

RESEARCH ARTICLE

# Classroom Disorder and Internalizing Problems Among Swedish Adolescents: Changes Between 1988 and 2011

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## ABSTRACT

**BACKGROUND:** Internalizing problems have increased among Swedish adolescents. We examined whether classroom disorder was associated with internalizing problems and whether it explained the trends in internalizing problems. Furthermore, we examined whether school contextual factors were associated with internalizing problems and whether they moderated the association between classroom disorder and internalizing problems.

**METHODS:** We used repeated cross-sectional survey data (1988-2011) among all 15- to 16-year-old students in Värmland, Sweden (N = 9491 boys, N = 9313 girls). School-level factors were the proportions of students with a low/average socioeconomic or an immigration background.

**RESULTS:** Results from mixed effects models showed that classroom disorder was associated with internalizing problems across the years of investigation but did not explain the trends in internalizing problems. This association was moderated by the school-level proportion of students with a low/average socioeconomic background but not the school-level proportion of students with an immigration background.

**CONCLUSIONS:** Students who perceived their classroom to be disorderly more often also reported more internalizing problems. Future studies are necessary to investigate other potential school factors that may explain the trends in internalizing problems.

**Keywords:** classroom climate; internalizing problems; socioeconomic conditions; immigration background; adolescents; mental health.

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There has been an alarming increase in internalizing mental health problems in Swedish adolescents in the past 30 years, particularly among girls.<sup>1</sup> To explain this trend, research so far has focused mostly on national-level (eg, cross-country comparisons of labor market trends), municipality-level (eg, unemployment rates), and individual-level (eg, comparisons of trends across sexes) factors.<sup>2-4</sup> This study addresses a much less explored, but critical factor for adolescents - classroom disorder in schools.

Major changes have taken place in the Swedish school system in recent decades. The responsibility for schools was transferred to the local authorities in 1991, parents became eligible to choose their child's school, and in 1992, publicly funded independent schools were established.<sup>5</sup> Changes to the curriculum placed a greater emphasis on the student's individual role and responsibility in the learning process and formal grades were discontinued in the lower classes (mid-1990s).<sup>5</sup> Subsequent to these changes, a recent international

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report highlighted an increase in classroom disorder in Swedish schools during the 2000s among 15-year-olds.<sup>6</sup> Also, student disengagement, such as increased tardiness and decreased motivation, increased, particularly among adolescents with a lower socioeconomic or immigration background.<sup>6</sup>

During the last decades, projects have been initiated at the national as well as the regional and local levels in Sweden in order to improve the psychosocial environment in schools. In Värmland, the county where the data for this study were collected, as well as in other counties in Sweden, different programs were implemented aimed at improving the psychosocial school environment, including the classroom climate. The impacts of these interventions have not been evaluated using randomized and controlled study designs, but there are indications of positive impacts on the classroom climate.<sup>7</sup>

National reports suggested that Swedish schools may have become more segregated in the past few decades in terms of the socioeconomic and immigration backgrounds of students.<sup>8</sup> Furthermore, the performance gaps between socioeconomically advantaged and disadvantaged students and between students with and without an immigration background are growing.<sup>9</sup> Thus, equity between schools seems to be decreasing.

It has been hypothesized that “impaired education” and “deficient working environments” in schools could be associated with the increase in internalizing problems among adolescents.<sup>10</sup> However, the hypothesis remains largely unexplored. In this study, we examined whether classroom disorder could explain the observed trends in adolescents’ internalizing problems in the past few decades. Classroom disorder is one aspect of classroom climate, a pertinent school-related factor associated with adolescents’ internalizing problems.<sup>11</sup> Research showed that social,<sup>12,13</sup> learning,<sup>14,15</sup> and environmental<sup>16</sup> aspects of classroom climate were associated with internalizing problems.

Considering the evidence for an association between classroom climate and internalizing problems, classroom climate may contribute to explaining the trends in internalizing problems. In a few previous studies, although various aspects of classroom climate were associated with internalizing problems, school disengagement, performance worry,<sup>17,18</sup> school demands and relationships with teachers and peers<sup>19</sup> did not explain the trends in internalizing problems over time. In Sweden, using the same dataset as in this study, parallel findings for too high teacher demands were observed.<sup>15</sup> It has not yet been examined whether environmental aspects such as classroom disorder explain the trends in internalizing problems.

Decreasing equity and diversity in Swedish classrooms may also be associated with adolescents’

internalizing problems. Because schools with lower socioeconomic conditions and higher proportions of students with an immigration background may have fewer resources,<sup>20</sup> lower-quality teachers,<sup>21</sup> and the demands on teachers may be greater,<sup>22</sup> these factors also may be associated with classroom disorder,<sup>23</sup> and therefore, may moderate the association between classroom disorder and internalizing problems.

In this study, we examined school-related factors, specifically, individual-level perceived classroom disorder (1), and school-level proportion of students with a low/average socioeconomic (2), and immigration (3) background in relation to internalizing problems. First we examined whether these factors were associated with internalizing problems, and secondly whether they explained the trends in internalizing problems. Thirdly, we examined whether the school-level factors moderated the association between classroom disorder and internalizing problems. We hypothesized that more frequent classroom disorder and higher proportions of students with a low/average socioeconomic or immigration background at school would be positively associated with internalizing problems, and that each of these factors would affect the trends in internalizing problems. Furthermore, we hypothesized that the association between classroom disorder and internalizing problems would be stronger in schools with higher proportions of students with a low/average socioeconomic or immigration background.

