



A multi-informant study of school climate: student, parent, and teacher perceptions

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Abstract

This paper presents a multi-informant study on school climate with the aim of (a) comparing students', teachers', and parents' perceptions of several school climate dimensions and (b) examining the associations between dimensions pertaining to classroom practices and school atmosphere in both students and teachers. Participants comprised 105 teachers, 320 parents, and 1070 students (49% female; $M_{age} = 11.77$) enrolled in four middle schools in Northern Italy. The latent mean comparison of students', teachers', and parents' perceptions revealed many significant differences, with teachers generally reporting better perceptions of the quality of the school environment. A multigroup path analysis highlighted associations between classroom practices and school atmosphere dimensions of school climate which varied for students and teachers. The findings are discussed in terms of their implications for school intervention and the fostering of a supportive school environment.

Keywords School climate · Multidimensional School Climate Questionnaire · Multi-informant · Latent means comparison · Multigroup analysis

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School climate is defined as “the quality and character of school life” (Cohen et al., 2009, p. 182), concerning both the psychosocial school atmosphere and intergroup interactions (Reyes et al., 2012). The vast literature in this field has come to agree that the construct of school climate is multidimensional, including aspects that range from didactic practices to learning processes, from relational quality to discipline and safety (for a review, see Wang & Degol, 2016). Also, many studies have provided evidence that the various school climate dimensions affect learning and academic achievement (Berkowitz et al., 2017) as well as more clinical outcomes, such as problem behaviours or violence in school (Reaves

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et al., 2018; Steffgen et al., 2013) and students' and teachers' mental health (Aldridge & McChesney, 2018; Gray et al., 2017).

Even if several authors provided theoretical frameworks suggesting ways of organizing the understanding of school climate (see, e.g., the authoritative school climate theory, Cornell et al., 2016), most empirical works on school climate still do not rely on solid theoretical foundations (Wang & Degol, 2016). Interesting suggestions able to inform research come especially from the system view of school climate (Rudasill et al., 2018), emphasizing that school is made of a series of nested and interactive systems that are entwined to promote or detract from students' school experience. This view suggests that for a better comprehension of school climate we need to address two major weaknesses of the current literature. The first is that, to build a systemic understanding of school climate, we need studies including multiple perspectives, as the existing literature is based almost exclusively on student perceptions (Wang & Degol, 2016). The second regards the lack of distinction between aspects related to concrete practices experienced every day in the classroom and aspects related to the relational and educational atmosphere felt in the school (Grazia & Molinari, 2021a). These two aspects, often considered at the same level in empirical studies, would instead be better understood as different nested systems in a systemic perspective (Rudasill et al., 2018), offering a clearer path for interpretation.

The present study adopted a multi-informant approach to provide innovative insights in the direction of addressing both these weaknesses. More specifically, our first aim was to collect and compare different point of views on school climate, by including teachers and parents alongside students, to portray a comprehensive picture of school climate perceptions. Then, we examined the associations between classroom practices and school atmosphere components of school climate, considered as two distinct and yet related components of the school environment, and again compared how these associations varied for different informants.

A multi-informant perspective in school climate research

A recent cornerstone review of the literature on school climate highlighted that almost all school climate research has used students' perceptions as the primary source of information (Wang & Degol, 2016). This is a major gap in the existing literature, as each of the various school actors, students, and teachers but also parents provides unique yet complementary visions of school climate. Several authors agree that, whenever possible, measurement of school climate should be based on collective and multiple perceptions (Marsh et al., 2012, Wang & Degol, 2016) in order to compose a truer and richer picture of the environment experienced in school. However, only few existing research have integrated multiple perspectives on different aspects and dimensions of school climate to study its links with school level contextual factors (Konold, 2018) and student outcomes such as student dropout (Kotok et al., 2016) and achievement (Konold et al., 2018; Maxwell et al., 2017) and none directly compared different perspectives on the same dimensions. Nonetheless, there are studies which, even if not explicitly focused on the study of school climate, provided evidence that students and teachers often do not share similar views of the learning environment and didactic practices, with teachers showing a more positive outlook (Mameli et al., 2020; Raviv et al., 1990). These findings further support the importance for school climate research to expand its reach by including multiple informants in order to compose and compare their perspectives.

The scarcity of multi-informant studies may be due in part to the methodological challenges related to their design, which may discourage or hinder their conduction and publication. Indeed, research with multiple perspectives requires adequate samples and multi-informant measures with sound psychometric properties, which are not always available (Grazia & Molinari, 2021a). This study aimed to fill in this gap of school climate literature by comparing students', teachers', and parents' perceptions of many dimensions of their school's climate. To achieve this, we used a multidimensional measure of school climate (the Multidimensional School Climate Questionnaire, MSCQ) including a student and parent version, already validated (Grazia & Molinari, 2021b, 2022), and a teacher version, of which we assessed psychometric properties and measurement invariance for this study. This measure, based on a systemic approach to school climate (Janosz et al., 1998) consistent with the theoretical view proposed by Rudasill et al. (2018), offers a methodologically sound ground to address this major weakness of school climate research.

