A Research Synthesis of the Associations Between Socioeconomic Background, Inequality, School Climate, and Academic Achievement

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Educational researchers and practitioners assert that supportive school and classroom climates can positively influence the academic outcomes of students, thus potentially reducing academic achievement gaps between students and schools of different socioeconomic status (SES) backgrounds. Nonetheless, scientific evidence establishing directional links and mechanisms between SES, school climate, and academic performance is inconclusive. This comprehensive review of studies dating back to the year 2000 examined whether a positive climate can successfully disrupt the associations between low SES and poor academic achievement. Positive climate was found to mitigate the negative contribution of weak SES background on academic achievement; however, most studies do not provide a basis for deducing a directional influence and causal relations. Additional research is encouraged to establish the nature of impact positive climate has on academic achievement and a multifaceted body of knowledge regarding the multilevel climate dimensions related to academic achievement.

For the past half-century, there has been an ongoing discussion among scholars, educational practitioners, and policymakers regarding the relationship among social inequality, socioeconomic status (SES), and academic achievement (Alexander,

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Entwisle, & Olson, 2001; Roscigno & Ainsworth-Darnell, 1999). Various policies and reforms have been implemented throughout the years and across the world to address the multiple social inequalities in education, corresponding with social trends and shifts such as the civil rights and desegregation movements. Since the 1980s, and increasingly during the past two decades, the educational reform literature has focused on the importance of academic achievement and standards-based reform (Berliner, 2006; Fullan, 1993). Literature has demonstrated that one of the strongest predictors of academic achievement is student and school SES (Sirin, 2005). Researchers throughout the world have found a significant correlation between SES and academic achievement, to the detriment of students and schools with lower SES backgrounds (e.g., National Center for Education Statistics, 2013; Organisation for Economic Co-operation and Development, 2009).

In addition, the role of school climate in these relationships has been discussed and examined. Researchers have asserted that students in schools with positive climates perform better academically than what they would otherwise have achieved on the basis of SES background (Bryk & Schneider, 2002). Nonetheless, scientific evidence establishing links among SES, school climate, and academic achievement has been inconclusive due to inconsistency of methods, instruments, definition of variables, and design of studies.

There is little research about the theoretical nature of the relationships among SES, climate, and academic performance, because the scientific literature has provided diverse and often confusing descriptions of the mechanisms by which positive school climate contributes to student achievement. More than 80 studies have explored these types of questions using different methods and assumptions. Some authors argued that a positive climate may have an additive positive contribution to student achievement, beyond the negative influence of low SES (Brand, Felner, Shim, Seitsinger, & Dumas, 2003; Schagen & Hutchison, 2003). These authors suggested an explanation that describes school climate as compensating for low SES and contributing to academic achievement beyond the expected outcomes based on SES background. By contrast, others have argued that a school's SES influences its social climate, which in turn influences academic achievement. Thus, schools affected by high poverty and crime, low SES, and additional risk-related social issues often fail to establish a safe and supportive school climate due to the multiplicity of inflowing family- and community-related stressors placed on the school setting and staff (McCoy, Roy, & Sirkman, 2013).

However, if such schools were able to alter their climate to be more supportive, this could theoretically influence the negative effects of low SES, crime, and negative community or family influences. This explanation describes school climate as mediating the relationship between SES background and academic achievement through student connectedness and engagement with the school (M. T. Wang & Holcombe, 2010) and their sense of safety (Benbenishty & Astor, 2005). Finally, other researchers have shown that the relationship between SES background and academic achievement changes across schools of different climate. For example, in a positive school climate, the relationship between SES and achievement is weaker compared to schools with a less positive climate (Cheema & Kitsantas, 2014). This finding suggests that the relationship between academic achievement and student and school SES can be moderated by positive school climate.

To further complicate matters, research focusing on the bivariate associations among SES background, school climate, and academic achievement has been inconsistent and somewhat confusing. Although lower SES backgrounds are significantly associated with lower academic achievement (e.g., Sirin, 2005), some research has demonstrated that students and schools from lower SES backgrounds experience more negative school climate (e.g., Khoury-Kassabri, Benbenishty, Astor, & Zeira, 2004), whereas other research did not indicate systematic associations between SES background and school climate experiences (e.g., Berkowitz et al., 2015).

When results of multiple studies focusing on the same hypothesis significantly differ, further scientific work should account for the variability by systematic work (Cooper & Hedges, 2009). Thus, the primary purpose of this article is to synthesize the scientific evidence applicable to this extensive and inconsistent body of knowledge regarding the interrelations between SES, school climate, and academic achievement. A better understanding of these relationships can help in further explicating the role of school climate and its potential contribution to reducing the achievement gap while generating important insights regarding the school reform literature.

Due to the wide variation in the definition of school climate and, consequently, its measurement, one of the challenges in fully understanding the relationships among SES, academic achievement, and school climate may be related to the manner in which school climate is defined and measured. Multiple definitions, measurement tools, and approaches to school climate could be a source of inconsistency in research findings and should be examined and considered while making deductions and conclusions. We present and discuss these different definitions while suggesting the importance of the variation of these definitions as potentially accounting for some of the inconsistencies in research findings.

School Climate Definitions and Measurements

Halpin and Croft (1963), pioneers of research on school climate, maintained that climate is the "personality" of the school, expressing the collective perception of teachers of school routine and thereby influencing their attitudes and behaviors. Their definition was based on the measure of a school's openness and assumed six prototypes of school climate on a continuum ranging from *open* to *closed*. This research pair developed the Organizational Climate Description Questionnaire, which focuses on teacher perceptions of social interactions in school (Table 1). Health is another metaphor used to examine school climate (Hoy & Hannum, 1997). A healthy school demonstrates harmony among the technical, managerial, and institutional levels and successfully manages external factors while remaining goal oriented. In healthy schools, the students, teachers, administrative staff, and community work together constructively and in full cooperation (Table 1).

Subsequent research into school climate broadened terminology usage, concepts, and measurement parameters used to define and measure climate. Extending prior research (i.e., Pyper, Freiberg, Ginsburg, & Spuck, 1987), Simons-Morton and Crump (2003) measured climate from student perspectives, particularly focusing on respectful relations, teacher support, and clarity of school rules (Table 1). The Inventory of School Climate–Student developed by Brand et al. (2003) is

TABLE 1

Definitions and measurement of school climate

Authors	General objective	Measurement perspective	Main dimensions
Halpin and Croft (1963)	Organizational Climate Description Questionnaire; organizational climate is the organizational "personality" of a school, ranging from open to closed	Teachers	• Teachers' behavior: Disengagement, hindrance, esprit, intimacy • Principals' behavior: Aloofness, production emphasis, trust, consideration
Hoy and Hannum (1997)	Measure of organizational climate of middle schools; a health school climate demonstrates harmony among technical, managerial, and institutional levels	Students	• Technical: Teachers and students' behaviors, academic emphasis, teachers' sense of affiliation • Managerial: collegial leadership, resource support, principal influence • Institutional: integrity
Simons-Morton and Crump (2003)	School climate describes the unique culture or personality of a school formed through interaction among physical setting, organizational factors, and human relations at school	Students	• Teacher support • Clarity of school rules and extent of enforcement • Relationships and respect among students • Social activity
Brand, Felner, Shim, Seitsinger, and Dumas (2003)	Multidimensional assessment of student perceptions of overall school climate	Teachers	• Teacher support • Consistency and clarity of rules and expectations • Student commitment and achievement orientation • Negative peer interactions • Positive peer interactions • Disciplinary harshness • Student input in decision making • Instructional innovation and relevance • Support for cultural pluralism • Safety problems

(continued)

TABLE 1 (continued)

Authors	General objective	Measurement perspective	Main dimensions
Brand, Felner, Seitsinger, Burns, and Bolton (2008)	Inventory of School Climate–Teachers	Teachers	• Peer sensitivity • Disruptiveness • Teacher–student interactions • Achievement orientation • Support for diversity • Safety
Bear, Yang, Mantz, Pasipanodya, and Boyer (2014)	Delaware School Climate Survey: Students, teachers, and home; assesses student, teacher and staff, and parent and guardian perceptions of school climate, compares and contrasts perspectives	Students, teachers, parents	• Teacher–student relations • Student relations • Respect for diversity • Clarity of expectations • Fairness of rules • School safety • Bullying victimization
		Teachers, parents	• Teacher–home communication
		Teachers	• Student engagement
National Center on Safe Supportive Learning Environments (n.d.)	A positive school climate is the product of a school's attention to fostering safety; promoting a supportive academic, disciplinary, and physical environment, and encouraging and maintaining respectful, trusting, and caring relationships throughout the school community	Students, staff, parents	• Student engagement: Relationships among students, respect among students, school engagement • School safety: Emotional safety, physical safety, substance use • School environment: Physical environment, academic environment, wellness, discipline

TABLE 1 (continued)

Authors	General objective	Measurement perspective	Main dimensions
National School Climate Council (2007)	Climate is the quality and character of school life and experiences that reflects norms, values, interpersonal relationships, teaching, learning and leadership practices, and organizational structures; a sustainable, positive school climate fosters youth development and learning necessary for a productive, contributing, and satisfying life in a democratic society	Students, staff	• Safety: Rules and norms, sense of physical security, sense of social and emotional security • Teaching and learning: Support for learning, social and civic learning • Interpersonal relationships: Respect for diversity, social support for adults, social support for students • Institutional environment: School connectedness and engagement, physical surroundings
		Staff	• Leadership • Professional relationships

another important survey instrument that incorporated parameters pertaining to relationships and the fairness of rules and punishments. This group of researchers later developed a tool to evaluate school climate from the teacher perspective (Brand, Felner, Seitsinger, Burns, & Bolton, 2008; Table 1). Acknowledging the importance of how all members of the school community perceive climate, Bear, Yang, Mantz, Pasipanodya, and Boyer (2014) evaluated school climate based on elements of social support and school social structure. They developed several versions of the Delaware School Climate Survey: for students, teachers, and parents. These instruments added the measurement of school bullying, a parameter not included in earlier definitions of climate (Bear et al., 2014; Table 1).

