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Published in:
Journal of Criminal Justice

DOI:
[10.1016/j.jcrimjus.2020.101758](https://doi.org/10.1016/j.jcrimjus.2020.101758)

Publication date:
2021

Document Version
Publisher's PDF, also known as Version of record

[Link to publication in Tilburg University Research Portal](#)

Citation for published version (APA):
Janssen-de Ruijter, E. A. W., Mulder, E. A., Bongers, I. L., Vermunt, J. K., & van Nieuwenhuizen, C. (2021). One is not the other: Predicting offending after discharge from secure residential care of male adolescents with four risk profiles. *Journal of Criminal Justice*, 72, [101758]. <https://doi.org/10.1016/j.jcrimjus.2020.101758>

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One is not the other: Predicting offending after discharge from secure residential care of male adolescents with four risk profiles

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ARTICLE INFO

Keywords:

Risk profiles
Offending
Severity
Residential care

ABSTRACT

Purpose: Adolescents who are admitted to secure residential care have a high risk of delinquency after discharge. However, this risk may differ between subgroups in this heterogeneous population of adolescents with severe psychiatric problems and disruptive problem behaviour. In this study, the predictive validity of four risk profiles was examined for the number of minor, moderate, and severe offences after discharge from secure residential care.

Methods: The sample comprised 238 male former patients of a hospital for youth forensic psychiatry and orthopsychiatry in the Netherlands. In three Poisson regression analyses, the relationship between four previously identified risk profiles and the number of minor, moderate, and severe offences after discharge was examined.

Results: The results showed that the four risk profiles differed significantly in the number of minor, moderate, and severe offences after discharge. Post hoc analysis revealed no mediating effect of termination of treatment on the relationship between the risk profiles and the number of minor, moderate, and severe offending after discharge.

Conclusion: Adolescents with many risk factors in multiple domains and adolescents with mainly family risks have an increased risk of persistent delinquency after discharge. Treatment should be tailored more effectively to the specific risks and needs of these adolescents.

1. Introduction

Adolescents with psychiatric and behavioural problems who are admitted to secure residential care have a high risk of (persistent) delinquency after discharge (Knorth, Harder, Zandberg, & Kendrick, 2008). More specifically, high offending rates (60–66%) were found for adolescents after discharge from residential care (Baglivio, Wolff, Piquero, DeLisi, & Vaughn, 2018; Cuevas, Wolff, & Baglivio, 2019; Luong & Wormith, 2011; Weijters, Verweij, Tollenaar, & Hill, 2019). Although reducing the risk of offending behaviour is an essential aim of forensic residential care, a meta-analysis by Knorth et al. (2008) confirmed that offending behaviour is more difficult to treat than other

problems. Moreover, Moffitt's dual taxonomy assumes a continuity of antisocial behaviour into adulthood when this behaviour started in early childhood (Moffitt, 2003, 2006). The persistent delinquency of adolescents after residential care has major consequences for the victims, the society, and the adolescents themselves. Because of the risk that their juvenile delinquency will continue and turn into life-course persistent offending (Moffitt, 2003, 2006), it is essential that residential treatment is tailored to the specific risks and needs of adolescents to maximise the treatment effects and reduce recidivism (Loeber, Slot, & Stouthamer-Loeber, 2008; Peterson-Badali, Skilling, & Haqanee, 2015; Van der Laan, Veenstra, Bogaerts, Verhulst, & Ormel, 2010).

The risk-need-responsivity model of offender treatment (RNR-

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<https://doi.org/10.1016/j.jcrimjus.2020.101758>

Received 29 July 2020; Received in revised form 22 October 2020; Accepted 22 October 2020

Available online 3 November 2020

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model) describes how interventions within (juvenile) criminal justice can be applied in an effective manner using three evidence-based principles (Andrews & Bonta, 2010). First, the risk principle states that the intensity of the intervention should match the individual's recidivism risk (more intensive treatment for persons with a higher risk of recidivism). Second, according to the need principle, interventions should focus on the criminogenic needs of each person, which are needs that stimulate criminal behaviour. Third, the responsivity principle outlines guidelines for how to adapt interventions to the responsivity of the individual; for example by adapting treatment to the person's learning ability (Andrews & Bonta, 2010). The particular importance of the risk and need principles has been underlined by several studies (Brogan, Haney-Caron, NeMoyer, & DeMatteo, 2015; Koehler, Lösel, Akoensi, & Humphreys, 2013; Singh et al., 2014). For example, previous studies have shown that adolescents who did not receive treatment adequately matched to their criminogenic needs had a higher likelihood of offending than adolescents whose criminogenic needs were addressed more adequately (Luong & Wormith, 2011; Peterson-Badali et al., 2015; Vieira, Skilling, & Peterson-Badali, 2009).

Before being able to apply the risk principle to treatment, insights into which adolescents have an increased risk of offending behaviour are necessary. From previous studies, it is well known that risk factors play an important role in the prediction of (persistent) delinquency in youths, with criminal history as one of the strongest predictors (Assink et al., 2015; Caudy, Durso, & Taxman, 2013; Farrington, 2003; Loeber et al., 1993; Mulder, Brand, Bullens, & Van Marle, 2011; Sampson & Laub, 2005; Scott & Brown, 2018; Tanner-Smith, Wilson, & Lipsey, 2013). Moreover, the accumulation of multiple risk factors is more predictive for later problems than single risk factors (Loeber, Burke, & Pardini, 2009). The findings of previous person-centred studies have shown a dose-response relationship between exposure to an accumulation of risk factors in various domains and increased risk of later adverse outcomes; that is, groups of adolescents with many risk factors in multiple domains are at an increased risk of later problems (Dembo, Wareham, Poythress, Meyers, & Schmeidler, 2008; Mulder, Vermunt, Brand, Bullens, & Van Marle, 2012; Van Domburgh, Geluk, Jansen, Vermeiren, & Doreleijers, 2016; Yampolskaya, Mowery, & Dollard, 2014). For example, Van Domburgh et al. (2016) found that first offenders with numerous problems across multiple domains (individual, peer, and family) reported more antisocial behaviour at a 2-year follow-up than groups of first offenders with fewer risk factors in single domains.

