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Participation and Frequency in Criminal Convictions across 25 Successive Birth Cohorts: Collectivity, Polarization, or Convergence?

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ABSTRACT

Against the backdrop of an overall declining crime trend our overarching objective is to explore whether this development has concealed any degree of divergence between participation and frequency in crime. We employ Swedish longitudinal data comprising 25 complete birth cohorts born between 1960 and 1984 and followed to age 30 using convictions data. The results show a complex pattern of change, by which the crime rate partly conceals divergent processes between participation and frequency. In particular, among the males we find a consistent decrease in the size of the convicted population, whereas the frequency of crimes among convicted offenders has increased across cohorts born during the early 1970s and later. We discuss the results against both behavioral and reactional mechanisms and conclude that future crime trends research should consider a broad range of criminal career parameters which cannot be discerned using aggregate crime data.

Introduction

The criminal career approach was formulated during a historical time period when increasing crime rates were a major public concern in the United States, and where there was a strong policy interest in seeking more knowledge around individual offenders and their crime patterns to improve crime preventive measures (Visher, 2016). A key claim made by proponents of this approach was to distinguish between, on the one hand, the proportion of individuals within the population who offend, that is, participation, and, on the other hand, the rate at which active offenders offend, that is, frequency (Blumstein, Cohen, & Farrington, 1988). With respect to policy, this distinction was deemed relevant since a decrease in the crime rate could be achieved through either one of these measures. In relation to theory it was suggested that different sets of causes may influence the initiation of a criminal career (i.e. participation), and the frequency by which offenders commit crime (see also Paternoster & Triplet, 1988).

Today, criminologists debate how to understand the fall in crime rates seen in many Western societies during recent decades (Aebi & Linde, 2012; Farrell, Tilley, & Tseloni, 2014; Tonry, 2014). In this context, a small field of research has utilized the criminal career approach to explore whether or not falling crime rates can be linked to any divergence in trends in participation and frequency across successive birth cohorts (Andersen, Anker, & Andersen, 2016; Berg, Baumer, Rosenfeld, & Loeber, 2016; Matthews, 2016; von Hofer, 2014, see also Baumer, Vélez, & Rosenfeld, 2018). The general conclusion, so far, appears to be that the crime drop is driven by a decline in participation in crime, first and foremost among young males.

However, it is not clear if the crime drop has been reflected in offending frequencies within the offender population across successive cohorts, or to what extent the age–crime relationship has changed over the course of this historical trend. Previous research on the topic has also faced a number of limitations. Besides the fact that very few studies have employed a cohort approach to distinguish between participation and frequency in crime, these studies typically analyze a specific age range spanning only a few years of adolescence, which limits the possibility of obtaining insights into whether crime has simply been postponed to early adulthood. In this respect, an additional complexity is that that the crime drop has largely been linked to crime types which are typically distributed to adolescence, particularly property-related crime, while criminal career research has consistently shown that other crime types, such as violent and drug crimes, are more related to late adolescence and early adulthood (Farrington, Piquero, & Jennings, 2013; Kyvsgaard, 2003; Laub & Sampson, 2003). Further, most studies in this field of research have been based on male populations, and have, thus, not been able to provide knowledge regarding the possibility of changing criminal career patterns among females during the course of the crime drop. Since the crime drop among young males also appears to have reduced the gender gap in crime (Estrada, Bäckman, & Nilsson, 2016; Matthews, 2016), it is relevant to ask how participation and frequency in crime have played out across successive cohorts in the female population.

Against the backdrop of an overall declining crime trend in Sweden, reflected in both conviction data and self-reports, our overarching objective is to explore the extent to which participation and frequency have followed similar or divergent trends across a range of successive birth cohorts. We employ a dataset comprising 25 complete Swedish birth cohorts born between 1960 and 1984 and followed to age 30 using convictions data. The panel structure of this dataset provides a unique opportunity to explore the link between birth cohort membership and criminal career patterns over a substantial number of successive birth cohorts during a phase of their lives in which crime tends to both peak and decline according to the conventional wisdom of criminal career research (DeLisi & Piquero, 2011). As a first step, we contrast the development of participation and frequency across the full age range of these 25 successive cohorts. As a second step, we scrutinize the observed patterns by decomposing participation and frequency by age and crime types, with a specific focus on violent, property, and drug crime; three crime type categories usually highlighted by developmental and life-course criminology (Farrington, 2003; Laub & Sampson, 2003). They also show different trends over the period studied which, given the use of convictions data, to varying degrees can be assumed to be influenced by behavioral and reactional mechanisms, respectively (see further below). Throughout the empirical analyses we separate males and females.

The exploration of the link between birth cohort membership and criminal career parameters contributes to both crime trends research and life-course criminology. Farrell, Laycock, and Tilley (2015) recently argued that much has been learned about historical crime patterns, but less is known of how the aggregate development has been expressed in terms of changing patterns of criminality (p. 2). In this respect, the usage of longitudinal multicohort conviction data allows us to distinguish between participation and frequency, which is informative to theoretical controversies surrounding the crime drop since mechanisms may work via either one of these concepts (Berg et al., 2016). Relatedly, Matthews and Minton (2018) argued that the extent to which the typical age–crime relationship has changed across successive birth cohorts, and how such a change relates to gender and crime types, ought to provide highly relevant pieces of the crime-drop puzzle (see also Matthews, 2016).

From the point of view of life-course criminology, Sampson (2015) argued that, despite the fact that the life-course paradigm at its core is a framework for linking individual and societal development (see Elder, 1994), this link has largely been missing in research on crime and the life course. With few exceptions, there is little published data that might shed light on this paradigmatic principle, which is partly due to the fact that most contemporary longitudinal datasets on crime and the life course have been designed as single birth cohort studies (Sampson, 2015). We would, therefore, argue that the mere exploration of longitudinal multicohort data, and of the extent to which criminal career patterns varies across successive birth cohorts, represent an important means for locating the study of criminal careers in its historical context. In particular, such an exploration speaks to the validity of assuming constancy, or invariance, in criminality across birth cohorts (Bäckman, Estrada, Nilsson, & Shannon, 2014; MacLeod, Grove, & Farrington, 2014).

We begin by presenting the crime trend in Sweden over the period during which the cohorts in our data grew up. Next, we present an ideal-typical model which schematically shows how the development of the aggregate crime rate across successive cohorts may conceal divergent trends in participation and frequency, respectively. Drawing on the crime drop literature, we also present general theoretical accounts for why divergent trends might or might not be expected, as well as previous empirical research that has explored changing patterns of criminality. Next, we discuss methodological considerations in relation to the use of administrative crime data and the methods we employ, before moving on to describe our dataset. In the following section, we present our results. Finally, we discuss our findings in light of the crime drop and changes in Swedish society relating to both behavioral and reactional explanations.

