Emotional symptoms among adolescents: epidemiological analysis of individual-, classroom- and school-level factors

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Background: Large proportions of schoolchildren suffer from emotional symptoms and there are large variations across schools. It is unknown to what degree this variation is due to composition of schoolchildren in each school or to contextual factors. Objectives are to identify factors at individual, classroom and school levels associated with emotional symptoms. Method: Data stem from the Danish contribution to the international Health Behaviour in School-aged Children study 2010 including 4922 schoolchildren aged 11–15-years from a random sample of schools and including data from school leaders. Emotional symptoms are defined as daily presence of at least one of four symptoms: feeling low, irritable or bad tempered, nervous and having difficulties falling asleep. Multilevel multivariable logistic regression analyses are applied to identify and quantify factors at individual, classroom and school level. Results: Schoolchildren from low (odds ratio (OR) 1.70, 95% CI: 1.33–2.17) and medium (OR 1.50, 95% CI: 1.22–1.85) occupational social class (OSC) and schoolchildren exposed to bullying (OR 3.82, 95% CI: 2.71–5.40), had increased odds for emotional symptoms. A negative classroom climate was associated with emotional symptoms (OR 1.29, 95% CI: 0.99–1.69) and so was being part of classrooms with a high prevalence of bullying (OR 1.28, 95% CI: 1.0–1.60). Conclusion: Female sex, low OSC, single parent family, exposure to bullying and a high prevalence of bullying within a class are all associated with emotional symptoms. Most variation across schools is explained by individual-level factors but psychosocial aspects of the classroom environment also play a role.

Introduction

Emotional symptoms are widespread among adolescents and vary substantially across schools. Few studies exist about school and classroom factors contributing to schoolchildren’s emotional health, and on how much of the variation is attributable to characteristics of schools and students.

Most schoolchildren have good emotional health, but large proportions experience emotional and other psychosocial symptoms. Early adolescence is a particularly vulnerable time for developing emotional symptoms. Frequent presence of emotional symptoms like anxiety and depressed mood may have immediate implications for school attendance, academic functioning and social relations and also have long-term implications. School-based mental health promotion programmes may have positive effects and act as a buffer for children who do not receive support elsewhere.

Social determinants of emotional symptoms are only partly identified. Low socioeconomic position (SEP) seem to impact negatively on adolescents’ health and increase the risk of emotional symptoms. Amoné-P’Olak et al. showed that 10- to 12-year-old children with lower SEP had increased odds for internalizing and externalizing problems. Bøe et al. also found that low SEP was a significant predictor of mental health problems. Family structure may be important. Vanaelst et al. showed that living in a non-traditional family structure was a risk factor for psychosomatic and emotional symptoms and Stewart-Brown et al. showed that good parent–child relationships are crucial for developing positive mental health.

School climate may influence children’s mental health and wellbeing. Inconsistency about what constitutes a good or poor school climate exists. The concept often comprises a range of factors, e.g. supportive relationships with peers and teachers, participation, social inclusion and commitment to school. An important aspect of school climate is bullying which is a strong predictor of emotional symptoms and other negative outcomes. In a study across 28 countries Due et al. showed odds ratios (OR) for emotional symptoms among students being bullied weekly ranging from 1.67 (95% CI: 1.55–1.78) for feeling tired in the morning to 7.47 (95% CI: 6.87–8.13) for feeling left out of things. Bullying also seems to reach beyond those directly exposed, creating anxiety and posing bystanders at risk for developing emotional symptoms.

Norwegian and Swedish studies show that social and emotional support from classmates is crucial for young people’s wellbeing. Problematic peer relations such as peer victimization and bullying are important predictors of emotional symptoms, e.g. low self-esteem and anxiety and these symptoms may persist into adulthood. Modin and Östberg used an index of psychosomatic symptoms and found significantly more symptoms among schoolchildren who felt exposed to harassment. Some studies show large variations in emotional symptoms between schools but few have analysed why variations may reflect the socioeconomic and demographical composition of the schoolchildren or the contextual-level factors at classroom and school level. Modin and Östberg found that 2.5% of variations in psychosomatic complaints were due to contextual-level differences between schools and classes. Studies using multilevel analyses to disentangle and quantify the relative effects of the individual, classroom and school on students’ emotional symptoms are few and the findings are incongruent.
Objectives

Objectives were therefore to apply multilevel analyses to quantify the extent of school variations in emotional symptoms and to identify factors and conditions at the individual, classroom and school level associated with emotional symptoms.

