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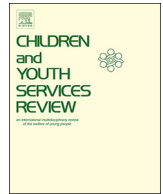
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The development of a risk and needs assessment instrument for truancy

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ABSTRACT

The aim of this study was to develop a risk and needs assessment instrument for truancy for use by juvenile probation. No validated tools are yet available for this purpose, while about half of all juvenile probation cases involve truancy in the Netherlands. It was examined whether risk/protective factors for general delinquent behavior were predictive for truancy and whether a risk assessment instrument could be developed based on these factors with sufficiently high predictive power. The sample consisted of 10,233 juveniles between 12 and 18 years of age ($M_{age} = 16.21$; $SD = 1.34$) who had been convicted for committing an offense. CHAID analyses were performed to develop (a) a risk model containing both static and dynamic risk/protective factors to estimate the level of risk of truancy and (b) a needs model containing only dynamic risk/protective factors to gain insight into the extent to which (and the way in which) the risk can be reduced. A split-sample validation was applied, with half of the sample being used to construct the models and the other half to validate the models. The AUC values of both risk models corresponded with a medium effect size (AUC = 0.69 for the risk model; AUC = 0.67 for the needs model), which can be considered sufficient to justify their use as instruments for risk and needs assessment for truancy for use by juvenile probation. Future research should examine whether and how the instrument (which was called Actuarial Risk and Needs assessment Instrument for Truancy [ARNIT]) can be further improved by adding specific truancy risk/protective factors.

1. Introduction

Truancy is associated with many problems, such as psychiatric problems, externalizing problem behavior, delinquency, risky sexual behavior, teenage pregnancy, and the abuse of alcohol, tobacco, marijuana, and other substances (see, for example, Chou, Ho, Chen, & Chen, 2006; Egger, Costello, & Angold, 2003; Jaafar et al., 2013). In addition, youth showing excessive absenteeism are at high risk for permanent dropout from school (Kearney, 2008), which may lead to economic deprivation and different mental and social problems in adulthood (Kogan, Luo, Murry, & Brody, 2005; Tramontina et al., 2001). In the Netherlands, the country where this study was conducted, about half of all juvenile probation cases concern truancy. In these cases, youth are supervised by the juvenile probation on the grounds of violating the Compulsory Education Act. To be able to reduce (the risk of) truancy it is important to perform a risk and needs assessment so that these juveniles can be referred to appropriate interventions. However, no validated instruments are currently available for performing risk and needs assessment in truancy cases. Therefore, the aim of the current study was to develop a risk and needs assessment instrument specifically for truancy for use by juvenile probation.

Truancy is a form of problem behavior that can be explained from an ecological perspective on the development of children (Bronfenbrenner 1979, 1986; Kearney, 2008). Ecological models assume that the development and behavior of a child is the result of the interaction of the child with different social ecological systems surrounding the child, such as the family, peers, and the school environment (microsystem), the extended family (exosystem), and the culture, laws, and social-political conditions (macrosystem). In each of these systems, risk factors can be present that increase the risk of negative child development and behavior (including truancy) and protective factors that decrease this risk. Risk factors in more proximal social systems exert more influence on the child's development and behavior than risk factors in more distal social systems (Bronfenbrenner, 1986). Therefore, studies aimed at determining risk and protective factors for truancy are mainly focused on child-related factors and factors present in the microsystems directly surrounding the child, such as family-, peer-, and school-related factors (Gubbels, van der Put, & Assink, 2019). These proximal factors for truancy are therefore important factors for risk and need assessment instruments.

Knowledge about risk factors and their effects on truancy is essential in the prevention and intervention of this problem behavior. The Risk

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Need Responsivity (RNR) model plays an important role in judicial care to prevent delinquent behavior (Andrews & Bonta, 2010; Andrews, Bonta, & Hoge, 1990). This model is used in judicial care as a guidance for offering effective offender assessment and treatment services, and its effectiveness has been proved in several review studies (see, for instance, Andrews et al., 1990). It can be assumed that the RNR-model also applies to truancy, since delinquency and truancy can both be explained by an accumulation of risk factors in several systems (Andrews & Bonta, 2010; Gubbels et al., 2019). In addition, there is an overlap in risk factors for truancy and delinquency, such as antisocial peers, substance abuse, antisocial behavior and antisocial cognitions (see Gubbels et al. (2019) for an overview of risk factors for school absenteeism and Andrews and Bonta (2010) for an overview of risk factors for delinquency). The RNR-model consists of the following three general principles that are important for effective treatment: (1) the intensity of intervention should be adjusted to the level of risk of recurrence (risk principle); (2) the intervention should be focused on dynamic (treatable) risk factors for recurrence (need principle) and (3) the intervention should be tailored to the motivation, learning style and skills of the juvenile. To be able to apply the RNR-principles, adequate risk and needs assessment tools are required. However, only a few risk assessment instrument are available worldwide that are specifically aimed at truancy and school absenteeism.

