

# DELINQUENT DEVELOPMENT AMONG EARLY-ONSET OFFENDERS

## Identifying and Characterizing Trajectories Based on Frequency Across Types of Offending

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Early-onset offending is generally recognized as a risk factor for persistent criminal behavior. However, variation in long-term delinquent development among early-onset offenders remains rather underexplored and poorly understood. We, therefore, used multitrajectory modeling to identify distinct subgroups of early-onset offenders ( $n = 708$ ) based on the frequency of offending across several types of offenses up to age 25. We used multinomial regression analysis to characterize subgroups on gender, ethnicity, and childhood neighborhood characteristics. Six offender subgroups could be distinguished in our data: nonrecidivists (51%), sporadic recidivists (25%), and low-rate (8%), moderate-rate (10%), high-rate adult-peaked (3%), and high-rate adolescence-peaked recidivists (3%). Males, minorities, and children from disadvantaged neighborhoods were more likely to follow re-offending trajectories characterized by increased levels of property crime, vandalism, and violent and

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sexual offenses. Findings are discussed in relation to criminological theory, and recommendations are made for future life-course criminological research.

**Keywords:** offending trajectories; early-onset offenders; life-course criminology; multitrajectory modeling

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Early-onset offenders—those offenders who start before the age 12—are at high risk of developing persistent criminal behavior across the life-course (Loeber & Farrington, 2000; Loeber, Slot, van der Laan, & Hoeve, 2008; Snyder, 2001). Childhood-onset offenders are 2 to 3 times more likely to become chronic offenders than youth who start offending in adolescence (Loeber, Farrington, & Petechuk, 2003; Moffitt, Caspi, Harrington, & Milne, 2002). Early-onset offenders also tend to engage in more serious types of offending, including violence (Loeber et al., 2003).

Despite their elevated risk of becoming persistent offenders, a substantial portion of early-onset offenders desists from crime before reaching adulthood (Moffitt, Caspi, Dickson, Silva, & Stanton, 1996; Stouthamer-Loeber, Loeber, Stallings, & Lacourse, 2008). In fact, only half of all children displaying antisocial and offending behavior during childhood persist in offending in adulthood (Moffitt et al., 2002). Heterogeneity among early-onset offenders poses a challenge to policy-makers. Although intervening at an early age may seem necessary to prevent further escalation into chronic offending, unnecessary intervention resulting from false-positive identification of high-risk youth should be avoided. Apart from being cost-ineffective, excessive interventions and potential stigmatization may even be harmful (Hill, Coie, Lochman, & Greenberg, 2004). At present, however, identification of would-be chronic offenders is hampered by a lack of knowledge on differential re-offense patterns of early starters and factors associated with distinct delinquent pathways.

Extant studies aimed at identifying distinct offending patterns across the life-course (for reviews, see Jennings & Reingle, 2012; Piquero, 2008) unfortunately offer very limited insight into differences in delinquent pathways among early-onset offenders. Current trajectory-based studies largely use general population and general offender samples (Allard, Chrzanowski, & Stewart, 2017; Blokland, Nagin, & Nieuwbeerta, 2005; Broidy et al., 2015; Ferrante, 2013; Jennings & Reingle, 2012; Yessine & Bonta, 2009). Such samples, however, might have precluded meaningful differentiation among childhood-onset offenders, as the expected prevalence of early-onset offenders in general and offender populations is low (Moffitt et al., 2002; Snyder, 2001; van der Laan, van Domburgh, Hoeve, Loeber, & Slot, 2008). As a result, variation in offending patterns among childhood-onset offenders is overshadowed by the identification of large non-rate (e.g., D'Unger, Land, McCall, & Nagin, 1988; Land, McCall, & Nagin, 1996; Piquero, Farrington, Nagin, & Moffitt, 2010) and low-rate (e.g., Allard et al., 2017; Blokland et al., 2005; Broidy et al., 2015; Ferrante, 2013) offending subgroups.

The inability to differentiate between offending patterns of childhood-onset offenders constitutes an important gap in our knowledge, as identifying and characterizing their distinct re-offense patterns has both theoretical and practical merit. First, it could help confirm or challenge theoretical assumptions (Moffitt, 1993, 2006) on the existence of distinct offending patterns of early-onset offenders and associated offender characteristics. Second, to the extent that individual and neighborhood characteristics differentiate between

offending trajectories (see Moffitt, 1993; Moffitt et al., 1996), this could strengthen efforts to identify children at low and high risk of long-term criminal involvement.

To fill this knowledge-gap, two key methodological challenges need to be overcome. First, studies have to include solely known childhood-onset offenders to be able to explore meaningful variation in delinquent pathways within this specific offender subgroup. Second, early starters have to be identified in childhood and followed beyond adolescence (Jennings & Reingle, 2012), during which delinquent behavior is theorized to peak for all individuals regardless of age of onset (Moffitt, 1993).

The purpose of the current study was to address the abovementioned issues by asking (a) whether subgroups of early-onset offenders can be identified based on patterns in the frequency and nature of their offending from childhood into adulthood and (b) whether gender, ethnicity, and childhood neighborhood characteristics can help characterize subgroups following distinct offense patterns. To address these questions, data were used on more than 700 individuals who were registered by the police for an offense before age 12. As a police contact/arrest at a young age has emerged as the most consistent indicator of persistence in offending (DeLisi, Neppl, Lohman, Vaughn, & Shook, 2013), this sample enables us to draw a detailed picture of heterogeneity in delinquent development among childhood-onset offenders.

### **THEORIES ON DELINQUENT DEVELOPMENT OF EARLY-ONSET OFFENDERS**

Moffitt's (1993, 1997, 2006) developmental taxonomic theory is the most influential theoretical model arguing that offense patterns in the general population can be divided into distinctive offending trajectories. Moffitt (1993) originally stated that, while the majority of offenders are theorized to only temporarily engage in crime during adolescence, a small number of individuals will start offending early in the life-course and continue offending at a high-rate during adolescence. Based on emerging empirical findings, Moffitt later expanded her original taxonomic theory by including a third offending pathway. By then, several longitudinal studies had identified a small group of early starters who engaged only in low-to-moderate delinquency during adolescence (Moffitt et al., 1996; Nagin, Farrington, & Moffitt, 1995; Raine et al., 2005). From this, Moffitt (2006) concluded that some early-onset offenders will show delinquent behavior up to age 18 that is too infrequent to be classified as classic life-course-persistent offending (see Moffitt, 2006, for her altered theory and empirical underpinnings). Thus, while Moffitt (2006) still argues that the majority of early-onset offenders will follow the delinquent pathway of the original life-course-persistent offender, she now anticipates that a small group of early starters will show low-rate offending behavior during adolescence and will desist before reaching early adulthood (i.e., low-level chronics; Moffitt, 2006).

In addition to duration and overall levels of offending, the offender subgroups are hypothesized to commit different types of crime. Although life-course-persistent offending is generally thought to be more versatile than that of adolescence-limited delinquents, persistent offenders are believed to increasingly commit violent types of offenses with age (Moffitt, 2003, 2006). Offenders on the life-course-persistent trajectory are thought to continuously suffer from the individual and familial risk factors that instigated their problems in childhood (i.e., contemporary continuity). As life-course persisters are exposed to new life domains with age (e.g., school, peers, neighborhood), accumulating negative experiences

enhance a process of escalation of offending (i.e., cumulative continuity). Longer involvement in crime and new social circumstances are believed to change the manifestation of tendencies toward offending with age (i.e., heterotypic continuity). As a result, life-course persisters are thought to engage in all types of age-appropriate delinquent behaviors in all stages of life; they are thought to hit and kick at onset, exhibit theft and drug use throughout the teenage years, and turn toward violent offending upon entering adulthood (Moffitt, 1993; Moffitt et al., 2002). In contrast, low-level chronic offenders are thought to suffer from depression and anxiety, excluding them from deviant social peer groups. As a result, while low-level chronics are subject to both contemporary and heterotypic continuity, they would be less affected by the process of cumulative continuity causing the escalation of offending among their high-level counterparts (Moffitt, 2006).

