulvey, & Nagin, 2001), and mortality (D'Unger, Land, McCall, & Nagin, 1998). In GBTM, assignment of each individual in a sample to a trajectory is based on the highest posterior probability associated with each latent class. For example, the posterior probability that is closest to 1.0 suggests the trajectory group to which the individual belongs

Selection of the number of groups that best fits the data is conventionally based on the Bayesian Information Criterion (BIC) (or sample-size adjusted BIC, ssaBIC; Sclove, 1987), corresponding to the largest BIC value. Additional model-fit diagnostics and model selection statistics also could be applied, including the odds of classification (OCC) and Jeffreys's scale of evidence for Bayes factors, (Nagin, 2005), as well as the entropy measure (Celeux & Soromenho, 1996) and likelihood difference tests, such as the Lo-Mendell-Rubin likelihood ratio test (LMR-LRT; Connell & Frye, 2006) and the bootstrapped parametric likelihood ratio test (BLRT), useful for smaller sample sizes (McLachlan & Peel, 2000). The applicability of these various statistics will depend on a number of factors, including sample size, normality of the data, and separation among the classes (Muthén, 2004). Of course, as a good reminder, Maxwell, Kelley, and Rausch (2008) noted that "theory should pay a role in determining the number of latent classes" (p. 552). Detailed descriptions of the methodology are available for the interested reader in Brame et al. (2012), Nagin (1999, 2005, 2011), Piquero and Nagin (2010), and Sullivan and Piquero (2011).

Subsequently, a researcher may be interested in examining unique characteristics of the classes and how the trajectory groups differ among themselves. Following the classify/analyze paradigm (Roeder, Lynch & Nagin, 1999), once individuals are sorted into discrete trajectory groups, a multinomial regression framework (or other statistical approach) may be applied to identify the best set of developmental predictors and correlates (i.e., risk and protective factors) that differentiates the groups (Raudenbush, 2001), thus integrating both person-centered and variable-centered approaches. Individual, family, peer, school, and neighbourhood childhood and adolescence variables are recorded, which are then subjected to analysis. Consistent with the developmental and life-course (DLC) perspective, this research approach identifies common and specific factors that distinguish one trajectory group from another to uncover unique causal processes producing distinct patterns of offending over the life course. In other words, different trajectory groups may have distinctive etiological pathways that could be established through this methodological framework.

What typically emerges from trajectory analyses is anywhere from two to eight distinct trajectory groups, depending on such methodological factors as length of follow-up, sample size, and nature of the offense data. Each trajectory group comprises between 3% and 65% of the study sample. Although there is variability in the number of trajectory groups that results from these analyses, studies generally yield some combination of high-rate, moderate-rate, and low-rate groups; adolescent-peaked and adult-peaked groups; early and late desisters; and a non-offender group, if the study is based on a community sample (e.g., Piquero Farrington, & Blumstein, 2007). Studies with offender samples typically identify a low-rate (i.e., near-zero) trajectory group, which often comprises the largest group in the sample. For example, Bersani et al. (2009) reported that 70% of their offender sample fell into the lowest-rate group, which they referred to as sporadic offenders. Groups with the smallest numbers (e.g., generally between 3% and 10%) tend to comprise high-rate persistent offenders and these trajectories are labeled accordingly. Questions remain, however, about the exact number of trajectory groups that best represent offender populations (but see Skardhamar, this issue). The important point drawn from this research is that criminal offenders comprise a heterogeneous population and that trajectory analysis is able to capture this underlying heterogeneity (Nagin & Odgers, 2010a).

Developmental risk factors predict trajectory group membership

Research has been undertaken to identify developmental precursors (risk and protective factors) of trajectory group membership. For example, in their analysis of the CSDD data, Nagin and Land (1993) found that, compared to individuals in the adolescent-limited, low rate chronic, and nonoffender groups, individuals in the high rate trajectory group were more likely to be very troublesome in childhood and prone to alcohol and drug use in adolescence. Given that high-rate

