The European Journal of Public Health, Vol. 28, No. 6, 1012–1018

doi:10.1093/eurpub/cky089 Advance Access published on 11 June 2018

Perceived school climate, academic well-being and school-aged children's self-rated health: a mediator analysis

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Background: Schools are crucial settings for young people's development. Rare studies have examined the impact of perceived school-climate and academic well-being on young people's self-rated health in joint analyses. This study focuses on the role of perceived school-climate and academic well-being for young people's self-rated health and examines whether school climate is mediated by indicators of academic well-being. **Methods:** Data were obtained from the German National Educational Panel Study, including seventh grade students ($n = 6838$) aged 11–12, nested in 710 classes within 277 schools. Indicators of school climate (teacher control, demands, autonomy, interaction, goal setting and orientation, teaching quality) and academic well-being (satisfaction with school, helplessness in major school subjects) were reported from students. Multilevel modelling was used to analyze the relative importance of perceived school-climate and academic well-being on school-aged children's self-rated health. **Results:** Results showed that academic well-being is strongly related to self-rated health. The better students perceive their academic well-being, the lower the likelihood of poor self-rated health. In contrast, indicators of perceived school climate are only indirectly related to self-rated health, mediated by academic well-being or are not at all associated with self-rated health. **Conclusions:** This study suggests that school climate is important for academic well-being but not as important for students' self-rated health as academic well-being. Health promotion initiatives in schools have to ensure that school climate serves to enhance students' academic well-being to avoid health problems in the long-run.

Introduction

School climate plays a unique and important role in shaping students' academic well-being as well as general well-being and health.[1–3] Generally, school climate has often been defined as the quality and character of school life.[1,4] In more detail, it is a multidimensional construct,[5,6] referring to the 'quality and character of school life [...] based on patterns of people's experience of school life and reflects norms, goals, values, interpersonal relationships, teaching and learning practices and organizational structures'.[7] School climate features, such as school demands, control, interaction and autonomy among classmates, are closely linked to students' academic well-being, i.e. school satisfaction or perceived school-related helplessness.[1,8] Those features are likely to represent either risk factors or resources in childhood and adolescence and are linked to young people's health outcomes.[9–14]

Regarding the association between school climate and health, a positive relationship with and support by teachers and peers,[9,12,15,16] a school climate perceived favourably in relation to safety and fairness and stronger connectedness to school were associated with better health outcomes.[17–19] Perceiving higher teacher control, disciplinary climate and demands in school were often related to poor health outcomes,[9,14,17,20] whereas higher perceived autonomy and interaction among classmates were associated with better health.[17]

For the association between academic well-being and self-rated health (SRH), several studies revealed that students perceiving low school satisfaction[10,12,21] and experiencing higher levels of helplessness—as a proxy of stress at school—report worse health outcomes.[9,14,21–23]

However, given prior studies on the association either (i) between school-climate and academic well-being, (ii) between school climate and adolescent health or (iii) between academic well-being and adolescent health, few have unravelled whether school climate is directly linked to young people's health or whether it is mediated by academic well-being. This lack of knowledge is mostly due to limited indicators of school climate or academic well-being in previous surveys.[3–5,7,24] In contrast to other surveys with young people, such as the 'Health Behaviour in School-aged Children Study (HBSC)', the German National Educational Panel Study (NEPS) asks students about their perceptions of school-climate and academic well-being in a representative sample for secondary school students in Germany.[25] More explicitly, NEPS surveys students' perceptions on teachers' behaviour in class in relation to control, demands, organization, teaching quality and promotion of students' autonomy and interaction. Thus, the main research aim is to examine whether students' perceived school climate is either (i) directly associated with student health or (ii) mediated by indicators of academic well-being. We therefore test a model (figure 1) which has been proposed to link different

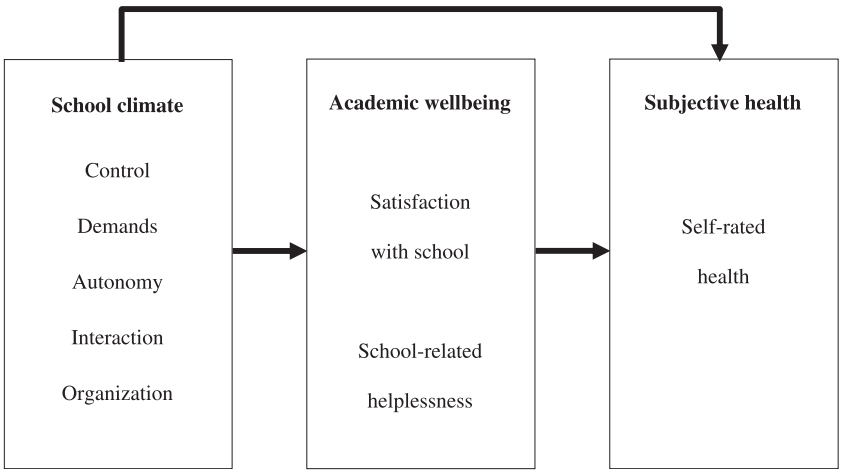

Figure 1 Conceptual model. (adapted from previous studies[23,26])

dimensions of school-climate and academic well-being to students' health[23,26] and address two research questions:

