

Violence Prevention through Early Risk Assessment: Development and Validation of the Prokid Plus Risk Assessment Tool

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Aim

- Inform about ProKid Plus
 - Risk assessment tool
 - Based on official police records
 - Estimates a youth's risk of committing a violent offense in the near future
 - To be used by police officers
 - Primary goal: prevention
- Developed by:
 - Unit Early Risk Assessment of the Dutch police
 - Radboud University Nijmegen
 - Praktikon
- Validation



Background

- Juvenile violence is a serious societal problem
 - Negative consequences for victim, witness, and perpetrator
- Early prevention and intervention essential
- Important role for the police
- Requires tool which enables police to identify high-risk youth

What's already available?

ProKid12min vs ProKid Plus

ProKid 12min	ProKid Plus
Automated risk assessment tool	Automated risk assessment tool
Developed by Unit Early Risk Assessment of the Dutch police	Developed by Unit Early Risk Assessment of the Dutch police
Uses routinely collected data stored in Dutch police database	Uses routinely collected data stored in Dutch police database
Children 0-12 years	Adolescents 12-18 years
Risk of future police contacts	Risk of future violent offending
Information on police contacts of child and cohabitants	Information on police contacts of youth, cohabitants, and fellow-suspects
Algorithms based on criteria formulated by behavioral scientists and experts from the Dutch Police Service	Algorithms based on statistical analyses
Implemented in incidents registration system of the Dutch police; generates a risk score for each child that comes into contact with the police	Being implemented in incidents registration system of the Dutch police

ProKid Plus: Requirements

- Goal
 - Risk assessment regarding future violent offending for youth who come into contact with the police (in no matter what role, i.e., suspect, victim, or witness)
 - Initial screening
 - Informing at which youth prevention should be targeted or which youth should be referred to specialized youth care agencies for further screening and/or treatment
- Target population for use of the instrument
 - Police officers
- Target population for generating risk scores
 - Adolescents aged 12-18 years
- To enable automated assessment procedure, instrument should only use information available in operational police systems
- Scientific foundation regarding risk factors

Scientific Foundation

- Risk factors
 - Criminal history of youth
 - Criminal history of the youth's family members (cohabitants) and peers (fellow-suspects)
 - Offending frequency
 - Versatility
 - Gender
 - Age
- Roles
 - Suspect
 - Witness
 - Direct victim
 - Indirect victim

Construction Sample

- 31,650 adolescents (20,082 boys, 11,568 girls)
- Between 12 and 18 years of age ($M = 16.4$, $SD = 2.9$)
- Police regions "Amsterdam-Amstelland" and "Gelderland-Midden"
- Police contact in 2007 (index incident), in any role (suspect, witness, victim)
- Police records of the 5-year period prior to the index incident (i.e., from 2002 to 2007) and 4-year period after the index incident (i.e., from 2007 to 2011)

Data: Police Registrations

	Role				Police actions	Living address
	Suspect	Witness	Direct victim	Indirect victim		
Youth	✓	✓	✓	✓	✓	✓
Fellow suspects	✓	✓	✓	✓	✓	✓
Cohabitants	✓	✓	✓	✓	✓	✓

ProKid Plus: Independent Variables

- We simplified the data, combining incident codes into new categories based on similar content (e.g., violent offenses, property offenses, vandalism, sexual offenses, weapons, fraud, alcohol/drugs, traffic etc.)
- 237 variables in total, pertaining to incidents of the youth, fellow suspects and cohabitants (each in the role of suspect, witness, direct victim, and indirect victim)
- Continuous (count)

ProKid Plus: The Dependent Variable

- Violent offending
 - Combination of 45 incident codes pertaining to purely violent offenses (e.g., violent theft, mugging, shooting, bombing) as well as sexual offenses with a violent component (e.g., rape)
- Binary (yes/no)

ProKid Plus

- Logistic regression analysis
- What incidents go together with a violent offense?
- Weights
- Incorporated into algorithm
- Individual risk scores
- 6 risk categories ('very low' to 'very high')