The National Center on Safe Supportive Learning Environments (n.d.) of the U.S. Department of Education proposed a conclusive model for school climate evaluation termed the *safe and supportive schools model*. A positive school climate is the product of a school's attention to fostering safety; promoting a supportive academic, disciplinary, and physical environment; and encouraging and maintaining respectful, trusting, and caring relationships throughout the school community (National Center on Safe Supportive Learning Environments, n.d.; Table 1). Finally, the National School Climate Council (NSCC; 2007) offered a comprehensive definition of school climate that covers all of the elements of school climate suggested in previous definitions (Table 1).

Social climate also exists on a classroom level, because the classroom is the central context in which learning, student-to-student interactions, and teacher–student interactions occur. In a positive classroom climate, the teacher fosters a sense of ease and enjoyment by demonstrating positive regard and warmth in interactions with students (Hamre & Pianta, 2005). Classroom climate has also been defined and measured in a variety of ways, including the Classroom Environment Scale (Trickett & Moos, 1973), the Learning Environment Inventory (Fraser, Anderson, & Walberg, 1982), and the Inventory of Classroom Environments (Sinclair & Fraser, 2002).

This review revealed fairly significant differences in the methods employed by various researchers in their measurements of school and classroom climate. Nevertheless, it also indicated several central components that recur in the majority of definitions and measurements: positive teacher–student relationships, sense of safety, and student connectedness to and engagement in school. This review also exposed a tendency in recent years to include additional elements of climate not previously considered in school climate definitions. For example, elements of supportive and significant relationships prevalent in social and emotional learning (Collaborative for Academic, Social, and Emotional Learning, 2015), character education components (Schwartz, Beatty, & Dachnowicz, 2006), school bullying (Swearer, Espelage, Vaillancourt, & Hymel, 2010), and comprehensive school dissemination of changes, all of which are common in the positive behavior support approach (Bradshaw, Koth, Bevans, Ialongo, & Leaf, 2008), are included in later school climate definitions and measurements. Current educational reform efforts focus on high academic standards that are implemented on local and international levels. The role of school climate and its relationship to academic achievement is increasingly important to understand, and the variation in definitions should be taken into account as we aim to understand these relationships.

The following section presents a synthesis of scientific research findings linking SES, school climate, and academic achievement. This research synthesis attempted to address whether positive climate mitigates the relationship between SES and academic achievement such that more positive climates improve academic performance and reduce achievement gaps among students and schools of different SES backgrounds.

Method

Search Strategy

Four databases (Web of Science, PubMed, PsycINFO, and ERIC) were systematically searched using a comparable search strategy. These databases were selected because they are the main databases in the fields of education, psychology, and social sciences research. When built-in search filters were available, the search included only peer-reviewed articles written in English and published between 2000 and 2015. The decision to focus on this period was based on increasing interest in school climate characteristics, schools' added value, and in-school effectiveness evident during these years (H. F. Ladd & Walsh, 2002; Teddlie & Reynolds, 2000). The most simple and effective search strings were developed. Conjugations and plural forms of the search words were also included.

First, the search terms were used to locate articles on school or classroom climate and academic achievement. Separated by the Boolean term "AND," the search terms were as follows: "Academic" OR "academic achievement" OR "academic outcome" OR "academic performance" OR "test score," and "school climate" OR "classroom climate" OR "classroom emotional climate." Second, because some studies focused on variables we identified as central components of climate, yet without explicit reference to the term *climate*, additional searches were conducted to pinpoint research that measured associations between academic performance and student–teacher relationships, school safety, or school or classroom engagement or connectedness. Following standard search process, the study located research on academic performance using the same search terms as previously described and based on one or more of the following search terms: "School connectedness" OR "classroom connectedness" OR "engagement" OR "bonding," "teacher–student relationship" OR "student–teacher relationship" OR "teacher–student support," and "school safety."

Study Selection Procedure

Retrieved studies were hand-searched for duplicates, which were removed. Then, based on the title and the abstract, two researchers independently decided if the retrieved articles were original empirical research focused primarily on the association between school or classroom climate and academic achievement. Both qualitative and quantitative studies were included. Papers were excluded for the following reasons: The language of the article was not English, the paper focused on measurement validation, no actual form of academic performance was measured, school-age children were not the main study population, or academic achievement was not the outcome variable. Editorials, presentations, conference reports, commentaries, and papers that were not peer

Records identified through database screening: 704

| Web of science: 338 | PubMed: 74 | PsycINFO: 30 | ERIC: 262 |

Excluded Duplicates: 196

Records Screened on Basis of Title and Abstract

Excluded Articles: 416
- Did not examine relations between academic achievement and climate
- Used measurements that did not constitute evidence of academic achievement (i.e., effort, self-efficacy, expectations, engagement, aspirations)
- Did not involve school-age children
- Not peer reviewed
- Focused on measurement validation

Full-Text Articles Assessed for Eligibility: 92

Excluded Articles: 14
- Language (not English)
- Did not study academic achievement as outcome variable
- Did not involve school-age children
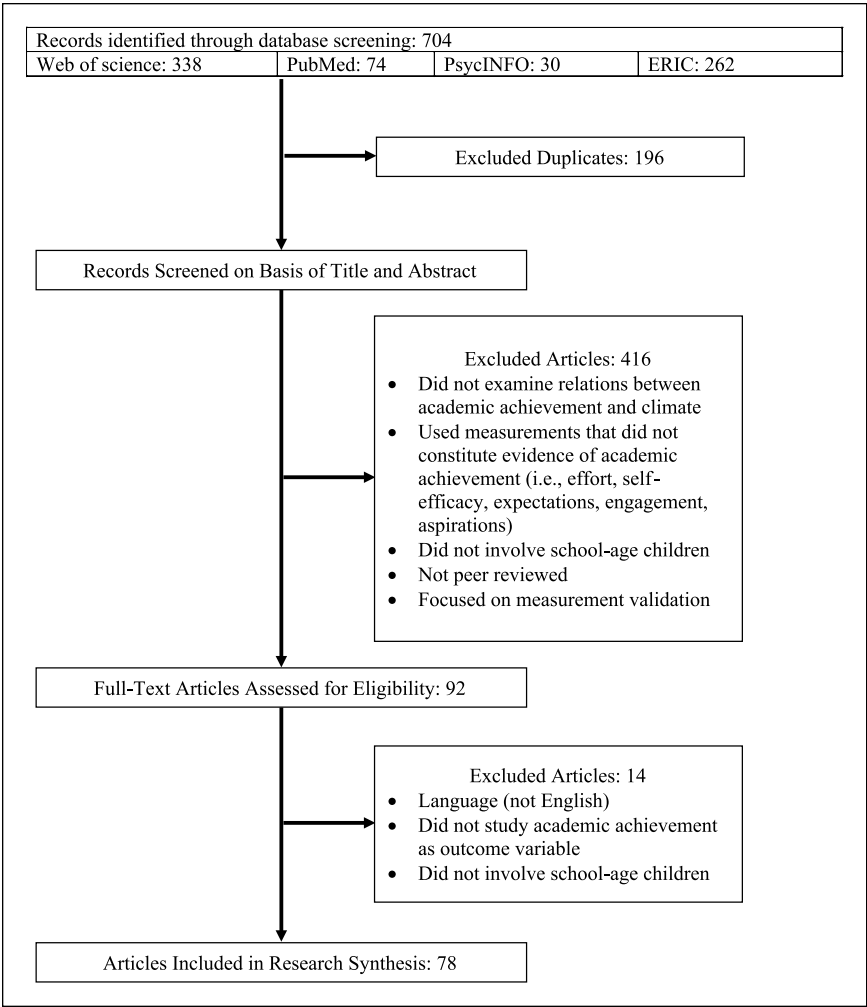
Articles Included in Research Synthesis: 78

FIGURE 1. *Flow diagram of the review inclusion process.*

reviewed were also excluded. Of the remaining articles, full-text copies were retrieved. These articles were assessed again for inclusion as previously described. Inconsistencies in decisions to include or exclude a study were resolved by a third researcher (see Figure 1).

Data Extraction Process

Two authors independently extracted the following data from the included studies: (a) study design, (b) unit or level of analysis, (c) sample characteristics, (d) climate measurement, (e) academic achievement measurement, and (f) main

findings (compensating, mediating, or moderating effect of climate). Disagreements were again resolved by discussion between the two review authors and when necessary by a third researcher. Findings of the research synthesis are presented in Table 2. Table 2 is divided into five sections, one for each term used in the search: school climate, classroom climate, student–teacher relationships, safety, and engagement or connectedness.