offenders commit a disproportionate number of crimes (Wolfgang et al. 1972) and that they impose high financial costs on the criminal justice system and society at large (Cohen, Piquero, & Jennings, 2010), understanding the developmental pathways leading to this trajectory group could potentially inform the development of selective and targeted early intervention and prevention programs. In this regard, Day, Nielsen, Ward, Sun, Rosenthal, Duchesne, Bevc, & Rossman (2012) reviewed 20 trajectory studies that measured developmental risk factors. Five conclusions were be drawn from this review. First, the high rate, chromic group comprises between 1.3% and 27.0% of the study samples. Second, evidence of a cumulative risk effect was found in that high rate trajectory groups tend to have the most risk factors; low rate groups tend to show the most favorable backgrounds; and moderate rate groups tend to fall somewhere in between. Third, individuals on the high rate and chronic trajectories, in comparison to the low rate or non-offender trajectories, are overrepresented on a range of life adversity variables. Specific risk factors included early conduct problems, male gender, sensation seeking, depression, substance abuse/dependence, family adversity, contact with a child welfare agency, criminal family members, association with a delinquent peer group, poor academic achievement, and exposure to community violence. Fourth, no single risk factor or set of risk factors emerged as the most salient predictor of high rate chronic offending. Fifth, consistent with developmental theories of antisocial behavior (e.g., Moffitt 1993), the risk factors were thought to exert their influence at different stages of development. In other words, a different set of factors gave rise to the onset of the behavior (e.g., punitive and inconsistent parenting) than contributed to the maintenance of the behavior once initiated (e.g., deviant peer associations).

Controversies

The concept of a developmental trajectory is a metaphor drawn from the natural sciences (Laub & Sampson, 2003; Macoby, 1984). As such, it can only be an approximation of the construct of interest (Pickles & Hill, 2006). Not surprisingly, the study of trajectories is not without controversy (Bauer, 2007; Piquero, 2008; Skardhamar, this issue). Debates in the literature are centered on issues at the conceptual, theoretical, and methodological level. A few of the concerns are outlined below.

First, researchers caution that there is a danger of reifying a set of criminal trajectories that emerge from the statistical analyses (McAra & McVie, 2012; Piquero, 2008). In other words, researchers must be careful not to speak of a trajectory as if it were a real entity, existing in reality, to which individuals in that trajectory group follow in lock-step fashion. Rather, trajectory groups are a statistical approximation of reality generated by the data analysis (Raudenbush, 2005).

Second, the researcher plays a role in the ensuing results, entering an element of subjectivity to the procedure. For example, there is subjectivity in the specification and interpretation of the resulting statistical model.

Third, the notion that trajectory group memberships are predicated on a set of developmental risk factors that may be identified through analyses such as multinomial regression is not accepted by all scholars (Case & Haines, 2009). In particular, the absence of a clear and generally accepted specification of the causal mechanisms that link past events to later outcomes is a major limitation of the approach. Critics of risk factor research also note that the common use of dichotomization of predictor and outcome variables results is an oversimplification of complex relationships (Case & Haines, 2007).

Fourth, there is debate about the best way to apply the statistical criteria for determining the number of trajectory groups that are best represented by the data. The general convention in the literature is to use the largest Bayesian Information Criterion (BIC) value as the cutoff for the number of groups. However, interpretation of the BIC has been called into question as, in some instances, the BIC may continue to improve as the number of groups increases (Nagin, 2005; Nagin & Odgers, 2010a). In spite of the limitations, including the subjective need for the researcher to "eyeball" the trajectory groups to determine the suitability of the model, the BIC remains in use as the accepted approach. To address the issue, Nielsen, Rosenthal, Sun, Day, Bevc, and Duchesne (in press), proposed an alternative means of determining the optimal number of groups using cross-validation (Hélie, 2006; Stone 1974), specifically, leave-one-out cross-validation. The cross-validation criterion for number of groups involves choosing the value of K of latent groups that minimizes the cross-validation error (CVE). To run

the trajectory analysis, Nielsen et al. developed a statistical program called crimCV, written in the R-programming language.[1]

These ongoing discussions in the literature, notwithstanding, the study of criminal trajectories remains an important approach to model and understand patterns of change and continuity in offending from a person-centered perspective.

Concluding remarks

To paraphrase Collins (2006), this is an exciting time for developmental research on crime. With a growing number of longitudinal datasets at hand, the empirical investigation of criminal trajectories is an active and flourishing enterprise with its own upward trajectory (Erosheva, Matsueda, & Tesesca, 2014). If trajectory research can tell us something about the past (before the start of the trajectory), present (during the trajectory), and future (subsequent to tracking the trajectory) of criminal offenders, I will highlight three areas of research that may inform each element in this time path.

