

A MULTILEVEL ANALYSIS OF STUDENT PERCEPTIONS OF SCHOOL CLIMATE: THE EFFECT OF SOCIAL AND ACADEMIC RISK FACTORS

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This multilevel study examines the extent to which individual- and school-level variables are predictive of three aspects of students' perceived school climate (order, safety, and discipline; fairness and clarity of school rules; and teacher-student relationship) by using a nationally representative sample. A wide range of social and academic risk factors at the individual level are examined. The results show that individual-level predictors, such as having behavior problems at school, being held back a grade, coming from a single-parent family, parents' education level, gender, and ethnicity (e.g., Hispanic and Asian), play a significant role in student perceptions of school climate. The results suggest that these relationships between the individual-level predictors and students' perceived school climate are fairly robust across schools. School-level variables, such as attending a private or a Catholic school, are also significant predictors of students' perceived climate. Furthermore, the study reveals significant interaction effects among the predictors and provides more accurate interpretations of the findings. © 2011 Wiley Periodicals, Inc.

School climate is defined as the character and quality of life within a school that is shaped by its organizational structure, physical environment, instructional practices, interpersonal relationships, and overarching values, objectives, and customs (Cohen, McCabe, Michelli, & Pickeral, 2009). Understanding and examining school climate seems imperative, given the significant amount of research suggesting that positive school climate is associated with various student outcomes, including academic achievement and performance (Battistich, Soloman, Kim, & Watson, 1995; Felner, Aber, Primavera, & Cauce, 1985; Griffith, 1999; Roeser & Eccles, 1998; Stewart, 2007), adaptive psychosocial adjustment (Battistich et al., 1995; Brand & Felner, 1996; Kuperminc, Leadbeater, & Blatt, 2001; Roeser & Eccles, 1998), satisfaction with school (Griffith, 1999; Verkuyten & Thus, 2002), sense of belonging at school (Vieno, Perkins, Smith, & Santinello, 2005), academic value and self-concept (Hoge, Smit, & Hanson, 1990; Roeser & Eccles, 1998), motivation to learn (Battistich et al., 1995; Eccles & Wigfield, 1993), and student school behavior (Coker & Borders, 2001; Purkey & Smith, 1983; Reid, 1983; Rumberger, 1987; Sommer, 1985).

Bandura (2001) attests in the social cognitive theory that what influences an individual's attitudes and behaviors is not necessarily objective reality but how the person perceives one's experiences. Consequently, school environment is likely to impact students' academic learning and school experiences through their perceptions which thus are important targets for school improvement initiatives and student interventions. A variety of definitions and assessments have been proposed to address school climate (see Cohen et al., 2009; Zullig, Koopman, Patton, & Ubbes, 2010). Recent research has acknowledged the complexity of school climate and advocated that this construct is multidimensional (Kuperminc, Leadbeater, Emmons, & Blatt, 1997; Verkuyten & Thus, 2002). Three important aspects of this construct, including order, safety, and discipline (Furlong et al., 2005; Griffith, 2000; Haynes, Emmons, & Comer, 1993; Wilson, 2004), teacher-student relationship (Furlong et al., 2005; Griffith, 2000; Haynes et al., 1993; Wilson, 2004), and fairness and clarity of school rules (Brand, Felner, Shim, Seitsinger, & Dumas, 2003; Haynes et al., 1993), have been identified and examined by a majority of school climate assessments. These aspects of school climate capture the safety, discipline, fairness, warmth, and support of both the social and physical environment of

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schools, and play a central role in improving schools' effectiveness and assisting students' social and academic success.

One particular area of contention in examining students' perceptions of school climate has been the appropriate unit of analysis, that is, whether to analyze this construct at the school or individual level (e.g., Anderson, 1982; Van Horn, 2003). On one hand, researchers have analyzed school climate as a property of the school at the school level by focusing on the means of raters within the school (Van Horn, 2003). From this perspective, student ratings are aggregated, and the focus is on the school rather than the individual perceptions of those who function within the school. A limitation of this perspective of a single school-level analysis is its assumption that individual perceptions of school climate do not vary significantly across schools. Therefore, an investigation of the diversity of school climate perceptions among different individuals within the school is restricted from this perspective (Van Horn, 2003).