Given the high prevalence (57%) of offending behaviour after discharge from secure psychiatric residential care of adolescents with major psychiatric and behavioural problems (Janssen-de Ruijter, Mulder, Bongers, Omlo, & Van Nieuwenhuizen, 2019), it is valuable to identify adolescents with an elevated risk of (persistent) delinquency. In a previous study of adolescents admitted to secure psychiatric residential care, four classes or risk profiles – based on various co-occurring risk factors in multiple domains – were identified (Janssen-de Ruijter, Mulder, Vermunt, & Van Nieuwenhuizen, 2017). In the aforementioned study, two classes of adolescents with many risk factors in multiple domains were found. The adolescents in these two classes primarily differed in their family risks: Class 2 had individual, peer, school, and family risks, while Class 1 also had individual, peer, and school risks but no family risks. The adolescents in the other two classes had fewer risk factors in single domains; specifically, adolescents in Class 3 had risks primarily in the peer domain and adolescents in Class 4 had risks primarily in the family domain. According to the dose-response principle, an elevated risk of delinquency after discharge is expected, especially for adolescents with many risk factors in multiple domains (e.g., Van Domburgh et al., 2016; Yampolskaya et al., 2014).

The present study focused on the predictive validity of risk profile membership for offending behaviour after discharge from secure psychiatric residential care. Since previous studies on recidivism have primarily been limited to short-term delinquency (e.g., Van Domburgh et al., 2016; Yampolskaya et al., 2014), a longer and variable time-at-

risk period was used in the current study. By using a long time-at-risk period, persons who committed their first crime a few years after discharge could also be identified. As an outcome measure, the number of offences after discharge was used instead of a dichotomous measure of offending to gain a comprehensive overview of all offending behaviour after discharge. Moreover, the severity of the offences was taken into account, which is valuable because severe offences may have a greater impact on society and the victims than minor offences. Hence, the aim of this study was to examine the predictive validity of the four distinct risk profiles from a previous study (Janssen-de Ruijter et al., 2017) for the number of minor, moderate, and severe offences after discharge from secure psychiatric residential care.

2. Methods

2.1. Setting

The present study was conducted at the Catamaran, a hospital for youth forensic psychiatry and orthopsychiatry in the Netherlands. This hospital offers residential treatment to a specific group of adolescents (aged between 14 and 23 years) with major psychiatric and behavioural problems from all over the country. In the Netherlands, the term orthopsychiatry encompasses specialised treatment of adolescents with severe disruptive behaviour (with or without offending behaviour) in combination with one or more psychiatric disorders. In orthopsychiatry units, patients are admitted with a Dutch juvenile civil law measure or, occasionally, voluntarily. Measures under the Dutch juvenile civil law are applied to adolescents whose development is at risk and whose parents or caregivers are not capable of providing the required care. Forensic psychiatric units admit adolescents who have been sentenced under Dutch juvenile criminal law. These adolescents had committed severe offences and have (comorbid) psychiatric disorders. Irrespective of the type of measure, all the patients in this hospital suffer from severe multiple problems in multiple life areas.

At the Catamaran, a multidisciplinary team of psychiatrists, psychologists, family therapists, social workers, and staff workers offers intensive treatment. This treatment comprises for instance aggression regulation therapy, psychomotor therapy, systemic therapy, psychotropic medication, job training, and education. Because of the heterogeneity of the risks and needs of the patients, each patient has a personalised treatment program. Over the years, the treatment program of the Catamaran has evolved, following new insights from the field. Since 2014, the Catamaran has been awarded a certificate for highly specialised care for patients with serious complicated mental health problems.

2.2. Procedure

The entire population of 241 patients who were admitted for at least three months to the Catamaran between January 2005 and December 2014 was included in this study. In this time span, two persons have been readmitted to the Catamaran under the conditions of a new conviction. However, only their first-time admission was included. Furthermore, only male patients were admitted to the hospital in this specific time span, which resulted in a 100% male sample. As three persons objected to the use of their data for scientific research, the final sample comprised 238 male patients.

Background information and risk profile membership were derived from the data collection of a previous study (Janssen-de Ruijter et al., 2017). After receiving approval from the Dutch Ministry of Justice and Safety, official registered data were sourced from the Official Judicial Offence Registry of the Netherlands in October 2015. This registry from the Dutch Ministry of Justice and Safety includes judicial documentation abstracts with details of all court appearances of the whole lifetime of each person, including the dates and types of offences committed. Fourteen persons were unknown in this registry, which means that they

had not committed any transgressions and/or offences before, during, and after residential care. All offences after discharge from the Catamaran were transferred from the judicial documentation abstracts to an SPSS-database by the first author. Two random selections of 24 cases (10% of the sample) were re-coded by a second rater to determine the interrater reliability of the data entry. The interrater agreement between the raters was 95–97%.