Examples of risk assessment instruments for school absenteeism are: (a) the School Refusal Assessment Scale (SRAS-R; Kearney, 2002), (b) the Truancy/Attendance Assessment (School, 2009), and (c) the Risk Indicator Survey I (RISK-I; Kim & Barthelemy, 2010). The aim of the SRAS-R is to identify the main reason for school absenteeism. This instrument distinguishes between the following reasons for school absenteeism: (1) avoiding school-related stimuli (e.g. fear of testing, fear of teachers or feeling bad at school), (2) avoiding social situations at school (e.g. feeling isolated or being bullied), (3) attention from important others (e.g. prefer to be with parents than at school), and (4) tangible reward outside the school setting (e.g. do fun things). This instrument consists of separate questionnaires for children and for parents, each consisting of 32 items that must be scored on a 6-point scale (0 = never and 6 = always). The Truancy/Attendance Assessment is aimed at assessing the risk of school absenteeism and consist of a questionnaire for teachers or other professionals at school. This instrument contains 13 items, including poor school performance, truant friends, social isolation and drugs use and indicates after completion whether the risk of school absenteeism is high, medium or low. The RISK-I is also aimed at estimating the risk of absenteeism and also consists of a questionnaire for teachers or other school professionals. This instrument consists of 32 items in the following 6 domains: behavioral problems, unstable home situation, social problems, lack of motivation, self-harm an attention problems. After completing the RISK I, the school professional has to make the final assessment whether the risk of absenteeism is high or low (structured clinical assessment).

Although a few assessment instruments are available for school absenteeism, these instruments have hardly been validated to date, so the psychometric characteristics of these instruments are largely unknown, such as the predictive validity and reliability. In addition, these instruments do not distinguish between risk and need assessment, which is important for referring juveniles to appropriate interventions aimed at preventing future truancy. The aim of the current study was therefore to develop an instrument for risk and needs assessment for use by juvenile probation officers in cases of truancy. Currently, the National Instrument for Juvenile justice system (NIJ) is used for risk and needs assessment for all juveniles under the supervision of juvenile probation. The NIJ is largely based on the Washington State Juvenile Court Assessment (WSJCA; Barnoski, 2004a, 2004b) and consists of the most important static and dynamic risk factors for general delinquent behavior. To develop an instrument specifically for truancy, it was examined to what extent the items of the NIJ are predictive for future truancy and whether an risk model could be developed to estimate the

risk of future truancy. Given the aforementioned overlap in risk factors for truancy and delinquency, it was expected that an instrument with a sufficiently high predictive validity could be developed. In addition, it was examined whether a risk model could be developed based on only the dynamic (changeable) NIJ -items with a sufficiently high predictive validity, so that insight is gained into the extent to which (and the way in which) the risk can be reduced. This model will be further referred to as needs model.

2. Method

2.1. Sample

The sample consisted of 10,233 juveniles between 12 and 18 years of age ($M_{age} = 16.21$; $SD = 1.34$) who had been convicted for committing an offense and for whom the NIJ was completed between July 1th, 2012 and December 31th, 2013. The sample consisted of $n = 8,625$ (84.3%) boys and $n = 1,608$ girls (15.7%). Most of the juveniles $n = 9,001$ (88.0%) were born in the Netherlands. The sample consisted of $n = 3,146$ (30.7%) first offenders and $n = 7,087$ (69.3%) repeat offenders.

2.2. Instruments

2.2.1. National instrument for the juvenile justice system (NIJ)

The National Instrument for the Juvenile justice system (NIJ) is a risk and needs assessment instrument that is largely based on The Washington State Juvenile Court Assessment (WSJCA; Barnoski, 2004a, 2004b). The WSJCA identifies a youth's risk and protective factor profile to guide rehabilitative efforts. The development of the instrument was based on a review of the following types of research: recidivism prediction literature and instruments, for example the Wisconsin Risk Scale (Baird, Storrs, & Connelly, 1984) and the Youth Level of Service and Case Management Inventory (Hoge & Andrews, 1994), theoretical models for juvenile delinquency, risk and protective factor research, resiliency research and research on effective juvenile delinquency programs (see Barnoski, 2004a, 2004b).

The NIJ comprises of two parts: a quick-screen and a full-screen. The quick-screen is administered to all youth suspected of a crime to obtain a first indication of the criminogenic and care needs. The quick-screen has to deliver insight into the domains in which juveniles experience problems and to indicate whether community service is warranted. The quick-screen also indicates whether the juvenile offender needs to be referred for further psychiatric assessment. If the quick-screen indicates that a juvenile has criminogenic or care needs in more than one domain, then the full-screen should be administered

The quick-screen consists of 57 items and the full-screen of another 55 items (112 in total) spread over the following 10 domains: living and family-situation, school, work, free-time, social relations, skills, aggression, behaviour and attitude, mental health problems (including history of child abuse), and substance use. Items are rated at a 3-point scale (strong protective side, neutral middle part, strong risk side, for example the item 'youth believes there is value in getting an education' with response categories 'believes getting an education of value', 'somewhat believes education is of value' and 'does not believe education is of value') or at a 4-point scale (strong protective side, weak protective side, weak risk side, and strong risk side, for example the item 'goal setting' with response categories 'sets realistic goals', 'sets somewhat realistic goals', 'sets unrealistic goals', 'does not set goals'). The full-screen allows a more extensive inventory of all dynamic risk and protective factors, and indicates which interventions are appropriate given a youth's risk and protective factor profile.