On the other hand, researchers who study organizational climate maintain a different perspective. They argue that the unit to examine is the individual within the school because climate will be perceived differently by each individual due to different personal characteristics and school experiences (Mok & McDonald, 1994). This reflects the theory of Rogers (1951), which presumes that individuals react to experiences psychologically according to an internal frame of reference and individual perception. Therefore, it has been proposed that analysis of school climate should also be conducted at the individual level (Sirotnik, 1980) because within-school individual differences would be more predictive of student perceptions of school climate (Van Horn, 2003).

In combination of both perspectives, recent school climate research has highlighted the importance of examining multiple levels of influence on student perceptions of the school climate at both elementary (e.g., Battistich, et al., 1995; Griffith, 1999; Koth, Bradshaw, & Leaf, 2008; Vieno et al., 2005) and secondary levels (McNeely, Nonnemaker, & Blum, 2002; Rowan, Raudenbush & Kang, 1991). Specifically, research has indicated that student perceptions of school climate are not only associated with the features of school environment within which students are situated, but also are shaped by their individual characteristics and experiences (e.g., Griffith, 1999; Koth et al., 2008). Consistent with this notion, research has suggested that variations in students' perceived school climate exist not only among schools but also among individuals within a school (e.g., Battistich et al., 1995; Griffith, 1999; Koth et al., 2008; Rowan, et al., 1991).

A growing body of research has documented the school-level variation in student perceptions of school climate by examining school-level predictors of student perceptions of school climate, such as school enrollment (Griffith, 2000; Koth et al., 2008; Vieno et al., 2005), faculty turnover (Koth et al., 2008; Mitchell, Bradshaw, & Leaf, 2010), student-teacher ratio (Mitchell et al., 2010), student mobility (Koth et al., 2008; Mitchell et al., 2010), school sector (e.g., public vs. private; Vieno et al., 2005), and percentage of students receiving free and reduced meals (FARMS; Koth et al., 2008; Vieno et al., 2005). However, there is mixed evidence as to how school-level factors are related to student perceptions of school climate. For example, McNeely and colleagues (2002) suggested that students within larger schools have more negative perceptions of the school, whereas Vieno and colleagues (2005) indicated that no significant relationship existed between school size and students' school community perceptions. To complicate the matter even further, Koth and colleagues (2008) suggested that school enrollment was negatively related to students' perceived school motivational climate but not to their perceptions of order and discipline in school. Similarly, Vieno and colleagues (2005) indicated that schools with a predominant make-up of high socioeconomic status (SES) students reported more positive perceptions of school community on average. On the contrary, Koth and colleagues (2008) found in their between models that the school percentage of students receiving FARMS was not related to student perceptions of school climate. These mixed results warrant a reinvestigation of the links between student perceptions of multiple aspects of school

climate and school-level predictors using a large-scale complex sample, which was the purpose of the current study.

In addition to the school-level influence, individual-level variables have also been identified as predictors of student perceptions of school climate. Researchers have consistently found that minority students (Battistich et al., 1995; Koth et al., 2008; McNeely, et al., 2002) and male students (Battistich et al., 1995; Griffith, 1999; Koth et al., 2008; Verkuyten & Thus, 2002) report less favorable perceptions of school climate. However, with only a few notable exceptions (e.g., McNeely et al., 2002), prior research efforts have primarily focused on the role of limited demographic characteristics of individuals, such as race and gender, in examining the individual-level influence on student perceptions of school climate. Little research has been devoted to understanding how students who experience conditions that are impediments to learning (i.e., *social risk*) and who exhibit a set of school problem behaviors (i.e., *academic risk*) lead to variations in their perceived school climate.