2.3. Measurements

2.3.1. Risk profiles

In a previous study (Janssen-de Ruijter et al., 2017), latent class analysis (LCA) was used to identify subgroups. In this LCA, pre-admission risk factors operationalised by items of the Structured Assessment of Violence Risk in Youth (SAVRY; Lodewijks, Doreleijers, Ruiter, & Wit-Grouls, 2006) and the Juvenile Forensic Profile (JFP; Brand & Heerde, 2010) were used. The SAVRY is a risk assessment tool based on the structured professional judgement model and consists of 24 risk items and six protective items. The JFP has been developed to measure risk factors in all life areas using file data and this instrument contains seventy risk factors. Both instruments were scored by officially trained and certified researchers and trainees under supervision at the start of admission. From these two instruments, eleven pre-admission risk factors divided into four domains (individual, family, peer, and school) were used. The individual domain consisted of three risk factors: hyperactivity, cognitive impairment, and history of drug abuse. The family domain comprised three risk factors: exposure to violence in the home, childhood history of maltreatment, and criminal behaviour of family members. The three risk factors in the peer domain were peer rejection, involvement in criminal environment, and lack of secondary network. The school domain contained two risk factors: low academic achievement – which is operationalised as learning problems – and truancy.

For the optimal modelling of the data in the LCA (see also Janssen-de

Ruijter et al., 2017), the information criteria suggested a range of a three-class model (Bayesian information criterion; BIC) to a seven-class model (Akaike information criterion; AIC). The Akaike information criterion 3 (AIC3) – which is the suitable criterion to use in small samples (Andrews & Currim, 2003) – was lowest for the four-class model. The bootstrap likelihood ratio test (BLRT) confirmed that the four-class model was preferred over the three-class model (BLRT = 44.44, $p < .000$). Therefore, four classes were identified (see Fig. 1). Class 1 ($n = 119$) represented persons with many risk factors in three domains, specifically drug abuse in the individual domain, involvement in criminal environment in the peer domain, and truancy in the school domain. Individuals in Class 2 ($n = 70$) had risk factors in all four domains, such as drug abuse in the individual domain, childhood history of maltreatment in the family domain, involvement in a criminal environment in the peer domain, and truancy in the school domain. Persons in Class 3 ($n = 49$) had the lowest risks overall, though they had an increased risk of peer rejection. Finally, persons in Class 4 ($n = 32$) mainly had risk factors in the family domain (e.g., childhood history of maltreatment).

The persons in the four classes differed on demographic and admission characteristics, psychopathology, drug use, criminal behaviour and life events. For example, persons in Classes 1 and 2 had more often committed offences before admission, such as vandalism and property offences. Furthermore, they were more often classified with disruptive behaviour disorders, substance disorders, and/or schizophrenia or other psychotic disorders compared with persons in the other classes. Main differences between persons in Class 1 and 2 were the higher percentage of autism spectrum disorders in Class 1 and the higher percentages of reactive attachment disorders and life events in the family domain in Class 2. Persons in Class 3 were characterised by autism spectrum disorders and had experienced bullying in their past. In addition, they had the highest prevalence of committed sex offences compared with the other three classes. Persons in Class 4 had the earliest age of (outpatient) care, were youngest at admission to the Catamaran and experienced most often out-of-home placements prior to admission. Moreover,

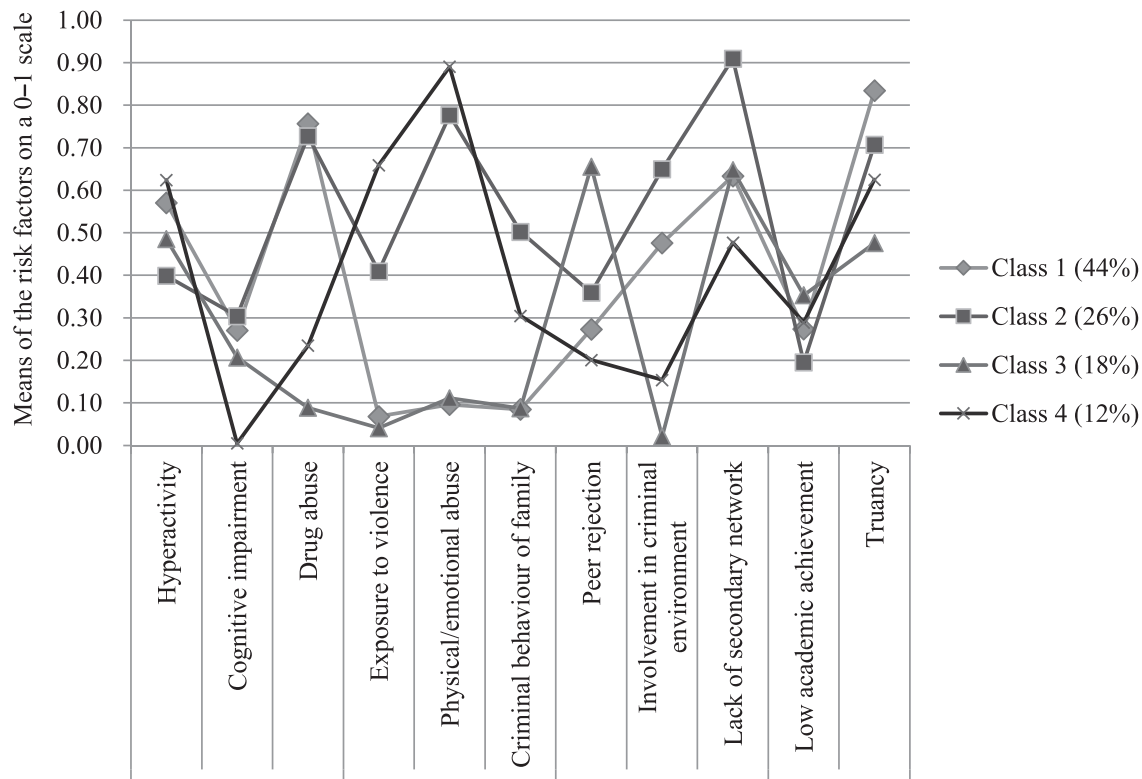


Fig. 1. Four-class solution ($N = 270$; Janssen-de Ruijter et al., 2017).

persons in Class 4 had the highest percentage of no previous convictions compared with all classes and were more often classified with reactive attachment disorders compared with persons in Classes 1 and 3.