School and classroom climate distinct yet related components

A second weakness of the existing literature on school climate concerns the theoretical conceptualization and assessment of school and classroom climate as two distinct yet related structural and organizational entities. The system view of school climate proposed by Rudasill et al. (2018) offers a clear conceptualization of these two entities. These authors argued that classrooms constitute the proximal nanosystem, made up of practices and interactions, in which the more distant school climate (microsystem), made up of beliefs and relational aspects, is created by means of the combined perceptions of its members. In other words, in the classroom everyday life, students interact among one another and, with the teachers, are involved and participate in didactic practices. Through all these actions, they build their experience as members of the school community and develop interpretations and perceptions that converge in their vision of school climate. Grasping the distinction and interdependence between these two entities is thus a necessary step for capturing the complexity of school climate.

However, on the empirical level, this distinction is not accounted for. As shown by previous reviews providing a reasoned description of school climate measures (Zullig et al., 2010), most of them include items and dimensions more closely related to what happens inside the classroom (e.g., teacher support) alongside items and dimensions regarding the broader school atmosphere such as school connectedness. To our knowledge, there is no study offering a comprehensive view of school climate capable of keeping these two entities distinct in order to assess their associations.

In the present study, we filled in this gap by studying the associations between classroom and school-related dimensions of school climate. The measure we used, the MSCQ, is useful to this aim because it is based on the conceptualization of school climate proposed by Janosz et al. (1998) who, consistently with the system view (Rudasill et al., 2018), argued that school climate is made up of two different components, one related to the concrete practices experienced every day in the classroom and another related to the more abstract features of the relational and educational climate felt in the school. Consistently with this view, the MSCQ is composed by two distinct sections, one including dimensions measuring classroom practices and another including dimensions related to the school atmosphere. This structure offers the possibility to clearly distinguish these components of school climate and assess their reciprocal associations (Grazia & Molinari, 2021b).

Moreover, having adopted a multi-informant approach, we could also move a step further and compare these associations for students and teachers.

Research objectives

Research on school climate, while clearly establishing the importance of this construct for the study and improvement of learning environments, is affected by some weaknesses. First, scholars agree on the need to include multiple perspectives in the study of school climate (Wang & Degol, 2016), but a comparison of students, teachers, and parents points of view on the same dimensions was never conducted before. Second, while the systemic view of school climate suggests the importance of understanding the specificity of each nested level of the school environment (Rudasill et al., 2018), concrete classroom activities and the more abstract school atmosphere have never been clearly distinguished and studied in their reciprocal associations. In the present study, we adopted a multi-informant approach to address these weaknesses of the literature and provide new insights to school climate research.

This general purpose was achieved by pursuing three specific aims. First, we tested the psychometric properties of the teacher version of the MSCQ, made up of dimensions and items that mirrored those already comprised in the validated students' and parents' versions, and tested its measurement invariance with respect to student and parent versions. This first step was critical to ensure that our multi-informant approach was based on a sound measure, not only validated for different populations but also allowing for comparison among perspectives without the risk of systematic measurement differences. Our prediction was to find the same factorial structure and measurement invariance among the three groups. Second, we compared students, teachers, and parents' perceptions of classroom practices and school atmosphere. Based on the results of previous studies (Mameli et al., 2020), we expected to find that the various actors have different perceptions, with teachers more positively evaluating most aspects. Third, we examined the associations, for students and teachers, between concrete components of the school climate related to classroom practices and the more abstract dimensions of school atmosphere. In line with the system approach (Rudasill et al, 2018), which emphasizes the interplay between nested contexts, we expected classroom practices to be associated with aspects of school atmosphere. Moreover, we tested whether these associations differed between students and teachers. As this comparison had never been done before, we advanced no predictions.

Method

Participants

The total populations of students, teachers and parents of four middle schools (sixth to eighth grade) in Northern Italy were involved in this study and asked to complete a questionnaire on a voluntary basis without incentives. The choice to focus on middle schools, which in Italy are a self-contained stage of transition from primary to secondary school, was motivated by a far-reaching interest in the educational implications of research. In these years, students experience a stable environment (with the same classmates and

mostly the same teachers) helping them to move from the relational-centered approach of primary schools to the knowledge transmission approach of high school (Kim et al., 2014).

The families come from very heterogeneous social and cultural backgrounds. For this study, we did not directly assess their socio-economic status. However, from the Italian Ministry of University and Research (MIUR) official website providing information on every single school, we know that the four participating schools were attended by students from a varied socio-economic background, ranging from low to high, and that a relevant percentage (between about 10 and 20%) of them came from non-Italian families, mostly originating from Northern Africa and Eastern Europe.

The participants were 105 teachers (85% female; all of Italian origins; 3% with age ranging between 20 and 30 years old, 14% between 31 and 40, 37% between 41 and 50, 46% older), 320 parents (90% females, 92% of Italian origin; 1% aged 20 to 30 years, 14% aged 31 to 40, 75% aged 41 to 50, 10% older), and 1070 students (49% female; 93% born in Italy; $M_{age} = 11.77$, $SD_{age} = 0.72$). Given the great difference in numbers for the three participant groups, we followed a procedure for balancing the group numbers while making the most of our total sample. We used SPSS software to automatically select smaller random samples of students for each multigroup analysis, extracting a percentage of the total sample that was comparable to that of the other groups (teachers or parents). The selected random samples were set up to be representative of the whole sample in terms of gender, Italian, or non-Italian origin and mean age. To accomplish our first and second aims, we considered a random sample of 206 students for the comparison with teachers and another sample of 339 students for the comparison with parents; finally, we accomplished our third aim by considering another sample of 117 students.

