

# Recidivism in subgroups of serious juvenile offenders: Different profiles, different risks?

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## ABSTRACT

**Background** Research has shown that the treatment of juvenile offenders is most effective when it takes into account the possible risk factors for re-offending. It may be asked whether juvenile offenders can be treated as one homogeneous group, or, if they are divisible into subgroups, whether different risk factors are predictive of recidivism.

**Aims and hypotheses** Our aims were to find out whether serious juvenile offenders may be subdivided into clearly defined subgroups and whether such subgroups might differ in terms of the risk factors that predict recidivism.

**Methods** In a sample of 1111 serious juvenile offenders, latent class analysis was used to identify subgroups. For each juvenile offender, 70 risk factors were registered. Severity of recidivism was measured on a 12-point scale. Analysis was then conducted to identify the risk factors that best predicted the different patterns of recidivism.

**Results** Four distinct subgroups of juvenile offenders were identified: serious violent offenders, violent property offenders, property offenders, and sex offenders. Violent property offenders were the most serious recidivists and had the highest number of risk factors. Serious violent offenders and property offenders were characterised by overt and covert behaviour, respectively. Sex offenders differed from the other three groups in the rarity of their recidivism and in the risk factors that are present. For each of these four subgroups, a different set of risk factors was found to predict severity of recidivism.

**Conclusions** Differences in recidivism rates occurred in spite of the fact that most of these youngsters had been in the standard treatment programme offered to serious juvenile offenders in the Netherlands. This was not a treatment outcome study, but the indication that two of the groups identified in our study appeared to be worse after going through this programme, whereas the other two did quite well in terms of recidivism lends weight to our idea that such classification of juvenile offenders may lead to more targeted treatment programmes that would better serve both the general public and the youths concerned. Copyright © 2011 John Wiley & Sons, Ltd.

## Introduction

Research into juvenile offending has mainly concentrated on finding risk factors for the onset and persistence of offending (Loeber and Farrington, 1998; Cottle et al., 2001; Ang and Huan, 2008). Previous research has shown that treatment effect is best if intensive intervention is selectively assigned to offenders with the highest risk profile, focusing on criminogenic targets, using proven interventions and treatment strategies, with good implementation and follow-up (Borum, 2003). Cognitive behavioural techniques and multisystemic therapy have shown to be effective in treatment of serious juvenile offenders (Fanniff and Becker, 2006; Reitzel and Carbonell, 2006).

According to the principles described earlier, treatment should be fitted to the particular characteristics, risk and needs of the offender under treatment, but cost-effective practice dictates that offenders are generally treated in groups. The research question in this article is, accordingly, if rather than treating juvenile offenders as one homogeneous group, is it possible to identify subgroups, each with different risk factors and different patterns of offending, such that treatment may be better targeted? In previous studies, researchers have found evidence for the existence of different subgroups of serious juvenile offenders. Loeber and Hay (1994), for instance, distinguished three developmental trajectories of criminal behaviour: the authority conflict pathway, a pathway of covert problem behaviour and a pathway of overt problem behaviour. The nature of criminal behaviour in each trajectory differs from the other. The further along a pathway the juvenile has travelled, the more serious the behaviour; the earlier she or he started, the longer the trajectory (Kelley et al., 1997). Aggressive boys are particularly at risk of committing covert acts as well, whereas boys engaging in covert acts were less likely to develop aggressive behaviours. Escalation in either the overt or the covert pathway was often preceded by boys' escalation in the authority conflict pathway (Loeber et al., 2008). Sex offenders were not considered in this pathway model.

There have been several studies on subgroups of serious offenders, such as violent offenders or sex offenders. Most of these, however, have focused on one type of offending, mostly sex offending or violent offending; instead of examining subgroups among all types of offenders, nevertheless, collectively, they suggest that there may be

differences in recidivism between different types of serious offenders. Rates for sexual recidivism, for instance, appear to be lower than for general recidivism, among any juvenile offenders as well as juvenile sexual offenders specifically (Nisbet et al., 2004; Waite et al., 2005). Also, differences between subgroups in risk factors for recidivism have been found for juvenile sex offenders on the one hand and violent offenders on the other (Loeber et al., 2001; Miner, 2002; Vermeiren et al., 2004).