(1) What role do indicators of perceived school climate play for students' academic well-being?
(2) Are indicators of perceived school climate directly linked to students' SRH or does academic well-being mediate between the perceived school climate and SRH?

Methods

Data

The NEPS carried out by the Leibniz Institute for Educational Trajectories (LIfBi) at the University of Bamberg, examines educational processes in Germany across the entire lifespan, starting in 2010 with six starting cohorts (SC), followed up annually or biannually.[25] Besides comprehensive competence tests, NEPS also covers non-cognitive measures, such as SRH.

Sample

This study focuses on individual measures from seventh graders (aged 11–12 years) in secondary regular schools in Germany, surveyed in wave 3 of the NEPS SC3 in 2012/2013 ($n = 6838$ realized student interviews in 710 classes, nested in 277 schools). This study uses a cross-sectional design using wave 3 of SC3 which includes a variety of school-climate and academic well-being measures. Students were sampled through a stratified multistage process. After stratification by school type, region and other indicators, schools were drawn and then full classes were sampled.[27,28]

Students were interviewed in class by paper and pencil interview (PAPI). Survey documents used were previously submitted to, reviewed and approved by the respective Ministries of Education of the 16 federal states. Data protection officers of the federal states guarantee strict compliance with the statutory data protection regulations.[29]

The amount of missing information at the item level overall is relatively low at only 5.9%. Due to the accumulated impact of item–non-response in models with many indicators, employing a strict complete case analysis would lead to a loss of 38.6% of cases. Comparing students with complete to those with incomplete information, missing data are higher in boys ($\chi^2 = 4.567$, df = 1, $P = 0.033$) and for low track schools ($\chi^2 = 74.746$, df = 3, $P < 0.001$). To minimize possible biases due to missing data, we employed multiple imputations for inference statistics and conducted sensitivity analyses.

Indicators

Outcome: SRH

SRH was used as the dependent variable and is measured in five response categories ('very good', 'good', 'average', 'poor' and 'very poor'). This indicator was dichotomized in 'very good/good' vs. 'average/poor/very poor'.[21]

Independent variables: school-climate and academic well-being

School climate is measured by seven and academic well-being by three indicators. Except for satisfaction with school, all indicators are operationalized as scales with three to nine individual items each (Supplementary Appendix table A1).

For academic well-being, we included 'satisfaction with school' as well as 'helplessness in German language' and 'helplessness in mathematics' with the latter two being indicators of school-related stress. School satisfaction was measured using an 11-point scale asking students 'how satisfied they are with their situation at school' (response options: 0 = 'completely dissatisfied' to 10 = 'completely satisfied') and used as a metric measure. Helplessness in German language (5 items, range 5–25, Cronbach's α 0.89) and mathematics (5 items, range 5–25, Cronbach's α 0.86) are scales designed for NEPS.[30]

School climate was measured by six indicators asking students about the perception of school climate and teaching of German language teacher. 'Teacher control' measures the teacher's control over and awareness of events in class and individual students' behaviours (4 items, range 4–20, Cronbach's α 0.82).[31,32] 'Demands' measures teachers' expectations and demands for students' achievements (5 items, range 5–25, Cronbach's α 0.67).[31,33] 'Student autonomy' captures the autonomy to bring in their own views, suggestions and questions in class given by teacher (3 items, range 3–15, Cronbach's α 0.82).[34] Promoting 'interaction' measures how students are allowed and encouraged by the teacher to interact and help each other (3 items, range 3–15, Cronbach's α 0.84).[33] The issue of class 'organization' is covered by two indicators. First, 'goal setting and orientation' captures teacher's ability to summarize and connect lessons (3 items, range 3–15, Cronbach's α 0.80).[31,35] Second, 'teaching quality' measures the overall performance of teachers (9 items, range 9–38, Cronbach's α 0.81).[36] All indicators were used as metric variables and transformed to z-standardized scores for analysis,

Table 1 Sample description (NEPS SC3, wave 3, $n = 6838$)

