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Young on the wrong path

Exploring the social costs of adolescent criminal careers

Commissioned by the Research and Data Centre (WODC)

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Summary

Policy context and information needs

When an adolescent commits criminal offences, there are social costs involved. Depending on the type of offence, these costs may include the material, physical and/or mental harm to victims, the costs of tracing, prosecuting, trying and punishing offenders, and the opportunity costs caused by unfavourable labour market outcomes. But how high are these social costs?

The Dutch Ministry of Justice and Security (JenV) needs an indication of the social costs of adolescent criminal careers. This information can be factored into decisions on the deployment of offender-focused crime prevention measures.

This study attempts to meet the outlined need. The analyses provide an indication of patterns in the criminal careers of adolescents and the social costs associated with them. The research thus provides scientific input for the political and social debate on the costs of crime and the social benefits of its prevention.

Problem definition and research questions

The reason, policy context and objective result in the problem statement: 'What are the social costs of different types of adolescent criminal careers?' In this study, the adolescent period is defined as the period of 11 years after the completion of the Cito final test, on average the age of 12 to 23.

The four research themes, with associated questions answered in the study, are:

1. **Characterisation**. What types of adolescent criminal careers emerge in the recent literature? Which types of careers are interesting to investigate in this study?
2. **Pattern.** What does a plausible crime pattern of different types of criminal careers look like?
3. **Costs.** What social costs follow from these types of criminal careers?
    a. What victim costs can be linked to them?
    b. What costs follow from government action as a result of the criminal careers in question? Consider investigating, - and taking into account the probability of being caught - prosecuting, trying and punishing the offender.
    c. What other social costs logically follow from the criminal careers in question?
    d. What are the opportunity costs of the types of criminal careers?

4. **Distribution.** What can be said about the level of all individual cost items, distributional effects (to whom do the costs accrue) and the total social costs?

Main findings

In total, the estimated social costs of criminal careers of adolescents who left primary school in the period 2008 to 2011 amount to €10.3 billion (price level 2022), or on average almost €2.6 billion per cohort (i.e. a group of adolescents who leave primary school in the same year) - and, all things being equal, per year, also per cohort. These costs fall into (8) different types of consequence and response costs (see table S1).

Table S1 Social costs of adolescent crime, by type

Cost type	Amount (billion €)	(%)
Consequential		
> Material damage	2,3	22%
> Non-material damage	3,1	30%
> Loss of productivity	1,6	16%
> Medical expenses	0,3	3%
Response		
> Investigation	1,2	12%
> Prosecution	0,3	3%
> Trial	0,7	7%
> Enforcement	0,9	8%
Total	10,3	

Over half of these costs (55%) land with the victims (and their relatives) of adolescent crime. About 30% consist of response costs (investigation, prosecution, trial and enforcement). This is a rough estimate, not corrected for insurance payments or compensation from offenders. In addition to these consequence and reaction costs, there are additional opportunity costs for offenders, as criminal careers 12 years after leaving primary school reduce the likelihood of obtaining a starting qualification and increase the likelihood of low income.

Through sequence analysis, the study distinguishes six typical patterns based on the frequency and timing of suspected crimes during the adolescent period. Table S2 presents the distinguished patterns, their prevalence and the median and total social costs of the criminal careers associated with the patterns.

Table S2 Social costs of adolescent crime, by cluster

Cluster	Number (%)		Cost Median (€)	Cost Total (bln €)
No suspicions	446.984	(87,1 %)	-	-
1 suspicion, early	27.207	(5,3 %)	21.300	1,3
1 suspicion, late	17.137	(3,3 %)	27.400	1,4
2 suspicions	9.153	(1,8 %)	50.800	1,1
3-5 suspicions	7.640	(1,5 %)	109.100	1,8
6+ suspicions	5.027	(1,0 %)	359.200	4,6

Most adolescents were not suspected of a crime during the tracking period. The social costs increase with the severity of the criminal career. The group in cluster '6+ suspicions' - 1% of adolescents - accounts for a disproportionate share of the social costs of adolescent crime: over 44% of the total.

Adolescent criminal careers are associated with significant labour market disadvantages, with lower chances of obtaining a starting qualification and higher chances of low income. Early involvement and multiple suspicions have a particularly significant negative effect: for six or more suspicions, the difference with the group below is 17.4 percentage points for income and 15.9 percentage points for starting qualification. This points to clear cumulative disadvantages of intensive criminal career paths. On top of this, there are expected indirect costs to society (including through lower tax revenues, greater benefit dependency and increased use of social services).