Procedures

In compliance with the ethical norms laid down by the Italian National Psychological Association, all participants were informed about the study's aims, confidentiality of their answers, and the voluntary nature of their participation. For students, informed consent of both parents was collected (with about 1% of parents refusing). By means of an online platform, teachers and parents filled in the questionnaire individually, at a time of their choice during an allotted period, while students completed the questionnaire during school hours in the presence of a researcher who gave the same instructions to everyone and answered any questions.

Measures

The Multidimensional School Climate Questionnaire (MSCQ) is a multidimensional and multi-informant measure for school climate, with validated versions and measurement invariance achieved for students (Grazia & Molinari, 2021b) and for parents (Grazia & Molinari, 2022). The teacher version was developed for this study and its psychometric properties were evaluated (first aim). All versions are made up of two main sections, classroom practices and school atmosphere. The section *classroom practices* refers to what is actually done in everyday class activities. In the versions for students and for teachers, this section comprises six dimensions, namely, rules, student support, student involvement, positive teaching, encouragement, and class management. In the parent version, it only includes the dimension of student support, of which parents can have experience. The *school atmosphere* section refers to perceptions of intangible and abstract features

of the school environment that individuals develop through repeated experiences. For students and teachers, this section includes five dimensions, that is, student relations, student–teacher relations, educational climate, sense of belonging, and interpersonal justice. The parent-version includes the same dimensions, with the exception of the sense of belonging. An overlook of the dimensions for each version can be found in Table 1.

Overall, the student and teacher versions include 49 items and the parent version 27 items. All items are worded in mirroring ways for the different informants (e.g., the student-version item “In my school, we are expected to do our best” is formulated in the teacher-version as “In my school, students are expected to do their best,” and in the parent-version as “In my child’s school, students are expected to do their best”). Participants were asked to answer on a 6-point Likert scale ranging from “completely disagree” to “completely agree,” so that higher scores indicate better perceptions of school climate. Cronbach’s alphas for each dimension are reported in the Results section.

Data analysis

All analyses were carried out with Mplus version 8.0 (Muthén & Muthén, 1998–2017) using maximum likelihood with robust standard error estimator (MLR). For our first aim, we explored the factorial structure and the psychometric properties of the teacher version of the questionnaire. In order to test whether the factorial structure for the student-version would fit the teacher-version as well, we conducted confirmatory factor analyses (CFA) on the classroom practices and school atmosphere sections separately. We considered the following indices of goodness of fit and cutoff criteria: root mean square error of approximation (RMSEA < 0.08), comparative fit index (CFI > 0.90), and standardized root mean squared residual (SRMR < 0.08) (Hu & Bentler, 1999; Lai & Green, 2016). We tested the internal consistency by computing Cronbach’s alphas and composite reliability scores (w) for each dimension (Dunn et al., 2014).

We then tested measurement invariance between the teacher-version of the MSCQ and the other two (for students and for parents), a necessary condition to carry out the subsequent comparisons. These analyses allowed us to test in steps whether the same questionnaire is invariant for different informants with regard to (a) the general factorial structure

Table 1 Multidimensional School Climate Questionnaire (MSCQ): dimensions for each version

	Student version	Parent version	Teacher version
<i>Classroom practices</i>			
Rules	Yes	No	Yes
Student support	Yes	Yes	Yes
Student involvement	Yes	No	Yes
Positive teaching	Yes	No	Yes
Encouragement	Yes	No	Yes
<i>School atmosphere</i>			
Student relations	Yes	Yes	Yes
Student–teacher relations	Yes	Yes	Yes
Educational climate	Yes	Yes	Yes
Sense of belonging	Yes	No	Yes
Interpersonal justice	Yes	Yes	Yes

(configural invariance); (b) loadings of each item on the factor it is meant to measure (metric invariance); and (c) intercepts (i.e., mean scores) for each item (scalar invariance). Thus, we sequentially constrained model structure, factor loadings and item thresholds to be equal across groups (teachers and students; teachers and parents) and compared model fit indices for the resulting nested models to assess whether the deterioration of model fit in the more constrained model was acceptable. Cutoff criteria to keep the more constrained model were $\Delta CFI \leq -0.010$ and $\Delta RMSEA < 0.015$ (Chen, 2007; Cheung & Rensvold, 2002). We also tested the Satorra-Bentler scaled chi square difference (Satorra & Bentler, 2001), but, given its higher sensitivity to sample size, in case of disagreement among indices of fit, we considered the other indices sufficient (Cheung & Rensvold, 2002).

To accomplish our second aim, we conducted latent means comparisons, computed in the scalar invariance model by constraining the comparison group's latent means to be zero and leaving the other's latent means free to be estimated in terms of the difference between groups' means. We then computed the critical ratio (CR) to assess whether the differences were significant, by dividing the parameter estimate for its standard error. A CR value larger than 1.96 indicates statistically significant differences in the latent means; if it is positive, the group has a latent mean higher than the comparison group, while if it is negative, the group has a latent mean lower than the comparison group. Lastly, Cohen's d (parameter estimate divided by the standard deviation) was computed as a measure of effect size of the difference in latent means.