			Frequencies	
			Absolute (*n*)	**Relative (%)**
SRH				
Very good/good			5514	80.6
Average/bad/very bad			1028	15.0
Missing			296	4.3
Gender				
Boy			3531	51.6
Girl			3304	48.3
Missing			3	<0.1
School type				
High track ('Gymnasium')			3053	44.6
Medium track ('Realschule')			1823	26.7
Low track ('Hauptschule')			540	7.9
Mixed track			735	10.7
Missing			687	10.0
Migration background				
Migration background			1465	21.4
No migration background			4802	70.2
Missing			571	8.4
School-related parental support				
High			1977	28.9
Medium			2046	29.9
Low			2421	35.4
Missing			394	5.8
	Cronbach's alpha	Missing % (*N*)	Mean (SD)	Min.–max.
Academic well-being indicators				
Satisfaction with school (1 item)	–	12.3 (141)	7.51 (2.17)	0–10
Helplessness in German language (5 items)	0.90	16.7 (537)	8.39 (3.47)	5–20
Helplessness in mathematics (5 items)	0.86	16.5 (521)	8.71 (3.19)	5–20
Perceived school-climate indicators				
Teacher control (4 items)	0.82	6.1 (417)	13.43 (3.67)	4–20
Demands (5 items)	0.67	8.6 (586)	16.99 (3.67)	5–25
Autonomy (3 items)	0.82	8.9 (612)	10.15 (2.82)	3–15
Interaction (3 items)	0.84	7.7 (524)	10.01 (2.84)	3–15
Goal setting and orientation (3 items)	0.80	7.5 (513)	9.14 (2.96)	3–15
Teaching quality (9 items)	0.81	12.4 (847)	27.39 (4.12)	9–36

Note: SD, standard deviation.

to compare coefficients between measures. High values correspond to the meaning of the indicators.

Control variables

Control variables are students' gender, age, attended school type, migration background and school-related parental support. Students born outside Germany or having at least one parent born outside of Germany, were counted as having a migration background. School type was included via four categories, as the educational system in Germany is highly differentiated and hierarchically organized in low ('Hauptschule'), medium ('Realschule') and high track schools ('Gymnasium') as well as comprehensive schools ('Gesamtschule') combining aspects of all tracks. School-related parental support is an indicator that measures parents' interest in and help with students' experiences and achievements in school (5 items, range 5–25, Cronbach's α 0.80). Table 1 shows the sample descriptions of all variables.

Statistical analysis

Linear and generalized linear mixed models have been conducted for the mediator analysis. All mixed models include random intercepts for classes and schools. As a prerequisite, associations between school-climate and academic well-being, as well as separate and joint associations of school-climate and academic well-being with SRH have been checked (figure 1). If there are significant associations between school-climate indicators and SRH, school-climate and academic well-being, as well as between academic well-being and SRH, we can assess the impact of academic well-being as a mediator, by comparing the associations in the separate models with those in the joint models. Multiple imputations with 50 imputations in total were employed to minimize bias, which might be introduced by listwise deletion, considering the skewed distribution of cases with missing information over students' school types.[37] The imputation model contained all variables used in the analysis, before items were combined into scales or dichotomized, and used logistic methods for dichotomous and categorical variables and predictive mean matching to impute ordinal or metric variables.[38] As sensitivity analyses, indicators of school-climate and academic well-being were analyzed in separate models, in combined constructs, as well as employing complete cases analyses to assess possible biases.

Results

Descriptive results

Overall, 16% of students report poor SRH. For school-climate indicators, lower levels in teacher control, autonomy, interaction in class and teaching quality are associated with higher prevalence in poor SRH. Goal setting and orientation as well as demands were not significantly related to students' poor SRH. For academic well-being, lower satisfaction with school and feelings of helplessness in German language or mathematics were related to higher prevalence rates in poor SRH. Supplementary Appendix Table A2 presents bivariate associations between measures of school-climate and academic well-being in relation to poor SRH.

Table 2 Linear mixed models for indicators of academic well-being ($n = 6838$ students, in 710 classes, in 277 schools)

