

Psychosocial factors and indoor environmental quality in respiratory symptom reports of pupils: A cross-sectional study in Finnish schools

Supplementary Materials

- Supplementary Table 1. Number of participants in the questionnaire survey (the response rate shown in brackets).
- Supplementary Table 2. The dose-response associations between pupil- and parent-reported worry about IEQ and respiratory symptoms reported in general. Odds ratios (95% CI) are reported.
- Supplementary Table 3. Estimated odds ratios (95% confidence intervals) for respiratory symptoms reported by parents of primary school pupils from the combined sample of parent-primary school pupil pairs. The analyses were conducted in imputed sample (n = 8775) and original sample (complete cases, n = 1606).
- Supplementary Table 4. Variance between schools in respiratory symptoms explained by a) only pupil- or parent-reported worry and b) psychosocial factors without worry reported in relation to the school environment ('In relation to school) and without such relation ('In general') in three samples.
- Supplementary Table 5. Variance between schools in respiratory symptoms explained by (a) individual and allergic characteristics, (b) school IEQ, and (c) psychosocial factors reported in relation to the school environment ('In relation to school) and without such relation ('In general') in three samples.
- Supplementary Figure 1. Flow diagram describing how the school buildings and participants in three samples were selected for the study.
- Supplementary Figure 2. The prevalence of respiratory symptoms by three classes of IEQ for parents who were worried and not worried about IEQ in schools.

Supplementary Table 1. Number of participants in the questionnaire survey (the response rate shown in brackets).

Year	Primary school pupils (3-6 grade)	Secondary school pupils (7-9 grade)	Parents of primary school pupils (1-6 grade)
2017	5360 (68%)	1905 (55%)	2426 (20%)
2018	4475 (57%)	2059 (48%)	1513 (13%)

Parents completed the questionnaires for their 1-6-grade pupils. Primary school pupils (3-6 grade) and secondary school pupils (7-9 grade) completed the questionnaires themselves.

Supplementary Table 2. The dose-response associations between pupil- and parent-reported worry about IEQ and respiratory symptoms reported in general. Odds ratios (95% CI) are reported.

Worry about IEQ	Primary school pupils (n = 8775)	Secondary school pupils (n = 3410)	Parents of primary school pupils (n = 3540)
1 (not worried)	Reference	Reference	Reference
2	1.25 (1.10, 1.42)	1.48 (1.13, 1.94)	1.52 (1.06, 2.17)
3	1.93 (1.67, 2.24)	2.11 (1.61, 2.77)	2.97 (2.09, 4.21)
4	3.06 (2.42, 3.87)	4.42 (3.25, 6.02)	8.66 (5.92, 12.69)
5 (worried a lot)	3.71 (2.64, 5.22)	7.54 (4.97, 11.42)	11.51 (7.60, 17.44)

Supplementary Table 3. Estimated odds ratios (95% confidence intervals) for respiratory symptoms reported by parents of primary school pupils from the combined sample of parent-primary school pupil pairs. The analyses were conducted in imputed sample (n = 8775) and original sample (complete cases, n = 1606).

	In general		In relation to school	
	Imputed sample	Original sample	Imputed sample	Original sample
<i>Building-related variables (school level)</i>				
Good IEQ	1.00	1.00	1.00	1.00
Moderate IEQ	1.12 (0.80, 1.57)	0.98 (0.63, 1.52)	1.18 (0.80, 1.57)	1.37 (0.61, 3.07)
Poor IEQ	1.41 (0.75, 2.64)	1.39 (0.78, 2.45)	1.30 (0.75, 2.64)	1.86 (0.73, 4.77)
<i>Psychosocial variables (individual level)</i>				
Worry about IEQ	1.40 (1.19, 1.65)	1.47 (1.26, 1.73)	1.61 (1.33, 1.94)	1.74 (1.38, 2.21)
Neuroticism	1.18 (0.92, 1.53)	1.10 (0.91, 1.32)	1.26 (0.95, 1.68)	1.22 (0.90, 1.64)
Conscientiousness	0.77 (0.62, 0.94)	0.78 (0.60, 1.02)	0.88 (0.59, 1.30)	0.93 (0.62, 1.39)
Extraversion	0.99 (0.77, 1.28)	0.98 (0.79, 1.21)	1.11 (0.86, 1.44)	1.13 (0.81, 1.58)
Openness	1.05 (0.86, 1.28)	1.03 (0.82, 1.28)	1.02 (0.69, 1.50)	0.96 (0.68, 1.36)
Agreeableness	1.07 (0.79, 1.44)	1.13 (0.87, 1.48)	1.08 (0.73, 1.60)	1.16 (0.76, 1.77)
Low school satisfaction	0.98 (0.67, 1.45)	1.99 (0.74, 1.36)	1.08 (0.71, 1.65)	0.88 (0.54, 1.43)
Home satisfaction				
0 (high)	1.00	1.00	1.00	1.00
1 (moderate)	1.11 (0.90, 1.37)	1.30 (0.89, 1.88)	1.09 (0.76, 1.54)	1.03 (0.57, 1.89)
2 (low)	1.09 (0.73, 1.63)	1.00 (0.44, 2.30)	1.10 (0.60, 2.04)	1.01 (0.27, 3.77)
Having friends to spend time with				
0 (often)	1.00	1.00	1.00	1.00
1 (more or less often)	1.00 (0.80, 1.26)	1.22 (0.82, 1.82)	1.00 (0.73, 1.38)	1.46 (0.77, 2.77)
2 (rare)	1.03 (0.73, 1.47)	1.20 (0.61, 2.33)	1.03 (0.65, 1.66)	1.09 (0.38, 3.14)
<i>Psychosocial variables (school level)</i>				
Worry about IEQ reported by principals	1.16 (0.82, 1.64)	1.22 (0.91, 1.64)	1.72 (1.14, 2.59)	1.87 (1.18, 2.95)

