Classification of patterns of offending in developmental and life-course criminology, with special reference to persistence

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Abstract

Developmental and life-course criminology can be differentiated from other types of criminology by its focus on, and appreciation of, change over time in antisocial behaviour and offending, using longitudinal research. This approach emerged from a long history of longitudinal studies which culminated in the articulation of the 'criminal careers' perspective in the mid 1980s. Since then there have been numerous analyses and developmental and life-course theories which have attempted to explain and classify patterns of offending and antisocial behaviour over time. In this paper we consider various methods used to classify these behaviours, using the examination of persistent antisocial behaviour and offending as a case study. While sophisticated analytic techniques exist, we argue that in the case of identifying persistent offending, a focus on the duration of offending is the key consideration.

Developmental and life-course criminology can be differentiated from other types of criminology by its focus on, and appreciation of, change over time. The other papers in this special issue cover the classification of different types of offending and related behaviours, and while offending 'types' form an important part of developmental

and life-course criminology, its unique contribution is to approach the examination of *change over time* in these behaviours, using longitudinal research. Research in this area makes use of data sets ranging from a collation of official data that tracks individuals through one or more government body such as policing, corrections, and health systems, to prospective longitudinal data sets that employ survey methods and interview tools to follow-up individuals over time. Some of the best studies in this field have blended these approaches. This leads to the question of which behaviours do we, as developmental and life-course criminologists, study as the dependent variable? The short answer is all of them.

In this paper we describe the ways in which developmental and life-course criminologists classify patterns of behaviour over time. In doing this we describe the 'criminal career' tradition which emerged from the collective findings of a number of longitudinal studies, and then consider what types of behaviour these studies have measured. One particular pattern of behaviour that has captured considerable attention is that of 'persistent offending'. We examine early typological approaches to identifying persistent antisocial behaviour across the life-course. We then provide a discussion of the pros and cons of classifying patterns of behaviour and identifying persistent offending using statistical approaches such as group-based trajectory models and latent growth curves. This is followed finally with a proposal for a simpler approach to identifying patterns of persistent antisocial behaviour and offending, with the goal of ensuring consistency in conceptualisation and operationalisation of the concept within the field of developmental and life-course criminology. Firstly, though, we turn to the issue of measurement and consider what we are focused on when we study criminal careers.

1.1 Measurement

As mentioned, developmental and life-course criminologists are interested in behaviours ranging from the most serious criminal offending (i.e., those that have been adjudicated as convictions by the criminal justice system) through to significantly less socially harmful behaviours which may not come to 'official' attention. The latter are often identified with self-reported measures such as the Child Be[Instruction: This is a proper noun and should not be changed from US spelling.]haviorBehaviour Checklist (Achenbach, 2001) and were pioneered in the field by Elliott et al. (1985). Given that developmental and life-course criminologists are interested in the development of behaviour throughout the entire life-course (pre-natal period to death), official data are often not the best measures, as these may miss important transitions. Earlier in the life-course, reports of behaviour are collected from checklists completed by parents, teachers, and carers (for example, those used in the Pittsburgh Youth Study (Loeber et al., 2017)); self-reports from those who are old enough and have sufficient language skills to report on their own behaviours; and also through direct observation (such as the early observations of aggression from 17 months of age by Tremblay et al. (2004)). It is important to keep in mind that comparisons between self-report scales and official offending can be further complicated by the fact that many of the behaviours that are included in self-reported antisocial behaviour scales would not be adjudicated as a crime even if they had come to the attention of police (Junger-Tas & Marshall, 1999).

The difference between self-report and official reports of behaviour has long been a topic of investigation by those working in the field (Jolliffe & Farrington, 2014). An early examination of the differences between self-reported and officially-reported delinquency found that the relationship between race and crime observed in official statistics, which suggested that ethnic minorities were more 'criminal', was not observed in self-report data (Gould, 1969, 1981). However, self-reported and official delinquency were much more similar amongstamong Caucasians. More recent examinations, where self-reported arrests were compared to official records of arrests, have shown relatively high levels of concordance (Babinski et al., 2001; Hindelang et al., 1979; Maxfield et al., 2000). Despite this, arrests for serious offences were less likely to be self-reported in a

Californian study (Babinski et al., 2001) but more accurately reported in the UK Cambridge Study of Delinquent Development (Kazemian & Farrington, 2005). In an analysis comparing self-reported offending and official records for people of different ethnicities in Seattle, Jolliffe et al. (2003) found that they generally provided a similar picture for most ethnicities, with greater similarity for White males and least similarity for Asian females. In terms of measurement, retrospective self-reporting, or reporting on behaviour in the distant past, has been found to be much less accurate than the collection of self-report offending with shorter periods of recall time and more regular follow-up (Kazemian & Farrington, 2005), highlighting the importance of designing rigorous prospective longitudinal studies.

While overall official and self-report offending provide a complementary picture of offending, discrepancies can be observed when comparing self-reported offending and convictions. In the Cambridge Study in Delinquent Development, virtually all the men admitted to committing an offence that could have resulted in a conviction; they self-reported: thirty times more offences than those identified officially; a significantly earlier age of onset; and significantly longer criminal career durations (persistence) when compared with convictions (Farrington et al., 2014). Acknowledging that self-reported measures capture a much broader range of behaviour, overall self-report measures are considered to have acceptable reliability and validity (Thornberry & Krohn, 2000). Careful consideration needs to be made of which operationalisation of antisocial and/or offending behaviour has been utilised when interpreting the generalisability of findings and also in the tests of theoretical postulates. The study of the patterns over time in both self-report and official offending ~~have~~ has been conducted predominantly in the criminal career framework. We now turn to a discussion of its origins and key points of focus.