## METHODS

### Participants

Participants were adolescents who took part in the Young in Värmland study, a repeated cross-sectional survey study that took place 8 times between 1988 and 2011 in the county of Värmland in Sweden. During the spring semester of each year of investigation, a questionnaire was given to all students in the ninth grade of compulsory education (aged 15-16 years). Across all years, 23,167 adolescents from 42 schools in 16 municipalities participated in the study. In 1995, 2 of the municipalities did not participate; therefore, data from the 7 schools in these municipalities were excluded from the entire analysis. Data from 6 additional schools were excluded because data were not available for all time points. Data from 1 additional school were excluded because school-level data on proportion of students with an immigration background were not available for most time points. Adolescents were included in the final sample for the current study if data were available on internalizing problems (123 had missing data), classroom disorder (77 had missing data), and sex (140 had missing data). The final samples for this study consisted of 9491 boys and 9313 girls from 29 schools.

## Procedure

School personnel handed paper-and-pencil questionnaires to the students. Before the data collection, the parents of all eligible participants were informed of the study. Participation was voluntary. Students completed the questionnaire anonymously in the classroom and returned it to the school personnel in a sealed envelope.

## Instrumentation

**Internalizing problems.** We used the Psychosomatic Problems scale to measure internalizing problems. Adolescents were asked how frequently during the school year they experienced 8 psychosomatic symptoms (eg, difficulty concentrating, headaches). Answers were given on a 5-point Likert scale (never to always) and summed to a total scale. A few items were resolved for differential item functioning across sexes following Rasch psychometric analyses.<sup>24</sup> The non-linear raw scores were transformed to a linear scale on which each person has a location (logit) value. Higher values on the logit scale indicated a greater degree of internalizing problems. The scale has previously been examined using Young in Värmland data and shown to be reliable and to work invariantly across the years of investigation.<sup>24</sup>

**Classroom disorder.** The questionnaire contained a number of statements following the question: "What characterizes the school work in your class?" One of these statements was: "The school work is characterized by that it is disorderly in the classroom." Answers were given on a 5-point Likert scale. We collapsed the answers into 3 categories: *never* or *seldom*, *sometimes*, and *often* or *always*.

**School-level factors.** School-level proportion of students with a low/average socioeconomic background was indicated by parent education levels, or the proportion of students whose parent(s) had completed less than 2 years of higher education. The proportion of students with an immigration background was indicated by the proportion of students whose parent(s) or they themselves had been born outside of Sweden. These variables were based on individual-level national registry data and aggregated to the school level for the years in which the Young in Värmland study took place. School-level data were not always available for the same years as the Young in Värmland data were collected. In these cases, we used the data from either the previous year or following year (15 cases).

## Data Analysis

We conducted a series of multilevel linear regression models with individuals at level 1, nested in years of investigation at level 2, nested in schools at level 3, for boys and girls separately. We

tested successive models and compared each with the previous using likelihood ratio tests (LRT). First, we estimated null models including only the outcome variable of internalizing problems and random intercepts at the second and third levels (Model 0). Next, we estimated models that included dummy variables for each year of investigation, with 1988 as the reference year (Model 1). These models served as references regarding the trends in internalizing problems: we compared the coefficients for each year of investigation in these and successive models that included additional variables in order to assess whether the additional variables explained the trends in internalizing problems. We then added the main effect of classroom disorder (Model 2). Next, we examined whether adding random slope terms for classroom disorder at the second and third levels significantly improved model fit. We then included the main effects for school-level proportions of students with a low/average socioeconomic (Model 3) and immigration (Model 5) background. We partitioned each of these variables into a regional component (indicating the differences between schools) and a longitudinal component (indicating the differences over time, or between years of investigation).<sup>25</sup> In Models 4 and 6, we included cross-level interaction terms between classroom disorder and school-level proportions of students with a low/average socioeconomic and immigration background. We specified all models using maximum likelihood estimations in Stata version 14.<sup>26</sup>