Note. All analyses were adjusted for pupils' individual and allergic characteristics. The estimates highlighted in bold are statistically significant at $p < 0.05$. Psychosocial factors were reported by primary school pupils and respiratory symptoms were reported by parents of primary school pupils. For imputed sample, the statistical analyses were conducted using the pooled estimates of 20 imputed data sets.

Supplementary Table 4. Variance between schools in respiratory symptoms explained by a) only pupil- or parent-reported worry and b) psychosocial factors without worry reported in relation to the school environment ('In relation to school) and without such relation ('In general') in three samples.

	Only pupil- or parent-reported worry		All psychosocial factors without worry	
	In general	In relation to school	In general	In relation to school
Primary school pupils	54 %	85 %	0 %	0 %
Secondary school pupils	100 %	95 %	0 %	0 %
Parents of primary school pupils	93 %	89 %	7 %*	4 %*

Note. The variance between schools in respiratory symptoms was 0.6-2.4%.

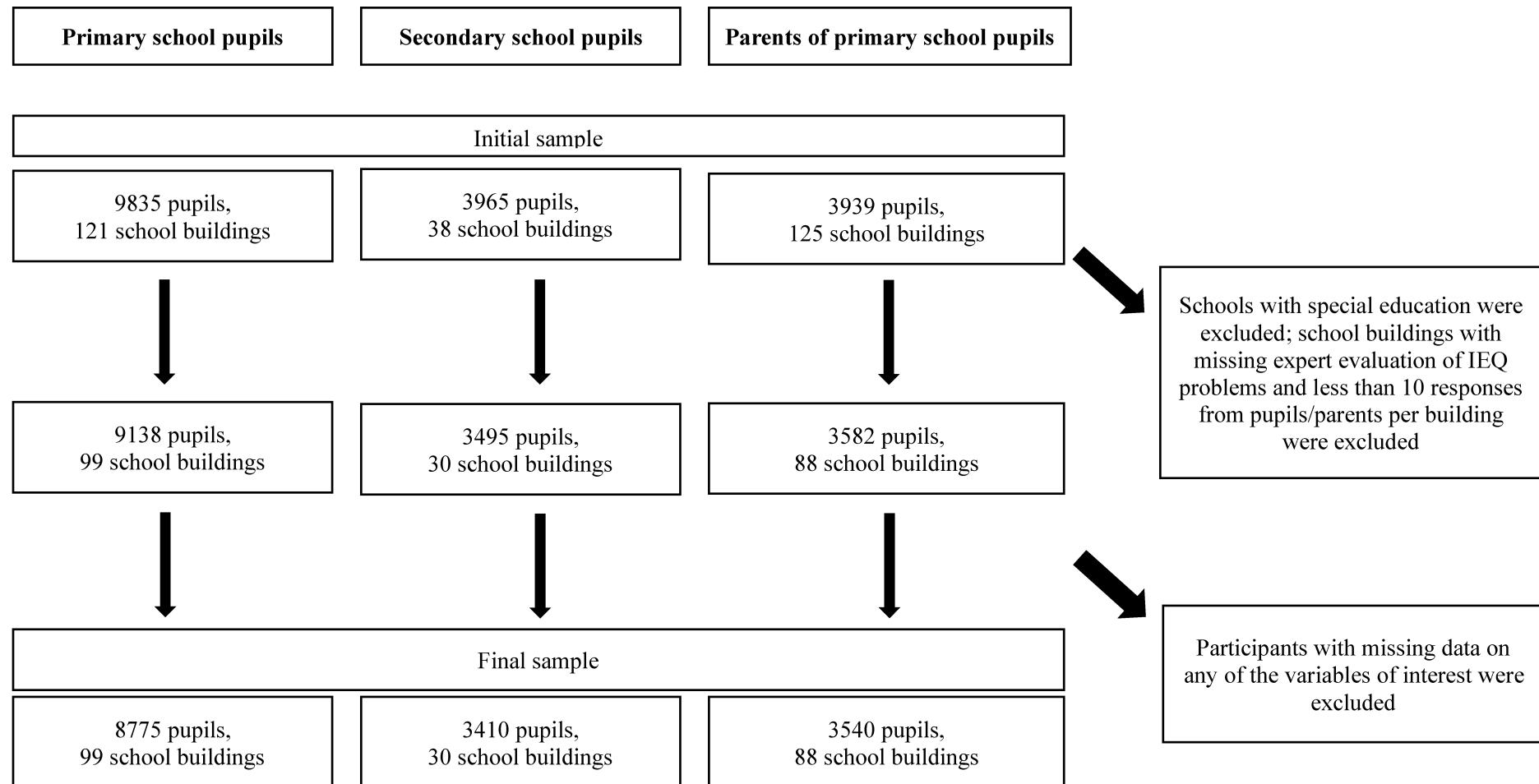
Percentages were calculated as (variance of the model including only individual and allergic minus variance of the model including individual and allergic characteristics and psychosocial factors) / variance of the model including only individual and allergic characteristics.