Using hierarchical structured data, we took into account that students from same school share similar characteristics and are exposed to similar contextual factors that influence their emotional health. The analyses applied two approaches, contextual and compositional. The contextual effects refer to school processes, i.e. school policies and classroom climate, while the compositional approach refers to the socioeconomic and demographic aspects of the individual schoolchildren.

Method

Study design and population

Approximately 85% of all Danish children attend the local public school. They are in the same classroom for most classes during a 10-year period, i.e. the classroom climate is an important feature in children’s lives.

Data stem from the Danish 2010 contribution to the international Health Behaviour in School-aged Children (HBSC) study.7 The sampling frame was all public and private schools in Denmark (N = 1969) of which 137 were drawn at random and 73 (53.3%) participated in the study. School participation was significantly lower in the capital region of Copenhagen than in the rest of the country and significantly lower in large compared with small schools. Reasons for non-participation were generally that schools had recently participated in a similar health survey. The study included all schoolchildren aged 11, 13 and 15 (corresponding to grade 5, 7 and 9) in these schools. The participation rate was 86.3% of the schoolchildren enrolled in the relevant classes (n = 4922).

The schoolchildren answered the internationally standardized HBSC questionnaire during a school lesson36 and data collection was completely anonymous. The school leaders responded to postal questionnaires about school characteristics, response rate 93.2%, n = 69. We merged data from school leaders and schoolchildren. Fifteen classes with less than ten children were excluded. Further, schoolchildren in schools without answers from the school leader were excluded. The final study population included 4543 schoolchildren from 265 classrooms and 69 schools with information from both schoolchildren and school leaders.

The study adhered to all national ethical and data protection requirements.

Measurements

Dependent variable

Emotional symptoms were measured by the emotional symptom part of the HBSC Symptom Check List (HBSC-SCL).27–29 Schoolchildren reported how often they had experienced the following four symptoms in the past six months: Feeling low, irritable or bad tempered, feeling nervous and difficulties falling asleep. These emotional symptoms are all associated with adverse psychological and health outcomes later in adolescence and adulthood37.38 and they reflect symptoms included in the Diagnostic and Statistical Manual of Mental Disorders, fifth edition’s definition of generalized anxiety (difficulty sleeping) and depressive disorders (sadness, irritability, anxiousness).30 Response options were: About every day, more than once a week, about every week, about every month and rarely or never, dichotomized into one or more emotional symptom daily vs. all others. One hundred sixty-six children with missing information were excluded.

Individual-level independent variables

Family type was constructed from information about who the child lives with, categorized into four family types: Traditional (two biological parents), single parent, reconstructed (mother/father and stepmother/father) and other (e.g. foster families). Two hundred sixty-six children with missing information were excluded.

Migration status was measures by children’s and parent’s country of birth and categorized into three groups: Native Danish (child and at least one parent born in Denmark), descendants (child born in Denmark and both parents born outside Denmark) and immigrants (child and parents born outside Denmark). Children with missing information were excluded.

Occupational Social Class (OSC) was constructed from children’s reports about their parents’ occupation. The research group coded OSC according to standards of the Danish National Institute of Social Research,32 which is similar to the UK Registrar General’s classification. Each child was classified by the highest ranking parent and categorized into high (I and II), medium (III and IV), low OSC (V and economically inactive) and unclassifiable. Some children provided insufficient information for coding of social class, e.g. responses like ‘my father works in an office’ or ‘my mother works in (company name)’. We kept these 656 schoolchildren with unclassifiable data as a separate category since we did not want to omit so many from the analyses.

Grade is used as a proxy for age. Mean ages for grade 5, 7, and 9 were 11.8 (SD = 0.44), 13.8 (SD = 0.48) and 15.8 (SD = 0.42).

Exposure to bullying was included as an important determinant for emotional symptoms. Schoolchildren were asked: How often have you been exposed to bullying at school during the past 6 months? The variable was dichotomized into children exposed to bullying almost once a week or more often vs. those exposed less often or never. 38 children did not respond and were excluded.

Classroom-level variables

Data derived from aggregating individual-level variables to classroom level. As an indicator of classroom climate we applied the item: ‘The students in my class enjoy being together’ (strongly agree, agree, neither/nor, disagree or strongly disagree). Responses were dichotomized into those who disagreed or strongly disagreed versus the rest, aggregated to classroom level and dichotomized into positive classroom climate (10% or less negative responses) and negative classroom climate (more than 10% negative responses).

Exposure to weekly bullying during the past six months was categorized into: (i) no-one in the class exposed, (ii) one or two exposed and (iii) three or more exposed. Sensitivity analyses showed that choice of cut point did not change the direction of the observed associations.

School-level variables

We included two indicators of school climate derived from the school leader questionnaire, (i) presence of anti-bullying policies at school (yes, no) and (ii) whether other initiatives to prevent bullying (yes, no) was taken.