The backdrop: an overall declining crime trend

In many Western countries, the 1960s constituted the start of a period witnessing sharp increases in recorded crime, which from the 1990s was followed by declining crime levels, the so-called crime drop (see Tonry, 2014). While this overall decrease in official crime is uncontested, there are some variation across crime types and countries, and, related to this, some controversy around whether the development is primarily linked to behavioral or reactional explanations (Aebi & Linde, 2012; Farrell et al., 2014; Tonry, 2014). Figure 1 presents the conviction rate per 100,000 individuals between 1975 and
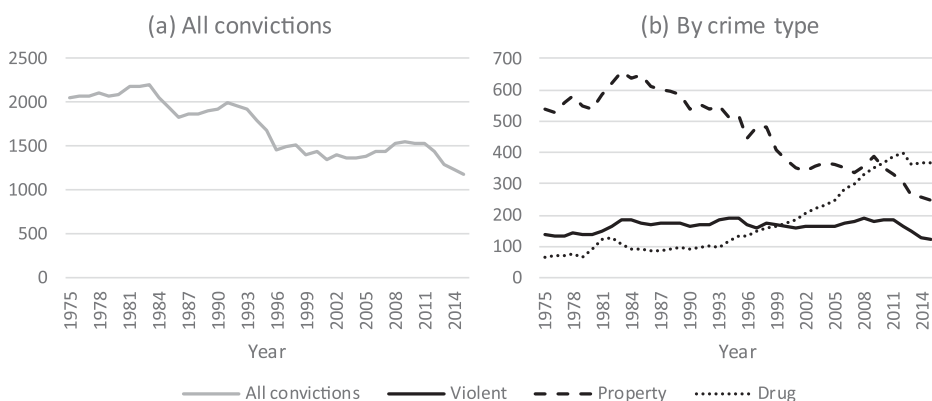
Figure 1. All convictions (a) and convictions by crime type (b) per 100,000 individuals in the general Swedish population aged 15 and over, 1975–2015.

2015 in Sweden for any conviction (a) and by the three broader crime categories of violent, property, and drug related crime (b). As can be seen, the overall rate of convictions has decreased rather drastically over this period. In 2015, it was less than half of that during the early 1980s, although, we also see periods of relative stability and even periods of increasing conviction rates, most notably during the mid-2000s. As is evident from Figure 1(b), the crime type structure has also changed during this period. The general trend has first and foremost been driven by property crime, whereas violent crime has been relatively stable and drug crime has increased, particularly since the early 1990s.

The decrease in property crime is uniform across Western countries and has primarily been explained through the framework of opportunity theories, i.e. an actual change in behavior caused by improvements in security measures (e.g. Farrell et al., 2014). When it comes to nonlethal violent crime, there has, during the time period, been an increase in offenses reported to the Police across all the Scandinavian countries, which does not follow the generally decreasing trend in the Anglo-Saxon countries (Tonry, 2014; von Hofer, 2014). The interpretation of this increase is subject to some debate, although, the main bulk of research suggest that it is most probably linked to reactional mechanisms, including a decreasing tolerance toward violence (Estrada, 2006; Kivivuori, 2014; Schwartz, Steffensmeier, & Feldmeyer, 2009; Tonry, 2014). In the case of Sweden, such an interpretation is supported by the fact that the number of hospitalized for violence has decreased, that the proportion of the population who report that they have been subjected to violence has not increased, and that lethal violence has not increased (Estrada, 2006). Also, as shown in Figure 1(b), such an increase is not seen in Swedish conviction statistics. When it comes to officially recorded drug crime, the increasing trend in Sweden is also seen in a broader Western European context (Aebi & Linde, 2012). In Sweden, this is a crime category where reactional mechanisms have played an obvious role since the 1980s, in general due to a policy framed as zero tolerance, and more specifically due to stricter legislation and police priorities regarding drug use (Lenke & Olsson, 2002; Tham, 1995).[1]

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[1]The definition of drug crime has broadened during the period studied, where one of the more important legislative reforms was the criminalization of personal use in 1988. This has resulted in a substantial increase in registered drug crime, while self-reported drug use has remained fairly stable (BRÅ, 2016).

Previous research also indicates that the crime drop has been driven by males, and thus, that the higher levels of offending previously seen among young males have moved closer to the lower levels of offending traditionally found among females (Estrada et al., 2016). This tendency is also confirmed by Swedish self-report studies in which the proportion of school youth who report having participated in theft, vandalism, and violent offenses declined between the mid-1990s and the early 2010s, and more markedly among boys than girls (Shannon, Bäckman, Estrada, & Nilsson, 2014).

Taken together, the cohorts born during the 1960s grew up, and experienced their peak age of criminality, during a period in which Swedish conviction rates were relatively high (the 1980s), whereas subsequent cohorts experienced this phase of life during a period with relatively low conviction rates (the 1990s and 2000s). The decrease in overall convictions captures heterogeneity in crime types. The decline has mainly been reflected in property crime; in contrast, violent crime has been relatively stable and drug crime has increased, a development which follows a larger Western European trend (Aebi & Linde, 2012). Based on the descriptions in Figure 1, however, it remains unclear as to whether these trends are merely the result of changes in the proportion of convicted individuals, or to what extent they may also reflect changes in offending frequencies within the convicted population. In the following, we present an ideal-typical model together with general theoretical accounts for why we might or might not expect changing patterns of criminality across successive cohorts.

Collectivity, polarization, and convergence across successive birth cohorts

A small number of recent studies have employed longitudinal multiple cohort data to dissect aggregate crime trends. In essence, these studies have compared different birth cohorts with respect to participation and frequency over some specified age range in order to explore whether the crime trend has reflected changes in the "anatomy" of crime (Berg et al., 2016, p. 378).[2] To recall, participation is a property of the population which distinguishes offenders from non-offenders, while frequency is a property of the offending population which reflects the degree of individual criminal activity by active offenders (Blumstein et al., 1988, p. 4). In the criminal career terminology, participation and frequency together produce the crime rate, i.e. the mean number of crimes accounted for by a member of the cohort.

Figure 2 presents a schematic depiction of how the crime rate over successive birth cohorts, whether it is stable, decreasing or increasing, may capture three different processes with respect to participation and frequency. Collectivity[3] is a process which essentially describes a synchronized development of participation and frequency. For example, if the aggregate crime rate decreases across successive cohorts, collectivity refers to a situation in which the offending population decreases in size and the mean frequency rate in the offender subpopulations also decreases (b).

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[2]Berg et al. (2016) use the terms prevalence and incidence, which are equivalent to the terms participation and frequency employed here. Given some previous confusion surrounding these concepts, particularly incidence, we follow the suggestion of Blumstein et al. (1988) and use the terms participation and frequency.
[3]The term is borrowed from Skog's (1985) theory on the collectivity of drinking cultures, which postulates that changes in alcohol behavior are synchronized across different consumption categories.
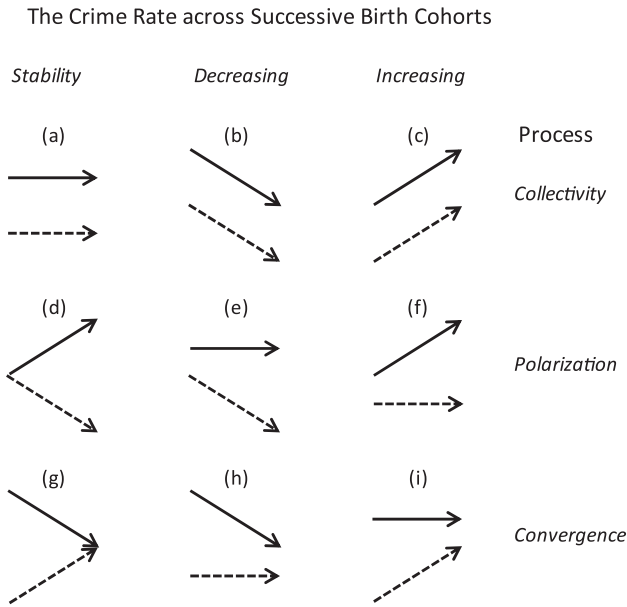
The Crime Rate across Successive Birth Cohorts

Figure 2. (a–i) An ideal-typical model with respect to how the development of the crime rate over successive birth cohorts may reflect similar or different trends between participation (dashed arrows) and frequency (solid arrows).

