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Exploring the relationship between school-based management and school climate using PISA data

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Abstract
Although scholars have proposed school climate as a key mediator through which school-based management (SBM) can improve educational outcomes, empirical evidence on the relationship between SBM and school climate improvement is sparse. In this article, we use three waves of Programme for International Student Assessment (PISA) data across 57 countries to examine the association between SBM autonomy and different dimensions of school climate (academic, community, and safety). We find that greater school autonomy is associated with significant improvements in all dimensions of school climate, although the strongest improvements occur in safety. Our results show that these improvements primarily occur when schools are given greater autonomy over students (student assessment, admission, and discipline), whereas giving schools greater autonomy over teachers, budgets, or curricula is not associated with climate improvement. Heterogeneity analysis indicates that increased school autonomy is overall associated with improvement in all three dimensions of school climate in high-income countries but not in low- and middle-income countries. However, the positive association between autonomy over students and school climate is observed in both groups of countries. The results suggest that increased autonomy over students should be prioritized in the sequencing of SBM reforms.

Keywords School-based management · School autonomy · School climate · PISA

Introduction

The COVID-19 pandemic created severe challenges for education systems the world over. At the peak of the pandemic, almost 1.6 billion learners, or 94% of the world's student population, were affected by the closing down of educational institutions (UNESCO, 2020). The school closures led to extensive loss of learning, increased the risk of student dropout, and deepened educational inequalities due to unequal access to remote learning (United Nations, 2022). The combination of school closure and pandemic-induced family stressors also increased the incidence of psychosocial and mental health problems in school-aged children (McNamara, 2021). Overcoming these issues has become more challenging by the fact that public education budgets have been reduced in many low- and middle-income countries (LMICs) and some high-income countries (HICs) (Al-Samarrai et al, 2021).

Under these circumstances, creating a positive and supportive climate in schools is crucial to attracting and retaining students, ensuring their well-being, and overcoming pandemic-induced learning deficits. School climate, defined as the "quality and character of school life" (National School Climate Council, 2007, p. 4), is known to affect students' well-being, motivation, attendance, and educational achievement (Thapa et al., 2013). In this article, we examine the feasibility of one possible route to school climate improvement, i.e., strengthening school-based management (SBM) or school autonomy. This route is of particular interest as SBM administrative structures already exist in many countries, usually in the form of local school committees.

SBM policies aim to decentralize school management by transferring responsibility and autonomy for school operations and decision-making to school-level actors. First

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introduced in Australia in the 1970s, SBM has become increasingly prevalent in school systems across the globe (Caldwell, 2005). Several studies have shown a positive influence of SBM on student outcomes. A recent meta-analysis of the empirical evidence concluded that SBM leads to small reductions in student dropouts, statistically significant reductions in grade repetitions, and robust increases in test scores, although there is considerable heterogeneity in the effects across contexts (Carr-Hill et al., 2018).

However, whereas researchers have broadly evaluated the effects of SBM on student outcomes, there has been less progress on proposing a clear conceptual pathway from SBM to learning improvements (Cheng & Cheung, 2004; Cheung & Cheong Cheng, 2002). In this regard, observers have identified school climate as a key mediator in the relationship between SBM and student educational achievement (Cook, 2007; Fullan & Watson, 2000; Mejia & Filus, 2018). Yet, the relationship between SBM and school climate has been insufficiently explored in the literature (Ho, 2005).

In our view, there are several good reasons to empirically examine this relationship. First, it cannot be assumed that SBM implementation will necessarily improve school climate. Although the rationale for introducing SBM policies is usually framed in terms of greater accountability, efficiency, relevance to local issues, and responsiveness and rapidity of decision-making, school principals and teachers often struggle with the consequent changes to their roles and the added administrative and managerial demands (De Grauwe, 2005); in turn, the potential for conflict between different sets of school-level actors increases (Addi-Raccah & Ainhoren, 2009; Bæck, 2010). Given the relational nature of school climate and the importance of strong interpersonal relationships in fostering a positive school climate, there exists a potential tension between implementing school autonomy and improving school climate.

Second, different domains of school autonomy can affect school climate in different ways. Some SBM studies have highlighted particular areas of conflict or contention: For instance, teachers frequently resent parental supervision of their activities in the classroom and encroachment on their pedagogical autonomy, and principals are unhappy about sharing decision-making on school budgets with the community while remaining ultimately accountable for school performance (Bæck, 2010; De Grauwe, 2005). Because conflict has the potential to negatively impact school climate, it is important to explore whether school autonomy domains associated with higher conflict are also associated with worse school climate.

Finally, the relationship between school autonomy and school climate can also vary significantly across contexts. Previous research has demonstrated that the socioeconomic contexts surrounding SBM implementations have significant implications for its effects on learning outcomes, with SBM arrangements increasing student achievement in developed countries but reducing it in developing countries (Hanushek et al., 2013). It would therefore be instructive to explore whether the association between school autonomy and school climate also varies by development status. Accordingly, we aimed to answer the following three research questions:

RQ1 What is the association between overall school autonomy and school climate?

RQ2 What are the associations between individual domains of school autonomy and school climate?

RQ3 Does the association between school autonomy and school climate vary between HICs and LMICs?

We examined these research questions using data from the public schools of 57 countries/regions[1] obtained from the 2009, 2012, and 2015 Programme for International Student Assessment (PISA) surveys. We examined associations between school autonomy and overall school climate as well as specific climate subdomains, namely the academic climate of the school (academic climate), the quality of interpersonal relationships between the student and teacher communities (community climate), and the perceived extent of physical and emotional student safety (safety climate). We also examine associations between specific domains of school autonomy (autonomy over teachers, budgets, students, and curricula) and school climate improvements.

Literature review

School-based management

SBM is defined as "the systematic decentralization to the school level of authority and responsibility to make decisions on significant matters related to school operations within a centrally determined framework" (Caldwell, 2005, p. 1). The key assumption underlying SBM models is that giving responsibility to school-level actors improves school outcomes by harnessing their deeper local knowledge about the school, students, and local environment. When parents and local community members are involved in SBM, as is often the case, improved outcomes also result from increased scrutiny and accountability.

[1] Note that this group includes East Asian cities/regions such as Hong Kong and Macau. For simplicity, however, we henceforth refer to the group as countries.

SBM reforms have been popular in both developed and developing countries. Such reforms are often strongly encouraged by international development agencies and aid donors as part of decentralization reforms. However, SBM models vary widely between countries mainly along two major dimensions: autonomy and participation (Patrinos et al., 2009). Autonomy refers to the degree of responsibility that is devolved, whereas participation refers to the actors to whom responsibility is devolved. Low-autonomy models might allow school-level actors to play an advisory role, whereas high-autonomy models would give them substantive powers over various domains of school operations.