The aim of our study was to find a classification of serious juvenile offenders by analysing past criminal behaviour in a cohort of young male offenders who, between them, had committed a full range of offences. In order to do this, we used a data-driven method of analysis – latent class analysis (LCA) (Francis et al., 2004; Magidson and Vermunt, 2004). Because reducing severity of recidivism is one important aim of intervention (*harm reduction*; Marshall and McGuire, 2003), our outcome variable was severity of recidivism. Our main research question was therefore can serious juvenile offenders be subdivided into clearly distinct subgroups on the basis of their offence history?

Secondary questions were as follows:

Do subgroups of serious juvenile offenders have different in recidivism rates?

Are risk factors that predict severity of recidivism different in each subgroup of serious juvenile offenders?

We also expected that with data-driven analysis, we would be able to identify the two subgroups suggested by the model presented by Loeber and Hay, of youths with predominantly overt offending behaviour and youths with mainly covert offending behaviour.

## Methods

### Ethics

The study was approved by the Medical Ethical Committee of Erasmus University Medical Centre.

### Sample

The sample was drawn from all male adolescents aged 12–22 years sentenced between 1 January 1995 and 31 December 2004 under a mandatory treatment order for placement in a Dutch juvenile institution for compulsory treatment ( $n = 1154$ ). This mandatory treatment order is the most severe sanction for youths in the Netherlands and may be imposed for periods from 2 to 6 years. Such youths represent the top 5% most serious offenders. The files and the criminal records of the participants were used for data collection. Offence details were not fully available in 43 cases, and a requirement of the study was that youths must have been back in the community – that is at risk for offending – for not less than 2 years

before data collection. Thus, the final sample was of 728 youths. The mean time at risk was 5.83 years (range: 2.0–11.17, standard deviation = 2.39).

### *Instrument*

#### *Juvenile Forensic Profile*

The 70-item Juvenile Forensic Profile (FPJ; Brand and Van Heerde, 2004) was especially developed for offender research using file data. It was constructed from internationally and nationally validated instruments for risk assessment together with instruments for measuring problem behaviour, including the Child Behaviour Check List (Achenbach, 1991), the Structured Assessment of Violence Risk in Youth (Borum, 2006), the Psychopathy Check List: Youth Version (Forth et al., 2003), the Juvenile-Sex Offender Assessment Protocol (Prentky and Righthand, 2003) and the HCR-20 Violence Risk Assessment Scheme (Webster et al., 1997). Each item of the FPJ is measured on a three-point scale: 0 = no problems, 1 = some problems and 2 = severe problems. Previous research using the FPJ on this Dutch juvenile data set showed that the available file information for this cohort was thorough and complete enough to be able to score the instrument (Van't Hoff et al., 2002). The inter-rater reliability was acceptable (double scoring of 250 files,  $r = 0.73$ ;  $K = 0.61$ ), and a high convergent validity was found with the Structured Assessment of Violence Risk in Youth (Van Heerde et al., 2004). The predictive validity of the instrument was tested in a sample of 102 boys, yielding an area under the curve of 0.803 with the total score from nine risk factors. Additional work has confirmed that the psychometric properties of the instrument are satisfactory (Brand, 2005a; Brand, 2005b; Van Heerde and Mulder, 2005; Mulder et al., 2010). Data were collected by final year psychology or criminology undergraduates. The students all received 3 weeks of training in use of the FPJ.