First, more work is needed on the developmental precursors and pathways leading to the full spectrum of trajectory groups, not just the high rate persistent offenders (Jennings & Reingle, 2012). Although there is now considerable research on the identification of risk factors of crime, less empirical work has been done to delineate the causal mechanisms that link events to outcomes (Farrington, 2003). In order to test theory-based models, perhaps the use of serial (versus parallel) multiple mediation (Hayes, 2013), in which a series of mediators are strung out in a causal chain, using posterior probabilities as the dependent variables, could test complex causal paths. The practical implication of identifying the causal mechanisms is that, rather than targeting the risk factor, which might be immutable, early intervention and prevention programs may target "the pathogenic processes that contribute to onset or to maintenance" (Shirk, Talemi, & Olds, 2000, p. 846) of the criminal behavior.

Second, although used primarily in health research to identify changes in trends in the rates of diseases like cancer, joinpoint analysis (http://www.surveillance.cancer.gov/joinpoint/) may be helpful to identify specific points of inflection or changes in criminal trajectories. Joinpoint analysis has been used to study changes in the rates of firearm homicides (Langmann, 2012) and suicide rates (Gagnes, Robtitaille, Hamel, & St. Laurent, 2010) and may be applied to criminal trajectories that are based on time (rather than age). For example, it would be useful to know how soon after a first criminal offense adolescent-peaked offenders display a downturn in their delinquent behavior. In addition to providing a more precise description of change over time, this type of information may inform the timing of prevention and intervention efforts at the period of greatest risk for criminal activity (Prince, & Maisto, 2013).

Last, further work could be done to examine the consequences of trajectory group membership. Studies that have investigated such effects have examined the subsequent impact of following a given criminal trajectory on substance abuse, peer substance use, violence problems with partner relationships, and residence in a high-crime neighborhood (Brook, Lee, Finch, Brown, & Brook, 2013) and substance use and depression (Wiesner, Kim, & Capaldi, 2005; Wiesner & Windle, 2006). Taken together, the studies suggest that the relation between trajectory group membership and subsequent outcomes is complex. However, in general, individuals who follow high and moderate rate offense trajectories were found to experience the worst outcomes, compared to low rate or nonoffender trajectory groups.

In conclusion, developmental and life course (DLC) models of crime have led the way in embracing the principles and knowledge drawn from the developmental sciences. The research questions that emanate from the developmental framework include those concerned with: (1) charting and describing the nature and course of criminal behavior across the lifespan; and (2) uncovering the factors associated with the onset of crime and with the multiple trajectories of offending, as well as patterns of desistance from crime. These have been the primary interests of criminal trajectory research for the past two decades and, although a wealth of information has accumulated, there is still a great deal more to learn. Further work is needed to explicate the causes, course, and consequences of distinct criminal trajectories. Researchers could examine the validity and reliability of the group structure of their trajectory models in terms of unique etiological pathways, group characteristics, and response to intervention (Nagin & Odgers, 2010b), and replicated with different samples and different measures of crime, including official records and self-report data.

Notes

1. The program is publically available on the Comprehensive R Archive Network (CRAN) at http://cran.r-project.org/.

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Criminal Trajectories: Taking Stock and Moving Forward

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Abstract: Heterogeneity in change over time is at the centre stage of life course criminology, and group-based trajectory modeling (GBTM) is one much-used method in this area of research. Earlier methodological debates have brought considerable clarity on what GBTM can and cannot do. This article discusses some key remaining problems and promises in the uses of GBTM.

Acknowledgements: I am grateful for the valuable comments from Jukka Savolainen on several drafts of this article.

Criminal trajectories: Taking stock and moving forward

I started working on topics related to criminal careers and life course criminology about ten years after group-based trajectory modelling (GBTM) was introduced in criminology. At first exposure, I was enthusiastic about this method. I can easily relate to Bauer's (2007) account of his initial reaction to the related technique of growth mixture models:

> "Here was a method that could be used to tease apart population heterogeneity in change over time. No longer would we be limited to single trajectory models like latent curve analysis – now we could allow for multiple trajectories. And given the choice between a single trajectory and multiple trajectories, who would not opt for the latter?" (Bauer 2007: 759).