Research methodology

The study starts with a literature review on adolescent criminal careers. The literature review helps operationalise the concepts of adolescence and early adulthood and summarises what is known about the prevalence and frequency of adolescent delinquency. It also focuses on 'special' offender groups highlighted in the literature. These include 'late starters', women, offenders of specific crimes,

offenders with psychotic disorders and addicted offenders. This kaleidoscope of topics gives us the 'broad picture' surrounding adolescent criminal careers.

As a basis for the quantitative analyses, we then construct a longitudinal analysis file of the four cohorts of about half a million Dutch schoolchildren who completed primary school in the years 2008, 2009, 2010 or 2011. We impose a number of conditions in terms of the completeness and consistency of this analysis file, the main choices being that pupils must have taken the Cito final test, reside in the Netherlands for most of the analysis period and have a plausible age at primary school exit between 8 years (very rare cases) and the legal maximum of 14 years. We collect a range of background characteristics from these individuals: demographic characteristics (age and gender), characteristics of the household in which they grow up (number of parents and children in the family, income and assets, and criminal antecedents), school advice, the score on the Cito final test and the number of judicial interactions of the child during the primary school period. These pre-adolescent characteristics serve as control variables for determining the opportunity cost of an adolescent criminal career.

We follow the cohorts over the subsequent 11-year period of adolescence (on average corresponding to ages 12 to 23). We link all observed interactions with the justice chain (suspicions, prosecutions, trials and punishments). Finally, we collect some labour market data for all individuals for the year immediately after adolescence. For that particular year, we determine whether a starting qualification has been obtained and whether the personal gross annual income is below the second decile of the income distribution (indicating that 80 per cent of adolescents have a higher income at that time).

The most recent study calculating the social costs of crime for the Netherlands is from a while back (SEO, 2007). It was beyond the scope of this study to perform a *bottom-up* recalibration of the underlying costing of this SEO study. Where possible, however, the costs were updated using the most recent crime cost figures from the annual *Crime & Law Enforcement* Report (hereafter C&R) of the WODC, CBS and the Council for the Judiciary. This gives a more up-to-date picture and better reflects how the enforcement chain is currently organised - and allows costs to be allocated in more detail to different crime types. It also provides us with figures for the main types of costs from SEO (2007) for the years 2008 to 2022.

To reduce the multitude of adolescent criminal careers to a manageable classification of typical careers, we use sequence analysis. Sequence analysis is a method derived from sociology that allows sequences of statuses to be analysed as a whole. The criminal careers of adolescents are coded as a sequence of year-states of length 12, with the first state in the sequence corresponding to the year of completion of the Cito final test and the last state in the sequence interpreted as the end of the adolescent period. We use the typical careers identified with sequence analysis to depict the adolescents' crime patterns.

To get a picture of the opportunity costs of different types of criminal careers during the adolescent period, we also explore the (presumably better) labour market position an adolescent would have had in the absence of criminal activity. We examine the post-adolescent starting position in the labour market through two measures: possession of a starting qualification and (not) having a low income. To establish the purest possible link between a given criminal career and later labour market outcomes, we control for several pre-adolescent characteristics. Without that step, the relationship between criminal behaviour and starting position in the labour market could be biased, for example by comparing a pre-adolescent with (given baseline characteristics) lower odds and criminal adolescence with a (given baseline characteristics) promising peer without criminal antecedents.

To overcome these compositional effects, we use *propensity score matching* (PSM[1]). This statistical technique simulates random grouping (in our case: having a particular criminal career) by matching adolescents with similar pre-adolescent characteristics - and thus a (based on observed characteristics) similar predisposition to criminal behaviour. For each adolescent with a criminal career, the most similar person *without a* criminal career is determined based on the above-mentioned pre-adolescent characteristics. We then use logistic regression to determine the relationship between a given criminal career and the two labour market outcomes (possession of starting qualification and low income).

Literature review

The literature review reveals that understanding criminal careers, especially during the transition from adolescence to early adulthood, is a complex field in which generic models are increasingly giving way to specific analyses of diverse offender groups. Although no unambiguous empirical definition exists for the periods of adolescence and early adulthood, researchers often use age boundaries influenced by the juvenile and adult criminal justice system, such as ages 12, 18 and 23.