#### *Classification of offending behaviour*

The Official Judicial Offence Registry of the Netherlands supplied offence data. These were made up of details on all court appearances, the date and type of offence and the date of conviction or acquittal. All convictions dated after release from the juvenile institution were counted as recidivism. Recidivism was operationalised in three ways:

recidivism and non-recidivism;  
violent and non-violent recidivism;

severity of the offences was classified according to 12 mutually exclusive categories, based on the maximum sentence, the amount of harm and the amount of violence during the offence. Clinicians and law professionals evaluated the classification (Van Kordelaar, 2002). The classification and distribution of offences according to this measure is shown in Table 1.

Table 1: Operationalisation of offending before treatment, n = 728

Categories	Valid percentage per type of offence
1 = Misdemeanour	31.5
2 = Drug offence	4.3
3 = Vandalism (property)	25.1
4 = Property offence	79.8
5 = Moderate violent offence/assault	64.8
6 = Violent property offence	55.4
7 = Serious violent offence/serious assault	23.6
8 = Sex offence, same age	15.5
9 = Pedosexual offence	8.1
10 = Manslaughter	11.7
11 = Arson	3.8
12 = Murder	3.7

### Statistics

Most statistics were calculated with SPSS 15.0 (Statistical Packages for the Social Sciences 15.0 for Windows). The prevalence of different risk factors is presented using descriptive statistics. Subgroups of offenders were found using LCA, which was performed with Latent GOLD 4.0 (Vermunt and Magidson, 2005). LCA can be used for clustering cases (offenders) into homogeneous subgroups and has some notable advantages over other clustering techniques (Hagenaars and McCutcheon, 2002; Francis et al., 2004; Magidson and Vermunt, 2004). An important difference with traditional clustering techniques such as K-means-clustering, is that LCA is a statistical model, which means that more formal tests are available for deciding about the number of clusters. Other differences are that it can be used with variables of any measurement level and that no decisions about the scaling of the variables need be made. The outcome of a LCA is probabilistic classification of every case to the identified subgroups, which can be turned into a deterministic classification by assigning cases to the most likely cluster (Vermunt and Magidson, 2002).

The input for the LCA consisted of 13 categorical variables. The first variable was the number of offences committed, classified into three categories: low, average and high frequency of offending (0 = one to three convictions; 1 = four to seven convictions; 2 = eight or more convictions). The other 12 variables correspond to the 12 types of offences shown in Table 1; that is, for each type of offence, a subject got the score of 0 (no offence in the category) or 1 (one or more offences in the category). In this way, we searched for subgroups based on the total criminal careers of juvenile offenders, taking into account all different kinds of offences they committed. The Bayesian Information Criterion, which is the most used model selection measure in LCA, selected the model with four clusters as the best solution. Clinical interpretability supported this choice.

Scores on the 70 FPJ-derived risk factors were compared between the subgroups identified with LCA by using nonparametric Kruskal–Wallis test and Mann–Whitney tests. Nonparametric tests were used because risk factor data were skewed.

Differences between subgroups in recidivism patterns were analysed with analysis of variance. The correlation of risk factors with severity of recidivism was tested with (nonparametric) Spearman's correlation. Multiple linear regression analysis was used to analyse prediction of severity of recidivism. Missing values analysis was performed to check the influence of missing values on the outcome of the regression analysis. This showed that missing values did not significantly influence outcome. Bonferroni correction was applied to correct for multiple testing.

## Results

### *Latent class analysis*

Four subgroups of offenders were identified with LCA. There was no significant difference in time at risk between these groups (5–6 years in all). The groups were given the following interpretative labels:

#### Cluster 1

*Serious violent offenders* ( $n = 114$ ). This group consisted of youths who commit (*serious*) *violent offences* but commit these offences with a low frequency. Serious violence included serious assault and, at much lower frequency, manslaughter, arson and murder.

#### Cluster 2

*Violent property offender* ( $n = 334$ ). Youths in this group are high-frequency offenders who combine *violent and property* offences. The type of offences in this subgroup are mainly assault and robbery and, to a lesser extent, theft.