Polarization and *convergence* are two processes which, in contrast to collectivity, involve differing trends in participation and frequency, respectively. Polarization describes a process whereby participation and frequency move further apart. In the context of a declining crime trend, polarization might relate to a situation in which the offender population becomes smaller while the mean frequency rate remains relatively stable (e). If, on the other hand, the aggregate crime rate increases, polarization might involve an increasing frequency rate while the offender population remained relatively stable in size (f). Convergence, in contrast, describes a process whereby participation and frequency move toward each other (g; h; i). Finally, Figure 2 describes two ideal-typical situations in which the crime rate across successive cohorts conceals fundamentally divergent trends in participation and frequency, respectively, one involving polarization (d), the other convergence (g). This model, being ideal-typical, should be seen as providing general guidance regarding how the crime rate across successive cohorts may, or may not, be linked to divergence between participation and frequency. For example, a process of collectivity, as defined here, would imply that participation and frequency develop in the same direction, but this does not necessarily mean that the two elements develop at exactly the same pace.

Paternoster and Triplet (1988) have argued that participation and frequency reflect two separate offending decisions – to initiate and to continue a criminal career – and that "(t)heoretical variables, such as conventional commitments, differential associations, perceived risk, or frustrated aspirations, may have fundamentally different effects on these two offending decisions" (p. 592). As observed by Berg et al. (2016), however, few theories focused on aggregate crime trends have made any explicit distinctions between mechanisms related to participation and frequency. Drawing on the crime drop literature, we will focus on three influential hypotheses as a means of clarifying the

processes of collectivity, polarization, and convergence, respectively; changes in: (1) opportunities to commit crime, (2) informal social control, and (3) formal social control.

Perhaps the most influential hypothesis with regard to the international crime drop observed over recent decades focuses on the effects of reduced crime opportunities (Farrell et al., 2014). Stated briefly, situational crime prevention efforts, such as improved locking devices on cars and the increased use of credit cards as opposed to cash handling have made crime more difficult. One hypothesis that has linked this theory to criminal careers is the so-called debut crime hypothesis (Farrell et al., 2015). Farrell et al. (2015) argue that the level of crime in a society may be viewed as a function of opportunity structures: at high levels of crime it may be easier to embark on a criminal career, and vice versa when crime opportunities become scarcer. Since the aggregate crime trend is to a large extent driven by property offences, and because these types of crime are also those which typically initiate a criminal career, the crime drop implies that fewer individuals have debuted in crime. In turn, Farrell et al. argue, this reduction in property crime debuts has led to less extensive criminal careers that typically involve a wide range of offenses, including violent crime. Cohort effects may, therefore, have been produced by changes in the opportunities for debut crimes, which would affect both participation and frequency across successive cohorts in a similar direction. Hence, the debut-crime hypothesis predicts a considerable overlap with respect to participation and frequency which, viewed in relation to the model in Figure 2, would correspond to a process of collectivity producing a decreasing aggregate crime rate across successive cohorts (b).

According to Paternoster and Triplet (1988), social control theory makes clear statements regarding which individuals become involved in crime, but it is less clear whether or not the theory can account for offending frequencies (p. 596). Taking this observation further, Berg et al. (2016) note that arguments which primarily link the US crime drop to a fall in participation usually highlight increases in informal social control (e.g. elevated levels of collective efficacy or a growing ratio of older vs. younger persons). More generally, it has been argued that changing levels of informal social control have a greater effect on individuals on the threshold of entering into a criminal career than on individuals who have already developed a criminal career. For example, according to Moffitt's (1993) Dual Taxonomy, the explanations for adolescence-limited offending are essentially social, whereas the fundamental causes of life-course persistence are traits that emerge in early infancy or even prenatally. As a consequence, adolescence-limited offending will be more responsive to historical change than life-course persistence. In a similar manner, Gottfredson and Hirschi (1990) would posit that individuals with low self-control, who typically commit crime at a high frequency, are unable to make attachments to conventional society and, as a result, are little affected by improvements in informal social control. In relation to our model in Figure 2, these are theoretical accounts which, during periods of decreasing aggregate crime rates, would work primarily via participation and would thereby correspond to a process of polarization (e).

Finally, one hypothesis concerning the crime drop, which in contrast to those described above could involve a disproportionate decrease in the frequency rate, is the so-called imprisonment hypothesis (Farrell et al., 2014). Here, selective incapacitation of the tail of the offending distribution could have a substantial effect on recidivism and the mean frequency rate (Piquero, Farrington, & Blumstein, 2007); this has

indeed been proposed as one explanation for the crime drop in the United States (Levitt, 2004). While the mass imprisonment witnessed in the United States has not been seen in other Western nations, including Sweden, formal control measures may also involve a heightened focus by the police on high-risk subjects and areas. If such secondary crime prevention efforts are effective, they may affect the frequency rate more than levels of participation in crime (Berg et al., 2016, p. 382). In relation to our model in Figure 2, such a mechanism would, therefore, produce convergence in the context of a decline in the aggregate crime rate across successive cohorts (h).

These hypotheses all indicate mechanisms linked to individual behavior. However, it is important to recognize that the "behavior" of the criminal justice system may certainly play an important role for recorded crime in general, but also for any divergence in the trends of participation and frequency. For example, with respect to increasing measures of formal social control, more intensive policing may increase the frequency of convictions rather than the opposite. McAra and McVie (2005) note that once (young) offenders are known to the police they become part of the suspect population which in turn increases their exposure to further involvement with the criminal justice system. We discuss these issues in further detail below.

Previous research

There are only a few previous studies which have contrasted participation and frequency across birth cohorts. Berg et al. (2016) used individual-level longitudinal data from the Pittsburg Youth Study to examine whether the 1990s crime drop had captured divergent tendencies with respect to self-reported measures of participation and frequency among two cohorts of 17- to 18-year-old males born in the early and late 1990s, respectively. They found decreasing levels of involvement in both violent and property crime. However, while the decline in property crime was driven by reductions in both participation and frequency, thus, indicating a process of collectivity, the observed decrease in violence was primarily the result of a decline in offending participation. Also, with respect to drug sales, the participation had decreased whereas the frequency had increased, thus, suggesting a polarized development.

In a Danish study, Andersen et al. (2016) used administrative data on criminal charges and found that the offending population had consistently decreased in size across successive birth cohorts, but that the rate of offending frequency over these same cohorts had remained virtually the same. In another study, Matthews (2016) used a different approach, essentially standardization and decomposition of conviction data, to dissect the aggregate crime trend in Scotland into its participation and frequency components, while accounting for the age structure among both males and females. In line with Andersen et al. (2016), the results showed that participation was the driving force behind the decline among males, and that frequency generally played little role. Matthews (2016) also found gender differences, in particular noting that the age structure appeared to be the most important influence on changing conviction rates among females, which led him to suggest that both gender and a broader age range spanning more than only a few years should be used in order to more fully understand how participation and frequency have changed over the course of the crime drop.