Moffitt's (1993) taxonomy also offers expectations on the associations between gender, ethnicity, and early environmental differences and offending subgroups. Life-course-persistent offending would mainly be limited to males, as they tend to suffer more from the neuropsychological deficits assumed to underlie this pathway than females. Minorities would also be at elevated risk for life-course-persistent offending, because as a group, they are likely to grow up in the most disadvantaged familial and economic environments (see Piquero, Moffitt, & Lawton, 2005). Childhood environmental characteristics are also thought to distinguish between low- and high-rate persistent offenders, with low-level offenders residing in more adaptive social environments than their high-level counterparts (Moffitt, 2006).

The Moffitt taxonomy leads us to expect that most early starters frequently commit crimes across the entire life-course, whereas a small group of early-onset offenders engage only in low-to-moderate delinquency during adolescence. In addition, we would expect persistent offenders to engage in all types of offending and high-rate chronic offenders to disproportionately, and increasingly, engage in violent crime. Furthermore, males, minorities, and children from low socioeconomic status (SES) and highly urban neighborhoods would be most likely to show persistent and violent delinquent behavior.

### PRIOR RESEARCH

The potentially meaningful differentiation of re-offense patterns among childhood-onset offenders is vastly understudied. To exemplify a systematic review on delinquent trajectories, Jennings and Reingle (2012) found that out of the 105 studies included, only one study (i.e., van Domburgh, Vermeiren, Blokland, & Doreleijers, 2009) was based on a sample of childhood-onset offenders. To provide empirical groundwork to the current study, we, therefore, draw from trajectory-based studies using juvenile offender samples.

Prior work among adolescent offenders has identified between three and seven offending trajectories (Baglivio, Wolff, Piquero, & Epps, 2015; Day et al., 2012; Laub, Nagin, & Sampson, 1998; Livingston, Stewart, Allard, & Ogilvie, 2008; Monahan, Steinberg, Cauffman, & Mulvey, 2009; Mulvey et al., 2010; van der Geest, Blokland, & Bijleveld, 2009; Ward et al., 2010). Trajectory subgroups generally include low-, moderate-, and high-rate offending groups. The low-rate group typically consists of the largest portion of the sample, whereas the high-rate group makes up the smallest trajectory subgroup (Day et al., 2012; Laub et al., 1998; Monahan et al., 2009; Mulvey et al., 2010; van der Geest et al., 2009; Ward et al., 2010).

Studies on juvenile offender samples confirm Moffitt's assumptions on (heterotypic) continuity among early-onset offenders, by reporting that early-onset offenders follow the

most chronic delinquent pathways, and commit the highest amount and most diverse types of offenses (Broidy et al., 2015; Day et al., 2012). In a large sample of youth arrested before age 18, Baglivio et al. (2015) found distinct delinquent pathways among juveniles who started offending in childhood. While some early starters desisted shortly after age 13 years (32%), others either had a steady, but low number of arrests up to the age of 17 years (29%), or showed high-rate persistent offending throughout the adolescent period (7%). Data on 287 male childhood-onset offenders also revealed heterogeneity in re-offending patterns by supporting a model with three distinct subgroups: a low-rate group (68.3%), an escalating group (24.7%), and a high-rate group (7.0%; van Domburgh, Vermeiren, et al., 2009).

Unfortunately, it remains relatively unclear whether offending subgroups vary by demographic factors such as gender, as most trajectory-based studies are based on male subjects (Day et al., 2012; Laub et al., 1998; Monahan et al., 2009; Mulvey et al., 2010; van der Geest et al., 2009; Ward et al., 2010). Studies that were able to characterize trajectory subgroups based on demographic characteristics found that males were more likely to populate the chronic offending groups than females (Block, Blokland, van der Werff, van Os, & Nieuwbeerta, 2010; Livingston et al., 2008; Piquero, Brame, & Moffitt, 2005). Findings on ethnicity seem context dependent. In the United States, minorities (i.e., non-Whites) were more likely to belong to the trajectory subgroup demonstrating an early-onset and chronic offending trajectory (Baglivio et al., 2015), whereas Australian Indigenous offenders were more likely than non-Indigenous offenders to populate the early-onset/chronic trajectory (Livingston et al., 2008). After gender and ethnicity were controlled for, neighborhood disadvantage was no longer associated with trajectory group membership (Livingston et al., 2008). In a childhood-onset sample (van Domburgh, Vermeiren, et al., 2009), minorities were found to be more likely to follow the high-level than the low-level offending pathways, and children from disadvantaged neighborhoods were overrepresented in the escalating offender subgroup.

Although abovementioned studies highlight heterogeneity in offending patterns, the literature is characterized by a number of limitations. First, the generalizability of findings among juvenile offenders to childhood-onset offenders is limited. Childhood-onset offenders without an arrest during adolescence are not included in juvenile offender samples, whereas variation in offending among children that do re-offend might be overshadowed by offending behavior of the more common adolescent-onset offender. Second, in previous studies, offending subgroups were categorized based on frequency of offending alone (Day et al., 2012; Laub et al., 1998; Ward et al., 2010) or broad distinctions between nonserious and serious types of crime (van der Geest et al., 2009; van Domburgh, Vermeiren, et al., 2009). However, a relevant taxonomic theory (Moffitt, 1993) as well as critiques of life-course criminological research (Evans, Simons, & Simons, 2016; Hasking, Scheier, & Abdallah, 2011; Odgers et al., 2007) highlights that the complexity of delinquency is underestimated when it is defined solely as the frequency of offending. Scholars state that it is important to distinguish between several types of offending behaviors when identifying offender subgroups (Evans et al., 2016; Hasking et al., 2011; van Domburgh, Vermeiren, et al., 2009). Third, a limitation of past research featuring early-onset offenders is the use of short follow-up periods (van Domburgh, Vermeiren, et al., 2009). This is unfortunate because to test the popular notion that an early onset elevates the risk of becoming a chronic offender (see Moffitt, 1993), studies have to be focused on delinquent development beyond adolescence, during which delinquent behavior is theorized to peak for all offenders.



## THE CURRENT STUDY

Given the paucity of studies focused on long-term re-offense patterns of childhood-onset offenders, the current study explores the extent to which distinct delinquent trajectories can be identified within a sample of approximately 700 early-onset offenders. These data provide us with a follow-up period of 3 to 14 years, which gives us insight into re-offending in the theoretically relevant period beyond adolescence. To take offense types into account, we use a multigroup trajectory model to identify clusters of individuals following similar trajectories across multiple types of crime. In doing so, we hope to uncover the most useful taxonomy of early-onset offenders by accurately reflecting the full range of their offending behavior. Finally, the current study incorporates key demographic and early neighborhood explanatory factors to examine the assumption that males, youths from non-Western backgrounds, and individuals from disadvantaged neighborhoods are overrepresented in the high-rate persistent delinquent trajectories.

## METHOD

### PARTICIPANTS AND PROCEDURES

This study was based on participants of the Dutch Childhood Arrestees Study<sup>1</sup>, a prospective longitudinal study on children registered by the police for committing a first offense prior to age 12. Although offenses committed before the age of criminal responsibility (i.e., 12 years in the Netherlands) are not registered in national crime statistics, they are documented in local police registration systems. These registration systems were used to select first-time registered children from three different Dutch police districts (Gelderland-Midden, Utrecht, and Rotterdam-Rijnmond) in the Netherlands, ensuring that neighborhoods with a sufficient range in levels of SES and urbanization were included. Children were not eligible for inclusion when (a) they committed status offenses (i.e., behavior that is only prosecutable for certain [age] groups, such as truancy), (b) they were not legal residents of the Netherlands (because of foreseeable problems at follow-up), (c) they committed the crime on the command of their parents, or (d) inclusion would complicate police procedures.