2.3.2. Criminal history

Criminal history was operationalised by four variables: prior violence, prior convictions, age at first offence, and failure to comply with prior probation/community supervision. Prior convictions and age at first offence were derived from the judicial documentation abstracts. The variable 'prior convictions' was dichotomised (0 = no, 1 = yes) and was scored 'yes' if a patient had been convicted at least once for one (or more) offence(s) prior to admission to the Catamaran. The variable 'age at first offence' (in years) was calculated using the date of birth and the date of the first committed offence that resulted in a conviction. Prior violence and failure to comply with prior probation/community supervision were based on the eponymous risk factors of the SAVRY (historical items 1 and 4). In the current study, these variables were dichotomised (0 = no, 1 = yes) as follows: low risk was scored as 'no', and moderate and high risks were scored as 'yes'.

2.3.3. Termination of treatment

Termination of treatment was dichotomised into two groups: completer (0) and dropout (1). Completer was scored when the residential treatment was terminated in accordance with the multidisciplinary team. Dropout was scored if treatment was terminated prematurely, i.e. when treatment was terminated against the advice of the multidisciplinary team or when adolescents were expelled. The information about termination of treatment was obtained from the patient files.

2.3.4. Offending after discharge

To measure offending after discharge from secure residential care, official registered data was used. This data was obtained in October 2015, resulting in a mean time at risk of 53 months ($SD = 27.7$ months, range = 10–125 months). Offending after discharge comprised all convicted offences in the period after discharge from the Catamaran until October 2015, including offences for which someone had been summoned. Transgressions were excluded. Offending after discharge was operationalised as the number of minor, moderate, and severe offences after discharge. The classification system of the severity of offences was based on the penalty term, as described by [Wartna, Blom, and Tollenaar \(2011\)](#). Examples of minor offences, with a penalty of less than 4 years, are insulting a public servant and joyriding. Moderate offences, with a penalty of 4 to 8 years, consist of, for example, burglary and public violence. Examples of severe offences, with a penalty of 8 years or more, are rape and robbery.

2.4. Statistical analyses

All analyses were run in Latent GOLD 5.1 ([Vermunt & Magidson, 2005, 2013](#)). A bias-adjusted step-3 approach was used which allows the use of latent class assignments while correcting for classification errors. In this approach, the maximum likelihood procedure proposed by [Vermunt \(2010\)](#) was used. To assess the impact of the risk profile membership on the number of minor, moderate, and severe offences after discharge, three separate log-linear Poisson regression analyses were conducted. These analyses contained membership of the four risk profiles as a categorical predictor, with Class 3 serving as the reference category, and controls for criminal history (i.e., prior violence, prior convictions, age at first offence, and failure to comply with prior probation/community supervision), time at risk and unobserved heterogeneity. Unobserved heterogeneity was taken into account by means of a (non-parametric) random intercept ([Skrondal & Rabe-Hesketh, 2004](#); [Vermunt & Magidson, 2004](#)). The number of minor, moderate, and severe offences after discharge was used as an outcome measure. Analyses were run with 160 sets of random start values and 250 initial iterations

to prevent local maxima. Post hoc, logistic and Poisson regression analyses were conducted to examine whether termination of treatment mediated the relationship between risk profile membership and offending after discharge to evaluate the impact of residential treatment on this relationship.

3. Results

3.1. Sample description

The mean age at admission to the Catamaran was 16.9 years and the mean length of stay at the Catamaran was 18 months (see [Table 1](#)). The distribution of adolescents who were sentenced under Dutch juvenile criminal law and under Dutch juvenile civil law was approximately 50–50. The majority of all adolescents (59.7%) ended their treatment at the Catamaran in accordance with the multidisciplinary team (i.e., completers). At discharge, autism spectrum disorders (44.5%) and disruptive behaviour disorders (42.9%) were the most common classifications.

With regard to criminal history, a large majority of the adolescents was convicted for one (or more) offence(s) before admission to the Catamaran (81.9%). The mean age at the first offence before admission was 14.5 years old. Approximately three-quarters of the adolescents (76.5%) had used violence prior to their admission and 65.5% had prior failures of supervision and/or intervention.

As for offending after discharge, a small majority of the sample (52.1%) had no summoned or convicted offences after discharge including two persons who did appear in court but were acquitted for their alleged offences. The other 48% of the sample were summoned or convicted after discharge from residential care. Their mean number of offences after residential care was 4.8 ($SD = 5.2$, range = 1–26 offences). Regarding severity of reoffending, moderate offences – with a penalty between 4 and 8 years – were most common (40%). The mean number of moderate offences after discharge was 3.6 ($SD = 3.8$, range = 1–20 offences). Minor and severe offences were committed less often after residential care (respectively, 24% and 11%). The mean number of minor offences was 2.4 ($SD = 2.2$, range = 1–13), and that of severe offences was 2.3 ($SD = 2.3$, range = 1–10).