With respect to age, these and other studies (e.g. Farrell et al., 2015) have shown that the crime-drop is first and foremost a decline in male adolescent offending. As Matthews and Minton (2018) argue, the task of research, therefore, appears to have shifted from that of explaining an increasingly peaked age–crime curve to explaining one that has become increasingly flat (p. 314). Their own analyses suggest that this trend is particularly evident among males, which has in turn led to the typical age–crime curve becoming increasingly similar among males and females over time. More broadly, this suggests that sociologically important variation exists across historical periods, and gender groups in specific features of the age–crime relationship (Ulmer & Steffensmeier, 2014; see also Soothill, Ackerley, & Francis, 2004).

The current study

In line with Berg et al. (2016) we note that the crime drop literature rarely brings up the distinction between participation and frequency. The assumption from general explanations for crime trends, regardless of whether they are based on behavioral or reactional change, then appears to be that these measures are equally affected by the hypothesized mechanism. The panel data employed in the current study span 25 successive birth cohorts born between 1960 and 1984. The range of these cohorts, thus, provides an opportunity to develop our understanding of whether the crime rate across cohorts has concealed any divergence between participation and frequency. Further, in light of the fact that most of the analyses concerning the age–crime relationship are based on cross-sectional data, it has to be recognized that the aggregate age–crime relationship for a single year does not describe the longitudinal sequence of crime as it has developed over age in a birth cohort (Loeber & Farrington, 2014). As highlighted by the criminal career approach, the age–crime curve may conceal age-graded differences in participation and frequency (Blumstein et al., 1988). Since all cohorts are followed to 30 years of age this provides a unique opportunity to also explore whether the age–crime curves have changed during a period of the life course in which criminality tends both to peak and decline. While the age–crime curve may be expected to be universal in the sense that criminal activity tends to decline with age (Loeber & Farrington, 2014), there is reason to expect changes in this relationship, both within and across gender groups, which may in turn provide important insights into both criminal careers and crime trends (e.g. Ulmer & Steffensmeier, 2014).

Methodological considerations

Our approach is to analyze the crime rate as measured in conviction data across our 25 birth cohorts by means of a decomposition into participation and frequency.[4] Participation measures the percentage of a given birth cohort that has ever been

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[4]The cohort approach does not directly measure the aggregate crime rate as it develops in a country over time. The conviction rate at any given year is a sum of convictions in all birth cohorts who have reached the age of criminal responsibility that year. With respect to the range of our cohorts, we restrict the upper age limit to age 30 which means that we do not measure crime beyond young adulthood. Further, we only include individuals who were resident in Sweden at age 15 and, therefore, do not measure crime among individuals who migrated to the country after age 15.

convicted for a crime (up to age 30) and frequency measures the mean number of convicted crimes among convicted offenders of a given birth cohort (up to age 30). Comparing participation and frequency will enable us to provide answers as to whether we can speak of collectivity, polarization, or convergence in crime across the full birth cohorts. To further scrutinize the overall trend in convicted crime, we explore the trends in violent, property, and drug crime, respectively. Finally, we analyze the age–crime relationship in overall crime and by crime type.

Aside from mere criminal propensity, conviction data depends on several facets of the criminal justice system, including the risk for arrest, possible changes in criminal legislation, the rules governing criminal justice procedures, and the effectiveness of the justice system in general (von Hofer, 2014). It could, therefore, be argued that additional sources of crime data, such as repeat survey data, would provide a more optimal means of distinguishing between behavioral and reactional mechanisms (e.g. Farrington et al., 2013; Schwartz et al., 2009). While these issues regarding the use of official crime data for measuring criminality are well known, we claim that the longitudinal multiple cohort design combined with Swedish conviction data is a novel approach in informing both the crime drop literature and criminal career research.

First, the measure for participation of overall crime up to age 30, that is, over a period of 15 years covering the peak age of criminality, ought to be a rather efficient method to describe the prevalence of persons who commit crime more frequently. As argued by von Hofer (2014), these individuals "will be arrested and convicted – sooner or later – irrespective of short-term trends in the clearance rate and the likelihood of arrests leading to convictions" (p. 171).[5] Frequent offenders should also be less affected by changes in legislation as criminal career research has consistently shown that they tend to be versatile rather than specialized (DeLisi & Piquero, 2011). Despite being based on criminal justice sanctions, this design, therefore, provides a more reliable way of measuring the development of criminal behavior over time (i.e. successive birth cohorts) than traditional (official) crime trend data (MacLeod et al., 2014; von Hofer, 2014).

Second, we follow much of the crime drop literature and break down the measure of overall crime into violent, property, and drug crime. In this respect, we highlight that drug crime over the studied time period is highly susceptible to reactional changes, whereas property crime is more susceptible to behavioral change.[6] Although, this is nothing new to the crime drop literature (e.g. Aebi & Linde, 2012), it remains, however, unexplored whether the crime rate in these respective crime types is driven by participation, frequency, or both. Thus, we argue that this exploration fills an important empirical gap in the crime drop literature.

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[5]Moreover, Swedish police and prosecutors are bound by the legality principle, which means that, as a rule, the authorities must arrest or prosecute whenever they believe an offense has occurred. The Swedish police does not have a sanctioning mandate except with regard to the imposition of fines for minor traffic offences such as speeding. Further, Swedish conviction data are not exclusively comprised of court sentences, but also include summary sanction orders imposed by the prosecutor and waivers of prosecution implying the guilt of the suspect. Indeed, around half of all convictions in our dataset comprise decisions at the level of the prosecutor. Overall, Swedish convictions data may, thus, be said to have a relatively high degree of coverage in relation to crimes committed (von Hofer, 2014).

[6]It should also be noted that the respective crime categories are less susceptible to changes in the clearance rate than the measure for overall crime as the latter is partly driven by a changing crime type structure.

Finally, the use of conviction data must be put in the context of the availability of other data sources. One obvious advantage of using Nordic administrative crime data is that we can analyze the total population longitudinally with no nonresponse rates and virtually no panel attrition (Lyngstad & Skardhamar, 2011). Indeed, to our knowledge, there is no other data source that offers the potential to dissect the crime rate into participation and frequency following a range of 25 successive cohorts up to age 30. As reviewed in the background section, the development in Swedish official trend data reflects very well a broader development in Western European countries (see Aebi & Linde, 2012), and with the exception for nonlethal violence, the Anglo-Saxon countries as well (see Tonry, 2014). Swedish longitudinal studies also show that age-graded patterns of overall crime as well as violent, property, and drug crime are highly similar to longitudinal studies from other Western countries (for an overview of findings from criminal career research, see DeLisi & Piquero, 2011). We, therefore, argue that our analysis, despite being based on Swedish data, is informative for an international audience of both crime drop and criminal career scholars.

Data

The full study population was drawn from the Swedish population register and comprises every individual born during the years 1960 through 1984 who was resident in Sweden at age 15. Since every Swedish resident has a unique personal identification number, it has been possible to link information on convictions and dates of death and migration from the Swedish convictions register, the Swedish mortality register, and the Swedish migration register. The members of each birth cohort have been followed prospectively from age 15 (i.e. the age of criminal responsibility in Sweden) to age 30. This means that the data relate to convictions for the period 1975 through 2015. Mortality and migration data were used to select individuals who were at risk of being convicted at age 15 (i.e. were not deceased or had emigrated before this age). Additionally, when we break down participation and frequency into age–crime curves, individuals who died or emigrated during the follow-up were right-censored one year after the age of decease/emigration. In total, the study population comprised 2,644,369 individuals, of which 553,401 (20.9%) were convicted at least once between age 15 and 30.

