

Prospective longitudinal research on the development of offending

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Abstract

This article reviews prospective longitudinal surveys of offending and their advantages and problems. It summarizes knowledge about criminal careers based on official records and self-reports. It documents major individual, family, socio-economic and neighbourhood risk factors, and reviews knowledge about intergenerational transmission, cross-national comparisons and protective factors. It also discusses research on the effects of life events on the course of development of offending. New prospective longitudinal surveys are recommended, with frequent assessments, and comparisons of criminal career features according to official records and self-reports. These surveys would make it possible to compare changes within individuals in risk factors and life events with later changes within individuals in offending.

Keywords

Criminal careers, cross-national comparisons, longitudinal surveys, protective factors, risk factors

Longitudinal research in criminology is concerned with the development of criminal careers and with the influence of risk or protective factors and life events on the course of development of offending (Farrington, 2003a). This article aims to review some of the major prospective longitudinal studies in criminology and some of their most important contributions to knowledge. Within the scope of this article, it is only possible to mention a few of the more salient results; for more details, see Farrington (2013, 2015). My focus is on longitudinal research on offending rather than on childhood conduct disorder, adult antisocial behaviour or substance use. I will not discuss theories or interventions as these are reviewed in other articles in this special issue.

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Prospective longitudinal surveys

Definitions

Prospective longitudinal surveys involve repeated measures of the same people. Therefore, they involve at least two data collection points. The word “prospective” implies that risk and protective factors are measured before outcomes.

The most important prospective longitudinal surveys focus on community samples of hundreds of people, with repeated personal interviews spanning a period of at least five years (Farrington, 1979b, 2013; Farrington & Welsh, 2007). I focus on community surveys (as opposed to surveys of offenders) because they are needed to study the natural history of offending and the effects of risk or protective factors and life events. In order to avoid retrospective bias, it is important to measure risk and protective factors before the development of offending and to calculate prospective probabilities (e.g. the probability that a person from a deprived background will become an offender). Therefore, I focus on prospectively chosen samples rather than retrospectively chosen ones.

I require follow-up interview or questionnaire data because I believe that official record data cannot provide adequate information on offending, risk and protective factors and life events. The best surveys collect data from several different sources, such as the participants, their parents, teachers, peers and records. I set a minimum of a five-year follow-up period because I think that at least this period is required to provide minimally adequate information about the natural history of development of offending. Of course, many prospective longitudinal surveys of offending extend for much longer, for 30–40 years or more (see e.g. Farrington & Pulkkinen, 2009; Laub & Sampson, 2003).

Advantages

In criminology, the main advantage of these longitudinal surveys is that they provide information about the development of criminal careers over time, including data on ages of onset and desistance, the frequency and seriousness of offending, the duration of criminal careers, continuity or discontinuity in offending and specialization and escalation (Piquero, Farrington, & Blumstein, 2003). They also provide information about developmental sequences, within-individual change, effects of life events, and effects of risk and protective factors at different ages on offending at different ages (Farrington, 2003a). A great advantage of longitudinal compared with cross-sectional surveys is that longitudinal surveys provide information about time ordering, which is needed in trying to draw conclusions about causes.

Problems

While prospective longitudinal surveys have many advantages, they also have problems. The main challenge is to draw convincing conclusions about causal effects (see Murray, Farrington, & Eisner, 2009). Because of their focus on naturalistic observation, longitudinal surveys find it difficult to disentangle the impact of any particular variable from the effects of numerous others. It is particularly difficult to rule out selection effects; for

example, child abuse may predict delinquency because antisocial parents tend to abuse their children and also tend to have delinquent children, without there being any causal effect of child abuse on delinquency. A popular method of ruling out selection effects is to use propensity score matching (Theobald & Farrington, 2009). Few researchers have tried to study the effects of life events by following people up before and after them in within-individual analyses (see later).

Other problems can be overcome more easily. Attrition is a problem in some longitudinal surveys, but others, such as the Cambridge Study in Delinquent Development (CSDD), have very high response rates (Farrington, 2003b; Farrington et al., 2006). The infrequency of data collection often makes it difficult to pinpoint causal order, although some studies (e.g. the Pittsburgh Youth Study or PYS; see Loeber, Farrington, Stouthamer-Loeber, & White, 2008) have many years of repeated assessments. Testing effects can also be problematic; these refer to the effect of completing one assessment (e.g., a questionnaire or an interview) on a subsequent assessment. For example, it is commonly found that self-reported delinquency admissions are greater in a first assessment than subsequently, especially if participants realise that each admission triggers further questions and therefore prolongs the interview. The importance of testing effects can often be estimated (Thornberry, 1989). It is sometimes difficult to determine if changes (e.g. in offending) over time are attributable to aging, changing time periods, or changing birth cohorts, and the length of time before key results are available is sometimes a problem. These difficulties can be overcome by following up multiple cohorts in an accelerated longitudinal design (Farrington, Ohlin, & Wilson, 1986; Tonry, Ohlin, & Farrington, 1991).