A fundamental concept is the *age-crime* curve, which has a bell-shaped course in which delinquency increases from late childhood, peaks in the teenage years (15 to 19 years), and then declines. However, recent Dutch data show a flattening of this peak. A classic theoretical framework is Moffitt's dual taxonomy, which distinguishes between a large group of *adolescence-limited offenders*, whose criminal behaviour is limited to the adolescent period, and a small group of *life-course persistent offenders*, who start at an early age and are responsible for a disproportionate share of crime.

The more recent focus on specific offender groups has provided valuable, differentiated insights that differ from the generic patterns. For instance, it appears that a large proportion of suspects do not start until after the age of 18 (*late starters*), contrary to classical theories that emphasise early starts. These late starters more often specialise in crimes such as fraud, organised crime or sex offences, while early starters are more versatile and persistent. Women also tend to start their criminal careers

[1] PSM is increasingly applied within criminology and social sciences (see, e.g., Morris & Gibson, 2011; Osbuth et al., 2017).

later and have a relatively high recidivism rate. Studies of specific crimes also show unique career paths.

Creation of the analysis files

The analysis file was created by linking several CBS microdata sources, taking as a starting point all persons who left primary school in the years 2008 to 2011. As a *proxy*, adolescents who took the Cito final test in these years were selected, resulting in an initial population of 525,953 individuals. After removing double counting and excluding individuals with missing or incomplete background information, a cleaned analysis file of 513,148 adolescents remained. For this population, pre-adolescent personal, household and environmental characteristics were collected, their adolescent interactions with police and justice were counted and their post-adolescent starting position in the labour market was determined. This laid the basis for the longitudinal analyses on criminal careers and social costs.

We assign costs for two main types of cost items, namely consequential (costs) of and response (costs) to crime, to the adolescents in our analytical database based on interactions with police and justice during the adolescent period. Consequential costs accrue to victims and society, and include (non-)material damage, loss of productivity and medical costs. Response costs refer to the costs incurred by police and the judiciary in detecting, prosecuting, and trying offenders and in enforcing sentences. For these, a total of eight types, we variously determined the costs for each type of crime and assigned them to an interaction with police and justice of the adolescents in our analysis file.

Specifically, all consequence costs were assigned to all crime suspects. By doing so, we implicitly take into account both double counting (individuals who are suspects more than once) and the *dark number* of unidentified suspects: these costs are distributed proportionally among the observed suspects. For response costs, we allocate investigation, prosecution, trial and enforcement costs to observations of suspicion, OM criminal cases, ZM criminal cases and (OM and ZM) criminal cases with imposed sanctions such as prison sentences, community service and financial sanctions, respectively.

Typical patterns of adolescent criminal careers

Sequence analysis

Typical patterns in adolescent criminal careers were determined with sequence analysis. This distinguished six statuses according to the number of times an adolescent had been suspected of a crime from the calendar year in which primary school was left:

- No suspicions;
- 1 suspicion;
- 2 suspicions;
- 3 suspicions;

- 4-5 suspicions;
- More than 5 suspicions.

