ICT supporting the assessment, explanation, and reduction possibilities of severity of violence experienced by secondary pupils

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Overview

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2. Mokken Scale Analysis (MSA)
3. Method
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5. Discussion

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1. Introduction

Assessment of violent behaviour of pupils:

a. personal, social, pedagogical, home, school, societal var.
b. same age: differences in psychological development
c. former experiences at home and other situations
d. cross-sectional versus longitudinal design
e. one-level versus multilevel design
f. (in)consistency between policy at national level and school curricula or programs to combat violence in schools

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Potential improvements

- Gray, Jackson, and Farrall (2011):
  a. conceptualisation / emotional aspects / feelings of safety
  b. assessment in / concerning specific persons and situations
  c. reliable and valid measurement procedures
- FA: relations (groups of) items and latent scores
- Item Response Theory (IRT):
  a. ordering items and respondents
  b. (non)parametric analysis
  c. latent trait scores

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IRT scale analysis

Various approaches, i.e.:

a. Guttman (ordinal, unidimensional, deterministic)
b. Rasch (interval item ordering, probabilistic, cumulative latent trait score)
c. Mokken (ordinal or nonparametric item ordering, probabilistic, cumulative latent trait score)

IRT scale analysis:

Item response functions do not intersect (item order; person order); different types of homogeneity indices
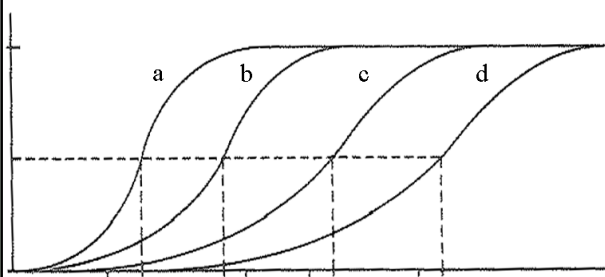
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Example 1: Guttman ordering, 4 items

Pupil	Calling names	Tripping on purpose	Beating someone up	Using a weapon	Scale score
	Item a	Item b	Item c	Item d	
1	0	0	0	0	0
2	1	0	0	0	1
3	1	1	0	0	2
4	1	1	1	0	3
5	1	1	1	1	4
frequency	4	3	2	1	

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Example 2: Non-intersecting probabilistic item functions

2. Mokken Scale Analysis (MSA)

Homogeneity indices (reliability; internal consistency calculated by iterative procedures):

- H_{ij} : pair of items: ratio covariance $X_i X_j$ / max. covar.

- H_i : cov. X_i all items / max. covar.

- H : scale, all items: ratio covariances items / max. covar.

Mokken Scale criteria and statistics

- **Monotone homogeneity:** scale is unidimensional; item and respondent invariance; cumulative ordering
  a. Each $H_{ij} > 0$
  b. Each $H_i > 0,30$
  c. $H > 0,30; \rho$
- **Double monotonicity:** ordering of items is uniform across groups of respondents, or person free
  a. H^T : degree to which item ordering ident. for each resp. population
  b. Neg. H^T values not larger 10% of respondents
  c. $H^T > 0,30$
- **Sumscore items Mokken Scale: severity or difficulty**

Research question

1. Does MSA of secondary pupils' experience of violence result in an adequate Mokken scale?
2. What is the relevance of individual pupil and contextual school variables with respect to severity of violence experienced (sumscore)?
3. Can results be returned to schools in effective ways?

3. Method

Operationalisation school violence and safety
- Types violence, situations, motives, policy, prevention
- Victim, perpetrator, witness roles
- Pupils, teachers, other staff, family of pupils
- Assessed with pupils, teachers, other staff, leadership

Data collection by large-scale ICT
- Digital national school surveys
- Data collection 2006, 2008, 2010, 2012

Secondary analysis 2008

- Data of secondary pupils 2008; n=78,840
- First random sample (n1=14,388): MSA to construct scale
- Second random sample (n2=14,350): cross-validation
- Relevant individual and school variables w.r.t. sumscore
- Multiple regression analyses to explore / compare results

Feed-back of survey results to schools by large-scale ICT

4. Results

Types of violence (29 items)	Cronbach's α
Verbal (4)	.85
Material (5)	.83
Social (6)	.81
Mild physical (5)	.89
Severe physical (4)	.72
Sexual (5)	.78

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Random samples pupils and distributions: Gender, Country of Birth, Feeling at Home

Second. pupils	N	Boys		Other country of birth		Feel at home in other country	
		N	%	N	%	N	%
Sample 1	14,388	7,100	49.3	785	5.5	1339	9.3
Sample 2	14,350	7,348	51.2	739	5.1	1364	9.5

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Results sample 1: Mokken Scale 25 items: lowest scoring