Results

The search retrieved 704 citations, 196 of which were duplicate publications. Of the remaining items, 416 articles were not eligible for inclusion. Another 14 articles were excluded after review of the full-text articles, resulting in 78 articles that met inclusion criteria and were included in the research synthesis (Figure 1). Only one third of the studies were based on nationally representative samples of students.

To achieve a comprehensive understanding of the relationships among SES, academic achievement, and school climate, our findings could be viewed as examining two complementing issues: (a) the methodological aspect, which includes the measurements, climate perspective, unit of analysis, and study design of the articles examined in this review, and (b) the thematic results, which focus on the findings emerging from these studies and the effect of school climate on the relationship between SES and academic achievement. Altogether, these findings provide a comprehensive understanding of the associations among SES, climate, and academic achievement to allow for more concrete recommendations for future research and policy design.

Great Variation in Climate Measurement

The substantial variation in school and classroom climate definitions and measurements reflected in Table 1 are also reflected in Table 2. The findings reveal that although many articles measured climate using one or more of the most prevalent and central components of climate such as safety, student–teacher relationships, and engagement or connectedness (e.g., Hopson, Lee, & Tang, 2014; Shin, Lee, & Kim, 2009; Swanson, Valiente, & Lemery-Chalfant, 2012), other articles measured school climate based on less common measures, such as student disturbances and discipline problems (Cheema & Kitsantas, 2014), administrative leadership, school environment, and expectations (Martín, Martínez-Arias, Marchesi, & Pérez, 2008), or a sense of confidence and the extent of ethnic-based tension at the school (O'Malley, Voight, Renshaw, & Eklund, 2015). Furthermore, some articles measured climate more broadly based on numerous aspects of school climate (e.g., Liu, Van Damme, Gielen, & Van Den Noortgate, 2015; Sweetland & Hoy, 2000), whereas others measured only one or two components of climate, such as discipline problems and disturbances (e.g., Cheema & Kitsantas, 2014), teacher–student relationships (e.g., Liew, Chen, & Hughes, 2010), or students' sense of school community (e.g., W. Wang et al., 2014). Finally, one study measured school climate based on an objective measurement of school records of school size and student attendance (Chen & Weikart, 2008).

These differences reflect uncertainty and perhaps confusion among researchers regarding school and classroom climate. What exactly is climate, how does it

TABLE 2

Compensating, mediating, and moderating effects of school and classroom climate on academic achievements

First author (year)	Method	Main study findings
School climate and academic achievement		
Barile (2012)	Design: Longitudinal: 2 waves; 2002, 2004 Unit of analysis: Student, school Sample: Nationally representative, 7,779 students Climate: Student: teacher–student relationship Achievement: Standardized test scores	No COM: Controlling for sophomore-year math grades and SES, no significant associations found between positive climate and achievement by senior year
Berkowitz (2015)	Design: Cross-sectional Unit of analysis: Student, school Sample: nationally representative, 53,946 students Climate: Student: student–teacher relationships, risky peer behavior, school violence (MEITZAV) Achievement: Standardized test scores	COM: School climate positively contributed to student achievement beyond SES status MOD: Achievement gaps between students of different SES in the same school decreased in schools characterized by positive climate
Buyse (2009)	Design: Longitudinal: 3 waves; 2003–2004, 2004–2005, 2005–2006 Unit of analysis: Student, classroom Sample: Nationally representative, 3,582 students Climate: Teachers: Student–Teacher Relationship Scale; relational classroom climate based on teacher–child closeness and conflict Achievement: Standardized test scores	COM: The more conflict in the teacher–child relationship in first grade, the worse mathematics achievement during the first 3 years of primary school; however, variance explained by relational conflict was small
Cheema (2014)	Design: Cross-sectional Unit of analysis: Student Sample: Representative, 4,199 students Climate: Student: student disturbances and discipline problems Achievement: Standardized test scores (PISA, 2003)	COM: An improvement in disciplinary climate in the classroom correlated to an increase in achievement
Chen (2008)	Design: Longitudinal: 2 waves; 2002–2003, 2003–2004 Unit of analysis: School Sample: Representative, 212 schools Climate: School records: school size and student attendance Achievement: Standardized test scores	COM: A significant direct effect of student attendance rate on academic achievement MED: School disorder mediated the relationship between low-SES background and low academic achievement

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TABLE 2 (continued)

First author (year)	Method	Main study findings
Crosnoe (2004)	Design: Longitudinal: 2 waves; 1 year apart Unit of analysis: Student, school Sample: Nationally representative, 10,991 students Climate: Student: student–teacher bonding Achievement: Self-reported grades	COM: Students bonding with teachers was positively related to later achievement MOD: Hispanic American girls had better grades when they had more positive views of teachers, compared with most boys and Whites
Davis (2006)	Design: One-year case study Unit of analysis: Student Sample: nonrepresentative, 6 students, 6 teachers	COM: One means of improving achievement in schools is to improve the quality of teacher–student relationships
Elias (2008)	Design: Longitudinal: 2 waves; 1 year apart Unit of analysis: Student, school Sample: Nonrepresentative, 282 students, 6 schools Climate: Student: social support, socioemotional competence Achievement: GPA	COM: Considerable variance in end-of-year academic outcomes was predicted by perceived teacher support during the year
Hopson (2011)	Design: Cross-sectional Unit of analysis: Student Sample: Nonrepresentative, 485 students Climate: Student: school quality, connection and relationships with adults Achievement: Self-reported grades	COM: Positive perspectives of school climate significantly correlated with higher grades
Hopson (2014)	Design: Cross-sectional Unit of analysis: Student, school Sample: 13,025 students, 43 schools Climate: Student: teacher and student support, school connectedness, disruptive and unsafe behaviors Achievement: Self-reported grades	MOD: Improved school safety did not increase the likelihood of better grades for students attending segregated schools; yet school safety was related to better grades in schools that are less segregated
Hughes (2008)	Design: Longitudinal: 3 waves; 3 years Unit of analysis: Student Sample: Nonrepresentative, 671 students Climate: Student: teacher–student relationship quality Achievement: Standardized test scores	MED: The effect of first-grade teacher–student relationship on reading and math achievement 2 years later was completely mediated by Year 2 effortful engagement

TABLE 2 (continued)

First author (year)	Method	Main study findings
Jia (2009)	Design: Cross-sectional Unit of analysis: Student Sample: Nonrepresentative, 706 Chinese students, 709 U.S. students Climate: Student: support from teachers and friends, autonomy in the classroom Achievement: School grades	COM: Support from teachers and peers was strongly correlated with higher grades
Johnson (2006)	Design: Cross-sectional Unit of analysis: School Sample: Nonrepresentative, 1,555 students, 59 schools Climate: Teacher: School-Level Environment Questionnaire Achievement: Standardized test scores	COM: A positive relationship between teacher perceptions of school climate and student achievement MOD: In high-SES schools, school climate was positively related to student achievement; however, in lower SES schools, there was a smaller relationship between school climate and achievement
Košir (2014)	Design: Longitudinal: 2 waves; beginning and end of school year Unit of analysis: Student Sample: Nonrepresentative, 816 students Climate: Student: teacher personal support Achievement: GPA	COM: Students with higher perceptions of teacher support at the beginning of the school year have better achievements at the end of the school year and vice versa
Liew (2010)	Design: Longitudinal: 2 waves; 2001, 2002 Unit of analysis: Student Sample: Nonrepresentative, 761 students Climate: Student: teacher–student relationships Achievement: Standardized test scores	MOD: Children with low task accuracy performed just as well as those with high task accuracy if they were paired with a positive and supportive teacher
Liu (2015)	Design: Cross-sectional Unit of analysis: Student, school, country Sample: Nonrepresentative: 161,619 students, 6,062 schools, 28 countries Climate: Student: disciplinary climate, student–teacher relations, teacher's support; principal: teacher-related factors affecting school climate, student-related factors affecting school climate, teacher morale and commitment, student morale and commitment Achievement: Standardized test scores (PISA, 2003)	MED: Three school climate factors (disciplinary climates, students' positive behavior, student morale) significantly mediated the relationship between school's background characteristics and academic achievements

(continued)

TABLE 2 (continued)

First author (year)	Method	Main study findings
Ma (2000)	Design: Cross-sectional Unit of analysis: Student, school Sample: Representative, 6,883 students Climate: Student: disciplinary climate, academic press, parental involvement Achievement: Standardized test scores	COM: Of the three school climate factors, disciplinary climate, was seen to be the most important determinant of academic achievement
McCoy (2013)	Design: Longitudinal: 3-year panel research: 2007, 2008, 2009 Unit of analysis: School Sample: 500 students Climate: Student: safe respectful climate; socioemotional learning environment, academic rigor Achievement: Standardized test scores	COM: Higher levels of safe and respectful climate were found to predict increases in academic achievement, and higher academic achievement was found to predict increases in safe and respectful climate; relationships were equal in magnitude
McCormick (2015)	Design: Longitudinal: 4 waves in 3 years Unit of analysis: Student, school Sample: 22 schools, 120 teachers, 435 students Climate: Teacher: leadership, accountability, and safety and respect dimensions Achievement: Standardized test scores	MOD: School climate moderated INSIGHTS' impacts on academic outcomes
Mohammad-pour (2013)	Design: Cross-sectional Unit of analysis: Student, classroom, school Sample: Nationally representative (Singapore), 4,599 students, 326 classrooms, 164 schools Climate: Student: science self-concept, attitude toward science, educational aspiration; teacher: perception of school climate; principal: perception of school climate (TIMSS questionnaires, 2007) Achievement: Standardized test scores (TIMSS, 2007)	COM: An increase in classroom climate scale predicted an increase in the classroom average test scores
Morin (2014)	Design: Longitudinal: 2 waves; 2005–2006, 2006–2007 Unit of analysis: Student, classroom Sample: Nationally representative, 2,541 students, 89 classrooms	COM: Classroom-level climate significantly predict classroom levels of achievement MED: Classroom climate perceptions influence math self-efficacy which influences math achievement