	Satisfaction with school			Helplessness in German language			Helplessness in Mathematics		
	β	SE	*t*-value	β	SE	*t*-value	β	SE	*t*-value
Perceived school climate[z]									
Teacher Control	**0.03** ∗	**0.02**	**2.17**	−0.02	0.02	−1.07	**0.06**∗∗∗	**0.02**	**−3.66**
Demands	**−0.08**∗∗∗	**0.01**	**−5.51**	**0.04**∗∗	**0.02**	**2.72**	**0.12**∗∗∗	**0.01**	**8.68**
Autonomy	**0.10**∗∗∗	**0.02**	**5.26**	**−0.06**∗∗	**0.02**	**−3.18**	**−0.14**∗∗∗	**0.02**	**−7.56**
Interaction	0.02	0.02	1.13	0.03	0.02	1.70	−0.02	0.02	−0.95
Goal setting and orientation	**−0.04**∗	**0.02**	**−2.47**	**0.07**∗∗∗	**0.02**	**4.44**	**0.04**∗∗	**0.02**	**2.71**
Teaching quality	**0.16**∗∗∗	**0.01**	**10.68**	**−0.16**∗∗∗	**0.02**	**−10.54**	**−0.12**∗∗∗	**0.02**	**−8.00**
Constant	0.04	0.02	−1.77	−0.23∗∗∗	0.03	−8.60	−0.04	0.03	−1.40
$\sigma^2_{classes}$	0.001			0.013			0.011		
$\sigma^2_{schools}$	0.010			0.016			0.013		
Deviance (−2LL)	16 600.77 (df = 17)			16 813.15 (df = 17)			16 393.82 (df = 17)		

Note: models are controlled for class- and school-level, for age, gender, school type, migration background and school-related parental support; deviances for empty models only containing controls are −2LL = 17 376.79 (df = 10) for satisfaction with school, −2LL = 17 237.90 (df = 10) for helplessness in German language and −2LL = 17 1033.08 (df = 10) for helplessness in mathematics; SE, standard error; *z*, *z*-standardized; bold = significant coefficients; ∗: $p < 0.050$; ∗∗: $p < 0.010$; ∗∗∗: $p < 0.001$; −2LL, −2x log-likelihood.

Table 3 Logistic multilevel models for poor SRH ($n = 6838$ students, in 710 classes, in 277 schools)

	M1: school climate	M2: academic well-being	M3: school-climate and academic well-being
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Academic well-being[z]			
School satisfaction	–	**0.64 (0.60–0.69)**∗∗∗	**0.68 (0.63–0.73)**∗∗∗
Helplessness in German language	–	**1.11 (1.03–1.20)**∗∗	**1.09 (1.00–1.18)**∗
Helplessness in Mathematics	–	**1.18 (1.09–1.28)**∗∗∗	**1.12 (1.02–1.21)**∗∗
Perceived school climate[z]			
Teacher control	0.93 (0.85–1.02)	–	0.95 (0.86–1.04)
Demands	**1.12 (1.04–1.22)**∗∗	–	1.07 (0.99–1.16)
Autonomy	0.94 (0.85–1.05)	–	1.00 (0.89–1.11)
Interaction	**0.87 (0.79–0.95)**∗∗	–	**0.87 (0.79–0.96)**∗∗
Goal setting and orientation	**1.16 (1.06–1.28)**∗∗∗	–	**1.14 (1.04–1.26)**∗∗
Teaching quality	**0.86 (0.79–0.93)**∗∗∗	–	0.93 (0.86–1.02)
Constant	0.13 (0.12–0.16)∗∗∗	0.13 (0.11–0.15)∗∗∗	0.16 (0.12–0.21)∗∗∗
$\sigma^2_{classes}$	0.106	0.143	0.123
$\sigma^2_{schools}$	0.046	0.030	0.039
Deviance (−2LL)	**5160.59 (df = 16)**	**5043.99 (df = 12)**	**4992.69 (df = 19)**

Note: models are controlled for variances at class- and school-level, for age, gender, school type, migration background and school-related parental support; deviance (−2LL) for the empty model only containing controls = 5332.94 (df = 9); CI, confidence interval; SE, standard error; *z*, *z*-standardized; bold = significant coefficients; ∗: $p < 0.050$; ∗∗: $p < 0.010$; ∗∗∗: $p < 0.001$; −2LL, −2x log-likelihood.

Multivariate results

School climate and students' academic well-being

Table 2 shows the linear regression models regarding the impact of school-climate indicators on academic well-being. For school satisfaction, higher teacher control, autonomy in class and teaching quality are positively associated with school satisfaction, whereas higher demands as well as goal setting and orientation are related to lower school satisfaction. For interaction, no significant association with school satisfaction was found.

Results (table 2) indicate that teaching quality and autonomy are negatively associated with helplessness in German language. In contrast, teacher control and interaction in class are not significantly related to the perception of helplessness in German language. Demands as well as goal setting and orientation are associated with a higher level of helplessness in German language. For helplessness in mathematics (table 2), a similar pattern was found.

School climate and students' SRH

Table 3 shows the results of the logistic regression models for poor SRH. Regarding the association between school climate and SRH, demands as well as goal setting and orientation are related to higher likelihoods of poor SRH. In contrast, classmate interaction and teaching quality are positively linked to SRH. Autonomy shows no significant association with SRH.