~~2.~~2 The criminal career perspective and key dimensions

The Developmental and Life-Course (DLC) criminology paradigm grew from a critical mass of findings that were derived from a number of early prospective longitudinal studies (see Farrington (1979) for a review). These were expertly packaged by Blumstein et al.'s (1986) who proposed that longitudinal patterns of offending, known as criminal careers, comprised distinct dimensions that reflect quantifiable variations in criminal behaviour. Whilst the idea of a criminal career has been familiar to criminologists since at least the early-to-mid twentieth century (as reflected, for example, in the works of Eleanor ~~[~~(1989~~-~~–1972~~]~~) and Sheldon ~~[~~(1896~~-~~–1980~~]~~) Glueck), Blumstein et al. (1986) were instrumental in providing an empirical and policy-informed framework for the study of individual patterns of offending (Blumstein et al., 1988). Indeed, over the last forty years, research on criminal careers has been instrumental for the advancement of theory and policy, particularly in regard to the identification of distinct patterns of behaviour over the life-course (Piquero et al., 2012; Whitten et al., 2019).

There are a number of important dimensions of the criminal career paradigm including *onset, termination, desistance, duration, persistence, frequency,* and *seriousness.* The initiation of a criminal career is reflected by the term *onset*, which can vary from the age of the first official offence to the first report, by the parent, teacher, or individual, of antisocial behaviour, depending on the data available in each study. An early age of *onset* is associated with later frequent and pervasive patterns of offending (Piquero, Farrington, & Blumstein, 2007), and is often regarded as one of the key criteria necessary for the identification of "persistent", "chronic", and other high-risk offender typologies. Similarly, the concept of *termination* refers to the age of the last observed criminal offence in studies that use official offending, and this is used to signify the end of a criminal career. Often, this term is used interchangeably with *desistance*, which has variously been defined, as the causal process leading to the cessation of criminal behaviour (Sampson & Laub, 2003a, 2003b), the perpetual maintenance of crime-free behaviour (Bottoms et al., 2004), or as a deceleration in the frequency, variety, and seriousness of offending (Le

Blanc & Loeber, 1998). In the criminal career literature, the qualifier "*active*" is used to denote an offender or criminal career that has not yet desisted (i.e., *active* offender / *active* criminal career). Obviously, the ability to identify true desistence critically depends on the length of the follow-up, and unfortunately, relatively few longitudinal studies have such long follow-ups. Recent evidence from men followed to age 61, suggests that active careers can be very long (Farrington, 2019).

Most criminal careers follow an 'age-normative' pattern of offending (Thornberry, 2005) with an onset of around middle adolescence and a termination before 25 years of age (Moffitt et al., 2002: Piquero, Farrington, & Blumstein, 2007; Loeber & Farrington, 2012). The time between *onset* and *termination* is referred to as the criminal career *duration*. Whilst a criminal career can consist of a single offence (Blumstein et al., 1988), a criminal career *duration* is only observable among offenders who have committed two or more offences at different time points. Research on criminal career *duration* is relatively sparse given the methodological challenges associated with observing criminal careers in their entirety. Nonetheless, most criminal careers tend to be of a relatively short duration of around five to ten years in length, with considerably fewer offenders continuing to offend over longer durations (Farrington, 2019).

Offence *frequency,* denoted as *lambda* (λ), refers to the number of offences committed by an offender during their criminal career. In this regard, λ reflects the extent of an individual's repeated involvement in crime (Blumstein et al., 1988). Generally, those with an earlier age of onset tend to have a greater offence frequency and also a longer criminal career duration (Piquero, Farrington, & Blumstein, 2007). The *seriousness* of offending is also correlated with greater offence frequency. Indeed, *escalation* in offending, or the progressive involvement in more serious offence types over an active criminal career, is common ~~amongst~~among more frequent offenders (Liu et al., 2011). A greater offence frequency is also associated with more *versatility* in offending (i.e., the tendency to engage in different types of crime), whilst offending in later life typically coincides with greater offence *specialisation* (i.e., the tendency to engage in similar types of crime) (DeLisi et al., 2011; Nieuwbeerta et al., 2011; Piquero, 2000).

Of all these dimensions, it is persistent antisocial behaviour and offending which has captured the attention of researchers and policy makers alike. Persistence has been defined many different ways (see below), but definitions tend to include aspects of onset (i.e., earlier age of onset), duration (i.e, longer duration), and frequency (i.e., greater number of offences). In conjunction with identifying persistent offending has been examining the factors that explain antisocial behaviour and offending. These concepts warrant consideration here because their relationship to the outcome of persistent offending is important.

The nomenclature around risk and protective factors for offending can be very confusing as researchers have tended to use these terms imprecisely, but the work of Loeber et al. (2008) provides a useful organisational framework. Using the Pittsburgh Youth Study, a prospective longitudinal study of about 1,500 boys starting in 1st, 4th and 7th grades, Loeber et al. (2008) trichotomized potential explanatory variables (e.g., low school achievement) into a 'risk' end (the 25% scoring lowest on school achievement), the middle (the 50% scoring in the middle of school achievement), and the 'promotive' end (the 25% with highest school achievement). If those who scored the lowest on school achievement were significantly more likely to commit offences than those in the middle and promotive end, this would be a 'risk' factor. If those who scored the highest on school achievement were significantly less likely to commit offences than those in the middle and risk end, this would be a 'promotive' factor. If there was a linear relationship, such that those who scored low on school achievement were more likely to commit offences than those who scored in the middle, and those in the middle were more likely to offend than those who scored high, this would be a 'mixed' factor. Loeber et al. (2008) tested many

variables and found that many that had been considered risk factors were actually promotive, such as having fewer symptoms of attention deficit hyperactiv~~ity~~ely disorder. ~~This is of obvious practical importance because if we were providing to support with those who have a particular risk factor we would provide this to those 25% scoring the highest, but when if we wanted to target a promotive factor we would have to target the middle 50% as well.~~ This is of obvious practical importance because if a variable is a mixed factor for offending (e.g., depressed mood) then targeting and improving this may reduce the likelihood of offending for all, because of the linear relationship it has with offending. However, if the variable is a risk or promotive factor the success of the intervention may depend on targeting the correct group, which would be the 25% most extreme for a risk factor and the 75% least extreme for a promotive factor.

