Depressive symptoms in adolescent pupils are heavily influenced by the school they go to. A study of 10th grade pupils in Oslo, Norway

Ole R Haavet1, Ingvild Dalen2, Jørund Straand1

Background: A school is generally acknowledged to be a key setting for promoting pupils’ health and well-being. This assumption forms the basis for the European Network of Health Promoting Schools, organised in 1991 by the World Health Organisation, the Council of Europe, and the European Commission. Their strategy was founded on a social model Organisation, the Council of Europe, and the European Commission. The aim of this study was to explore differences in the prevalence of depressive symptoms among adolescents attending different schools in order to explore the possibility that the social context may account for some of the variation. Depressive symptoms are associated with a number of negative life experiences, and cumulative adverse experiences may place young people at risk. In a study comparing two US schools that differed in their level of bullying and violence, for example, pupils at the high-prevalence school reported a higher incidence of symptoms of depression than did pupils at the low-prevalence school. More encouragingly, depressive symptoms may also be influenced by risk-reducing factors, thus enabling a positive school environment to reduce depression among adolescents. Knowledge about such differences may be relevant for planning local measures to promote good health in high-risk schools, for alerting parents, teaching staff, and health care workers. The aim of this study was to explore differences in the prevalence of depressed pupils in different public schools in Oslo, and to examine the relationships between depressive symptoms and two sets of risk factors individually and for each school.

Materials and methods

The data reported in this article constitute part of a youth study in the Greater Oslo Health Survey, a classroom survey conducted among 10th year pupils (15–16 years of age) at all Oslo schools in 2000 and 2001. The study was run by the Norwegian Institute of Public Health in collaboration with the University of Oslo and the Municipality of Oslo. Permission was received from the Norwegian Data Inspectorate and the Regional Committee for Research Ethics approved the study. Almost all Norwegian schools are public, run by the municipality, and recruiting pupils from the local geographical area. A limited number, however, are private religious or non-religious schools.

School authorities, school health employees, parents, and pupils were informed about the survey before its implementation, and parents could withdraw their children from participation. Trained field workers visited each classroom, explained the self-administered questionnaire, and gathered the completed forms. Blank questionnaires were left behind for absent pupils. Furthermore, a blank questionnaire and a stamped, addressed envelope were sent to the homes of pupils who did not respond. The questionnaire addressed negative life experiences, state of...
physical and mental health, health care utilization, and possible health promoting issues.

Depressive symptoms were defined as an average score of 10 items ≥1.85 [Hopkin's Symptom Check List-10 (HSCL-10) test; table 1]. A composite risk variable encompassing presence of negative factors (PNF) was created by summing four life events that were identified in previous reports18,19 as being associated with illness and health care utilization: pressure to succeed, exposure to bullying, violence, and sexual violation (table 1). The resulting composite variable was dichotomised, thereby defining anyone who had experienced at least two of the four risk factors as being at risk (positive PNF score). A second composite variable comprised by absence of positive factors (APF) created by three important factors related to less health care attendance and lower rates of illness,20 namely the value parents placed on the opinions of our respondents, educational aspirations, and self-reported physical activity (table 1).

The absence of one or more of these factors defined the respondent as being at risk (positive APF score). The cut-off points for PNF and APF, respectively, were chosen so that 15–30% of the pupils scored positive on each composite factor. Anyone lacking answers to one or more of the questions comprising a composite factor was registered as missing on this factor.

The data were analysed using mainly SPSS 12.0. Each gender was analysed separately. Confidence intervals for proportions were estimated using the normal approximation method. The proportion in different schools of pupils' positive score on the two risk factor variables and the HSCL-10 test were compared using Pearson’s chi-squared tests. Logistic regression modelling was performed, relating the odds of a positive HSCL-10 score to the PNF and APF scores, respectively.

The multilevel modelling was performed in MLwiN 1.10, where the estimation procedure was second order penalized quasi-likelihood restricted iterative generalized least squares.

Among the 8316 pupils attending 10th grade during 2000 (62 schools) and 2001 (60), 7329 (88%) filled in the questionnaire. Included in this study were 46 ordinary public schools with an average of 163 pupils (range 56–385), and with a total of 7505 pupils (3802 boys, 3684 girls, 19 with missing data regarding gender).

### Results

Missing data occurred through omissions on the HSCL-10 test (3.6%), PNF (5.6%), and APF (3.9%). Of the remaining pupils, 1248 tested HSCL-10 positive, 1048 had a positive PNF score, and 1756 had a positive APF score.

All over prevalence (95% CI) of symptoms of depression among the pupils was 9.3% (8.3–10.3) for boys and 26% (23.4–27.7) for girls (table 2). Corresponding proportions of boys and girls with a positive PNF score were 27.1 (25.4–29.6) and 23.1% (21.2–25.7), and with a positive APF score 13.1 (11.9–14.3) and 17.3% (16.2–20.2), respectively (table 2).