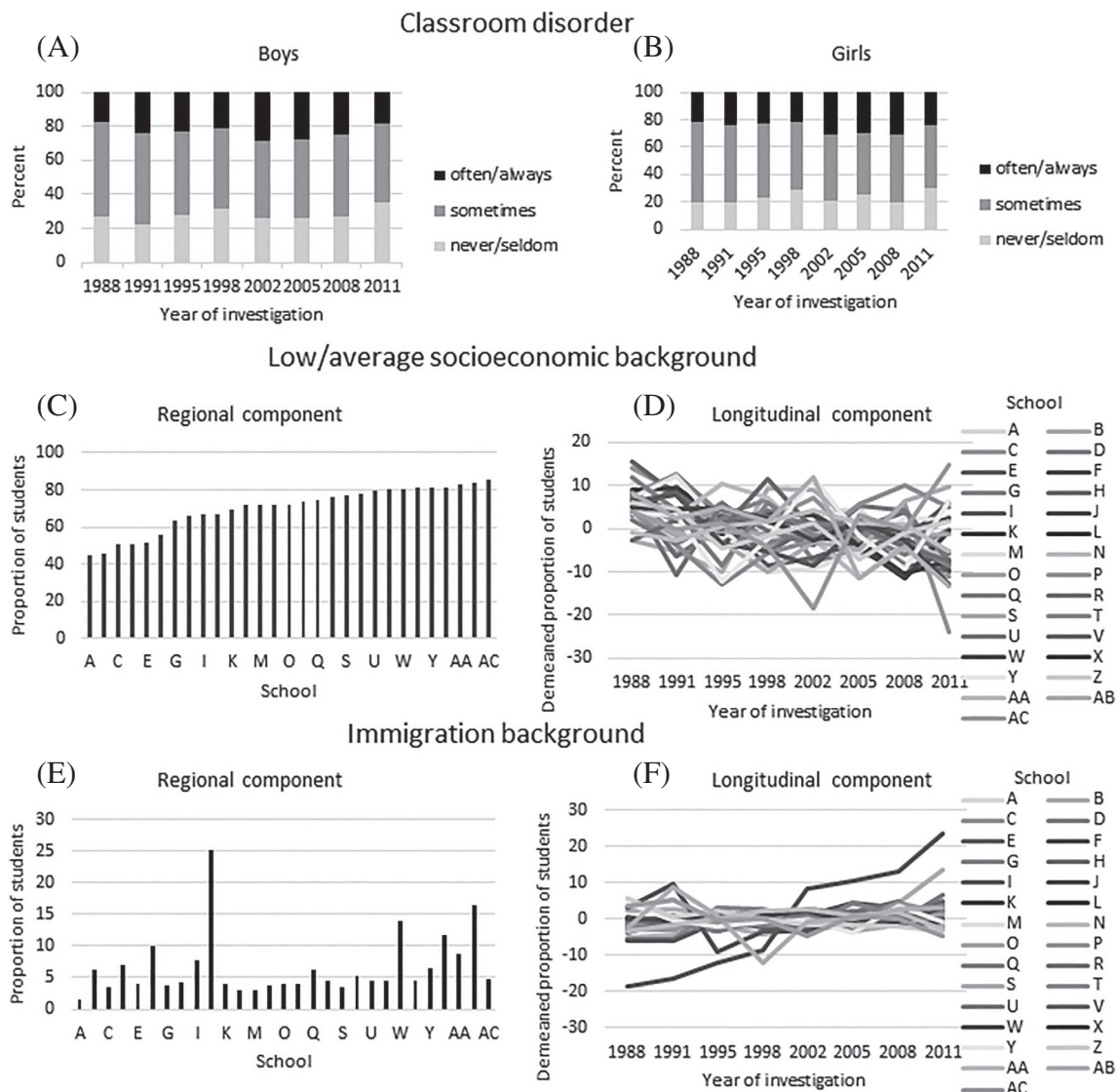
## RESULTS

We calculated descriptive statistics of classroom disorder and the regional and longitudinal components of school-level proportions of students with a low/average socioeconomic and immigration background (Figure 1). The intraclass correlations for year and school were 0.012 and 0.000, respectively, in boys and 0.028 and 0.005, respectively in girls (based on the null models). Tables 1 and 2 show the statistics for all models in boys and girls, respectively. In boys, the mean values of internalizing problems did not change during the years of investigation (Table 1, Model 1). In girls, compared to 1988, internalizing problems were higher at each year of investigation from 1998 through 2011 (Table 2, Model 1).

### Classroom Disorder

Classroom disorder was positively associated with internalizing problems in boys and girls, and including this term in Model 2 improved the fit significantly. Adolescents who perceived their classroom to be more disorderly reported more internalizing problems. In boys and girls, adjusting for classroom disorder

Figure 1. Descriptive Statistics for Classroom Disorder at Each Year of the Investigation in Boys (A) and Girls (B), and the Regional (C and E) and Longitudinal (D and F) Components of School-Level Proportion of Students With a Low/Average Socioeconomic (C and D) and Immigration (E and F) Background



resulted in slightly lower estimates of internalizing problems between 2002 and 2008 but the differences are minimal. This indicates that classroom disorder did not account for the trends in internalizing problems over time. Figure 2 illustrates these effects. Next, we tested whether including random slopes for classroom disorder improved model fit. This was the case for this effect at the second level in girls only.

### Low/Average Socioeconomic Background

The regional component (ie, differences between schools) of the school-level proportion of students with a low/average socioeconomic background was significantly associated with boys' internalizing problems

(Model 3). Boys reported more internalizing problems when they attended schools with a higher proportion of students with a low/average socioeconomic background. The longitudinal component (ie, differences over time) was not associated with internalizing problems. In girls, the regional and longitudinal components of low/average socioeconomic background were not significantly associated with internalizing problems.

