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Abstract

The current study aimed to test the factorial structure and psychometric properties of a parent version of the Multidimensional School Climate Questionnaire (MSCQ), a multi-informant and multidimensional measure of school climate recently developed and validated in Italian for a student version, by also providing evidence of measurement invariance between students and parents. Participants were 320 parents, mostly mothers, and 339 students enrolled in four middle schools in Northern Italy. The confirmatory factor analysis (CFA) showed a good fit for the expected six-dimension model (Student Support, Home-school Relations, Student Relations, Student-Teacher Relations, Educational Climate, Justice). All factors were positively correlated with each other and reported good Cronbach's alphas and composite reliability scores (ω). Full configural and metric and partial scalar invariance were achieved between parents and students. These findings confirm that the parent version of the MSCQ is a psychometrically sound measure to assess multidimensional perceptions of school climate. Lastly, limitations and practical implications are discussed.

Keywords: Multidimensional School Climate Questionnaire; school climate; measurement; parent-version; confirmatory factor analysis; invariance

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Worldwide and for quite some time, school climate, defined as the quality and character of school life reflecting norms, values, relations, teaching and learning practices (Cohen, Mccabe, Michelli, & Pickeral, 2009), has been a topic of great interest for scholars in the field of educational psychology (Wang & Degol, 2016). This large and still growing interest is documented by an extensive literature output on the many associations of school climate with important outcomes, such as students' and teachers' mental health and wellbeing (Aldridge & McChenney, 2018; Gray, Wilcox, & Nordstokke, 2017), academic achievement (Berkowitz, Moore, Avi Astor, & Benbenishty, 2017), problem behaviors and violence in school (Reaves, McMahon, Duffy, & Ruiz, 2018; Steffgen, Recchia, & Viechtbauer, 2013). For its impact on such outcomes, school climate is definitely of interest not only for researchers, but also for educators and policymakers, who can make use of scientific results to promote interventions aimed at self-reflection, school change and improvement (Cohen, Mccabe, Michelli, & Pickeral, 2009; Grazia & Molinari, 2019; Thapa, Cohen, Guffey, & Higgins-D'Alessandro, 2013).

However, recent reviews have highlighted a weakness of research in the field, namely that almost all studies on school climate only considered the students' perceptions (Wang & Degol, 2016). Very few studies have included other informants, such as teachers or parents. Indeed, most of the existing measures of school climate have addressed the perceptions of students and have not included versions for other informants (Grazia & Molinari, 2020). This holds true in particular for parents, whose points of view were largely overlooked; to the best of our knowledge, only one multidimensional measure of school climate for parents has been developed (Bear, Yang, & Pasipanodya, 2014).

This is a serious shortfall in the literature, especially considering that school climate has often been conceived within a systemic framework that finds its major strength in the possibility to capture the complexity of the school environment by considering the points of view of different school actors (Wang & Degol, 2016). Hearing everyone's voice is necessary in order to accomplish the long-term aim of improving schools through interventions and to foster self-reflection. Parents in particular, with their being involved and at the same time being outside the school, presumably develop ideas on school climate that are complementary to those of students and teachers (Thapa et al., 2013) and as such deserve to be the subject of study.

Thus, to be able to grasp a complete and nuanced picture, a multi-informant, multidimensional and psychometrically sound measure that enables to compare the perceptions of the various school actors on the same dimensions is needed. In this direction, a crucial point to be considered is that, to make comparisons possible, it is mandatory that the multi-informant measure guarantees measurement invariance among the different groups of respondents. When a measure is invariant, the factorial structure, factor loadings and item intercepts remain equal across groups, thus confirming that what we measure is indeed a construct that is conceived with the same meaning for all participants. The development of a validated multi-informant instrument based on measurement invariance is thus a crucial advance in the study of school climate, allowing researchers to compare scores and interpret differences as due to different perceptions and not to a different understanding of the construct. It is noteworthy that, given the very different school climate experiences of students and parents, only some of the multiple dimensions of school climate will be comprised in both the student- and parent-versions. The study procedures for the selection of dimensions and items are detailed in the Method section.