(continued)

TABLE 2 (continued)

First author (year)	Method	Main study findings
	Climate: Student: motivation, classroom challenge, teacher caring Achievement: Standardized test scores	
Morrison (2014)	Design: Cross-sectional Unit of analysis: Student Sample: Nonrepresentative, 60 students Climate: Student: not specified Achievement: Perceived academic performance	COM: The more victimization, harassment and discrimination, the more harmful were the consequences for academic performance
O'Malley (2015)	Design: Cross-sectional Unit of analysis: Student, school Sample: Nationally representative, 490,000 students, 902 schools Climate: Student: CHKS school climate questionnaires: connection, relationships with adults, meaningful participation, sense of confidence, positive learning environment, extent of ethnic-based tension at the school, victimization and violence Achievement: Self-reported GPA	COM: Pupils from schools with a more positive climate reported high achievements MOD: A positive school climate moderates the connection between family structure and GPA, particularly for single-parent families or homeless students
Rimm- Kaufman (2007)	Design: Semiexperimental longitudinal: 4 waves; 3 years Unit of analysis: Student, school Sample: Nonrepresentative, 381–514 students per cohort Climate: Student: well-managed and caring learning environment Achievement: Standardized test scores	COM: Students in Responsive Classrooms schools showed greater increase in reading and math performance
Shin (2009)	Design: Cross-sectional Unit of analysis: Student, school Sample: Nationally representative; Korea: 5,067 students, 149 schools; Japan: 4,669 students, 144 schools; United States: 5,292 students, 274 schools Climate: Student: school disciplinary climate, teacher–student relations Achievement: Standardized test scores (PISA, 2003)	COM: Disciplinary climate contributed significantly to disparity in scores

TABLE 2 (continued)

First author (year)	Method	Main study findings
Stewart (2008)	Design: Cross-sectional Unit of analysis: Student, school Sample: Representative, 11,999 students; 715 high schools Climate: Student: student effort (attachment, involvement, commitment), association with positive peers; school administrators and students: school social problems; teachers and students: school cohesion Achievement: Student-reported school grades	COM: school attachment and school commitment, were significantly and positively related to GPA COM2: Schools with greater cohesion had higher average student GPAs; SES, ethnicity, school location, school size, and school social problems were not significantly associated with average GPA when school cohesion and individual-level predictors were taken into account
Sweetland (2000)	Design: Cross-sectional Unit of analysis: School Sample: 86 schools, 2,741 teachers Climate: Teacher: Organizational Climate Description Questionnaire, Revised Middle: school openness, academic emphasis, seniority among teachers, principal's impact, collegial leadership, principal's support, protectiveness of the institution Achievement: Standardized test scores	COM: Correlations of low to medium strength between climate and scores
W. Wang (2014)	Design: Cross-sectional Unit of analysis: Student, school Sample: Representative, 1,023 students, 50 schools Climate: Student: Sense of School as a Community Scale Achievement: GPA	COM: An increase in school climate is significantly related to an increase in grades
Classroom climate and academic achievement		
Allen (2013)	Design: Longitudinal: 2 waves; 2 years Unit of analysis: Student, classroom Sample: 643 students; 37 classrooms Climate: Emotional support, classroom organization, instructional support (CLASS secondary version) Achievement: standardized test scores	COM: Positive emotional climate and sensitivity associated with higher achievements
López (2012)	Design: Cross-sectional Unit of analysis: Student, classroom Sample: 995 students; 46 classrooms Climate: CLASS Achievement: Standardized test scores	MOD: Emotional warmth was particularly relevant for academic achievements of students' at risk for school failure

TABLE 2 (continued)

First author (year)	Method	Main study findings
Martín (2008)	Design: Longitudinal: 3 waves; 1 year apart Unit of analysis: Student, school Sample: Nonrepresentative, 965 students; 27 schools Climate: Teacher: administrative leadership, school environment, teacher expectations Achievement: School grades	COM: Achievement in language was associated with efficient leadership, achievement in math was associated with the school and its faculty having high expectations
Reuland (2014)	Design: Semiexperimental longitudinal: 3 waves; 1 academic year Unit of analysis: Student, classroom Sample: Nonrepresentative, 523 students; 28 classrooms Climate: Observed classroom victimization Achievement: Standardized test scores	COM: Students in low-victimization classrooms had higher achievement scores compared to those in high-victimization classrooms COM: In high victimization classrooms, the academic performance of children at the beginning of the year remains similar to the end of year
Reyes (2012)	Design: Cross-sectional Unit of analysis: Student, classroom Sample: 1,399 students, 63 teachers, 63 classrooms Climate: Student and classroom observation (CLASS elementary school version) Achievement: GPA	MED: Students' engagement mediated the relationship between classroom emotional climate and grades
Willms (2001)	Design: Cross-sectional Unit of analysis: Student, school, country Sample: Nationally representative (13 countries), 100 schools per country Climate: Student: student disturbances, fights, friendship Achievement: Standardized test scores	COM: Positive classroom climate was one of the most significant factors contributing to better academic achievements
Student–teacher relationships and academic achievements		
Chiu (2010)	Design: Cross-sectional Unit of analysis: Student, school Sample: Nationally representative (41 countries), 107,975 students, 150 schools per country Climate: Student: teacher–student relationship Achievement: Self-reported grades	COM: Students whose perceived relationships with their teacher were 10% higher than their respective means, scored significantly higher

(continued)

TABLE 2 (continued)

First author (year)	Method	Main study findings
DiLalla (2004)	Design: Longitudinal: 2 waves; 6–8 years apart Unit of analysis: Student Sample: Nonrepresentative, 146 students Climate: Parent: Behavioral Style Questionnaire, Child Behavior Checklist Achievement: GPA, Teacher's Report Form	COM: Children with poor student–teacher relationships had significantly lower grades in school
Fan (2012)	Design: Cross-sectional Unit of analysis: Student Sample: Nonrepresentative, 1,954 students, 50 schools Climate: Teacher: teacher–student relationship Achievement: Test scores	COM: There was a significant relationship between teacher–students' interpersonal relationship and students' academic achievements
Hamre (2005)	Design: Longitudinal: 2 waves: beginning and end of school year Unit of analysis: Student, classroom Sample: 910 students, 827 classrooms Climate: Teacher: Student-Teacher Relationship Scale Achievement: Standardized test score	MOD: The main effect for the prevalence of high functional risk on achievement was moderated by the level of emotional support in the first-grade classroom
Hughes (2007)	Design: Cross-sectional Unit of analysis: Student Sample: Nonrepresentative, 443 students Climate: Teacher: child engagement, Social Competence Scale, Teacher Student Relationship Big Five Inventory; teacher–student relationship Achievement: Standardized test scores	MED: Classroom engagement mediates the associations between student–teacher and parent–teacher relatedness and child achievement the following year
Kodzi (2014)	Design: Cross-sectional Unit of analysis: Student, classroom, school Sample: 2,388 students, 70 teachers, 72 schools Climate: Student: students hurt each other, teacher hurts students, teacher corrects homework Achievement: GPA, standardized test scores	COM: Having a supportive and caring teacher positively related to academic performance, controlling for other school characteristics
Spilt (2012)	Design: Longitudinal: annual; 6 years Unit of analysis: Student Sample: Nonrepresentative, 657 students Climate: Teacher: teacher–student relationship (Network of Relationships Inventory) Achievement: Standardized test scores	COM: Growth patterns of teacher–student relationship quality predicted gains in academic achievements

TABLE 2 (continued)

First author (year)	Method	Main study findings
Swanson (2012)	Design: Cross-sectional Unit of analysis: Student Sample: Nonrepresentative, 266 students Climate: Student and teacher: student–teacher relationship Achievement: School grades	MED: Student–teacher relationships significantly mediated the relation between cumulative home risk and achievement
Zimmer-Gem-beck (2006)	Design: Cross-sectional Unit of analysis: Student Sample: Nonrepresentative, 324 students Climate: Student: teacher–student relationship (teacher autonomy support, involvement, and structure), peer relationships, fit with general school environment Achievement: self-reported grades	COM: Correlations between grades and relationships with teachers' relation-ships with peers, and engagement were all positive and significant MED: The association between teacher–student relationships and achieve-ment was mediated by student engagement
Safety and academic achievement		
Glew (2005)	Design: Cross-sectional Unit of analysis: Student Sample: 3,530 students Climate: Student: safety at school Achievement: Standardized test scores	COM: Victims and bully-victims were more likely to have low achievement than bystanders
Glew (2008)	Design: Cross-sectional Unit of analysis: Student Sample: 5,391 students Climate: Student: role in school bullying, school safety, belonging to school Achievement: GPA	COM: Higher grades were associated with decreased odds of bullying involvement
Hopson (2014)	Design: Cross-sectional Unit of analysis: Student, school Sample: 13,025 students, 43 schools Climate: Student: School Success Profile: risk and protective factors in student neighborhoods, schools, peer groups, and families; student health and well-being Achievement: School grades	COM: Protective school, home, peer group, and neighborhood environ-ments categorized by social support and safety are associated with positive academic outcomes; students attending schools that are more segregated and in which the majority of students are African American had worse academic outcomes than students in other schools

