

ORIGINAL ARTICLE

## Psychosocial work environment in school and students' somatic health complaints: An analysis of buffering resources\*

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### Abstract

**Aim:** This study explores the association between the psychosocial work environment in school and students' somatic health complaints. With its point of departure from the Demand–Control–Support (DCS) model, the aim was to examine how aspects of decision control and social support can moderate stress-related health implications of high psychological demands. **Methods:** Data come from two cross-sectional waves of the Swedish version of Health Behaviour in School-aged Children (HBSC 2005/2006 and 2009/2010), which consists of a total of 9427 11-, 13- and 15-year-old students. A two-level random intercept model was applied, with school class as the level 2 unit. **Results:** Findings showed significant associations between school demands and somatic health complaints for all studied age groups, with a slight increase in strength with age. Decision control as well as social support from teachers, parents and peers consistently predicted a favorable association with health. An age pattern emerged in the analyses of stress-moderating resources. For 11 year olds parental support was the only resource that displayed a significant interaction with demands in relation to somatic health complaints, whereas for 13 year olds, decision control and support from teachers and parents all demonstrated moderating effects on student health. For 15 year olds, however, it was peer support that acted as a buffering resource in the studied relationship. **Conclusions:** **The psychosocial work environment is an important predictor of students' health complaints. Overall, social support was a better stress-moderating resource than decision control, but some “buffers” were more important at certain ages than others.**

**Key Words:** School-related stress, school demands, school pressure, psychosocial work environment, Demand–Control–Support model, decision control, social support, somatic health, health complaints, multilevel analyses

### Introduction

The present study builds on the framework of the Demand–Control–Support (DCS) model [1,2], commonly used in research to identify how certain combinations of working conditions predict stress and ill health in the adult population [3]. This framework has more recently also shown to be useful in studying the work environment of children and adolescents in the school setting [4–6]. The original model [2] distinguishes between four types of working situations according to the balance between the demands that are

put on the individual and the control (decision latitude) one has over working conditions. A high level of decision control is assumed to moderate the stress caused by high psychological demands. Later, the model was developed by including social support as an important aspect of the work situation [1]. Although the spectrum of demand and decision control is likely to be more limited for students than adult employees, these components are nevertheless central parts of working conditions in both settings. School is young

\*This study was presented at the 4th IMS/CHESS workshop: Health and Society, 10 December 2014 at Federal University of Rio de Janeiro State, Rio de Janeiro, Brazil.

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(Accepted 30 September 2016)

people's main workplace, characterized by similar features to those of adults, such as a standard for tasks and activities, deadlines, work responsibility, and feedback routines. Thus, from a DCS model perspective, the health implications of students' working conditions can in many ways be expected to resemble those of adult employees.

How school factors influence students' health and well-being has gained increased research interest [7,8]. The psychosocial work environment is an integrated part of the Swedish Work Environment Act, which not only covers the adult population but also regulates the school environment [9]. Work-related factors in the school setting such as finding schoolwork difficult, time pressure, and overload of work have previously been shown to predict both psychological and somatic health complaints [10,11]. Recent research has also pointed to a marked increase in perceived stress because of schoolwork among Swedish lower secondary students [12]. The demands placed on students during the learning process inevitably entail a certain degree of stress. However, the relationship between a stressful school situation and student health is also dependent on the compensatory resources available in the classroom setting and in the young person's immediate surroundings [13]. Students who experience a high workload in combination with inferior access to compensatory resources to handle their school situation are thus more likely to report stress-related illness. How students perceive school demands, and the extent to which various types of demands are experienced as stressful, is however likely to vary according to intellectual capacity and ability. Although it has been suggested that a sub-group of very high-performing students are at greater risk for stress-related health implications [14], research generally points towards an overall negative association between school performance and health problems [15].