The NIJ was completed based on information gathered in conversations with both the youth and the family. The school mentor was approached by telephone for information about how things were going at school. To complete the NIJ, motivational interviewing was used to

motivate the youth and the family to participate in the interview and provide information. The guidelines and techniques for interviewing are described in the comprehensive LLJ manual (Ministry of Justice and Security, 2019).

2.2.2. Criminal history data

To examine whether previous delinquent behavior was predictive of truancy, information regarding former committed offenses was retrieved from the research and policy database judicial documentation of the Research and Documentation Centre of the Ministry of Justice and Safety. The following variables regarding the criminal history of the sample were included in the study: total number of prior offenses, total number of prior non-violent property offenses, total number of prior violent property offenses, total number of other prior violent offenses, total number of prior property damage, aggression, or disruption of public order, age at first offense and total number of prior truancy offenses.

2.2.3. Truancy recidivism

Truancy recidivism was defined as the occurrence of one or multiple truancy offenses within a follow-up period of two years after completing the NIJ. To measure truancy recidivism, data from the research and policy database judicial documentation of the Research and Documentation Centre of the Ministry of Justice and Safety were used (official records). Truancy recidivism was treated as a dichotomous variable (whether [1] or not [0] convicted for a truancy offense in a two years follow-up period).

2.3. Analysis

To examine the strength of the associations between NIJ -items and truancy recidivism and between earlier offense behavior and truancy recidivism, point-biserial correlations (r_{pb}) were calculated.

The risk models were developed by means of chi-squared automatic interaction detector (CHAID) analyses. CHAID is a decision tree classification method that groups cases into subsets of cases with different levels of risk on the basis of particular combinations of variables. This method focuses on interactions between variables rather than on main effects of variables in the dataset being examined. To build the CHAID models, we randomly divided the total group of juveniles into two groups; about 50% of the sample was used to construct the models and about 50% of the sample was used to validate the models.

In the first step of the CHAID procedure, the total group of subjects is divided into a number of subgroups on the basis of the variable most strongly associated with truancy recidivism. In the second step, the groups were split again on the basis of the variable that was then most strongly associated with truancy recidivism. This procedure was repeated until no variables remained that had a significant association with truancy in the subgroups, or until the groups had reached a minimum size ($n = 30$ in the present study). CHAID is appropriate for gaining insight into risk profiles with a high or a low risk, because it identifies groups of cases that share the same risk factors and thus the same risk of truancy recidivism (Thomas & Leese, 2003). Another advantage of CHAID is that the results are presented graphically and are therefore easy to interpret.

AUC-values were calculated to examine the predictive value of the risk models. The AUC-value is regarded as an appropriate measure of predictive validity (Rice & Harris, 2005). The AUC value indicates the probability that a randomly selected juvenile that will be convicted for a truancy offense within a follow-up period of 2 years has a higher risk classification than a randomly selected juvenile that will not be convicted of a truancy offense within two years (Hanley & McNeil, 1983). An AUC value of 0.50 indicates that the instrument performs no better than chance. A value of 1.00 indicates a perfect positive prediction, a value of 0.00 a perfect negative prediction. AUC values of 0.639–0.714 correspond with a medium effect size ($0.50 < d < 0.80$) and AUC

Table 1
Point-biserial correlations between risk/protective factors of NIJ and truancy recidivism.

Domain	r_{pb}
Family	
Parental supervision	0.060**
Parental authority	0.028**
Parental control	0.058**
Obedience of the juvenile	0.052**
Parental punishment	0.064**
Father has committed crimes in the past	0.027*
Mother has committed crimes in the past	0.009
Other family members has committed crimes in the past	0.039*
Out of home placement	−0.039**
Run away from home	−0.012
Child protection measure	−0.012
Willingness of the family to support the youth	−0.003
Attitude of parents towards the antisocial behavior of the youth	0.023
Family income	0.035*
Supportive network of the family	0.031*
Involvement of juvenile in family decisions	0.019
Serious conflicts in the family	0.030
Poor parental reward	0.005
School	
Youth believes there is value in getting an education	0.061**
Special education	0.013
Academic performance	0.064**
Conduct at school	0.078**
Earlier truancy	0.104**
Relationship with teachers	0.019
Recently sent out of class	0.080**
Recently suspended	0.046**
Likelihood that youth will stay in school and graduate	0.029
Work	
Understanding of what is required to maintain a job	0.016
Interested in employment	0.048*
Use of free time	
Interested/involved in structured recreational activities	−0.011
Interested/involved in unstructured recreational activities	0.026**
Problematic use of free time	0.057**
Relationships	
(Anti)social friends	0.062**
Admiration antisocial behavior of peers	0.060**
Resistance to antisocial peers	0.066**
Positive relationships with adults outside of family/school/work	−0.018
Social bond with community	0.013
Youth has been bullied	0.024
Youth has bullied	0.012
Relationship with antisocial person	0.017
Alcohol and/or drug use	
Frequency of alcohol use	−0.033**
Amount of alcohol consumption	−0.004
Frequency of drug use	0.029
Amount of drug consumption	−0.032
Participation in alcohol and/or drug program	−0.008
Mental health problems	
Intellectual disability	0.004
Diagnosis of psychiatric problems	−0.033**
Complaints about pain without a medical cause	0.012
Automutilation	−0.007
Dangerous things in the past	−0.001
Suicidal thoughts/behavior	−0.015
Victim of neglect	0.001
Victim of physical abuse	−0.010
Witness of domestic violence	0.033**
Experiences of violence outside the family	−0.001
Victim of sexual abuse	−0.021**
Attitude	
Accepts responsibility of antisocial behavior	0.054**
Respect for others property	0.057**
Respect for authority figures	0.034**
Empathy, remorse, sympathy, or feelings for victims(s)	0.021
Control over antisocial behavior	−0.011
Aspirations for better life	0.032**
Respect for rules/social conventions	0.010
Aggression	
Verbal aggression to solve a conflict	0.042**