Major surveys

Farrington (1979b) carried out one of the first detailed reviews of major longitudinal studies in criminology, defined as stated above. In general, large omnibus national surveys such as the UK National Child Development Study (Bowles & Florackis, 2012) have provided little information on offending, whereas smaller focussed city-based surveys such as the CSDD (Farrington, Piquero, & Jennings, 2013) have produced hundreds of articles on offending.

Table 1 summarizes 15 important early (initiated before 1979) prospective longitudinal surveys of offending, with a minimum sample size initially of at least 300, together with a key reference from each one. Eight surveys have followed up children or adolescents at least up to age 40, with repeated assessments including measures of offending: the Cambridge-Somerville Youth Study, the Kauai Longitudinal Study, the Columbia County Study, the CSDD, Individual Development and Adaptation, the Jyväskylä Longitudinal Study, the Montreal Two Samples Longitudinal Study, and the US National Youth Survey-Family Study. Of these, the CSDD had the most face-to-face interviews (nine, over a 40-year period from age 8 to age 48). The Cambridge-Somerville Youth Study was a longitudinal-experimental project (Farrington, 2006; Farrington, Loeber, & Welsh, 2010), with an experimental intervention followed by a long-term follow-up. It was the first large-scale randomized experiment in criminology.

Of the other seven surveys, three had follow-up interviews but no offending data up to age 40 (the UK National Survey of Health and Development, the Newcastle Thousand

Table 1. Early longitudinal surveys (before 1979).

Investigator, title	Initial sample	Follow-ups
McCord, Cambridge-Somerville youth study	650 boys age 10 in 1939 (Boston, USA)	Interviews, questionnaires, records at age 48 in 1975–1979 (McCord, 1990)
Douglas/Wadsworth, national survey of health and development	5362 children born 1946 (national UK sample)	Interviews up to age 53, criminal records up to age 20 (Wadsworth, 1979)
Miller/Kolvin, Newcastle thousand family study	1142 children born 1947 (Newcastle, UK)	Interviews up to age 50, criminal records up to age 33 (Kolvin et al., 1990).
Werner, Kauai longitudinal study	698 children born 1955 (Kauai, Hawaii, USA)	Five assessments and records up to age 40 (Werner & Smith, 2001)
Eron/Huesmann/Dubow, Columbia county study	876 children age 8 in 1959–1960 (New York State, USA)	Three interviews and records up to age 48 (Huesmann, Dubow, & Boxer, 2009)
West/Farrington, Cambridge study in delinquent development	411 boys age 8–9 in 1961–1962 (London, UK)	Nine interviews up to age 48, records up to age 56 (Farrington et al., 2013)
Magnusson/Stattni/ Andershed, individual development and adaptation	1027 children age 10 in 1965 (Orebro, Sweden)	Questionnaire and record data up to age 43–45 (Bergman & Andershed, 2009)
Kellam/Ensminger, Woodlawn project	1242 African American children age 6 in 1966 (Chicago, USA)	Interview at age 32 (McCord & Ensminger, 1997)
Pulkkinen, Jyväskylä longitudinal study	369 children age 8–9 in 1968 (Jyväskylä, Finland)	Five follow-ups to age 42, with interviews, questionnaires, records (Pulkkinen, Lyyra, & Kokko, 2009)
Butler/ Golding, British cohort study	17287 children born 1970 (national UK sample)	Interviews up to age 34 (Murray et al., 2010)
Venables/Raine, Mauritius child health project	1795 children age 3 in 1972 (Mauritius)	Seven interviews up to age 40 (Raine, Liu, Venables, Mednick, & Dalais 2010)
LeBlanc/Morizot, Montreal two samples longitudinal study	3070 adolescents age 12–16 in 1974 (Montreal, Canada); and delinquent sample	Seven interviews and records up to age 50 (LeBlanc & Frechette, 1989)
Silva/Moffitt, Dunedin Multidisciplinary Health and Development Study	1037 children age 3 in 1975–1976 (Dunedin, New Zealand)	Interviews up to age 38 and records (Moffitt, Caspi, Rutter, & Silva 2001)
Elliott/Huizinga/Menard, national youth survey – family study	1725 adolescents age 11–17 in 1976 (national US sample)	Interviews up to 2002–2003 (age 38–44) and arrest records collected (Elliott, 1994)
Fergusson/Horwood, Christchurch health and development study	1365 children born 1977 (Christchurch, New Zealand)	Interviews and records up to age 35 (Fergusson, Boden, & Horwood, 2015)

Family Study, and the Mauritius Child Health Project), while the other four have not yet followed up their samples to age 40. Two surveys (in Dunedin and Christchurch) were carried out in New Zealand. Longitudinal surveys that were originally designed as case-control studies, for example comparing delinquent and non-delinquent samples (e.g. Glueck & Glueck, 1968), or risk and non-risk samples (e.g. Widom & Massey, 2015), are not reviewed here. Similarly, longitudinal surveys without repeated personal contacts are excluded (e.g. Klinteberg, Almquist, Beijer, & Rydelius, 2011; Wolfgang, Figlio, & Thornberry, 1987), as are longitudinal surveys based on linked administrative data (e.g. Stewart et al., 2015), and surveys of delinquent or criminal samples (e.g. Mulvey et al., 2010). The Montreal Two Samples Longitudinal Study is included because the sample of adolescents was followed up and analysed completely separately from the sample of delinquents.