The present study focuses on four different buffering aspects, decision control, teacher support, parental support, and peer support, as well as their respective moderating effects on students' somatic health complaints, as predicted by perceived school demands.<sup>1</sup> The DCS model suggests that decision control is a precondition for coping with high work demands; however, findings are inconsistent regarding the school setting. An interaction effect on health complaints for the combination of low decision control and high demands has been reported in previous research based on Swedish school data [16], whereas students' decision-making in classroom activities has shown to have either no effect or a weak positive effect on self-reported health [17,18].

Social support is a well-known source of protection against stress and its health-related correlates [19]. The so-called buffering model [20] builds on the

assumption that in the presence of social support, stressors have a diminished impact on health. It has been suggested that social support can alter the way in which a stressful situation is perceived, as well as appraisal and development of coping strategies. A key aspect for both DCS and the buffering hypothesis is the emphasis on an interaction effect between a demanding situation and a hypothesized "protective" resource, such as decision control or support, on stress-related illness. Teachers constitute important sources of support in the classroom environment. Thus, both instrumental support in terms of instructional help with schoolwork [21] and emotional support such as appraisal and interest in the students [22] are associated with a decrease in students' reported health complaints. Parents serve as another important source of support. Although some children may perceive parents' academic expectations as stressful to live up to [23], the parent-child bond is still likely to constitute a salient source of emotional support in times of academic stress [24]. Parental engagement and interest in what occurs in school as well as parental help with homework is closely linked to achievement [25] and psychological wellbeing [5]. Although parents constitute the most central source of support for children in early life, changes in relational orientation tend to take place in adolescence, whereby peers assume an increasingly important role [26,27]. A supportive class climate, or "class spirit," has also been shown to buffer against academic stress [28] and its health-related consequences [29]. Poor classmate support, on the other hand, is closely linked to stress symptoms [30] and deterioration of mental health [31].

Using data based on classroom surveys, the aim of the present study is to examine the association between students' psychosocial work environment in school and somatic health complaints in a sample of 9427 11-, 13-, and 15-year-old school children. More specifically, it aims to explore if aspects of control and social support from teachers, parents, and peers can modify the relationship between school demands and somatic health complaints. Furthermore, we will examine if certain buffers are more prominent at certain ages than others. The focus of the present study lies on student-level associations, but to correct for the fact that classmates are not independent of each other with regard to school context experiences multilevel modeling will be applied [32].

## Methods

### *Sample and design*

The data come from the Swedish version of Health Behavior in School-aged Children (HBSC), covering

Table I. Description of the indices included in the analysis. All grades.

Index	Mean	SD	Range	Factor loadings	Eigen value	Cronbach's alpha	Percent
School demands	11.64	3.39	3–19	0.66–0.79	2.16	0.80	
Decision control	5.66	1.94	2–10	0.78–0.79	1.26	0.81	
Low			2–4				28.6
Middle			5–6				41.0
High			7–10				30.4
Support teachers	12.26	2.20	3–15	0.72–0.77	1.68	0.74	
Low			3–11				31.4
Middle			12–13				36.8
High			14–15				31.8
Support parents	22.06	3.11	5–25	0.69–0.84	3.19	0.83	
Low			5–20				28.3
Middle			21–23				28.4
High			24–25				43.3
Support peers	12.39	2.07	3–15	0.73–0.81	1.76	0.78	
Low			3–11				28.3
Middle			12–13				41.4
High			14–15				30.3
Somatic complaints	7.49	3.29	4–20	0.58–0.70	1.77	0.71	

the survey waves 2005/2006 and 2009/2010. A two-step clustered sampling design was used where a number of schools, representative of Sweden, were first randomly selected. After that, one school class at each school was randomly chosen. Classes with fewer than five students were then removed from the analyses. Full information on all variables used in the analyses was available for 9427 students, 3106 11 year olds, 3083 13 year olds, and 3238 15 year olds, covering 58.1, 62.3 and 65.7%, respectively, of the original samples.

#### Measurements

*Dependent variable.* *Somatic health complaints* were constructed from the question “How often have you experienced the following symptoms in the last six months?” followed by “headache,” “stomach pain”, “back pain,” and “dizziness.” The five response alternatives were “Almost every day,” “More than once a week,” “About one time a week,” “About once a month,” and “Rarely or never.” Based on these four items, an index ranging between 4 and 20 was created, with 20 corresponding to the worst possible health.