Data from two cohorts were combined: (a) children registered in 2000 to 2001 ( $n = 351$ , 82.6% male, 46.2% non-Western) and (b) children registered between 2003 and 2005 ( $n = 357$ , 84.9% male, 44.8% non-Western). The total sample encompassed 708 childhood arrestees (83.8% male, 45.5% non-Western) who were registered by the police between the ages of 5 and 11 years ( $M = 9.66$ ,  $SD = 1.50$ ,  $Mdn = 10$ ). Most participants (52.3%) were registered for committing vandalism prior to age 12, approximately one fourth (25.3%) was registered for property crime, and 14.7% was registered for a violent offense. Comparison with available data from the United States (Snyder, 2001) suggests that sample characteristics are similar in terms of gender and offense profiles.

### MEASURES

#### Measures used for multitrajectory modeling

Two registration systems were used to reconstruct participants' criminal history. We used the Dutch police registration system HKS (Herkennings Dienst Systeem) to gather information on frequency and type of re-offending from age 12 years and above over a 3- to 14-year follow-up period, from January 2000 until February 2015. The HKS has information on all

the times a person was identified as a suspect in a criminal case from age 12 years and above. As such, HKS contains information on suspects and not-convicted offenders. However, given that cases that are discarded in an early stage of investigation do not end up being registered in HKS and given that approximately 90% of all HKS-registered suspects are found guilty at a later stage (Besjes & van Gaalen, 2008), HKS data are closer to conviction than to arrest data. To correct for reduced time at risk, we gathered information on date of death and criminal sanctions from the Research and Policy Database Judicial Documentation ("Onderzoek- en Beleidsdatabase Justitiële Documentatie," OBJD) of the Research and Documentation Centre of the Ministry of Justice (WODC). As there was no participant mortality during the follow-up, we corrected for the possible reduction in police registrations due to time spent incarcerated (Piquero et al., 2001).<sup>2</sup> Relatively few participants ( $n = 75$ , 10.59%) had been incarcerated during the observation period. The average incarceration time among recidivists was 6.5 months ( $SD = 1$  year and 2 months,  $Mdn = 1.4$  months).

We determined frequency of re-offending per type of offense per age based on date of birth, date of police registrations, and crime descriptions from the police registration system (HKS). Crime descriptions in HKS were based on the following standard crime categorization employed by Statistics Netherlands (2019; see Kalidien, de Heer-de Lange, & van Rosmalen, 2011): (a) property crime (including theft, embezzlement, and fencing), (b) vandalism and crimes against the Public Order and Authority (such as discrimination and sedition), (c) violent and sexual offenses (including rape and [sexual] assault), (d) traffic offenses (including DUI, hit and run, joyriding and refusal of a breathalyzer test), (e) drug crimes (such as owning or selling illegal amounts of soft and hard drugs),<sup>3</sup> and (f) weapons offenses (including carrying a weapon in public).

To correct for spells of incarceration, we calculated the number of offenses individuals might have committed had they not been imprisoned (see Bijleveld, van de Weijer, Ruiter, & van der Geest, 2015). We multiplied the number of times participants had been registered by the police during the time they were free within a year's time period, by the inverse of the proportion of that year. For example, if an individual was detained for 6 months at age 20 and committed two offenses during the remaining 6 months of that year, this person was expected to have committed four offenses were he or she not have been incapacitated at age 20 years. As this correction led to disproportionately high offending rates per age for a few participants (e.g., because they had two police registrations in a year during which they were incarcerated for 11 months), we stabilized the correction effect (see also van der Geest et al., 2009) by capping their offending rates at the maximum of offenses committed by any individual in the sample without stabilization + 1. Thus, stabilizing the correction for incarceration put them within the sample's observed range, but still indicated that these individuals were more likely to have committed a disproportionately high number of offenses in the years they were incapacitated.

### Predictors

As ethnicity was not registered at participants' arrest below age 12, we determined ethnic background based on family name. This method is likely to be accurate in the vast majority of the cases, as intercultural marriages of foreign women to Dutch men (in which case, the child is likely to have a Dutch family name) were rare at the time our participants were born

(Statistics Netherlands, 2001). Most non-Western family names were easily recognizable. However, when a specific family name was common in both the Netherlands and in foreign countries, ethnicity was coded as “unknown” ( $n = 57$ ). This process led to high agreement among three coders (89%), and a high degree of interrater reliability was achieved ( $\kappa > .86$ ,  $p < .001$ ). As country of birth was registered at follow-up, we were able to check our initial coding among recidivists. We found that of the 66 recidivists born in non-Western countries, 89% was correctly classified as having a non-Western ethnicity based on their family name. For the 8% ( $n = 5$ ) that were wrongfully categorized as Western, and the 3% ( $n = 2$ ) originally categorized as “unknown,” we adjusted their ethnicity into non-Western based on their country of origin.

Postal codes were used as a proxy for neighborhood levels of SES and urbanization prior to age 12. The postal code classification of neighborhood SES was available in quintiles based on mean income, unemployment, and education level (Knol, 1998; Social and Cultural Planning Office of the Netherlands, 2002), with higher scores representing lower neighborhood SES. Information on urbanization levels was based on the number of households per square kilometers (Statistics Netherlands, 2006) and ranged from (1) “no-urbanization: less than 500 households per km<sup>2</sup>” to (5) “very high urbanization: 2,500 or more households per km<sup>2</sup>.” With the intent of using analytical techniques to compare groups, we increased the likelihood of having observations per trajectory group and levels of SES and urbanization by dichotomizing the neighborhood-related variables. We combined the lower three (low risk) and upper two (increased risk) categories for both variables. Hence, we separated “very high to average neighborhood SES” (1-3) from “low to very low neighborhood SES” (4-5) and “very low to average urbanization” (1-3) from “high to very high urbanization” (4-5). To deal with missing data, we added a category “unknown” to all predictor variables.

## ANALYSES

Our analyses proceeded in three steps. First, we studied the overall delinquent development in our sample by examining total recidivism rates and recidivism rates per type of offense. Second, we used a group-based multitrajectory model (Nagin, Jones, Passos, & Tremblay, 2018) to identify distinctive clusters of individuals displaying similar offending patterns across several types of offending. Parameters defining these patterns were allowed to vary freely across groups, so that groups could differ in both the level and shape of their delinquent pathways. When estimating offending trajectories, we excluded participants without an additional police registration during the follow-up period (Broidy et al., 2015; Ferrante, 2013), as including nonrecidivists would only add a flat trajectory to the model. Furthermore, it would increase the risk of low-level recidivists being pulled into the nonrecidivist group, which would complicate distinguishing between non- and low-level recidivists. In the third step, we assigned individuals to subgroups based on their maximum posterior group probabilities, and used group membership—with nonrecidivists denoted as a separate group—as a multiple nominal outcome in a series of multinomial logistic regression analysis. We studied whether gender, ethnicity, and levels of childhood neighborhood SES and urbanization (all dummy-coded) differentiated between trajectory subgroups. Additional analysis showed that there was no evidence of multicollinearity among these predictors, as variance inflation factor (VIF) scores were between 1 and 10 (Bowerman & O’Connell, 1990; Mertler & Vannatta, 2005) and tolerance values above 0.2 (Menard, 1995).