#### Cluster 3

*Property offenders* ( $n = 214$ ). These juveniles that commit mainly *property offences* with a high frequency; such offences were mainly theft and breaking and entering.

#### Cluster 4

*Sexual offenders* ( $n = 66$ ). These youths were almost exclusively committing sexual offences.

### Risk profile of four subgroups of offenders

The scores of the four subgroups differed significantly on 30 of the 70 risk factors (Table 2, only significant differences are shown). The highly frequent *violent property offenders* (cluster 2) appeared to be the most problematic subgroup in the sense of having high scores on more items than other groups; they had the highest scores on alcohol abuse, lack of conscience and problem insight but also got high scores for conduct disorder, low impulse control, alcohol and drugs abuse (also during the offence), involvement with criminal peers, criminal behaviour in the family, lack of parenting skills, authority problems, truancy, antisocial behaviour in the institution and escape from the treatment facility. *Property offenders* were the most similar to the violent property offenders and got higher scores than the more purely violent or more purely sex offending groups. *Serious violent offenders* were differentiated from property and violent/property offenders by a higher score on anxiety disorder, autism spectrum disorder and sadism. Sexual offenders also got high scores on these risk factors. Finally, the features particularly characteristic of *sexual offenders* were problems in interpersonal relationships, poor cognitive abilities and sexual problems.

### Recidivism in four subgroups of offenders

*Sexual offenders* had the lowest scores on both overall recidivism and on violent recidivism (Table 3). They also had the lowest severity of recidivism scores. *Serious violent offenders* got significantly lower scores than the remaining two subgroups on overall recidivism and severity of recidivism. They also had significantly lower scores for violent recidivism than violent property offenders but not lower than property offenders. *Violent property offenders* and *property offenders* both scored more highly on all variables but do not differ significantly from each other on recidivism. *Property offenders* had the lowest scores, lowest on offence severity before treatment but after treatment, committed significantly more serious offences than *sexual* or *violent offenders*.

### Predicting severity of recidivism in four subgroups of offenders

Table 4 shows the results of the (stepwise) multiple linear regression analysis, which was run for each subgroup individually. The results show that the set of risk factors that best predicted severity of recidivism was different for each group. For *serious violent offenders*, having witnessed domestic violence and the presence of a conduct disorder were the best predictors of severity of recidivism. This means that those serious violent offenders who witnessed domestic violence and have a conduct disorder are at a higher risk for severe recidivism than serious violent offenders who do not have these specific problems. The results of each regression analysis were thus to indicate which specific risk factors are most