*Independent variables.* *School demands* were measured through four items: “I have too much schoolwork,” “I find the schoolwork difficult,” and “The schoolwork makes me tired,” each of which had five response alternatives: “Fully agree,” “Agree,” “Uncertain,” “Do not agree,” and “Do definitely not agree.” “I am pressured by schoolwork” had four response alternatives “Not at all,” “A little,”

“Quite a lot,” and “A lot.” *Decision Control* was measured through two items: “Students help decide which activities they do in class” and “Students help decide how class time is used.” *Support from teachers* was measured through three items: “Our teachers treat us fairly,” “Most of my teachers are kind,” and “I get extra help if I need it.” *Support from parents* was measured through five items: “My parents help me out with homework,” “My parents are interested in what happens in school,” “If I have problems in school my parents try to help out,” “My parents encourage me to do my best in school,” and “My parents come to school and speak to my teachers.” *Support from peers* was measured through three items: “Students in my class get along well together,” “Most of my classmates are kind and helpful,” and “The other students accept me as I am.” The response alternatives for decision control and the three support measures were identical to the five ones used for school demands. All of the above described indices provided eigenvalues above 1 and acceptable Cronbach's alphas (see Table I).

*Control variables.* *Gender* was measured through student reports of being a boy ( $n=4567$ ) or a girl ( $n=4860$ ) in the questionnaire. *Year of survey* consisted of 2005/2006 ( $n=3955$ ) and 2009/2010 ( $n=5472$ ). *Self-rated ability* was measured through the item “How would your teacher rate your ability compared to your classmates?,” followed by four response alternatives: “Very good” ( $n=1793$ ), “Good” ( $n=4705$ ), “Average” ( $n=2559$ ), “Below average” ( $n=370$ .) Very good and good was coded as high self-rated ability.

*Statistical analyses*

Factor analyses based on a polychoric matrix for ordinal variables generated indices that were kept continuous in order to retain maximum information and computed as sum scores. For each of the three age groups, the predictive capacity of demands together with each of the four buffering resources (decision control, teacher support, parental support, and peer support) on somatic complaints were analyzed in four subsequent models. In a second step, two-way interaction analyses between demands and each of the buffering resources were performed. The statistical analyses were performed in Stata 13 by means of a linear two-level random intercept model, taking into account that the regression lines for different school classes crossed the *y*-axis at different points. Robust standard errors were used to account for any heteroskedasticity caused by the skewed distribution of the dependent variable. Finally, the intraclass correlation coefficient (ICC) was calculated to assess the proportion of the total variation in somatic health complaints that could be attributed to the school class level in each of the estimated models.

**Results***Psychosocial work environment and somatic health complaints*

Results for 11-, 13-, and 15-year-old students are presented in Tables II, III, and IV, respectively. Statistically significant associations between school demands and somatic health complaints were found for all ages, with a slight increase in strength with age. Decision control and social support were both associated with fewer health complaints. Common for all age groups was that teacher and peer support contributed to the strongest health promoting “effect” in the crude as well as in the adjusted models, whereas parental support did not appear to be equally strongly associated with somatic complaints. The weakest association was found for decision control. Associations also differed across age groups. For teacher and peer support, the estimates were stronger for 13- and 15-year-old children than for younger children. Parental support showed a similar negative association across age groups, whereas perceived control was only significantly related to health complaints among 13 year olds. For 11- and 13 year olds, the differences were small between crude and adjusted models. It was among the 15 year olds that the association between demands and health complaints decreased most when potential buffering resources were adjusted for.