3.2. Effect of risk profile membership on offending after discharge

In all three separate Poisson regression analyses, adolescents with the four risk profiles differed significantly in their number of offences after discharge (see [Table 2](#)). None of the adolescents without convictions before admission committed any minor or severe offences after discharge (see [Table S1](#) in Appendix). Therefore, the exact zero number of minor and severe offences for this group of adolescents without prior convictions was perfectly predicted by the use of prior convictions as a control variable. Consequently, the differences between the classes should, in these analyses for the number of minor and severe offences, be interpreted as the differences for adolescents *with* prior convictions.

For minor offending after discharge, adolescents in Classes 1 and 2 with prior convictions respectively committed 6.7 times (95% CI: 3.0–14.9) and 4.6 times (95% CI: 2.1–9.9) more minor offences after discharge than adolescents with prior convictions in Class 3 (reference category). In addition, adolescents with prior convictions in Classes 1 and 2 differed significantly from adolescents with prior convictions in Class 4 in the number of minor offences (Class 1 vs. Class 4: Wald = 22.164, $p = .000$; Class 2 vs. Class 4: Wald = 15.398, $p = .000$).

For moderate offending after discharge, the adolescents in Classes 1, 2, and 4 committed approximately 3.5 times more moderate offences after discharge than the adolescents in Class 3 (i.e., Class 1: 3.7 [95% CI: 1.8–7.5], Class 2: 3.6 [95% CI: 1.8–7.5], Class 4: 3.3 [95% CI: 1.4–8.0]). There were no significant differences in the number of moderate offences after discharge between adolescents in Classes 1, 2, and 4 (Class 1 vs. Class 2: Wald = 0.005, $p = .940$; Class 2 vs. Class 4: Wald = 0.113, p

Table 1
Sample description ($N = 238$).

	Total group	Class 1 ($n = 110$)	Class 2 ($n = 58$)	Class 3 ($n = 40$)	Class 4 ($n = 30$)
Immigrants ^a ($n = 204$)	27.7%	20.0%	48.3%	20.0%	26.7%
Age at admission	16.9	16.9	17.4	16.9	16.0
Age at discharge	18.5	18.3	19.1	18.8	17.6
Judicial measure					
Criminal law	48.3%	48.2%	63.8%	50.0%	16.7%
Civil law or voluntary	51.7%	51.8%	36.2%	50.0%	83.3%
Length of stay at the Catamaran	18.4	16.9	18.4	22.2	18.7
Termination of treatment					
Completer	59.7%	58.2%	51.7%	85.0%	46.7%
Dropout	40.3%	41.8%	48.3%	15.0%	53.3%
Psychopathology at discharge ^b					
Autism spectrum disorder	44.5%	51.8%	20.7%	75.0%	23.3%
Disruptive behaviour disorder	42.9%	46.4%	55.2%	25.0%	30.0%
Substance disorder	25.2%	34.5%	36.2%	0%	3.3%
Attention deficit/hyperactivity disorder	22.7%	25.5%	13.8%	25.0%	26.7%
Reactive attachment disorder	16.4%	5.5%	29.3%	5.0%	46.7%
Personality disorder ($n = 148$)	12.6%	10.9%	24.1%	2.5%	10.0%
Mood disorder	10.9%	14.5%	6.9%	10.0%	6.7%
Time at risk (in years)	4.4	4.7	4.5	4.2	3.4
Criminal history					
Age at first offence ($n = 195$)	14.5	14.7	14.3	14.5	14.3
Prior violence ($n = 219$)	76.5%	74.5%	79.3%	82.5%	70.0%
Prior convictions	81.9%	86.4%	87.9%	75.0%	63.3%
Prior failures of supervision/intervention ($n = 235$)	65.5%	74.5%	77.6%	37.5%	46.7%
Offending after discharge					
Offending behaviour (all offences)	47.9%	55.5%	55.2%	30.0%	30.0%
Number of all offences	4.8	5.2	5.0	2.7	4.3
Minor offending behaviour ^c	24.4%	34.5%	20.7%	12.5%	10.0%
Number of minor offences	2.4	2.5	2.5	2.2	1.3
Moderate offending behaviour ^d	39.9%	46.4%	46.6%	22.5%	26.7%
Number of moderate offences	3.6	3.7	4.0	2.0	3.4
Severe offending behaviour ^e	11.3%	14.5%	10.3%	5.0%	10.0%
Number of severe offences	2.3	1.8	3.5	1.5	2.7

^a Immigrants were operationalised as persons who were born abroad themselves and persons with at least one parent who was born abroad.

^b Psychopathology at discharge is derived from the, at the time of discharge, most recent DSM-IV-classifications from the patient database.

^c minor offending after discharge: all convicted or summoned offences after discharge with a penalty shorter than 4 years.

^d moderate offending after discharge: all convicted or summoned offences after discharge with a penalty between 4 and 8 years.

^e severe offending after discharge: all convicted or summoned offences after discharge with a penalty longer than 8 years.

= .740; Class 1 vs. Class 4: Wald = 0.094, $p = .760$).

For severe offending after discharge, adolescents with prior convictions in Class 1 committed 7.0 (95% CI: 2.8–17.9) times more severe offences after discharge than adolescents with prior convictions in Class 3. In addition, adolescents with prior convictions in Class 2 committed

4.4 (95% CI: 2.0–9.4) times more severe offences after discharge and adolescents with prior convictions in Class 4 committed 27.1 (95% CI: 6.4–114.3) times more severe offences than adolescents with prior convictions in Class 3. Furthermore, adolescents with prior convictions in Classes 1 and 2 differed significantly from adolescents with prior convictions in Class 4 (Class 1 vs. Class 4: Wald = 7.363, $p = .007$; Class 2 vs. Class 4: Wald = 11.155, $p = .001$).