A substantial body of research has been devoted to identifying risk factors that are associated with academic difficulty, school failure, or dropping out of school. The well-established risk factors commonly fall into two categories: social risk factors and academic risk factors. Social risk factors refer to students' demographic and historical characteristics that pose a higher likelihood of causing difficulty in school. These include race/ethnicity (Rouse & Fantuzzo, 2009; Rumberger, 1995), family income (Guang, 1998; Phelan, 1992; Gutman, Sameroff, & Eccles, 2002; Rouse & Fantuzzo, 2009; Rumberger, 1995), parents' education (Gutman, et al., 2002; Rouse & Fantuzzo, 2009), family structure (Barton, 2006; Gutman, et al., 2002), immigrant status (Fischer, 2010; Rumberger, 1995), and having siblings who have dropped out of high school (Hess & D'Amato, 1996). Academic risk involves school-related factors that hinder the likelihood of successful school outcomes, including having behavior problems at school (Farkas, Grobe, Sheehan, & Shuan, 1990; Phelan, 1992; Rumberger, 1995), being held back a grade (Randolph, Fraser & Orthner, 2004), and changing schools for reasons other than grade promotion (Rumberger & Larson, 1998).

Although an abundance of literature indicates that students who experience the aforementioned risk conditions have a greater likelihood of experiencing adverse academic outcomes, few studies have actually examined whether the social and academic risk factors lead to variations in student perceptions of school climate. Hence, the objective of the present study was to conduct a multilevel analysis examining (a) whether the social and academic risk students experience relate to their perceived school climate (order, safety, and discipline; fairness and clarity of school rules; and teacher–student relationship); (b) whether the differences among student perceptions of school climate link to school-level characteristics, such as school enrollment, the percentage of students in the school receiving FARMs (school % FARMs), and school sector (i.e., private and Catholic school); and (c) whether the within-school relations between school climate outcomes and individual-level predictors vary significantly across schools. The present study also assessed the interaction effects among the individual- and school-level predictors to provide more accurate interpretations of the main effects. The conceptual model displayed in Figure 1 guided our inquiry and research questions. Arrow A shows the direct link from students' social and academic risk factors to their perceptions of school climate. The main effects of the school-level characteristics on school climate are indicated in the figure by arrow B, and the equity concerns in this multilevel structure are represented by arrow C.

METHOD

Data

We used data from the Educational Longitudinal Study of 2002 (ELS: 2002), a large-scale national survey conducted by the National Center for Education Statistics (2004). The ELS: 2002

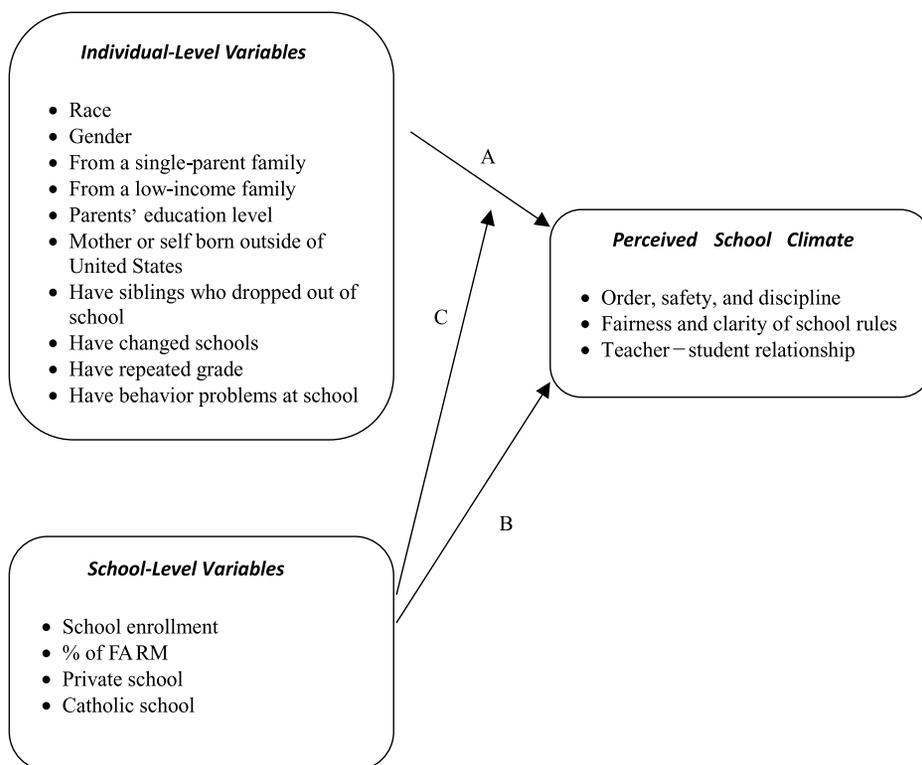


FIGURE 1. Conceptual model of the study.