### Multitrajectory model

The multitrajectory models were run using the STATA Trajectory Procedure (Jones, Nagin, & Roeder, 2001) in STATA 13. We identified the best-fitting model based on cubic-shaped trajectories, and a count-specific zero-inflated Poisson regression model. In doing so, we were able to prevent disproportional change in delinquent trajectories caused by years with zero police registrations (Lambert, 1992).

Due to low rates of participation in drug and weapons offenses, we combined these two types of offending to display delinquent development across different types of crime. As a result, trajectory subgroups were identified based on similarity of their offending patterns across five outcome variables: (a) property crime, (b) vandalism and crimes against the public order and authority, (c) violent and sexual offenses, (d) drug and weapons offenses, and (e) traffic offenses.

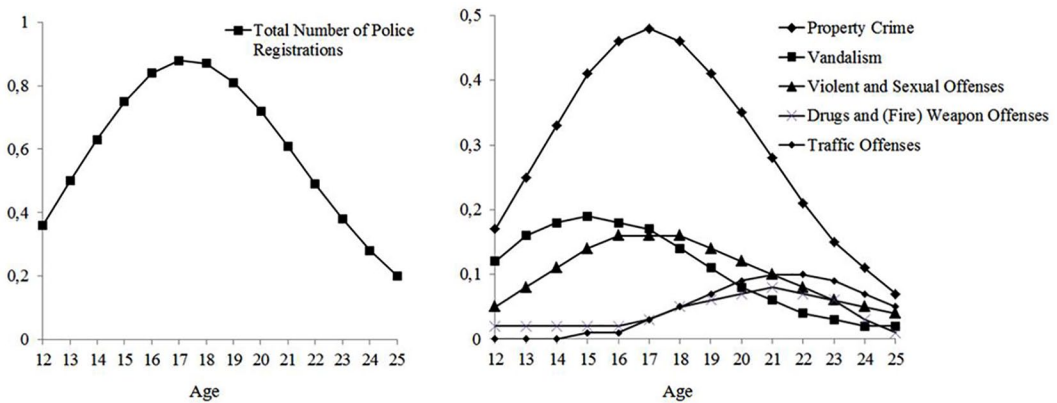
In line with Nagin's recommendations (see Nagin, 2005, 2010), the best-fitting model was selected based on three criteria: (a) Bayesian information criterion (BIC; Schwartz, 1978) values closest to zero, indicative of increased model fit compared with alternative models; (b) highest average posterior probabilities, representing higher degrees of classification certainty of each individual to his or her most likely trajectory; and (c) highest odds of correct classification (OCC; Nagin, 2005), indicating improvement of assignment accuracy over random assignment, while accounting for differences in group sizes. Mean posterior probabilities above .70 and OCCs of 5 or larger for all trajectory groups were considered indicative of satisfactory model fit and assignment accuracy (Nagin, 2005, 2010). In addition, Wald tests were performed to test for group differences in terms of intercepts and cubic slopes across all outcome variables.

*Attrition.* As the year of inclusion and age at first offense differed between participants, the average age at the end of follow-up ranged from 15 to 27 years ( $M = 22.10$ ,  $SD = 2.47$ ,  $Mdn = 22$ ; see bottom part of Table 1 for percentages of original sample across age). To avoid problems associated with defining parts of offending trajectories based on a small number of individuals, we limited the trajectories to ages for which data were available on at least 100 individuals. We, therefore, ended our observation of offending trajectories at age 25. In addition, we corrected for differences in participants' age at the end of the observation period, by coding nonobserved years as missing (see also van der Geest et al., 2009). For example, when participants reached the age of 20 at the end of the follow-up period, we coded their police registrations from ages 21 to 25 years as missing. As a consequence, they did not contribute to the estimation of the trajectories from age 21 to 25 years.

Independent sample  $t$  tests showed that there were no significant differences in participants' age at the end of the follow-up period across gender,  $t(699) = 1.56$ ,  $p = .12$ ; ethnicity,  $t(648) = .82$ ,  $p = .41$ ; or neighborhood urbanization levels,  $t(668) = 1.80$ ,  $p = .07$ . However, there was a significant difference in the level of neighborhood SES. Children from higher SES neighborhoods were older ( $M = 22.20$ ,  $SD = 2.32$ ) at the end of the observation period, than children from lower SES neighborhoods ( $M = 21.80$ ,  $SD = 2.36$ ),  $t(699) = 2.23$ ,  $p = .03$ .<sup>4</sup> Thus, although attrition led to decreasing power with age, substantial bias due to differential attrition is not likely to be an important threat to the validity of our conclusions.

**TABLE 1: Percent of Sample With a Police Registration by Age and Offense Types**

Offense Types and Attrition	Total		12		13		14		15		16		17		18		19		20		21		22		23		24		25	
	%		%		%		%		%		%		%		%		%		%		%		%		%		%		%	
Total	48.9		7.8		13.3		16.1		17.4		18.4		17.9		17.1		14.9		15.9		11.9		9.4		10.7		5.9		1.2	
Property crime	35.3		3.7		8.6		10.6		11.3		11.2		11.0		9.2		7.7		7.6		6.5		5.3		4.4		2.1		0.6	
Vandalism	29.7		4.2		5.8		5.9		6.2		6.8		5.6		5.7		4.1		2.2		2.5		1.8		1.7		1.3		0	
Violent and sexual offenses	25.4		2.0		3.0		3.7		5.1		6.6		5.3		4.4		3.9		4.0		3.1		3.0		3.4		1.3		0	
Drug offenses	6.1		0.1		0		0.3		0.3		0.4		0.7		0.9		0.8		1.5		1.7		1.5		1.3		0.8		0.6	
Weapons offenses	6.6		0.3		0.4		0.6		1.0		0.7		0.9		0.7		1.1		1.2		1.0		1.3		1.0		0.4		0	
Traffic offenses	10.7		0		0		0.3		0.3		0.4		1.0		2.0		2.4		3.8		1.9		3.3		3.4		1.3		1.2	
Percentage of original sample size across age			100		100		100		99.9		98.9		96.8		93.1		85.2		73.4		55.6		42.1		33.6		23.4		8.3	



**Figure 1: Average Number of Police Registrations per Age, Corrected for Days of Incapacitation**

## RESULTS

### DEVELOPMENT OF RE-OFFENDING

Results showed that half (48.9%,  $n = 346$ ) of early-onset offenders had a second police registration between the ages of 12 and 25 years (see Table 1). Most participants were registered for property crime (35.3%), vandalism (29.7%), and violent or sexual offenses (25.4%), whereas drug (6.1%), weapons (6.6%), and traffic (10.7%) offenses were less common.<sup>5</sup> Regarding involvement in crime across age, Table 1 shows that early-onset recidivists were typically criminally active during adolescence, as the largest share of participants was registered by the police at ages 16 and 17 years.

Regarding frequency of re-offending, Figure 1 shows that re-offending rates across age displayed the age-crime curve, with police registrations increasing up to age 17 and then declining into adulthood. However, the typical age-crime curve did not apply to all types of crime. On one hand, property crime, vandalism, and violent and sexual offenses followed the typical age-crime curve. Traffic offenses, and drug and weapons offenses, on the other hand, were virtually absent up to late adolescence to peak only in early adulthood.