(continued on next page)

Table 1 (continued)

Domain	r_{pb}
Physical aggression to solve a conflict	0.044**
Tolerance for frustration	0.002
Hostile interpretation of actions or intentions of others	-0.002
Skills	
Problem-solving behavior	0.054**
Impulsive behavior	0.018
Alternatives to aggressive behavior	0.033**
Dealing with others	0.031**
Dealing with difficult situations	0.046**
Dealing with feelings	0.007
Consequential thinking	-0.005
Goal setting	0.027
Situational perception	0.004
Monitoring/controlling external triggers that can lead to trouble	0.000
Monitoring/controlling internal triggers that can lead to trouble	-0.001

Note: * $p < .05$; ** $p < .001$; Correlations above 0.04 (lower bound of a small effect) are marked in bold.

values of 0.714 and higher correspond with a large effect size ($d > 0.80$; Rice & Harris, 2005).

3. Results

3.1. Association between risk/protective factors and truancy recidivism

Table 1 shows the point-biserial correlations (r_{pb}) between the NIJ-items and truancy recidivism (convictions of a truancy offense during a follow-up period of 2 years after completing the NIJ). It can be seen from the table that approximately half of the NIJ-items were significantly associated with truancy recidivism. Most of the significant items were part of the domains family, school, attitude and skills. However, not all items that were significantly related to truancy recidivism were clinically relevant, because of the large statistical power due to the large sample size ($N = 10,233$). The r_{pb} values for small, medium and large effect sizes for a 50% base rate are 0.10, 0.24 and 0.37 respectively (Rice & Harris, 2005). For base rates other than 50%, r_{pb} values for small, medium and large effects can be calculated using the conversion formulae (after Rosenthal, 1991; Swets, 1986) provided by Rice and Harris (2005). The overall truancy rate (base rate) in our sample was 5.1%. Using the conversion formulae, we found the r_{pb} values for small, medium and large effect sizes for a 5.1% base rate to be 0.04, 0.11 and 0.17 respectively. Items with a correlation higher than 0.04 (limit value small effect) are marked in bold in Table 1. In total, 21 items from the domains of family, school, work, leisure activities, relationships, attitude, aggression and skills had a small effect. No medium or large effects were found.

3.2. Association between previous delinquent behavior and truancy recidivism

Table 2 shows the point-biserial correlations (r_{pb}) between previous delinquent behavior and truancy recidivism. Previous delinquent behavior was not predictive of truancy recidivism, with the exception of previous convictions of truancy offenses and age at first offense (the younger, the higher the likelihood of truancy recidivism).

3.3. Development of a risk model based on static and dynamic risk/protective factors

To develop a risk model, a CHAID analysis was performed with truancy recidivism as dependent variable and the variables from Tables 1 and 2 that were associated with truancy recidivism as independent variables (variables with correlations marked in bold). In addition, a variable named "total score static and dynamic factors" was created by

Table 2

Point-biserial correlations between previous delinquent behavior and truancy recidivism.

	R
Number of previously committed offenses	-0.011
Number of previous violent crimes	-0.030**
Number of previous property crimes without violence	0.001
Number of previous property crimes with violence	-0.006
Number of previous crimes of destruction, mild aggression, or disturbance of public order	0.001
Age at first judicial contact	-0.078**
Number of previous truancy offenses	0.045**

Note. * $p < .05$; ** $p < .01$; Correlations above 0.04 (lower bound of a small effect) are marked in bold.

summing the individual NIJ-items and criminal history variables that were significantly related to child maltreatment. This variable comprised the sum of the following factors: parental supervision, parental control, obedience of the juvenile, parental punishment, juvenile values education, academic performance, behavioral problems at school, previously truant, previously suspended, previously expelled, interested in a job, use of free time, antisocial friends, admiration of antisocial behavior, resistance to influence of anti-social peers, accepting responsibility for antisocial behavior, respect for others' property, verbal aggression to solve a conflict, physical aggression to solve a conflict, problem-solving behavior, dealing with difficult situations, young age at first offense and previous convictions of truancy. This total score ranged from -30 (in case of predominantly protective factors) tot +54 (in case of predominantly risk factors) with a mean value of $M = 2.20$ ($SD = 16.87$).