Table 2 shows 15 important recent (initiated from 1979 onwards) prospective longitudinal surveys of offending. Three of these surveys were carried out in Australia: the Mater University Study of Pregnancy, the Australian Temperament Project, and the International Youth Development Study. One had an experimental intervention followed by a long-term follow-up (the Montreal Longitudinal-Experimental Study). Most have followed up a sample of children, through personal contacts, for at least 10 years.

Major findings

Criminal careers

The early longitudinal surveys advanced knowledge especially about criminal careers. In particular, the high prevalence of arrests or convictions of males that was discovered in these surveys was shocking to many people. For example, in Philadelphia, Wolfgang, Figlio and Sellin (1972) found that 35% of males were arrested before their 18th birthdays, and 43% were arrested before their 27th birthdays; half of the non-whites and 29% of the whites were arrested before age 18. In the CSDD in London, 21% of males were convicted by age 16, and 41% by age 50 (Farrington et al., 2006).

The early surveys revealed considerable continuity in criminal careers. In London, 61% of juvenile delinquents (convicted up to age 16) were reconvicted before age 21 (Farrington & West, 1981), while in Philadelphia 44% of juvenile delinquents (arrested up to age 17) were rearrested before age 27 (Wolfgang, 1973). Offenders were also versatile, both in the variety of crimes they committed and also in their antisocial behaviour (see also Brame, Mulvey, Piquero, & Schubert, 2014). In London, boys convicted up to age 18 tended to be heavy drinkers, heavy smokers, drug users, heavy gamblers, sexually promiscuous, very aggressive, and reckless drivers, and they tended to have unstable, low status job histories.

The greatest advances in criminal career research were achieved in the National Academy of Sciences panel report (Blumstein, Cohen, Roth, & Visher, 1986). This described the key parameters of a criminal career (e.g. prevalence, onset, frequency, termination, specialization, escalation) and set out simple mathematical models that explained and predicted the number of crimes committed. This early research has recently been updated by MacLeod, Grove and Farrington (2012).

Table 2. Later longitudinal surveys (from 1979 onwards).

Investigator, title	Initial sample	Follow-ups
White, Rutgers health and human development project	1380 adolescents age 12–18 in 1979–1981 (New Jersey, USA)	Five interviews up to age 30–31 in 2000 (Barker et al. 2007)
Bor/Najman/McGee, Mater university study of pregnancy	7233 children born 1981 (Brisbane, Australia)	Interviews up to age 30 (McGee et al., 2011)
Prior/Sanson/Vassallo, Australian temperament project	2443 children born 1982–1983 (Victoria, Australia)	Interviews up to age 28 (Prior, Sanson, Smart, & Oberklaid, 2000)
Hawkins/Catalano/Hill, Seattle social development project	808 children age 10 in 1985 (original intervention study in 1981) (Seattle, USA)	Interviews and records up to age 33 (Hawkins et al., 2003)
Tremblay/Vitaro, Montreal longitudinal-experimental study	1037 boys age 6 in 1985–1987 (Montreal, Canada)	Questionnaires up to age 17, records at age 24 (Boisjoli, Vitaro, Lacourse, Barker, & Tremblay, 2007).
Loeber/ Stouthamer-Loeber/ Farrington, Pittsburgh youth study	1513 boys age 7–13 in 1987–1988 (Pittsburgh, USA)	Interviews and records up to age 35 (Loeber et al., 2003)
Huizinga, Denver youth study	1528 children age 7–15 in 1988 (Denver, USA)	Interviews up to age 22–26 in 2003, arrest records up to 2011 (Huizinga, Weiher, Espiritu, & Esbensen, 2003)
Thornberry/Krohn, Rochester youth development study	1000 adolescents age 13–14 in 1988 (Rochester, USA)	Interviews and records up to age 32 (Thornberry et al., 2003)
Tolan/Henry, Chicago youth development study	341 boys age 11–13 in 1990 (Chicago, USA)	Six interviews up to age 22 (Tolan et al., 2003)
Golding/Murray, Avon longitudinal study of parents and children	14,062 children born 1991–1992 (Avon, UK)	Interviews up to age 21 (Barker, Arseneault, Brendgen, Fontaine, & Maughan 2008)
Resnick, national longitudinal study of adolescent health	20,745 adolescents age 13–18 in 1994–1995 (national US sample)	Four interviews up to age 24–32 in 2007–2008 (Bernat, Oakes, Pettingell, & Resnick, 2012)
Earls/Sampson, project on human development in Chicago neighbourhoods	About 6400 children from birth to age 18 (seven cohorts) in 1994–97 (Chicago, USA)	Three interviews up to 2000–2001 (Kirk, 2006)
McAra/McVie, Edinburgh Study of Youth Transitions and Crime	About 4300 children age 11 in 1998 (Edinburgh, UK)	Six interviews up to age 17, records up to age 22 (McAra & McVie, 2010)
Hemphill/Catalano, international youth development study	5769 children age 10–15 in 2002 (Victoria, Australia, and Washington, USA)	Interviews up to 2012–2013 (McMorris et al., 2007)
Wikström, Peterborough adolescent development study	716 adolescents age 12–13 in 2004 (Peterborough, UK)	Seven interviews up to age 20–21 in 2012 (Wikstrom, Oberwittler, Treiber, & Hardie, 2012)