All indicators of academic well-being (table 3, M2) were strongly related to SRH: higher school satisfaction was associated with lower likelihoods of poor SRH, whereas higher values of helplessness in both subjects were associated with higher odds ratio (OR) of poor SRH. M3 mutually includes all indicators of school-climate and academic well-being to assess their relative importance for SRH. As in M1, all indicators of academic well-being are significantly related to SRH. In contrast demands and teaching quality dropped its significance, while interaction as well as goal setting and orientation are less strongly related to SRH. According to the deviance values, the explained variance in SRH decreased from M1–M3, indicating that SRH is increasingly explained by indicators of academic well-being and features of school climate. However, the perceived academic well-being is most important for SRH in contrast to the perceived school climate.

Discussion

Summary of results

This study aimed at verifying whether school climate is directly linked to students' SRH or whether the association between school climate and SRH is mediated by academic well-being. The first research question addressed the association between perceived school-climate and academic well-being. Indicators of school climate were strongly related to academic well-being. In contrast, all indicators of academic well-being were strongly related to SRH and explained the highest amount of variance. Regarding the second research question, whether the association between school climate and SRH is mediated by academic well-being, results showed that associations between perceived school-climate indicators and SRH are either mediated by academic well-being or negligible.

Interpretation

School-climate and academic well-being

In general, students' academic well-being is strongly shaped by the perceived school climate and teachers' actions, creating a more positive or negative climate in class.[1,4,13] First, findings highlighted that higher teacher control, autonomy and teaching quality were related to higher school satisfaction, whereas students reporting higher demands revealed lower school satisfaction. Teaching quality (only for helplessness in German language) and autonomy in class (only for helplessness in Mathematics) had the strongest impact on helplessness in German language or Mathematics. Results are in line with findings from other studies, showing that students who perceive that their teachers care about them, respect them and praise them are more apt to like school.[9,15,39]

School climate and SRH

Second, associations between school climate measures and SRH have been tested. Few indicators (interaction, goal setting and orientation) were directly linked to SRH. Our finding on the relationship between higher interaction and lower likelihoods of poor SRH were in line with a study, highlighting that school participation and involvement among students were also significantly associated with better SRH and well-being.[8] This association is quite plausible as peers and classmates become increasingly important for young people during adolescence, while parents and other adult persons may lose connection to adolescent lives. Other studies also revealed that students' perceiving higher teacher support showed better health outcomes.[9,12] Thus, teachers who promote sharing ideas and concepts about schoolwork through interaction with classmates nurture the need of relatedness among young people and care for students' school life which is likely to be beneficial for their health.[15,16] Further, students' perception of teachers' goal setting and orientation in class was related to higher OR of poor SRH. Research on this relationship is, however, scarce. It is evident from another study that teachers focusing on a disciplinary class climate and strict classroom management may put pressure on young people, being likely to result in poor health.[17]

Academic well-being and SRH

Third, associations between perceived academic well-being and SRH have been tested, showing strong associations with SRH while explaining the highest amount of variance. In general, a positive academic well-being is considered to be a resource for young people's health,[12] while poor academic well-being is often related to stressors, highlighting that school and learning environments are a commonly reported source of distress among young people.[9–11,14] In line with other studies, results indicate that academic well-being—measured by school satisfaction—can be identified as a protective factor against poor health outcomes.[19] In contrast, school-related stress tends to be experienced by young people with higher levels of school pressure and is linked to poorer health outcomes.[11,20] Our results also revealed that higher school-related helplessness was associated with poorer SRH.[9,11,12]

Academic well-being as a mediator between school climate and SRH

Lastly, we also tested whether academic well-being mediates the association between indicators of school climate and SRH (figure 1). Only for demands and teaching quality, an indirect association with SRH—mediated by academic well-being—was found. Other school-climate indicators were not significantly related to either academic well-being or SRH. Other studies showed that students reporting better (psychosocial) working conditions in schools, such as better teaching quality and higher autonomy among classmates, revealed better health and well-being.[13,17] In contrast, teacher control and school demands were negatively associated with students' health in many studies.[9,14,20,22] In sum, school-climate indicators can probably be seen as structural school characteristics which stem from the learning environment that is mostly shaped by teachers' behaviour in relation to school work organization and the overall working atmosphere in class. Thus, it is plausible that school-climate indicators do not directly relate to SRH, rather than are partially mediated by the perception of academic well-being (i.e. school satisfaction and helplessness in school subjects).