The interaction between the regional component of proportion of students with a low/average socioeconomic background and classroom disorder was not statistically significant (Model 4 and Figure 3A,C) neither in boys nor in girls. The interaction between classroom disorder and the longitudinal component of



Table 1. Regression Model Statistics Predicting Internalizing Problems in Boys

	Model 0	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	B (SE) [95% CI]	B (SE) [95% CI]	B (SE) [95% CI]	B (SE) [95% CI]	B (SE) [95% CI]	B (SE) [95% CI]	B (SE) [95% CI]
Fixed effects							
Intercept	-1.13 (.02) [-1.16; -1.10]	-1.15 (0.04) [-1.23; -1.07]	-1.35 (0.04) [-1.44; -1.26]	-1.56 (0.10) [-1.75; -1.36]	-1.50 (0.15) [-1.80; -1.20]	-1.35 (0.05) [-1.45; -1.25]	-1.35 (0.06) [-1.46; -1.24]
Year							
1991		-0.03 (0.06) [-0.14; 0.09]	-0.06 (0.06) [-0.17; 0.05]	-0.06 (0.06) [-0.17; 0.06]	-0.05 (0.06) [-0.17; 0.06]	-0.06 (0.06) [-0.17; 0.05]	-0.06 (0.06) [-0.17; 0.05]
1995		-0.02 (0.06) [-0.13; 0.10]	-0.03 (0.06) [-0.15; 0.08]	-0.03 (0.06) [-0.14; 0.09]	-0.03 (0.06) [-0.14; 0.09]	-0.03 (0.06) [-0.15; 0.08]	-0.03 (0.06) [-0.14; 0.08]
1998		0.04 (0.06) [-0.08; 0.16]	0.04 (0.06) [-0.08; 0.15]	0.04 (0.06) [-0.08; 0.16]	0.04 (0.06) [-0.08; 0.16]	0.04 (0.06) [-0.08; 0.15]	0.04 (0.06) [-0.08; 0.15]
2002		0.01 (0.06) [-0.11; 0.12]	-0.04 (0.06) [-0.15; 0.08]	-0.03 (0.06) [-0.15; 0.09]	-0.03 (0.06) [-0.15; 0.09]	-0.03 (0.06) [-0.15; 0.08]	-0.04 (0.06) [-0.15; 0.08]
2005		0.05 (0.06) [-0.07; 0.16]	0.01 (0.06) [-0.10; 0.12]	0.02 (0.06) [-0.10; 0.14]	0.02 (0.06) [-0.10; 0.14]	0.01 (0.06) [-0.11; 0.12]	0.01 (0.06) [-0.11; 0.12]
2008		0.07 (0.06) [-0.05; 0.18]	0.04 (0.06) [-0.08; 0.15]	0.05 (0.06) [-0.08; 0.17]	0.05 (0.06) [-0.08; 0.17]	0.04 (0.06) [-0.08; 0.15]	0.04 (0.06) [-0.08; 0.15]
2011		-0.00 (0.06) [-0.12; 0.12]	0.01 (0.06) [-0.11; 0.13]	0.03 (0.07) [-0.11; 0.16]	0.03 (0.07) [-0.10; 0.16]	0.01 (0.06) [-0.11; 0.13]	0.01 (0.06) [-0.11; 0.13]
Classroom disorder							
Sometimes			<b>0.19 (0.03)</b> [0.14; 0.25]	<b>0.19 (0.03)</b> [0.14; 0.25]	0.14 (0.18) [-0.20; 0.49]	<b>0.19 (0.03)</b> [0.14; 0.25]	<b>0.22 (0.05)</b> [0.13; 0.31]
Always			<b>0.56 (0.03)</b> [0.49; 0.62]	<b>0.56 (0.03)</b> [0.49; 0.62]	0.44 (0.27) [0.03; 0.85]	<b>0.56 (0.03)</b> [0.49; 0.62]	<b>0.50 (0.06)</b> [0.39; 0.61]
LSB regional			<i>0.00 (0.00)*</i> [0.00; 0.01]	<i>0.00 (0.00)*</i> [0.00; 0.01]	0.00 (0.00) [-0.00; 0.01]		
LSB longitudinal			0.00 (0.00) [-0.00; 0.01]	0.00 (0.00) [-0.00; 0.01]	0.01 (0.00) [0.00; 0.02]		
CD x LSB regional							
Sometimes					0.00 (0.00) [-0.00; 0.01]		
Always					0.00 (0.00) [-0.00; 0.01]		
CD x LSB longitudinal							
Sometimes					-0.01 (0.00) [-0.02; -0.00]		
Always					-0.01 (0.01) [-0.03; -0.00]		
IB regional					0.00 (0.00) [-0.00; 0.01]		
IB longitudinal					0.00 (0.00) [-0.00; 0.01]		
CD x IB regional							
Sometimes							
Always							
CD x IB longitudinal							
Sometimes							
Always							
Random effects							
Year							
Intercept	0.02 (0.00) [0.01; 0.03]	0.02 (0.00) [0.01; 0.03]	0.01 (0.00) [0.01; 0.03]	0.01 (0.00) [0.01; 0.02]	0.01 (0.00) [0.01; 0.03]	0.01 (0.00) [0.01; 0.03]	0.01 (0.00) [0.01; 0.03]
School							
Intercept	0.00 (0.00) [0.00; 0.00]	0.00 (0.00) [0.00; 0.00]	0.00 (0.00) [0.00; 0.00]	0.00 (0.00) [0.00; 0.00]	0.00 (0.00) [0.00; 0.00]	0.00 (0.00) [0.00; 0.00]	0.00 (0.00) [0.00; 0.00]
LRT test							
$\chi^2$		421	<b>267.50</b>	5.13	7.10	0.04	5.73
df		7	2	2	4	2	4
Compared to		Model 0	Model 1	Model 2	Model 3	Model 2	Model 5