Statistical analysis

After removal of children in classes with less than 10 children, the number of complete cases were 4032 children nested in 265 classes in 69 schools. We used multilevel multivariable logistic regression analyses to evaluate the association between individual, classroom and school-level factors with emotional symptoms. The initial three-level model included only random effects of individual (n = 4032), classroom (n = 265), and school (n = 69) in order to estimate and separate the total variance into components.

Next, a full model was evaluated including all independent variables as fixed effects.
We also included interactions between the fixed effects of classroom climate, sex and OSC, respectively, and random effects of individual, classroom and school.

A backward elimination procedure was applied to exclude the least significant variables in the model one by one until only statistically significant variables remained.

The GLIMMIX procedure was used to perform the multilevel multivariable logistic regression analyses in Statistical Analysis System (SAS, version 9.3) applying a 5% significance level. We calculated Intra-Class Correlations (ICC)\(^{33}\) for emotional symptoms among schoolchildren within the same school-class and school as ICC\(_{class} = (s_1^2 + s_2^2)/(s_1^2 + s_2^2 + s_3^2)\) where \(s_2^2\) is the variance between school classes, \(s_3^2\) is the variance between schools and \(s_1^2\) is the variance between individuals approximated as 3.29.\(^{33,34}\) ICC for students within different school classes belonging to the same school was calculated as ICC\(_{school} = s_3^2/(s_1^2 + s_2^2 + s_3^2)\).

**Results**

We found large variations in emotional symptoms between schools (figure 1), mean 18.4% and range 7.3–32.5%, which was also present for each of the three grades (data not shown).

Among girls, emotional symptoms were more common in 5th and 7th than 9th grade (table 1). Girls in 5th grade reported better classroom climate than girls in 7th and 9th grade. Boys in 7th grade reported more negative classroom climate than boys in 5th and 9th grade. Few children were bullied often during the past 6 months, significantly more in 5th than 9th grade.

Girls had significantly increased odds (OR 1.32, 95% CI: [1.13–1.56]) of experiencing one or more emotional symptoms almost every day than boys (table 2). Children in medium and low OSC...
had higher odds for emotional symptoms (OR_{medium} 1.50, 95% CI: [1.22–1.85] and OR_{low} 1.76, 95% CI: [1.33–2.17]) than children in high OSC. Children from single parent and other family types had significantly higher odds (OR_{single parent} 1.32, 95% CI: [1.08–1.61] and OR_{other} 2.34, 95% CI: [1.37–3.99]) for emotional symptoms than children from traditional families. Children who were exposed to bullying had 3.82 (95% CI: [2.71–5.40]) fold higher odds for emotional symptoms than children who were not. When more than 10% of children in a class reported negatively on classroom climate, odds for emotional symptoms were higher (OR 1.29, 95% CI: [0.99–1.69]) than if no-one reports this. If three or more children in a class were exposed to bullying there was increased odds for emotional symptoms (OR 1.28, 95% CI: [1.03–1.60]).

No significant cross-level interactions between classroom climate and sex and OSC respectively existed.

Significant variations at school and classroom levels: ICC_{school} = 0.5% and ICC_{class} = 3.6% existed. Most variation in emotional symptoms was ascribed to the individual level, i.e. composition of schoolchildren within schools. Some but not all variation at classroom level was accounted for by the independent variables in the final model (table 3).

### Discussion

Approximately 20% girls and 16% boys experienced at least one emotional symptom every day. In line with other studies, we found that girls and schoolchildren from single parent families and low OSC had the highest odds for emotional symptoms. Prevalence proportions varied substantially across schools; in some schools students reported a 4.5-fold higher prevalence than in other schools. The large between-school variations persisted within each age group. Most of the variation in emotional symptoms could be ascribed to composition of schoolchildren (sex, family type and OSC). Contextual factors were also associated with children’s emotional symptoms. Classroom climate was borderline significant. Although the associations did not reach statistical significance, the results suggest that being part of a negative classroom climate is associated with emotional symptoms. Sensitivity analyses supported the findings.

Girls might be more sensitive to a poor classroom climate and report relatively lower levels of subjective health in schools with higher problem behaviors. It is well established that high socio-economic groups perform better in a range of health outcomes, and we hypothesized that children from high OSC were more robust and resilient to poor classroom climate than children from lower OSC. This appeared not to be the case in this study as cross-level interactions between classroom climate and sex and OSC were statistically insignificant.