As for the third aim, we started with a path analysis with latent variables to test whether Classroom practices would be associated with school atmosphere for a sample of students and teachers together. We first tested a model with all dimensions of both sections and then eliminated non-significant paths to obtain a final model. Afterwards, we performed a multigroup analysis to evaluate differences in path coefficients between students and teachers. In a first model, no constraints were specified, then path coefficients were constrained to be equal across groups, and changes in model fit indices were compared with the same cut off criteria indicated above. If differences in the indices exceeded the cutoff criteria, there is a deterioration in model fit, indicating that path coefficients are not invariant across groups.

Results

Factorial structure and measurement invariance of the MSCQ teacher version

The CFA on the six-dimensions model for the section *classroom practices* led to a few weighted adjustments. Modification indices suggested correlating a few residual errors, which can be considered as theoretically plausible (Gerbing & Anderson, 1984) as the items were mostly from the same dimension and tended to have similar formulations and meanings, which makes correlations plausible (e.g., “Most teachers appear to take pleasure from teaching” and “Most teachers appear to love their job”). One dimension (class management) and one item from the student-version (SS1, “There are professionals meant to help students with academic or personal problems”) showed unacceptable psychometric properties and largely worsened the model fit (respectively, $RMSEA = 0.08$, $CFI = 0.83$, $SRMR = 0.13$, and $RMSEA = 0.07$, $CFI = 0.89$, $SRMR = 0.08$), so we decided to remove them from the model and from subsequent comparison analysis for all participants. Information criteria supported this choice, as values for Akaike information criterion (AIC) and Bayesian information criterion (BIC) were higher for the six-dimension model (five-dimensions:

$AIC=4964.786$ and $BIC=5190.373$; six dimensions: $AIC=6154.01$ and $BIC=6414.099$) and for the model including the item (model without the item: $AIC=4964.786$ and $BIC=5190.373$; model with the item: $AIC=5248.591$ and $BIC=5482.139$).

The resulting five-dimension model reported acceptable fit indices: $MLR \chi^2(190)=279.38$, $p=0.000$; $RMSEA=0.07$; $CFI=0.91$; $SRMR=0.08$. Factor loadings were all significant and are reported in Table 1. Also for the *school atmosphere* section, after consulting the modification indices and theoretical reflection, we correlated a few error terms (e.g., “In general, students get along with one another” and “In general, relations among students are friendly”). The expected five-dimension model obtained good fit indices: $MLR \chi^2(193)=264.88$, $p=0.001$; $RMSEA=0.06$; $CFI=0.93$; $SRMR=0.07$. Factor loadings are reported in Table 2.

Composite reliability scores (Table 1) and Cronbach’s alphas (Table 3) were all above 0.70, indicating good internal consistency. Pearson’s bivariate correlations (Table 3) showed that all dimensions were positively correlated.

The teacher-version questionnaire achieved full configural and metric invariance with both student and parent versions (Table 4). Full scalar invariance was also obtained between teachers and parents, while with the students some items appeared to have non-invariant thresholds. After consulting the modification indices and a theoretical evaluation, they were freed from constraints, obtaining a partial scalar invariance. Each step is reported in Table 4. On the whole, we collected evidence to support measurement invariance among the different informants.

A comparison of school climate perceptions of students, parents, and teachers

The latent means comparisons (Table 5) highlighted many significant differences across groups.

With regard to the comparison between students and teachers, we found that teachers reported significantly higher scores in all the dimensions, with the exception of student relations and educational climate. In the student–teacher relations and interpersonal justice dimensions, the difference reported a large effect size, while in the remaining dimension effects, sizes were medium or small. We also found significant differences when comparing students and parents, with parents reporting lower scores in student support and higher scores in interpersonal justice and student–teacher relations; however, effect sizes were small for the first two differences and medium for the third. Teachers and parents also differed significantly in student support, student–teacher relations, and interpersonal justice, with parents reporting worse perceptions on all dimensions. Effect sizes were small except for the differences in the perception of student support, which reported a medium effect size.

Associations between classroom practices and school atmosphere dimensions for students and teachers

After exploring the associations between *classroom practices* and *school atmosphere*, we removed nonsignificant paths to obtain a final simpler model. This model showed good fit to our data: $MLR \chi^2(17)=24.621$, $p=0.104$; $RMSEA=0.05$; $CFI=0.99$; $SRMR=0.05$. The dimensions rules and positive teaching emerged to be significantly associated with *school atmosphere* dimensions (path coefficients for the full sample are reported in Table 6).