3.3. Termination of treatment as a mediator

The results of the logistic regression showed that risk profile membership is significantly related to termination of treatment (Wald = 8.985, $p = .030$). Next, the relationship between termination of treatment and the number of minor, moderate, and severe offences after discharge was examined, while controlling for the effects of the risk profiles, criminal history, time at risk, and unobserved heterogeneity. As shown in Table 3, termination of treatment did not significantly predict minor, moderate, and severe offending after discharge ($p > .05$). In these Poisson regression analyses, the differences between adolescents with the four risk profiles for minor, moderate, and severe offending after discharge were maintained (respectively, Wald = 33.757, $p = .000$, Wald = 16.9, $p = .000$, Wald = 19.465, $p = .000$). Since no significant effects of termination of treatment on the outcome measures were found, the mediating effect of termination of treatment on the relationship between the risk profiles and the number of minor, moderate, and severe offences after discharge was not confirmed.

4. Discussion

This study revealed a relationship between risk profile membership and the number of minor, moderate, and severe offences after discharge from secure psychiatric residential care, independent of criminal history before admission. Adolescents with mainly peer risks (Class 3) had the lowest number of offences after discharge. By contrast, adolescents with many risk factors in multiple domains (Classes 1 and 2) had committed a higher number of minor, moderate, and severe offences after discharge compared with adolescents in Class 3. Adolescents with mainly family risks (Class 4) had a similar number of moderate offences as adolescents in Classes 1 and 2. Moreover, adolescents in this class with convictions prior to admission had committed the highest number of severe offences compared with adolescents with prior convictions in all other classes. In addition, this study provided knowledge of the number of minor, moderate, and severe offences of the entire sample of adolescents with major psychiatric and behavioural problems after discharge from secure psychiatric residential care. Slightly less than half of all the adolescents in the entire sample (48%) were summoned or convicted for at least one offence after discharge. Moreover, almost half of the persons (49%) with convictions after discharge committed a maximum of two offences in the time-at-risk period up to 10 years after discharge. A small group of 25% committed seven or more offences after discharge. These recidivism rates are lower than those found in other studies (Baglivio et al., 2018; Luong & Wormith, 2011; Mulder et al., 2011; Weijters et al., 2019). This may be explained by differences between populations – in the current population, not all participants were convicted for offending behaviour before admission – or by the fact that, in this study, personalised psychiatric care may have been effective in reducing reoffending for some adolescents.

As expected, adolescents in Classes 1 and 2 – with a rich criminal history before admission to residential care – had an elevated risk of persistence in their offending behaviour after discharge. Adolescents in these two classes had many risk factors in multiple domains, such as a history of drug abuse, delinquent peers, and school problems. This finding of their elevated risk of offending behaviour is in line with previous studies in which it was also found that adolescents with many risk factors in multiple domains were at increased risk of later adverse outcomes (Dembo et al., 2008; Mulder et al., 2012; Van Domburgh

Table 2

The relationship between risk profile membership and minor, moderate, and severe offending after discharge (corrected for criminal history, time at risk, and unobserved heterogeneity).

	Minor offending				Moderate offending				Severe offending			
	Wald	<i>p</i>	Exp (β)	CI	Wald	<i>p</i>	Exp (β)	CI	Wald	<i>p</i>	Exp (β)	CI
Risk profiles	34.07	0.000			12.87	0.005			21.61	0.000		
Class 1			6.7	3.0–14.9			3.7	1.8–7.5			7.0	2.8–17.9
Class 2			4.6	2.1–9.9			3.6	1.8–7.5			4.4	2.0–9.4
Class 4			0.9	0.3–2.3			3.3	1.4–8.0			27.1	6.4–114.3
Criminal history												
Age at first offence	6.77	0.009	0.7	0.6–0.9	12.52	0.000	0.7	0.6–0.9	2.28	0.130	0.8	0.5–1.1
Prior violence (<i>n</i> = 219)	2.62	0.110	0.6	0.3–1.1	8.43	0.004	0.6	0.5–0.9	0.22	0.640	1.2	0.5–3.1
Prior convictions	22.00	0.000	4.3	2.3–7.8	3.78	0.052	1.3	1.0–1.8	0	1.00	1.0	–
Prior failures of supervision/intervention (<i>n</i> = 235)	16.52	0.000	3.0	1.8–5.0	18.11	0.000	2.5	1.6–3.8	22.22	0.000	5.0	2.6–9.7

Note. Reference category is Class 3; CI = confidence interval.

Table 3

The relationship between termination of treatment and risk profile membership on minor, moderate, and severe offending after discharge corrected for criminal history, time at risk, and unobserved heterogeneity (testing mediating effect)

	Minor offending				Moderate offending				Severe offending			
	Wald	<i>p</i>	Exp (β)	CI	Wald	<i>p</i>	Exp (β)	CI	Wald	<i>p</i>	Exp (β)	CI
Termination of treatment ^a	0.11	0.740	1.1	0.6–1.9	3.34	0.068	1.6	1.0–2.6	0.13	0.710	1.1	0.6–2.1
Risk profiles	33.76	0.000			16.92	0.000			19.46	0.000		
Class 1			6.7	3.0–14.9			3.2	1.7–6.0			7.0	2.5–19.8
Class 2			4.6	2.1–10.1			3.3	1.7–6.6			4.0	1.6–10.0
Class 4			0.9	0.3–2.3			1.7	0.8–3.7			26.3	6.0–116.0
Criminal history												
Age at first offence	3.63	0.057	0.8	0.6–1.0	1.47	0.230	0.9	0.8–1.1	1.99	0.160	0.8	0.5–1.1
Prior violence (<i>n</i> = 219)	1.90	0.170	0.6	0.3–1.2	6.53	0.011	0.4	0.2–0.8	0.29	0.590	1.3	0.5–3.3
Prior convictions	19.56	0.000	4.2	2.2–7.9	3.24	0.007	1.6	1.0–2.6	0	1.00	2.6	–
Prior failures of supervision/intervention (<i>n</i> = 235)	15.09	0.000	3.0	1.7–5.3	2.77	0.096	2.2	0.9–5.6	17.84	0.000	5.0	2.4–10.7

Note. Reference category is Class 3; CI = confidence interval.