Fig. 1 presents the output of the CHAID analysis (decision tree) and Table 3 gives a description of the risk groups. The risk of truancy recidivism is 5.3% in the total training sample ($n = 5,056$). The strongest predictor of truancy recidivism was the total risk score. Based on this variable, the training sample was divided into four subgroups, ranging from a risk score lower than -20 (predominantly protective factors) with a truancy risk of 0.9%, to a score greater than 18 (predominantly risk factors) with a truancy risk of 9.7%. Second, the subgroups were split again based on the variables that were then most strongly related to truancy. The risk model was based on a combination of five variables: (1) total score of risk/protective factors, (2) age at first offense, (3) previous convictions of truancy, (4) parental punishment and (5) previous truancy (this variable contains all earlier truancy, so also less serious truancy that did not led to a conviction). These variables proved to be the strongest predictors of truancy recidivism and made a unique contribution to the prediction of truancy recidivism. Based on these variables, eleven risk groups were distinguished that varied from very low risk (risk of truancy of 0%) to high risk of truancy (risk of truancy of 21%). The AUC value of the risk model was 0.713 (95% CI [0.686-0.740]) in the training sample and 0.686 (95% CI [0.658-0.715]) in the testing sample.

3.4. Development of a needs model based on dynamic risk/protective factors

Another CHAID analysis was performed to develop a needs model with truancy recidivism as dependent variable and the dynamic variables from Table 1 that were associated with truancy recidivism as independent variables (variables with correlations marked in bold with the exception of previously truant, previously suspended, and previously expelled). In addition, a variable named "total score dynamic factors" was created by summing the individual NIJ-items that were significantly related to child maltreatment. This variable comprised the sum of the following factors: parental supervision, parental control, obedience of the juvenile, parental punishment, juvenile values education, academic performance, conduct at school, interested in a job,

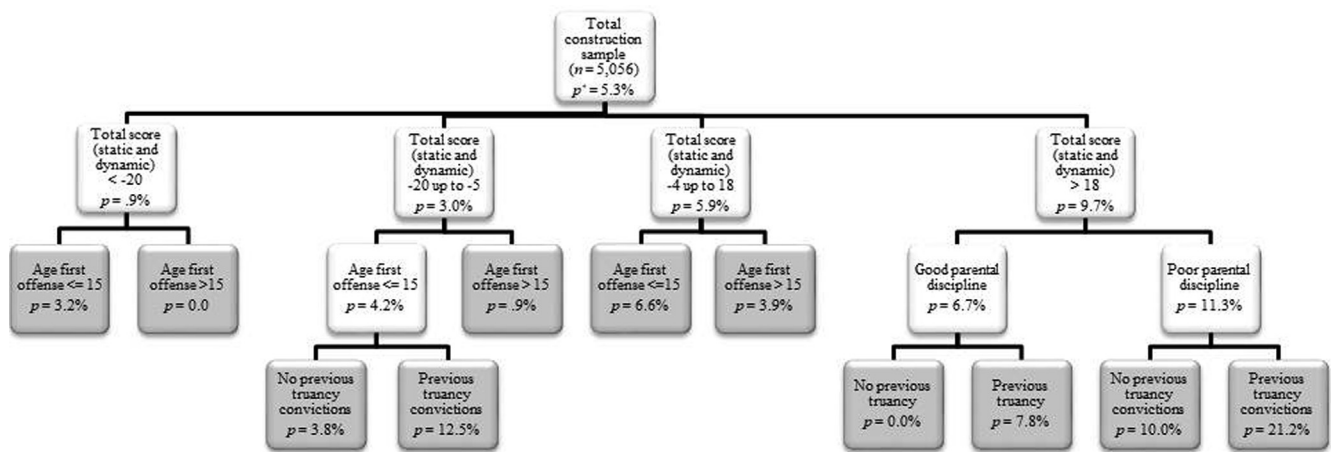


Fig. 1. CHAID output risk model. Notes. *p = proportion of truancy recidivism. The grey shaded terminal nodes represent the 'risk groups' in which cases have similar scores on the variables and thus a similar risk of truancy recidivism.

use of free time, antisocial friends, admiration of antisocial behavior, resistance to influence of anti-social peers, accepting responsibility for antisocial behavior, respect for others' property, verbal aggression to solve a conflict, physical aggression to solve a conflict, problem-solving behavior, dealing with difficult situations. This score ranged from -25 (in case of predominantly protective factors) tot +41 (in case of predominantly risk factors) with a mean value of $M = 0.38$ ($SD = 14.23$).