Table 2 Factor loadings (λ) from the CFA on the teacher version of MSCQ and composite reliability scores for each factor (ω)

	λ	ω
<i>Section 1. Classroom practices</i>		
Rules (R)		.87
R1. Students know the consequences for breaking the rules	.59	
R2. Most people know the school rules	.53	
R3. At school, some time is spent to explain the rules clearly to students	.76	
R4. It is easy to obtain information about the school rules	.64	
R5. The rules are clear and easy to understand	.75	
R6. Teachers enforce the rules	.68	
R7. Teachers intervene when a student doesn't keep to the rules	.70	
Student support (SS)		.72
SS2. When they have problems, students seek the help of adults in the school	.55	
SS3. If students have personal problems, they can easily get help from adults in the school	.65	
SS4. If students have academic problems, they can easily get help from teachers	.87	
Student involvement (SI)		.79
SI1. Students are asked their opinion on the school functioning	.69	
SI2. When it is important, teachers ask students' opinions before making decisions for them	.72	
SI3. There are moments or situations when students can express their opinion on the school	.79	
SI4. Students participate to define rules	.54	
Positive teaching (PT)		.77
PT1. Most teachers appear to draw pleasure from teaching	.65	
PT2. Most teachers appear to love their job	.61	
PT3. Teachers explain what we are about to learn	.58	
PT4. Teachers explain why what we study is important	.58	
PT5. Teachers use methods that make their subject interesting	.66	
Encouragement (E)		.71
E1. Teachers tell us that we can do it	.60	
E2. Teachers encourage students to do their best	.70	
E3. Teachers compliment us when we work hard to learn	.78	
<i>Section 2. School atmosphere</i>		
Student relations (SR)		.81
SR1. Students help each other	.70	
SR2. In general, students get along with one another	.61	
SR3. Students treat one another respectfully	.69	
SR4. Students can count on each other	.65	
SR5. In general, relations among students are friendly	.63	
Student-teacher relations (STR)		.82
STR1. Students and teachers feel good together	.84	
STR2. In general, students and teachers get along with each other	.53	
STR3. Students feel close to most of their teachers and they trust them	.74	
STR4. In general, relations between students and teachers are friendly	.83	
Educational climate (EC)		.72
EC1. At my school, you can really learn and get a good education	.51	
EC2. At my school, you can feel that students' success is the priority for teachers	.57	
EC3. At my school, you can feel that studying is important	.66	

Table 2 (continued)

	λ	ω
EC4. At my school, we are expected to do our best	.63	
EC5. In general, what we learn is interesting	.51	
Sense of belonging (SB)		.91
SB1. I would rather be in a different school	.76	
SB2. At my school, I feel at ease	.85	
SB3. I am proud to be a teacher of this school	.88	
SB4. This school is important for me	.66	
SB5. I love my school	.90	
Interpersonal justice (IJ)		.72
IJ1. Punishment is fair	.63	
IJ2. Students are treated with justice	.45	
IJ3. The rules are fair	.90	

Note. CFAs for the two sections were conducted separately. R=rules; SS=student support; SI=student involvement; PT=positive teaching; E=encouragement; SR=student relations; STR=student–teacher relations; EC=educational climate; SB=sense of belonging; IJ=interpersonal justice

Then we tested a multigroup unconstrained model on students and teachers separately, which reported good fit to our data ($MLR\chi^2(34)=53.049$, $p=0.020$; $RMSEA=0.07$; $CFI=0.99$; $SRMR=0.06$), even though path coefficients appeared to vary greatly. In fact, when we fixed them to be equal in a constrained multigroup model, the model fit reported an unacceptable deterioration ($MLR\chi^2(51)=130.024$, $p=0.000$; $RMSEA=0.12$; $CFI=0.97$; $SRMR=0.19$). Therefore, as the model indicated that the associations between *classroom practices* and *school atmosphere* were not invariant between teachers and students, it was rejected. Path coefficients for both groups from the unconstrained model are reported in Table 6.

Discussion

The purpose of this study, built upon a system approach to school climate (Janosz et al., 1998; Rudasill et al., 2018), was to address two main weaknesses of the literature on school climate, i.e., the scarcity of studies including multiple perspectives and considering separately classroom and school level components of school climate. The findings and their educational implications are discussed in the following sections.

The multi-informant perspective

With regard to our first aim, the MSCQ teacher-version was confirmed to have good psychometric properties, and the factorial structure resulted to be largely the same in the three considered groups of students, parents, and teachers. The dimensions of each questionnaire section reported substantial correlations among them, but not so high as to indicate discriminant validity issues. While acknowledging that these correlations should be interpreted with due caution, we note that they respect the nature of the questionnaire, measuring