*Effect modifications*

Significant interactions between school demands and each of the four health-promoting resources are highlighted in bold in the mid-part of Tables II–IV, pointing to an interesting age pattern. A stress-moderating effect can be taken to exist if a significant interaction between demands and any of the four potential buffering resources is displayed. Interaction analyses were first performed based on continuous, and then categorical (divided in thirds), versions of the hypothesized buffering resources. Both gave rise to the same results, but for illustrative reasons the estimates presented in the middle parts of Tables II–IV and in Figure 1 were based on the categorized versions of decision control and sources of support. The interaction analyses were performed in separate models, which means that the coefficients presented at the top of Tables II–IV represent the “main effects” of demands and the four potential buffering resources on health complaints (i.e., without any interaction terms included in the model). Results showed that a high level of parental support was the only condition that appeared to buffer against 11-year-old children’s health complaints, whereas for 13 year olds high levels of decision control and teacher support as well as a high or intermediate degree of parental support seemed to buffer against negative health outcomes of experiencing high demands. For 15 year olds, finally, a high or intermediate level of peer support as well as an intermediate degree of teacher support emerged as likely buffers against the detrimental health outcomes of high demands. The significant interactions are illustrated in predictive margin plots (Figure 1) with thirds of the four buffering resources plotted along the demand scale, and the certainty of the prediction given by confidence intervals.

*Between class variation in somatic health complaints*

The lower parts of Tables II–IV display variance in somatic complaints between school classes. As expected, the largest variation in the outcome took place at the individual level. Nevertheless statistically significant variation between school classes appeared for all the studied age groups. The ICC in the empty models revealed that 2.2–3.0% of the total variation in students’ somatic complaints can be attributed to the school class-level depending on age.  $R^2_{\text{student}}$  gives information of how much of the variation in students’ somatic complaints that is accounted for by the various models, corresponding to 5–6% for 11 year olds, 6–7 % for 13 year olds, and 9–10% for 15-year olds. Interpretation of the  $R^2_{\text{class}}$  value must take into

Table II. Two-level random intercept model: b-coefficients of somatic complaints according to aspects of demand, control and support among 11-year-old students. Models 1–4 are adjusted for gender, self-rated ability and survey year ( $n=3106$ , classes=200).

	Empty model	Unadjusted	Model 1 (D×C)	Model 2 (D×TS)	Model 3 (D×PS)	Model 4 (D×PES)
Demand ( <b>D</b> )		0.26***	0.25***	0.23***	0.24***	0.23***
Decision control ( <b>C</b> )		-0.07*	-0.02			
Teacher support ( <b>TS</b> )		-0.22***		-0.12***		
Parental support ( <b>PS</b> )		-0.13***			-0.07**	
Peer support ( <b>PES</b> )		-0.27***				-0.16***
<b>Interaction terms</b>						
<b>D×C</b> Low (ref.)						
Middle			0.03			
High			0.07			
<b>D×TS</b> Low (ref.)						
Middle				0.01		
High				-0.07		
<b>D×PS</b> Low (ref.)						
Middle					-0.01	
High					-0.11*	
<b>D×PES</b> Low (ref.)						
Middle						0.03
High						-0.06
Variance <sub>class</sub>	0.411***		0.385***	0.389***	0.384***	0.391***
ICC	2.2%		2.1%	2.2%	2.1%	2.2%
$R^2_{student}$			0.05	0.06	0.05	0.06
$R^2_{class}$			0.05	0.05	0.07	0.05

ICC: intraclass correlation coefficient.

Note: Interaction analyses were carried out in separate models.

\*\*\* $p<0.001$ , \*\* $p<0.01$ , \* $p<0.05$ .Table III. Two-level random intercept model: b-coefficients of somatic complaints according to aspects of demand, control and support among 13-year old students Models 1–4 are adjusted for gender, self-rated ability and survey year ( $n=3083$ , classes=181).