Incidents

- Youth
- Cohabitants
- Fellow suspects

Violent offense

2002

2007

2011

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ProKid Plus

- Actuarial risk assessment
 - Equal to (Guy, 1998) or better than (Hanson & Morton-Bourgon, 2009) structured clinical instruments in the prediction of future delinquency
- Official police records valuable for assessing the risk of future offending (Assink et al., 2014; Berk, 2012; Cocx, 2009)

Results

- Significant effects found for variables pertaining to:
 - Youth
 - Cohabitants
 - Fellow suspects
- Significant effects found for each role:
 - Suspect
 - Witness
 - Direct victim
 - Indirect victim
- Significant effects found for gender, age, and versatility

Validation

- To what extent are adolescents classified in a high-risk category more likely to become a suspect of a future offense than adolescents classified in a low-risk category?
- What is the accuracy of ProKid Plus in terms of sensitivity and specificity?

Validation Sample

- 40,149 adolescents (25,274 boys, 14,875 girls)
- Between 7 and 22 years of age ($M = 17.9$, $SD = 3.3$)
- Police region "Amsterdam-Amstelland"
- ProKid Plus risk classification on 1-1-2012 (index date)
- Data on their registrations as a suspect for a violent offense during the four years after the index date

Analyses

- ROC Analysis
 - Sensitivity
 - We want youth who commit the offense to be classified as ‘high-risk’: Few false negatives
 - Specificity
 - We want youth who do not commit the offense to be classified as ‘low-risk’: Few false positives

Results: Descriptives

		Categorie Geweld						Totaal
		1	2	3	4	5	6	
0	N	29408	2568	2950	807	86	8	35827
	% binnen Cat. Geweld	96,7%	87,0%	71,1%	41,7%	13,4%	11,1%	89,2%
	% van Totaal	73,2%	6,4%	7,3%	2,0%	0,2%	0,0%	89,2%
1	N	990	385	1199	1127	557	64	4322
	% binnen Cat. Geweld	3,3%	13,0%	28,9%	58,3%	86,6%	88,9%	10,8%
	% van Totaal	2,5%	1,0%	3,0%	2,8%	1,4%	0,2%	10,8%
Totaal	N	30398	2953	4149	1934	643	72	40149
	% binnen Cat. Geweld	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
	% van Totaal	75,7%	7,4%	10,3%	4,8%	1,6%	0,2%	100,0%