Strengths and limitations

The NEPS data are of overall high quality, representative for the German educational system and cover valuable indicators of school-climate and academic well-being as well as health indicators, such as SRH. SRH is well-established by other child and adolescent health surveys (e.g. the HBSC-Study), also being linked to objective health outcomes such as morbidity and even mortality.[40] We used multiple imputations, which usually outperform analyses with only complete cases.[37] Additional bias or noise over an analysis of complete cases is highly unlikely, as multiple imputations are very well suited to work with large sample sizes and low to moderate amount of missing to provide correct inferential statistics with unbiased standard errors.[38] In sensitivity analyses using listwise deletion, most associations could be replicated, with no changes in direction and only some slight changes in magnitude but larger standard errors. Because of the cross-sectional analysis, findings are based only on the model assumptions. However, pathways might differ, e.g. in reverse, school climate might mediate the link between academic well-being and SRH. Some limitation stem from possible biases due to the students' self-reported measures. Further, correlations between measures of school climate might result in multicollinearity of regression coefficients but potential biases should be negligible due to the low to moderate correlation coefficients ($r < 0.3$, Supplementary Appendix table A3). However, we found no indication for substantial biases or contradicting results in the sensitivity analyses.

Conclusion

This study extended prior studies by examining whether perceived school climate is directly linked to students' SRH or whether the perception of school climate is mediated by academic well-being. In sum, results suggest that academic well-being is more important for SRH, whereas indicators of perceived school climate are mostly indirectly related to SRH or are partially mediated by academic well-being. The fact that school is compulsory until the end of lower secondary education makes it even more important for health promotion in schools to ensure that school climate serves

to enhance students' academic well-being to avoid health problems in the long-run.

Supplementary data

Supplementary data are available at *EURPUB* online.

Acknowledgements

This article uses data from the National Educational Panel Study (NEPS): Starting Cohort Grade 5, doi: 10.5157/NEPS: SC3: 3.1.0. From 2008 to 2013, NEPS data was collected as part of the Framework Program for the Promotion of Empirical Educational Research funded by the German Federal Ministry of Education and Research (BMBF). As of 2014, NEPS is carried out by the Leibniz Institute for Educational Trajectories (LIfBi) at the University of Bamberg in cooperation with a nationwide network.

Funding

The study was funded by the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) through the DFG Priority Programme 1646 (Education as a Lifelong Process). Analyzing Data of the National Educational Panel Study (NEPS) (Grant DFG-RI 2467/3-1).

Conflicts of interest: None declared.

Key points

- Rare studies have examined the impact of perceived school-climate and academic well-being on young people's self-rated health in joint analyses.
- A mediator analysis showed that academic well-being is directly related to students' self-rated health.
- Perceived school-climate indicators were mostly indirectly or not at all related to students' self-rated health.
- Perceived school climate is important for academic well-being but not as much for students' health as academic well-being.

References

1 Thapa A, Cohen J, Guffey S, Higgins-D'Alessandro A. A review of school climate research. *Rev. Educ Res* 2013;83:357–85.

2 Kidger J, Araya R, Donovan J, Gunnell D. The effect of the school environment on the emotional health of adolescents: a systematic review. *Pediatrics* 2012;129:925–49.

3 Huang K-Y, Cheng S, Theise R. School contexts as social determinants of child health: current practices and implications for future public health practice. *Public Health Rep* 2013;128:21–8.

4 Zullig KJ, Koopman TM, Patton JM, Ubbes VA. School climate: historical review, instrument development, and school assessment. *J Psychoeduc Assess* 2010;28:139–52.

5 Zullig KJ, Collins R, Ghani N, et al. Preliminary development of a revised version of the school climate measure. *Psychol Assess* 2015;27:1072.

6 Stewart D, McWhirter J, Rowe F, et al. Promoting school connectedness through whole school approaches. *Health Educ Res* 2007;107:524–42.

7 Cohen J, McCabe L, Michelli NM, Pickeral T. School climate: research, policy, practice, and teacher education. *Teach Coll Rec* 2009;111:180–213.

8 Róiste A, de Kelly C, Molcho M, et al. Is school participation good for children? Associations with health and wellbeing. *Health Educ Res* 2012;112:88–104.

9 Plenty S, Östberg V, Almquist YB, et al. Psychosocial working conditions: an analysis of emotional symptoms and conduct problems amongst adolescent students. *J Adolesc* 2014;37:407–17.

10 Torsheim T, Aaroe LE, Wold B. Sense of coherence and school-related stress as predictors of subjective health complaints in early adolescence: interactive, indirect or direct relationships? *Soc Sci Med* 2001;53:603–14.

11 Torsheim T, Aaroe LE, Wold B. School-related stress, social support, and distress: prospective analysis of reciprocal and multilevel relationships. *Scand J Psychol* 2003;44:153–9.