gathers information at multiple levels from students, parents, teachers, and administrators and provides a comprehensive description of the home, community, and school environment. The multilevel nature of the data was deemed appropriate for this investigation because it supplied a broad coverage of student school climate perceptions, student demographic characteristics, and risk conditions, as well as adequate school structural and social composition features.

The ELS: 2002 employed a two-stage, complex sample design, first selecting eligible schools and then selecting students from within each school regardless of school size. Certain populations of students, such as Asian and Hispanic, were oversampled to provide estimates with acceptable precision. To adjust for differential sampling and correct for nonresponse, we applied weights from both the student and school levels in our statistical analyses to prevent the threat of incorrect estimates. The use of weights also allowed us to make inferences regarding the population being studied—for example, the population of 10th-grade students in the United States who were enrolled in 2002. The present study also employed a multiple imputation (MI) Markov Chain Monte Carlo approach using SAS (version 9.2) software to handle the missing data. The MI approach has been shown to provide more accurate estimates by introducing appropriate random error into the process (King, Honaker, Joseph, & Scheve, 2001). The final total sample for the study consisted of 16,168 10th-grade students and 757 high schools.

Measures

Student (Level 1). Three aspects of school climate were examined in this study: (a) order, safety, and discipline; (b) clarity and fairness of school rules; and (c) teacher-student relationship.

Table 1
School Climate Items and Factor Loadings for the Principle Component Analysis

Content	Factor Loading
Order, Safety, and Discipline ($\alpha = .73$)	
Other Students Often Disrupt Class	.528
In Class Often Feels Put Down by Students	.504
Does Not Feel Safe at This School	.644
Disruptions Get in Way of Learning	.608
Misbehaving Students Often Get Away With It	.621
There Are Gangs in School	.652
Racial/Ethnic Groups Often Fight	.642
Teacher-Student Relationship ($\alpha = .71$)	
Students Get Along Well with Teachers	.633
The Teaching Is Good	.772
Teachers Are Interested in Students	.807
Teachers Praise Effort	.680
In Class Often Feels Put Down by Teachers (Reversed)	.574
Fairness and Clarity of School Rules ($\alpha = .67$)	
Everyone Knows What School Rules Are	.633
Students Know Punishment for Broken Rules	.732
School Rules Are Fair	.624
Punishment Same No Matter Who You Are	.706
School Rules Are Strictly Enforced	.599

All three scales were adopted and adjusted from existing surveys in the literature, including the School Climate Survey (Haynes et al., 1993) and the California School Climate and Safety Survey (Furlong et al., 2005). The items addressing the three scales are similar to those seen in various empirical studies and have been reported as demonstrating good reliability and validity (e.g., Zullig et al., 2010). Students responded to the items by indicating the extent to which they agreed with each statement. The content of the items assessing each of the scales is presented in Table 1. The scale of order, safety, and discipline consists of seven items and assesses student-perceived school safety, order, and the appropriateness of student behavior at school. The scale of teacher–student relationship consists of five items and assesses the extent to which students perceive that they get along with their teachers, enjoy the instruction, and feel cared for by their teachers. The scale of clarity and fairness of school rules consists of five items and assesses the extent to which students believe that school rules are clearly stated and fair to every student. The items were measured on a 4-point scale and were appropriately reverse coded, when necessary. Analyses of the internal consistency yielded satisfactory results with adequate Cronbach’s alpha of .73, .71, and .67 for each scale, respectively. Additional principle component analyses revealed that the factor loadings of the items on each scale were all moderate to strong with coefficients of no less than .50 (see Table 1).