Later longitudinal research has continued to study criminal careers, especially using self-report information. For example, Elliott (1994) used his Presidential Address to the American Society of Criminology to review results obtained in the National Youth Survey on the prevalence, onset, and continuity of serious violent offending (according to self-reports). In the PYS, Loeber et al. (2008) compared prospective age-crime curves based on reported offending (by boys, mothers, and teachers) with similar curves based on arrests and convictions. They found that the prevalence, frequency, and duration of criminal careers were all greater for reported offending than for arrests, and that the escalation from minor to more serious crime was greater for reported offending than for arrests. Theobald, Farrington, Loeber, Pardini, and Piquero (2014) discovered that, on average, there were 22 self-reported offences for every conviction. Also, there were differences in offending between different birth cohorts; boys who became teenagers during a period of high societal violence tended to be more violent themselves than boys who became teenagers when societal violence was lower (Fabio et al., 2006).

As longitudinal surveys have followed up participants to older ages, the interest has tended to shift from onset to desistance, and from early onset to later adult onset. The burgeoning knowledge about desistance has been reviewed by Bushway and Paternoster (2013) and by Kazemian and Farrington (2015). In general, the most important influences on desistance are getting married, becoming employed, joining the military, and breaking up with delinquent peers (see e.g. Sampson & Laub, 1993). In the CSDD, Farrington, Ttofi, Crago and Coid (2014) compared onset, desistance and duration in self-reports compared with convictions. They found that onset was earlier, desistance was later, and duration was longer in self-reports. Following the seminal work of Moffitt (1993), there has also been a great deal of interest in types of offenders, and especially in adolescence-limited versus life-course-persistent offenders (e.g. Farrington, Ttofi, & Coid, 2009). From the viewpoint of criminal justice policy, it is important to know whether a young offender is about to stop offending or whether he or she is likely to continue into a long criminal career.

Krohn, Gibson and Thornberry (2013) reviewed knowledge about adult onset offenders. Their offending is often different from that of earlier onset offenders; in the CSDD late onset offenders tended to commit sex crimes, theft from work, vandalism, and fraud, whereas juvenile onset offenders were most likely to commit burglary and vehicle theft (McGee & Farrington, 2010). In the same project, Zara and Farrington (2009) found that the best predictors of late onset offenders were high nervousness and few friends, which may perhaps have protected boys from offending in adolescence.

In recent years, there has been a great deal of research on continuity and change in offending. Researchers now realize that relative stability is perfectly compatible with absolute change (Farrington, 1990). Nagin and Paternoster (1991, 2000) proposed that the continuity between juvenile and adult offending may reflect either persistent or population heterogeneity (the persistence of an underlying construct such as an anti-social personality or low self-control) or state dependence (the fact that the occurrence of an early crime increases the probability of a later crime, for example because of labelling or stigmatization) or both. In the CSDD, persistent heterogeneity was more important (Paternoster, Brame, & Farrington, 2001). The same was true in the Dunedin study, but additionally Piquero, Brame and Moffitt (2005) found that continuity was similar for males and females.

Risk factors

The language of risk and protective factors has become very influential in criminology (Farrington, 2000; Hawkins & Catalano, 1992). Risk factors predict a high probability of an undesirable outcome such as offending, whereas protective factors predict a low probability of offending in the presence of risk (see later).