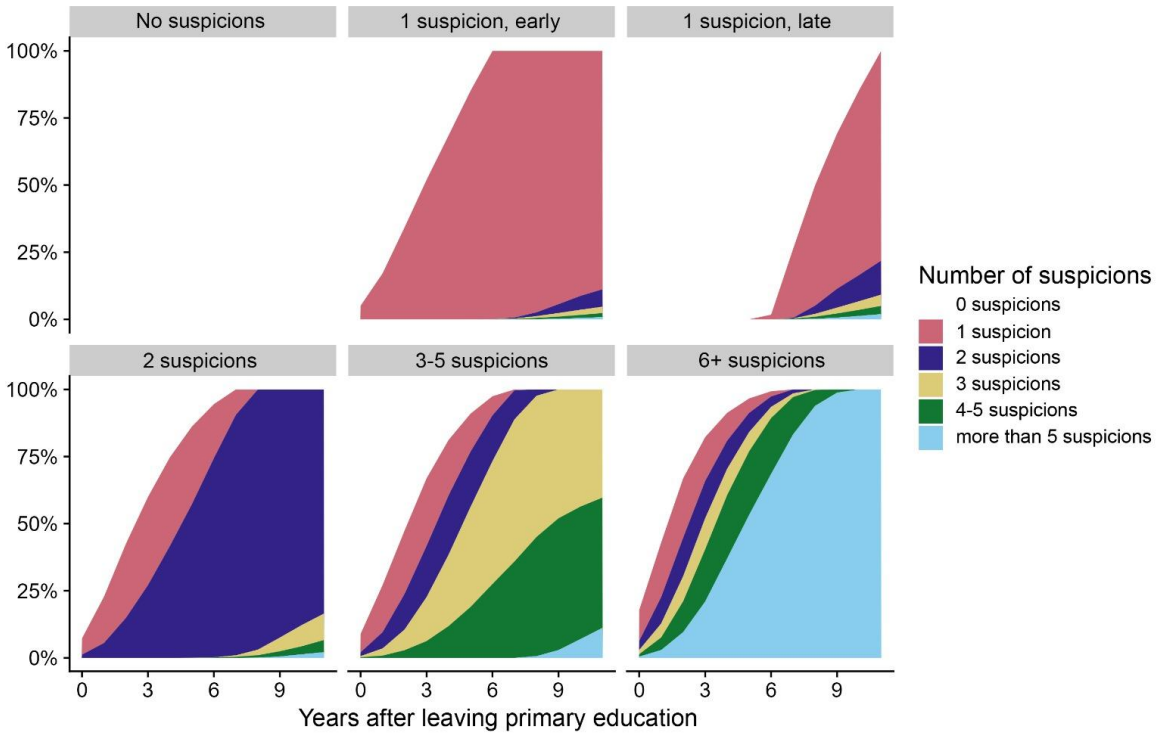
With the year statuses, sequences, sets of 12 positions, were constructed. In total, there are 3,614 unique sequences (sequences of statuses). Some of these sequences occur frequently, others less frequently - in general, the greater the number of suspicions at the end of the tracking period ('T=11'), the *more complex* the sequence. We then determined which sequences are more similar to each other (and which are less so) and clustered the individual sequences based on similarity.

The typology created with sequence analysis provides insight into the (main differences in) frequency and timing of adolescent criminal behaviour, but says nothing beforehand about the type of crimes and the severity of those crimes within the cluster. Therefore, a typology is also created based on (the sequence of) types of crimes. Combined with the sequence clusters, a more complete picture of criminal careers in the adolescent period emerges.

Typical patterns in adolescent crime

Figure S1 presents the evolution of the cumulative number of suspicions over time for the six distinct clusters. The x-axis represents the time (in years) since leaving primary school and the y-axis shows the percentage distribution across statuses (the proportion of adolescents with a particular status in a given year). The chart labels give a brief description of the cluster, and the statuses are distinguished by colour. Descriptive statistics of the clusters are presented in Table S1.

Figure S1 Development of the cumulative number of suspicions over time for the six distinct clusters. Source: Atlas Research calculations based on CBS Microdata.



A total of six different clusters have been distinguished. The labels given to these clusters correspond to the career path that best represents most adolescents in that cluster. However, each cluster also contains paths that deviate from this path, as shown in Figure S1. For example, there are adolescents in cluster '1 suspicion, early' who have more than 1 suspicion at the end of the tracking period. However, due to the timing and frequency of the crimes, these paths fit better with the other paths in cluster '1 suspicion, early' than those in cluster '2 suspicion'. Indeed, in that cluster, the second suspicion usually occurs before the sixth year after leaving primary school.

Table S3 Characteristics of the six distinct clusters. Source: Atlas Research calculations based on CBS Microdata.

Cluster	Number of adolescents (%)		Suspicions T=11	Unique sequences	Years to 1e suspicion
No suspicions	446.984	(87,1 %)	0,00	1	-
1 suspicion, early	27.207	(5,3 %)	1,22	381	3,4
1 suspicion, late	17.137	(3,3 %)	1,47	239	8,7
2 suspicions	9.153	(1,8 %)	2,34	486	3,1
3-5 suspicions	7.640	(1,5 %)	4,18	1.482	2,7
6+ suspicions	5.027	(1,0 %)	12,94	1.025	2,0

The first distinguished cluster, 'No suspicions', comprises 87% of adolescents. These adolescents are not suspected of any crime during their entire adolescent period - defined in this study as the period of 11 years after completing the Cito final test, on average, ages 12 to 23.