Another aspect of autonomy concerns the domains of school management in which school-level actors are given decision-making powers. School autonomy encompasses a wide variety of functions that can be devolved to decision-makers at the school level, including (a) personnel management (paying staff salaries, hiring and firing teachers and administrative staff, establishing incentives for teachers, and supervising and evaluating teachers); (b) pedagogy (setting classroom hours by subject, selecting textbooks/curricula, setting mode of instruction, and setting the school calendar); (c) school maintenance and infrastructure (building and maintaining the school and buying school materials); (d) school budget (allocating and overseeing the school budget and deciding the school fees); and (e) school monitoring and evaluation (Patrinos et al., 2009). Regarding participation, Patrinos et al. (2009) distinguished between four main models: administrative-control SBM, professional-control SBM, community-control SBM, and balanced-control SBM. In the first three models, control is devolved primarily to the school principal, teachers, and parents and local community members, whereas in the fourth model, control is shared by all three groups of actors.

Empirical evaluations of SBM have indicated that it favorably impacts school enrollment (Sawada et al., 2016), student attendance (Jimenez & Sawada, 1999), grade passing and repetition (Carnoy et al., 2008; Gertler et al., 2012), student dropout (Jimenez & Sawada, 2014; Murnane et al., 2006), teacher attendance (Chen, 2011), teacher effort (Di Gropello & Marshall, 2011), and test scores (Carr-Hill et al., 2018; Ling et al., 2010; Yamauchi, 2014).

School climate

Mitchell et al. (2010) defined school climate as "the shared beliefs, values, and attitudes that shape interactions between the students, teachers, and administrators. These tacit rules delineate the parameters of acceptable behavior and norms for the school" (p. 272). As the definition suggests, school climate is a broad and multidimensional concept. Although there is a lack of consensus about the precise dimensions and measurement of the concept of school climate, most scholars agree that the teaching and learning context, relationships between actors, safety, and institutional features of the school are key aspects.

Wang and Degol (2016), for instance, listed the following four main domains of school climate: academic climate, community, safety, and the institutional environment. The academic climate domain includes teaching and learning practices and expectations, the role of school leadership in shaping and executing a vision for the school, and support for professional development of teachers and staff. The community domain relates to the quality of interpersonal relationships in the school and whether students feel a sense of connectedness, belonging, and acceptance; it also includes the quality of relationships with parents and other community members. The safety domain relates to students' physical and emotional safety and maintenance of order and discipline are maintained in the school. Finally, the institutional environment domain is concerned with the physical characteristics of the school, availability of school resources, and organizational aspects such as class size, school schedules, and ability to track students. Other researchers have proposed similar conceptualizations (Larson et al., 2020; Thapa et al., 2013).

The concept of school climate has gained prominence as our understanding of its role in improving student outcomes has increased. These outcomes include students' increased self-esteem and improved self-concept; better mental health and psychological well-being; increased motivation to learn; reduced aggression, violence, victimization, and bullying in school; reduced alcohol and drug use; reduced absenteeism and suspension rates; and increased achievement as well as improved teacher retention (Thapa et al., 2013). In a systematic review of studies on the relationships between school climate and students' behavioral, academic, and emotional outcomes, findings from all but two studies indicated associations in the expected direction, i.e., with positive school climate correlated with improved student outcomes (Larson et al., 2020). Berkowitz et al. (2017) found that a positive school climate can mitigate the negative effects of socioeconomically disadvantaged background on student achievement, thereby helping to reduce the achievement gaps between students with high and low socioeconomic status. Darling-Hammond and Cook-Harvey (2018) concluded that "a positive school climate is at the core of a successful educational experience."

Relationship between school-based management and school climate

Researchers have suggested school climate as a key mediator in the relationship between SBM and student achievement. Cook (2007) proposed that effective SBM reform first improves the school's social and academic climate and that

that in turn leads to improvements in students' academic achievement. Fullan and Watson (2000) noted that structural SBM reform must be succeeded by "cultural" changes such as the development of greater collaboration and professional exchange of ideas among teachers, a greater sense of collective responsibility for student development, and improvements in the school–community relationship before stakeholders can expect to see improvements in educational outcomes.

Mejia and Filus (2018) proposed that SBM would lead to changes in school culture that would have positive effects on the attitudes and behaviors of teachers, students, and parents; improvements in culture and attitudes would in turn lead to improved school quality and, ultimately, improved student achievement. Indeed, Bruns et al. (2011) suggested that tracking intermediate changes in school climate would be a useful way of gauging whether SBM reforms ultimately improve learning outcomes. Consequently, in this article, we focus on SBM as a key school-level structural reform and examine its relationship with school climate.

A primary rationale for focusing on SBM stems from its emphasis on increased autonomy; scholars have consistently argued that autonomy is an important contributor to improved organizational climate. There are two streams of literature in which organizational climate functions as a dependent variable. The first stream comes from organizational psychology and explores climate at the individual level. Here, organizational climate is conceptualized as situational: a function of several variables that constitute the psychological environment, such as camaraderie, support, and control over one's own life (Auh et al., 2011; Moran & Volkwein, 1992). More specifically, researchers have used frameworks such as the self-determination theory to understand how discretion, control, and freedom are tied into the concept of individual empowerment and thereby determine the perceived climate of the individual working in the organization (Auh et al., 2011; Ryan & Deci, 2000). The second stream of literature explores organizational climate at the structural level and is much less researched. This stream argues that at the organizational level, the organization's physical environment (such as facilities), structural environment (such as span of control, organizational size, levels of hierarchy, and autonomy provided to employees), and process environment (such as reward orientation, involvement in planning and goal setting, and salary) are key to understanding organizational climate (James & Jones, 1974; Lawler et al., 1974).

The above discussion suggests that giving school-level actors some degree of autonomy to manage their own affairs can improve school climate by enhancing their feelings of agency, empowerment, control, and motivation (Dou et al., 2017). SBM arrangements that increase the involvement of teachers in school decision-making have been shown to increase teachers' sense of empowerment, self-efficacy, commitment, and sense of community (Dee et al., 2003; Gaziel, 1998). Additionally, SBM arrangements that involve community members in school management can help create stronger community partnerships, which positively impact school climate.

However, SBM also has the potential to create interpersonal conflict at the school level (Addi-Raccah & Ainhoren, 2009; Bæck, 2010; Leithwood & Menzies, 1998a, 1998b), increase role conflict for school administrators and teachers by changing established management and accountability mechanisms (De Grauwe, 2005; Nir & Eyal, 2003), and introduce sociopolitical tensions of the community into schools by promoting community involvement in school management (De Grauwe, 2005). Empirically analyzing the relationship between SBM and school climate is necessary for determining whether the positive or negative effects predominate.

In addition to examining the relationship between the extent of overall school autonomy and school climate, the SBM literature also suggests examining the associations between different domains of school autonomy with school climate as a promising line of inquiry. This is because SBM studies have highlighted the likelihood of conflict or contention in particular domains of school management. Curriculum and pedagogy is one such domain. Studies have shown that teachers frequently resent parental supervision of their activities in the classroom and encroachment on their pedagogical autonomy (Bæck, 2010; De Grauwe, 2005). Addi-Raccah and Ainhoren (2009) noted that "teachers feel that parents' empowerment decreases their well-being, introduces uncertainty into their work, and raises questions about their professional discretion." School budgets are another contentious domain; principals are often dissatisfied about sharing decision-making on school budgets with the community while remaining ultimately accountable for school performance (De Grauwe, 2005).