Eight individual-level risk factors based on parent report were included in the study. The number of times a 10th-grade student changed schools other than grade promotions was measured on a scale ranging from 0 to 5 (0 = 0 times, 1 = 1 time, 2 = 2 times, 3 = 3 times, 4 = 4 times, and 5 = 5 or more times). The number of siblings who had dropped out of school before graduating from high school was measured on a scale ranging from 0 to 6 (0 = 0 siblings, 1 = 1 sibling, 2 = 2 siblings, 3 = 3 siblings, 4 = 4 siblings, 5 = 5 siblings, and 6 = 6 or more siblings). The highest

Table 2
Unweighted Descriptive Statistics for All Student-Level and School-Level Variables

	Mean	SD
<i>School-Level Variables:</i>		
School Enrollment	4.60	2.47
% FARMs	3.22	1.95
Private	0.10	0.30
Catholic	0.13	0.33
Unweighted $n = 751$ high schools.		
<i>Student-Level Variables:</i>		
Order, Safety, and Discipline	2.77	0.48
Fairness and Clarity of School Rules	2.75	0.49
Teacher-Student Relationship	2.90	0.47
Female	0.50	0.50
Hispanic	0.15	0.35
Asian	0.09	0.29
Black	0.13	0.34
Other	0.06	0.23
From a Low-Income Family	0.15	0.35
Parents' Education Level	4.50	2.09
From a Single-Parent Family	0.22	0.42
Mother or Self Born Outside of U.S.	0.23	0.42
Number of Siblings Dropped Out of High School	0.21	0.62
Number of Times Changed Schools	1.27	1.47
Held Back a Grade	0.13	0.33
Had Behavior Problems at School	0.08	0.26
Unweighted $n = 16,168$ students.		

level of education attained by the parents was measured using an 8-point scale (1 = *Did not finish high school*, 2 = *Graduated from high school or GED*, 3 = *Attended 2-year school but without a degree*, 4 = *Graduated from 2-year school*, 5 = *Attended college but without a 4-year degree*, 6 = *Graduated from college*, 7 = *Completed master's degree or equivalent*, and 8 = *Completed PhD, MD, or equivalent*). The five remaining risk factors were all dummy variables addressing whether the 10th-grade student (a) ever repeated a grade, (b) was from a single-parent family, (c) was from a low-income family (less than \$20,000 per year), (d) had displayed behavior problems at school, and (e) was born outside of the United States or his or her mother was born outside of the United States. Five demographic categorical variables assessing student ethnicity and gender, specifically Hispanic, Black, Asian, others, and female, were also included in the study.

School (Level 2). The following school-level predictors were included in the study: school enrollment, school % FARMs, and school sector (private and Catholic school). School enrollment captured the number of 10th-grade students enrolled in the school and was measured on 7-point scale (1 = *1-99 students*, 2 = *100-199 students*, 3 = *200-299 students*, 4 = *300-399 students*, 5 = *400-549 students*, 6 = *550-699 students*, and 7 = *700 or more students*). School % FARMs captured the school percentage of students receiving free and reduced meals on 7-point scale (1 = *0%-5%*, 2 = *6%-10%*, 3 = *11%-20%*, 4 = *21%-30%*, 5 = *31%-50%*, 6 = *50%-75%*, and 7 = *76%-100%*).

School sector was recoded into two dummy variables, private school and Catholic school, with public school as the reference group.

Plan of Analysis—Hierarchical Linear Modeling

The multilevel nature of the research questions posed in this study was addressed with hierarchical linear modeling (HLM), which incorporated the examination of both individual differences and school effects on student perceptions of school climate. In other words, addressing the research questions involved estimating the effects of individual-level risk factors as well as the effects of school structure and social composition features on students' perceived school climate. We thus applied a two-level analysis strategy by HLM (version 6.0; Bryk & Raudenbush, 1992). This two-level HLM application followed three steps in constructing three different models to examine each school climate outcome: an unconditional model, a within-school model, and a between-school model.