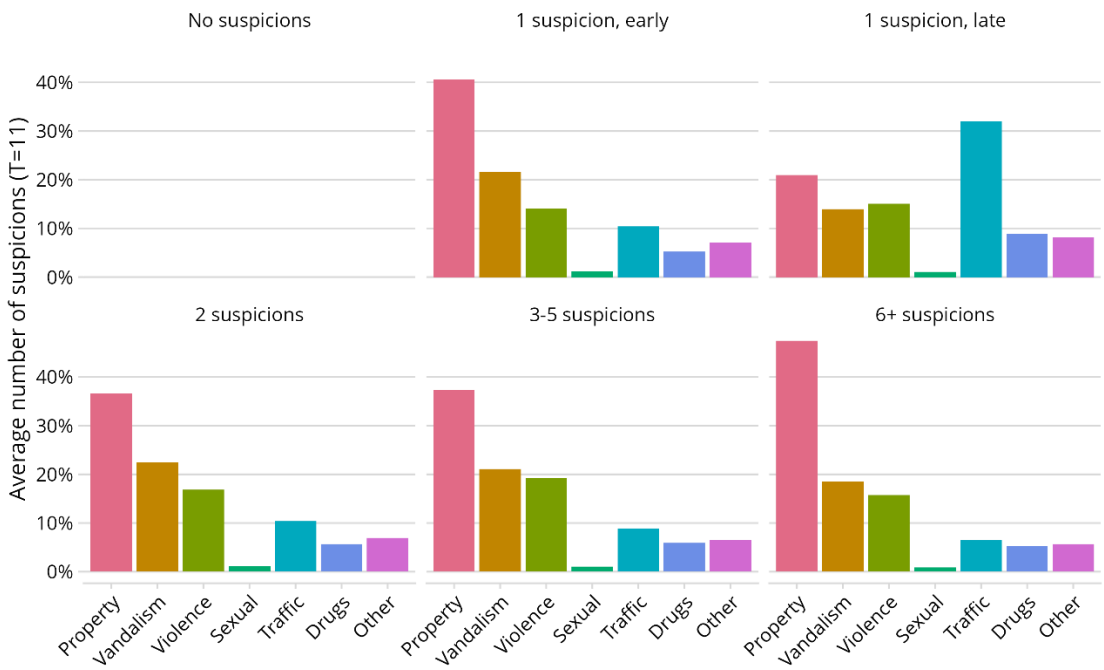
The next two clusters, '1 suspected, early' and '1 suspected, late', are followed by 27,207 (5.3%) and 17,137 (3.3%) of adolescents, respectively - about two-thirds of adolescents suspected of one or more crimes during the tracking period. These are adolescents generally suspected of one crime. The main difference between the two clusters is the timing of the first crime. Whereas in cluster '1 suspicion, early' the suspicion usually occurs before the age of 18 is reached (85% of adolescents in this cluster are suspected of a crime within five years of leaving primary school), whereas in cluster '1 suspicion, late' it usually does not occur before the seventh year after leaving primary school.

In the fourth cluster, '2 suspicion', the bulk of adolescents have been suspicious of two crimes by the end of the adolescent period. This pattern is followed by 9,153 adolescents (1.8% of the total, 13.8% of adolescents with at least one suspicion during the adolescent period). By the age of 18 (T=6), 74% of adolescents in this cluster had been suspected of at least two crimes.

The fifth cluster, '3-5 suspicions', consists of the 7,640 adolescents (1.5%) who, by the end of their adolescent period, have (generally) been suspected of a crime three to five times. What is striking is that the time to first suspicion is largely similar to cluster '2 suspicions', but suspicions follow in rapid succession thereafter. By the end of the adolescent period, adolescents in this cluster have been suspected of a crime an average of 4.2 times.

The sixth cluster is formed by the 5,027 adolescents (1.0%) with the 'most serious' criminal careers and is labelled '6+ suspicions'. At the end of the tracking period, all adolescents in this cluster have been suspected of a crime at least six times, but mostly much more often. The average number of suspicions at the end of the adolescent period is almost 13.

Figure S2 Suspicions by type of crime per cluster, relative



Source: Atlas Research calculations based on CBS microdata

The clusters differ mainly in the number of suspicions and to a lesser extent in the type of suspicions. The exception is cluster '1 suspicion, late'. In the remaining four clusters of criminal career patterns, property crimes predominate. On average, about 20% of suspicions during the adolescent period involve a property crime. After that, crimes in the Vandalism-category are the most frequent (20% of suspicions on average), followed by violent crimes (16% of suspicions on average). Cluster '1 suspicion, late' is an exception to the above observation. Traffic offences (32%) and drug offences (8.9%) are relatively common in this cluster. Property crimes play an important role in adolescents' criminal behaviour not only in a general sense. In patterns characterised by multiple suspicions, property crimes are often the first type of crime an adolescent was suspected of. In this sense, property crimes are the gateway to a criminal career in several ways.