TABLE 2 (continued)

First author (year)	Method	Main study findings
Lacey (2013)	Design: Cross-sectional Unit of analysis: School Sample: Random representative, 7,304 students, 2,918 teachers, 286 schools Climate: Student: personal victimization; student and teacher: general prevalence of teasing and bullying in the school, assessment of the severity of the problem, frequency of pupils suffering teasing based on origin, sexual orientation or external appearance Achievement: GPA	COM: Percentage of minority pupils in the school and reports about teasing and bullying contributed significantly to explaining the disparity in scores; in schools with a low frequency of bullying and teasing, a high percentage of pupils succeeded on the tests; as the frequency of bullying and teasing increased, fewer pupils in the school succeeded in passing the tests
Lucio (2012)	Design: Cross-sectional Unit of analysis: Student, school Sample: Nationally representative, 14,796 students Climate: Student: school safety, gangs and fighting in school Achievement: GPA	COM: Sense of safety significantly related to achievements; school safety was uniquely related to GPA after controlling for SES, other background characteristics, and other risk factors for school failure
Patton (2012)	Design: Cross-sectional Unit of analysis: Student Sample: 612 students Climate: Student: School Success Profile: community violence, school violence, attacks at school, afraid to go to or from school Achievement: Self-reported grades	COM: Feeling safe in the neighborhood was directly linked to being afraid and indirectly linked with grades
Rumberger (2005)	Design: Longitudinal: 3 waves; 1988, 1990, 1992 Unit of analysis: Student, school Sample: Representative, 14,217 students, 913 schools Climate: Proportion of students reporting feeling unsafe at school Achievement: Standardized test scores	COM: School characteristics accounted for more of the differences in student learning than student background characteristics, and this is especially true for students attending high-SES schools; feeling unsafe was significantly and negatively related to achievements
Engagement and connectedness and academic achievement		
Abbott-Chapman (2014)	Design: Longitudinal: 1985–2006 Unit of analysis: Student Sample: Nationally representative, 6,559 students Climate: Student: Australian Schools Health and Fitness Survey, Student Engagement Instrument Achievement: Highest level of education and current occupation of students as adults	COM: The odds of having a high level of completed education in adulthood were greater for those with higher childhood school engagement

TABLE 2 (continued)

First author (year)	Method	Main study findings
Archambault (2013)	Design: Longitudinal: infancy to fourth grade Unit of analysis: Child, student Sample: Provincial representative, 1,820 students Climate: Teacher: classroom engagement, student–teacher relationship Achievement: Teacher reports on grades	COM: A warm teacher–student relationship in first grade predicted fourth-grade engagement over the contribution of kindergarten skills and second grade achievement
Benner (2008)	Design: Longitudinal: 2 waves; beginning and spring of school year Unit of analysis: Student Sample: Nonrepresentative, 1,120 students Climate: Student: self-reported engagement; teacher: students' engagement Achievement: GPA	COM: Greater school engagement at the beginning of the year was associated with higher grades at the end of the year
Bonny (2000)	Design: Cross-sectional Unit of analysis: Student Sample: 3,491 students Climate: Student: school connectedness score Achievement: Self-reported grades	COM: Higher school connectedness was associated with better academic performance
Borofsky (2013)	Design: Longitudinal: 2 waves; 5 years apart Unit of analysis: Student Sample: Nonrepresentative, 118 students Climate: Student: school engagement Achievement: GPA	MED: School engagement mediated the association between community violence exposure and school GPA
Bryan (2012)	Design: Cross-sectional Unit of analysis: Student Sample: Nationally representative, 10,426 students Climate: Student: attachment to school and teacher, school commitment, school involvement Achievement: Standardized test scores	COM: School bonding significantly predicted academic achievement; students who did not like school at all had significantly lower academic achievement scores than did students who liked school a great deal
Catalano (2004)	Design: Longitudinal semiexperimental; 10 waves Unit of analysis: Student Sample: Nonrepresentative, first study: 808 students, second study: 938 students Climate: Parent, teacher, student reports on student connectedness Achievement: Test scores	COM (Study 1): A measure of school bonding, attachment and commitment to school when children were in 3rd grade had a positive association with academic test scores in 7th grade COM (Study 2): Students in the experimental schools had increased academic performance

(continued)

TABLE 2 (continued)

First author (year)	Method	Main study findings
Chase (2014)	Design: Longitudinal: 2 waves; grades 6–8 Unit of analysis: Student Sample: Nonrepresentative, 710 students Climate: Student: school connectedness (Behavioral-Emotional-Cognitive School Engagement Scale) Achievement: Self-reported GPA	COM: Bidirectional relationships between school engagement and GPA; stronger school engagement predicted higher GPA, and a higher GPA predicted stronger school engagement
Eisenberg (2003)	Design: Cross-sectional Unit of analysis: Student Sample: Representative, 4,746 students Climate: Student: school connectedness (Eating Among Teens Survey) Achievement: Self-reported grades	COM: Moderate positive correlation between liking school and grades
Fall (2012)	Design: Longitudinal: 2 waves; 2002, 2004 Unit of analysis: Student Sample: National probability, 14,781 students Climate: Student: Education Longitudinal Study (2002–2004) Achievement: Test scores, dropout at 12th grade	COM: Academic and behavioral engagement positively influenced students achievement
Faulkner (2009)	Design: Cross-sectional Unit of analysis: Student Sample: Representative sample, 2,243 students Climate: Student: school connectedness Achievement: Self-reported grades	COM: School disconnectedness is associated with poorer academic performance
Forrest (2013)	Design: Cross-sectional Unit of analysis: Student, school Sample: 4,437 students, 34 schools Climate: Student; bullying, bullying victimization, peer connectedness, teacher connection, engagement Achievement: GPA, standardized state achievement test scores	COM: Low aggression was positively related to GPA; low bully-victim was positively related to state test scores
Galla (2014)	Design: Longitudinal: 3 years, annual Unit of analysis: Student Sample: 135 students Climate: Teacher: Children's Behavior Questionnaire–Very Short Form: effortful engagement Achievement: Standardized test scores (SAT)	COM: High effortful engagement was associated with above average test scores

TABLE 2 (continued)

First author (year)	Method	Main study findings
Iyer (2010)	Design: Longitudinal: 3 waves; fall, spring, following year Unit of analysis: Student Sample: Demographically representative, 390 students Climate: Student: school avoidance attitudes; teacher: students' independent and enthusiastic participation as indicator of school engagement Achievement: Teacher ratings of student performance	MED: School engagement mediated the link between peer victimization and academic achievement
G. W. Ladd (2009)	Design: Longitudinal: annually; ages 5–13 Unit of analysis: Student Sample: Nonrepresentative, 383 students Climate: Parent, teacher: School Liking and Avoidance Questionnaire Achievement: Standardized state test scores	COM: Students with higher level of engagement attained an average level of achievement that was significantly higher than students with lower level of engagement
Liem (2011)	Design: Cross-sectional Unit of analysis: Student Sample: Nonrepresentative, 1,436 students Climate: Student: Motivation and Engagement Scale-High School Achievement: Standardized test scores	MED: School engagement partially mediated the link between same-sex peer relationships and academic performance
McMahon (2011)	Design: Longitudinal: 6 waves; 6 semesters Unit of analysis: Student Sample: Nonrepresentative, 111 students Climate: Student: Psychological Sense of School Membership Scale; Comprehensive Assessment of School Environments, Student Satisfaction Survey Achievement: GPA	COM: More frequent school inclusion practices significantly predicted higher GPA across time; more school belonging and less aggression were the strongest predictors of higher GPA
Nakamoto (2011)	Design: Cross-sectional Unit of analysis: Student Sample: Nonrepresentative, 135 students Climate: Students: academically engaged behaviors Achievement: GPA	COM: The effect of school engagement on GPA is significant and positive MED: School engagement mediates the association between peer victimization and GPA
Nasir (2011)	Design: longitudinal for case studies: 2 waves; 2 years Unit of analysis: Student Sample: Nonrepresentative, 120 students; 20 case studies Climate: Student: academically engaged behaviors, interpersonal connection, institutional connection, school environment; observations of case studies Achievement: Academic records for case studies, self-reported grades	COM: All types of connectedness contributed to academic achievements; students with high levels of connectedness had higher grades and graduation rates

(continued)

TABLE 2 (continued)

First author (year)	Method	Main study findings
Niehaus (2012)	Design: Longitudinal: 3 waves; fall, winter, spring of school year Unit of analysis: Student Sample: Nonrepresentative, 330 students Climate: student: needs and satisfaction, caring adult relationships in school Achievement: GPA	COM: The more decline that students perceived in school support across the year, the lower their GPAs were at the end of the year
Perry (2010)	Design: Cross-sectional Unit of analysis: Student Sample: Nonrepresentative, 285 students Climate: Student: Identification with School Questionnaire, School Engagement Questionnaire Achievement: School records GPA and self-reported GPA	MED: The effect of career preparation on grades was mediated by school engagement
Seelman (2012)	Design: Cross-sectional Unit of analysis: Student Sample: Nonrepresentative, 315 students Climate: Student: school engagement, presence of a safe adult at school, presence of gay–straight alliance, feeling unsafe or afraid at school Achievement: GPA	COM: School engagement is a significant predictor of GPA, and this relationship is strongest in the presence of a gay–straight alliance
Sirin (2004)	Design: Cross-sectional Unit of analysis: Student Sample: Nonrepresentative, 336 students Climate: Student: school engagement and sense of belonging, behaviors in school and activities in the classroom. Achievement: School grades	COM: There was a positive and significant relationship between academic performance and school engagement
Van de gaer (2009)	Design: Longitudinal: 6 annual waves Unit of analysis: Student Sample: Representative, 2,270 students Climate: Student: school engagement (interest in learning tasks, relationship with teachers, attitude toward homework) Achievement: Test scores	COM: Students who showed less decline in school engagement had higher learning rates in language