Fortunately for me, the software PROC TRAJ had been made publicly available (Jones and Nagin 2001) and, as an experienced SAS user, it was easy for me to embrace this method. At the time, I considered GBTM an impressive technique to examine criminal careers. Relatively quickly I published a report on criminal careers in a Norwegian birth cohort using this method. I had intended to turn that study into an academic paper in English but that never happened. For that I blame my statistics teacher and supervisor, professor Tore Schweder, who did not understand the point of all those groups I had identified. As my answers to him were less than satisfactory, it was obvious I had not fully understood the implications of the method I was using. The supportive mentor that he was, Tore suggested that I learn more about these methods and proposed I should do a simulation study to test how the model behaves. He also recommended I learn about the more general framework of latent variable modelling and singled out the book by Skrondal and Rabe-Hesketh (2004) as a source. Most of that book is still beyond my competence, but I found it helpful to see GBTM as a special case of a general framework. Having never done a simulation study before, it took me a while to complete. As a part of the process, I read extensively about the debates and controversies concerning the GBTM. During this period, several new studies using GBTM were published, and I made a point of reading them all.

Fast-forwarding to present time, it is my opinion that the debates of the past 10 years or so have largely settled the fundamental controversies regarding the method. The recent article by Brame, Paternoster and Piquero (2011) offers a thorough and fair discussion of the main issues, and suggests considerable agreement between the critics and advocates. For example, with respect to the critical studies by Bauer and Curran (2003), Weakliem and Entner-Wright (2009), and Skardhamar (2010), Brame et al. (2011) state they have "no quarrel with the technical features of the simulations presented". In my reading of the literature, which I think is in agreement with Brame et al. (2011), the following claims are uncontroversial:

- GBTM (or any discrete mixture model) can be used to approximate a latent continuous distribution
- If true subpopulations with distinct trajectories exist in the data, GBTM is likely to find the correct groups
- GBTM is a descriptive technique, typically applied in exploratory analysis
- The identification of "groups" ought not be a mechanical exercise but requires theoretical guidance

The contribution by Professor Day (this issue) is also consistent with these claims. Day refers to new developments in model selection using cross-validation, and such improvements are clearly worth

exploring. However, the controversial issue is not what the GBTM does or the proper way to estimate the model, but the meaning of the groups generated using this method. My take on this is simple: Theories should be evaluated by testing their predictions, and GBTM can be applied in this manner as a part of "normal deductive science" (Brame et al 2011: 17). The most common application of GBTM has focused on evaluating the empirical validity of the typological theories, the most famous of which is Moffitt's dual taxonomy (Moffitt 1993, 2006). It is my opinion that many of the studies that have claimed to test this theory using GBTM do not amount to compelling or even informative tests of the hypothesized outcomes.

I do not deny that GBTM can be useful for testing assumptions of developmental theories, but the value of a test depends on what is tested. As a basic requirement, we should apply what Mayo (2010) refers to as the "Minimal Scientific Principle for Evidence" which states that the evidence is poor for any theory, H, if the method or procedure used has little or no ability to find flaws in H, even if H is false. I take this principle to be a key feature of normal deductive science. While one may often find empirical evidence to be consistent with any given theory, this is less persuasive if the evidence is also consistent with competing theories. The evidence is particularly weak if it is unlikely to be inconsistent with any or most theories. It is only if the test is severe, we might interpret positive evidence as truly supporting the theory.

In my judgment, the article that introduced GBTM into criminology (Nagin and Land, 1993) qualifies as a good example of how GBTM can be used deductively in hypothesis-testing. Brame et al. (2011) reminds us that at the time there were genuine theoretical disagreements about the invariance of the age-crime curve. Using GBTM, Nagin and Land (1993) were able to demonstrate heterogeneity in offending trajectories by age. This is a fine example of how GBTM can be used in normal deductive science as this study was able to falsify the hypothesis of invariance of the age-crime curve. I doubt that many contemporary scholars deny the presence of age-heterogeneity in criminal offending.