The importance of taking a domain-specific approach to examining school autonomy is also highlighted by studies that show that the effect of SBM on test scores varies with the domain in which schools are granted greater autonomy. Luschei and Jeong (2020) observed that SBM resulted in higher student achievement when teachers were granted greater autonomy, particularly in the areas of school staffing and setting curricula. Wößmann (2003) found that test scores increased when schools were given greater control over personnel management but decreased when they were given greater control over setting curricular standards or school budgets, as the latter generated incentives for opportunistic behavior.

Fuchs and Wößmann (2007) also found that the relationships between domains of school autonomy and test scores was different in systems with and without external exit

exams and that students in schools with greater autonomy over course content, textbooks, and teacher salaries exhibited higher test scores in school systems with external exit exams. In contrast, Maslowski et al. (2007) found that school autonomy models in which schools were given responsibility for personnel management were associated with lower reading achievement once compositional differences in the student body were accounted for.

Finally, the SBM literature also highlights that the effects of school autonomy are heterogeneous between high-income and low-income countries. Carr-Hill et al. (2018) examined SBM effectiveness in LMICs and observed that there were positive effects on test scores in middle-income but not in low-income countries. Hanushek et al. (2013) found that school autonomy had a positive effect on student achievement in developed countries but a negative effect in developing countries and concluded that SBM reforms in countries with weak institutional structures might in fact be inimical to school performance and student learning.

However, little empirical research exists on the relationship between SBM and school climate. A notable exception is a study by Ho (2005), who examined the effect of SBM on educational outcomes using school climate as a mediating variable. She found no association between school-based decision-making per se and mathematics performance, but also found a strong positive association between teachers' participation in school-based decision-making and performance, almost all of which was explained by intermediate improvements in school climate (Ho, 2005).

Data and methodology

The data

We used data from the PISA surveys designed and carried out by the Organisation for Economic Co-operation and Development (OECD); PISA is a triennial international survey that measures the academic performance of 15-year-old students.[2] PISA uses a two-stage sampling design for data collection. In the first stage, the sampling units were schools with 15-year-old students. Schools are identified from a national list of all schools and sampled using probability proportional to size sampling. In the second stage, students in selected schools were the sampling units, and all students aged 15 had an equal probability of being sampled. PISA takes utmost care to ensure that the data are representative and comparable across countries and years, and this includes strict quality controls during all stages of the survey including questionnaire design, sampling, and verification. Because of this strict quality control, PISA datasets have been widely used in the literature to analyze various school- and student-level outcomes (Hanushek et al., 2013; Ho, 2005; Trinidad, 2020).

The PISA surveys are designed and weighted to be proportional to the population at the student level (OECD, 2012, 2014, 2017), and they collect a wide range of information on students' domestic and academic lives. However, the surveys are also excellent sources of information at the school level because the principals of the sampled schools complete questions on school information, producing detailed information on school facilities, management systems, staffing, assessment mechanisms and school climate (OECD, 2012, 2014, 2017). Because our primary variables of interest, school climate and school autonomy, were both at the school level, we primarily utilized the school-level dataset for this study. However, to account for environmental factors at the school level such as students' average economic status or parental education, we also aggregated student-level data for such variables (appropriately scaled) to the school level.

We constructed a panel dataset using data from the years 2009, 2012, and 2015. Since different schools are sampled in different years, the panel was constructed at country-level. To ensure the panel was balanced, we only selected countries with data available across all 3 years, resulting in 57 countries for the analysis. Although several other iterations of data are available before and after the years mentioned here, data from the three selected years share common questions on the key variables and therefore are comparable; these include questions on the nature and extent of school autonomy and various indicators related to school climate. The observations were scaled using PISA-provided weights. Missing data were not a significant concern in our analysis as fewer than 5% of observations for the dependent and independent variables were missing. Despite the low proportion of missing data, we conducted Little's test (Li, 2013), which confirmed that variables were missing at random.

We retained only public schools for the analysis. The final dataset contains information on 36,513 schools across the 3 years from 57 different participating countries. Countries included in the analysis consisted of both LMICs and HICs.[3] The complete list of countries used for the analysis is available in Online Annex A.

[2] Data used for this study are publicly available on OECD's PISA platform: https://www.oecd.org/pisa/data/.

[3] The countries have been classified as per World Bank's World Development Indicators. Complete list of countries and their classification can be found here: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.

Variables

This section describes how we constructed the dependent variable, key independent variables, and control variables used in the analysis. A complete list of all variables used in the study with their description is available in Online Annex B.

Dependent variable

Our dependent variable was school climate. Following Wang and Degol's (2016) conceptualization of school climate, we used indicators from the PISA school questionnaires to construct subindices for the schools' academic, community, and safety climates. However, whereas Wang and Degol also conceptualized a fourth category to represent the school's institutional climate that included school maintenance, infrastructure, and provision of educational resources, we did not operationalize this category as it is heavily skewed toward tangible school inputs and resources. School inputs undoubtedly contribute to, but are somewhat removed from, individuals' psychological experiences within schools that constitute the essence of school climate (O'Malley et al., 2012). In this article, we focused on the behavioral, relational, and intangible aspects of school climate. Although we followed Wang and Degol (2016) when constructing our school climate subindices, our categories of academic, community, and safety climate also resemble Thapa et al.'s (2013) teaching and learning, relationships, and safety and to some extent the "Instructional Context," "Relationships and Support," and "Social Climate and Safety" categories conceptualized by Larson et al. (2020).

We calculated the means of the following indicators to measure a school's academic climate: extent of teacher absenteeism and extent to which teachers meet students' needs; these two indicators measure commitment to teaching and learning in the school. Similarly, we calculated the means of the following two indicators to measure the community domain of school climate: whether students have respect for teachers and whether teachers are too strict with students; these indicators measure the quality of interpersonal relationships between students and teachers in the school. We used the means of the following four indicators to measure school safety: students' use of alcohol or illegal drugs; students intimidating or bullying other students; students skipping classes; and student absenteeism. These indicators measure the degree to which the school provides a physically and emotionally secure, orderly, and disciplined environment for students. We also constructed an overall composite variable: the simple mean of all eight climate-related indicators. Other researchers including Ho (2005) and Trinidad (2020) have used similar school climate indices.

For each indicator listed above, the PISA surveys ask school principals the following question: "In your school, to what extent is the learning of students hindered by the following phenomena?". The responses are measured as ordinal variables where the categories "not an issue at all," "very little," "to some extent," and "a lot" are represented by values 1, 2, 3, and 4, respectively. We inverted the response scale so that larger values represented better school climate. During the analysis, we examined the associations of our primary independent variable (school autonomy) with school climate, as well as with the three climate sub-dimensions (academic climate, community climate, and safety climate) separately.

Key independent variable

Our key independent variable of interest was school autonomy. The PISA school questionnaire inquires about a wide range of tasks that can potentially be undertaken at the school level, including (1) selecting teachers for hire; (2) firing teachers; (3) deciding on teachers' starting salaries; (4) deciding on teachers' salary increases; (5) formulating total school budget; (6) allocating school budget; (7) establishing student discipline policies; (8) establishing student assessment policies; (9) approving students for enrollment; (10) choosing textbooks; (11) determining course content; and (12) deciding on courses offered. The survey asks principals whether responsibility for carrying out these tasks lies with them, teachers, a school governing board (SGB), the regional authority, or the national education authority.