Bold values indicate:  $p < .001$ ; italic values indicate:  $p < .05$ .  
 Est, estimate; CD, classroom disorder; LSB, low/average socioeconomic background; IB, immigration background; LRT, log likelihood ratio test.  
 All years of investigation were entered as dummy variables, with the year 1988 as the reference year.  $N_1 = 949$ ;  $N_2 = 232$ ;  $N_3 = 29$ .  
 \* More exact coefficients: Est = 0.0029, SE = 0.0013,  $p = .024$ , 95% CI = 0.0004; 0.0053.

Table 2. Regression Model Statistics Predicting Internalizing Problems in Girls

	Model 0	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	B (SE) [95% CI]	B (SE) [95% CI]	B (SE) [95% CI]	B (SE) [95% CI]	B (SE) [95% CI]	B (SE) [95% CI]	B (SE) [95% CI]
Fixed effects							
Intercept	<b>-0.57 (0.02)</b> [-0.62; -0.53]	<b>-0.72 (0.04)</b> [-0.80; -0.64]	<b>-0.98 (0.05)</b> [-1.07; -0.90]	<b>-1.15 (0.12)</b> [-1.38; -0.93]	<b>-1.20 (0.17)</b> [-1.53; -0.87]	<b>-1.00 (0.05)</b> [-1.11; -0.90]	<b>-1.02 (0.06)</b> [-1.13; -0.90]
Year							
1991	-0.01 (0.05) [-0.11; 0.09]	-0.02 (0.05) [-0.13; 0.08]	-0.00 (0.06) [-0.11; 0.11]	-0.00 (0.06) [-0.11; 0.11]	-0.00 (0.05) [-0.11; 0.11]	-0.02 (0.05) [-0.13; 0.09]	-0.02 (0.05) [-0.13; 0.09]
1995	0.07 (0.05) [-0.04; 0.18]	0.07 (0.05) [-0.04; 0.18]	0.10 (0.06) [-0.01; 0.21]	0.10 (0.06) [-0.01; 0.21]	0.10 (0.06) [-0.01; 0.21]	0.07 (0.06) [-0.03; 0.18]	0.08 (0.06) [-0.03; 0.18]
1998	<i>0.11 (0.05)</i> [0.00; 0.21]	<i>0.13 (0.05)</i> [0.02; 0.23]	<i>0.16 (0.06)</i> [0.04; 0.27]	<i>0.16 (0.06)</i> [0.04; 0.27]	<i>0.15 (0.06)</i> [0.04; 0.26]	<i>0.13 (0.05)</i> [0.02; 0.23]	<i>0.13 (0.05)</i> [0.02; 0.24]
2002	<b>0.19 (0.05)</b> [0.09; 0.30]	<i>0.16 (0.05)</i> [0.05; 0.27]	<i>0.19 (0.06)</i> [0.08; 0.30]	<i>0.19 (0.06)</i> [0.08; 0.30]	<i>0.19 (0.06)</i> [0.08; 0.30]	<i>0.16 (0.06)</i> [0.05; 0.27]	<i>0.16 (0.06)</i> [0.05; 0.27]
2005	<b>0.31 (0.05)</b> [0.21; 0.41]	<b>0.29 (0.05)</b> [0.18; 0.39]	<b>0.33 (0.06)</b> [0.21; 0.44]	<b>0.33 (0.06)</b> [0.21; 0.44]	<b>0.33 (0.06)</b> [0.21; 0.44]	<b>0.29 (0.05)</b> [0.18; 0.39]	<b>0.29 (0.05)</b> [0.18; 0.39]
2008	<b>0.29 (0.05)</b> [0.18; 0.39]	<b>0.25 (0.05)</b> [0.15; 0.36]	<b>0.30 (0.06)</b> [0.18; 0.42]	<b>0.30 (0.06)</b> [0.18; 0.42]	<b>0.30 (0.06)</b> [0.18; 0.41]	<b>0.25 (0.06)</b> [0.14; 0.36]	<b>0.25 (0.06)</b> [0.14; 0.36]
2011	<i>0.19 (0.05)</i> [0.08; 0.29]	<b>0.20 (0.06)</b> [0.09; 0.31]	<b>0.25 (0.06)</b> [0.13; 0.38]	<b>0.25 (0.06)</b> [0.13; 0.38]	<b>0.26 (0.06)</b> [0.14; 0.38]	<i>0.20 (0.06)</i> [0.08; 0.31]	<i>0.20 (0.06)</i> [0.08; 0.31]
Classroom disorder							
Sometimes		<b>0.24 (0.03)</b> [0.18; 0.29]	<b>0.24 (0.03)</b> [0.18; 0.30]	<b>0.24 (0.03)</b> [0.18; 0.30]	0.33 (0.18) [-0.01; 0.68]	<b>0.24 (0.03)</b> [0.18; 0.30]	<b>0.24 (0.05)</b> [0.14; 0.33]
Always		<b>0.59 (0.03)</b> [0.53; 0.66]	<b>0.59 (0.03)</b> [0.52; 0.66]	<b>0.59 (0.03)</b> [0.52; 0.66]	<i>0.60 (0.21)</i> [0.20; 1.00]	<b>0.59 (0.03)</b> [0.53; 0.66]	<b>0.64 (0.06)</b> [0.53; 0.75]
LSB regional			<i>0.00 (0.00)*</i> [-0.00; 0.00]	<i>0.00 (0.00)*</i> [-0.00; 0.00]	0.00 (0.00) [-0.00; 0.01]		
LSB longitudinal			0.00 (0.00) [-0.00; 0.01]	0.00 (0.00) [-0.00; 0.01]	<i>0.01 (0.00)</i> [0.00; 0.02]		
CD x LSB regional							
Sometimes							
Always							
CD x LSB longitudinal							
Sometimes							
Always							
IB regional							
IB longitudinal							
CD x IB regional							
Sometimes							
Always							
CD x IB longitudinal							
Sometimes							
Always							
Random effects							
Year							
Intercept	0.03 (0.01) [0.02; 0.04]	0.01 (0.00) [0.01; 0.02]	0.01 (0.00) [0.01; 0.03]	0.01 (0.00) [0.00; 0.03]	0.01 (0.00) [0.00; 0.03]	0.01 (0.01) [0.00; 0.03]	0.01 (0.01) [0.00; 0.03]
Slope							
School							
Intercept	0.00 (0.00) [0.00; 0.02]	0.01 (0.00) [0.00; 0.02]	0.00 (0.00) [0.00; 0.01]	0.00 (0.00) [0.00; 0.01]	0.00 (0.00) [0.00; 0.01]	0.00 (0.00) [0.00; 0.01]	0.00 (0.00) [0.00; 0.01]
Likelihood-ratio test							
$\chi^2$		<b>59.77</b>	<b>345.91</b>	4.35	7.17	0.93	1.90
df		7	2	2	4	2	4
Compared to		Model 0	Model 1	Model 2	Model 3	Model 2	Model 4