Two features of administrative data making them suitable for criminal career research is that they usually contain reliable information on the type of offense and the timing of the crime (Eggleston & Laub, 2002; Lyngstad & Skardhamar, 2011). Because there is a time lag between the date of an offense and the conviction date, the age of offending should ideally be registered when the offense was committed and not at the time of the conviction (Farrington et al., 2013). Swedish conviction data include the exact date of up to 30 recorded offenses in every conviction that was based on a court decision or where the prosecutor issued a waiver of prosecution.[7]

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[7]If a prison sentence is not the typical outcome on the basis of the penal code, the prosecutor can choose to issue a waiver of prosecution or a summary sanction order. These two types of convictions require that there is no uncertainty with regard to the guilt of the suspect, which in practice means that the suspect has to admit having committed the crime.

Information on the date of the offense was missing in some cases where the prosecutor had issued a summary sanction order.[8] In these cases, the date of the conviction was used instead. This is reasonable, since this type of conviction is determined more swiftly and is only used when the offense is considered relatively minor and offenders have acknowledged their guilt. In these cases, therefore, the time between the offense and the conviction decision is relatively short.

The Swedish convictions register also contains information on the offense type. As noted in the introduction, we break down the overall measure of crime into three broad offense categories: Violent crimes (assault, aggravated assault, violence against a public servant, homicide, robbery, unlawful threat, unlawful compulsion, gross violation of integrity, unlawful persecution, nonsexual molestation), Property crimes (theft, grand theft auto, shoplifting), and Drug crimes (production of drugs, possession of drugs, distribution of drugs, use of drugs). Since a conviction may include several offenses, all of the offenses in the conviction were examined when coding the offense type categories.

Results

Collectivity, polarization, or convergence?

Figures 3 and 4 illustrate the development of the mean number of convictions per cohort member (i.e. the crime rate) across successive birth cohorts (a) and the decomposition of the crime rate into participation and frequency (b) among males and females, respectively. Beginning with the males, there is a consistent decrease in the crime rate from the oldest cohorts to the cohorts born during the early 1970s, after which it remains relatively stable (Figure 3(a)). The overall decrease of the crime rate across successive cohorts reflects the conviction trend in Sweden (Figure 1(a)). Interestingly, as can be seen in Figure 3(b), while participation for the male population decreases rather dramatically across the cohorts (from around 40% to 25%), the mean frequency rate only decreases up to the cohorts born in 1971, after which there is a slight increase up to the youngest cohorts born in the early to mid-1980s. Hence, viewed in terms of the model in Figure 2, we see a process of collectivity among the males up to the cohorts born during the early 1970s and a process of polarization thereafter.

Among the females, there is a consistent decrease in the crime rate from the 1960 cohort until the early 1970s cohorts (Figure 4(a)) from whereon there is an increase. In contrast to the males, then, the crime rate among the females follows a u-shaped trend. Also, in contrast to the males, there is a fairly similar development of participation and frequency across the full range of cohorts (Figure 4(b)). In that sense, the development among the females is best described as a process of collectivity, with the size of the offending population and the frequency rate in the offending population generally having followed one another.

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[8]In total, information on the date of the principal offences was missing in 24% of convictions, and all of these cases concerned summary sanction orders.
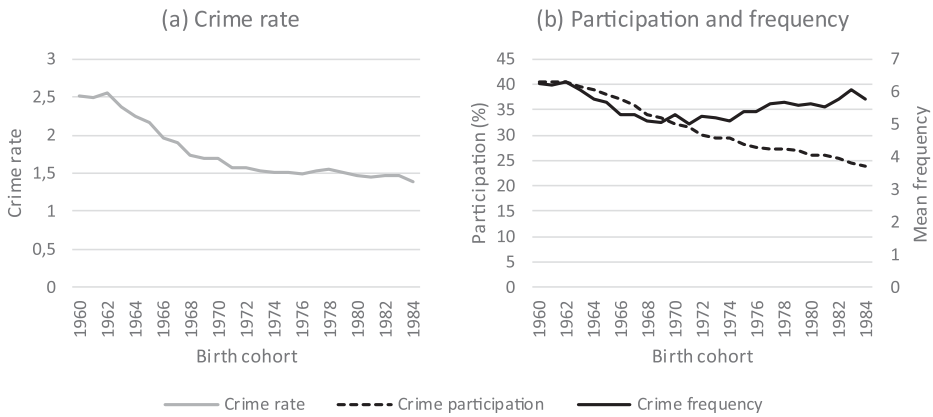
Figure 3. (a, b) Decomposition of the crime rate (a) into participation and frequency (b) by birth cohort. Males residing in Sweden at age 15 followed to age 30.
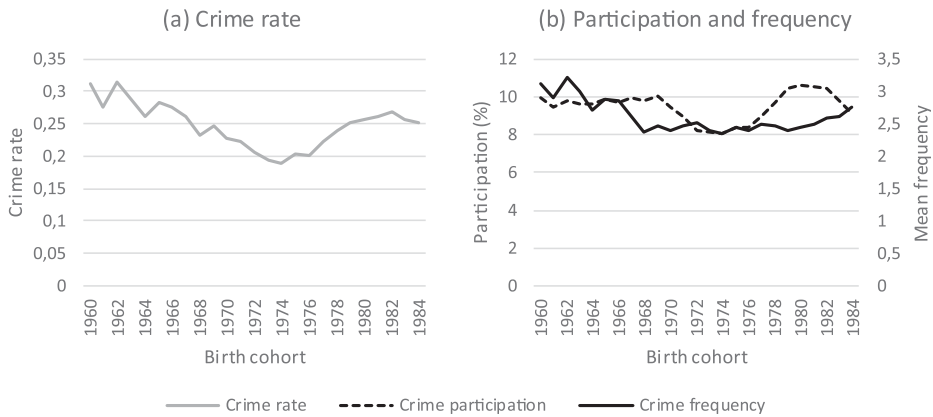

Figure 4. (a, b) Decomposition of the crime rate (a) into participation and frequency (b) by birth cohort. Females residing in Sweden at age 15 followed to age 30.

In Table 1, we show the development of the crime rate of violent, property, and drug related crime and a decomposition of these respective crime types into participation and frequency. For males (Panel a), the overall crime rate conceals fundamentally different developments in these three crime types where violent crime is relatively stable, property crime is decreasing, and drug related crime is increasing across successive cohorts. This reflects the change in the crime type structure that has occurred in Sweden over the recent four decades (see Figure 1(b)). Indeed, the opposite developments of property and drug related crime across successive male cohorts have rendered the drug crime rate equal to the property crime rate among young males born during the early 1980s. It should also be noted that the decline in the overall crime rate appears to be largely driven by the decrease in property crime as this is indeed a large category of crime (see also Aebi & Linde, 2012).

While a breakdown of these crime rates into participation and frequency shows that these two measures have developed at somewhat different paces across successive cohorts, none of them suggests the kind of polarization depicted in overall crime

Table 1. Decomposition of the crime rate into participation and frequency by crime type and grouped birth cohort among males (a) and females (b).