We defined a task as being under SBM if it was the responsibility of teachers, the principal, or the SGB. We classified the tasks into four domains: autonomy over teachers (tasks 1–4); autonomy over the school budget (5,6); autonomy over students (7–9); and autonomy over the school curriculum (10–12). We measured school autonomy in a particular domain as the mean score of the school's autonomy over the tasks in that domain and measured overall school autonomy as the mean score of school autonomy over all 12 tasks.

Control variables

We included various school-level characteristics as control variables that consisted of two types: those measuring the socioeconomic status of the average student in the school and those measuring other school-specific characteristics. To measure an average student's socioeconomic status, we included the following variables: parental education; average availability of education-related aids and possessions at home; and household assets measured by access to TV, car, computer, and bathroom. Other school-specific characteristics included school location (urban vs. rural), student enrollment, size of full-time teaching staff, and availability

Table 1 Summary statistics

	Count	Mean	Standard deviation	Minimum	Maximum
Types of school climates					
Academic climate	35,574	3.03	0.65	1	4
Community climate	35,762	3.06	0.57	1	4
Safety climate	35,782	2.94	0.59	1	4
School climate	35,785	3.01	0.49	1	4
Types of SBM autonomy					
Autonomy over teachers	36,091	0.36	0.36	0	1
Autonomy over budget	36,075	0.73	0.35	0	1
Autonomy over students	36,068	0.84	0.26	0	1
Autonomy over curriculum	36,081	0.72	0.36	0	1
Overall SBM autonomy	36,035	0.66	0.23	0	1
Parental education	35,046	12.66	3.55	3	18
Index of educational assets	32,915	8.48	2.56	0	12
Index of household assets	34,099	3.51	0.86	0	4
Location of school (Rural = 1)	36,016	0.14	0.35	0	1
Total enrolled students	34,300	728.92	622.84	5	15,000
	34,300	49.35	15.79	0	100
Number of full-time teachers	34,098	45.67	36.35	0	639
Facilities in school	35,126	0.66	0.27	0	1
Number of schools	36,513	36,513	36,513	36,513	36,513
Number of countries	57	57	0	57	57

Source Authors' calculations based on PISA data

of various school-level facilities for students. Table 1 provides summary statistics of the variables described above (a detailed description can be found in Online Annex B).

Estimation strategy

The school climate (SC) of school i in country c in year t is given by the function

$$SC_{cti} = \mathcal{F}\left(SF_{cti}, SE_{cti,}SA_{cti}\right) \tag{1}$$

where SF refers to school facilities, SE is students' socioeconomic status, and SA is the level of school autonomy. To estimate the association between SA and SC, a starting point is the regression

$$SC_{cti} = \beta_0 + \beta_1 SA_{cti} + \beta_2 SF_{cti} + \beta_3 SE_{cti} + \varepsilon \tag{2}$$

However, school climate is also affected by (a) country-specific sociocultural factors such as characteristics of the national schooling system or national attitudes toward schooling; (b) secular time-specific shocks such as global economic downturns or disease outbreaks that affect all countries in the same way; and (c) time-specific shocks that affect individual countries, such as changes in national education policies in a particular year. As none of these factors are directly observable in our data, the true error term can be represented by

$$\varepsilon = \varepsilon_{cti} + \eta_c + \eta_t + \eta_{ct} \tag{3}$$

where ε_{cti} is the error term orthogonal to the explanatory variables; η_c consists of factors specific to country c that are stable (time invariant) and potentially unobservable; η_t consists of time-varying global trends or shocks; and η_{ct} consists of time-varying country-specific factors. To account for the potential bias that η_c, η_t, and η_{ct} might have caused in estimating our main parameter of interest (β_1), we included country-specific, year-specific, and country–year-specific dummy variables in Eq. (2), which became

$$SC_{cti} = \beta_0 + \beta_1 SA_{cti} + \beta_2 SF_{cti} + \beta_3 SE_{cti} + \mu_t + \mu_c + \mu_{ct} + \nu_{cti} \tag{4}$$

where μ_t is a set of year-specific dummies, μ_c is a set of country-specific dummies, and μ_{ct} consists of country-year dummies. Therefore, we used panel regression with country, year, and country-year fixed effects to understand the relationship between school autonomy and school climate.

Results

Table 2 shows the results of regressing school climate on overall school autonomy. The results showed positive and significant associations between overall school autonomy and all dimensions of school climate. SBM was positively

Table 2 Association between school autonomy and school climate

Variables	Academic climate	Community climate	Safety climate	School climate
Overall SBM autonomy	0.182**	0.177*	0.249***	0.207***
	(0.081)	(0.093)	(0.088)	(0.075)
Parental education	− 0.010***	− 0.005	− 0.000	− 0.005*
	(0.004)	(0.003)	(0.003)	(0.003)
Index of educational assets	0.005	0.017***	0.020***	0.014***
	(0.006)	(0.005)	(0.005)	(0.005)
Index of household assets	0.020	− 0.003	0.008	0.008
	(0.019)	(0.018)	(0.018)	(0.016)
Location of school (Rural = 1)	0.075**	0.132***	0.190***	0.131***
	(0.035)	(0.033)	(0.032)	(0.029)
Total enrolled students	− 0.000***	− 0.000	− 0.000**	− 0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Number of full-time teachers	− 0.000	− 0.000	0.000	− 0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Facilities in school	0.008	0.002	0.016	0.008
	(0.013)	(0.010)	(0.010)	(0.008)
Constant	3.390***	3.422***	3.175***	3.327***
	(0.109)	(0.095)	(0.086)	(0.080)
Country FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Country-year	Y	Y	Y	Y
Observations	27,737	27,865	27,878	27,878
R^2	0.146	0.139	0.222	0.194

Standard errors in parentheses

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

and significantly correlated with academic climate, community-based climate, school safety, and, consequently, overall school climate. The association was strongest between SBM and safety climate.

We also examined the relationship between specific domains of school autonomy and school climate. As described above, we classified school autonomy into four domains, namely, autonomy over teachers, autonomy over budget, autonomy over students, and autonomy over curriculum to understand whether some aspects of school autonomy are more closely associated with school climate improvement than others. Table 3 shows the results of regressing school climate on the separate domains of school autonomy, indicating that not all aspects of school autonomy were important in improving school climate.

Specifically, autonomy over budget and curriculum had no significant association with any components of school climate. Autonomy over teachers was weakly associated with improved academic climate but did not have any positive association with the community climate or safety climate of the school. In contrast, autonomy over students was positively and significantly associated with all three dimensions of school climate. The estimated coefficient was largest for the academic climate dimension.

We also examined whether the association between SBM and school climate varies between higher- and lower-income countries. Hanushek et al. (2013) found that school autonomy affects student performance positively in developed countries but negatively in developing countries. Our purpose was to examine whether there is similar heterogeneity in the relationship between school autonomy and school climate. We classified countries according to their income level into two categories, HICs and LMICs, and estimated separate regressions to understand the relationship between SBM and school climate in each category; the results are shown in Table 4. Increased school autonomy was associated with improvement in all three dimensions of school climate in HICs, with the strongest associations seen for community climate and safety climate. However, apart from a significant improvement in safety climate, we found no significant relationship between school autonomy and school climate in LMICs.