Fig. 2 presents the output of the CHAID analysis (decision tree) and Table 4 gives a description of the risk groups. The risk of truancy recidivism was 5.1% in the total training sample ($n = 5,120$). The strongest predictor of truancy recidivism was the total dynamic risk/protective score. Based on this variable, the training sample was divided into four subgroups, ranging from a risk score lower than -20 (predominantly protective factors) with a truancy risk of 1.1%, to a score greater than 23 (predominantly risk factors) with a truancy risk of 10.6%. Second, the subgroups were split again based on the variables that were then most strongly related to truancy. The risk model was based on a combination of seven variables: (1) total score of dynamic risk/protective factors, (2) problematic use of leisure time, (3) parental punishment, (4) conduct problems at school and (5) parental control, (6) resistance to influence anti-social peers, and (7) use of verbal aggression to solve a conflict. These variables proved to be the strongest predictors of truancy recidivism and made a unique contribution to the prediction of truancy recidivism. Based on these variables, eleven risk groups were distinguished that varied from very low risk (risk of truancy of 1.1%) to high risk of truancy (risk of truancy of 23%). The AUC value of the actuarial needs classification was 0.709 (95% CI [0.682–0.736]) in the trainings sample and 0.666 (95% CI [0.634–0.698]) in the testing sample.

4. Discussion

The aim of the present study was to develop a risk and needs assessment instrument specifically for truancy for use by juvenile probation. First, it was examined whether risk factors for general delinquent behavior were predictive for truancy. Twenty-one risk factors, from the domains of family, school, work, leisure activities, relationships, attitude, aggression and skills had a small effect on truancy; no medium or large effects were found. Furthermore, the variables 'age at first offense' and 'previously committed truancy offenses' were predictive of future truancy. Based on those twenty-three risk factors, two risk models were constructed by means of CHAID analyses: (a) a 'risk' model containing both static and dynamic risk factors to estimate the level of risk and (b) a 'needs' model containing only dynamic risk factors to gain insight into the extent to which (and the way in which) the risk can be reduced. In building the models, a split-sample validation was applied, with half of the sample being used to construct the models and the other half to validate the models. The AUC values of both risk models corresponded with a medium effect size (AUC = 0.69 for the risk model and AUC = 0.67 for the needs model).

Some of the risk factors that were examined in the present study did not appear to be significantly related to truancy, while these risk factors were related to truancy according to a recent meta-analysis on risk factors for school absenteeism (Gubbels et al., 2019). Examples of these factors are drug and alcohol abuse, psychiatric symptoms, and delinquent behavior. A possible explanation for these different findings is that the meta-analysis concerns youth in the general population whereas our study concerns youth that has committed a crime. Other differences between the present study and the meta-analysis of Gubbels and colleagues are that (1) our study relates to truancy while the meta-

Table 3
Description of the risk groups of the risk model.

Description of the risk group	%*	P
1. Total score static and dynamic factors > 18; no poor parental punishment, no previous truancy	1.2%	0.00
2. Total score static and dynamic factors -20 or lower; age at first offense older than 15 years	7.5%	0.00
3. Total score static and dynamic factors between -20 and -4; age at first offense 15 years or older	10.9%	0.01
4. Total score static and dynamic factors -20 or lower; age at first offense 15 years or younger	3.1%	0.03
5. Total score static and dynamic factors between -20 and -4; age at first offense was 15 years or younger; no previous convictions of truancy	18.5%	0.04
6. Total score static and dynamic factors between -4 and 18; age at first offense older than 15	9.7%	0.04
7. Total score static and dynamic factors between -4 and 18; age at first offense 15 years or younger	29.9%	0.07
8. Total score static and dynamic factors > 18; no poor parental punishment, previously truant	6.8%	0.08
9. Total score static and dynamic factors > 18; poor parental punishment, previous convictions of truancy	9.3%	0.10
10. Total score static and dynamic factors between -20 and -4; age at first offense was 15 years or younger; previous convictions of truancy	0.8%	0.13
11. Total score risk factors > 18; poor parental punishment, previous convictions of truancy	2.0%	0.21

*Percentage of the sample (size of the risk groups), p = risk of truant recidivism.

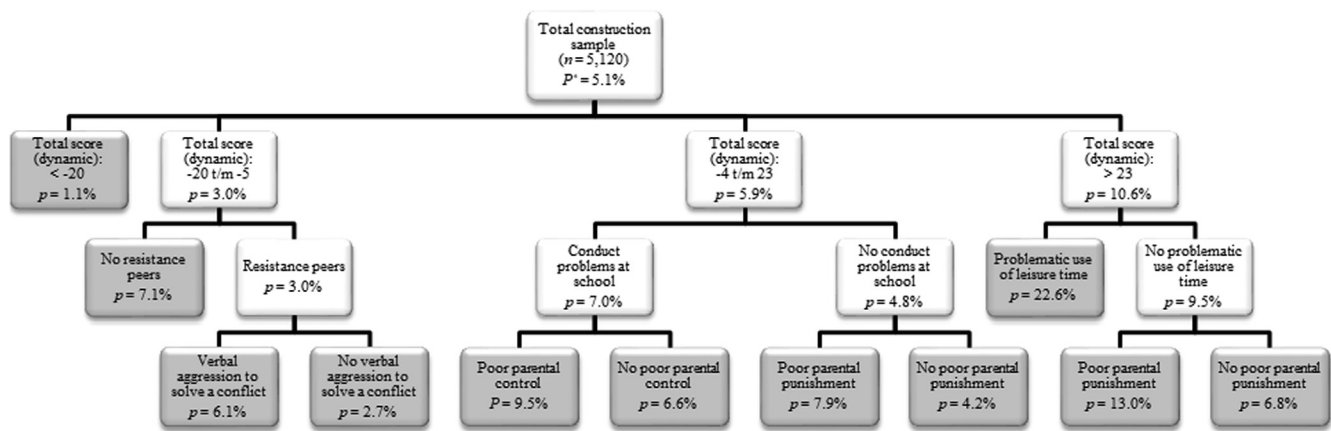


Fig. 2. CHAID output needs model. Notes. *p = proportion of truancy recidivism. The grey shaded terminal nodes represent the 'risk groups' in which cases have similar scores on the variables and thus a similar risk of truancy recidivism.

analysis relates to school absenteeism, including both truancy, school refusal and school phobia and (2) our study concerns youth in high school (12–18 years), whereas the meta-analysis relates to youth in both primary and high school (4–18 years).