Table 2: Risk factors in the forensic profile for juvenile offenders

Risk factors (0 = no problems; 1 = some problems; 2 = severe problems)	Kruskal-Wallis, $\chi^2$ (p)	1: Serious violent offenders (n = 114), M (SD)	2: Violent property offenders (n = 334), M (SD)	3: Property offenders (n = 214), M (SD)	4: Sex offenders (n = 66), M (SD)
Parents' parenting skills	8.30 (0.040)	1.36 (0.62)	1.46 (0.60)	1.43 (0.61)	1.22 (0.68)
Criminal behaviour in the family	18.39 (0.000)	0.44 (0.76)	0.78 (0.89) <sup>1</sup>	0.72 (0.88) <sup>1</sup>	0.38 (0.71)
Involvement with criminal peers	159.55 (0.000)	0.74 (0.73)	1.42 (0.60) <sup>1</sup>	1.33 (0.63) <sup>1</sup>	0.33 (0.54)
Previous contact with mental health services	15.66 (0.001)	1.50 (0.71)	1.74 (0.57) <sup>1</sup>	1.63 (0.66) <sup>1</sup>	1.53 (0.75)
Authority problems	51.85 (0.000)	1.22 (0.82)	1.39 (0.74)	1.39 (0.79)	0.59 (0.79)
Truancy	76.39 (0.000)	1.21 (0.86)	1.45 (0.76) <sup>1</sup>	1.48 (0.74) <sup>1</sup>	0.52 (0.71)
Having an unknown victim	16.36 (0.001)	0.97 (0.66)	0.80 (0.67) <sup>1</sup>	0.74 (0.51) <sup>1</sup>	1.00 (0.47)
Substance abuse during/preceding the offence	41.44 (0.000)	0.41 (0.54)	0.62 (0.68)	0.51 (0.71)	0.05 (0.22)
Alcohol abuse	27.40 (0.000)	0.40 (0.62)	0.52 (0.67) <sup>3</sup>	0.32 (0.54)	0.14 (0.43)
Drug abuse	76.00 (0.000)	0.83 (0.86)	1.21 (0.79) <sup>1</sup>	1.14 (0.80)	0.25 (0.59)
Conduct disorder	81.35 (0.000)	1.29 (0.74)	1.62 (0.60)	1.56 (0.67) <sup>1</sup>	0.71 (0.86)
Lack of conscience	12.26 (0.007)	1.39 (0.53)	1.58 (0.51) <sup>1</sup>	1.53 (0.51)	1.45 (0.53)
Low impulse control	13.12 (0.004)	1.56 (0.64)	1.48 (0.67)	1.38 (0.68)	1.20 (0.80)
Problem insight	12.60 (0.006)	1.41 (0.59)	1.57 (0.55) <sup>1</sup>	1.52 (0.54)	1.69 (0.47)
Antisocial behaviour in the institution	10.63 (0.014)	0.58 (0.62)	0.75 (0.67)	0.76 (0.64)	0.57 (0.64)

Table 2: Continued

Risk factors (0 = no problems; 1 = some problems; 2 = severe problems)	Kruskal-Wallis, $\chi^2$ (p)	1: Serious violent offenders (n = 114), M (SD)	2: Violent property offenders (n = 334), M (SD)	3: Property offenders (n = 214), M (SD)	4: Sex offenders (n = 66), M (SD)
Escape, absconding	34.60 (0.000)	0.32 (0.66)	0.62 (0.78) <sup>1</sup>	0.50 (0.73)	0.15 (0.44)
Anxiety disorder	15.66 (0.001)	0.37 (0.63) <sup>3</sup>	0.19 (0.41)	0.14 (0.37)	0.31 (0.61) <sup>23</sup>
Autism spectrum disorder	49.64 (0.000)	0.25 (0.61) <sup>23</sup>	0.14 (0.49)	0.10 (0.40)	0.60 (0.84) <sup>23</sup>
Sadism	30.42 (0.000)	0.13 (0.41) <sup>3</sup>	0.05 (0.22)	0.08 (0.29)	0.37 (0.70) <sup>23</sup>
Searching for a victim, planning	153.90 (0.000)	0.04 (0.27)	0.03 (0.22)	0.00 (0.00)	0.64 (0.91) <sup>23</sup>
History of sexual abuse	50.58 (0.000)	0.24 (0.63)	0.17 (0.51)	0.12 (0.44)	0.68 (0.86) <sup>23</sup>
Sexual problems	233.31 (0.000)	0.37 (0.61)	0.29 (0.62)	0.16 (0.49)	1.82 (0.49) <sup>23</sup>
Pedosexuality	322.31 (0.000)	0.05 (0.29)	0.02 (0.19)	0.02 (0.18)	1.20 (0.96) <sup>23</sup>
Intelligence/IQ	12.35 (0.006)	93.67 (16.27)	89.87 (15.17)	92.45 (15.41)	85.17 (17.96) <sup>23</sup>
Low academic achievement	11.27 (0.010)	0.56 (0.77)	0.68 (0.71)	0.64 (0.77)	0.92 (0.79) <sup>23</sup>
Neurological problems	12.49 (0.006)	0.24 (0.47)	0.27 (0.52)	0.20 (0.46)	0.44 (0.59) <sup>23</sup>
Peer rejection	20.76 (0.000)	0.69 (0.81)	0.51 (0.70)	0.50 (0.69)	0.98 (0.87) <sup>23</sup>
Lack of intimate relationships	16.94 (0.001)	0.84 (0.76)	0.91 (0.78)	0.94 (0.77)	1.32 (0.71) <sup>23</sup>
Lack of social skills	23.70 (0.000)	0.78 (0.73)	0.75 (0.67)	0.74 (0.68)	1.20 (0.68) <sup>23</sup>
Avoidant coping style	8.16 (0.043)	0.72 (0.77)	0.71 (0.67)	0.79 (0.71)	0.97 (0.68) <sup>23</sup>