The most important risk factors for offending that were identified in early longitudinal surveys have generally been confirmed in later surveys: high impulsiveness or low self-control, low intelligence, low school attainment, poor child-rearing, poor parental supervision, young mothers, child abuse, parental conflict, disrupted families, low socio-economic status (SES), delinquent peers, and disadvantaged neighbourhoods (Derzon, 2010; Farrington, Loeber, & Ttofi, 2012; Leschied, Chiodo, Nowicki, & Rodger, 2008). The key questions are whether these risk factors cause delinquency and, if so, through what intervening mechanisms. In order to investigate this, it is important to study the independent, interactive and sequential effects of risk factors, and especially whether changes in risk factors within individuals are followed by changes in delinquency within individuals (see later). In this article, I will particularly review results that throw light on these questions. There is only space to review a few of the more important risk factors.

Most longitudinal studies of offending did not start until age 6 or later. However, in the British Cohort Study, Murray, Irving, Farrington, Colman and Bloxson (2010) investigated the extent to which very early risk factors (measured up to age 5) predicted self-reported convictions at ages 30 and 34. Murray and his colleagues found that the strongest early predictors were a single mother, a teenage mother, maternal smoking during pregnancy, loss of a biological parent, and family deprivation (low social class, low parental education, poverty, and household overcrowding). The likelihood of a conviction increased with the early risk score, from 17% to 44% for boys and from 3% to 11% for girls.

Individual factors

Impulsiveness is the individual factor that is most strongly related to offending. Unfortunately, there are many different constructs referring to a poor ability to control behaviour (e.g. hyperactivity, low self-control, sensation-seeking, risk-taking, a poor ability to delay gratification). It would be desirable in all longitudinal studies to try to establish what are the distinct theoretical constructs that underlie the empirical variables.

The most extensive research on different measures of impulsiveness was carried out in the PYS by White et al. (1994). The measures that were most strongly related to self-reported delinquency at ages 10 and 13 were teacher-rated impulsiveness (e.g. acts without thinking), self-reported impulsiveness, self-reported under-control (e.g. unable to delay gratification), motor restlessness (from videotaped observations), and psychomotor impulsiveness (on the Trail Making Test). Generally, the verbal behaviour rating tests produced stronger relationships with offending than the psychomotor performance tests, suggesting that cognitive impulsiveness (e.g. admitting impulsive behaviour) was more relevant than behavioural impulsiveness (based on test performance). A systematic review (Jolliffe & Farrington, 2009) showed that early measures of impulsiveness (especially daring and risk-taking) predicted later measures of violence.

Low intelligence is another important individual risk factor, and this may lead to delinquency through the intervening factor of low school attainment. The association between school failure and delinquency has been demonstrated repeatedly in longitudinal surveys (e.g. Maguin & Loeber, 1996). In the PYS, Lynam, Moffitt and Stouthamer-Loeber (1993) concluded that low verbal IQ led to school failure and subsequently to self-reported delinquency, but only for African American boys. An alternative theory is that the link between low IQ and delinquency is mediated by disinhibition (impulsiveness, Attention Deficit-Hyperactivity Disorder or ADHD, low guilt, low empathy), and this was also tested in the PYS (Koolhof, Loeber, Wei, Pardini, & D'Escury, 2007). In the Christchurch study in New Zealand, low school achievement predicted convictions after controlling for parental criminality, inter-parental violence, single parent families and deviant peers (Jakobsen, Fergusson, & Horwood, 2012).

Family factors

Of all child-rearing methods, poor parental supervision is usually the strongest and most replicable predictor of offending (Smith & Stern, 1997). Many studies show that parents who do not know where their children are when they are out, and parents who let their children roam the streets unsupervised from an early age, tend to have delinquent children. For example, in McCord's (1979) classic Cambridge-Somerville Youth Study in Boston, poor parental supervision in childhood was the best predictor of both violent and property crimes up to age 45. In the CSDD, 61% of boys who were poorly supervised at age 8 were convicted up to age 50, compared with 36% of the remainder (Farrington et al., 2009).

Many studies show that broken homes or disrupted families predict delinquency. In the Newcastle Thousand-Family Study, Kolvin, Miller, Scott, Gatzanis and Fleeting (1990) reported that marital disruption (divorce or separation) in a boy's first five years predicted his later convictions up to age 32. Similarly, in the Dunedin study in New Zealand, Henry, Moffitt, Robins, Earls and Silva (1993) found that children who were exposed to parental discord and many changes of the primary caretaker tended to become antisocial and delinquent. In the National Longitudinal Survey of Adolescent Health, Demuth and Brown (2004) concluded that single-parent families predicted delinquency because of their lower levels of parental supervision, closeness and involvement with children.

In the CSDD, both permanent and temporary separations from a biological parent before age 10 (usually from the father) predicted convictions and self-reported delinquency, providing that they were not caused by death or hospitalization (Farrington, 1992b). However, homes broken at an early age (under age 5) were not unusually criminogenic (West & Farrington, 1973). Separation before age 10 predicted both juvenile and adult convictions (Farrington, 1992a), and it predicted adult convictions independently of other factors such as low family income or poor school attainment; 60% of boys who had been separated from a parent by their tenth birthday were convicted up to age 50, compared with 36% of the remainder (Farrington, Ttofi, & Coid, 2009). Overall, the most important factor seemed to be what happened to the boy after the separation. Boys who remained with their mother after the separation had the same delinquency rate as boys from intact low conflict families (Juby & Farrington, 2001). An analysis of

mediating factors suggested that broken homes caused hyperactivity, which in turn caused offending (Theobald, Farrington, & Piquero, 2013).