The developed risk model distinguished between 11 risk groups that varied in risk level from 0% to 21% and the needs model distinguished between 11 risk groups that varied in risk level from 1% to 23%. The risk level in each risk group refers to the risk that the youth will be convicted for truancy behavior within a two-year follow-up period. The actual risk of truancy is probably considerably higher because not all truancy behavior leads to convictions (see limitations of the study). The two risk models together form the Actuarial Risk and Needs assessment Instrument for Truancy (ARNIT; see appendix I for the included items and scoring). The predictive validity of the risk- and needs model is comparable to the average value of instruments that are used for predicting delinquent behavior. For example, Schwalbe (2007) found an average AUC value of 0.64 and Fazel, Singh, Doll, and Grann (2012) found average weighted correlations of $r = 0.28$ to $r = 0.32$ for risk assessments instruments predicting delinquency recidivism in juvenile offenders. The predictive accuracy of the ARNIT is therefore sufficient to justify its use as an instrument for risk and needs assessment for truancy for use by juvenile probation.

Review studies generally show that actuarial risk assessments are better than clinical assessments (Aegisdóttir et al., 2006; Dawes, Faust, & Meehl, 1989; Grove, Zald, Lebow, Snitz, & Nelson, 2000; Van der Put, Assink, & Van Solinge, 2017), so it is expected that using an actuarial instrument will lead to an improvement in practice. However, it is important to examine in further research whether and how the predictive validity of the ARNIT can be improved (see limitations of the study). Further, it is important to realize that the ARNIT is not suitable for determining a penalty, but only as an aid in choosing an appropriate

behavioral intervention aimed at reducing the risk of future truancy. The ARNIT distinguishes between risk and needs assessment by providing insight in the level of risk and the way in which the risk can be reduced. So the instrument can be helpful in determining the desired intensity and the dynamic risk factors that should be addressed in a behavioral intervention and thus makes it possible to work according to the RNR-model of effective rehabilitation interventions.

4.1. Limitations

Some limitations of the study should be mentioned. The first limitation relates to the outcome measure used in the present study. The outcome measure was defined as the occurrence of one or multiple convictions for truancy offenses within a follow-up period of two years after completing the NIJ. The actual risk of truancy is therefore probably considerably higher because not all truancy behavior leads to convictions. Truancy is often not prosecuted under criminal law but is handled within the civil law context with voluntary interventions. The level of risk per group must therefore be regarded as a relative risk compared to the other groups and not as an absolute risk. A second limitation is the subjective nature of the rating system. For about half of the items of the NIJ, the interrater reliability is moderate to low (Van der Ark, Van Leeuwen, & Jorgensen, 2018) which may explain why some of the items did not correlate with future truancy. A third limitation is that an instrument for general delinquent behavior was used for the development of the ARIS. As a result, specific risk factors for truancy may not have been included (factors that are predictive for truancy but not for general delinquent behavior, such as internalizing problems). Future research should examine whether and how the instrument can be further improved by adding these specific truancy risk factors. These factors could be added to the ARNIT as experimental

Table 4
Description of the risk groups of the needs model.

Description of the risk group	%	P
1. Total score dynamic factors lower than -0.20	9.3%	0.01
2. Total score dynamic factors between -19 and -5, resistance anti-social peers, no use of verbal aggression to resolve a conflict	27.6%	0.03
3. Total score dynamic factors between -4 and 23, no conduct problems at school, no inconsequent punishment parents	20.9%	0.04
4. Total score dynamic factors between -19 and -5, resistance anti-social peers, use of verbal aggression to solve a conflict	2.1%	0.06
5. Total score dynamic factors between -4 and 23, conduct problems at school, good parental control	21.4%	0.07
6. Total score dynamic factors > 23, no problematic use of leisure time, no inconsequent punishment parents	4.9%	0.07
7. Total score dynamic factors between -19 and -5, peer resistance anti-social peers	0.8%	0.07
8. Total score dynamic factors between -4 and 23, no conduct problems at school, inconsequent punishment parents	3.9%	0.08
9. Total score dynamic factors between -4 and 23, conduct problems at school, poor parental control	4.0%	0.10
10. Total score dynamic factors > 23, no problematic use of leisure time, inconsequent punishment parents	4.6%	0.13
11. Total score dynamic factors > 23, problematic use of leisure time	0.6%	0.23

*Percentage of the sample (size of the risk groups), p = risk of truant recidivism.

items (items that are measured but not yet taken into account when determining the risk level) so that in future research it can be examined whether these factors are important for assessing the risk of truancy and how these factors should be weighted. It is important to realize however that it is not necessary to include *all* risk factors for truancy in a risk assessment tool, because risk factors are often strongly interrelated and therefore, a subset of risk factors is often sufficient to make a good prediction of future behavior (see for example Van der Put et al., 2011). For needs assessment it is important to include all relevant dynamic (changeable) factors that are needed to be able to refer youth to appropriate interventions.