In our final set of results, we examined the differences in the associations between various domains of school autonomy and school climate between HICs and LMICs (Table 5). The findings were comparable with the results of Table 3 in that autonomy over students was the only domain of autonomy

Table 3 Association between domains of school autonomy and school climate

Variables	Academic climate	Community climate	Safety climate	School climate
Autonomy over teachers	0.105*	0.039	0.053	0.068
	(0.056)	(0.054)	(0.047)	(0.045)
Autonomy over budget	0.004	0.027	0.033	0.025
	(0.044)	(0.041)	(0.042)	(0.038)
Autonomy over students	0.204***	0.153**	0.173***	0.176***
	(0.059)	(0.061)	(0.061)	(0.050)
Autonomy over curriculum	− 0.055	− 0.003	0.034	− 0.011
	(0.054)	(0.050)	(0.049)	(0.045)
Parental education	− 0.009***	− 0.005	− 0.000	− 0.005*
	(0.004)	(0.003)	(0.003)	(0.003)
Index of educational assets	0.006	0.017***	0.020***	0.014***
	(0.006)	(0.005)	(0.005)	(0.005)
Index of household assets	0.019	− 0.003	0.008	0.008
	(0.019)	(0.018)	(0.018)	(0.016)
Location of school (Rural = 1)	0.067*	0.126***	0.184***	0.125***
	(0.035)	(0.032)	(0.032)	(0.029)
Total enrolled students	− 0.000***	− 0.000	− 0.000**	− 0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Number of full-time teachers	− 0.000	− 0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Facilities in school	0.009	0.003	0.017*	0.009
	(0.013)	(0.010)	(0.010)	(0.008)
Constant	3.345***	3.378***	3.127***	3.283***
	(0.110)	(0.103)	(0.091)	(0.083)
Country FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Country-year	Y	Y	Y	Y
Observations	27,733	27,861	27,874	27,874
R^2	0.148	0.140	0.223	0.196

Standard errors in parentheses

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

significantly associated with improvement in school climate. This was the case for both HICs and LMICs.

To test the robustness of the findings, we also estimated separate regressions classifying high- and upper-middle-income countries as one group, and lower-middle and lower-income countries as another group, and the results (not reported here) remained consistent with those in Tables 4 and 5.

Discussion and conclusion

The aim of this article was to examine the association between school autonomy and school climate improvement. We considered three dimensions of school climate (academic climate, community climate, and safety climate) and four domains of school autonomy (autonomy over teachers, autonomy over budget, autonomy over students, and autonomy over curriculum) in our analysis. In addition to generating average associations for the entire sample, we conducted subsample analyses for LMICs and HICs separately.

This article extends the scholarly discourse on SBM in three ways. First, it demonstrates that SBM is positively associated with school climate improvement. Using panel data analysis with a large set of fixed effects including country, year, and country-year fixed effects, we showed that increased school autonomy was associated with statistically significant increases in overall school climate as well as each of the three individual climate dimensions (academic, community, and safety), although the association with community climate improvement was only weakly significant. Because the relationship between SBM and school climate is not well documented, our study contributes to the SBM literature by empirically

Table 4 Association between school autonomy and school climate of high-income countries and LMICs

Variables	High-income countries				Low-income countries			
	Academic climate	Community climate	Safety climate	School Climate	Academic climate	Community climate	Safety climate	School Climate
Overall SBM autonomy	0.247**	0.346**	0.309**	0.300**	0.136	0.058	0.196**	0.138
	(0.109)	(0.157)	(0.153)	(0.118)	(0.114)	(0.095)	(0.094)	(0.089)
Parental education	− 0.003	− 0.003	0.006	0.000	− 0.013***	− 0.006	− 0.003	− 0.007**
	(0.006)	(0.005)	(0.005)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
Index of educational assets	0.004	0.018**	0.030***	0.017**	0.005	0.015*	0.012*	0.010
	(0.008)	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)	(0.007)	(0.006)
Index of household assets	0.015	− 0.011	0.014	0.006	0.023	0.004	0.014	0.014
	(0.045)	(0.046)	(0.053)	(0.045)	(0.021)	(0.019)	(0.018)	(0.017)
Location of school (Rural = 1)	0.045	0.108**	0.221***	0.125***	0.091*	0.137***	0.162***	0.128***
	(0.050)	(0.048)	(0.050)	(0.042)	(0.048)	(0.044)	(0.041)	(0.039)
Total enrolled students	− 0.000	0.000	0.000	0.000	− 0.000***	− 0.000	− 0.000***	− 0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of full-time teachers	− 0.001*	− 0.001	− 0.001	− 0.001	0.001	− 0.000	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Facilities in school	0.010	− 0.003	0.003	0.003	0.007	0.002	0.018*	0.009
	(0.022)	(0.025)	(0.028)	(0.023)	(0.015)	(0.010)	(0.010)	(0.009)
Constant	2.600***	2.707***	2.328***	2.546***	3.422***	3.495***	3.290***	3.399***
	(0.231)	(0.240)	(0.226)	(0.213)	(0.129)	(0.103)	(0.092)	(0.091)
Country FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Country-year FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	19,105	19,228	19,235	19,235	8,632	8,637	8,643	8,643
R^2	0.096	0.075	0.144	0.098	0.170	0.174	0.267	0.238

Standard errors in parentheses

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

demonstrating that granting schools greater autonomy to manage their own affairs contributes to significant improvements in school climate, which is crucial for student development, engagement, and learning (Darling-Hammond & Cook-Harvey, 2018).

Our second contribution is that we identified specific school autonomy domains that contribute most to school climate improvement, allowing for a more nuanced understanding of the complex relationship between school autonomy and school climate. This is informative for educational policy-making and policy implementation. When SBM reforms result in a wide variety of functions being devolved to schools, school councils often struggle to take on so many new functions concurrently. Consequently, some experts have recommended a more graduated approach to devolving decision-making responsibility, whereby schools are given autonomy over specific areas of decision-making based on their capacities and needs, rather than granting all schools wide-ranging autonomy all at once (Briggs & Wohlstetter, 2003; De Grauwe, 2005). Despite this, the SBM literature does not provide much guidance on the issue of how to sequence school autonomy reforms. Exploring the school autonomy domain–school climate relationship, as we did here, can assist in generating policy-relevant recommendations about which areas of school autonomy to prioritize first.