*Only among parents, psychosocial factors did not include personality traits. Other psychosocial factors were the same in all three samples (school satisfaction, home satisfaction, and having friends). Worry about IEQ reported by school principals was not included in these analyses.

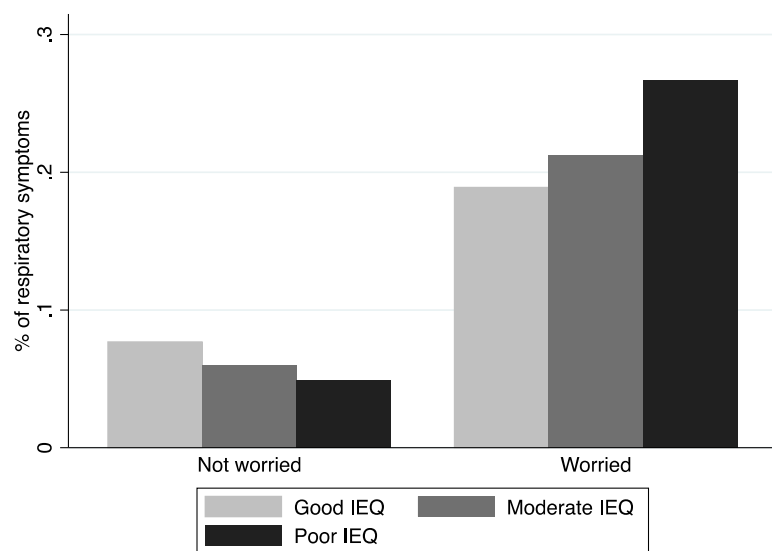
Supplementary Table 5. Variance between schools in respiratory symptoms explained by (a) individual and allergic characteristics, (b) school IEQ, and (c) psychosocial factors reported in relation to the school environment ('In relation to school) and without such relation ('In general') in three samples.

Respiratory symptoms	Individual and allergic characteristics		IEQ, and individual and allergic characteristics		Psychosocial factors, and individual and allergic characteristics	
	In general	In relation to school	In general	In relation to school	In general	In relation to school
Primary school pupils	1 %	5 %	68 %	74 %	30 %	80 %
Secondary school pupils	31 %	9 %	20 %	18 %	100 %	100 %
Parents of primary school pupils	11 %	3 %	39 %	57 %	97 %	87 %

Note. The variance between schools in respiratory symptoms was 0.6-2.4%.



Supplementary Figure 1. Flow diagram describing how the school buildings and participants in three samples were selected for the study.



Supplementary Figure 2. The prevalence of respiratory symptoms by three classes of IEQ for parents who were worried and not worried about IEQ in schools.