### OFFENDING TRAJECTORIES

To select the optimal number of trajectory groups, we estimated multitrajectory models with up to six groups and compared their fit. As illustrated in Table 2, the fit indices indicated that the five-group model described the data best. In this five-group solution, BIC values were lowest. In addition, average posterior group membership probabilities were high: all averaging above .90. The OCC ranged from 12 to 1,091, indicating high assignment accuracy. Although this five-group model identified two relatively small subgroups (less than 5%), model fit was substantially better than that of the four-group model. Further examination of the five-group model indicated that distinguishing between the two smallest groups yielded unique information about their levels as well as developmental patterns of recidivism (see Figure 2 and Table 3)—information that was lost in the four-group model. We opted for the model with five re-offending subgroups. We note, however, that additional

**TABLE 2: Fit Measures for One- to Six Multigroup Models ( $n = 346$ )**

Groups	BIC	2( $\Delta$ BIC) <sup>a</sup>	Average posterior probabilities	OCC	Group membership ( $n$ )
1	-7,800.55		1		346
2	-7,061.60	1,477.9	.99; .96	28; 82	270; 76
3	-6,947.57	228.06	.98; .93; .96	25; 45; 207	231; 77; 38
4	-6,926.55	42.04	.93; .90; .94; .98	12; 42; 58; 325	181; 58; 70; 37
<b>5</b>	<b>-6,853.07</b>	<b>146.97</b>	<b>.93; .90; .94; .97; .98</b>	<b>12; 42; 65; 549; 1,091</b>	<b>180; 59; 68; 21; 18</b>
6	-6,882.12	-29.05	.88; .89; .98; .98; .97; .76	9; 39; 94; 651; 610; 31	154; 61; 60; 21; 19; 31

Note. Starting values were required to converge the five- and six-group models. We, therefore, reestimated these models, using intercepts and cubic slopes from the  $k - 1$  group model as starting values. Bold text represents model fit indices for final group model. BIC = Bayesian information criterion; OCC = odds of correct classification. <sup>a</sup>2( $\Delta$ BIC) > 10 indicates there is very strong evidence that the more complex model is favored above the simpler model (Jones et al., 2001).

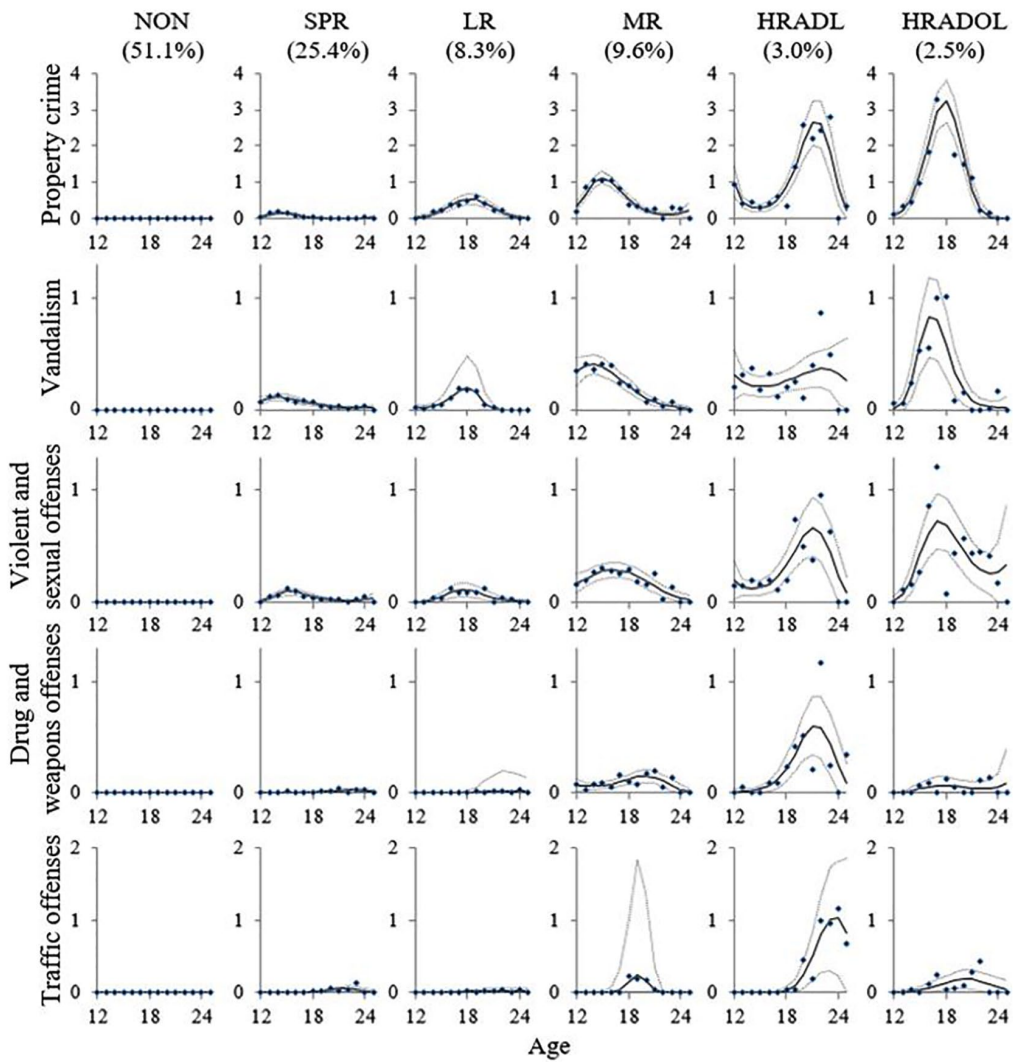
analyses (not reported here, but available upon request) showed that current conclusions were not substantively affected by choosing the five- over the four-group model.

Apart from the a priori defined group of nonrecidivists (NON; 51.1%,  $n = 362$ ), the five recidivist groups were assigned the following labels based on overall level differences in re-offending: sporadic recidivists (SPR; 25.4%,  $n = 180$ ), low-rate recidivists (LR; 8.3%,  $n = 59$ ), moderate-rate recidivists (MR; 9.6%,  $n = 68$ ), high-rate adult-peaked recidivists (HRADL; 3.0%,  $n = 21$ ), and high-rate adolescence-peaked recidivists (HRADOL; 2.5%,  $n = 18$ ). Re-offending patterns for each group across five types of crime are illustrated in Figure 2, with columns representing offending trajectories per subgroup.<sup>6</sup> Figure 3 builds on the findings presented in Figure 2, by displaying the total frequency of offending, as well as the relative share of each type of offense per subgroup.

Most participants belonged to the subgroup that is characterized by noninvolvement in any type of offending as registered by the police during the observation period. Mean offending rates per year were low in both the SPR ( $M = 0.20$ ,  $SD = 0.16$ ) and LR ( $M = 0.44$ ,  $SD = 0.20$ ) subgroups. The SPR and LR groups differed in their development of property crime and vandalism, which peaked at age 13 to 14 for the SPR group, whereas the LR group showed a (low) peak at age 18. The MR group had higher average offending rates per year ( $M = 1.25$ ,  $SD = 0.57$ ) than the first three trajectory subgroups. The MR group was mostly characterized by higher levels of violent and sexual offenses than the SPR group and an earlier peak in property crime (age 16) than the LR group (age 18; see Figures 2 and 3).

In addition, Figure 2 shows that mean offending rates per year were highest in the HRADL ( $M = 1.94$ ,  $SD = 1.00$ ) and HRADOL ( $M = 2.36$ ,  $SD = 0.74$ ) subgroups. These two high-rate groups differed in levels of offending at age 12 and developmental patterns of property crime, vandalism, and violent and sexual offenses (see Table 3 for Wald tests). Although the HRADL group had higher initial levels of property crime, vandalism, and violent and sexual offenses, their patterns of offending started to steadily rise around age 18, peaked around age 22, and decreased toward age 25. The HRADOL group, however, showed lower levels of offending at age 12, but police registrations increased rapidly to a high frequency at age 18.