By examining the association between individual school autonomy domains and school climate, our analysis found that school climate improvements are primarily associated with increases in school autonomy over students, which accords schools' powers to make decisions about student enrollment and establish student assessment and discipline policies. Greater autonomy over students improves all three dimensions of school climate. In contrast, greater autonomy over teachers, which includes decisions about hiring and firing teachers and teacher salaries, weakly improves the

Table 5 Association between domains of school autonomy and school climate of high-income countries and LMICs

Variables	High-income countries				Low-income countries			
	Academic climate	Community climate	Safety climate	School Climate	Academic climate	Community climate	Safety climate	School Climate
Autonomy over teachers	0.097	0.035	0.004	0.046	0.104	0.031	0.069	0.071
	(0.090)	(0.085)	(0.080)	(0.074)	(0.071)	(0.068)	(0.058)	(0.057)
Autonomy over budget	− 0.003	0.106	0.078	0.061	0.006	− 0.011	0.012	0.008
	(0.063)	(0.066)	(0.067)	(0.057)	(0.058)	(0.051)	(0.053)	(0.049)
Autonomy over students	0.280***	0.217**	0.142	0.212**	0.154**	0.096	0.165***	0.139**
	(0.088)	(0.108)	(0.114)	(0.085)	(0.075)	(0.062)	(0.063)	(0.055)
Autonomy over curriculum	− 0.044	0.005	0.088	0.016	− 0.063	− 0.014	0.011	− 0.025
	(0.073)	(0.078)	(0.080)	(0.065)	(0.073)	(0.061)	(0.058)	(0.057)
Parental education	− 0.003	− 0.003	0.007	0.000	− 0.012***	− 0.006	− 0.003	− 0.007*
	(0.006)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
Index of educational assets	0.004	0.018**	0.030***	0.017**	0.006	0.015**	0.012*	0.011*
	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.007)	(0.006)
Index of household assets	0.016	− 0.012	0.014	0.006	0.022	0.004	0.013	0.013
	(0.044)	(0.045)	(0.053)	(0.044)	(0.021)	(0.019)	(0.018)	(0.017)
Location of school (Rural = 1)	0.038	0.104**	0.220***	0.121***	0.084*	0.133***	0.155***	0.123***
	(0.050)	(0.047)	(0.049)	(0.041)	(0.048)	(0.043)	(0.041)	(0.039)
Total enrolled students	− 0.000*	0.000	0.000	− 0.000	− 0.000***	− 0.000	− 0.000***	− 0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of full-time teachers	− 0.001	− 0.001	− 0.001	− 0.001	0.001	− 0.000	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Facilities in school	0.012	− 0.002	0.003	0.004	0.007	0.002	0.019*	0.009
	(0.021)	(0.025)	(0.028)	(0.022)	(0.015)	(0.010)	(0.010)	(0.009)
Constant	2.509***	2.633***	2.297***	2.481***	3.391***	3.463***	3.244***	3.364***
	(0.237)	(0.249)	(0.228)	(0.217)	(0.129)	(0.105)	(0.093)	(0.090)
Observations	19,101	19,224	19,231	19,231	8,632	8,637	8,643	8,643
R^2	0.100	0.077	0.145	0.100	0.171	0.174	0.268	0.239

Standard errors in parentheses

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

academic climate of the school, and greater autonomy over school budget and curricula are not associated with significant changes in any climate dimensions.[4]

On a more somber note, our third contribution is to show that the school autonomy–school climate association tends to break down in LMICs. Our heterogeneity analysis by country subgroup demonstrated that overall school autonomy is only significantly associated with school climate improvement in HICs, not in LMICs. Although we could not ascertain the reasons for this within the parameters of our study, possible factors include differences in educational systems and contexts, the strength of subnational institutions, human capital levels of local communities, and political and administrative commitment to SBM implementation between the two groups of countries (Abadzi, 2013; De Grauwe, 2005; Hanushek et al., 2013). It is striking, however, that greater autonomy over students is the only autonomy domain associated with school climate improvement in both sets of countries.

A key policy implication of our findings is the need to prioritize autonomy over students in school autonomy policies. It is not easy to implement SBM at the school level:

[4] It should be noted, however, that our conceptualization of school climate here has focused on intangible aspects of climate while excluding tangible indicators such as school infrastructure and resources that are more likely to be affected by school budgeting decisions.

Decision-making structures have to be changed, and school-level actors have to learn how to work together on a range of issues that they were not previously responsible for. Consequently, it might be advisable to take a gradual, staggered approach to implementation, whereby schools are not given responsibility for a whole range of decisions at once but are granted autonomy over different domains of school management in a sequential manner. Our findings suggest that granting schools autonomy over students is a good starting point for the sequential approach as it is likely to change school climate for the better.

Why is autonomy over students associated with school climate improvement whereas autonomy over teachers, budgets, and curriculum are not? Although our exploratory analysis did not allow for definitive insights into the reasons, we speculate that this is related to the potential for conflict between different sets of school-level actors such as the principal, teachers, and parents and other community members. Whereas the school climate literature has highlighted the importance of interpersonal relationships between school personnel and other school-level actors in producing a positive school climate (Alinsunurin, 2020), the SBM literature has documented the potential for conflict when management decisions are devolved to the school level.

Leithwood and Menzies (1998b), for instance, noted that "the single biggest hurdle to developing an effective school council is interpersonal conflict of one sort or another." Moreover, such conflict is also documented to be higher around decisions relating to teachers, budgets, and curriculum and pedagogy. Cranston (2001) observed that there was tension between teachers and parents particularly around issues directly associated with the classroom.

Bæck (2010) discussed the resistance of teachers to parents' encroachment on their pedagogical autonomy. Addi-Raccah and Ainhoren (2009) noted that "teachers feel that parents' empowerment decreases their well-being, introduces uncertainty into their work, and raises questions about their professional discretion." De Grauwe (2005) highlighted that teachers were resistant to parental supervision or oversight over their pedagogy and that school principals were resistant to community control over school budgets. We speculate that autonomy over students is subject to less contention, which makes it easier for collective decisions to be made and implemented.

Notwithstanding the importance of sequencing SBM polices, our study also shows that careful consideration must be given when implementing SBM in developing countries. Because the gains from SBM are seemingly limited to HICs, identifying contextual and institutional mechanisms that facilitate better results from SBM in developing countries is crucial before implementing it. De Grauwe (2005) suggests that there are a few steps that should be taken to attain benefits from SBM, including (a) ensuring that all schools have basic facilities and resources; (b) developing mechanisms to provide all schools with a support system; (c) conducting regular performance evaluations and providing constructive feedback; and (d) providing different forms of intrinsic and extrinsic motivation to the school administrators (including the principal). More research is needed to test these hypotheses and understand other drivers behind successful SBM approaches in developing countries.

The study has several limitations that, given the nature of our data, could not be overcome. First, we included a limited number of countries in our sample. Additionally, high-income nations are overrepresented, and there are very few low-income nations in the sample. Second, because PISA samples different schools in different years, the panel structure of the data had to be created at the country level and not at the school level; hence, we could not make causal inferences by examining within-school changes across time. Third, the target population of PISA samples is 15-year-old students, and the samples are designed to be representative at the student level. Our attempt, therefore, was not to extrapolate results from our sample of schools to the population of schools but to identify associations using the schools sampled in the Fourth, although our use of country-, year-, and country-year fixed effects had the advantage of controlling for various country- and year-specific unobserved variables, it also meant that various country-level factors such as culture, institutions, and educational systems were absorbed by such fixed effects; hence, we could not observe various country-specific idiosyncrasies and heterogeneities that would have further enriched the discussion, and we therefore had to compromise on identifying national-level differences to improve unbiasedness of our results. Fifth, although the PISA data record whether school-level responsibility for school management tasks lies with the principal, teachers, or the SGB, they do not clarify differences in structures or power relations of SGBs across countries. In that sense, the constitution of SGBs is not clarified, which limits our ability to understand their role in SBM and improved school climate.