Several researchers have investigated factors that might mediate the link between young mothers and child delinquency. In the Dunedin study in New Zealand, Jaffee, Caspi, Moffitt, Belsky, and Silva (2001) concluded that the link between teenage mothers and violent children was mediated by maternal characteristics (e.g. intelligence, criminality) and family factors (e.g. harsh discipline, family size, disrupted families). In the Rochester Youth Development Study (RYDS), Pogarsky, Lizotte and Thornberry (2003) found that the most important mediating factor was the number of parental transitions (frequent changes in care-givers). Much research suggests that frequent changes of parent figures predict offending by children (e.g. Krohn, Hall, & Lizotte, 2009).

Socio-economic and neighbourhood factors

It has been suggested that the link between a low SES family and antisocial behaviour is mediated by family socialization practices. For example, Larzelere and Patterson (1990) in the Oregon Youth Study concluded that the effect of SES on delinquency was entirely mediated by parent management skills. In other words, low SES predicted delinquency because low SES families used poor child-rearing practices. Sometimes, these families may have been overwhelmed by numerous personal and social problems. In the Christchurch Health and Development Study, Fergusson, Swain-Campbell and Horwood (2004) found that living in a low SES family between birth and age 6 predicted self-reported and official delinquency between ages 15 and 21. However, this association disappeared after controlling for family factors (physical punishment, maternal care, and parental changes), conduct problems, truancy, and deviant peers, suggesting that these may have been mediating factors.

Many studies show that boys living in urban areas are more criminal than those living in rural areas (Derzon, 2010; Foster & Brooks-Gunn, 2013). In the US National Youth Survey, the prevalence of self-reported assault and robbery was considerably higher among urban youth (Elliott, Huizinga, & Menard, 1989). Within urban areas, boys living in high crime neighbourhoods tend to be more violent than those living in low crime neighbourhoods. In the PYS, living in a disadvantaged neighbourhood (either as rated by the mother or based on census measures of poverty, unemployment, and female-headed households) significantly predicted official and reported violence (Farrington, 1998) and homicide offending (Farrington, Loeber, & Berg, 2012).

It is clear that offenders disproportionately live in inner-city areas characterized by physical deterioration, neighbourhood disorganization, and high residential mobility (Shaw & McKay, 1969). In the Project on Human Development in Chicago Neighbourhoods, Sampson, Raudenbush and Earls (1997) found that the most important community predictors of violence were concentrated economic disadvantage, immigrant concentration, residential instability, and low levels of informal social control and social cohesion. However, again, it is difficult to determine to what extent the areas themselves influence antisocial behaviour and to what extent it is merely the case that antisocial people choose to live in deprived areas (e.g., because of their poverty or public housing allocation policies). These are often termed 'facilitation' compared with

'selection' hypotheses. Interestingly, both neighbourhood researchers such as Gottfredson, McNeil and Gottfredson (1991) and developmental researchers such as Rutter (1981) have argued that neighbourhoods have only indirect effects on antisocial behaviour through their effects on individuals and families. In the Chicago Youth Development Study, Tolan, Gorman-Smith and Henry (2003) concluded that the relationship between community structural characteristics (concentrated poverty, racial heterogeneity, economic resources, violent crime rate) and individual violence was mediated by parenting practices, gang membership, and peer violence.

Intergenerational transmission

In the CSDD, the concentration of offending in a small number of families was remarkable (Farrington, Barnes, & Lambert, 1996). Less than 6% of the families were responsible for half of the criminal convictions of all members (fathers, mothers, sons, and daughters) of all 400 families. Having a convicted mother, father, brother or sister significantly predicted a boy's own convictions. As many as 63% of boys with a convicted parent were themselves convicted up to age 40. Furthermore, convicted parents and delinquent siblings predicted self-reported as well as official offending (Farrington, 1979a). Same-sex relationships were stronger than opposite-sex relationships, and older siblings were stronger predictors than younger siblings. Therefore, there is intergenerational continuity in offending.

Several longitudinal studies have followed up the children of the original participants in order to investigate intergenerational transmission. (Special sections of journals on this topic have been edited by Capaldi, Conger, Hops, & Thornberry, 2003 and by Bijleveld & Farrington, 2009.) Many researchers have been interested in mediating factors that might intervene between parental offending and child offending. For example, in the RYDS, Thornberry, Freeman-Gallant and Lovegrove (2009) found that the continuity from parental self-reported delinquency to child antisocial behaviour was primarily mediated by parent stress and ineffective parenting. Similarly, in the CSDD, the intergenerational transmission of convictions decreased in strength after controlling for intervening family and socio-economic risk factors (Farrington, Coid, & Murray, 2009). However, in investigating intergenerational transmission, it would be desirable to estimate the importance of genetic factors (Rowe & Farrington, 1997).