	Empty model	Unadjusted	Model 1 (D×C)	Model 2 (D×TS)	Model 3 (D×PS)	Model 4 (D×PES)
Demand ( <b>D</b> )		0.33***	0.30***	0.25***	0.29***	0.29***
Decision control ( <b>C</b> )		-0.16***	-0.1**			
Teacher support ( <b>TS</b> )		-0.37***		-0.25***		
Parental support ( <b>PS</b> )		-0.17***			-0.12***	
Peer support ( <b>PES</b> )		-0.30***				-0.21***
<b>Interaction terms</b>						
<b>D×C</b> Low (ref.)						
Middle			0.05			
High			-0.12*			
<b>D×TS</b> Low (ref.)						
Middle				-0.04		
High				-0.13*		
<b>D×PS</b> Low (ref.)						
Middle					-0.26***	
High					-0.18**	
<b>D×PES</b> Low (ref.)						
Middle						-0.01
High						-0.07
Variance <sub>class</sub>	0.549***		0.429***	0.388***	0.440***	0.408***
ICC	3.0%		2.1%	1.7%	2.2%	1.9%
$R^2_{student}$			0.06	0.07	0.07	0.07
$R^2_{class}$			0.22	0.29	0.20	0.26

ICC: intraclass correlation coefficient.

Note: Interaction analyses were carried out in separate models.

\*\*\* $p<0.001$ , \*\* $p<0.01$ , \* $p<0.05$ .

Table IV. Two-level random intercept model: b-coefficients of somatic complaints according to aspects of demand, control and support among 15-year-old students. Models 1–4 are adjusted for gender, self-rated ability and survey year ( $n=3238$ , classes=179).

	Empty model	Unadjusted	Model 1 (D×C)	Model 2 (D×TS)	Model 3 (D×PS)	Model 4 (D×PES)
Demand (D)		0.39***	0.29***	0.26***	0.29***	0.28***
Decision Control (C)		-0.13***	-0.06			
Teacher support (TS)		-0.37***		-0.24***		
Parental support (PS)		-0.19***			-0.14***	
Peer support (PES)		-0.34***				-0.25***
<b>Interaction terms</b>						
<b>D×C Low (ref.)</b>						
Middle			-0.04			
High			-0.02			
<b>D×TS Low (ref.)</b>						
Middle				-0.10*		
High				-0.03		
<b>D×PS Low (ref.)</b>						
Middle					-0.05	
High					-0.08	
<b>D×PES Low (ref.)</b>						
Middle						-0.07
High						-0.10*
Variance <sub>class</sub>	0.589***		0.507***	0.468***	0.474***	0.494***
ICC	2.7 %		2.4%	2.1%	2.1%	2.3%
$R^2_{student}$			0.09	0.10	0.10	0.10
$R^2_{class}$			0.14	0.20	0.20	0.16

ICC: intraclass correlation coefficient.

Note: Interaction analyses were carried out in separate models.

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ .

account the overall low variation in health complaints that can be attributed to the class level. Of this, 5–7% of the variation in somatic health of 11-year-old students can be attributed to the school class level. The corresponding ranges for 13- and 15 year olds are 20–29% and 14–20%, respectively.

### Discussion

Consistent with previous findings, this study demonstrated that the psychosocial work environment in school is important for student health [4,7,10,11]. After adjustment for students' self-rated ability, higher school demands were associated with an increased level of somatic health complaints across all of the three studied age groups, whereas decision control as well as teacher, parental, and peer support all contributed to a decrease in stress-related ill health. This study took its point of departure from the DCS model [1], and an overall conclusion that can be drawn is that social support seems to play a more crucial role than decision control in moderating the association between high school demands and somatic complaints. Of the three sources of social support that were investigated, support from teachers and peers showed the strongest association with student health, and parental support demonstrated a somewhat weaker association across all age

groups. Decision control was only significantly associated with somatic health complaints among 13 year olds. The identification of stress-relieving agents in the school setting is important because if such support can take place in school, the students' achievements becomes less dependent on conditions at home.