(a) Males	1960–1964	1965–1969	1970–1974	1975–1979	1980–1984
Violence					
Crime rate	0.211	0.198	0.200	0.239	0.254
Participation (%)	8.456	7.995	7.774	8.568	8.902
Mean frequency	2.500	2.475	2.578	2.790	2.852
Property					
Crime rate	0.878	0.683	0.544	0.450	0.319
Participation (%)	15.162	14.183	12.841	12.127	9.862
Mean frequency	5.794	4.817	4.240	3.708	3.235
Drug					
Crime rate	0.103	0.074	0.088	0.180	0.291
Participation (%)	3.274	2.027	2.151	4.023	6.159
Mean frequency	3.155	3.638	4.070	4.486	4.730
N^a	269,296	291,260	278,585	253,001	255,177
(b) Females	1960–1964	1965–1969	1970–1974	1975–1979	1980–1984
Violence					
Crime rate	0.015	0.016	0.015	0.021	0.027
Participation (%)	0.917	0.969	0.950	1.226	1.479
Mean frequency	1.660	1.637	1.596	1.751	1.810
Property					
Crime rate	0.105	0.108	0.090	0.104	0.112
Participation (%)	3.834	4.756	4.471	5.642	6.254
Mean frequency	2.728	2.266	2.024	1.836	1.793
Drug					
Crime rate	0.019	0.015	0.016	0.028	0.048
Participation (%)	0.755	0.510	0.502	0.863	1.396
Mean frequency	2.539	2.982	3.155	3.271	3.438
N^a	261,841	280,941	269,157	242,824	242,287

[a]Number of cohort members.

among male birth cohorts born during the early 1970s and onwards. Violent and property crimes indicate processes of collectivity across successive cohorts with the size of the offending population and the frequency rate in the offending population generally having followed one another. Drug related crime also shows a process of collectivity from cohorts born during the early 1970s and onwards. However, there is also a polarized process across the older cohorts born during the 1960s over which the drug offending population slightly decreases, whereas the frequency of drug crimes within the drug offending population increases. Hence, the decrease of the drug crime rate across this range of male cohorts can be attributed to a decline of the proportion of the population who is convicted for drug crime, whereas the frequency of drug crimes within the drug offending population increases during the same range of cohorts.

As opposed to the patterns revealed for males, it is not obvious that the development of the overall crime rate for females conceals divergent trends for the three crime types (Table 1, Panel b). Although, violent crime does not decrease over the earlier cohorts, the upward trend in the overall crime rate, starting with cohorts born in the early 1970s is repeated, in various degrees, in all three crime types. While the crime drop in many Western countries has largely been driven by male property crime (Aebi & Linde, 2012), the female property crime rate has across our range of cohorts been fairly stable, and even increasing somewhat over later cohorts. With respect to the decomposition of the property crime rate, it becomes clear that there is a rather

divergent development between participation and frequency. The property offending population has increased, whereas the frequency of property crime has decreased, thus, suggesting a process of convergence.

The decomposition of the violent crime rate among the females indicates that while both participation and frequency in violent crime increase across these younger cohorts, the increase in the rate appears to be mainly driven by participation. The rate of female drug crime reflects a decrease across successive cohorts born during the 1960s cohorts and an increase from the 1970s cohorts and onwards. As with the males, the decrease in the drug crime rate across the older cohorts captures a polarized process where the drug offender population has decreased in size while the frequency of drug related crime has increased. The increase in the drug crime rate from cohorts born during the 1970s and onwards is also similar to that of males and essentially captures a process of collectivity.

So far, we have shown that participation and frequency should not by routine be presumed to follow each other in collectivity but may indeed indicate processes of both polarization and convergence. This was most evident with respect to the polarization in overall crime that occurred across male cohorts born from the early 1970s to the mid-1980s, the polarization in drug crime that occurred among both male and females across cohorts born in the 1960s, and the convergence in property crime that occurred among females across the full range of cohorts in the study. We now turn to scrutinize how these overall developments have played out in terms of the age–crime relationship.

Age and crime across successive birth cohorts

In Figures 5 and 6, we decompose the observed participation and frequency patterns further in order to examine how these observed developments are distributed with respect to age. The male participation rate (Figure 5(a)) has generally decreased across the full age range over successive cohorts, although, this decrease is particularly evident in late adolescence. There is a decrease in participation over the entire age span when males born during the early 1960s are contrasted with the rest of the cohorts,
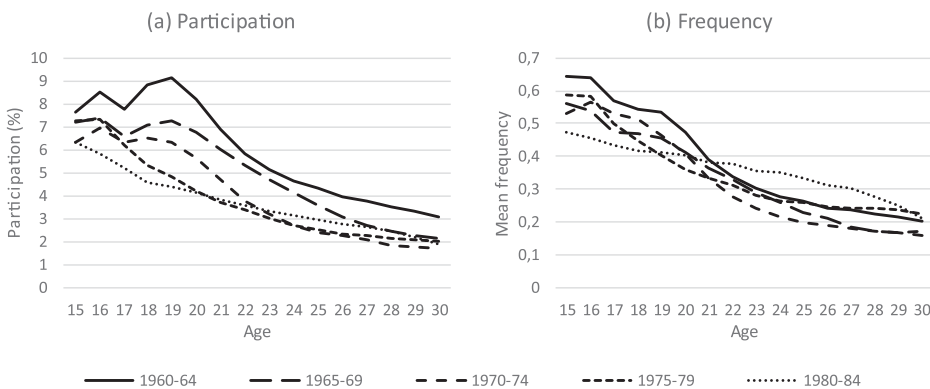

Figure 5. (a, b) Age–crime participation curves (a) and age–crime frequency curves (b) by grouped birth cohort. Males only.
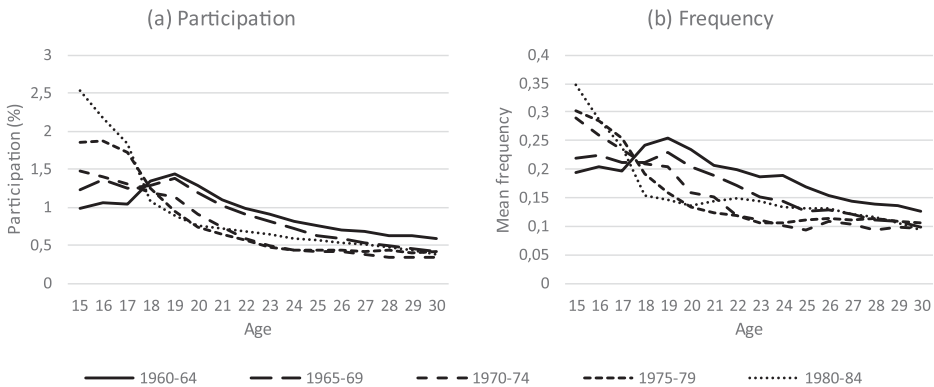
Figure 6. (a, b) Age–crime participation curves (a) and age–crime frequency curves (b) by grouped birth cohort. Females only.

while later cohorts tend to display more similar rates of participation in crime during the early years of criminal responsibility and early adulthood.