Within individual schools, the mean prevalence of pupils with symptoms of depression was 9.6% (range 0–19.0%) for boys and 25.6% (3.3–39.0%) for girls (table 3). The mean prevalence of positive PNF was 27.5 (12.3–45.5) and APF 13.7 (2.4–37.5), respectively, for boys and 23.4 (2.4–38.8) and 18.2 (4.3–37.5), respectively, for girls.

### Table 1 Specifications of the items addressed in the questionnaire

<table>
<thead>
<tr>
<th>Negative life experiences</th>
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<tbody>
<tr>
<td>About how many hours per week spent in physical activity (in sport/do physical exercise to an extent that you feel out of breath or sweat)?a</td>
<td></td>
</tr>
<tr>
<td>Highest education considered?b</td>
<td></td>
</tr>
<tr>
<td>Family values opinions?c</td>
<td></td>
</tr>
<tr>
<td>Positive risk-reducing factors</td>
<td></td>
</tr>
<tr>
<td>a: Dichotomised during data analysis: No/Yes, at times; Yes, often</td>
<td></td>
</tr>
<tr>
<td>b: Dichotomised during data analysis: Never/Sometimes; About once a week; Several times a week</td>
<td></td>
</tr>
<tr>
<td>c: Dichotomised during data analysis: Never/Yes, only by youth; Yes, only by adults; Yes, both youth and adults</td>
<td></td>
</tr>
<tr>
<td>d: No/Yes</td>
<td></td>
</tr>
<tr>
<td>e: Dichotomised during data analysis: 0 h/1–2; 2–3; etc.</td>
<td></td>
</tr>
<tr>
<td>f: Dichotomised during data analysis: University or regional college education of higher or intermediate level highest/Other</td>
<td></td>
</tr>
<tr>
<td>g: Dichotomised during data analysis: Completely; Partially agree/Completely disagree, Partly disagree</td>
<td></td>
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### Table 2 10th grade public school pupils (n = 7505)* in Oslo: prevalence (prev) of depressive symptoms†, PNF, and APF with 95% confidence intervals

<table>
<thead>
<tr>
<th></th>
<th>Boys (n = 3802)</th>
<th>Girls (n = 3684)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>(%)</td>
<td>(%)</td>
</tr>
<tr>
<td>HSCL-10</td>
<td>3163 9.3</td>
<td>3171 26.0</td>
</tr>
<tr>
<td>PNF</td>
<td>3131 27.1</td>
<td>3197 23.1</td>
</tr>
<tr>
<td>APF</td>
<td>3099 13.1</td>
<td>3108 17.3</td>
</tr>
</tbody>
</table>

* a: 19 with missing data regarding gender
b: Symptoms of depression defined as ≥1.85 on HSCL-10
c: PNF consisting of self-reported pressure to succeed, sexual violation, and exposure to bullying and violence
d: APF consisting of respondents' self-reported physical activity, educational aspirations, and family's value of their opinions

** Do schools influence depression?**
For girls, chi-squared tests showed significant variations in the prevalences of pupils with symptoms of depression by individual school (P = 0.03), and positive PNF (P ≤ 0.001) and APF (P ≤ 0.001) scores (table 3). For boys, the trend towards variation in symptoms of depression between different schools was not significant (P = 0.19), but the PNF and APF factors both varied significantly (P = 0.046 and 0.016).

Using logistic regression modelling, we found significant relationships between symptoms of depression and the risk factors for both genders (table 4). For boys, the odds ratio (95% CI) for PNF was 4.5 (3.5–5.8). The odds ratio for APF was 3.1 (2.3–4.4). For girls, corresponding figures were 3.5 (2.9–4.2) for PNF and 2.1 (1.7–2.6) for APF (table 4).

Subsequently, the corresponding multilevel logistic regression model was fitted, where both the constant and effects of PNF and APF were allowed to vary at school level. The results of this analysis were approximately identical to the ones found by the one-level analysis, both with respect to effect sizes and standard errors. None of the factor-effects were found to vary between the different public schools.

### Discussion

For female pupils, our data support that their school is independently associated with depressive symptoms, also when controlling for the positive and negative factors investigated. A similar tendency, however not significant, was observed for male pupils. The variation of pupils with symptoms of depression was associated with features of the pupils’ social context. For both genders, the positive and negative factors investigated had significant effects on the odds of a positive HSCL-10 score, and these relations seem to be consistent between schools. In some schools, more than one in three pupils had a positive HSCL-10 score, raising the question that the test used may in general be too sensitive, or that the cut-off point for a positive score should be gender-adjusted. However, the HSCL-10 test has been validated for 16- to 24-year-olds, and against the more comprehensive HSCL-25. Jones and Kafetios used the HSCL-25 to screen for mental health problems among 337 pupils 13–15 years of age in Bosnia. In a subsample (n = 40) comprised of high and low test scorers, their test results corresponded well with a qualitative assessment in slightly less than four out of five cases. Even if the HSCL-10 test is not validated in 15-year-olds in a comparable setting, it is nevertheless to be expected that a large proportion of the pupils with a positive HSCL-10 score do experience depressive symptoms to an extent that reduce their quality of life and school achievements.