The DCS model as well as the buffering hypothesis [20] emphasizes the interaction between demands in the work situation and protective resources for stress-related illness. In this study the interaction analyses revealed a clear age pattern. A significant buffering effect for teacher support was found for 13- and 15 year olds. Previous research has suggested that fewer personal relationships with teachers are built during the transition period from primary to lower secondary school, since the number of teachers normally increases [27]. However, for Swedish lower secondary students, our results indicated an increased importance of teacher support during this stage of schooling. For the current study subjects school marks was introduced at the age of 14 with two year of building merit for the selection to upper secondary school. As these years are likely to be intense, teacher support may become particularly important in handling school-related stress. It is worth noting that in the oldest age group it was in fact a moderate (rather than a high) level of teacher support that had the

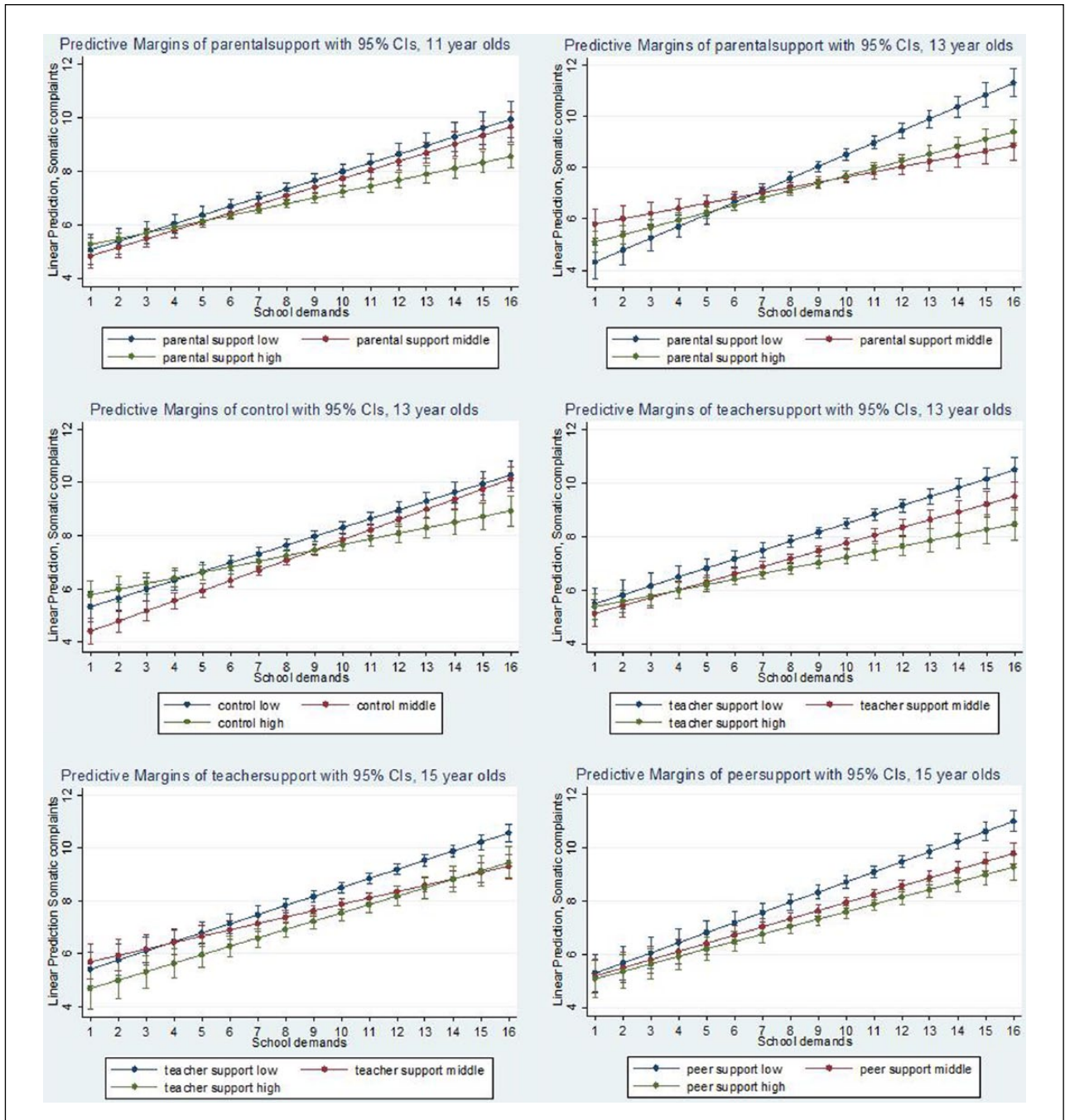


Figure 1. Graphical illustration of the significant interaction patterns between school demands and buffering resources on somatic complaints for students 11, 13, and 15 year olds. CI: confidence interval.