In step 1, an unconditional model was assessed to partition the variance in each school climate outcome into its within- and between-school components. In other words, this model allowed us to estimate the amount of variance in each aspect of school climate that could be explained at the individual level and school level. In step 2, we examined a within-school model to investigate the relationship of the individual-level social and academic risk factors with each aspect of school climate. Because interpreting "main effects" without interaction terms can lead to an incomplete knowledge of such effects (e.g., Lee & Burkam, 2003), we thoroughly examined the interactions among the individual-level predictors for each school climate outcome in this step. All student-level predictors and interactions were grand-mean centered to make the coefficient estimates more interpretable as recommended (Raudenbush & Bryk, 2002). Additionally, the random effects of the individual-level predictors were estimated to determine whether they should be fixed or estimated as random in the next step. In the final step, both individual- and school-level variables were included in a between-school model to predict each school climate outcome. More specifically, the school climate outcomes, adjusted for both student social and academic risk factors that were included in the Level-1 model, were simultaneously explored as a function of school-level features. In this step, we also assessed the interactions among school-level predictors in predicting students' perceived school climate.

RESULTS

Descriptive Statistics

Among the 16,168 10th-graders, there were approximately 57% White, 13% Black, 15% Hispanic, and 9% Asian students. The remaining students were Native American, Hawaiian, multiracial, or of other races. Approximately 15% of students were from a low-income family, and 22% were from a single-parent family. There were 23% of students who or whose mothers were born outside of the United States, 13% of students who were once held back a grade, and 8% of students who had behavior problems at school (see Table 2). On average, students changed schools once for reasons other than grade promotion, and the average level of parents' highest education was graduation from a 2-year college. In addition, the sample of 751 high schools comprised approximately 77% public schools, 13% Catholic schools, and 10% private schools. The percentage of students receiving FARMs was 11% to 20%, and the average school enrollment was 300 to 399 students.

Unconditional Model

Using HLM, we first assessed the fully unconditional model to partition the total variance in each school climate outcome into within- and between-school components (Raudenbush & Bryk, 2002); that is, we calculated the proportion of variance in each school climate outcome lying

systematically between schools (the intraclass correlation), as well as the proportion of variance to be explained at the individual level. Results showed that the majority of the variance (80% for order, safety, and discipline, 85% for teacher–student relationship, and 87% for fairness and clarity of school rules) was explained by between-individual variation, whereas school-level variation accounted for 20%, 15%, and 13% of the variance for each school climate outcome, respectively. Whereas the majority of previous studies restricted their investigations to limited individual-level demographic variables, these findings highlight the importance of explaining student perceptions of school climate by considering a more encompassing collection of individual-level predictors. The significant proportions of between-school variance to be explained also provided empirical support for our decision to use a multilevel method.

Within-School Model

The within-school model explored the relationships of the social and academic risk factors with student perceptions of school climate. Despite our interest in estimating some of the slopes as random effects, the results showed that none of the random effects were significant. These findings indicated that the effects of the individual-level predictors did not vary significantly across schools and hence were estimated as fixed effects, with slopes kept constant across schools; that is, the arrow C in the conceptual model shown in Figure 1 was fixed across schools. Analyses of single-level within-school models were conducted to explore the possibility of individual-level interactions. Significant interactions among individual-level predictors were included in the subsequent HLM between-school models.

Tables 3, 4, and 5 present the results for the within-school and between-school models predicting the three school climate outcomes. Findings showed that the perceptions of female students toward the clarity and fairness of school rules and teacher–student relationship were more favorable than those of male students. Compared with White students, both Hispanic and Asian students perceived their schools to be less safe and orderly (see Table 3), whereas students of other races (e.g., American Indians or Alaska natives) perceived their teacher–student relationship as less supportive (see Table 5). The results also showed that students with more educated parents tended to have more positive perceptions of school order, safety, and discipline. Results pertaining to the risk factors showed that students who or whose mothers were born outside of the United States tended to have more negative perceptions of school order, safety, and discipline, as did students with behavior problems at school or with more siblings who had dropped out of high school. Additionally, students who were from single-parent families, had repeated a grade, or had behavior problems at school perceived a less supportive teacher–student relationship. Finally, students who had behavior problems at school also felt that school rules were less fair and clear.