Table 3 Correlations, descriptive statistics, and Cronbach's alpha

	1	2	3	4	5	6	7	8	9	10	11	M (SD)	α
Students													
<i>Section 1. Classroom practices</i>													
1	Rules	-										5.06 (.61)	.63
2	Student support	.49**	-									4.77 (.93)	.66
3	Student involvement	.45**	.51**	-								4.13 (1.19)	.74
4	Positive teaching	.51**	.51**	.46**	-							4.73 (.95)	.76
5	Encouragement	.44**	.51**	.46**	.63**	-						4.98 (1.02)	.72
<i>Section 2. School atmosphere</i>													
7	Student relations	.37**	.32**	.33**	.31**	.33**	.14**	-				4.49 (1.08)	.86
8	Student-teacher rel	.45**	.48**	.44**	.64**	.56**	.38**	.45**	-			4.21 (1.16)	.85
9	Educational climate	.56**	.48**	.36**	.67**	.59**	.33**	.39**	.64**	-		4.90 (.89)	.76
10	Sense of belonging	.40**	.38**	.33**	.48**	.41**	.32**	.50**	.54**	.55**	-	4.70 (1.21)	.86
11	Interpersonal justice	.50**	.41**	.38**	.54**	.47**	.34**	.59**	.63**	.54**	.54**	4.55 (1.21)	.76
Teachers													
<i>Section 1. Classroom practices</i>													
1	Rules	-										5.12 (.67)	.87
2	Student support	.46**	-									5.11 (.63)	.72
3	Student involvement	.41**	.53**	-								4.56 (.86)	.78
4	Positive teaching	.54**	.68**	.45**	-							5.01 (.58)	.77
5	Encouragement	.35**	.63**	.56**	.65**	-						5.28 (.63)	.71
<i>Section 2. School atmosphere</i>													
7	Student relations	.35**	.36**	.43**	.36**	.34**	.29**	-				4.58 (.58)	.81
8	Student-teacher rel	.57**	.39**	.47**	.46**	.43**	.35**	.63**	-			4.88 (.59)	.82
9	Educational climate	.64**	.49**	.45**	.61**	.48**	.36**	.51**	.72**	-		5.15 (.54)	.71
10	Sense of belonging	.50**	.23*	.25*	.40**	.30**	.41**	.40**	.58**	.64**	-	5.11 (.90)	.90

Table 3 (continued)

	1	2	3	4	5	6	7	8	9	10	11	M (SD)	α
11	Interpersonal justice	.60**	.28**	.38**	.49**	.42**	.29**	.29**	.50**	.63**	.51**	5.09 (.69)	.67
	Parents												
2	Student support	-	-	-	-	-	-	-	-	-	-	4.64 (.88)	.76
7	Student relations	-	.48**	-	-	-	-	-	-	-	-	4.48 (1.05)	.94
8	Student-teacher rel	-	.67**	-	-	-	.68**	-	-	-	-	4.71 (.90)	.90
9	Educational climate	-	.69**	-	-	-	.58**	.78**	-	-	-	5.10 (.72)	.82
11	Interpersonal justice	-	.58**	-	-	-	.51**	.71**	.68**	-	-	4.87 (1.05)	.80

* $p < .05$. ** $p < .01$. *Note.* The dimension student support was computed without the item SS1 for all the informants

Table 4 Model comparison indices for measurement invariance

Model tested (model compared with)	$MLR\chi^2$	Scaling factor for MLR	df	p	CFI	RMSEA	SRMR	$\Delta S\text{-}B\chi^2$	Δdf	p	ΔCFI	$\Delta RMSEA$
Invariance between teachers and students												
<i>Section 1. Classroom practices</i>												
Configural	460.211	1.1273	380	.000	.953	.037	.060	-	-	-	-	-
Metric (vs configural)	487.292	1.1350	397	.001	.947	.038	.069	26.226	17	.070	-.006	.001
Scalar (vs metric)	550.838	1.1293	414	.000	.920	.046	.073	62.249	17	.000	-.027	.008
-----Less I4	537.912	1.1290	413	.000	.927	.044	.072	55.326	16	.000	-.020	.006
-----Less PT3	528.697	1.1305	412	.000	.931	.043	.072	44.113	15	.000	-.016	.005
-----Less R7	522.132	1.1308	411	.000	.935	.042	.072	36.918	14	.001	-.012	.004
-----Less R6	505.528	1.1310	410	.001	.944	.039	.070	18.512	13	.139	-.003	.001
<i>Section 2. School atmosphere</i>												
Configural	527.254	1.1768	387	.000	.944	.049	.057	-	-	-	-	-
Metric (vs configural)	562.882	1.1929	403	.000	.936	.051	.072	32.225	16	.009	-.008	.002
Scalar (vs metric)	637.202	1.1823	420	.000	.913	.058	.074	87.970	17	.000	-.023	.007
-----Less EC5	620.670	1.1819	419	.000	.919	.056	.073	68.640	16	.000	-.017	.005
-----Less SR3	608.838	1.1820	418	.000	.924	.055	.073	54.192	15	.000	-.012	.004
-----Less SB5	598.936	1.1817	417	.000	.927	.053	.072	42.245	14	.000	-.009	.002
Invariance between teachers and parents												
Configural	537.841	1.2026	320	.000	.945	.057	.052	-	-	-	-	-
Metric (vs configural)	571.746	1.2229	335	.000	.940	.058	.066	31.631	15	.007	-.005	.001
Scalar (vs metric)	612.858	1.2072	350	.000	.933	.059	.066	47.462	15	.000	-.007	.001