Cross-national comparisons

There have been increased efforts in recent years to carry out cross-national comparisons of results in longitudinal studies. For example, Farrington and Wikström (1994) compared criminal careers in the CSDD and Project Metropolitan studies, and Broidy et al. (2003) compared developmental trajectories in six sites in three countries. The International Youth Development Study was designed as a cross-national longitudinal study in Victoria (Australia) and Washington State, USA (McMorris, Hemphill, Toumbourou, Catalano, & Patton, 2007), and many of the predictors of youth violence were similar in the two places (Hemphill et al., 2009). Cross-national comparisons are important to establish to what extent results are replicated in different settings and conversely to what extent findings might be influenced by contextual and cultural

differences. Farrington and Loeber (1999) compared risk factors for delinquency in London and Pittsburgh, and found that they were generally similar. Also, Murray et al. (2014) showed that perinatal risk factors predicted self-reported violence at age 18 in the UK ALSPAC study and in the Pelotas Birth Cohort study in Brazil.

While arrests and convictions of fathers predicted antisocial behaviour of boys, imprisonment of fathers before boys were aged 10 further increased the risk of later antisocial and delinquent outcomes in the CSDD (Murray & Farrington, 2005). However, the effect of parental imprisonment in Sweden (in Project Metropolitan) disappeared after controlling for parental criminality (Murray, Janson, & Farrington, 2007). This cross-national difference may have been the result of shorter prison sentences in Sweden, more family-friendly prison policies, a welfare-oriented juvenile justice system, an extended social welfare system, or more sympathetic public attitudes towards prisoners (see also Murray, Bijleveld, Farrington, & Loeber, 2014).

Protective factors

In the past the term *protective factor* has been used ambiguously. Some researchers have suggested that a protective factor is merely the opposite end of the scale to a risk factor (e.g. White, Moffitt, & Silva, 1989). For example, if poor parental supervision is a risk factor, good parental supervision might be a protective factor. However, this seems to be using two terms for the same variable. Other researchers have suggested that a protective factor interacts with a risk factor to minimize or buffer its effects (e.g. Rutter, 1985). Typically, the impact of a protective factor is then studied in the presence of a risk factor. Loeber et al. (2008) suggested a consistent terminology. Following Sameroff, Bartko, Baldwin and Seifer (1998), they defined *promotive* factors as variables that predict a low probability of offending, and *protective* factors as variables that predict a low probability of offending among persons in a risk category.

The most extensive research on promotive factors predicting a low probability of violence and serious theft was carried out in the PYS by Loeber et al. (2008, chapter 7). They studied predictors over four age ranges in the youngest cohort and over three age ranges in the oldest cohort. Predictor variables were trichotomized into the risk end, the middle category, and the promotive end. In order to allow promotive and risk effects to be potentially different, the risk category was compared with the middle category, and the promotive category was compared with the middle category. Loeber and his colleagues found that, consistently, low ADHD was a promotive factor for low violence, but high ADHD was not a risk factor for high violence. These results replicated the earlier findings of Stouthamer-Loeber, Loeber, Wei, Farrington and Wikström (2002) in the same project for predicting persistent serious delinquency. Also, in the PYS (Loeber et al., 2008), (good) parental supervision, (low) physical punishment by the mother, and (high) involvement of the boy in family activities tended to have promotive rather than risk effects.

High school achievement has often been identified as a promotive or protective factor. In a classic longitudinal survey in Kauai, Hawaii, Werner and Smith (1982) studied vulnerable children who had four or more risk factors by age 2 (including poverty, low maternal education, a disrupted family, perinatal stress, and low IQ) and compared those who did not develop any serious learning or behavioural problems by age 18 with

those who had mental health problems or committed serious delinquencies. Among the most important protective factors were good reading, reasoning and problem solving skills at age 10 (Werner & Smith, 1992, 2001). Also, high academic achievement was often a promotive factor in the Pittsburgh Youth Study analyses (Loeber et al., 2008).

In research on protective factors in the RYDS, Smith, Lizotte, Thornberry and Krohn (1994) found that high-risk children who were resilient (non-delinquent) tended to have good parental supervision and good attachment to parents. In similar research on deprived children who became non-delinquents in the Newcastle Thousand Family Study, Kolvin et al. (1990) reported that the non-delinquent children tended to have received better parental supervision. Also, Lynam et al. (2000) in the PYS showed that a good neighbourhood was a protective factor against impulsivity, since impulsivity did not predict offending in good neighbourhoods, and Farrington and Ttofi (2012) in the CSDD found that boys who received good child rearing in poor housing had the same delinquency rate as boys in good housing.