Several significant interactions were detected as well. In regard to the school climate of order, safety, and discipline, a significant interaction between the number of siblings who had dropped out of high school and whether student or mother was born outside of the United States was found at the individual level. The results indicated that the effect of the number of siblings who dropped out of school on students' perceived school order, safety, and discipline differed for students who or whose mother were born outside of the United States. More specifically, the negative effect of the number of siblings who dropped out of school on students' perceived school order, safety, and discipline was slightly less for students who were born, or had mothers who were born, outside of the United States (see Table 3).

In regard to the school climate of fairness and clarity of school rules, two significant interactions were detected. The results indicated that the effect of students' having behavior problems at school differed for students who changed schools (other than grade promotions) and repeated a grade.

Table 3
 Multilevel Results for Order, Safety, and Discipline

Independent Variable	Model 1: Unconditional Model		Model 2: Within School Model		Model 3: Between School Model	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Intercept	2.86***	0.01	2.85***	0.01	2.79***	0.01
School Enrollment					-0.01	0.01
% FARMS					0.01	0.01
Private					0.25***	0.05
Catholic					0.14***	0.03
<i>Interactions:</i>						
School Enrollment × % FARMS					-0.01*	0.00
<i>Fixed Effects:</i>						
Female			0.02	0.01	0.02	0.01
Hispanic			-0.09**	0.03	-0.08**	0.03
Asian			-0.07*	0.03	-0.06*	0.03
Black			-0.03	0.02	-0.02	0.02
Other			-0.04	0.03	-0.04	0.03
From a Low-Income Family			-0.03	0.02	-0.03	0.02
Parents' Education Level			0.01***	0.00	0.01**	0.00
From a Single-Parent Family			0.01	0.02	0.02	0.02
Mother or Self Born Outside of U.S.			-0.06**	0.02	-0.06**	0.02
Number of Siblings Dropped Out of High School			-0.04**	0.01	-0.04**	0.01
Number of Times Changed Schools			-0.01	0.00	-0.01	0.01
Held Back a Grade			-0.03	0.02	-0.04**	0.02
Had Behavior Problems at School			-0.06*	0.03	-0.06*	0.03
<i>Interactions:</i>						
Born Outside of U.S. × Number of Siblings Dropped Out			0.05**	0.02	0.05**	0.02
<i>Chi-square table:</i>						
	SD	Variance	df	χ^2		
Model 1: Intercept	0.21	0.05	750	4650.83***		
Model 2: Intercept	0.20	0.04	750	4138.38***		
Model 3: Intercept	0.15	0.18	745	2796.75***		

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

In other words, the negative effect of students' having behavior problems at school on students' perceptions of fairness and clarity of school rules was smaller for students who changed schools (other than grade promotions) or repeated a grade; that is, among students who had behavior problems at school, those who changed schools or repeated a grade tended to feel more favorably toward the fairness and clarity of school rules.

With regard to the teacher-student relationship, four significant interactions were detected. The first interaction was between predictors of being Asian and being held back a grade, indicating that the negative effect of repeating a grade on students' perceptions of the teacher-student relationship was diminished for Asian students. The predictor of having behavior problems at school significantly

Table 4
Multilevel Results for Fairness and Clarity of School Rules

Independent Variable	Model 1: Unconditional Model		Model 2: Within School Model		Model 3: Between School Model	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Intercept	2.77***	0.01	2.78***	0.02	2.76***	0.01
School Enrollment					-0.01	0.01
% FARMs					0.00	0.01
Private					0.16*	0.06
Catholic					0.09**	0.03
<i>Fixed Effects:</i>						
Female			0.06***	0.01	0.06***	0.01
Hispanic			0.00	0.03	0.01	0.02
Asian			0.01	0.03	0.01	0.03
Black			0.05*	0.03	0.06*	0.02
Other			-0.01	0.03	-0.01	0.03
From a Low-Income Family			0.00	0.02	0.00	0.02
Parents' Education Level			0.00	0.00	-0.00	0.00
From a Single-Parent Family			-0.02	0.02	-0.02	0.02
Mother or Self Born Outside of U.S.			0.03	0.02	0.03	0.02
Number of Siblings Dropped Out of High School			-0.00	0.01	0.00	0.01
Number of Times Changed Schools			0.00	0.00	0.00	0.00
Held Back a Grade			-0.01	0.03	-0.01	0.02
Had Behavior Problems at School			-0.19***	0.05	-0.19***	0.05
<i>Interactions:</i>						
Times Changed Schools × Had Behavior Problem			0.04*	0.02	0.04*	0.02
Held Back a Grade × Had Behavior Problem			0.20**	0.07	0.20**	0.07
<i>Chi-square table:</i>						
	SD	Variance	df	x ²		
Model 1: Intercept	0.18	0.03	750	2957.86***		
Model 2: Intercept	0.18	0.03	750	3032.57***		
Model 3: Intercept	0.17	0.03	746	2844.39***		