Bold values indicate:  $p < .001$ ; italic values indicate:  $p < .05$ .  
 CD, classroom disorder; IB, immigration background; LRT, log likelihood ratio test; LSB, low/average socioeconomic background.  
 All years of investigation were entered as dummy variables, with the year 1988 as the reference year.  $N_1 = 9313$ ;  $N_2 = 232$ ;  $N_3 = 29$ .

Figure 2. Coefficients for Internalizing Problems Unadjusted and Adjusted for Classroom Disorder in Boys (A) and Girls (B)

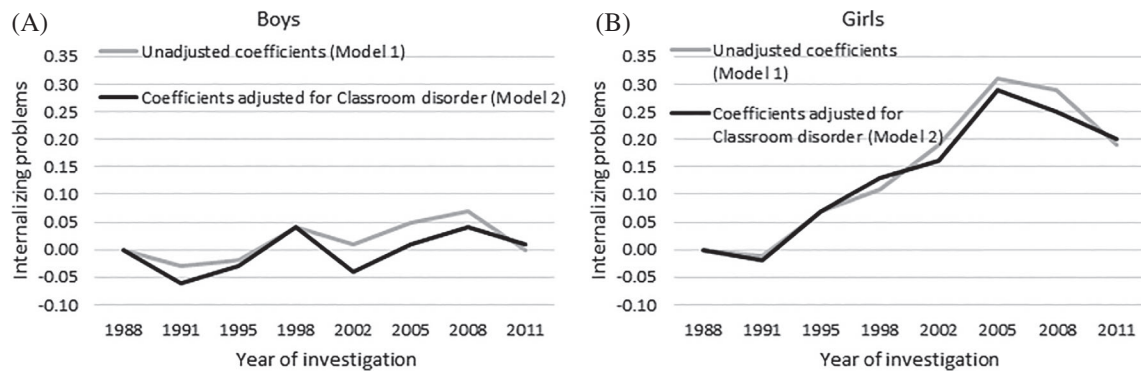
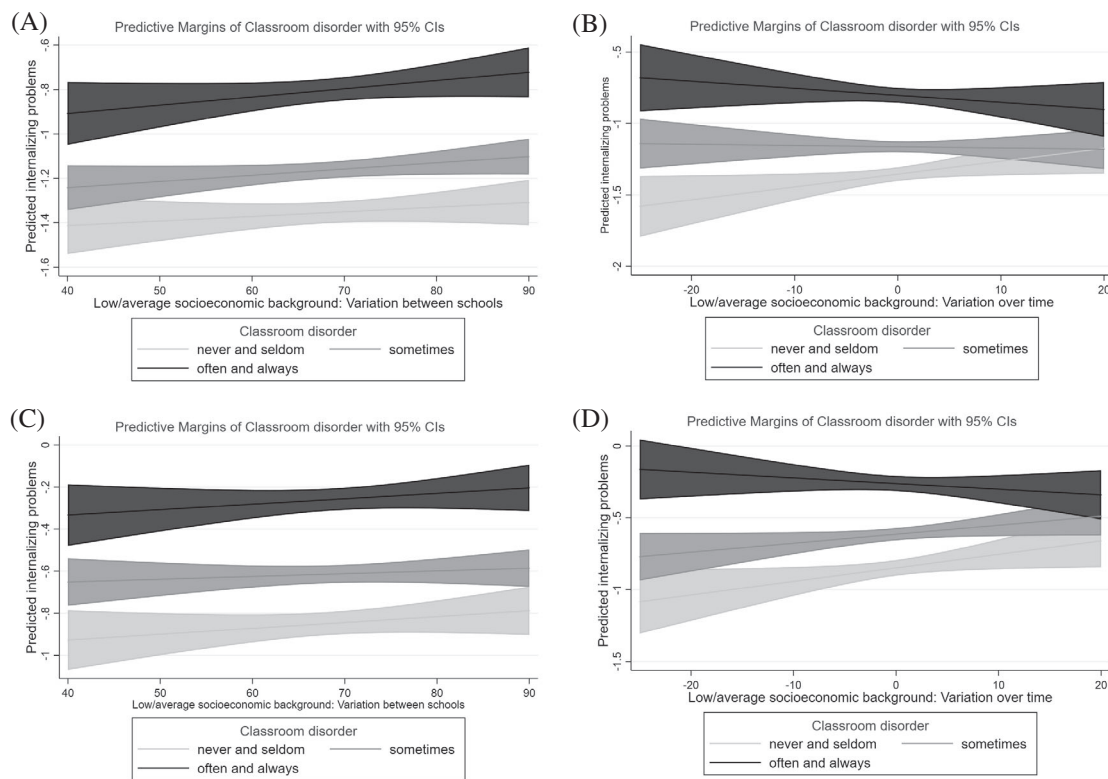