12 Inchley J, Currie D, Young T, et al. Growing up unequal: gender and socioeconomic differences in young people's health and well-being. Health Behaviour in School-aged Children (HBSC) study: international report from the 2013/2014 survey. Report No.: 7. WHO, 2016.

13 Kutsyuruba B, Klinger DA, Hussain A. Relationships among school climate, school safety, and student achievement and well-being: a review of the literature. *Rev Educ* 2015;3:103–35.

14 Modin B, Ostberg V, Toivanen S, Sundell K. Psychosocial working conditions, school sense of coherence and subjective health complaints. A multilevel analysis of ninth grade pupils in the Stockholm area. *J Adolesc* 2011;34:129–39.

15 Rueger SY, Malecki CK, Demaray MK. Relationship between multiple sources of perceived social support and psychological and academic adjustment in early adolescence: comparisons across gender. *J Youth Adolesc* 2010;39:47–61.

16 Danielsen AG, Samdal O, Hetland J, Wold B. School-related social support and students' perceived life satisfaction. *J Educ Res* 2009;102:303–20.

17 McNeely CA, Nonnemaker JM, Blum RW. Promoting school connectedness: evidence from the national longitudinal study of adolescent health. *J Sch Health* 2002;72:138–46.

18 Loukas A, Suzuki R, Horton KD. Examining school connectedness as a mediator of school climate effects. *J Res Adolesc* 2006;16:491–502.

19 Bond L, Butler H, Thomas L, et al. Social and school connectedness in early secondary school as predictors of late teenage substance use, mental health, and academic outcomes. *J Adolesc Health* 2007;40:357.e9.

20 Eriksson U, Sellström E. School demands and subjective health complaints among Swedish schoolchildren: a multilevel study. *Scand J Public Health* 2010;38:344–50.

21 Currie C, Zanotti C, Morgan A, et al., editors. *Social Determinants of Health and Well-Being among Young People: Health Behaviour in School-Aged Children (HBSC) Study: International Report from the 2009/2010 Survey*. Copenhagen: World Health Organization, 2012.

22 Wiklund M, Malmgren-Olsson E-B, Öhman A, et al. Subjective health complaints in older adolescents are related to perceived stress, anxiety and gender-a cross-sectional school study in Northern Sweden. *BMC Public Health* 2012;12:13.

23 Vieno A, Santinello M, Galbiati E, Mirandola M. Running head: school setting school climate and well being in early adolescence: a comprehensive model. *Eur J Sch Psychol* 2004;2:219–37.

24 Petrie K. The relationship between school climate and student bullying. *TEACH J Christ Educ* 2014;8:7.

25 Blossfeld H-P, Roßbach H-G, Maurice J, editors. *Education as a Lifelong Process: The German National Educational Panel Study (NEPS)*. Wiesbaden: VS Verlag für Sozialwissenschaften, 2011.

26 Samdal O, Wold B, Klepf KI, Kannas L. Students' perception of school and their smoking and alcohol use: a cross-national study. *Addict Res Theory* 2000;8:141–67.

27 Aßmann C, Steinhauer HW, Kiesl H, et al. Sampling designs of the National Educational Panel Study: challenges and solutions. *Z Erziehwiss* 2011;14:51–65.

28 Skopek J, Pink S, Bela D. *Data manual: starting cohort 3 - from lower to upper secondary school. NEPS SC3 1.0.0. NEPS Research Data Paper*. University of Bamberg, 2012.

29 Hellrung M, Meyer-Everdt M, Waschk A, Hillen P. Methodenbericht NEPS Startkohorte 3. Haupterhebung - Herbst/Winter 2011: A 29. Bamberg, 2014.

30 Schwarzer R, Jerusalem M. *Skalen Zur Erfassung Von Lehrer-Und Schülermerkmalen: Dokumentation Der Psychometrischen Verfahren Im Rahmen Der Wissenschaftlichen Begleitung Des Modellversuchs Selbstwirksame Schulen*. Berlin: Freie Universität Berlin, 1999.

31 Wagner W, Helmke A, Rösner E. *Deutsch Englisch Schülerleistungen international: Dokumentation der Erhebungsinstrumente für Schülerinnen und Schüler, Eltern und Lehrkräfte*. Frankfurt, M.: GFPF; DIPF, 2009.

32 de Jong R, Westerhof KJ. The quality of student ratings of teacher behaviour. *Learn Environ Res* 2001;4:51–85.

33 Ryan AM, Patrick H. The classroom social environment and changes in adolescents' motivation and engagement during middle school. *Am Educ Res J* 2001;38:437–60.