Men, and adolescents over 12 when they leave primary school, are overrepresented (more common) in all typical patterns of adolescent crime. The same applies to adolescents where, based on their score on the Cito final test, a school recommendation of vmbo elementary or framework vocational fits. Adolescents with a Cito score fitting vmbo mixed or theoretical are overrepresented in the typical patterns '1 suspicion, early', '1 suspicion, late', '2 suspicions', but not in the 'heavier' typical patterns. Adolescents in single-parent households and adolescents growing up in large families (two parents, four or more children) are above average in all typical patterns of criminal careers - and the more suspicions in the typical pattern, the more overrepresented these adolescents are. Adolescents who had already come into contact with police and justice before the year they left primary school are heavily overrepresented in the clusters of criminal career patterns. These adolescents are up to five

times more frequent in cluster '2 suspicions', eight times more frequent in cluster '3-5 suspicions' and more than 15 times more frequent in cluster '6+ suspicions'.

Social costs of adolescent criminal careers

In total, the costs as a consequence of and response to crime of adolescents who left primary education in the period 2008 to 2011 amount to 10.28 billion euros (price level 2022) - or almost 2.6 billion euros per cohort. These costs were allocated to adolescents in accordance with the methodology set out in Chapter 5. A rough estimate of the distributional effect of these costs shows that more than half of these costs (about 55%) land with the victims and their loved ones. This mainly concerns the (non-)material damage directly resulting from the crimes committed by adolescents. No data were available to adjust for insurance or offender compensation, which would likely reduce victim costs. The government bears the largest share of costs from adolescent crime (≈30%).

The 5,027 adolescents with the '6+ suspicion' pattern account for 44% of the cost of adolescent criminal careers, or a total cost of €4.6 billion - or an average of €1.15 billion per cohort. On average (per adolescent), the social costs as a consequence of and response to the criminal careers of these adolescents thus amount to over €911 thousand. However, the variation within this group is large - the median social costs of the criminal careers of these adolescents amount to 361 thousand euros.

Adolescent criminal careers also entail opportunity costs in the form of labour market disadvantages in terms of income and education. To estimate these opportunity costs as accurately as possible, *propensity score matching* was used to find the most comparable adolescent (given pre-adolescent characteristics) for all adolescents who had been suspected of a crime at least once and who had not been in contact with the police and the judicial system during the adolescent period. The effect of a criminal career path on two labour market outcomes was then determined for these *matched* adolescents. The results of this analysis are summarised in Table S2.

Table S4 Net effect of criminal career during adolescence on labour market outcomes

	Non-low inkomen		Basic labour market qualification	
Cluster comparison	Frequency	Proportion	Frequency	Proportion
'1 suspicion, early' vs. '0 suspicions'	22.679	−3,2%	27.207	−7,0%
'1 suspicion, late' vs. '0 suspicions'	14.190	−5,4%	17.137	−8,1%
'2 suspicions' vs '1 suspicion, early'	7.998	−2,7%	9.153	−5,7%
'2 suspicions' vs '1 suspicion, late'	7.998	−0,5%	9.153	−3,7%
'3-5 suspicions' vs. '2 suspicions'	6.886	−6,0%	7.640	−8,1%
'6+ suspicions' vs. '3-5 suspicions'	4.639	−17,4%	5.027	−15,9%
Computations Atlas Reserach, data from CBS Microdata				

Criminal career paths reduce the probability of obtaining an entry-level qualification and increase the probability of low income 12 years after leaving primary school. Multiple suspicions or early involvement in crime have a particularly strong effect. The biggest differences occur in the cluster with six or more suspicions: they are 17.4 percentage points less likely to have a non-low income and almost 16 percentage points less likely to achieve a starting qualification than comparable adolescents from the cluster below (3-5 suspicions). These findings point to substantial and cumulative disadvantages of intensive criminal adolescence, even with similar starting positions before adolescence.