Regarding distributions of offense types, Figure 3 shows that SPR and MR offenders resembled each other in that for offenders in both trajectory groups property offending



**Figure 2: Multitrajectory Model of Observed and Predicted Frequency of Offense Types per Trajectory Subgroup**

*Note.* NON = nonrecidivists; SPR = sporadic recidivists; LR = low-rate recidivists; MR = moderate-rate recidivists; HRADL = high-rate adult-peaked recidivists; HRADOL = high-rate adolescence-peaked recidivists.

started to decline from the mid-teens onward to a low rate in the early 20s, followed by a small increase up to age 25. Only MR offenders also showed an increase in the proportion of drug and weapons offenses during this period. For the other recidivist groups, the proportion of property crimes did not decline until the early 20s, before giving way to traffic offenses in the LR and HRADL group, and violent and—to a lesser extent—drug and weapons offenses in the HRADOL group. Thus, violent and sexual offenses made up an increasing part of total crime among the HRADOL subgroup, indicating possible escalation of delinquent behavior toward the end of the follow-up period.

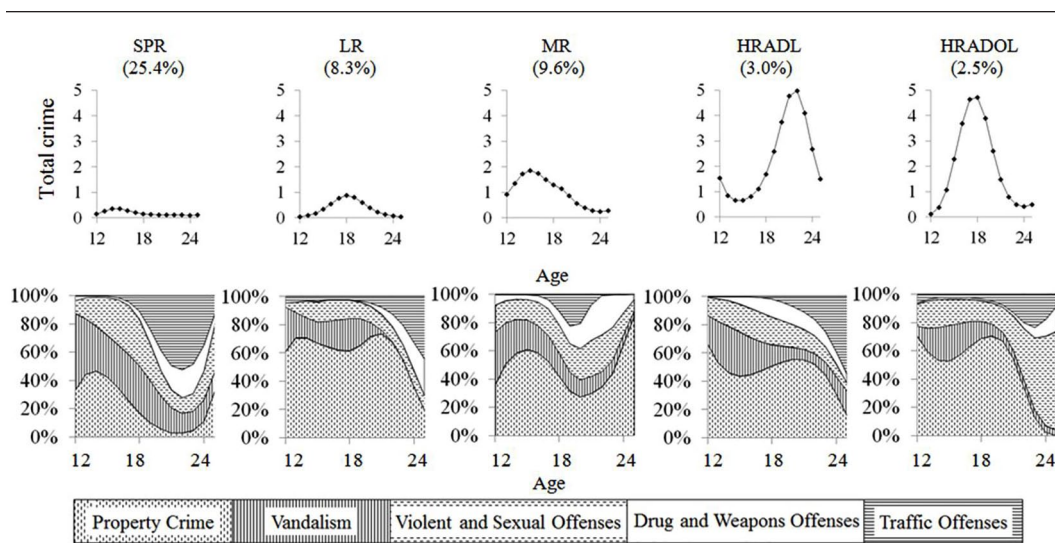


**TABLE 3: Wald Tests on Differences Between Intercepts and Cubic Slopes per Type of Offense Across Five Trajectory Subgroups**

Offense Types	Intercept / Slope	LR vs. SPR	MR vs. SPR	HRADL vs. SPR	HRADOL vs. SPR	MR vs. LR	HRADL vs. LR	HRADOL vs. LR	HRADL vs. MR	HRADOL vs. MR	HRADOL vs. HRADL
Property	Intercept	4.88*	2.09	45.81***	5.45*	2.26	15.29***	0.00	99.47***	2.63	15.16***
Property	Slope	10.19**	2.68	43.78***	12.00***	6.69**	8.93**	0.18	94.25***	8.77**	5.05*
Vandalism	Intercept	2.20	0.55	4.44*	4.28*	1.71	0.77	5.82*	2.09	5.89*	9.48**
Vandalism	Slope	3.97*	0.64	3.67	1.77	3.27	2.33	6.04*	1.21	3.02	5.35*
Violence	Intercept	0.02	10.12**	22.68***	0.01	1.64	5.04*	0.01	4.91*	5.72*	14.64***
Violence	Slope	0.45	9.79**	22.55***	0.29	0.71	3.51	0.12	4.28*	4.40*	13.15***
Drug/Weapons	Intercept	0.13	0.00	0.06	1.92	0.13	0.12	0.02	0.05	2.01	1.51
Drug/Weapons	Slope	0.10	0.00	0.00	1.92	0.10	0.10	0.00	0.00	2.14	2.01
Traffic	Intercept	0.01	0.64	0.14	0.00	0.77	0.10	0.00	0.76	0.72	0.12
Traffic	Slope	0.17	1.47	0.10	0.08	1.91	0.00	0.02	1.57	1.72	0.02

Note. Lower group is reference category. LR = low-rate recidivists; SPR = sporadic recidivists; MR = moderate-rate recidivists; HRADL = high-rate adult-peaked recidivists; HRADOL = high-rate adolescence-peaked recidivists.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

**Figure 3: Total Predicted Amount of Police Registrations and Distribution of Types of Offenses per Trajectory Subgroup Across Age**

Note. SPR = sporadic recidivists; LR = low-rate recidivists; MR = moderate-rate recidivists; HRADL = high-rate adult-peaked recidivists; HRADOL = high-rate adolescence-peaked recidivists.

#### CHARACTERIZING TRAJECTORY SUBGROUPS

As the trajectory model identified two small subgroups with high rates of offending, the high-rate adult and adolescence-peaked groups were combined to form the “high-rate” (HR) recidivist group in follow-up analysis to create sufficient power.<sup>7</sup> The overall multinomial model with group membership as dependent variable was statistically significant (see Table 4), although predictors explained no more than 17% of group assignment.

In the model with nonrecidivists as the comparison group, Table 4 shows that males were more likely to belong to the SPR (odds ratio [OR] = 2.39), and MR (OR = 6.06) groups

**TABLE 4: Odds Ratio Results From Multinomial Regression Analysis: Effects of Demographic and Childhood Neighborhood Factors on Group Membership (*n* = 708)**

Predictors	Total sample, %	SPR vs. NON	LR vs. NON	MR vs. NON	HR vs. NON	LR vs. SPR	MR vs. SPR	HR vs. SPR	MR vs. LR	HR vs. LR	HR vs. MR
<b>Sex</b>											
Female (reference)											
Male	83.8	2.39**	1.84	6.06**	NI	0.77	2.54	NI	3.29	NI	NI
		1.38-4.14	0.83-4.11	1.83-20.02		0.31-1.91	0.72-8.99		0.82-13.13		
Unknown											
	1.0	10.38*	NI	NI	NI	NI	NI	NI	NI	NI	NI
		1.74-61.78									
<b>Ethnicity</b>											
Western (reference)											
Non-Western	45.5	1.01	3.08**	2.04*	6.36***	3.06**	2.03*	6.31**	0.66	2.06	3.12
		0.67-1.53	1.57-6.05	1.10-3.81	2.25-18.00	1.50-6.24	1.05-3.91	2.18-18.25	0.28-1.55	0.63-6.77	0.98-9.88
Unknown											
	8.2	0.73	1.49	1.24	5.57*	2.03	1.69	7.59**	0.83	3.73	4.49
		0.35-1.52	0.46-4.80	0.42-3.63	1.47-21.01	0.57-7.20	0.53-5.43	1.87-30.86	0.19-3.68	0.70-19.97	0.91-22.16
<b>SES</b>											
High (reference)											
Low	48.0	1.15	0.94	2.06*	2.62*	0.82	1.80	2.29	2.19	2.78	1.27
		0.74-1.76	0.50-1.78	1.06-3.99	1.04-6.63	0.42-1.63	0.89-3.63	0.88-5.95	0.95-5.05	0.97-7.98	0.44-3.70
Unknown											
	1.0	0.63	NI	1.40	NI	NI	2.24	NI	NI	NI	NI
		0.08-5.02		0.10-20.23			0.14-35.94				
<b>Urbanization</b>											
Low (reference)											
High	69.9	1.13	1.55	1.32	0.66	1.38	1.17	0.59	0.85	0.43	0.50
		0.70-1.82	0.67-3.61	0.56-3.14	0.21-2.05	0.56-3.36	0.47-2.91	0.18-1.88	0.27-2.67	0.11-1.63	0.13-1.93
Unknown											
	5.4	2.49	3.75	3.61	2.39	1.51	1.45	0.96	0.96	0.64	0.66
		0.84-7.41	0.84-16.69	0.90-14.56	0.48-12.03	0.34-6.61	0.37-5.75	0.19-4.77	0.18-5.27	0.10-4.15	0.11-3.96