The term *protective factor* has also tended to be used inconsistently, with some researchers equating this with, what Loeber et al. (2008) referred to as a mixed factor. Other researchers have defined a protective factor as a variable that interacts with a risk factor to nullify its effect or as a variable that predicts a low probability of offending among a group at risk. Therefore, protective factors can be divided into two categories; interactive and risk-based. *Interactive protective factors* are buffering factors that moderate against the effects of risk factors in high-risk groups (Jolliffe et al., 2016). *Risk-based protective factors* predict a low probability of the onset or stability of antisocial behaviour or offending irrespective of the presence of risk factors (Jolliffe et al., 2016). Despite these varied definitions, the large majority of research on persistent antisocial behaviour and offending has taken a 'mixed' factor approach and referred to this as a risk factor approach.

3.3 Existing examinations of persistent offending

Research on criminal careers, as situated within the developmental and life-course criminology paradigm, has uncovered a number of remarkably consistent findings. For example, it is widely recognised that the aggregate rate of crime participation peaks in late adolescence and early adulthood, and steadily declines thereafter (Farrington, 1986). Likewise, many studies have found that early-in-life risk factors (e.g., poor parental supervision) are associated with an earlier age of onset and more frequent offending, whilst certain protective factors (e.g., high intelligence) can decrease this risk ~~amongst~~among vulnerable individuals (Baglivio et al., 2014; Farrington, 2017). More concerning, however, is the consistent finding that a small percentage of the population is often responsible for around half of all crimes (Moffitt, 1993; Wolfgang et al., 1972). This often-replicated finding has spurred much interest by researchers and policy makers and has led some to argue that these offenders, who have a disproportionate impact on aggregate crime rates, should be at the forefront of incapacitation efforts (Blumstein et al., 1986). As this small group of offenders also demonstrates marked continuity in their criminal behaviour, they have been aptly called 'persistent offenders' by the justice community.

Persistent offending has been a topic of interest in the criminal justice literature for some time (Radzinowicz, 1939). Whereas most criminal careers are relatively brief, typically lasting no more than a decade on average (Whitten et al., 2017), persistent offenders continue to offend despite 'naturally occurring' pressures to desist (Laub & Sampson, 2003). Exceedingly long criminal careers are associated with more serious offending (Liu et al., 2011), frequent offending (Whitten et al., 2017), and disproportionate economic damage on society (DeLisi & Gatling, 2003). Current incapacitation efforts seem to do little to prevent a persistent criminal career (Cullen et al., 2011). There is strong evidence that imprisoning offenders does not reduce future offending, either through individual deterrence nor by incapacitation (MacLeod et al., 2012) and there is further evidence that imprisonment may even contribute to the development and maintenance of offending (Chen & Shapiro, 2007). Developmental crime prevention strategies may be a more useful and cost-effective alternative that prospectively identifies vulnerable individuals based on key early-in-life risk factors (Dodge & McCourt, 2010).

There have been many studies that explore the factors associated with persistent offending, with the intent that future prevention efforts may target these factors and thus reduce this persistence. Much of this research centres on the proposition that, in childhood, those who become persistent offenders experience cognitive deficits, a dysfunctional upbringing, and structural adversity (Farrington, 2005; Moffitt, 2006; Thornberry, 2005). It is also generally thought that persistent offenders commit their first offence at an early age, are versatile in their offending, and mostly offend alone (Moffitt, 2006). One critical challenge which has hampered research in this area however, is that there is no agreed definition or operationalisation of persistent offending or a persistent offender (Whitten et al., 2017).

Persistent offenders have been referred to by many names, including *chronic offenders*, *life-course persistent*, *habitual offenders*, *early starters*, and *career criminals* (Blumstein & Moitra, 1980; Moffitt, 1993). Scholars have struggled to agree whether, for example, offending across specific age ranges (Bergman & Andershed, 2009), committing many offences (Hill et al., 2007), or an early age of a first offence (Lobley et al., 2012), should be the defining feature of persistent offending. Detailed justifications for these definitions are rarely provided.

Current definitions of persistent offending broadly correspond to three key measures of the criminal career: *duration, onset,* and *frequency* (Whitten et al., 2017). Definitions that measure persistent offending by the duration of the criminal career include "offending before and during adulthood" (Farrington et al., 2009), and "offending across multiple stages of the life-course" (Sampson & Laub, 2003a, 2003b). These definitions have been operationalised as "offending before and after the age of 21" (Pulkkinen et al., 2009), and "offending every decade from the age of 10 to 60" (Sampson & Laub, 2003a, 2003b). Persistence has also been defined by onset age, and has been operationalised as "committing three offences before the age of 14" (Hagell & Newburn, 1994), or "at least one offence committed between 10–12 and 12–14 years of age" (Hay & Forrest, 2009)". Furthermore, persistence, as measured through offence frequency, includes definitions such as "the most frequent offenders" (Piquero, Daigle, et al., 2007), and "chronic offenders" (McGloin & Stickle, 2011), and has been operationalised as "the ten percent most frequent offenders" (Piquero, Daigle, et al., 2007), and "those who have committed five or more offences" (McGloin & Stickle, 2011).