4.2. Conclusion

Despite these limitations, an instrument has been developed with sufficient predictive validity that can be used to estimate the risk of future truancy and to gain insight into the extent to which and the way in which the risk can be reduced. The ARNIT relates to the risk of *future* truancy and therefore it is important to use an additional instrument that relates to the *current* situation in case a youth is skipping school at the moment, to gain insight into what needs to be done to get the youth back to school at the moment. The ARNIT can serve as an aid in

referring youth to appropriate interventions with the aim of reducing the future risk of truancy.

Ethics approval and consent to participate

This study was ethically conducted based on the rules maintained by the Faculty Ethics Review Board (FMG–UvA) of the University of Amsterdam, the Netherlands.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the author on reasonable request.

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Declaration of Competing Interest

The author declares that she has no conflict of interest.

Appendix A. Items and scoring of the actuarial risk and needs assessment instrument for truancy (ARNIT)

Items	Responses (scoring)
1. Parental supervision (parents know whom youth is with and what youth is doing)	1. consistent, good supervision (-1), 2. Sporadic supervision (2), 3. inadequate supervision (3)
2. Parental control (parents supervise compliance with rules)	1. usually (-1), 2. sometimes (3), 3. usually not (3)
3. Obedience of the youth (degree to which youth obeys and follows rules)	1. usually (-1), 2. sometimes (1), 3. usually not (2)
4. Parental punishment of undesirable behavior	1. consistent appropriate punishment (-1), 2. consistent overly severe (-1), 3. no punishment (0), 4. consistent insufficient punishment (3), inconsistent punishment (6)
5. Youth believes there is value in getting an education	1. believes getting an education of value (-1), 2. somewhat believes education is of value (2), 3. does not believe education is of value (2)
6. Youth's academic performance in the most recent school term	1. mostly As and Bs (-2), 2. mostly Bs and Cs, no Fs (0), mostly Cs and Ds, some Fs (2), 3. some Ds and mostly Fs (2)
7. Youth's conduct in the most recent term	1. recognition for good behavior (-2); 2. no problems with school conduct (-1), sometimes problems with school conduct (2), often problems with school conduct (4)
8. Youth has previously been truant	1. no, good attendance (-1), 2. sometimes (2), 3. often (5)
9. Number of expulsions in last six months	1. none (0), 2. one (1), 3. two or three (3), 4. four or more (4)
10. Number of suspensions in last six months	1. none (0), 2. one (3), 3. Two or more (4)
11. Current interest in employment	1. currently employed (-1), 2. not employed but highly interested in employment (0), not employed and not or somewhat interested (2)
12. Youth has a problematic use of leisure time	1. no (-1), 2. somewhat (1), yes (1)
13. Current friends youth actually spends time with	1. mainly pro-social friends (-2), 2. no consistent friends (-2), 3. both pro-social and anti-social friends (0), 4. mainly anti-social friends (3)
14. Youth admires/emulates anti-social peers	1. does not admire, emulate anti-social peers (-2), 2. somewhat admires, emulate anti-social peers (1), 3. admires, emulates anti-social peers (2)
15. Current resistance to anti-social peer influence	1. does not associate with anti-social friends (-3), 2. usually resists going along with anti-social peers (-1), 3. rarely/sometimes resists going along with anti-social peers (2), 4. Leads anti-social peers (3)
16. Youth accepts responsibility for anti-social behavior	1. accepts responsibility for anti-social behavior (-2), 2. partly accepts responsibility (1) 3. minimizes, denies, justifies, excuses, or blames others (2), 4. accepts anti-social behavior as okay (2)
17. Respect for property of others	1. respects property of others (-2), 2. Respects personal property but not publicly accessible property (1), 3. Conditional or no respect for personal property (2)
18. Belief in yelling and verbal aggression to resolve a disagreement or conflict	1. never or rarely (-1), 2. sometimes (0), 3. often (1)
19. Belief in fighting and physical aggression to resolve a disagreement or conflict	1. never or rarely (-1), 2. sometimes (1), 3. often (2)
20. Problem-solving	1. identifies consequences of actions and acts to obtain desired consequences (-3), 2. identifies consequences of actions (0), 3. does not understand there are consequences to actions (1)
21. Dealing with difficult situations	1. often uses skills in dealing with difficult situations (-2), 2. sometimes uses skills in dealing with difficult situations (0), 3. rarely uses skills in dealing with difficult situations (2)
22. Age first offense	1. age at first offense older than 15 (0), 2. age first offense 15 years or younger (1)
23. Previously convicted for truancy	1. no (0), 2. yes (1)

Appendix B. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.childyouth.2019.104721>.

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