In this direction, the current study aimed to test the factorial structure and psychometric properties of a parent version of the Multidimensional School Climate

Questionnaire (MSCQ), a multi-informant and multidimensional measure of school climate recently developed and validated in Italian for a student version (Grazia & Molinari, 2019), by also providing evidence of measurement invariance between students and parents.

Method

Participants and Procedure

A convenience sample of parents and students participated in this study. They were recruited in four middle schools in Emilia Romagna (Northern Italy) involved in a larger longitudinal project. In total, 320 parents voluntarily completed the questionnaire by means of an online platform; then, for conducting measurement invariance analyses on comparable groups, a sample of 339 students was randomly selected from the larger student sample. Even though the socio-economic status (SES) was not assessed directly for the study, information on each school were provided by the Italian Ministry of University and Research (MIUR) official website: the four participating schools were mostly attended by students from a medium socio-economic context and a relevant percentage of students (between about 10 and 20%) were immigrant from other countries (mainly Northern Africa and East-Europe), mostly second-generation. Most participating parents were mothers (90%), born in Italy (92%), aged between 41 and 50 years old (75%); they were married or had partners (86%) and had more than one child (69%). Thirty-five per cent had a university degree, 49% a high school degree, 16% a middle school degree. The student sample was equally distributed between genders (51% females); students were for the major part born in Italy (93%) and had a mean age of 11.82 years (SD = .71).

The research was conducted in accordance with the ethical norms defined by the Italian National Psychological Association. Participating parents were recruited with the help of teachers and parents' school representatives. After being informed of the aim of the study and of the confidentiality of their answers and providing their informed consent, parents completed the online questionnaire during an allotted period of time. Participating students

had obtained parental consent and were administered the questionnaire during class hours, using computers and an online platform.

Measure

For this study, we created a parent-version of the MSCQ previously validated in a student-version (Grazia & Molinari, 2019). The student version was made up of two main sections, *Classroom practices* and *School atmosphere.* The first section included five dimensions referring to what is actually done in everyday classroom activities (i.e., Student Support; Student Involvement; Positive Teaching; Encouragement; Class Management). The second section included five dimensions referring to intangible and abstract features of the school environment that individuals are expected to internalize through repeated experiences (i.e., Student Relations; Student-Teacher Relations; Educational Climate; Sense of Belonging; Interpersonal Justice). For the parent-version, we excluded the dimensions of which parents have only an indirect experience and kept five dimensions, one concerning the practices (i.e., Student Support) and four concerning the atmosphere (i.e., Student Relations, Student-Teacher Relations, Educational Climate, Interpersonal Justice). Items from the student version were carefully reformulated to capture the parents points of view (for example, the student-version item: “In my school students help each other” was changed to: “In my child’s school students help each other”). We also added a sixth dimension on Home-School Relations (6 items), which we considered to be very relevant for parents. In the end, the parent-version consisted of 27 items and six dimensions. Participants answered on a 6-point Likert scale ranging from “Completely disagree” to “Completely agree” so that higher scores indicate better perceptions of school climate.

Data Analysis

Analyses were conducted using Mplus version 8.0 (Muthén & Muthén, 2017). To test the factorial structure of the questionnaire, a confirmatory factor analysis (CFA) with the maximum likelihood with robust standard error estimator (MLR) was performed. Various

indices of goodness of fit were used with the following cut offs criteria (Hu & Bentler, 1999; Lai & Green, 2016): root mean square error of approximation (RMSEA < .08), comparative fit index (CFI > .90) and standardized root mean squared residual (SRMR <.08). To test for internal consistency, Cronbach's alphas and composite reliability scores (ω) were computed for each factor (Dunn, Baguley & Brunsden 2014). Configural, metric and scalar measurement invariance between parents and students were tested by comparing nested multigroup models: model structure, factor loadings and item thresholds were sequentially constrained to be equal across groups and differences in fit indices were tested. Cut-offs criteria to accept the more constrained model were ΔCFI ≤ -.010 and ΔRMSEA < .015 (Chen, 2007; Cheung & Rensvold, 2002). Ideally, $\Delta\chi^2$ should be non-significant; however, it is sensitive to sample size so, in case of discrepancy, we considered the other indices sufficient to support the goodness of the model (Cheung & Rensvold, 2002).