4.4 The need for consistent definitions

Many of these methods have significant conceptual limitations. For example, in the case of identifying persistent offenders as those who offend both before and during adulthood, this method assumes that all persistent criminal careers commence before adulthood, despite evidence indicating that adult-onset offenders can also have extremely long criminal careers (Gomez-Smith & Piquero, 2005; Whitten et al., 2017). Furthermore, many researchers have identified persistent offenders as those with an early age of onset, on account of the inverse correlation between onset age and criminal career duration. However, this perspective contradicts the widely established finding that many young offenders, even those with an early onset of offending, do not continue to offend into adulthood (Robins, 1978; Whitten et al., 2017).

To direct more attention to this issue, Whitten et al. (2017) searched for all the ways persistent offending had been defined and identified in the research literature from 1990 to 2017. This search uncovered 38 distinct operationalisations of persistent offending, with the key measure for each broadly corresponding to either criminal career duration (15 operationalisations), offence frequency (12 operationalisations), age of onset (nine operationalisations), or a combination of the three (two operationalisations). Of these operationalisations, 35 of which were able to be replicated using data from the Cambridge Study in Criminal Development. Examination

and comparison of the criminal careers of persistent offenders identified by these 35 methods revealed that different operationalisations generally identified qualitatively different offenders as persistent. If researchers cannot reliably identify persistence, then their ability to identify the risk factors associated with this behaviour will inevitably be limited.

The lack of agreement on how best to define and measure persistent offending also has serious ramifications for criminal justice policy makers (Hagell and Newburn, 1994;[Instruction: You will need to fix the brackets on the Piquero reference here.] (Piquero, 2009)Piquero, 2007). Without clear instructions on how to identify persistent offenders, or those at risk of becoming them, targeted prevention programs are likely to suffer from high rates of false positive identification. This may promulgate a net-widening problem where indicated prevention tactics target those not necessarily at risk of persistent offending. This may inflate the perceived efficacy of otherwise ineffective crime prevention programs, in addition to being an unnecessary strain on resources and infrastructure.

It is therefore paramount that researchers adopt a consistent definition of persistent offending in order to improve the quality and reliability of research on the phenomenon. As a first step, some have proposed that persistent offending be consistently defined by the duration of the criminal career (Whitten et al., 2019; Jolliffe, Farrington, Piquero, MacLeod, & Van de Weijer, 2017). As scholars from the health sciences have argued (Caetano et al., 2006), persistence is best understood as the duration of an event. Persistence is a temporal term denoting a deviation from a 'normative' period of activity. Evidence indicates that persistent offenders identified by an operationalisation based on the duration of the criminal career comprise a small proportion of the population (5–10%), yet are responsible for around half of all crimes, and have the longest criminal careers (Jolliffe, Farrington, Piquero, MacLeod, & Van de Weijer, 2017; Whitten et al., 2019). Operationalisations of persistent offending based on any other dimensions of the criminal career (i.e., onset or frequency) fail to capture those with the longest criminal career durations – the key characteristics of a persistent offender!

Research on persistent offending revolves around understanding why some offenders demonstrate an unusually enduring propensity to offend. To answer this question, only the duration of the criminal career should be measured. Identifying persistent offending based on multiple dimensions of the criminal career fails to consider the potential patterns or variations in offending amongstamong those with the longest criminal career durations. Indeed, longer criminal career durations are associated with an earlier age of onset and a greater number of offences committed. Nonetheless, numerous empirical observations have also found that not all lengthy criminal careers involve high-rate frequent offending or an early age of first offence (Moffitt, 2006; Farrington, Piquero, & Jennings, 2013). Theorists have translated these findings to indicate that some persistent offenders may first offend at a relatively later age or engage in a low rate of offending (Moffitt, 2006; Thornberry, 2005). This is consistent with longitudinal research indicating that that among offenders with a criminal career duration of 25 years or longer, around 10% were first convicted after their 18th birthday, and approximately 15% had four or fewer convictions (Whitten et al., 2017).

There are a number of reasons why persistent offenders may vary in offence frequency or age of onset. First, many offences may go undetected. Indeed, findings from the Cambridge Study in Delinquent Development indicate that each officially recorded conviction corresponded to around 34 self-reported offences (Farrington et al., 2014). Second, opportunities for crime fluctuate across the life-course, and are mediated by personal (e.g., age), environmental (e.g., criminogenic environments), and social factors (e.g., informal attachments to social controls) that operate at different times and contexts. Finally, the risk factors associated with criminal career duration may differ fromto those associated with the prevalence of offending and an early age of onset (Whitten,

McGee, Homel, & Farrington, 2019; Farrington, 2020). Hence, differences in early life experiences may lead to variations in offence frequency and onset age between persistent offenders.

Below we move into detailed consideration of three approaches that have focussed on identifying and explaining persistent antisocial behaviour and offending. Since the mid-1990s there has been an increased use of both group-based trajectory models (Nagin and Land, 1993) and latent growth curve techniques (Osgood, 2005) for uncovering patterns over time in the development of both antisocial behaviour and offending. There are varying degrees to which these techniques successfully identify the criminal careers of the longest duration. Later we identify a simpler approach for identifying persistent offenders. Firstly though, we provide a brief overview of the theoretical ideas on which have has driven these techniques, including the techniques used in early theory development.