Conclusions

The vast majority of adolescents (87%) never come into contact with police or justice during the adolescent period. For the remaining 13% of adolescents, sequence analysis was used to determine typical criminal career paths based on the timing and frequency of the number of suspicions. Most adolescents who come into contact with the police and justice system follow a path characterised by occasional crime. Two typical patterns are characterised by a one-off suspicion of criminal behaviour, and in the typical pattern '2 suspicions', the duration since the last suspicion also gives reason to suspect occasional, *adolescence-limited* crime.

Two other typical patterns involve early onset, possibly *life-course persistent*, crime, with the first suspicion of a crime typically occurring before the age of 15. Among adolescents with career path '3-5 suspicions', the frequency of suspicions decreases after reaching the age of about 18. Adolescents with career path '6+ suspicions' have the most severe career path. This is a relatively small group (1% of all adolescents; 7.6% of all adolescents who come into contact with the police and justice system during the tracking period at) that commits a disproportionately large share of crime. On average, these adolescents are suspected of nearly 13 crimes at the end of the tracking period.

These adolescents account for 44% of the cost of adolescent criminal careers, or a total societal cost of (on average) €1.15 billion per cohort. These results suggest that there is a relatively small group responsible for a disproportionate share of the costs. Somewhere between the second and fourth suspicion during adolescence, a tipping point seems to be passed, after which social and opportunity costs rise sharply. The (empirical) probability that a person who has been suspected of a crime twice three years after leaving primary education will belong to cluster '3-5 suspicions' or '6+ suspicions' is very high. The same is true for an adolescent who is suspected of multiple crimes in a two- or three-year span. In terms of timing, an intervention around this time seems most valuable - and, given the steeply rising costs for 'more serious' careers, quickly cost-effective.

Limitations and interpretive frameworks

Caution is needed when interpreting the findings of this study. Although the study offers indicative insights into the social costs of adolescent criminal careers, the results are highly dependent on (necessary) assumptions, methodological choices and data limitations. The findings should not be

taken as precise quantitative predictions or conclusive cost calculations, but provide estimates and ranges of the social and opportunity costs of criminal behaviour during the adolescent period.

First, the starting point of the study is based on judicial interactions, where suspicion serves as a *proxy* for criminal behaviour. Not every suspicion leads to prosecution or conviction, while conversely many crimes committed go unrecorded. This introduces both underestimation (due to the *dark number* of unregistered crimes) and overestimation (due to unjustified suspicions). To (do) arrive at a conclusive cost estimate, the costs of all crimes - including those resulting in a suspicion, let alone a conviction - are allocated to only the observed judicial interactions.

The cost estimates themselves are based on previous research (notably SEO 2007) and updated with recent figures from the WODC's C&R reports. A fundamental recalibration of the underlying cost elements was not within the scope of this study. Moreover, prevention costs were not considered due to the lack of reliable allocation mechanisms. In addition, distinctions between different crime types were limited to a grouping of two (for drug offences) to 15 (for property offences) more specific crime types. Within each of these categories, social costs will vary according to the nature and severity of the specific crime. The social costs calculated in this study thus form a partial picture.

Methodological caution is also required. The sequence analysis underlying the characterisation of criminal careers uses the frequency and timing of suspicions, without information on the nature or severity of the offence. The choice of clustering methods and the parameters used help determine which patterns are classified as 'typical'. Alternative classifications might have produced other typical patterns. Variation in frequency and timing of suspicions also exists within the distinguished patterns. The typical pattern acts as an average and may mask dispersion and outliers. Cluster membership should therefore be seen as relative proximity to a typical pattern, not uniformity of individual careers.

Propensity score matching was used in estimating opportunity costs. This technique corrects for visible pre-adolescent characteristics. Invisible factors (such as cognitive skills, motivation or social support) cannot be ruled out as playing a role in both criminal behaviour and subsequent labour market opportunities. The differences in labour market outcomes thus found cannot therefore be considered purely causal. Finally, the study concerns cohorts of adolescents who left primary school in the period 2008-2011. Changes in social policies, education, youth care and crime patterns may mean that the findings are not readily transferable to current or future generations.

Given these limitations, it is important to approach the results as indicative, policy-relevant insights, designed primarily to make qualitative differences between adolescent criminal careers visible, provide estimates of averages and ranges of the social costs of these criminal careers, and underscore the social importance of targeted intervention. This requires careful public and policy communication. Quantitative statements on costs and effects, given the exploratory nature of the study, should be communicated with prudence.