A similar tendency can be seen in Figure 5(b), showing the mean frequency rate over age among convicted males, with later cohorts displaying lower levels of activity during adolescence. Interestingly, although the frequency rate seen over all ages taken together is at approximately the same level in these two cohort groups (see Figure 3(b)), the age–crime frequency profiles reveal a shift whereby the activity in the latest cohort was relatively lower during adolescence and relatively higher during early adulthood. This shift is particularly evident when comparing the earliest cohort group (1960–1964) with the latest (1980–1984).

Among the females, there is a marked change in the age–crime curve by cohort membership with respect to both participation (Figure 6(a)) and frequency (Figure 6(b)), essentially in the form of a consistent increase in convicted offending during the early years of criminal responsibility and a decreasing tendency during late adolescence and to some extent also in early adulthood. While the main body of previous criminal career research based on earlier birth cohorts has shown that females tend to have a flatter age–crime curve than males (e.g. Block, Blokland, Van Der Werff, Van Os, & Nieuwbeerta, 2010; Sivertsson, 2018; Wikström, 1990), the current study indicates that the age–crime curves among males and females have become increasingly similar in later cohorts. This is largely a result of opposite developments for males and females in the youngest ages. Among males, both participation and frequency in these ages have decreased over birth cohorts, whereas for females they have increased. The age–crime curve among males has thereby become flattened during late adolescence (see also Matthews & Minton, 2018), but among females it has become increasingly skewed towards earlier ages.

As a final step we turn to the age–crime profiles in the respective crime categories. Figure 7 illustrates age–crime participation curves by violent, property, and drug crime among males and females, respectively.[9] For the sake of simplicity we

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[9]The age–crime frequency curves show a substantially similar development and are, therefore, not shown.
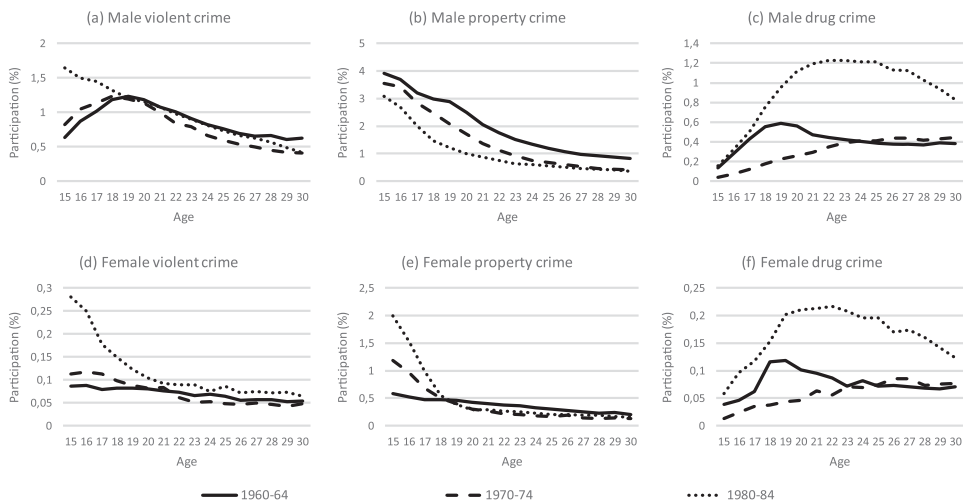
Figure 7. (a–f) Age–crime participation curves by crime type, grouped birth cohort, and gender.

only include three grouped birth cohorts; born in 1960–1964, 1970–1974, and 1980–1984.

It may first be noted that the shape of the overall age–crime relationship is clearly conditional on crime type, with property and violent crime being predominantly distributed toward adolescence whereas drug related crime is concentrated to early adulthood (see also Laub & Sampson, 2003; Piquero et al., 2007). Also, in contrast to violent and property crime, drug crime does not show a distinct peak but is instead more evenly distributed over a longer age period. Although the age-graded patterns in the three crime types are generally replicated across successive birth cohorts, there are also indications of change.

Beginning with the males, this change is most evident with respect to violent and drug crime. In short, violent crime has become increasingly skewed towards earlier ages, particularly in terms of the peak age. It has shifted from the late teens in the earlier cohorts born 1960–1964 and 1970–1974 to the age of criminal responsibility in the latest cohort born 1980–1984 (Figure 7(a)). The overall decrease in male property crime is seen over the full age range, although, it is most evident during adolescence and less so in early adulthood (Figure 7(b)). Drug crime shows a marked increase during early adulthood across successive cohorts and has, thus, become even more distinctly different from the overall age–crime relationship.

The age–crime profiles in violent and drug crime seen among the males are generally replicated among the females. That is, violent crime has become more skewed toward the age of criminal responsibility and drug crime has increased in magnitude during early adulthood. The main difference relates to property crime, where there has been a marked increase at the minimum age of criminal responsibility (Figure 7(e)). Indeed, this change appears to be a main driver for the overall change in the age–crime relationship among females (as shown in Table 1, Panel b).

Discussion

Like many other Western countries, Sweden has experienced declining criminal conviction rates during recent decades. Against this backdrop the current study employed a multicohort approach to explore what this decline has implied in terms of the size of the convicted population on the one hand, and the frequency of convictions within the offender population on the other.

The results show a complex pattern of change, by which participation and frequency vary by birth cohort membership, gender, age, and crime types. In line with a limited number of previous studies that have used longitudinal multicohort data to dissect the aggregate crime trend, our results indicate that the decline in convicted crime has primarily been due to a contraction of the male offender population. The male offender population has decreased from comprising 40% of the cohorts born in the early 1960s to 25% of the cohorts born during the early 1980s. In the Swedish case, this decline is most evident during late adolescence, which to some extent has led to an increasingly flat age–crime curve across successive cohorts (see also Matthews & Minton, 2018).

When it comes to the separate trends of participation and frequency, indicating processes of either collectivity, polarization, or convergence, our results show that we may distinguish between two periods. The first period includes the oldest cohorts, born in 1960, up to those born in the early 1970s, while the second is comprised of the cohorts born between the early 1970s and up to the mid-1980s. The first period is characterized by a consistent decline in both participation and frequency across gender. Thus, for these older cohorts, the trend is characterized by a process which appears to have affected both the risk of entering into a criminal career and the intensity of the criminal career, that is, a process of collectivity. The second period is instead characterized by a polarized trend between participation and frequency among males, but not among females. More specifically, the crime rate among the males, which is relatively stable across these younger cohorts, conceals a process whereby the size of the offender population has continued to decrease while the mean rate of offending frequency has consistently increased.

The first period, where participation and frequency have moved in tandem, appears to be consistent with theories that posit general mechanisms for the crime drop, including the hypothesis of cohort effects caused by changing opportunities to commit crime (Farrell et al., 2015). The second period, however, complicates general explanations for the crime drop. Instead, our results resonate well with those of Andersen et al. (2016) in indicating that "broad explanations of general changes in the crime rate might not sufficiently address the nature of the current trends in youth crime" (p. 1312). Referring to the influential security hypothesis, Andersen et al. note that if increasing security would be a sufficient explanation it would affect both first time offenses and recidivism, when, on the contrary, the results suggest that "the consequence of committing a first crime are unaltered and start the offender on a negative spiral with the same slope" (p. 1312).