Note. Percentages may not sum to 100 due to rounding.  $R^2 = .15$  (Cox and Snell), .17 (Nagelkerke). Model  $\chi^2(32) = 117.27^{***}$ . Lower group is reference category. Odds ratios that could not be calculated—for example, because trajectory subgroups consisted entirely of males—were labeled as “not identified” (NI). As the high-rate group consists entirely of males, odds ratios for comparing the high-rate group to other subgroup in terms of gender were not identified (NI). Odds ratios greater than 1.00 indicate increased probability of group membership. NON = nonrecidivists (*n* = 362); SPR = sporadic recidivists (*n* = 180); LR = low-rate recidivists (*n* = 59); MR = moderate-rate recidivists (*n* = 68); HR = high-rate recidivists (*n* = 39); SES = socioeconomic status.  
\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

than to the NON group. In addition, non-Western participants were more likely to be classified to the LR (OR = 3.08), MR (OR = 2.04), and HR (OR = 6.36) groups than to the NON group. Furthermore, residing in low SES neighborhoods as a child substantially increased the chances of being assigned to the MR (OR = 2.06) and HR (OR = 2.62) groups compared with the NON group.

When offender subgroups were compared, non-Western participants were more likely to belong to the LR (OR = 3.06), MR (OR = 2.03), and HR (OR = 6.31) groups than to the SPR group. Members of the LR, MR, and HR groups did not differ in terms of gender, ethnicity, or neighborhood levels of SES and urbanization.

In sum, multinomial regression analyses indicated that gender differentiated the SPR and LR groups from the NON subgroup. Minorities were more likely to be classified to the LR, MR, and HR groups than to the NON and SPR groups. Residing in a low SES neighborhood as a child only differentiated the MR and HR groups from the NON subgroup.

## DISCUSSION

The aims of the current study were to identify delinquent trajectories and demographic and neighborhood characteristics related to trajectory group membership in a Dutch sample of early-onset offenders. We employed multitrajectory modeling to identify subgroups among approximately 700 early starters, following similar offense patterns across several types of offending. Results showed that delinquent development in early-onset offenders is highly heterogeneous. Next to an *a priori* defined nonrecidivist trajectory, five re-offending trajectories were identified: a sporadic, low-, moderate-, and two high-rate re-offending subgroups, whose offending peaked either in adulthood or adolescence. These findings extend prior trajectory-based studies, as knowledge of heterogeneity in long-term offending trajectories within the early-onset offender population is at present virtually absent. Charting delinquent development in children experiencing their first police contact prior to age 12, this study represents an important contribution to our understanding of distinct delinquent pathways of early starters into young adulthood, and how these different childhood-onset trajectories are related to demographic and neighborhood characteristics. This is important, as assumptions on the delinquent development of early-onset offenders constitute an important cornerstone of criminological theory and drives policies and treatment of delinquent children. Revealing that delinquent development in early starters is highly heterogeneous and often discontinuous, the current findings advance theory and policies as well as fuel future empirical work on offenders with an onset in childhood. Directions for future studies are described below.

Contrary to expectations of taxonomic theories, we found that over half of the early-onset offenders did not come into contact with the police again over the 10- to 14-year follow-up period. Even among those early-onset offenders who did re-offend, over 25% did so only sporadically. To the extent that childhood-onset offending is taken to signal personal or familial characteristics that continuously increase the likelihood of offending (i.e., contemporary continuity), the (near) absence of re-offending in a large part of the cohort is unexpected. This finding also diverges from prior empirical results. Among early-onset offenders in the youngest cohort of the Pittsburgh Youth Study for instance, only 20% desisted offending—as reported by child, parent, or teacher—between ages 14 and 19 years (van Domburgh, Loeber, Bezemer, Bezemer, Stallings, Stouthamer-Loeber, 2009). However,

despite high levels of desistance, prevalence of offending in the current sample was still 3 times higher than that of the general Dutch population, as only 14% of a Dutch birth cohort was registered by the police between 12 and 22 years of age (Blokland, Grimbergen, Bernasco, & Nieuwbeerta, 2010). Thus, compared with the general population, childhood-onset offenders are at increased risk of having a police contact at the ages of criminal responsibility. Moreover, compared with adolescent-onset (age 12 years and above) offenders, Dutch childhood-onset (below age 12 years) offenders report higher rates of property crime, vandalism, and violent offenses (Hoeve et al., 2015). Thus, while childhood onset does not predestine offenders to a frequent and prolonged criminal career, in line with the Moffitt taxonomy, the present study still found that an early onset of offending elevates the risk of becoming a chronic offender (see Moffitt, 1993).

Early-onset offenders who did re-offend at higher than sporadic rates showed re-offending patterns that differed both in shape and nature of offending, emphasizing the importance of distinguishing between types of offenses when categorizing subgroups of offenders. In line with a study by Ward et al. (2010), we found two high-rate groups; one with a peak in late adolescence and one with a peak in offending in early adulthood. The adolescence-peaked subgroup was the smallest subgroup with the highest average offending rates up to early adulthood. Future research could examine whether this finding still holds when childhood or adolescent-onset offenders are followed into late adulthood, as adult-peaked high-rate offenders might have longer criminal careers. Regarding distributions of offense types, the current study, as well as the study by Ward et al. (2010), indicated that high-rate offenders committed relatively more property crime than other trajectory subgroups. In the current study, the high-rate adolescence-peaked offenders also displayed increasing amounts of violent and sexual offenses.

Relating trajectories to demographic and childhood neighborhood characteristics revealed that males, non-Western participants, and participants residing in low SES neighborhoods below age 12 were likely to populate the more frequent re-offending pathways. These results are in accordance with the Moffitt taxonomy (Moffitt, 1993, 2006), and with findings from previous trajectory-based studies on associations between gender (Block et al., 2010; Livingston et al., 2008), ethnicity (van Domburgh, Vermeiren, et al., 2009), and trajectory group membership.

#### THEORETICAL IMPLICATIONS

Although some trajectories identified in this study resemble those hypothesized by taxonomic theories, there are also clear differences. Besides the nonrecidivists, the low- and moderate-rate recidivists do not necessarily fit within Moffitt's taxonomy. Although their total number of offenses was higher than that of the sporadic recidivists, their offending rates were lower than that of high-rate subgroups.

The high-rate adolescence-peaked recidivists come closest to resembling the classic life-course-persistent offender, as they displayed high-rate re-offending patterns into adulthood. Furthermore, the distribution of types of crime among high-rate adolescence-peaked offenders showed an increase in overall violent and sexual offenses over time. Their tendency to increasingly commit violent offenses seems to be in accordance with Moffitt's (1993) assumption that violent crimes make up an increasing part of total crime among high-rate chronic offenders. In contrast, the high-rate adult-peaked offenders did not seem to

disproportionately commit violent crimes toward the end of the observation period. Rather, property crime, vandalism, and traffic offenses made up a large part of total crime rates among high-rate adult-peaked offenders. The process of cumulative continuity thus seems to especially apply to adolescence-peaked offenders, causing escalation of offending in this trajectory subgroup.