TABLE 2 (continued)

First author (year)	Method	Main study findings
Véronneau (2010)	Design: Longitudinal: 3 waves Unit of analysis: Student Sample: Nonrepresentative, 1,278 students Climate: Student: SSRS questionnaire measuring behavioral engagement Achievement: GPA	COM: Peers' school engagement was a significant predictor of a positive change in academic achievements
M. T. Wang (2012)	Design: Longitudinal: 3 waves; 2 years apart Unit of analysis: Student Sample: 1,148 students Climate: student: Behavioral emotional and cognitive school engagement Achievement: GPA	COM: Declines in school participation and self-regulated learning were associated with within-person declines in GPA
M. T. Wang (2013)	Design: Longitudinal: 3 waves; 2 years apart Unit of analysis: Student Sample: 1,025 students Climate: Student: behavioral, emotional, cognitive engagement Achievement: GPA	COM: Adolescents from highly engaged group had GPAs notably higher than the GPAs of adolescents in the other groups (moderately engaged, cognitively disengaged, and minimally engaged)
Weiss (2009)	Design: Cross-sectional Unit of analysis: Student Sample: Nationally representative, 10,946 students Climate: Student: school engagement through psychological and behavioral connections with the values and aims of the school Achievement: Standardized test scores	COM: Student engagement was positively related to achievement MOD: The effects of engagement on achievements varied by the size of 10th-grade class; magnitude of engagement's effect was greatest in largest cohorts

Note. CHKS = California Healthy Kids Survey; CLASS = Classroom Assessment Scoring System; COM = compensatory effect; GPA= grade point average; INSIGHTS = INSIGHTS Into Children's Temperament; MOD = moderation effect; MED = mediation effect; PISA = Programme for International Student Assessment; SES = socioeconomic status; TIMSS = Trends in International Mathematics and Science Study.

manifest, and how is it assessed validly and reliably? In the absence of a clear and uniform definition and measurement of school climate, the ability of researchers and stakeholders to evaluate school growth over time is restricted. Thus, researchers are encouraged to construct a common definition and climate measurements that yield valid and reliable inferences that can be then translated into practice and policy guidelines to better support school improvement and sustainability, advancement of academic achievement, and eradication of social inequality.

A Need for a Multiple-Perspective Approach in Climate Measurement

Despite agreement among researchers on the importance of evaluating climate based on perspectives of the entire school community (e.g., NSCC, 2007; Thapa, Cohen, Guffey, & Higgins-D'Alessandro, 2013), findings (see Table 2) reveal a tendency to dismiss climate reports of teachers, school staff, and especially those of students' parents and other family members. The vast majority of studies (64%) were based solely on student climate reports (e.g., Buyse, Verschueren, Verachtert, & Van Damme, 2009; Morin, Marsh, Nagengast, & Scalas, 2014; Willms & Somer, 2001), about 13% solely on teacher reports (e.g., Johnson & Stevens, 2006; Sweetland & Hoy, 2000), and about 6% on a combination of student and teacher reports (e.g., Iyer, Kochenderfer-Ladd, Eisenberg, & Thompson, 2010; Lacey & Cornell, 2013) or student and school principal reports (Liu et al., 2015). Several studies recognized the importance of parental school involvement and measured it based on other school members' reports (Hughes & Kwok, 2007; Ma & Klinger, 2000); yet only three studies measured parents' climate reports (Catalano, Haggerty, Oesterle, Fleming, & Hawkins, 2004; DiLalla, Marcus, & Wright-Phillips, 2004; G. W. Ladd & Dinella, 2009). Finally, only three studies measured climate based on three perspectives: those of students, teachers, and principals (Mohammadpour, 2013; Stewart, 2008) and students, teachers, and parents (Catalano et al., 2004).

In addition, about 8% of studies measured climate using external measurements, such as school records on student attendance and school size (Chen & Weikart, 2008), classroom observation (Allen et al., 2013; López, 2012; Reuland & Mikami, 2014; Reyes, Brackett, Rivers, White, & Salovey, 2012), and a combination of both classroom observation and student reports (Nasir, Jones, & McLaughlin, 2011). This finding is especially important because there is an agreement regarding the fact that multiple perspectives are needed for school climate measurement, yet there are not enough empirical data based on this agreement. The reasons for the fact that few studies included multiple perspectives should be explored and understood and the agreement itself should also be reviewed, perhaps while suggesting rationalization and concrete methods of implementing such an approach.

Restricted Use Units of Analysis

Our review showed that the majority of the included studies focused on one unit of analysis, despite the fact that the school climate literature has established the importance of incorporating multiple levels when studying school climate. Table 2 reveals that more than half of the studies (54%) measured climate and achievement at the student level only (e.g., Liew et al., 2010; Morrison, Jewell, McCutcheon, & Cochrane, 2014). These studies examined whether students who report a more positive school climate reach higher levels of personal academic achievement. About 8%

only examined school-level measurements (e.g., Chen & Weikart, 2008; Johnson & Stevens, 2006). This second group of studies tested whether schools typified by more positive school climate also demonstrate better school achievement. The fact that 60% the studies focused solely on one measurement level (structural or individual) is surprising because these studies did not consider the hierarchical or nested nature of school systems in general and school climate in particular.

One third of the studies incorporated student-level measurements with either classroom-level (e.g., Allen et al., 2013; López, 2012; Reuland & Mikami, 2014) or school-level (e.g., Hopson et al., 2014; Martín et al., 2008) measurements. Finally, only two studies measured variables on three levels: student, classroom, and school (Kodzi, Oketch, Ngware, Mutisya, & Nderu, 2014; Mohammadpour, 2013). Findings from these very few studies could point to a specific context with the greatest potential to contribute to academic achievement. Mohammadpour (2013) reported that whereas student-level and school-level climate variables account for only a fifth of academic variance, classroom-level variables contribute significantly by accounting for more than half of the variance in academic achievement among students. This means that student academic achievement may significantly vary from one classroom to another in the same school. Kodzi et al. (2014), however, used separate models for measures at each level; thus, the relative contribution of variables at different measurement levels remained masked. In a third study, Liu et al. (2015) attempted to use three-level measures, including country-level variables, for SES background; however, initial findings proved to be statistically nonsignificant regarding school effects among countries and thus were excluded from the final analyses, which were based only on student- and school-level variables.

Limited Scope of Research Design

Most of the studies used a correlational design, as evident in Table 2; more than half (53%) were based on correlational research that did not provide a basis for deducing the influence of causal relations between climate and achievement (e.g., Cheema & Kitsantas, 2014). Nevertheless, the vast majority of these studies indicated a positive correlation between positive climate and higher academic achievement. About 42% were longitudinal studies that measured climate or academic achievement or both at more than one time point. Most of these studies were based on only two or three measurement points during the same school year (e.g., Martín et al., 2008) or 2 years (e.g., Elias & Haynes, 2008). Although based on a limited number of measurements, these studies provided a clear message: Positive climate at one point in time (particularly elements relating to positive teacher–student relationships, such as warmth, acceptance, and teacher support) positively contributed to higher academic achievement at a second point in time. Nevertheless, three studies indicated reciprocal or two-way relations between climate and academic achievement. For example, students reporting a high measure of support from teachers early in the year had better achievement at the end of the year, and conversely, students with higher performance early in the year reported greater support from teachers at the end of the year (Košir & Tement, 2014). Other longitudinal studies presented similar findings regarding a two-way relationship between academic achievement and sense of safety (McCoy et al., 2013) and school engagement (Chase, Hilliard, Geldhof, Warren, & Lerner, 2014).

Experimental or semiexperimental research may clarify the directionality of influences of climate and achievement, providing control over variable precedence and alternative explanations for variance in academic achievement. Only three studies employed a semiexperimental research design, all of which found that positive climate, or positive climate aspects, contributed to higher academic achievement (Catalano et al., 2004; Reuland & Mikami, 2014; Rimm-Kaufman, Fan, Chiu, & You, 2007).

Additional studies featuring longitudinal designs created a more solid foundation for deducting causal relationships between climate and academic achievement. Three studies were based on six measurements across 3 years (McMahon, Keys, Berardi, & Crouch, 2011) or 6 years (Spilt, Hughes, Wu, & Kwok, 2012; Van de Gaer, Pustjens, Van Damme, & De Munter, 2009). One study followed children from infancy to fourth grade (Archambault, Pagani, & Fitzpatrick, 2013). An additional study that followed students for 21 years from prekindergarten to adulthood indicated a higher level of completed education in adulthood for those experiencing more positive school climate throughout their life, namely, greater school engagement (Abbott-Chapman et al., 2014). Finally, DiLalla et al. (2004) indicated that preschool children with poor student–teacher relationships had significantly lower grades in school. These longitudinal studies demonstrated that a positive school climate increases students' academic achievement. Last, only one study employed a case study design (Davis, 2006), which indicated that more positive teacher–student relationships improve academic achievement.