A number of influential theories concerning the etiology of crime posit that individuals in the tail of the crime distribution, who commit a wide variety of crime, are less responsive to historical change than individuals on the margin of developing a criminal career (Gottfredson & Hirschi, 1990; Moffitt, 1993). As noted in relation to our ideal-typical

model, any degree of improvement in informal social control may, thus, be hypothesized to cause a polarization in crime. While the analysis of such a link is out of the scope of the current study, we find it hard to interpret the polarization seen among males as mainly driven by changing levels of informal social control. During recent decades Sweden has undergone societal changes which point to reduced levels of informal social control rather than increased levels, at least with respect to the ability for young people to establish themselves as adults by finding a job, a dwelling and forming a family (Bäckman & Nilsson, 2016; see also Massoglia & Uggen, 2010). Also, during the first half of the 1990s there was an economic crisis in Sweden which led to that the average age of establishment in the labor market rose markedly (Statistics Sweden, 2005). This affected primarily cohorts born in the early 1970s and later, which we show is indeed the watershed for an increasing frequency rate, and not participation, of convicted crime among males. The interpretation of the polarization in overall crime among the males is further complicated by the fact that any degree of polarization, as measured by official records, may be due to changes in the criminal justice system, for example a reallocation of formal control measures to already known offenders or changes in the clearance rate for overall crime.

Another finding that complicates general explanations for the crime drop is the different patterns revealed for males and females. In particular, among the females we do not observe a decrease in property crime, which has been highlighted as a main driver for the decrease in overall crime. On the contrary, we observe a quite marked increase in the property crime rate, which is, furthermore, driven by participation. This increase is particularly evident during the teenage years, which, together with violent crime, appears to have rendered an increasingly skewed age–crime distribution in later cohorts. In fact, the increase of both participation and mean frequency among females during the second period is driven entirely by an increase among the youngest in later cohorts and not in early adulthood. In other words, the number of early debutants among females has increased, but this does not appear to have led to an increase of crime in subsequent years.

While the breakdown into the three crime categories was generally characterized by collectivity, we note two interesting exceptions: the polarization in drug crime across cohorts born during the 1960s, and the convergence in property crime among females across the full range of cohorts. As noted earlier, one of the main reasons for the increase in registered drug crime was the zero-tolerance policy initiated in the 1980s and most explicitly expressed by the criminalization of the possession of drugs in 1988 (Lenke & Olsson, 2002). It is, therefore, interesting to note that the oldest cohorts in our data, for which we note a polarization in drug crime, came of age during a period when these changes had not been implemented. It may, therefore, be that the development across the 1960s cohorts reflects the previous policy that was more directed toward the distribution of drugs that, in turn, concerned a much smaller, but more hardened, population of offenders. A more in-depth analysis, including a more nuanced categorization of drug crime, would be informative to the apparent cohort differences of participation and frequency in drug crime.

With respect to property crime among females, the increase is fully driven by participation whereas the frequency of property crime has instead decreased. Estrada

et al. (2016) show that the increase in young women's registered property crime mainly relates to convictions for petty theft and suggest that this is an effect of police reporting propensities rather than an increasing propensity for females to commit property crime. Support for this interpretation is found in the national self-report studies among Swedish 15-year-olds, which show declining rather than increasing levels of theft among both boys and girls since 1995, although, the decline among boys is of a larger magnitude (Shannon et al., 2014). Our results align with the suggestion by Estrada et al. Indeed, if the offender population increases due to net-widening mechanisms, we might expect a process of convergence in officially recorded crime since it means that offenders with relatively low (re)offending propensities become increasingly drawn into the criminal justice system.

With respect to the age–crime relationship, Matthews and Minton (2018) recently argued that the task has shifted from that of explaining an increasingly peaked age–crime curve to instead having to explain a curve that has become increasingly flat (p. 314; see also Ulmer & Steffensmeier, 2014). While the crime drop generally appears to have involved a decline in male youth crime (Andersen et al., 2016; Berg et al., 2016; Matthews & Minton, 2018), our results are only partly consistent with the notion of a flatter age–crime curve. The male participation curves display decreases across almost the entire age range across successive cohorts, but a disproportionately large decrease during late adolescence, which is indeed supportive of a flattening tendency. In line with the notion of a flattening we also note a certain increase in participation and frequency during early adulthood among the males, which suggests that some criminality may have become postponed in later cohorts (see also Matthews & Minton, 2018). As already noted, this increase during early adulthood appears to be mainly driven by increasing levels of drug crime in later cohorts.

At the same time, however, the modal peak age for crime among both males and females has shifted toward the lower end of the age spectrum. As noted previously, the most apparent change in the age–crime curve across successive cohorts has occurred among females. Our results are in line with those of Matthews and Minton (2018) in the sense that the age–crime profiles among males and females have become increasingly similar over time. However, our results also suggest that this is due to a major shift of criminal convictions towards earlier ages in the later female cohorts. Indeed, while the majority of research focused on older cohorts born in the 1950s and 1960s suggests that females entered into registered crime later than males (Sivertsson, 2018), our results indicate that this was not the case in cohorts born during the 1980s. As noted above, it is also highly likely that this trend is, largely, a result of changes in society's reaction to crime.

The interpretation of our findings is complicated by the fact that they are the results of changes in both criminal behavior and society's reaction to crime. What we may fairly safely conclude is that the substantial contraction of the male convicted population, at least in part, reflects a change in criminal propensity in the general population. Besides our argument that the cohort design (following individuals to age 30) ought to be a reasonable approach in capturing those who commit crime more than just on a few occasions, this conclusion is also supported by the fact that male property crime appears to be the main driver for the overall decline. The other crime

types (including female property crime) are to various degrees driven by societal reactions to crime; most obvious is the development of drug crime. Thus, official criminal careers are, besides individual behavior, largely shaped by legal definitions of and reactions to crime. To the extent that being exposed to the justice system at an early stage of life influences life chances (e.g. Damm et al., 2017) crime policies, in a broad sense, are critical for the youth-to-adulthood transition and for how subsequent life trajectories develop for a substantial share of the population. To fully understand the impact of criminal behavior and reactions to crime, analyses of long-term consequences of crime need to include both of these aspects. More generally, it may be argued that reactions to crime are an important, but understudied, piece of the puzzle for explaining cohort differences in crime and related outcomes (Sampson, 2015).

Conclusion

Our results suggest that criminal career patterns and the distribution of crime have undergone significant changes over the course of our 25 successive cohorts. In this sense, our results present a challenge to theories which assume constancy in criminality across birth cohort membership (e.g. MacLeod et al., 2014), and to theories of the crime drop which posit general mechanisms for this historical trend (e.g. Farrell et al., 2015). In order to develop a better understanding of crime trends, we would agree with the authors of previous dissections of the aggregate crime rate that it is important to consider both demographic and social groups and a broad range of criminal career parameters (e.g. Andersen et al., 2016; Berg et al., 2016; Nilsson, Estrada, & Bäckman, 2017). While there are a wide variety of behavioral and reactional mechanisms that might explain the links between birth cohort membership and changing patterns of registered crime, the current study has demonstrated that the aggregate crime trend may conceal such mechanisms of change. As such, the current study may serve to encourage more analytical approaches to examining the continuous intersection between historical and individual crime development. In this respect, our ideal-typical model, by distinguishing between processes of collectivity, polarization, and convergence, may help to stimulate further research in this area, and we are convinced that an emphasis on the birth cohort is an important empirical pre-requisite for doing so.

Disclosure statement

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