^a 0 = completer, 1 = dropout.

et al., 2016; Yampolskaya et al., 2014). The elevated risk of (persistent) delinquency after discharge can be explained by the specific risk factors of the adolescents in these two classes as well as by the co-occurrence of multiple risk factors in various domains (e.g., Cameron, Frensch, Preyde, & Smit Quosai, 2011; Loeber et al., 2009; Scott & Brown, 2018; Van der Laan, Rokven, Weijters, & Beerthuizen, 2019). From research examining single risk factors for reoffending, it is known that engagement with delinquent peers is more strongly associated with delinquency than family and school risk factors (Ortega-Campos, García-García, Gil-Fenoy, & Zaldívar-Basurto, 2016; Tanner-Smith et al., 2013). Moreover, Van der Laan et al. (2019) found that the impact of having delinquent peers on the delinquency of serious juvenile offenders increases over time. Therefore, a focus on adolescents' peer network is essential for reducing delinquency, especially since exposure to delinquent peers appears to be a stable factor in their lives (Van der Laan et al., 2019).

As might be expected, adolescents in Class 3 had the lowest risk of offending behaviour after discharge. These adolescents experienced the fewest risk factors before admission to residential care. Conspicuously, they had the highest risk of peer rejection compared with adolescents in the other classes (Janssen-de Ruijter et al., 2017). Furthermore, they were commonly classified with an autism spectrum disorder, and, although they committed offences less often before admission than adolescents in other classes, sex offences were most common among these adolescents (Janssen-de Ruijter et al., 2017). The low offending rates after discharge in this group were as expected, given that both experiences of peer rejection and the absence of substance use are predictors of a successful outcome (i.e., no recidivism; Scott & Brown, 2018). Moreover, adolescents who had previously committed a sexual offence

seemed to have a low risk of recidivism (Calley, 2012; Mulder et al., 2012; Van Marle, Hempel, & Buck, 2010).

A striking finding of this study is the elevated risk of offending behaviour of adolescents in Class 4, who are mainly characterised by family risk factors prior to admission (i.e., exposure to violence in the home, childhood history of maltreatment and/or neglect, and criminal behaviour of family members), out-of-home placements, and the lowest amount of convictions before admission to residential care (Janssen-de Ruijter et al., 2017). Based on the dose-response principle confirmed in previous studies (e.g., Van Domburgh et al., 2016; Yampolskaya et al., 2014), a lower risk of offending behaviour after discharge may be expected by these adolescents with a low number of risk factors. However, adolescents in this group had increased rates of moderate offences after discharge and the adolescents with convictions prior to admission within this group also had increased rates of severe offences after discharge. This might be explained by the substantial family risks of the adolescents in this class. For example, criminal behaviour in the family was found predictive for violent recidivism (Mulder et al., 2011) and (persistent) maltreatment was found associated with violent and severe offending (Bunch, Iratzoqui, & Watts, 2018; Malvaso, Delfabbro, Day, & Nobes, 2018; Vinnerljung & Sallnäss, 2008). Moreover, prior delinquency and placement instability were significant risk factors for adult criminality among maltreated youth (DeGue & Widom, 2009). Thus beyond the dose-response principle, the family risk factors together with prior delinquency may have led to an increased risk of delinquency after discharge among these adolescents with prior convictions within Class 4.

Another explanation for the elevated rates of moderate and severe offences after discharge of the adolescents in Class 4 might be that –

despite the smaller amount of risk factors prior to admission – their risk factors were aggravated during and after their admission to residential care (Clarke, Peterson-Badali, & Skilling, 2019). Furthermore, it is conceivable that the criminogenic needs of this group were not sufficiently addressed during residential care (Haqanee, Peterson-Badali, & Skilling, 2015). The treatment of these adolescents may have primarily focused on the individual factors, whereas the families of these adolescents were the main cause of their problems.

Since the risk profiles are based on risk factors prior to admission to residential care, the question is whether residential treatment mediates the relationship between risk profile membership and delinquency after discharge. In this study, termination of treatment was used to investigate possible mediation in the relationship between risk profiles and delinquency after discharge since premature termination of treatment could limit the effectiveness of residential treatment due to the failure to reach treatment goals before discharge. Although we found that the risk profiles predicted premature termination of treatment – with adolescents in Classes 1, 2, and 4 having an elevated risk of treatment dropout compared with adolescents in Class 3 – termination of treatment did not predict delinquency after discharge. This finding contradicts the results of a couple of other studies in which a relationship between treatment dropout and delinquency was found (Olver, Wormith, & Stockdale, 2011; Van der Geest & Bijleveld, 2008; Vinnerljung & Sallnäss, 2008). Among adult offenders, Olver et al. (2011) found that non-completers were more likely to be high-risk offenders, suggesting that pretreatment risks also contribute to the relationship between treatment dropout and recidivism. The findings of our study, in which high-risk clients were also more at risk of treatment dropout, may indicate that the relationship between treatment dropout and recidivism, indeed, fades away if pretreatment risks – as manifested in the risk profiles – are taken into account. An additional explanation for the contradictory results from this study is the use of two diversified types of premature termination of treatment – dropout and pushout – merged into one measure. Lockwood and Harris (2015) found that the association of these two separate dropout types with various types of delinquency differs, which could lead to ambiguous findings when these two dropout types are included as one.