As our exploratory analysis did not provide definitive insights into the mechanisms underlying the observed pattern of associations, it would be useful for future researchers to probe the reasons school climate is positively associated with autonomy over students but not with other aspects of school autonomy. The SBM–school climate relationship in LMICs deserves particular attention for better understanding whether there are particular conditions under which SBM can improve school climate in these countries. Another fruitful area for further research would be to analyze which dimensions of school climate contribute most to improving educational outcomes (Larson et al., 2020) and how SBM can improve these dimensions.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s12564-023-09846-0.

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Data availability Data used for this study is publicly available on OECD's PISA platform which can be accessed here: https://www.oecd.org/pisa/data/.

Declarations

Competing interests The authors do not have any conflict of interest to disclose.

Ethical approval This study was carried out by analyzing secondary data with no identifying information. Hence it was exempted from Institutional Review Board approval.

References

Abadzi, H. (2013). School-based management committees in low-income countries: Can they improve service delivery? *Prospects, 43*(2), 115–132. https://doi.org/10.1007/s11125-013-9267-9

Addi-Raccah, A., & Ainhoren, R. (2009). School governance and teachers' attitudes to parents' involvement in schools. *Teaching and Teacher Education, 25*(6), 805–813. https://doi.org/10.1016/j.tate.2009.01.006

Alinsunurin, J. (2020). School learning climate in the lens of parental involvement and school leadership: Lessons for inclusiveness among public schools. *Smart Learning Environments, 7*(1), 1–23. https://doi.org/10.1186/s40561-020-00139-2

Al-Samarrai, S., Cerdan-Infantes, P., Bigarinova, A., Bodmer, J., Vital, M. J. A., Antoninis, M., Barakat, B. F., & Murakami, Y. (2021). Education finance watch 2021. *World Bank Group.* http://documents.worldbank.org/curated/en/226481614027788096/Education-Finance-Watch-202,1.

Auh, S., Menguc, B., Fisher, M., & Haddad, A. (2011). The perceived autonomy–perceived service climate relationship: The contingency effect of store-level tenure diversity. *Journal of Retailing and Consumer Services, 18*(6), 509–520. https://doi.org/10.1016/j.jretconser.2011.07.001

Bæck, U. D. K. (2010). 'We are the professionals': A study of teachers' views on parental involvement in school. *British Journal of Sociology of Education, 31*(3), 323–335. https://doi.org/10.1080/01425691003700565

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

Briggs, K. L., & Wohlstetter, P. (2003). Key elements of a successful school-based management strategy. *School Effectiveness and School Improvement, 14*(3), 351–372.

Bruns, B., Filmer, D., & Patrinos, H. A. (2011). *Making schools work: New evidence on accountability reforms*. The World Bank. Retrieved from Making Schools Work: New Evidence on Accountability Reforms (worldbank.org).

Caldwell, B. J. (2005). *School-based management (Vol. 3)*. International Institute for Educational Planning. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000141025/PDF/141025eng.pdf.multi

Carnoy, M., Gove, A. K., Loeb, S., Marshall, J. H., & Socias, M. (2008). How schools and students respond to school improvement programs: The case of Brazil's PDE. *Economics of Education Review, 27*(1), 22–38. https://doi.org/10.1016/j.econedurev.2006.04.005

Carr-Hill, R., Rolleston, C., Schendel, R., & Waddington, H. (2018). The effectiveness of school-based decision making in improving educational outcomes: A systematic review. *Journal of Development Effectiveness, 10*(1), 61–94. https://doi.org/10.1080/19439342.2018.1440250

Chen, D. (2011). School-based management, school decision-making and education outcomes in Indonesian primary schools. *World Bank Policy Research Working Paper* 5809. Retrieved from School-Based Management, School Decision-Making and Education Outcomes in Indonesian Primary Schools | Policy Research Working Papers (worldbank.org).

Cheng, Y. C., & Cheung, W. M. (2004). Four types of school environment: Multilevel self-management and educational quality. *Educational Research and Evaluation, 10*(1), 71–100. https://doi.org/10.1076/edre.10.1.71.26298

Cheung, F. W., & Cheong Cheng, Y. (2002). An outlier study of multilevel self-management and school performance. *School Effectiveness and School Improvement, 13*(3), 253–290. https://doi.org/10.1076/sesi.13.3.253.3428

Cook, T. D. (2007). School based management: A concept of modest entitivity with modest results. *Journal of Personnel Evaluation in Education, 20*(3–4), 129–145. https://doi.org/10.1007/s11092-007-9049-0

Cranston, N. C. (2001). Collaborative decision-making and school-based management: challenges, rhetoric and reality. *The Journal of Educational Enquiry, 2*(2).

Darling-Hammond, L., & Cook-Harvey, C. M. (2018). *Educating the whole child: Improving school climate to support student success*. Learning Policy Institute.

De Grauwe, A. (2005). *School-based management (SBM): Does it improve quality*. EFA Global Monitoring Report. Retrieved from School-based management (SBM): does it improve quality?; Background paper for the Education for all global monitoring report 2005: the quality imperative; 2004 (psu.edu).

Dee, J. R., Henkin, A. B., & Duemer, L. (2003). Structural antecedents and psychological correlates of teacher empowerment. *Journal of Educational Administration, 41*(3), 257–277. https://doi.org/10.1108/09578230310474412

Di Gropello, E., & Marshall, J. H. (2011). Decentralization and educational performance: Evidence from the PROHECO Community School Program in rural Honduras. *Education Economics, 19*(2), 161–180. https://doi.org/10.1080/09645290902992816

Dou, D., Devos, G., & Valcke, M. (2017). The relationships between school autonomy gap, principal leadership, teachers' job satisfaction and organizational commitment. *Educational Management Administration & Leadership, 45*(6), 959–977. https://doi.org/10.1177/1741143216653975

Fuchs, T., & Wößmann, L. (2007). What accounts for international differences in student performance? A re-examination using PISA data. *Empirical Economics, 2*(32), 433–464. https://doi.org/10.1007/978-3-7908-2022-5_10

Fullan, M., & Watson, N. (2000). School-based management: Reconceptualizing to improve learning outcomes. *School Effectiveness and School Improvement, 11*(4), 453–473. https://doi.org/10.1076/sesi.11.4.453.3561

Gaziel, H. (1998). School-based management as a factor in school effectiveness. *International Review of Education, 44*(4), 319–333. https://doi.org/10.1023/A:1003265723206

Gertler, P. J., Patrinos, H. A., & Rubio-Codina, M. (2012). Empowering parents to improve education: Evidence from rural Mexico. *Journal of Development Economics, 99*(1), 68–79. https://doi.org/10.1016/j.jdeveco.2011.09.004

Hanushek, E. A., Link, S., & Woessmann, L. (2013). Does school autonomy make sense everywhere? Panel estimates from PISA. *Journal of Development Economics, 104*, 212–232. https://doi.org/10.1016/j.jdeveco.2012.08.002

Ho, E. S. C. (2005). Effect of school decentralization and school climate on student mathematics performance: The case of Hong Kong. *Educational Research for Policy and Practice, 4*(1), 47–64. https://doi.org/10.1007/s10671-005-1546-7