It is all-too common in this literature to assume that a theory is supported if the theoretically predicted groups have been "identified" in the data. For example, Moffitt (2006) uses this logic when summarizing the evidence in support of her taxonomic theory: Since all studies using GBTM has found a LCP group or equivalent, this supports her theory. This conclusion is unwarranted because the evidence cited is equally consistent with other theories, such as the age-graded theory of social control (Laub and Sampson 1993) which treats offending heterogeneity as a continuous rather than a discrete (group-based) phenomenon. A major point in my own simulation study on GBTM (Skardhamar 2010) was that seemingly distinct groups can be found in data where no groups, in fact, exist. Moreover, random variation and state-dependence is sufficient to generate highly heterogeneous trajectories as revealed by GBTM. Because it is difficult to tell if the groups are truly discrete or just an approximation of a continuous distribution, the high-rate group found in many GBTM studies is just as likely to mark some upper quantile of the distribution of trajectories. I do not think any criminological theories are inconsistent with the existence of an upper quantile. Thus, the evidence regarding typologies is consistent with at least two competing theories, and hence uninformative to both.

The underlying problem here is not statistical but theoretical. I have argued elsewhere that Moffitt's taxonomy is unclear on key issues (Skardhamar 2009), including the meaning of the two types. Some might argue that one should not take the types literally, and that the hypothesized types (and the groups estimated in GBTM) are "ideal typical". But as others have noted, if life-course persistent offending (LCP) is just another name for high-rate offenders, there is nothing to disagree about (Sampson and Laub 2005: 20). As long as the theory is not clear about its predictions, it is hard to evaluate the implications of empirical evidence.

A related argument is that if GBTM fails to find a pattern implied by the theory this counts as negative evidence. Clearly, such inference relies heavily on the precision of the theory. But assuming the theory is precise, failing to find a group using GBTM only means that the hypothesized group is smaller than the ones identified. The argument has only some strength if the hypothesized group also is predicted to be among the most common ones. However, if the hypothesis is reasonably clear, the best way to settle such issues is not necessarily to use GBTM, as one could for example simply count the number of persons who fit the expected pattern.

As Erosheva, Matsueda and Telesca (2014) point out, there is a tendency in studies using GBTM to ask "How many groups are there?" Indeed, the number of groups is a central concern in many published

studies, and also the focus of two review articles (Piquero 2008, Jennings and Reingle 2012). In my view, the number of groups is not all that informative, primarily because, regardless of model fit, the statistics alone do not provide sufficient evidence that meaningful (distinct) groups truly exist. If the true latent distribution is continuous, I would be interested in the overall shape of the distribution the support points approximates – not in how many support points it takes. Professor Day (this issue) points out that the groups are only approximations of the constructs of interest. It is then necessary to be specific on what the constructs of interest are. If the underlying heterogeneity is not truly discrete, then one should aim at describing the distribution it approximates. GBMT or other nonparametric models can be useful to this end, but so can more conventional models assuming parametric distributions.

Although my initial enthusiasm for GBTM has faded, I continue to regard it as a potentially useful tool in the criminologists' arsenal of statistical methods, but like any powerful tool it should be handled with care. As the field moves forward, I would like to see the following improvements in the way in which criminologists use GBTM in their research:

1. As a matter of wording, researchers should avoid stating that so-and-so many groups have been "identified" as this gives the impression that truly distinct groups exist in the data. Instead, the correct wording should convey that the best-fitting model entails this many groups. I think it would be better to use terms like "established" or "constructed" as these imply that the groups are something the researcher takes an active part in creating. I believe this practice would help avoid unwarranted reification; a goal most scholars in the field seem to agree with (Nagin 2005, Day this issue). Of course, there might be cases where "identified" is the appropriate term, but that would require an explicit justification.

The number of groups should not be a central part of the research question unless one really believes that the unobserved heterogeneity is meaningfully discrete. A better question would be "What is the latent distribution of heterogeneity?" Greenberg and Ezell (2009) suggest using conventional multilevel models to assess the distribution of unobserved heterogeneity using standard software: Once the model is fitted, one can predict the individuals' intercepts and growth parameters (see also e.g. Skrondal and Rabe-Hesketh 2004). Afterwards, one may plot these point estimates to see if the predicted values cluster or not. (Importantly, the predicted values do not necessarily follow the theoretical distribution assumed in the model, and might cluster). Such results could then be compared with results from GBTM, for example, by checking how the predicted intercepts and growth parameters are distributed over the posterior probabilities from GBTM. There are probably more sophisticated ways of doing this, and I look forward to seeing such analyses performed. Another promising approach was suggested by Erosheva et al. (2014) who used unimodal curve registration (UCR) for studying criminal trajectories. In general, comparing results from models based on different assumptions is worth exploring further.