True-Positives & True-Negatives

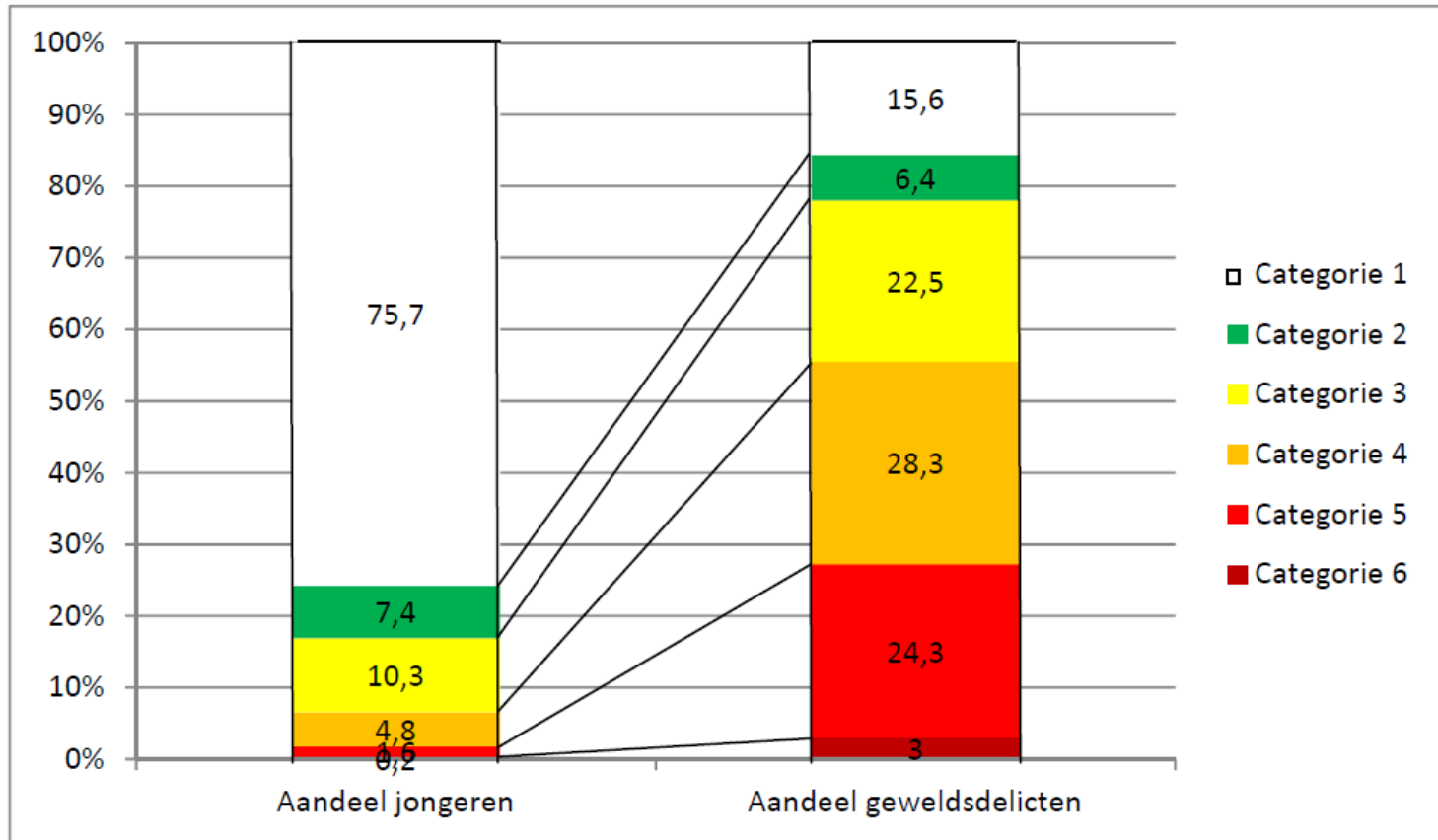
	Low risk (Cat. 1)	High risk (Cat. 5 & 6)
No violent offense	29408 (97%)	94 (13%)
Violent offense	990 (3%)	621 (87%)