This first set of findings related to methodological issues and considerations. Next, we present themes that emerged from the review related to the role of school climate in the association between SES background and academic achievement.

Positive Effect of Climate on Academic Achievement: School Climate Matters

Our review clearly demonstrated that school climate matters when it comes to the relationship between SES and academic achievement; most studies provided evidence that a more positive school climate is related to improved academic achievement, beyond the expected level of achievement based on student and school SES backgrounds. All but one study (Barile et al., 2012) found evidence of the impact or contribution of positive climate to achievement. A large number of studies (84%) found that positive climate has a compensatory positive contribution to academic achievement, meaning that such climates provide an additive value to academic achievement beyond the negative contribution of poor SES background. Several studies found this compensatory quality of climate to be predominantly influential for students from weaker SES backgrounds (e.g., Brand et al., 2003; Johnson & Stevens, 2006). For instance, a study conducted in Israel based on a nationally representative sample revealed that school climate had 4 times the impact on academic achievement in Arabic-speaking schools as in Hebrew-speaking schools (Berkowitz et al., 2015).

About 17% of the studies pointed to climate as a mediating influence on academic achievement. Some of this research showed that the relationships between SES background and student achievement are mediated by school climate components (Chen & Weikart, 2008; Liu et al., 2015); other studies indicated a mediating

effect of school climate components on the relationship between academic achievement and other background characteristics, such as community risk factors (Swanson et al., 2012) or community violence exposure (Borofsky, Kellerman, Baucom, Oliver, & Margolin, 2013). Other studies indicated a chain of influence in which students' classroom or school engagement mediated the effect of other school climate components on academic achievement (e.g., Liem & Martin, 2011; Morin et al., 2014; Reyes et al., 2012). For example, three studies indicated that the association between positive student–teacher relationships and higher academic achievement is mediated by students' classroom engagement (Hughes & Kwok, 2007; Hughes, Luo, Kwok, & Loyd, 2008; Zimmer-Gembeck, Chipuer, Hanisch, Creed, & McGregor, 2006). An additional two studies indicated that the correlations between victimization at school and academic achievement are mediated by student engagement in the classroom and school (Iyer et al., 2010; Nakamoto & Schwartz, 2011). These findings demonstrated that teacher–student relationships and violence victimization are factors that affect student engagement, and consequently academic achievement.

Moreover, there is evidence that school climate has a role in changing the strength of the relationship between SES and academic achievement, that is, positive school climate can decrease the contribution of low SES to lower grades and vice versa. About 13% of the studies found that climate has a moderating influence on the relationship between background characteristics and academic achievement. For example, some studies indicated that positive climate decreases the correlation between SES background and academic achievement, whereas negative school climate increases this correlation, primarily among students with lower SES backgrounds (Berkowitz et al., 2015; Crosnoe, Johnson, & Elder, 2004; Hopson et al., 2014; Johnson & Stevens, 2006; O'Malley et al., 2015), students with learning difficulties, and students at risk of school failure (Hamre & Pianta, 2005; Liew et al., 2010; López, 2012).

In summary, findings from Table 2 reveal substantial variability in climate definitions and measurements, a tendency to focus on student perceptions of climate, and a deficiency in longitudinal or experimental research designs to inform knowledge and theory on the influence of positive school and classroom climates on student academic achievement. Nonetheless, the current findings clearly reveal that the classroom and school are important contexts for predicting academic achievement, even after controlling for SES background.

Discussion

This research synthesis accounted for inconclusive scientific evidence establishing links between SES, school climate, and academic achievement and inconsistencies in methods, instruments, definition of variables, and design of studies. The synthesis included 78 studies dating back to 2000 on the effects of school and classroom climates on academic achievement among school-age children. In general, the studies were large and of high quality; however, many did not include nationally representative samples of students. Although significant differences in definitions and measurements of climate emerged, the main findings showed that positive school and classroom climates mitigate the negative effect of poor SES background on academic achievement.

Our findings indicate significant differences in climate definitions and measurements. This may reflect uncertainty and possible confusion in the scientific community regarding aspects that comprise school climate and points to the tangible need to agree on an exhaustive yet exclusive measurement for school and classroom climate that may be used extensively throughout research, and to facilitate a better understanding of what climate entails. Although metaphors used for climate, such as a school's unique personality or character, are instinctively understandable (e.g., Halpin & Croft, 1963; Simons-Morton & Crump, 2003), it is far more complicated to translate these intangible impressions to the aspects of school climate that can and need to be assessed. This difficulty was reflected throughout this research synthesis. As noted by Cohen and Geier (2010), over time, research is expected to support the development and understanding of the dimensions most essential to measurement and assessment of school climate.

This review highlights the need to establish a concrete, clear definition to serve as a foundation for measuring and evaluating school climate and developing climate improvement interventions. Such a definition should not be overly exhaustive and contain only those central areas that may be observed, quantified, and measured. With only a few exceptions, most studies examining climate in the current research synthesis included quality of student–teacher relationships and various measurements of emotional support and caring, primarily from teachers (e.g., Buyse et al., 2009; Hughes et al., 2008; Košir & Tement, 2014). A recent meta-analysis also established the positive contribution of student–teacher relationships to academic achievement (Roorda, Koomen, Spilt, & Oort, 2011). Thus, a supportive, caring approach from teachers is a core central component of climate that should be included in future research and practice definitions and measurements.

Additional central dimensions of climate identified in this synthesis and a recent systematic review (Upadyaya & Salmela-Aro, 2015) are a sense of connectedness and engagement to the school and feeling safe at school. The NSCC (2007) comprehensive definition of school climate is a solid foundation for establishing a unified measurement for school climate. However, there is a need to break down the major components of safety, teaching, learning, interpersonal relationships, institutional environment, leadership, and professional relationships into measureable subcomponents so that the model is empirical. As the school climate literature keeps evolving, researchers are encouraged to examine the associations among additional components of climate that are included in more recent measurements, such as those noted by the NSCC and the school's physical surrounding, relational trust, and respect for diversity. These aspects of school climate are known for their significant contribution to children's improved well-being, mental health, and physical health (Thapa et al., 2013) and should be further tested for their contribution to mitigating the negative effect of poor SES background on academic achievement. More research syntheses are encouraged to compile evidence on these additional elements in the future.

Multiple-Perspective Approach to School Climate Measurement

In essence, school climate reflects the experiences that students, school personnel, and parents have at school (Thapa et al., 2013). In the early days of climate research, researchers focused mainly on teacher and staff reports (Halpin & Croft, 1963; Hoy & Tarter, 1997). However, throughout the years there has been an increasing tendency to measure student perceptions, to neglect teacher and additional staff perspectives, and to dismiss the perspectives of parents and other family members. This finding is surprising for several reasons. First, it is wrong to assume that parents and teachers share the same school climate experiences, even with regard to the same school. For example, a student may enjoy a close and warm relationship with a teacher and thus be more prone to report a positive school climate, yet the teacher may experience a patronizing and insulting attitude from the school principal and thus be more prone to report a negative school climate experience. Similarly, parents may also experience school climate differently than their children, depending on the school's efforts to engage them (Baquedano-López, Alexander, & Hernandez, 2013).

Second, parent and staff member perceptions of school climate are important in themselves. A growing body of literature has suggested that parental engagement and the degree of positive connection with the school critically contributes to the improvement of children's learning, healthy development, and success in school (Barnard, 2004; Bunting, Drew, Lasseigne, & Anderson-Butcher, 2013). Empirical findings also demonstrated robust positive outcomes for teachers experiencing a positive climate across several domains, including greater teacher efficacy and greater levels of job satisfaction and work productivity (Bevans, Bradshaw, Miech, & Leaf, 2007). Thus, we encourage researchers to explore and uncover the entire school community's perceptions of school climate, which would allow more successful implementation of school reform programs that develop holistically with the whole school community (Thapa et al., 2013).

The Need for Expanding Methodology in School Climate Research Designs

Climate is usually considered to be experience-dependent and is measured subjectively through direct measurements that tap into the psychological experience of the individual with the school (O'Malley, Katz, Renshaw, & Furlong, 2012). Nonetheless, the current research synthesis revealed that some studies measured climate based on observations. It is appropriate to further examine the reliability and validity of observation-based climate measurements to predict academic achievement and the degree of congruence between climate observations and other research tools, namely, questionnaires, to evaluate climate and its relationship with academic achievement. In addition to observations, more mixed-methods studies that explore qualitative case studies, subcomponents of climate, and multiple perspectives of students, teachers, administrators, and district-level educators could further the theoretical literature.

Substantial Variation of Academic Achievement Measurement

A variety of measurements of academic achievement were used throughout the synthesized studies, including test scores, grade point averages, and school grades. These measures were self-reported or based on teacher reports and standardized

or unstandardized. Other studies also used perceived academic performance and dropout rate as academic performance indicators. There is no agreement about the relative merit of different measurement methods used to obtain accurate and valid information about student achievement (Martínez, Stecher, & Borko, 2009). Standardized test scores are usually considered the gold standard in assessing academic performance, because teachers may not be able to assess student achievement accurately and validly as their judgment is often affected by the motivation or engagement (Sharpley & Edgar, 1986) or background characteristics (Darling-Hammond, 1995) of students.