In addition, the sporadic recidivists seem to resemble Moffitt's low-rate chronic group, as they showed intermittent patterns of delinquent behavior up to age 18. As predicted by Moffitt (2006), these sporadic offenders seemed to desist from committing property crime, vandalism, as well as violent and sexual offenses upon entering adulthood. According to Moffitt (2006), the low levels of offending in adolescence would result from specific individual characteristics (depression and anxiety) that exclude sporadic offenders from deviant social peer groups. As a result, offenders in the sporadic trajectory subgroup would not be exposed to the same process of cumulative continuity as their high-level counterparts.

Finally, there is evidence of heterotypic continuity among all recidivist subgroups. With increasing age, vandalism made up a smaller part of the total criminal repertoire for all trajectory subgroups. In contrast, the proportion of traffic offenses and the proportion of offenses including drugs and weapons generally increased. The decrease in vandalism most likely reflects a shift in age-appropriate behavior (see Blokland & Palmen, 2012). Increases in traffic and drug and weapons violations predominantly signal increased opportunities for such behaviors with increasing age.

#### LIMITATIONS AND RECOMMENDATIONS

Although this study offers unique insights into the delinquent pathways of early-onset offenders, some limitations need to be considered. First, this study used a first police registration below age 12 as a proxy for early-onset offending. Although we expected that by doing so, a group was selected that shows stable patterns of disruptive behavior in childhood, it may have also caused the inclusion of subjects whose registration was more or less coincidental. Although one might think that this would especially be the case for subjects registered for committing vandalism below age 12, type of first offense was unrelated to trajectory group membership. An important task for future research is to examine whether current findings can be replicated among other samples of childhood-onset offenders—for example, defined as confessing to having committed more than one delinquent act before age 12 in a self-report survey. In this way, the generalizability of current findings to other samples of early-onset offenders can be examined.

Second, shapes of delinquent trajectories might have been influenced by our reliance on police registrations as a measure for offending. As a result, we lack information on delinquent behavior unknown to the police. In addition, it remains unclear whether participants were only suspects in the criminal case registered by the police or were eventually found guilty by a judge. On the contrary, police records have the advantage of being more reliable than self-report data regarding the timing of offenses as well as the occurrence of more serious offenses. In addition, police records contain more information on less serious offenses than conviction data, as minor offenses are less likely to end up in court.

Third, rates of re-offending might have been affected by the method used to correct for imprisonment. By calculating the number of offenses individuals might have committed without being imprisoned, we may have overestimated offending rates at the ages individuals were



incapacitated. However, as completely ignoring information on imprisonment has shown to affect group shape and membership (see Piquero et al., 2001), our attempt at correcting for exposure time probably led to a more accurate estimation of offending trajectories than if we had disregarded information on criminal sanctions. Future research may strive to include information on the actual dates individuals entered and left detention.

Fourth, the current study lacked information on noncriminal justice interventions early-onset offenders may have been subjected to during the observation period. To the extent their childhood police contacts signaled severe behavioral or familial problems, it is likely that parents, schools, child protection services, and other professionals were actively trying to curb these youths' delinquent development. The observed trajectories in our study could thus have evolved either because of or despite such efforts. If not for such interventions, low-rate recidivists might have developed into high-rate recidivists, while efforts to make high-rate recidivists refrain from further offending may have been absent or in vain. Relatedly, the association between these delinquent trajectories and personal and background characteristics may reflect differential availability of these interventions for certain demographic groups as much as the direct influences of these individual characteristics.

Finally, the multinomial model explained a limited amount of variance in group membership. Childhood characteristics may be insufficient to differentiate between (especially low-, moderate-, and high-rate) offending trajectories into adulthood in a group of children with histories of delinquency. Future research should, therefore, make an effort to incorporate important time-varying risk factors for offending, including noncriminal justice intervention efforts, which might explain more variance in group assignment.

## IMPLICATIONS

Trajectories identified in the current study illustrate heterogeneity among early-onset offenders in terms of the frequency and type of re-offending. This heterogeneity poses a challenge to policy-makers that focus on young offenders. The following key considerations need to be addressed in discussions on criminal justice interventions for early-onset offenders.

To the extent that discontinuity of offending among a large share of early-onset offenders (i.e., nonrecidivist subgroup) does not result entirely from prevailing intervention policy, this finding indicates that intervening at a young age might be unnecessary for a large group of justice-involved children. Intervening would be particularly troubling in the light of findings on the effects of interventions directed toward individuals at low risk of re-offending. Although focusing intervention efforts on children at high risk of re-offending has been shown to substantially reduce offending rates (Andrews & Dowden, 2006), targeting low-risk offenders might actually increase re-offending behavior (Lowenkamp & Latessa, 2002). It has, therefore, been suggested that low-risk youth should be diverted away from the juvenile justice system to avoid labeling (Campbell et al., 2019) and deviancy training (Lowenkamp, Latessa, & Holsinger, 2006). An overemphasis on the timing of a first police contact may lead to inaccurate decisions on the appropriateness of managing early-onset offenders in the criminal justice system. As yet, the causal mechanisms that either inhibit or promote persistent offending among low-risk children remain subject to future study.

Regardless of a lack of continuity in offending, previous research based on the Dunedin (Moffitt et al., 2002) and Cambridge (Jennings, Rocque, Fox, Piquero, & Farrington, 2016)

samples has shown that early-onset offenders who were unlikely to be involved in crime during adolescence experienced numerous psychological and social problems. Findings revealed that while offending rates were low, “recovering” early-onset offenders suffered from mental illness (Jennings et al., 2016; Moffitt et al., 2002), social isolation (Moffitt et al., 2002), psychopathy, poor home conditions, and poor intimate relation status (Jennings et al., 2016). Thus, while a large share of the current sample did not re-offend during the observation period, they are at increased risk of experiencing long-term negative life consequences and might benefit from some kind of (preventive) treatment targeting problems associated with the onset of offending in childhood.

As a small proportion of early starters continue to inflict substantial harm on others, preventing the progression along persistent offending pathways is crucial. Current findings suggest that such prevention efforts would be most viable when aimed at children residing in lower SES neighborhoods. Although studies have begun to explore which risk factors differentiate between trajectory subgroups of adolescent offenders (for reviews, see Assink et al., 2015; Jolliffe, Farrington, Piquero, Loeber, & Hill, 2017), further research into factors differentiating between early-onset trajectory subgroups is essential in considering policy regarding this specific and important offender population.

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### NOTES

1. This study was carried out by VU University Medical Centre, Department of Child and Adolescent Psychiatry and approved by the Dutch Ministry of Justice. See van Domburgh, Vermeiren, et al. (2009) and Geluk et al. (2014)—who used a subset of the current sample—for a more detailed description of this study.

2. To account for early release up to July 1, 2008 (when early release was standard in The Netherlands after two thirds of the sentence was completed), we multiplied the number of days spent in detention before this date by 2/3.

3. Note that in the Netherlands, possession of small “user” amounts of drugs or drug paraphernalia is not liable to prosecution. Drug offenses in the Netherlands thus pertain to commercial quantities of drugs produced, stored, sold, or smuggled.

4. This significant association between neighborhood socioeconomic status (SES) and age is due to differences in years of inclusion,  $\chi^2(4) = 61.42, p < .001$ . Children from high and low SES neighborhoods did not differ in their mean age of onset,  $t(699) = 0.33, p = .74$ .

5. A possible explanation for the low rate of traffic offenses in this sample is that the age limit for driving a car is 17 years under Dutch law.

6. We studied whether group assignment was determined by the combinations of different types of crimes. Results showed that participants who committed sexual offenses ( $n = 30$ ), drug offenses ( $n = 43$ ), or weapons offenses ( $n = 47$ ) were represented in all trajectory groups, indicating that the fact that they committed these specific types of offenses, did not determine their group membership classification.

7. Results for multinomial regression analysis with high-rate adult- and adolescence-peaked offenders as two separate groups are available from the corresponding author, upon request.

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