strongest buffering effect. Potentially, this could indicate that when perceived demands are high, measures of teacher support also capture expectations of performance that to some extent can be stressful. A moderate level of teacher support may thus constitute a less stress-inducing approach in this age group. Parental support was a significant protective resource

for 11- and 13 year olds, but peer support seemed to be an important buffer against stress-induced health complaints only in the oldest age group. Our findings regarding parental and peer support were in accordance with previous research showing that support from peers gradually tends to become more central than parental support during adolescence [26,27].

Our results add to these findings by showing that this mechanism can also serve as a stress-moderating resource in schoolwork.

Decision control did not demonstrate the same consistent pattern in our study as social support did. Here, a buffering effect in the association between demands and somatic complaints was only found for 13 year olds. In light of the transition to secondary school, relevant for this age group, our findings pointed to the importance of both decision control, as well as teacher and parental support. Potentially, decision control is a beneficial resource for these students in handling the new school situation and the increased demands because of the introduction of school marks. For the other two age groups, however, no substantial protective effect of decision control was found. These results are also consistent with previous findings of students' decision-making in classroom activities and self-rated health [17,18]. However, as noted by Mager and Nowak [17], few studies have measured comparable concepts and outcomes with regard to students decision-making at school, and even fewer have addressed health effects. To date, most studies in this area of research have focused on participation in student councils, which does not directly relate to students' own working situations, but rather to aspects of life skills, democratic skills and student–adult relationships [17].

Given the nature of the health outcome in this study, it is perhaps not too surprising that most of the variation took place at the individual level. However, a non-negligible between-class variation was demonstrated as well, which is consistent with previous findings [8,14]. This contextual variation was similar across age groups but somewhat larger among 13- and 15 year olds than among younger children.

### Strengths and limitations

The data from HBSC, with its rich information about psychosocial work environment of students, provide a great opportunity to examine how aspects of decision control and social support can moderate stress-related health implications of high psychological demands. There are nevertheless some limitations of the present study that need to be recognized. The cross-sectional design of this study did not allow issues of causality to be addressed. Data were self-reported, which may involve bias as a result of negative affectivity [33]. Furthermore, no objective data of school performance were available for the studied subjects. Therefore, the interpretation of our findings should take into consideration that we were only able to adjust for the students' self-rated ability, and not their actual performance.

Although gender was adjusted for in all analyses, it was not the main focus of the present study. This

could be considered a limitation, but from a previously published paper based on HBSC data we already know that the association between school demands and health complaints is somewhat stronger among girls than boys, and that health complaints and gender differences also tend to increase with age [34]. Furthermore, we were not able to adjust for the studied subjects' socioeconomic background because of lack of adequate information about this in our data [35,36]. This is also a limitation since familial socioeconomic status has shown to be an important factor to consider in studies of adolescent health [37]. Further research into the field of psychosocial work environment and student health should address these aspects.

### Conclusions

The aim of the present study with its point of departure from the DCS model was to explore the association between the psychosocial work environment in school and students somatic health complaints. The results suggest that aspects of demand control and support are important predictors of students' somatic health, and that social support was a better stress-moderating resource than decision control. The study also detected that some buffers were more prominent at certain ages than others. Learning more about how the psychosocial work environment in school influences student health could provide important guidance to school interventions and public health policy.

### Conflict of interest

None declared.

### Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was financed by the Swedish Research Council for Health, Working Life and Welfare (grant number 2013-0159) and Vårdalstiftelsen, Idéprövningen (grant number 2011-25/333).

### Note

- 1 It is important to underscore that whenever we use the terms “effect” or “predictive capacity,” we do not imply a causal, but rather a statistical effect.

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