Note. S-B χ^2 = Satorra-Bentler chi-square test

Table 5 Latent means comparisons

	CR	Cohen's <i>d</i>
Differences between students (comparison group) and teachers		
<i>Section 1. Classroom practices</i>		
Rules	2.20*	.29
Student support	5.03***	.75
Student involvement	2.22*	.34
Positive teaching	3.89***	.70
Encouragement	4.68***	.78
<i>Section 2. School atmosphere</i>		
Student relations	.01	.00
Student–teacher relations	6.32***	1.03
Educational climate	1.51	.30
Sense of belonging	2.38*	.35
Interpersonal justice	4.11***	.76
Differences between students (comparison group) and parents		
<i>Section 1. Classroom practices</i>		
Student support	- 3.53***	.27
<i>Section 2. School atmosphere</i>		
Student relations	-.30	.02
Student–teacher relations	8.31***	.58
Educational climate	1.37	.11
Interpersonal justice	4.02***	.30
Differences between teachers (comparison group) and parents		
<i>Section 1. Classroom practices</i>		
Student Support	-3.57***	.66
<i>Section 2. School atmosphere</i>		
Student relations	-1.45	.13
Student–teacher relations	-2.02*	.22
Educational climate	-1.24	.13
Interpersonal justice	-2.23*	.29

* $p < .05$. ** $p < .01$. *** $p < .001$

several closely related aspects of the school environment. Even more importantly, measurement invariance between the teacher version and the other two versions was found. This is an important and innovative result that promotes the use of this instrument for multiple informant studies and for score comparisons. A few items were not invariant on the scalar level between students and teachers, but they were scattered in different dimensions so that, in the end, no dimension had fewer than three fully invariant items, which are considered sufficient to compare latent means (Byrne et al., 1989). Overall we can conclude that MSCQ is a valid as well as reliable measure for multi-informant studies.

The good psychometric properties of MSCQ in the three versions allowed us to compare the points of view of different actors on the same dimensions, something that to our knowledge had never been done before. The findings were interesting and have a number of implications for research and practice. In the comparison between students and teachers, we found differences in their perception of student–teacher relations and

Table 6 Unstandardized multigroup path coefficients with latent variables

Independent variable	Dependent variable	Path analysis	Multigroup path analysis (unconstrained)	
		Full sample	Students	Teachers
Rules	Student relations	.40 (.09) ***	.56 (.11) ***	.08 (.07)
Positive teaching	Student–teacher rel	.62 (.07) ***	.76 (.06) ***	.15 (.10)
Rules	Educational climate	.24 (.07) ***	.35 (.08) ***	.08 (.09)
Positive teaching	Educational climate	.45 (.08) ***	.51 (.08) ***	.15 (.13)
Rules	Sense of belonging	.32 (.08) ***	.43 (.11) ***	.13 (.11)
Positive teaching	Sense of belonging	.21 (.09) *	.25 (.11) *	-.03 (.15)
Rules	Interpersonal justice	.36 (.09) ***	.63 (.10) ***	.02 (.07)
Positive teaching	Interpersonal justice	.25 (.09) **	.21 (.09) *	.07 (.12)

* $p < .05$. ** $p < .01$. *** $p < .001$

interpersonal justice, both showing large effect sizes, with teachers scoring higher. Overall, even if with smaller effect sizes, teachers had a more positive view of almost every dimension. This finding is consistent with previous studies (Mameli et al., 2020) and has important practical implications, as teachers' more favorable perceptions may limit their capacity to see and respond to the students' needs and requests (Den Brok et al., 2006; Könings et al., 2014). Moreover, this finding seems to suggest that the quality of relationships between students and teachers and the perceived fairness of the educational environment may be weak points in the overall school climate perceived by students. Given the associations of these school climate components with student outcomes such as motivation (Chory-Assad, 2002) and engagement (Fatou & Kubiszewski, 2018), these results suggest the importance of implementing interventions for improvement in this direction.

In the comparison with their parents, students also showed a more negative view of student–teacher relations and interpersonal justice, further underlining that these school climate components are critical and sensitive aspects of the students' lives. This finding shows that parents' perceptions, which were mostly overlooked (Bear et al., 2015), offer a unique point of view, which may enrich the understanding of how school climate is built and perceived. Indeed, parents also appeared more negative, as compared to students and teachers, on student support. These differences suggest that interventions aimed at helping parents and teachers to share common views and take into account one another's position may improve their collaboration and foster efficient joint actions.

Overall, these findings confirm the need to account for a multi-informant approach in the study of school climate (Wang & Degol, 2016) and the importance to plan and conduct interventions capable of considering and recomposing the different perceptions. In accordance with a systemic view of school life, all the actors want their voices to be heard, and all the points of view concur in the overall perception of the school environment. Developing awareness on the multiple views is undoubtedly a useful stepping stone towards promoting school climate change and improvement. Based on our findings, a practical and feasible way for school climate improvement would be to implement actions aimed at informing students, teachers, and parents about the multiple perspectives and fostering dialogue among them.

Interdependence of classroom practices and school atmosphere dimensions

A further novel element of the present study lies in considering classroom practices and school atmosphere as distinct and yet interrelated factors. This way of conceiving school climate has brought about a step forward in the understanding of the dynamics between these two structural and organizational school entities.