Superscripted numbers (1, 2, 3 and 4) indicates significant differences with one or more of the four other clusters,  $p \leq 0.0083$  (Bonferroni correction). SD = standard deviation.

Table 3: Differences in recidivism and severity between subgroups

	Recidivism	Violent recidivism	Sexual recidivism	Severity of past offences	Severity of recidivism
1: Serious violent	69% <sup>23</sup>	50% <sup>2</sup>	6%	8.75 (SD = 2.74) <sup>23</sup>	3.78 (SD = 3.43) <sup>23</sup>
2: Violent and property	89% <sup>1</sup>	74% <sup>1</sup>	6%	7.06 (SD = 1.75) <sup>13</sup>	5.59 (SD = 3.14) <sup>1</sup>
3: Property	82% <sup>1</sup>	64%	5%	6.11 (SD = 1.27) <sup>12</sup>	4.87 (SD = 3.19) <sup>1</sup>
4: Sex offenders	47% <sup>123</sup>	27% <sup>123</sup>	3%	8.71 (SD = 0.52) <sup>23</sup>	2.05 (SD = 2.84) <sup>123</sup>

Superscripted numbers (1, 2, 3 and 4) indicates significant differences with other clusters,  $p \leq 0.05$  (Bonferroni correction). SD = standard deviation.

Table 4: Stepwise linear regression analysis: predicting severity of recidivism (with 0 = no recidivism)

Step	Variable entered	R <sup>2</sup>	ΔR <sup>2</sup>	p	Final step standardised β coefficient
<b>Subgroup 1: serious violent offenders</b>					
1	Conduct disorder	0.113	0.113	0.000	0.329
2	Witnessing domestic violence	0.171	0.058	0.006	0.285
<b>Subgroup 2: violent property offenders</b>					
1	Treatment compliance (medication faith)	0.027	0.027	0.001	-0.182
2	Defective social network	0.048	0.021	0.003	-0.160
3	Negative coping	0.066	0.018	0.016	0.131
4	No. of offences in the past	0.082	0.016	0.018	0.125
5	Neglect	0.094	0.008	0.034	0.113
<b>Subgroup 3: property offenders</b>					
1	Feelings of hostility	0.048	0.048	0.000	-0.229
2	Physical abuse	0.080	0.032	0.003	0.195
3	Having an unknown victim in the past	0.102	0.018	0.012	-0.163
4	Anxiety disorder	0.127	0.025	0.025	-0.146
5	Lack of treatment motivation	0.146	0.019	0.029	0.142
<b>Subgroup 4: sex offenders</b>					
1	Incidents/aggression during treatment	0.141	0.141	0.003	0.353
2	Autism spectrum disorder	0.199	0.058	0.037	-0.242

predictive of serious recidivism in each subgroup. Among *violent property offenders*, severity of recidivism was best predicted by lack of treatment compliance, a negative (aggressive) coping style, a high number of offences in the past, being neglected by the parents and having a large but antisocial network. For *property offenders*, a history of physical abuse, having an unknown victim in past offences, lack of treatment motivation, the absence of an anxiety disorder and feelings of hostility were the significant predictors of severity of recidivism.

Finally, in *sex offenders*, those juveniles who did not have an autism spectrum disorder and were involved in incidents in the treatment facility were found to score more highly on severity of recidivism.