Severity	Items	Viol. type	Sum	N*	%	Cum. %
Middle	scratching/damaging something	Material	13	2908	3.7	78.8
	sexual gestures	Sexual	12	3241	4.1	75.0
	hiding or mislaying something	Material	11	3668	4.7	70.8
	making sexual comments	Sexual	10	3842	4.9	66.0
	spreading false rumours	Social	9	4057	5.2	61.0
	hitting	Mild phys.	8	4400	5.6	55.8
	tripping someone on purpose	Mild phys.	7	4464	5.7	50.1
	pushing/kicking on purpose	Mild phys.	6	4534	5.8	44.3
	striking/hurting on purpose	Mild phys.	5	4644	5.9	38.4
	making a lot of noise on purpose	Verbal	4	5454	7.0	32.3
	bothering someone on purpose	Verbal	3	4017	5.1	25.3
	talking in an extra loud voice	Verbal	2	3948	5.0	20.0
Least	calling someone names	Verbal	1	4556	5.8	14.9
			0	6933	8.9	9.0

•Number of pupils included = 77,005

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Results sample 1: Mokken Scale 25 items: highest scoring

Severity	Items	Viol. type	Sum	N*	%	Cum. %
Most	rape	Sexual	25	1068	1.4	100.0
	using a weapon	Sev. phys.	24	360	0.5	98.6
	sexually molesting someone	Sexual	23	489	0.6	98.1
	threatening someone w. weapon	Sev. phys.	22	648	0.8	97.5
	feeling someone up	Sexual	21	894	1.1	96.7
	spray-painting/dirtying something	Material	20	1318	1.7	95.5
	stealing	Material	19	1359	1.7	93.8
	beating or roughing someone up	Sev. phys.	18	1503	1.9	92.0
	threatening	Social	17	1802	2.3	90.1
	intimidating	Social	16	2071	2.6	87.7
	destroying things	Material	15	2339	3.0	85.1
	blackmailing	Social	14	2488	3,2	82,0
Middle	scratching/damaging something	Material	13	2908	3.7	78.8

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Mokken Scale statistics sample 1

N=14,388

Coefficient H=0.56; ρ=0.94

Matrix of H_{ij} values per item pair: minimum 0.34; maximum 0.88

H^T coefficient for entire group: 0.54

Number of negative H^T values: 341 (2.7%)

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Mokken Scale statistics sample 2

N=14,820

Coefficient H=0.55; ρ=0.94

Matrix of H_{ij} values per item pair: minimum 0.33; maximum 0.89

H^T coefficient for entire group: 0.51

Number of negative H^T values: 333 (2.5%)

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Exploratory two-level model of variables concerning Mokken sumscore severity of violence

Level	Explanatory variables or characteristics	Dependent var.
School	4. Mean severity of violence experienced 3. Mean educational variables 2. Mean family variables 1. Mean personal background variables	
Pupil	3. Education (year in school, track, school marks) 2. Family (country birth, at home Nthls, intact, religion, educ. parents) 1. Personal background (age, gender)	Sumscore: severity of violence experienced

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Multiple regression results

Pupil level: a pupil who is: older, a boy, born in the Netherlands, feels at home in another country, does not have an intact family, is not religious, is enrolled in the highest educational track, and is getting lower marks in the school subjects Dutch and mathematics experiences more severe violence than other pupils

School level: various composite or mean pupil variables; mean severity of violence experienced at school is most important in relative terms

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Digital feed-back to schools

Management summary: results at national and school level

Per school: longitudinal results

Diagnostic assistance to interpret various results

Stating and evaluating school policy

Relating national and school policies on school safety

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Discussion

- Large-scale digital survey to monitor school safety
- Mokken Scale Analysis
- Digitial feed-back to support school safety
- Further school support
- Further empirical research

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References

Michie, C., & Cooke, D.J. (2006). The structure of violent behaviour: A hierarchical model. *Criminal Justice and Behavior, 33*(6), 706-737.

Mokken, R.J. (1971). *A theory and procedure of scale analysis*. The Hague, The Netherlands: Mouton.

Molenaar, I.W., & Sijtsma, K. (2000). *MSP5 for Windows: A Program for Mokken Scale Analysis For Polytomous Items (Version 5.0)*. Groningen, The Netherlands: University of Groningen, ProGAMMA.

Mooij, T. (2011). Differences in pupil characteristics and motives in being a victim, perpetrator and witness of violence in secondary education. *Research Papers in Education,* 26, 105-128.

Mooij, T. (2012). A Mokken scale to assess secondary pupils' experience of violence in terms of severity. *Journal of Psychoeducational Assessment* (in press).

Mooij, T. (2012). Explaining severity of violence experienced by secondary school pupils. *(in preparation)*.

Mooij, T., Smeets, E., & De Wit, W. (2011). Multi-level aspects of social cohesion of secondary schools and pupils' feelings of safety. *British Journal of Educational Psychology, 81*(3), 369-390.

Van Schuur, W.H. (2003). Mokken Scale Analysis: Between the Guttman Scale and Parametric Item Response Theory. *Political Analysis, 11*, 139-163.

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