Institute of Psychology, Czech Academy of Sciences SCHOLA EMPIRICA, z.s. (Czech KiVa partner)

The interplay between selected protective/risk factors and outcomes in a KiVa antibullying program: Psychological networks perspective on potential mechanisms of change

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KiVa anti-bullying program

(Prevention – Intervention – Monitoring)

- Whole-school (students, teachers, parents)
- Evidence-based (Finland, Italy, the Netherlands)
- Complex program (regular lessons, trainings, KiVa team...)
- **Targets** bystander activization (defending behavior), change in attitudes, increase of the social and emotional competencies, reduction of bullying victimization and perpetration
- Czech implementation:
 - Schola Empirica, z.s.
 - Only second unit used (for 4.-6. graders)
 - Program length 10 months (school year 2021/2022)

Study design

- Cluster RCT: randomization of 24 primary schools (5/13 Czech regions); schools as divided to the KiVa intervention (n = 12) and wait-list control groups (n = 12).
- Baseline equivalence between groups in primary outcomes
- Measurement with the whole questionnnaire battery (LimeSurvey online): September-October 2021, January-February 2022, June 2022 (approx. 4 months interval)
- **Sample**: only 4. and 6. grades (N total = 671; intervention group n = 338, 56% girls, 47% fourth-graders; control group n = 333, 48% girls, 51% fourth-graders)
- **Project preregistration**: <u>https://osf.io/mrezb</u>
- **Results of the evaluation** of the KiVa Czech program:
 - After first year, null quantitative results in the main outcomes (but Bayes factor promising)
 - Qualitative change in the positive direction reported primarily by teachers
 - Implementation fidelity lower than expected

Measurement tools

(mostly unidimensional, MLR estimator, FIML, robust indices, the reported range across 3 measurement waves)



• Wellbeing (SCWBS):

OUTCOME

- Items about positive emotional state and positive outlook
- Fit: CFI = .94-.98; TLI = .93-.97; RMSEA = .039-.057; SRMR = .028-.039; ω = .81
- Bullying victimization (FBVS):
 - Items about physical, verbal, relational victimization; res.
 cov. between items of physical victimization: 6 a 9 (r = .42-.44)
 - Fit: CFI = .94-.96; TLI = .92-.94; RMSEA = .076-.084; SRMR
 = .044-.048; ω = .88
- Bullying perpetration (FBVS):
 - Items about physical, verbal, relational bullying; res. cov. between items of physical bullying: 6 a 9 (r = .11-.15)
 - Fit: CFI = .91-.96; TLI = .89-.94; RMSEA = .064-.092; SRMR
 = .052-.061; ω = .84

- Items about peer acceptance, student-teacher relationships, identification with school
- Fit: CFI = .94-.98; TLI = .92-.97; RMSEA = .062-.112; SRMR = .028-.038; ω = .81
- Social self-efficacy (SEQ-C):

Belonging to school (PSSM):

- Items about social colaboration, perceived social skills, assertiveness; res. cov. between items of assertiveness: 4 a 5 (r = .20-.27)
- Fit: CFI = .96-.97; TLI = .94-.95; RMSEA = .081-.096; SRMR = .030-.036; ω = .86
- Attitudes against/towards bullying (AABS):
 - Mildly correlated 2 factors (cognitive empathy vs. moral disengagement; r = .27-.32)
 - Fit: CFI = .97-.99; TLI = .96-.99; RMSEA = .026-.046; SRMR = .027-.035; ω empathy = .80; ω moral disengagement = .61
- **Defending** (PRQ):
 - Fit: CFI = 1.00; TLI = 1.00; RMSEA = .000; SRMR = .000; ω = .91

Correlation matrix depicted as a network



 8 factor scores in all 3 waves:
 Bivariate correlations between all 8 factor scores in all 3 waves:

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 Wait-list control group(N = 291)



- VICTn = bullying victimization frequency
- BULLYn = bullying perpetration frequency
- WELLn = wellbeing (positive mood/outlook)
- BELOn = school belonging

- SSEFn = social self-efficacy
- EMPVn = attitudes against bullying (empathy for victims)
- MORDn = pro-bullying attitudes (moral disengagement)
- DEFEn = defending roles behavior

Why using networks?