## Discussion

We fulfilled the aim of our study in finding that serious juvenile offenders may be classified into distinct subgroups on the basis of their past offending behaviour. We were able to move beyond theoretical considerations and distinguish four different subgroups on the basis of empirical evidence. We believe that we are the first ever to make direct comparisons of such groups.

A closer look at these subgroups shows that their characteristics are in line with the developmental trajectories suggested by Loeber and Hay (1994). Our *property offenders* fit their covert pathway group, our *serious violent offenders* fit their overt pathway and our *violent property offenders* fit a combination of these two. The fact that all three groups get significantly higher scores compared with sex offenders on truancy, school dropout and problems with authority suggests that they probably followed the authority conflict pathway as well.

Furthermore, the groups are characterised by different risk factors. The three groups do have several characteristics in common, but the *violent property offenders*, who proceed along two pathways at the same time, are the most disadvantaged group and are characterised by risk factors that fit their overt problem behaviour. *Property offenders* distinguish themselves from the *serious violent offenders* and *violent property offenders* by having one or more unknown victims in past offences. *Serious violent offenders* can be characterised by risk factors that fit their overt problem behaviour, for instance conduct disorder, low impulse control, substance abuse and authority problems. *Sex offenders* are quite different from the other three groups. They can be characterised by social problems and psychopathology, low intelligence and low academic achievement and sexual problems. Again, these characteristics are in accordance with the theory by Loeber and Hay.

The findings further showed that the four subgroups had validity in terms of their differences in recidivism rates and within group differences in risk factors that predict recidivism. The fact that *violent property offenders* and *property offenders* were the most serious recidivists *after* treatment lends some support to the idea that treatment should be much more precisely tailored to typology than a single, broad-spectrum approach. An alternative explanation might be that these two most seriously recidivist subgroups are simply more resistant to therapy of any kind. Psychopathy was not measured in this study, but we found that violent property offenders and property offenders had higher scores on lack of conscience and problem insight, which might be considered as a proxy for psychopathy. There is some evidence that people with high psychopathy scores do less well in criminal justice treatment programmes

(Salekin and Lynam, 2010). If, however, more accurately targeted treatment modules could be developed for these specific subgroups, then they and the rest of society might gain a lot. Serious violent offenders and sex offenders commit the most serious offences before treatment, but after treatment, they show the largest reduction in offending behaviour, with sex offenders showing the lowest recidivism rates of all four subgroups. In both cases, the findings may be more consistent with the low base rate of serious violence, and of sexual offending recidivism in this age group more specifically (Van Wijk et al., 2007), but it may also reflect the likelihood that criminal justice treatment programmes have been designed with these groups particularly in mind.

The finding that the risk factors that predict severity of recidivism are different for each subgroup is a very useful finding. Not only may it help professionals to monitor risk factors more accurately, but it may also lead to more precisely targeted interventions.

Our study has several limitations. Risk factors were measured only once and on the basis of file information. In future research, repeated measures during treatment will be included to be able to study treatment effect. Our study also, however, has important strengths, in particular the long follow-up time, the very large sample and the wealth of data on both offending behaviour and risk factors, which were derived using a psychometrically good instrument.

In conclusion, we identified four distinct subgroups of serious juvenile offenders, with each subgroup having its own risk profile and its own recidivism pattern. This implies that different treatment modalities should be applied in each subgroup, focusing on the specific risk factors that predict severity of offending, such as family factors and treatment adherence.

### Implications for practice

- The fact that recidivism risk differs between subgroups implies that the nature and intensity of treatment should differ depending on the subgroup a juvenile offender belongs to.
- Different risk factors predict severity of recidivism in each subgroup; therefore, treatment should aim at *different* risk factors depending on the subgroup a juvenile offender belongs to.
- The group differences identified suggest that an assessment tool that would allow for such identification in practice would be useful.

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