Figure 3. Interaction Between Classroom Disorder and the Regional Component (Variation Between Schools: (A and C) and the Longitudinal Component (Variation Over Time: B and D) of Proportion of Students with a Low/Average Socioeconomic Background Predicting Internalizing Problems in Boys (A and B) and Girls (C and D)



school-level proportion of students with a low/average socioeconomic background (ie, variation over time) was statistically significant in both boys and girls (Model 4 and Figure 3B,D). During the years of investigation in which the school-level proportion of students with a low/average socioeconomic background was higher, there were minimal differences in internalizing problems between adolescents who reported their classroom to be never/seldom, sometimes, or

often/always disorderly. During the years of investigation in which the proportion of students with a low/average socioeconomic background was lower, adolescents who reported their classroom to be disorderly more often reported more internalizing problems compared to adolescents who reported their classroom to be never/seldom disorderly. In girls, the effect was only significant between students reporting their classroom to be often/always and never/seldom disorderly.

## Immigration Background

In boys and girls, the school-level proportion of students with an immigration background was not significantly associated with internalizing problems (Model 5). Furthermore, the interactions between classroom disorder and the regional and longitudinal components of proportion of students with an immigration background were not statistically significant (Model 6).

## DISCUSSION

Given that a recent report highlighted increasing classroom disorder among adolescents,<sup>6</sup> our first purpose was to examine whether classroom disorder was associated with internalizing problems. We provided evidence for this association among both boys and girls, adding to the accumulating evidence that social,<sup>13</sup> learning,<sup>14</sup> and environmental<sup>16</sup> aspects of classroom climate seem to be associated with adolescents' internalizing problems.

Considering the association between classroom climate and internalizing problems, we hypothesized that classroom climate would explain the trends in internalizing problems that have been observed over the past few decades among adolescents.<sup>2</sup> A few earlier studies showed that classroom social relationships<sup>19</sup> and teacher demands<sup>15</sup> did not explain the increase in internalizing problems. Our study was the first to examine whether classroom disorder explained these trends. Comparing the coefficients for year of investigation between models that were unadjusted and adjusted for classroom disorder indicated that classroom disorder did not account for the trends in internalizing problems, similar to the previous findings. Thus, although there is robust evidence that different aspects of classroom climate are associated with adolescents' internalizing problems, so far there has been no evidence that classroom climate explains the observed trends in internalizing problems.

A number of structural changes took place in the Swedish school system in the early 1990s, which may have contributed to a loss of equity and diversity between schools<sup>8</sup> and may be associated with classroom disorder.<sup>23</sup> In our study, we investigated whether the school-level proportions of students with a low/average socioeconomic and immigration background were associated with internalizing problems. We observed that boys, but not girls, who attended schools with a higher proportion of students with a low/average socioeconomic background reported more internalizing problems. We did not find evidence for main effects of the longitudinal component of school socioeconomic conditions or either component of the proportion of students with an immigration background on internalizing problems. This is partly in line with an earlier study in Sweden which found

that school-level parent education levels were not associated with adolescents' internalizing problems,<sup>27</sup> although we did see some indications of this effect in boys. In that study, an association between school-level proportion of students with an immigration background and internalizing problems was observed,<sup>27</sup> in contrast to our findings. This discrepancy in findings may be due to the proportions of students with an immigration background in the schools under study, which was higher on average in the previous study than in ours. In the schools included in our study between 1988 and 2011, the proportions of students with an immigration background may have been too low to affect students' rates of internalizing problems.