Results

To address the first aim, we conducted a CFA on the expected six-factor model, allowing all factors to covary, consistently with the theoretical model. The model reported good fit indices: MLR $\chi^2(309) = 515.61$, $p = .000$; RMSEA = .05; CFI = .95; SRMR =.05. Factor loadings, reported in Table 1, were all significant and ranged from $\lambda = .45$ to $\lambda = .89$.

[Insert Table 1]

Cronbach's alphas and composite reliability scores (ω) were good, supporting the internal consistency of the factors. Bivariate two-tailed Pearson's correlations indicated that all factors were positively correlated. These values and descriptive statistics for each factor were reported in Table 2.

[Insert Table 2]

For the second aim, measurement invariance between students and parents (excluding the Home-School Relations dimension, absent in the student-version) was tested: configural and metric invariance were achieved for all items. Full scalar invariance could not be reached

due to an excessive worsening of the fit indices. After the examination of the modification indices and theoretical reflection, one item was freed (EC5) and partial scalar invariance was reached. Overall our findings, reported in Table 3, supported the measurement invariance.

[Insert Table 3]

Discussion

Despite the large number of studies on school climate, parents' perceptions have been almost completely neglected (Wang & Degol, 2016). Accordingly, there is a lack of multi-informant measures capable of capturing the parents' perceptions and of making comparisons between different populations of school actors. The current study addressed this weakness by providing evidence of the validity of the MSCQ parent-version, that allows researchers to rely on a multi-informant, multidimensional and psychometrically sound measure of school climate.

The CFA revealed that the expected six-dimension factorial structure fits well with the data. As it shows that the same factorial structure holds for students and for parents, this finding confirms the stability of MSCQ as multi-informant. Moreover, Cronbach's alphas and composite reliability scores indicate good internal consistency for all the dimensions.

Full configural and metric invariance were achieved for all items; this result indicates that both the parent and the student versions of the instrument share the same general factorial structure and factor loadings for each item. Partial scalar invariance was achieved after removing item EC5 ("In general, what students learn is interesting"). The removal of this item, after consulting the modification indices, was considered acceptable at a theoretical level because it is reasonable that preadolescent students and adults have different opinions about what is considered to be "interesting," thus influencing the invariance of the item threshold. By and large, our findings support measurement invariance of the instrument between parents and students. This is a very important achievement and a necessary step for

making the MSCQ a measure capable of making comparisons between the various informants' points of view.

Some limitations of the present study need to be recognized. First of all, the data were collected on a convenience sample; the participants were recruited in schools in close geographical proximity and parents were mostly female, thus limiting the heterogeneity of our sample. As for the gender composition of the parent sample, however, it should also be considered that mothers, in Italy but also elsewhere, are far more involved in the school lives of their children as compared to fathers (Tan & Goldberg, 2009). This makes them more likely to take part in school surveys and overall to offer more informed perceptions on the school climate at their children's schools. Secondly, due to refusals from schools, we were unable to collect a second set of data that would have allowed us to conduct test-retest reliability analyses. Future studies may address both these limitations: a repeated use of the instrument, with different samples in different geographical areas may undoubtedly provide more information on group differences and the general stability of the data. Finally, a teacher-version of the MSCQ could improve the strength of the measure further.

Despite these limitations and the consequent necessary caution in interpreting our findings, the study results support the use of the MSCQ parent-version for a multidimensional and multi-informant understanding of school climate. This is a significant contribution both for practical interventions and research purposes. For school workers and managers, the availability of a valid school climate measure accounting for students as well as for parents' perceptions guarantees the possibility to consider the multiple voices and to foster collaboration between schools, families and educational psychologists that is desired to improve schools, develop interventions and foster greater achievement.