5.5 Operationalisations of persistent behaviour in existing developmental and life-course theories

One developmental and life-course theory of crime, particularly in the study of persistent offending, is Moffitt's (1993, 2018) dual taxonomy of *life-course persistent* and *adolescence-limited* antisocial behaviour. Life-course persistent offenders were operationalised as those who exhibited extreme childhood antisocial behaviour in at least three of the four assessment periods (five, seven, nine, and 11 years), and then self-reported delinquency at either age 15 or 18 (Moffitt & Caspi, 2001). It was argued that the foundations of persistence begin with childhood risk factors (e.g., neuropsychological deficits and family poverty) and early onset conduct problems (Moffitt, 1993). Life-course persistent behaviour is characterised by stability and continuity through varying manifestations of antisocial behaviour across time: "biting and hitting at four, shoplifting and truancy at ten, selling drugs and stealing cars at 16, robbery and rape at 22, and fraud and child abuse at 30" (Moffitt, 1994, p. 12). Moffitt argues that there is also uniformity in the prevalence rates of various expressions of serious antisocial behaviour, with many studies showing prevalence at around five to ten10 per cent% of males.

Longitudinal research suggests that the small proportion of people exhibiting antisocial behaviour at each stage in the life course, are actually the same group of life-course persistent people (Moffitt, 1994, p.11). The first step in this pathway, according to Moffitt's theory, is inherited or acquired neuropsychological deficits. Moffitt cites research demonstrating that even minor neuropsychological deficits can result in a myriad of developmental problems that may contribute to dysfunctional parent-child relationships in even the most loving families' (Moffitt, 1994, p.15). Neuropsychological damage also leads to poor language development and self-control behaviours and Moffitt (1994) observes that the link between verbal impairment and antisocial outcomes is one of the largest and most robust effects in the study of antisocial behaviour.

It is proposed that children with such deficits induce a series of failed parent-child interactions and that their difficult temperament contributes to a socialisation environment that seems to exacerbate their difficulties (Moffitt, 1994, p. 20). Over the life-course a series of failed interactions leads to a repertoire of antisocial behaviours, and as the individual has learned few prosocial behaviours, the options for change are few (Moffitt, 1993, p. 683). These individuals are more likely to be rejected by both adults and peers and as a result may withdraw or strike out pre-emptively, causing further social isolation.

Persistence of this antisocial behaviour is perpetuated by the interaction between individuals' traits and the environmental reactions to them. Any opportunities for change in this cycle are transformed into opportunities for continuity in antisocial behaviour. These individuals, whose behaviour consists of pathological antisocial behaviour across the life-course, are quite distinct from those whose antisocial behaviour is short-term and

situational (Moffitt, 1994, p. 29). It is this phenomenon, with antisocial behaviour that is limited predominantly to the teen years, that Moffitt refers to as adolescence-limited antisocial behaviour (1993, p. 676).

To demonstrate this short-term antisocial behaviour, Moffitt (1993, p. 676) cites English and American research that demonstrates that the huge peak in the rate of offences in adolescence is due to an increase in prevalence of offenders rather than an increase in the frequency of offending. The behaviour of adolescents in this category is characterised by discontinuity, having never been antisocial during their childhood and being unlikely to remain antisocial into their adulthood (Moffitt, 1993, p. 685). Moffitt proposes that that the decreasing age of biological maturity, and increasing age of social maturity is responsible for adolescence-limited antisocial behaviour.

A 'maturity gap' is the result, with adolescents becoming "chronological hostages of a time warp between biological age and social age" (Moffitt, 1994, p. 31). Consequently, adolescents trapped in the maturity gap are denied access to mature status, whereas the life-course persistent antisocial adolescents will be perceived as having attained maturity. The life-course persistent individuals will possibly have their own small business in the underground economy, have fathered or mothered children and appear to be free of their family of origin (Moffitt, 1994, p. 28). The mechanism then, through which previously 'non-antisocial' adolescents become antisocial is through a process of social mimicry. The life-course persistent antisocial individuals are viewed as having access to a precious resource— 'mature status' and the individuals categorised in the adolescence-limited group, mimic their behaviours in an attempt to achieve mature status.

According to the theory, once individuals in the adolescence-limited group have reached a stage where they can access legitimate forms of responsibility, for example through marriage or entering the workforce, their antisocial behaviour will cease. For them, the cost of antisocial behaviour becomes too high and they will revert back to the prosocial behaviour skills learned early in life. However, there is some evidence to suggest that this adolescence onset group of individuals also has high levels of internalising problems and life stress that may prevent this (Aguilar et al., 2000). There are small number of adolescence-limited individuals who became trapped in a 'snare' such as a drug addiction, imprisonment, teenage pregnancy and/or interrupted education which increases the likelihood of maintaining antisocial behaviour across the life course (McGee et al., 2015; Moffitt, 1993). So despite an onset of antisocial behaviour later in life, compared to the life-course persistent group, the experience of snares, life stress, and poor mental health may lead to persistence in antisocial behaviour beyond adolescence.

There has been extensive testing of this theory, including follow-up of the men in the Dunedin Study to age 38 by Moffitt (2018). Using the identification of the life-course persistent group based on childhood and adolescent measures (as described above), she found that 55 ~~per cent~~% of these men were convicted between 26 and 38 (compared to 18 ~~per cent~~% in the total cohort for the same time period). These men who were grouped as life-course persistent in adolescence, also had poorer mental and physical health in their thirties and these findings have been replicated in many other studies (for a recent overview, see Moffitt, 2018).