Interestingly, the longitudinal component of school-level proportion of students with a low/average socioeconomic background moderated the association between individual-level classroom disorder and internalizing problems in both boys and girls in our study. The effect of classroom disorder on internalizing problems was minimal during the years of investigation when school socioeconomic conditions were lower. However, during years of investigation when school socioeconomic conditions were higher, classroom disorder was strongly associated with internalizing problems such that students who reported that their classroom was disorderly more often also reported more internalizing problems. Thus, the effect of classroom climate on internalizing problems was particularly influential during years of investigation when school-level socioeconomic conditions were higher. From the descriptive plot of the longitudinal component of school socioeconomic conditions (Figure 1D) it is clear that the proportion of students with a low/average socioeconomic background became lower over time in most schools. Hence, the effect of school-level socioeconomic conditions had a greater impact on adolescents' internalizing problems during the later years of our study period. An implication of the gradual increase in parent education levels over time may be that the construct of lower socioeconomic conditions had become more selective. Therefore, the effects of school risk factors seem to have become stronger over time among this subgroup of adolescents with lower socioeconomic conditions.

This study was executed in one county in Sweden; therefore, some of the results may not be directly generalizable to the whole of Sweden or to other countries. Whereas the current study indicates an improvement of the classroom climate at the end of the study period, possibly driven by the above-mentioned programs implemented in Värmland,<sup>7</sup> nationwide data indicates an opposite change.<sup>28</sup> However, the long-term trend of increasing internalizing problems seem to be characteristic of Sweden in general.<sup>8,29</sup> Furthermore, the increasing trend in internalizing problems has been observed in many North American



and European countries in the past decades.<sup>30</sup> Similarly, studies from various countries provided evidence for an association between different aspects of classroom climate and internalizing problems.<sup>13,31</sup> Accordingly, our results do seem to fit in with the general international trends in classroom climate and internalizing problems.

### Limitations

Our study requires consideration in the following context. First, the data were from a repeated cross-sectional survey study; therefore, the associations are cross-sectional and it is not possible to determine causality at the individual level. Second, it is important to keep in mind that we assessed classroom disorder as perceived by adolescents, which was most relevant to our research questions as it has been suggested that adolescents' perceptions matter most regarding issues related to their mental health.<sup>31</sup> However, students and teachers may differ in their perceptions of the classroom climate.<sup>32</sup>

### Conclusions

The findings from our study indicated that adolescents who perceived their classroom to be more disorderly reported more internalizing problem between 1988 and 2011. This was particularly so during the later years of investigation when school socioeconomic conditions were higher. Furthermore, boys but not girls who attended schools with lower socioeconomic conditions reported more internalizing problems. The school-level proportion of students with an immigration background was not associated with internalizing problems and did not moderate the association between classroom disorder and internalizing problems. One should interpret these results given municipality policies aiming to allocate more resources to schools with lower socioeconomic conditions and higher proportion of students with an immigration background. Although classroom disorder was associated with internalizing problems among adolescents, it did not explain the trends in internalizing problems. Future studies are necessary to investigate other potential school factors that may explain the trends in internalizing problems.

### IMPLICATIONS FOR SCHOOL HEALTH

Our findings contribute to the growing evidence that classroom climate is strongly associated with adolescents' mental health,<sup>11</sup> and demonstrated the importance of classroom disorder in particular. Therefore, schools and teachers should make an effort to decrease disorderliness in classrooms. Supported by the school, teachers could do this by, for example:

- ensuring that student tardiness is kept to a minimum;
- ensuring that the noise level in the classroom is not excessive;
- maintaining structure in the classroom, in terms of both the physical environment and the learning content;
- using positive discipline techniques, setting clear rules and fostering students' self-discipline;<sup>33</sup>
- focusing on teacher-student and student-student relationships;<sup>34</sup>
- using social problem solving coping styles to support their classroom management techniques.<sup>35</sup>

Whereas classroom climate has previously been linked to academic success,<sup>6</sup> our study highlights that it is also important for students' mental health. In addition, our findings indicate that improvements to classroom climate may be most beneficial in schools with decreasing proportions of students from a low socioeconomic background. Given the growing gap in socioeconomic conditions between schools in Sweden<sup>6</sup> as well as the United States,<sup>36</sup> we expect the effect of classroom disorder on adolescents' mental health to heighten. Therefore, we also suggest that municipality- and national-level education authorities regard between-school equality as a priority in the education system.

### Human Subjects Approval Statement

We carried out data collection in accordance with the research ethics principles in humanistic-social science research stipulated by the Swedish Research Council. In addition, a local Ethics Committee at Karlstad University reviewed the principles guiding the data collection from 2005 onwards.

### Conflict of Interest

The authors declare no conflicts of interest.

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