In total 4.1% of the variation in emotional symptoms can be ascribed to contextual conditions (3.6% between school-classes and 0.5% between schools). These rather small contextual-level differences are in line with previous studies and suggest that the main variation in emotional symptoms is due to differences between individuals. We may have underestimated the effect of the classroom and school level due our limited data at these levels. It is plausible that mental health promotion initiatives, social capital, the schools ethos etc. affect schoolchildren’s emotional symptoms but this was not measured in our study.

This study contribute to the insight into emotional health and how school and in particular classroom factors may contribute to future health promotion research. An interesting observation was that the measure of bullying exposure was closely related to emotional symptoms while the existence of anti-bullying policy at the school level was not. Lack of association between anti-bullying policies at schools and children’s emotional symptoms in this study may reflect that the existence of a policy is not the only crucial factor. Anti-bullying efforts need to be enforced and implemented successfully and thereby reduce bullying remarkably. This should also lead to a decline in emotional symptoms.

Due to our cross-sectional design, we are unable to make causal inferences. Social networks may have a beneficial effect on mental health outcomes but schoolchildren’s mental health may also influence social networks. It is likely that a negative classroom climate affects schoolchildren’s emotional symptoms but students...
with emotional symptoms may also influence the classroom climate. The longitudinal study by Somersalo et al. indicates that the most likely causality is the first.

In this study, selection bias may have occurred especially at the school level because only 53.7% of the initially selected schools participated. We lack sufficient socio-demographic information about declining schools, but the most common reason for non-participation was not related to the study population but to recent participation in another health survey. We may have underestimated the prevalence of emotional symptoms because of non-participation bias. Higher absence rates might also be found in school classes with poor classroom climate and high rates of bullying.

Data are self-reported which we consider a strength when studying schoolchildren’s emotional health. We are concerned with schoolchildren’s emotions, not teachers’ or parents’ perceptions of them. HBSC-SCL is a simple measure that may only capture fragments of the term emotional symptoms. Nevertheless, this measure has been tested in several other studies and showed to be both valid and reliable. We focused solely on the emotional items. Difficulty falling asleep is one of the symptoms measured in this study. It is not only an emotional symptom but can be an important predictor of later depression as demonstrated by Sivertsen et al. Bias in relation to the classroom climate might have occurred. We did not collect data at the classroom level, but used aggregated schoolchild-level data that might simply reflect an individual-level effect. The measure used though, reflects the schoolchildren’s observation of social relations in the classroom rather than individual emotions.

Finally, this study may be confounded by unmeasured factors as we lack information about potential determinants of emotional symptoms e.g. family dynamics and parenting style.

Implications for research and practice

It is important to understand the large sex differences and why being part of non-traditional families play a role in experiencing emotional symptoms. Exposure to bullying is another important factor both at the individual and the contextual level confirming that bullying prevention is still very important.

To plan successful mental health promoting interventions among schoolchildren, more information about what constitutes a positive and inclusive classroom climate is needed. This information could be obtained by field studies. Schoolchildren with emotional symptoms may have more negative perceptions of their lives and experiences. Collection and combination of teacher perceptions of school- and classroom climate would give a more nuanced picture.

Studies of the school environment should be extended to include school initiatives on emotional health and the enforcement thereof. Further, more objective measures of school climate i.e. structural factors like student-teacher ratio, teacher- turnover and -climate should be included. Developing longitudinal studies to investigate the complex processes around school context and emotional health during a longer time period would be beneficial. It seems that positive dimensions of mental health e.g. self-efficacy are socially patterned. More research on social inequality in emotional health and positive dimensions such as self-efficacy and whether it mediates the relationship between SES and emotional health is needed.

Conclusion

Substantial school variations in the prevalence of emotional symptoms exist. Significant predictors of emotional symptoms were being a girl, low OSC, single parent family, exposure to bullying, and high prevalence of bullying within the classroom. Most variation across schools was explained by individual-level factors, i.e. the composition of students. Psychosocial aspects of the classroom environment such as high bullying prevalence within the classroom also played a role, over and above the effect on the individual victim of bullying.

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Key points

- Most schoolchildren have good emotional health but a large minority report emotional symptoms
- There are substantial variations in emotional health across schools and classes, but little is known about why
- Determinants at the individual level (compositional factors) such as female sex, low social class, non-complete family, and exposure to bullying explained most of the variation in emotional symptoms.
- Factors at the classroom level and school level: negative classroom climate and large proportion exposed to bullying explained 4.1% of the variation in emotional symptoms.
- Efforts to reduce bullying and improve classroom climate are important elements in promotion of emotional health among schoolchildren.

References


30 www.dsm5.org. (accessed 8 April 2014)


33 Mairal R, Hesketh S, Skrondal A. *Emotional symptoms among adolescents* 649