- Generating new hypotheses (exploration of the structure of relationships between larger set of variables)
 - Clustering
 - Mediation (temporal)
 - Revelation of hidden residual relationships (contemporaneous)
- Graph theory advantages
 - Centrality of variables in the system
 - Revealing potential causal pathways
 - Bridges between clusters
 - Fastest path from the point A to the point B
 - Epistemologically more suitable for some constructs



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Longitudinal network model

(graphical vector autoregressive cross-lagged network model for panel data with lag-1, *psychonetrics* R package)

- Input:
 - nodes as factor scores estimated in advance (detrending not necessary – measurement wave without effect)
 - nodes mean-centered according to respective school classes and zstandardized
- Setting:
 - saturated model \rightarrow pruned model of non-significant edges (α = .05) without Bonferroni correction, bootstrapped (with 100 resamples)
 - shared layout and shared maximum between multiple networks
 - multigroup model (KiVa intervention vs. Wait-list control groups)
- Extracted network types:
 - Temporal (within-person, edges = cross-lagged and autoregressive associations - PDC)
 - Contemporaneous (within-person, edges = residual associations after temporal effects are accounted for – Markov random fields from Gaussian Graphical Model)

Saturated model

χ2(360)=640.69, p<.001, TLI=.93, CFI=.95, RMSEA=.048 [.042; .054], AIC=39842.8, BIC=41141.3



 Pruned model

 χ2(565)=1725.95, p<.001,</td>

 TLI=.81, CFI=.81,

 RMSEA=.078 [.074; .082],

 AIC=40518.0, BIC=40892.2



VICT = victimization BULLY = bullying WELL = wellbeing BELO = belonging SSEF = soc. self-eff. EMPV = empathy MORD = moral dis. DEFE = defending

- Contemporaneous partial correlations (stable within average person, over all 3 waves)
 - Pruned edges ($\alpha = .05$)
- Effects according to the literature:
 - Supported/expected
 - Unrelated/contrary
 - Supported/contrary
 - No support found (yet?)

- Results:
 - Group diffs small
 - Role of defending different
 - Role of wellbeing different
 - To mention: bullying perpetration + victimization



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- Temporal PDC (within average person, lag-1)
 - Pruned edges ($\alpha = .05$)
- Naturally (control group):

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- Belonging contributing in all 3 outcomes
- Moral disengagement buffers bullying and vice versa
- Victimization SSEF negative loop
- Empathy important overall + for defending
- Inertia of wellbeing, belonging, victimization stronger
- MORD $\leftarrow \rightarrow$ SSEF (?)

• When KiVa at school:

- MORD not buffering bullying
- Wellbeing as reward for other mechanisms
- Negative victimization SSEF loop disappeared
- Empathy lost its activating role, defending lost passive role
- Senzitization (bullying victimization)

Centrality (gVAR temporal)



Summary

- Networks in both groups similar
- Social self-efficacy mostly interconnected with other nodes (central in both groups)
- Longitudinal (t-1) well-being more active and transitional in KiVa group
- Defending more actively contributing in KiVa group

Limits of the approach

- General limits of the networks
 - Lack of generalizability
 - It is difficult to match the **measurement time-window** with the time-window of the real change of the variables
 - Edges are not causal, overfitting is often the case
 - Problem with the network **completeness** (*what is missing? what is redundant?*)
 - How to investigate reliability?
 - Linear relationships only, except of the potentiality to look for the feedback loops (reality is often nonlinear)
 - **Overwhelming** and decision paralysis in interpretation given too many information

Limits of this study

- **1.** Interpretation of the potential noise in data (extreme skewness of variables, only three waves, assumed stationarity, not perfect dealing with the hierarchical data structure of students nested in classes and schools, small sample size for multigroup model, fit of the pruned models was low, Bonferroni's correction wipes out nearly all edges)
- 2. Low fidelity intervention in some of the participating schools, large mortality of the sample, intervention length too short for substantial change of the schools culture
- 3. Ideally, even the **measurement model** should be a part of the single panel gVAR model (*psychonetrics combines SEM and NET*), but low power for that

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