The high-prevalence schools were contrasted by schools at the other end of the scale, where only 1 in 20 pupils had a positive HSCL-10 score. The school context plays a significant role in the lives of pupils, and it is likely that our findings are representative for 10th year pupils. Konu et al. have recently completed a study of students’ well-being, in which the school context was comprised by 56 independent variables. Our study utilized fewer factors, however, in its composite dichotomous variables, PNF and APF. One essential question is, therefore, whether the four factors representing PNF and the three factors representing APF actually characterize a considerable portion of the social context in each school. Even if the seven factors represent a significant proportion of the pupils’ potential risk factors for symptoms of depression, they obviously do not represent the total risk, which undoubtedly also should include factors like schoolwork stressors, friendship problems, pupils’ well-being in the classroom, curriculum, the nature of the school–community interface, parent–school collaborations, and none of which were included in the independent variables utilized in this study. However, the seven chosen traits are each significantly associated with symptoms of depression and can in some way be influenced by the school setting. Because the two sets of risk factors were strongly associated with the odds for symptoms of depression in each school, we believe that the two factors probably may be useful descriptors of the social context in a school. For all the three variables, symptoms of depression (HSCL-10), PNF, and APF, the prevalence fluctuations differed between boys and girls, because they experience the school context differently.

Adolescents can be an accurate source of health data, but the reliability of adolescent reporting is influenced by such question characteristics as sentence complexity and time frame. There were, however, few missing data in this study, suggesting that the pupils understood the questions, hence contributing to the reliability and internal validity of the study.

The high participation rate within the population of interest suggests that our findings are representative for 10th year pupils in Oslo public schools, and probably also for pupils in similar urban settings in Norway and comparable countries.

As this was a cross-sectional study, we cannot explore causal relationships between the depressive symptoms and the investigated risk factors. For example, we cannot exclude confounding factors like, e.g. disposition of the victims, elements of their life style, and other factors in their environment. Even though both household income of pupils’ families and the financial resources of a school have been related to depressive symptoms among adolescents in the US, educational level and socioeconomic status of the adolescents’ families only accounted for 1% of the variation in pupils’ general subjective well-being in...
Finland. The large variation in the prevalence of symptoms of depression in different Oslo schools could not be predicted by their geographical location according to well known socioeconomic differences. Possible explanations for this may be the relative social equity in Norway, and that the influence of peers in this period of life probably outweighs socioeconomic status.

Although the associations do not tell us if the risk factors preceded symptoms of depression, there is a suggestion of chronological order in the fact that the HSCL-10 test asked respondents to report their symptoms during the previous week while the risk-factor questions were related either to experiences during the previous year or to experiences not anchored in time. Kim et al. have showed that stressful life experiences and internalization of symptoms are mutually interrelated over time.

Although we did not analyse an exhaustive number of risk factors, the PNF and APF were significant factors influencing the pupils’ psychological status. Because symptoms of depression covaried so strongly with both PNF and APF, the HSCL-10 test may itself be an instrument for investigating features of the social context related to a school. However, not only these factors but also a range of different aspects need to be explored at the schools with high prevalences of pupils with symptoms of depression.

Knowledge about the prevalence of depressed pupils in a school may be a necessary prerequisite for effective involvement for school authorities and health workers. Ten years after the introduction of the European Network of Health Promoting Schools, the number of pupils with symptoms of depression varies greatly among Oslo schools. Among the high-prevalence schools there is a need to explore the possibilities of implementing local measures to promote good health. Alerting and educating school employees, health care workers and parents can obtain this. More research is needed to increase the knowledge about the impact of the context on adolescents’ mental health.

Acknowledgements

The data collection was conducted as part of the Oslo Health Study 2000–2001 in collaboration with the Norwegian Health Screening Service of Norway, now the Norwegian Institute of Public Health. This research was supported by the Fund for Quality Assurance of Primary Health Care by the Norwegian Medical Association.

Key points

- The aim was to explore differences in the prevalence of depressed pupils in schools and the relationships with two sets of risk factors.
- The proportion of pupils with depressive symptoms varies greatly among Oslo public schools.
- For female pupils, their school is associated with depressive symptoms, and for male there is found a difference in the proportion of pupils with depressive symptoms related to their geographical location.
- For both genders, the positive and negative factors investigated had significant effects on depressive symptoms consistent between schools.
- Ten years after the introduction of the European Network of Health Promoting Schools, there is still a need implementing measures to promote good health.

References


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