James, L. R., & Jones, A. P. (1974). Organizational climate: A review of theory and research. *Psychological Bulletin, 81*(12), 1096. https://doi.org/10.1037/h0037511

Jimenez, E., & Sawada, Y. (1999). Do community-managed schools work? An evaluation of El Salvador's EDUCO program. *The World Bank Economic Review, 13*(3), 415–441. https://doi.org/10.1093/wber/13.3.415

Jimenez, E., & Sawada, Y. (2014). Does community management help keep children in schools? Evidence using panel data from El Salvador's EDUCO program. *Economic Development and Cultural Change, 62*(2), 307–338. https://doi.org/10.1086/674096

Larson, K. E., Nguyen, A. J., Solis, M. G. O., Humphreys, A., Bradshaw, C. P., & Johnson, S. L. (2020). A systematic literature review of school climate in low and middle income countries. *International Journal of Educational Research, 102*, 101606. https://doi.org/10.1016/j.ijer.2020.101606

Lawler, E. E., III., Hall, D. T., & Oldham, G. R. (1974). Organizational climate: Relationship to organizational structure, process and performance. *Organizational Behavior and Human Performance, 11*(1), 139–155. https://doi.org/10.1016/0030-5073(74)90010-5

Leithwood, K., & Menzies, T. (1998a). Forms and effects of school-based management: A review. *Educational Policy, 12*(3), 325–346. https://doi.org/10.1177/0895904898012003006

Leithwood, K., & Menzies, T. (1998b). A review of research concerning the implementation of site-based management. *School Effectiveness and School Improvement, 9*(3), 233–285. https://doi.org/10.1080/0924345980090301

Li, C. (2013). Little's test of missing completely at random. *The Stata Journal, 13*(4), 795–809.

Ling, C., Khattri, N., & Jha, S. (2010). *The effects of school-based management in the Philippines: An initial assessment using administrative data*. World Bank Policy Research Working Paper 5248. Retrieved from The Effects of School-based Management in the Philippines: An Initial Assessment Using Administrative Data (worldbank.org).

Luschei, T. F., & Jeong, D. W. (2020). School governance and student achievement: Cross-national evidence from the 2015 PISA. *Educational Administration Quarterly, 57*(3), 331–371. https://doi.org/10.1177/0013161X20936346

Maslowski, R., Scheerens, J., & Luyten, H. (2007). The effect of school autonomy and school internal decentralization on students' reading literacy. *School Effectiveness and School Improvement, 18*(3), 303–334. https://doi.org/10.1080/09243450601147502

McNamara, L. (2021). School recess and pandemic recovery efforts: Ensuring a climate that supports positive social connection and meaningful play. *Facets, 6*(1), 1814–1830.

Mejia, A., & Filus, A. (2018). Exploring predictors of impact of school-based management in rural Mexico: Do student engagement, teacher attitudes and parent involvement predict better academic outcomes? *International Journal of Educational Research, 88*, 95–108. https://doi.org/10.1016/j.ijer.2018.01.010

Mitchell, M. M., Bradshaw, C. P., & Leaf, P. J. (2010). Student and teacher perceptions of school climate: A multilevel exploration of patterns of discrepancy. *Journal of School Health, 80*(6), 271–279. https://doi.org/10.1111/j.1746-1561.2010.00501.x

Moran, E. T., & Volkwein, J. F. (1992). The cultural approach to the formation of organizational climate. *Human Relations, 45*(1), 19–47. https://doi.org/10.1177/001872679204500102

Murnane, R. J., Willet, J. B., & Cardenas, S. (2006). *Did Participation of Schools in Programa Escuelas de Calidad (PEC) Influence Student Outcomes?* Facultad de Educación de la Universidad de Harvard.

National School Climate Council. (2007). *The school climate challenge: narrowing the gap between school climate research and school climate policy, practice guidelines and teacher education policy*. National School Climate Center. https://schoolclimate.org/wp-content/uploads/2021/05/school-climate-challenge-web.pdf

Nir, A. E., & Eyal, O. (2003). School-based management and the role conflict of the school superintendent. *Journal of Educational Administration, 41*(5), 547–564. https://doi.org/10.1108/09578230310489362

OECD. (2012). *PISA 2009: Technical Report*. OECD. https://www.oecd.org/pisa/pisaproducts/50036771.pdf

OECD. (2014). *PISA 2012: Technical Report*. OECD. https://www.oecd.org/pisa/pisaproducts/PISA-2012-technical-report-final.pdf

OECD. (2017). *PISA 2015: Technical Report*. OECD. https://www.oecd.org/pisa/data/2015-technical-report/PISA2015_TechRep_Final.pdf

O'Malley, M., Katz, K., Renshaw, T. L., & Furlong, M. J. (2012). Gauging the system: trends in school climate measurement and intervention. In S. Jimerson, A. Nickerson, M. J. Mayer, & M. J. Furlong (Eds.), *Handbook of school violence and school safety* (pp. 324–336). Routledge. https://doi.org/10.4324/9780203841372-32

Patrinos, H. A., Barrera-Osorio, F., & Fasih, T. (2009). *Decentralized decision-making in schools: The theory and evidence on school-based management*. The World Bank. https://openknowledge.worldbank.org/bitstream/handle/10986/2632/487400PUB0dece101Official0Use0Only1.pdf?sequence=1&isAllowed=y

Ryan, R. M., & Deci, E. L. (2000). The darker and brighter sides of human existence: Basic psychological needs as a unifying concept. *Psychological Inquiry, 11*(4), 319–338. https://doi.org/10.1207/S15327965PLI1104_03

Sawada, Y., Aida, T., Griffen, A., Kazianga, H., Kozuka, E., Nogushi, H., & Todo, Y. (2016). On the role of community management in correcting market failures of rural developing areas: Evidence from a randomized field experiment of COGES project in Burkina Faso. *Annual Meeting, July 31-August 2, Agricultural and Applied Economics Association*. https://ideas.repec.org/p/ags/aaea16/236323.html

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

Trinidad, J. E. (2020). Material resources, school climate, and achievement variations in the Philippines: Insights from PISA 2018. *International Journal Of Educational Development, 75*, 102174. https://doi.org/10.1016/j.ijedudev.2020.102174

UNESCO. (2020). *UN Secretary-General warns of education catastrophe, pointing to UNESCO estimate of 24 million learners at risk of dropping out*. Retrieved from https://en.unesco.org/news/secretary-general-warns-education-catastrophe-pointing-unesco-estimate-24-million-learners-0

United Nations. (2022). *The Sustainable Development Goals Report* Retrieved from https://unstats.un.org/sdgs/report/2022/The-Sustainable-Development-Goals-Report-2022.pdf

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

Wößmann, L. (2003). Schooling resources, educational institutions and student performance: The international evidence. *Oxford Bulletin of Economics and Statistics, 65*(2), 117–170. https://doi.org/10.1111/1468-0084.00045

Yamauchi, F. (2014). An alternative estimate of school-based management impacts on students' achievements: Evidence from the Philippines. *Journal of Development Effectiveness, 6*(2), 97–110. https://doi.org/10.1080/19439342.2014.906485