Nevertheless, research indicated a correlation between teacher reports on academic achievement and standardized test scores (Hopkins, George, & Williams, 1985; Martínez et al., 2009). Furthermore, although some researchers argued in favor of using self-reported grades (Cassady, 2001), others indicated they are unlikely to accurately represent the scores of students with low grade point averages and those with low ability (Kuncel, Credé, & Thomas, 2005). It is safe to assume that some forms of academic achievement, such as self-reported grades, are used more frequently due to convenience. Nonetheless, the aforementioned contradictions regarding the validity and reliability of measurements demonstrate the importance of using an array of academic achievement measures and the need to conduct further research to determine which combination of measures best suits research on the association between school climate and academic achievement.

As opposed to variability in the type of measure used for academic achievement, the majority of synthesized studies measured academic achievement in math, language arts, science, or English-as-a-foreign-language content areas. These core subjects are currently considered the most central and important for higher education and future careers. Thus, academic success in these content areas is foundational, whereas performance in other subjects, such as music, art, physical education, and especially vocational training programs, is considered less applicable to a wide range of careers and more leisure related.

The implied message delivered to teachers and school principals is that other unmeasured subjects are not as important as the core subjects. Furthermore, theory and knowledge regarding the mitigating effect of school climate on academic achievement are biased because research has never tested whether positive school climate contributes to academic achievement in areas other than core subjects. For example, one study indicated that mathematics is the subject most affected by school processes (Liu et al., 2015), yet no research has ever tested the contribution of climate to arts, physical education, social and emotional learning, civics, vocational subjects, or any other alternative other than the core subjects, mainly mathematics. This omission is especially surprising because character education and civic learning are elements included in the most acceptable and widely used definition of school climate (NSCC, 2007). With most states having adopted the Common Core and the inclusion of social and emotional components in academic standards, a careful examination of the role of school climate and its subcomponents as they pertain to different academic subjects is warranted. Moreover, research on how these variables manifest in evolving SES contexts given these changes is sorely needed.

Multiple educational researchers have conceptualized schools as the center of a larger ecological system, embedded in multiple social contexts that interact with the surrounding social, cultural, and physical environments (Bronfenbrenner, 2005; Comer & Haynes, 1991). The influences of the multiple layers surrounding an individual student can and should be measured and assessed (Cohen, McCabe, Michelli, & Pickeral, 2009; Thapa et al., 2013). For example, beyond the personal experience of climate, students also share a collective climate experience at the classroom or school level (e.g., a general sense of safety at school or support from teachers); thus, there is variability in climate experiences among schools and even from classroom to classroom (Reyes et al., 2012).

Nonetheless, the current findings reveal that the majority of studies did not consider the hierarchical or nested nature of school climate and its effect on academic achievement in multilevel frameworks. This restricted focus on only one research level (structural or individual) is not conducive to examining to what degree academic achievement is rooted in student-level variables (differences in classrooms or schools), classroom-level variables (differences among classrooms), and school-level variables (differences among schools). Studying multifaceted factors related to the individual student, classroom, or school contexts may significantly promote climate improvement interventions, indicating a specific context with the greatest potential to contribute to academic achievement. For example, if the largest proportion of variance in academic achievement is explained by classroom-level variables (Mohammadpour, 2013), then the majority of climate improvement efforts should be invested in the classroom context, such as by supporting more positive experiences during classes. The scarcity of studies examining the impact of classroom-level variables on academic achievement and measuring variables at more than two measurement levels suggests that additional research is needed to establish a multifaceted body of knowledge regarding the multilevel climate dimensions related to academic achievement.

Association Between Climate and Academic Achievement: School Climate Matters

This review demonstrates that a positive school climate contributes to higher academic achievement and decreases the negative influence of poor SES background characteristics and other risk factors on academic achievement. A positive school climate would naturally contribute to the school's communal sense of well-being, comfort, and pleasure. Although these outcomes are positive ends in themselves, current accountability programs create barriers for improving school climate because they appropriate funding and conceptual support mainly for educational purposes. Nonetheless, this research synthesis indicates that an improved school climate has a significant positive impact on academic achievement. In light of current educational policies calling on schools to increase student academic proficiency through state and federal reform legislation, investing efforts and resources in improving school climate is a goal worthy of consideration. Furthermore, we found that the positive compensatory contribution is especially relevant for students and schools with lower SES backgrounds. These findings

demonstrate that positive school climate could narrow, to some extent, achievement gaps among students from different ethnic and SES backgrounds.

The current findings also indicate that a positive climate mediates the relationship between student and school SES background characteristics and academic achievement. These findings demonstrate the protective qualities of positive school climate and its potential to break the chain of negative influences of poor SES background and risk factors on academic achievement. It is important to note, however, that the underlying assumption of a mediation effect is that a significant association exists between background characteristics and school climate (MacKinnon, 2008). This assumption implies a determinate nature of the relationship between low SES and negative school climate. Nonetheless, one encouraging finding emerging from this research synthesis is the lack of a statistically significant correlation between SES and perceptions of school climate (Berkowitz et al., 2015; Hopson & Lee, 2011). This finding implies that schools with lower SES backgrounds should not necessarily demonstrate poor climate and that positive classroom and school climates can and should be nurtured in schools serving individuals living in poverty.

Finally, this research synthesis also indicates that the strength of the relationship between background characteristics and academic achievement depends on the quality of school or classroom climates. Such findings indicate that classrooms and schools characterized by positive climates successfully level the playing field for students of lower SES backgrounds and thus have the potential to narrow achievement gaps among students of different SES backgrounds and between students with stronger and weaker academic abilities. By promoting a positive climate, schools could allow greater equality in educational opportunities, decrease socioeconomic inequalities, and enable more social mobility.

Because studies mainly employed cross-sectional designs, we recommend conducting further experimental research to establish the nature of the impact of positive climate on academic achievement. Qualitative research designs that employ focus groups, observations, interviews, discussions, study circles, and other case-learning methods and measures are also rare in school climate research. Nonetheless, such qualitative measures are an ideal way to learn about school climate because they provide school leaders and staffs with scientifically sound information to gauge and direct efforts to improve school climate and enhance students' academic proficiency (Cohen et al., 2009).

School Climate Improvement

As opposed to prior misconceptions (e.g., Coleman, 1966; Jencks et al., 1972), this research clearly shows that schools, and particularly classrooms, do matter and can do much to improve academic outcomes, thus highlighting the necessity and importance of interventions to support and improve school climate. Nonetheless, the lack of empirical evidence supporting recommended intervention strategies aimed at addressing school climate as a whole is painfully apparent. Published intervention programs with high scientific standards are mostly centered on one or more aspects of school climate, such as safety and violence or bullying prevention (Espelage, Gutgsell, & Swearer, 2004; Merrell, Gueldner, Ross, & Isava, 2008), social and emotional learning (Durlak, Weissberg,

Dymnicki, Taylor, & Schellinger, 2011), development of social skills, or relationships in school (Linares et al., 2005). However, practice leaders and school professionals have no comprehensive intervention program or guidelines to provide direction on how to implement changes in the social, emotional, and ethical abilities and tendencies of students and adults in school and which approaches are based on the best knowledge available (Cohen et al., 2009). Furthermore, studies demonstrating that climate is a changeable factor and documenting processes of change in school climate are lacking. This situation may stem from the absence of a clear definition of climate, without which it is difficult to develop interventions that may then be evaluated for efficacy.

Intervention guidelines should be based on accurate monitoring and assessment processes, documented, and critically evaluated. Leading NSCC researchers recommended guidelines to facilitate effective evidence-based interventions for climate improvement, some of which also emerged from the current research synthesis. For instance, they recommended developing a bank of case studies of schools that have successfully implemented significant school climate improvements (Cohen et al., 2009). As an example, an in-depth examination of "theoretically atypical schools," which employed qualitative methods such as interviews, focus groups, school safety mapping methods, policy discussion and analysis, and detailed school observations, provided evidence of core variables distinguishing between violent and nonviolent schools (Astor, Benbenishty, & Estrada, 2009). The qualitative findings indicated that schools with theoretically atypically low violence have a combination of organizational and social climate factors that are implemented effectively by the staff and under the leadership of a visionary principal (Astor et al., 2009). A reservoir of case studies of schools with visionary leaders could further our understanding of how to establish positive school climate in schools and would facilitate the development of detailed guidelines on the practice of a visionary school leader. Further studies are thus encouraged to employ more qualitative measures to gauge and direct methods on school climate improvement to support academic proficiency advancement (Cohen et al., 2009).

Previous research also indicated that locally developed programs that are designed to address specific school needs and executed by the school community demonstrate better outcomes (Marachi, Astor, & Benbenishty, 2013). We therefore recommend a strategy whereby school communities design their own climate improvement programs, tailor-made to their requirements and social and organizational characteristics, rather than only importing external models that proved effective elsewhere. Meaningful involvement of school community members in considering what kind of school they want allows for the development of a shared vision with associated core values. This is an essential foundation for any and all school improvement efforts (NSCC, 2015).

In conclusion, findings from the current study demonstrate the overall positive contribution of positive climate to academic achievement among all students but especially those from lower SES backgrounds. This synthesis outlines important research directions to fill in major knowledge and theory gaps regarding the influence of school climate on academic achievement and aspects of practice pertaining to improving school climate and academic achievement and eradicating socioeconomic disparities.

Note

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