A systematic approach to examine the prevalence of life-course persistent offenders, as well as other offending types (adolescence-limited and late-onset offenders using prospective longitudinal studies was undertaken recently by Jolliffe, Farrington, Piquero, MacLeod, and Van de Weijer (2017)). Overall, 55 prospective longitudinal studies were identified as potentially having relevant information about persistent offenders, and of these 14 had produced information on the prevalence of the various offending types. Additional data was made available from seven more studies. The results showed that the estimates of the prevalence of the offending groupings varied considerably, and that few studies included criminal career *duration* in their definitions of life-course persistent offenders. The average ages of onset for life-course persistent and adolescence-limited

offenders were similar, which was surprising given that age of onset was theorised to be a key differentiator of these groups (e.g., Moffitt, 1993). When Jolliffe, Farrington, Piquero, Loeber, and Hill (2017) explored the risk factors of these offending types there was little evidence that specific early risk factors were associated with specific offending types. However, life-course persistent offenders tended to have a greater number of risk factors, and the magnitude of these factors was somewhat greater than for adolescence-limited offenders, who in turn tended to have more risk factors (and of a greater magnitude) than late-onset offenders. The authors concluded that those who are grouped as life-course persistent and adolescence-limited offenders may differ more in degree (in the number and magnitude of risk factors) than in kind (in the specific risk factors that are predictive).

In contrast to a typological approach, like that proposed in Moffitt's theory, Sampson and Laub (2003a, 2003b) argue in their age-graded theory of informal social control, that weak adult attachments to informal social controls, and not childhood risk factors, are most important for the development of persistent offending. For these researchers, persistent offending was operationalised as offending at least once from age eight to 18, 19 to 31, and 31 years or older, arrest charges presentable to courts (i.e., criminal records) (Laub & Sampson, 2003). Sampson and Laub (1993, Laub, 2004) argue for a focus on cumulative disadvantage. While they investigate the mechanisms underlying the processes of persistent offending and desistence from crime (Laub, 2004, p. 38), they challenge developmental theorists' typological approaches (such as Moffitt, 1993) to understanding antisocial behaviour across the life course by "reject[ing] the idea of determinism and lawful predictability from childhood factors" (p. 34). They present a theoretical commitment to ideas of social malleability across the life course and a focus on the constancy of change. The degree to which it can be argued that developmental criminologists believe in 'determinism' and 'lawful predictability' from childhood factors is debatable but remains an ongoing point of contention among theorists. Typologies and statistical methods of grouping individuals are useful for understanding patterns in the data. The misuse of these systems of classification come about when the groups are reified as existing in reality and those interpreting the findings fall into the trap of the ecological fallacy in using group data to inform their interpretation of individuals' patterns of behaviour. In addition, as we will discuss in more detail below, some statistical techniques 'smooth over' the patterns of intermittency and variability in individual's lives.

Interactional theory of crime (Thornberry, 2005) suggests that persistent offending is largely the result of negatively reciprocated social interactions. This explanation was derived from research that operationalised persistent offenders as those belonging to longest trajectory, identified by group-based trajectory modelling (Thornberry, 2005). In these analyses, Thornberry (2005) used the 32-item self-report general delinquency index. Trajectory analysis, pioneered in criminology by Nagin and Land (1993), has become extremely popular in the last 20 years, but there are questions about the ability of this statistical method to accurately represent the reality of types of offenders and changes in offending across the life-course (Skardhamar, 2010). Trajectories are statistical concepts, and assigning particular offenders to particular trajectories may be problematic, particularly when people (mis)interpret these statistical groupings to exist in the real world. The important point is that offenders who are assigned to what are labelled 'persistent' trajectories do not necessarily have long criminal career durations.

We believe that prospective longitudinal studies starting in childhood or adolescence and following up into late adulthood are the only way to properly investigate persistent offending. It is important to distinguish persistent offenders who are identified based on the *duration* of their offending in prospective longitudinal studies from offenders with persistent *trajectories* of offending. Below we consider the strengths and weaknesses of two statistical approaches that have been used to identify persistent offending in prospective longitudinal studies;

growth curve models and group-based trajectory modelling. After this we will return to discussion of identifying persistence based on duration of offending.

6.6 Strengths and weaknesses of the two statistical grouping techniques

Standard growth curve modelling and group-based trajectory modelling are two important statistical techniques that allow developmental and life-course criminologists to explore developmental trends in antisocial behaviour and offending (Nagin, 2010). Both of these techniques allow researchers to identify patterns of behaviour which may be considered 'persistent'. At the broadest level, the term growth curve analysis encompasses any statistical approach that captures a trend in a dependent variable over time (Osgood, 2005). There are, however, distinct differences in the assumptions of standard growth curve models and group-based trajectory models that distinguish these two specific techniques. Specifically, standard growth curve models, estimated using either latent growth curve or multilevel modelling techniques, treat the underlying distribution function as continuous and model the variation around a mean trajectory of behaviour (Singer & Willet, 2003). In contrast, group-based trajectory models are categorical, allowing for individuals to be grouped according to distinct developmental trajectories, with varying underlying distributions (Nagin, 2005). This distinction both underlies and fuels the debate about whether individuals should or should not be grouped based on their trajectories of antisocial behaviour (Raudenbush, 2005; Sampson & Laub, 2005; Walters, 2012; Walters, 2014).

Group-based trajectory modelling has made a significant contribution to the ability to explore the development of antisocial behaviour (Nagin & Odgers, 2010a, 2010b; Piquero, 2008). The semi-parametric nature of group-based trajectory modelling overcomes some of the difficulties associated with exploring the data of individuals with extremely high or low levels of antisocial behaviour (Brame et al., 2012); those with the highest levels are also most likely to be persistent offenders. In general, analytic practice is to remove these individuals as outliers or transform the distributions to reduce the dispersion of the data. As a consequence, this creates the risk of deleting, reducing, or obscuring rare groups, such as those who engage in persistent offending behaviour (Nagin, 2005). Moreover, group-based trajectory modelling increases the accuracy and replicability of assigning individuals to groups by removing the need for researchers to define these groups using predetermined cut-offs on scaled distributions as has been done in typological approaches (Barrio et al., 2017; Bennette & Vickers, 2012; Broidy et al., 2003). Thus, group-based trajectory modelling provides a robust way for both the initial identification of groups and for the exploration of different distributions of normative and non-normative data within a single population.