Effects of life events

Surprisingly, there have been relatively few attempts in longitudinal studies to carry out within-individual analyses to study the effects of life events on the course of development of offending (see Farrington, 1988). Some researchers have retrospectively used life-history calendars to study this. For example, Horney, Osgood and Marshall (1995) obtained monthly data from prisoners on life circumstances such as living with a wife and drinking heavily and on crimes committed, and concluded that life circumstances influenced offending.

Having delinquent friends is an important predictor of later offending. For example, Battin, Hill, Abbott, Catalano and Hawkins (1998) showed that peer delinquency predicted self-reported violence in the Seattle Social Development Project (SSDP). Delinquent acts tend to be committed in small groups (of two or three people, usually) rather than alone. Large gangs are comparatively unusual. In the CSDD, the probability of committing offences with others decreased steadily with age. Before age 17, boys tended to commit their crimes with other boys similar in age and living close by. After age 17, co-offending became less common (Reiss & Farrington, 1991).

The major problem of interpretation is whether young people are more likely to commit offences while they are in groups than while they are alone, or whether the high prevalence of co-offending merely reflects the fact that, whenever young people go out, they tend to go out in groups. Do peers tend to encourage and facilitate offending, or is it just that most kinds of activities out of the home (both delinquent and non-delinquent) tend to be committed in groups? Another possibility is that the commission of offences encourages association with other delinquents, perhaps because “birds of a feather flock together” or because of the stigmatizing and isolating effects of court appearances and institutionalization. Thornberry, Lizotte, Krohn, Farnworth and Jang (1994) in the RYDS concluded that there were reciprocal effects, with delinquent peers causing delinquency and delinquency causing association with delinquent peers.

In the PYS, the relationship between peer delinquency and a boy's offending was studied both between individuals (e.g. comparing peer delinquency and offending over all boys at a particular age and then aggregating these correlations over all ages) and

within individuals (e.g. comparing peer delinquency and offending of each boy at all his ages and then aggregating these correlations over all boys). Peer delinquency was the strongest correlate of offending in between-individual correlations but did not predict offending within individuals (Farrington, Loeber, Yin, & Anderson, 2002). In contrast, poor parental supervision, low parental reinforcement, and low involvement of the boy in family activities predicted offending both between and within individuals. It was concluded that these three family variables were the most likely to be causes, whereas having delinquent peers was most likely to be an indicator of the boy's offending, because of co-offending (see also Hemphill, Heerde, Herrenkohl, & Farrington, 2015).

It is clear that young people increase their offending after joining a gang. In the SSDP, Battin et al. (1998) found this, and also showed that gang membership predicted delinquency above and beyond having delinquent friends. In the PYS, Gordon et al. (2004) reported not only a substantial increase in drug selling, drug use, violence, and property crime after a boy joined a gang, but also that the frequency of offending decreased to pre-gang levels after a boy left a gang. Thornberry, Lizotte, Krohn, Smith and Porter (2003) in the RYDS and Gatti, Tremblay, Vitaro and McDuff (2005) in the Montreal Longitudinal-Experimental Study also found that young people offended more after joining a gang. Several of these studies contrasted the 'selection' and 'facilitation' hypotheses and concluded that future gang members were more delinquent to start with but became even more delinquent after joining a gang.

The life event that has been investigated most often in prospective longitudinal studies is getting married. In the CSDD, Theobald and Farrington (2009) found that convictions decreased after a man got married. They matched married and unmarried men on their prior number of convictions and on a propensity score measuring their likelihood of getting married. In follow-up research, Theobald and Farrington (2011) reported that getting married at older ages had little effect on offending, because the later-married men tended to be drug users and binge drinkers, and because they maintained their aggressive attitudes and continued to go out with their male friends after marriage.

Conclusions

In order to advance knowledge, new prospective longitudinal studies of offending are needed, with frequent (preferably face-to-face) assessments, and a follow-up from childhood to adulthood. The repeated assessments would make it possible to compare changes within individuals in risk factors with later changes within individuals in offending, and therefore to draw convincing conclusions about causal factors. It is desirable to follow up community samples of hundreds of children in order to investigate why children from deprived or non-deprived backgrounds do or do not become offenders.

It is important to study criminal careers using both official records and self-reports, and to estimate scaling-up factors from official records to self-reports. More research is needed on promotive and protective factors. More research is also needed on risk factors, in order to investigate independent, interactive and mediating factors, and to try to establish what are the distinct underlying theoretical constructs. In investigating the effects of life events, it is important to control for selection effects (pre-existing differences), and in investigating the intergenerational transmission of offending it is

important to measure genetic factors. Cross-national comparisons are essential to investigate the generality of findings and the importance of national contexts.

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