False positives (specificity): 13%

False negatives (sensitivity): 3%

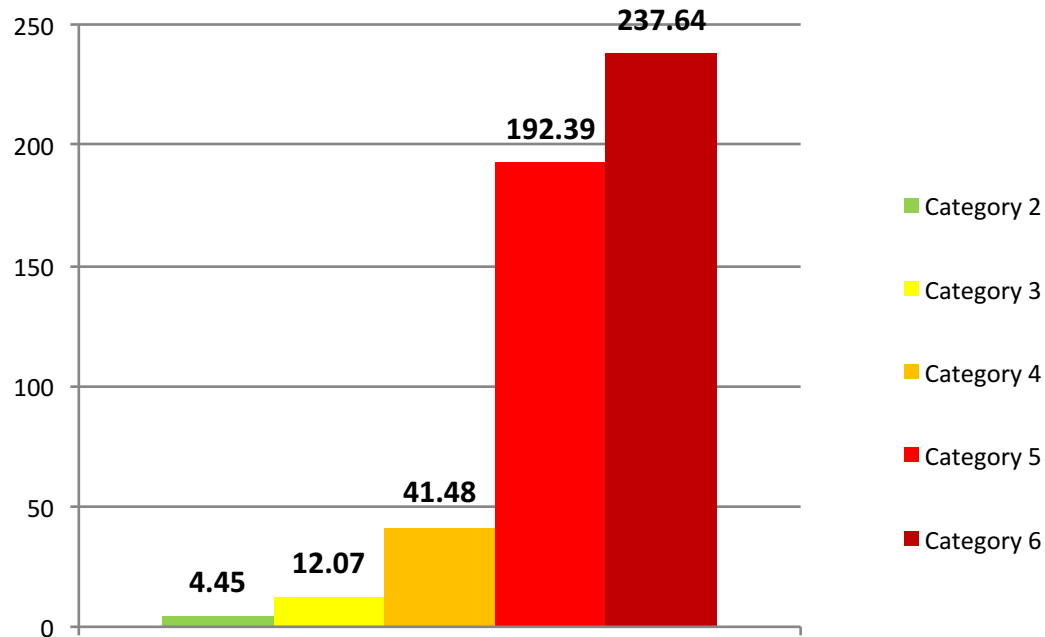


Results



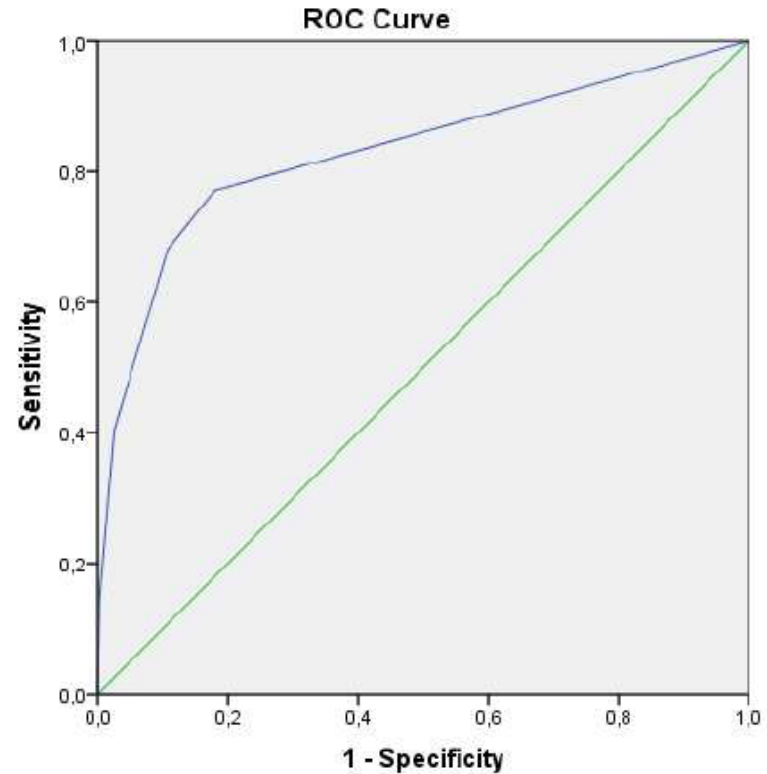
- 6.6% of the youth (Category 4, 5, and 6) responsible for 55.6% of the violent offenses
- 16.9% of the youth (Category 3, 4, 5, and 6) responsible for 78.1% of the violent offenses

Logistic Regression Analysis: Odds Ratios



Reference category is Category 1

Results: ROC Analysis



Area	Std. Error ^a	Asymptotic Sig.	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
,830	,004	,000	,822	,838