The ability of group-based trajectory modelling to address the limitations of parametric methods in exploring antisocial behaviour and offending has allowed for extensive testing of Moffitt's (1993) developmental taxonomy theory to move beyond arbitrary cut-points. In particular, group-based trajectory modelling has provided evidence for the adolescence-limited and life-course persistent offending trajectories. The technique has allowed for further development of the theory, also finding evidence for a small group of people who have stable-low levels of antisocial behaviour over time (see Jolliffe, Farrington, Piquero, MacLeod, & Van de Weijer, 2017; Moffitt, 2018; Piquero, 2008 for reviews of findings on taxonomy groups).

Researchers who reject a taxonomic view of antisocial behaviour (e.g., Laub & Sampson, 1993; Osgood, 2005; Sampson & Laub, 2005) argue, however, that these groups are an artefact of the method, raising questions of whether using group-based trajectory modelling has implications on the theoretical and conceptual interpretations of the development of antisocial behaviour that are not fully understood (Saunders, 2010; Skardhamar, 2010).

The instability and variations in categories of group-based trajectory analyses has been demonstrated when using different length datasets (i.e. following up individuals for longer periods of time). Changing the length of follow-up (i.e. comparing ages 10–32, 10–40, 10–48, and 10–56) has shown that the proportion of individuals assigned to groups changes and also the type of trajectory that an individual gets assigned to can change (Farrington, Piquero, & Jennings, 2013).

Standard growth curve models, although currently less common than group-based trajectory modelling in developmental and life-course criminology research, have some benefits over group-based trajectory modelling, where the type of data available allows them to be used. In contrast to the group-based trajectory approach that holds groups constant, the standard growth curve approach includes random effects in the model, allowing for the estimation of variability in individual behaviour. By holding groups constant, the true extent of behavioural variation within the population may be obscured by the arbitrary assignment to trajectory groups that may occur when using group-based trajectory modelling (Barnes, El Sayed, TenEyck, Nedelec, Connolly, Schwartz, Boutwell, Wright, & Beaver, & Anderson, 2017). While these models can be adapted to capture periods if intermittency, they often have issues with model fit. When looking at individuals who have been assigned to a 'persistent' trajectory, Bushway and Tahamont (2016, p. 379) demonstrate the marked variability and intermittency that is masked. The strong position of theory within developmental and life-course criminology may also be driving model selection in group-based trajectory modelling, with researchers being more inclined to report a persistent category to fit with theoretical expectations (Skardhamar, 2010). As such, the inclusion of random effects in standard growth curve models, reduces the risk of labelling people as "untreatable", by placing them in a persistent category, with incorrect assumptions that antisocial behavioural pathways are more fixed than they are in reality (Sampson & Laub, 2005).

The ability to explore random effects and to add time-varying effects makes standard growth curve models attractive to researchers aiming to understand how risk and protective factors influence the development of antisocial behaviour (Piquero, 2008). Research that uses standard growth curve models to explore risk (e.g., socioeconomic status) and protective factors (e.g., supportive parenting), indicate that, regardless of whether there are multiple or single trajectories of antisocial behaviour or offending, any variation around the mean average of these trajectories are likely to be related to these factors (e.g., Odgers et al., 2012). As the influence of risk and protective factors on antisocial behaviour can be explored at each time point in development, growth curve models are well suited for clinical applications, allowing for targeted intervention at specific time points where people are most influenced by these factors (Nagin & Odgers, 2010a, 2010b). This is particularly relevant for those hoping to reduce persistent offending.

Standard growth curve models, however, also have some disadvantages in exploring the development of antisocial behaviour and offending. Of particular importance for developmental and life-course criminologists, growth curve models do not allow for more fine-grained analysis of between-group differences, especially where the tail-end of the distribution (those who engage in rare behaviour) is of most interest to researchers (Nagin, 2005). Further, although growth curve models do account for random effects, they are still subject to statistical "smoothing" that obscures the true variability in individual trajectories over time (Osgood, 2005). As such, growth curve modelling is useful for showing how risk and protective factors relate to inter- and intra-individual patterns of change in antisocial behaviour over time, allowing researchers to map the general normative and non-normative development of behaviour, but they cannot account for extremely non-normative processes such as intermittency and desistance (Bushway & Tahamont, 2016).

To overcome the shortfalls in both standard growth curve and group-based trajectory modelling, there has been reasonable calls for researchers to use both approaches, either within a single study or in an attempt to replicate previous findings (Bushway et al., 2009; Saunders, 2010). It is more common for developmental and life-course researchers, however, to favour one of these approaches over the other, based on their theoretical orientation concerning patterns of development (Laub, 2006). Moreover, the ongoing pursuit of an understanding of which of these two techniques best quantifies the development of antisocial behaviour and offending has somewhat overshadowed research on alternate techniques that may overcome the issues inherent in all growth curve modelling techniques (Osgood, 2005). These current practices pose a risk that the current theoretical and empirical understanding of antisocial behaviour and offending is driven by the implications of the statistical technique used (Raudenbush, 2001; Raudenbush, 2005).

To date, research that explores the impact of growth curve techniques on interpretations of the development of antisocial behaviour is inconclusive regarding which technique is best suited to understanding this development (Bushway et al., 2009; Saunders, 2010). Previous findings suggest that *both* techniques provide valuable information on longitudinal patterns of antisocial behavioural development and offending, regardless of whether these are at a group or population level (Bushway et al., 2009; Raudenbush, 2005). Although the inclusion of random effects in standard growth curve models provides a little more context to this developmental pattern, it does not account for the true heterogeneity in antisocial behaviour across the life-course (Moffitt, 2018; Raudenbush, 2001). As such, the arguments for and against the use of these analytic techniques highlight the importance of considering not only how antisocial behaviour and offending develops, but how this development is empirically explored from a developmental and life-course perspective.