In line with the system theory principles (Rudasill et al., 2018), what individuals do in the classroom reverberate on how individuals feel at school. Indeed, our findings supported the hypothesis that classroom practices are associated with school atmosphere. More specifically, we found that participants (students and teachers together) who perceived better practices in relation to the clarity of rules and to a positive teaching approach also perceived a more stimulating educational environment, a greater sense of belonging and more positive feelings of interpersonal justice. While previous studies found that rules fairness plays a role in decreasing bullying and violent behaviours (Aldridge et al., 2018; Lindstrom Johnson et al., 2017), our findings add that this dimension is also important in building a good school atmosphere. As for positive teaching, consistently with our findings, previous research linked different but related dimensions (i.e., academic emphasis and academic support) with better achievement (Maxwell et al., 2017) and general school satisfaction (Zullig et al., 2011). In the present study, an interesting distinction between the two practices was that higher scores in the Rules dimension were related to the perception of better relations among students, while positive teaching was related to the perception of better relations with teachers. These findings are of great importance, as the perceptions of relationships inside the school are a central aspect of the school climate (Fraser & Walberg, 2005). Having clear and consistently enforced rules contributes to the creation of a learning environment in which good relations among students can thrive, while teachers' enthusiasm is able to promote good student–teacher relations.

Ultimately, through the analysis of the different paths for students and teachers, the multi-informant approach has allowed us to go one step further in the understanding of the associations between practices and atmosphere. A multigroup path analysis (on students and teachers separately) from the classroom practices to the school atmosphere dimensions showed that the above-discussed model was not invariant across both groups. In particular, for the teacher sample, none of the associations emerged as significant. A possible interpretation of this result is that teachers, most of whom can count on many years of teaching experience, may perceive the activities to be carried out in the classroom as more crystallized and static and thus unchangeable. This raises some concern, because if teachers are convinced that changing their practices will not lead to any improvements, they may not make the effort to review such practices in order to exploit their potential for the purposes of improving the school environment. Reflecting on the differences in perceptions might be an important leverage that informs an intervention, and a starting point to ease what, according to our findings, is perceived as a static situation. More specifically, interventions aimed at improving the relational environment in the school might start with actions focused on raising teachers' awareness about the associations in their pupils' perceptions of their practices and the relational environment, which could motivate them on a path of reflection and improvement.

Limitations

The study does have several limitations. First, the data collection in four schools located in the same geographical area limits the scope of the results for two reasons. One is that the limited school sample did not allow us to conduct extensive multilevel analyses

considering between-school variance. Starting from the insights provided by our findings, future studies might address this limitation with wider samples and multilevel analyses, as it was done before on other topics in school climate literature (see for an example Konold, 2018). Moreover, the study focus was on the Italian school context, while most of the reference work comes from the USA. In future research, cross-cultural studies might offer important cues on the links between school contexts and climate. Another limit is that the teacher sample in this study was relatively small and this did not allow us to conduct a rigorous validation of the measures. However, such a limitation is intrinsically related to the aim of comparing different points of views within the same schools, as the student–teacher ratio is necessarily and strongly unbalanced in favor of the former group. Future studies focusing specifically on teachers could address this limitation, providing further evidence of the psychometric properties of the measure, together with its predictive and discriminant validity. We should also note that, as our adult participants responded anonymously using an online platform (procedure employed for encouraging participation), we were unable to match parents, students, and teachers' answers. This is certainly an important limitation that we hope will be addressed with future studies. However, given the absence of previous studies comparing different points of view, this research can still provide useful insights and encourage this new line of inquiry in the study of school climate. Lastly, this is a correlational and cross-sectional study that seeks to understand the processes that operate over time in schools. Therefore, longitudinal data are most certainly needed to confirm the direction of the effects.

Conclusion

In conclusion, we stress the importance to theoretically ground school climate research within a systemic framework, which highlights the importance of accounting for all school actors' points of view and for the interdependence of the various nested levels (Bronfenbrenner, 1992; Rudasill et al., 2018). Notwithstanding the above-mentioned limitations, the multi-informant nature of the present study does offer interesting insights for both research and practice. For research, as this study can inform future studies by suggesting the importance of including different sources of information in order to truly capture the nuanced scenario of school climate. For practice, because reflecting on differences in perceptions and on the associations between everyday classroom practices and school atmosphere may be a first step for the implementation of interventions aimed at promoting a positive school environment.

Author contribution LM participated in conceiving the study design, scientifically supervised the study, contributed to the interpretation of the results, and drafted the manuscript. VG participated in conceiving the study design, conducted the statistical analysis, contributed to the interpretation of the results, and drafted the methodological and results sections of the manuscript. All authors contributed to the final manuscript.

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Declarations

Consent to participate Informed consent was obtained from all individual participants included in the study and their legal guardians. The research was conducted in accordance with the ethical norms of the Italian National Psychological Association.

Conflict of interest The authors declare no competing interests.

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Student engagement, academic emotions, well-being and social relations in school and school climate.

Most relevant recent publications:

- Grazia, V., Molinari, L. (2021). School climate multidimensionality and measurement: A systematic literature review. *Research Papers in Education*. 10.1080/02671522.2019.1697735.
- Grazia, V., Mameli, C., & Molinari, L. (2021). Being bored at school: Trajectories and academic outcomes. *Learning and Individual Differences*, 90, 102049. 10.1016/j.lindif.2021.102049.
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Most relevant recent publications:

- Mameli, C., Grazia, V., Passini, S., Molinari, L. (2021). Student perceptions of interpersonal justice, engagement, agency and anger: A longitudinal study for reciprocal effects. *European Journal of Psychology of Education*. 10.1007/s10212-021-00559-9.

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