ROC Analyses: AUC Values

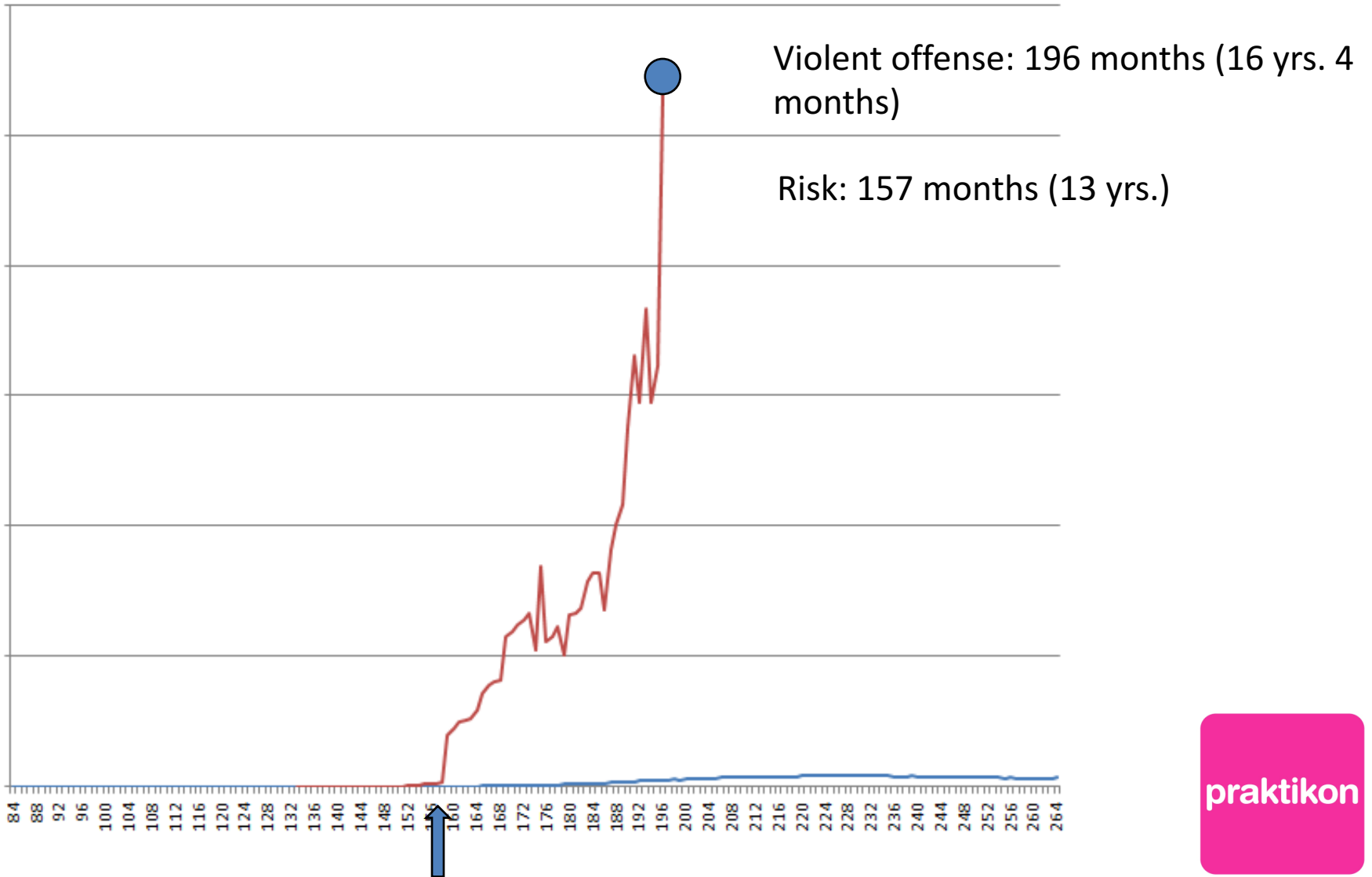
In words:

When comparing a randomly picked offender to a randomly picked non-offender, chances are 83% that the offender is classified in a higher ProKid Plus risk category than the non-offender



AUC value	Interpretation
0,5 - 0,7	Worthless to poor test
0,7 - 0,8	Fair test
0,8 - 0,9	Good test
> 0,9	Excellent to perfect test

Individual Case Illustration



Conclusions

- ProKid Plus is a powerful tool for identifying youth at risk of committing violent offenses
- Helps to narrow focus of prevention/intervention to kids who need it the most
 - Pros
 - Early risk assessment
 - Comprehensive set of risk factors (including incidents of cohabitants and fellow-suspects)
 - Automated risk assessment
 - Accurate
 - Cons
 - Age range
 - Only police data
 - Will need maintenance
 - Crime changes
 - Adaptations police registration system



What to do with this information?

- Preventive actions by police officers
- Referring to specialized youth care
- Extension Top 600 to Top 1000
 - Intervention program combining punishment and care

Thank you!

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