In the research field, this study fills in the current lack, in the area of educational and school psychology, of a parent measure with psychometrically sound properties able to capture multiple dimensions of school climate and allowing comparisons with students'

perceptions. Moreover, even though the measure was developed for the Italian context, it is an important step toward a goal desired from schools and educational psychologists elsewhere in the world. Building a knowledge basis on the construct that does not exclusively rely on the students' points of view but includes those of parents is undoubtedly an ambitious objective not only for the advance in the international literature (Wang & Degol, 2016) but also for schools in the 21st century.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author, VG, upon reasonable request.

References

Aldridge, J. M., & McChesney, K. (2018). The relationships between school climate and adolescent mental health and wellbeing: A systematic literature review. *International Journal of Educational Research*, *88*, 121–145. https://doi.org/10.1016/j.ijer.2018.01.012

Bear, G. G., Yang, C., & Pasipanodya, E. (2015). Assessing School Climate: Validation of a brief measure of the perceptions of parents. *Journal of Psychoeducational Assessment*, *33*(2), 115–129. https://doi.org/10.1177/0734282914545748

Beckstead, J. W. (2002). Confirmatory factor analysis of the Maslach Burnout Inventory among Florida nurses. International Journal of Nursing Studies, 39, 785-792. doi:10.1016/S0020-7489(02)00012-3

Berkowitz, R., Moore, H., Astor, R. A., & Benbenishty, R. (2017). A research synthesis of the associations between socioeconomic background, inequality, school climate, and academic achievement. *Review of Educational Research*, *87*(2), 425–469. https://doi.org/10.3102/0034654316669821

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 14*(3), 464-504. https://doi.org/10.1080/10705510701301834

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, *9*(2), 233-255.

Cohen, J., Mccabe, E. M., Michelli, N. M., & Pickeral, T. (2009). School climate: Research, policy, practice, and teacher education. *Teachers College Record, 111*(1), 180-213.

Dunn, T. J., Baguley, T., & Brunsden, V. (2014). From alpha to omega: A practical solution to the pervasive problem of internal consistency estimation. *British Journal of Psychology, 105*(3), 399-412. https://doi.org/10.1111/bjop.12046

Gerbing, D. W., & Anderson, J. C. (1984). On the meaning of within-factor correlated measurement errors. Journal of Consumer Research, 11, 572-580. doi:10.1086/208993

Gray, C., Wilcox, G., & Nordstokke, D. (2017). Teacher mental health, school climate, inclusive education and student learning: A review. *Canadian Psychology/Psychologie canadienne, 58*(3), 203-210. https://dx.doi.org/10.1037/cap0000117

Grazia, V., & Molinari, L. (2019). *School climate research: Italian adaptation and validation of a Multidimensional School Climate Questionnaire* [Manuscript submitted for publication].

Grazia, V., & Molinari, L. (2020). School climate multidimensionality and measurement: A systematic literature review. *Research Papers in Education*. https://doi.org/10.1080/02671522.2019.1697735

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Janosz, M., & Bouthillier, C. (2007). *Rapport de validation du Questionnaire sur l'Environnement Socioeducatif des Écoles secondaires (QES-secondaire)*. Montreal: Groupe de recherche sur les environnements scolaires (GRES), University of Montreal.

Lai, K., & Green, S. B. (2016). The problem with having two watches: Assessment of Fit when RMSEA and CFI disagree. *Multivariate Behavioral Research*, *51*(2–3), 220–239. https://doi.org/10.1080/00273171.2015.1134306

Muthén, L.K. and Muthén, B.O. (1998-2017). *Mplus User's Guide. Eighth Edition*. Los Angeles, CA: Muthén & Muthén

Reaves, S., McMahon, S. D., Duffy, S. N., & Ruiz, L. (2018). The test of time: A meta-analytic review of the relation between school climate and problem behavior. *Aggression and Violent Behavior*, *39*, 100–108. https://doi.org/10.1016/j.avb.2018.01.006