34 Hardre PL, Reeve J. A motivational model of rural students' intentions to persist in, versus drop out of, high school. *J Educ Psychol* 2003;95:347–56.

35 Ditton H. Qualitätskontrolle und Qualitätssicherung in Schule und Unterricht. Ein Überblick zum Stand der empirischen Forschung. In: Helmke A, Hornstein W, Terhart E, editors. *Qualität Und Qualitätssicherung Im Bildungsbereich; Schule, Sozialpädagogik, Hochschule*. Weinheim: Beltz, 2000: 73–92.

36 PISA. Programme for International Student Assessment (PISA 2000). Available at: https://www.mpib-berlin.mpg.de/Pisa/index.html (22 May 2018, date last accessed).

37 Schafer JL, Graham JW. Missing data: our view of the state of the art. *Psychol Methods* 2002;7:147.

38 van Buuren S. *Flexible Imputation of Missing Data*. Boca Raton: CRC Press, 2012.

39 Hallinan MT. Teacher influences on students' attachment to school. *Sociol Educ* 2008;81:271–83.

40 Schnittker J, Bacak V. The increasing predictive validity of self-rated health. *PLoS One* 2014;9:e84933.

The European Journal of Public Health, Vol. 28, No. 6, 1018–1023

doi:10.1093/eurpub/cky102 Advance Access published on 2 June 2018

Online sexual victimization in youth: predictors and cross-sectional associations with depressive symptoms

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Aim: The aim was to analyze (i) the prevalence of online unwanted sexual solicitation (USS) victimization, (ii) predictors of online USS and (iii) the associations between online USS and depressive symptoms in Swedish pupils in grades 7–9. **Methods:** An electronic questionnaire was disseminated in 2011 in schools in a municipality in the northern part of Sweden. Total $n = 1193$ (boys $n = 566$; girls $n = 627$). Logistic regression models were fitted to test the cross-sectional associations between predictors of online USS and depressive symptoms, respectively. **Results:** One third of girls and every fifth boy reported online USS victimization. In boys, predictors associated with online USS were offline bullying and sexual harassment victimization. Only offline sexual harassment victimization was associated with online USS in girls. Girls victimized by online USS had about twice the likelihood to report depressive symptoms compared to non-victimized girls. There were no associations between online USS and depressive symptoms in boys. While offline bullying was associated with depressive symptoms in both genders, offline sexual harassment victimization increased the likelihood to report depressive symptoms in girls only. **Conclusions:** Online USS was common among Swedish youth, particularly among girls. Schools, parents and internet safety educators should look at co-occurrence of different forms of victimization as offline victimization was a predictor of online USS. Online USS was associated with depressive symptoms in girls and may hence be a factor driving gender inequity in mental health in youth.

Introduction

Internet and computer/smartphone/tablet-mediated communications have opened up new opportunities for increased interaction with peers.[1] Young people can communicate in near real time with friends, connect with new friends, seek information, or visit civic or political websites, as well as create their own websites or blogs/vlogs. It can thus be seen as a forum for the development of social subjecthood, where young people can use the Internet as an enabler of e.g. positive sexual relations.[2] Nevertheless, the Internet has also opened new ways to victimization such as cyber bullying,[3] online sexual harassment,[4] internet harassment[5] and online unwanted sexual solicitation (USS).[6,7] The Internet has presented an increased opportunity for groomers to find victims, and groomers are skilled in building trust in children and young people.[8] In the past 15 years, there has been increasing concern about online USS, and it has become an additional harassment problem for young people, in addition to offline victimization as well as other forms of harassment online.[4] Adolescent victimization rates vary between 13% and 61% depending on how USS is measured,[4–6,9] and this remains an issue for increased mobilization.

Previous studies show that there is some inconsistency regarding co-occurrence of different forms of victimization. Espelage and Holt[10] found that bully victims report a high level of peer sexual harassment as well as higher levels of physical dating violence. There is also some support for the presence of co-occurrence between different forms of online harassment such as internet harassment and online USS.[11] Turner, Shattuck[12] have shown that about 18% of youth are poly-victims, meaning that they are likely to have been victimized by different victimization types, as well as in multiple settings (school, home, community). Other studies did not find support for an overlap between being bullied at school and Internet harassment.[13] Although Mitchell and Jones[14] found that there are co-occurrences between many forms of victimization, they did not find an elevated risk for online USS among those experiencing sexual harassment or peer victimization offline.

Despite these inconsistent findings, we consider it worthwhile taking into account offline bullying and sexual harassment victimization when assessing predictors of online USS. Research has found that an unknown adult as an online perpetrator is rare and that a substantial percentage of the solicitations come from