Meta-analyses have consistently found significant reductions in recidivism when interventions comply with the risk, need, and responsibility principles of the RNR-model (Koebler et al., 2013; Singh et al., 2014). The current study provided additional knowledge, which might enable clinicians in secure residential care settings to tailor treatment to these principles. For example, intensive treatment should be given to adolescents in Classes 1, 2, and 4, given their increased risk of offending behaviour after discharge. Furthermore, the criminogenic needs of adolescents could be derived from their risk profiles. Although the risk factors in the family domain of adolescents in Classes 2 and 4 are static risk factors that are unable to be diminished, treatment aimed at strengthening the person's (family) system is fundamental. Two meta-analyses identified a relationship between family-focused components of treatment and promising short-term outcomes of residential care (Knorth et al., 2008; Scott & Brown, 2018). These findings underline the importance of treatment aimed at the family for all adolescents, especially for adolescents in Classes 2 and 4 with major family risks. Furthermore, for adolescents in Classes 1 and 2 with many risks in multiple domains, multisystemic interventions during, and potentially after, treatment are recommended (Van der Pol et al., 2017). The essence of focusing on peers and school, in addition to individual problems, was also emphasised by Scott and Brown (2018), who found prosocial peer relationships and education/employment opportunities to be protective for recidivism. Ultimately, it is recommended to provide specific training aimed at social-cognitive and social-emotional skills for adolescents in Class 3 with social skills difficulties since this can strengthen treatment effects (Knorth et al., 2008).

The strengths of this study include the use of a reasonably large and complex sample, in which only three persons objected to the use of their

data, resulting in the inclusion of almost the entire male population that had received treatment in the hospital in a particular period. Another strength of this study is the mixture of both the frequency and the severity of offences after discharge within a long time-at-risk period of up to 10 years, which revealed – if applicable – how many offences a person committed in a long period after discharge and how serious these offences were. In this study, offending behaviour was defined as all convicted and summoned offences after discharge from residential care according to official registered data from the Dutch Ministry of Justice and Safety. The use of this official registered data was a strength of this study since this type of data provides an objective measure of offending behaviour. However, a limitation of the use of official registered data is that it may lead to an underestimation of offending behaviour since offences that are unknown to the police are missed.

Another limitation of this study is the sole use of risk factors *before* admission to residential care, even though this was deliberately chosen due to the focus of this study on improving treatment to the specific needs of the adolescents. Although the predictive value of the risk profiles based on these pre-admission risk factors was established in this study, it would have been of additional value to include changes in dynamic risk factors during residential treatment. Especially since previous studies have found that risk factors have the capacity to change over time and during treatment (Hilterman, Bongers, Nicholls, & Van Nieuwenhuizen, 2018; Mulvey et al., 2016; Van der Linde et al., 2020), and that some change scores – such as a change in peer associations – are associated with reoffending (Viljoen, Shaffer, Gray, & Douglas, 2017). Repeatedly assessing risk factors during residential care may also be beneficial for clinical practice, enabling clinicians to adapt their interventions to possible changes in the criminogenic needs of adolescents. In addition to risk factors, assessing promotive factors – which are factors that have been found to be protective for recidivism among justice-involved youths – is crucial (Kleeven, De Vries Robb , Mulder, & Popma, 2020; Scott & Brown, 2018; Ttofi, Farrington, Piquero, & DeLisi, 2016). Moreover, Fazel, Singh, Doll, and Grann (2012) established in their systematic review and meta-analysis the weaknesses of risk assessment, which means that caution is warranted when using risk assessment as sole determinant of discharge decisions. Nevertheless, the focus of this study is on the use of the risk profiles and their risks of delinquency for informing and adjusting treatment, which can be done safely. In future studies, the profiling of the risk profiles should be further elaborated with information on the protective factors and the development of established risk factors during care.

5. Conclusion

The considerable number of minor, moderate, and severe offences after discharge from secure residential care, as well as the differences between subgroups, highlights the need to tailor treatment more effectively to the specific risks and needs of the admitted adolescents. In this study conducted among a population of adolescents with major psychiatric and behavioural problems who were admitted to secure residential care, it emerged that the absence of convictions before admission and the risk profile with mainly peer risks are protective factors for committing (severe) offences after discharge from residential care. By contrast, adolescents with many risk factors in multiple domains and adolescents with mainly family risks have an increased risk of repeated (severe) delinquency after discharge. These adolescents need more intensive residential treatment and – within this treatment – family-focused components and a focus on both school/work and peers. More research is needed on how residential treatment can disrupt the relationship between risk profile membership prior to admission and offending behaviour after discharge from residential care. However, by means of this person-centred study, a further step has been taken to unravel the mystery of persistent offending behaviour in this heterogeneous population of adolescents suffering from multiple individual, family, peer, and school risks.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. This work was supported by GGzE Centre for Child & Adolescent Psychiatry.

Declaration of Competing Interest

None.

Acknowledgements

We thank Lieke Omlo for her valuable help in data entry. We would also like to thank the Dutch Ministry of Justice and Safety for providing judicial documentation abstracts.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jcrimjus.2020.101758>.

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