Steffgen, G., Recchia, S., & Viechtbauer, W. (2013). The link between school climate and violence in school: A meta-analytic review. *Aggression and Violent Behavior*, *18*(2), 300–309. https://doi.org/10.1016/j.avb.2012.12.001

Tan, E. T., & Goldberg, W. A. (2009). Parental school involvement in relation to children's grades and adaptation to school. *Journal of Applied Developmental Psychology, 30*(4), 442-453. https://doi.org/10.1016/j.appdev.2008.12.023

Thapa, A., Cohen, J., Guffey, S., & Higgins-D'Alessandro, A. (2013). A Review of School Climate Research. *Review of Educational Research*, *83*(3), 357–385. https://doi.org/10.3102/0034654313483907

Wang, M.-T., & Degol, J. L. (2016). School Climate: A Review of the construct, measurement, and impact on student outcomes. *Educational Psychology Review*, *28*(2), 315–352. https://doi.org/10.1007/s10648-015-9319-1

Table 1
Items and factor loadings from the CFA

In my child's school…	CFA (λ)
SS1. There are professionals meant to help students with academic or personal problems	.45
SS2. When they have problems, students seek the help of adults in the school	.66
SS3. If students have personal problems, they can easily get help from adults in the school	.84
SS4. If students have academic problems, they can easily get help from teachers	.75
HSR1. Parents take part in school activities	.48
HSR2. The school supports parents of students with special needs (personal or academic)	.79
HSR3. Parents are well informed about school activities	.63
HSR4. Parents' opinions on school functioning are asked for and appreciated	.70
HSR5. Parents have a good opinion of the school	.73
HSR6. Parents are quickly informed if a student has academic or behavioral difficulties	.71
SR1. Students help each other	.88
SR2. In general, students get along with one another	.87
SR3. Students treat one another with respect	.86
SR4. Students can count on each other	.88
SR5. In general, relations among students are friendly	.89
STR1. Students and teachers feel good together	.89
STR2. In general, students and teachers get along with each other	.80
STR3. Students feel close to most of their teachers and they trust them	.82
STR4. In general, relations between students and teachers are friendly	.82
EC1. You can really learn and get a good education	.73
EC2. You can feel that students' success is the priority for teachers	.86
EC3. You can feel that studying is important	.60
EC4. Students are expected to do their best	.55
EC5. In general, what students learn is interesting	.70
IJ1. Punishment is fair	.70
IJ2. Students are treated with justice	.85
IJ3. The rules are fair	.74

Note. SS = Student Support; HSR = Home-School Relations; SR = Student Relations; STR = Student-Teacher Relations; EC = Educational Climate; IJ = Interpersonal Justice; λ = factor loading.

Table 2
Descriptive statistics, correlations and Cronbach's alpha for each factor

		1	2	3	4	5	6	M (SD)	α	ω
1	Student Support	-						4.64 (.88)	.76	.77
2	Home-school Rel.	.77**	-					4.79 (.82)	.83	.83
3	Student Relations	.48**	.47**	-				4.48 (1.05)	.94	.94
4	Student-Teacher Rel.	.67**	.66**	.68**	-			4.71 (.90)	.90	.90
5	Educational Climate	.69**	.73**	.58**	.78**	-		5.10 (.72)	.82	.83
6	Interpersonal Justice	.58**	.54**	.51**	.71**	.68**	-	4.87 (1.05)	.80	.81

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

Table 3
Results for measurement invariance between students and parents

Model tested (model compared with)	χ^2	*df*	*p*	CFI	RMSEA	SRMR	$\Delta\chi^2$	Δdf	p	ΔCFI	ΔRMSEA
Configural	528.971	358	.000	.964	.038	.043	-	-	-	-	-
Metric (vs configural)	558.692	374	.000	.961	.039	.050	29.008	16	.024	-.003	.001
Scalar (vs metric)	644.638	390	.000	.946	.045	.053	105.887	16	.000	-.015	.006
- Less EC5	592.959	389	.000	.957	.040	.051	38.227	15	.001	-.004	.001