Given their utility and researchers' preference for sophisticated statistical techniques, group-based trajectory modelling is very commonly used for identifying persistent offenders without due consideration of these limitations. Because the method uses a semi-parametric approach that places individuals into distinct developmental trajectories based on posterior probabilities (Nagin, 1999), one must keep in mind that these groups are not literal entities, but convenient approximations (Nagin & Odgers, 2010a, 2010b). There is a big problem of assigning individuals to trajectories. Individual trajectories of offending often differ vastly from the aggregate group-based trajectories. Furthermore, the names and meanings given to these trajectories are determined by the researcher's discretion and interpretation, and what would be considered a 'persistent trajectory' in one study may not be considered so in another. Those trajectories with the longest active duration of offending tend to be labelled persistent and/or chronic, adding to the confusion surrounding the operationalisation of persistent offending.

7 Temporal operationalisations of persistence

We contend that measurement of persistence should be focussed solely on duration of a criminal career using lengthy prospective longitudinal studies that follow individuals for their entire lives. Although widely used, and done so with varying success, more complicated techniques to identify persistent antisocial behaviour and offending are not required. Sophisticated models, while useful categorising large amounts of longitudinal data to identify patterns, lead to the over complication and sometimes misspecification of the relatively simple concept of persistence. We now turn to a consideration of how long is long enough to be considered a persistent offender? The key goal of identifying persistent offending is to identify those who have longest criminal careers compared to those more typical in length. Recent research using the Cambridge Study in Delinquent Development defined persistent offenders as those whose criminal career lasted at least 20 years between the first and last offences (Farrington, 2020). Of the 172 offendEers, 47 (27.3%) had a criminal career lasting at least 20 years, 40 (23.3%)

had a career between 5 and 19 years, 36 (20.9%) had a career between 0 and 4 years, and 49 (28.5%) had a zero career because they only had one conviction. The longest criminal career was from age 10 to age 59. The average duration of criminal careers was 12.91 years (Farrington, 2020).

Utilising data from seven longitudinal data sets, Whitten et al. (2020) found that operationalising persistent offending as either (i) the 20% of offenders with the longest criminal career durations, or (ii) offenders with a criminal career duration one standard deviation greater than the mean criminal career duration in a population-based or general offender-based sample,[1] consistently identified a small group of offenders who were responsible for around half of all offences and had the longest criminal career durations. This consistency remained despite variations in study follow-up length, population demographics, and measures of offending. As a step towards consistency in the field, Whitten et al. (2020) propose that persistent offending can be usefully defined as a criminal career that exceeds the average duration by one standard deviation or greater than the mean criminal career duration in a population-based sample. Because persistent offending is a *temporal* concept that describes behaviour that spans a significant portion of the life-course, research on this phenomenon should be conducted using longitudinal datasets that are capable of observing complete (or as complete as possible) criminal careers. Shorter datasets that are incapable of observing whole criminal careers are unable to adequately identify persistent offenders by an extended duration of the criminal career, and are consequently at a higher risk of mislabelling offenders as persistent or non-persistent.

8.8 Conclusion

In this paper we have shown that developmental and life-course criminology can be differentiated from other types of criminology by its focus on, and appreciation of, change over time. These approaches require large, prospective longitudinal studies with lengthy follow-ups, particularly when studying the core concepts of the criminal career perspective such as onset, persistence, and desistence. Developmental and life-course criminologists examine a broad range of behaviours that are encompassed within the categories of antisocial behaviour and offending and measure these using self-reports, reports from others such as parents and teachers, and also official data. The varying ways in which our key outcome variable is conceptualised and operationalised, as well as the techniques used to analyse data, are often driven by both an ideological commitment to a particular theoretical perspective and applying methodological approaches that align with that perspective. In this paper we took the case study of examining persistent antisocial behaviour and offending over the life-course; the duration of a criminal career. We identified that although sophisticated statistical techniques are useful in making sense and the classification of large longitudinal datasets, that sometimes simple methods can be more accurate.

Uncited references

Baker et al., 2015

Lösel and Farrington, 2012

Piquero, 2009

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ⓘ The corrections made in this section will be reviewed and approved by a journal production editor. The newly

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Footnotes

Text Footnotes

[1] *Population-based samples* are representative samples from the wider population, and the inclusion of offenders is incidental. On the other hand, *general offender-based samples* only comprise of offenders, although sample selection is not determined by specific offending

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Highlights

- ~~Developmental and life-course criminology can be differentiated from other types of criminology by its focus on, and appreciation of, change over time.~~ Developmental and life-course criminology can be differentiated from other types of criminology by its focus on change over time.

- ~~The varying ways in which our key outcome variable is conceptualised and operationalised, as well as the techniques used to analyse data, are often driven by both an ideological commitment to a particular theoretical perspective and applying methodological approaches that align with that perspective.~~ Conceptualisation and operationalisation, as well as analytic techniques, are often driven by commitment to a particular theory.

- ~~Persistent offending should only be operationalised using a measure of duration of a criminal career.~~ Persistent offending should only be operationalised using a measure of duration of a criminal career.

- ~~Although sophisticated statistical techniques are useful in making sense and the classification of large longitudinal datasets, that sometimes simple methods can be more accurate.~~ Although sophisticated statistical techniques are useful in the classification of longitudinal data, simple methods can be more accurate.

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