2. Advocates of GBTM should provide clearer advice as to when the groups should be interpreted as real vs. heuristic. Bauer (2007) makes the recommendation to not interpret the mixture components unless there are explicit reasons for doing so, but focus instead on the overall distributions. Bauer distinguishes between direct and indirect interpretations of the latent classes. The latter implies focusing on the overall latent distribution of which the discrete groups are supposed to be approximations. For an indirect interpretation, the group-specific parameters are not of particular interest. Moreover, the common practice of interpreting the findings as if the groups were real while just stating the caveat that they might not, easily leads to misunderstandings and unclear interpretations. I think Bauer's advice is good and should be adopted in criminological studies using GBTM.

3. What GBTM does best is summarize univariate longitudinal patterns into a manageable number of groups of persons who behave similarly. Without a question, GBTM is an elegant descriptive technique. Erosheva et al (2014: 325) notes that using GBTM to control for heterogeneity is underutilized in criminology, and they found few studies doing so. One exception is Haviland and Nagin (2007) who used propensity score matching to estimate the causal effect of gang membership on violent offending. In addition to other variables, they summarized earlier offending using GBTM and included the predicted posterior probabilities in the matching model. It seems obvious that taking into account the timing and frequency of past behavior improves the comparability of the controls, and using GBTM to this end makes sense. That said, one could probably

also summarize past behaviour using ad-hoc categories (such as the frequency of prior delinquency), but using GBTM might be more effective. Another example is Skardhamar and Savolainen (2014) who summarized pre-employment offending trajectories using GBTM when studying post-employment offending.

In general, I would like to see more studies using GBTM to test theories deductively. This relies on the precision of the relevant criminological theory. If the research question is sufficiently clear, GBTM may be the recommended approach.

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A Note from the Editor

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I wanted to first take a moment to express my gratitude to all of the people who have helped provide content for this and the past two newsletters. This has truly been a group effort. As I put this newsletter together, I noticed how much of an international effort this was as well. Our board members and authors come from all over the world. With members from 13 countries, it would seem that criminologists around the world are interested in the developmental and life-course (DLC) criminology.

I would now like to assess where we are and where we are headed. As mentioned in the membership section, the DLC division of the ASC has experienced a rapid growth in membership. With the possible introduction of a DLC journal, the DLC division will provide a new outlet for scholarship in the DLC area. I would like to make sure that the DLC newsletter and web site are also filling a need.

In addition to board reports, the past two newsletters contained excellent articles by Arjan Blokland and Chris Gibson. The newsletter committee was able to put together some resources for members and the program committee was able to give us information on the 2013 ASC conference.

It is hoped that you find the current articles on employment, education and crime, and group based trajectory modeling to be of interest. Thanks to Frank Weerman, David Day, and Torbjørn Skardhamar for taking the time to write and submit articles.

With this issue, we have added a section that contains a list of new DLC books in print. We would like to make this a regular feature, and perhaps even add a list of recently published articles by DLC members. If you have a newly published work, please send me the reference by email and I will try to include it in the next newsletter.

If all goes according to plan, our next newsletter will contain a series of articles on longitudinal data analysis. This will be a series of reports from a panel moderated by Stacey Bosick at the 2013 ASC conference. We look forward to learning more about longitudinal data analysis from Delbert Elliott, David Farrington, Rolf Loeber, Magda Stouthamer-Loeber, and Edward Mulvey.

The next newsletter should also contain information on upcoming programs for the ASC conference in November. This material will be coming from the programming committee.

If you have ideas for content that would be appropriate for a future DLC newsletter, please send them to me. I have nothing left in the pipeline for after the next newsletter, so your input will be most appreciated. Please send me any requests for information that you would like to see presented, or any offers to write articles for future newsletters.

I would like to point out that past newsletters and other content are available on the DLC web site at http://www.dlccrim.org. The DLC web site is in need of some maintenance and a facelift. Any suggestions for web content are also appreciated.

In keeping with the international scope of our membership, I hope that those in the northern hemisphere enjoy the summer, and those in the southern hemisphere enjoy the winter!! We will be back next fall/spring with another edition.