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

interacted with the number of times students changed schools, the number of siblings who dropped out of high school, and whether students once repeated a grade. More specifically, among students who had behavior problems at school, those who changed schools, or were held back a grade perceived their relationship with teachers more favorably, whereas those with more siblings who dropped out of high school perceived their relationships with teachers less favorably (see Table 5).

Between-School Model

To recapitulate, in this step of the analysis, the level-1 model remained the same as previously described, including the entire set of student social and demographic risk factors, as well as previously

Table 5
 Multilevel Results for Teacher–Student Relationship

Independent Variable	Model 1: Unconditional Model		Model 2: Within School Model		Model 3: Between School Model	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Intercept	2.93***	0.02	2.93***	0.02	2.91***	0.01
School Enrollment					−0.00	0.01
% FARMs					0.01	0.01
Private					0.28***	0.05
Catholic					0.17***	0.00
<i>Fixed Effects:</i>						
Female			0.03*	0.01	0.03*	0.01
Hispanic			−0.04	0.03	−0.03	0.03
Asian			−0.06	0.04	−0.05	0.03
Other			−0.04	0.03	−0.03	0.03
Black			−0.08*	0.03	−0.08*	0.03
From a Low-Income Family			0.01	0.03	0.01	0.02
Parents' Education Level			0.01	0.00	0.00	0.00
From a Single-Parent Family			−0.04*	0.02	−0.04*	0.02
Mother or Self Born Outside of U.S.			0.04	0.02	0.04	0.02
Number of Siblings Dropped Out of High School			−0.01	0.01	−0.01	0.01
Number of Times Changed Schools			−0.01	0.01	−0.01	0.01
Held Back a Grade			−0.08**	0.03	−0.08**	0.03
Had Behavior Problems at School			−0.18***	0.04	−0.18***	0.04
<i>Interactions:</i>						
Asian × Held Back a Grade			0.21*	0.10	0.21*	0.09
Times Changed Schools × Had Behavior Problem			0.04*	0.02	0.04*	0.02
Held Back a Grade × Had Behavior Problem			0.23**	0.08	0.23**	0.08
Number of Siblings Dropped Out × Had Behavior Problem			−0.09*	0.03	−0.09**	0.03
<i>Chi-square table:</i>						
	<i>SD</i>	<i>Variance</i>	<i>df</i>	<i>χ²</i>		
Model 1: Intercept	0.19	0.04	750	3347.26***		
Model 2: Intercept	0.18	0.03	750	3288.24***		
Model 3: Intercept	0.16	0.02	746	2698.22***		

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

detected significant interactions. We added school-level predictors, including school enrollment, % FARMs, and school sector (Catholic and private school) into the level-2 model. The results of the between-school models largely resembled the results from the within-school models at the individual level. The results at the school level indicated that students in private or Catholic schools on average perceived a more favorable school climate than did students in public schools in all three aspects. In other words, students in private or Catholic schools reported a more orderly climate, rated school

rules as more fair and clear, and perceived their relationship with teachers as more supportive than did students in public schools. Interactions among school-level predictors were examined. A small interaction between school enrollment and % FARMs was detected, indicating that among the schools with a higher percentage of FARMs, students in those with higher enrollment tended to perceive a less orderly, safe, and disciplined climate.

DISCUSSION

The current study aimed to examine student perceptions of school climate in three aspects: order, safety, and discipline; fairness and clarity of school rules; and teacher–student relationship. In response to the differing perspectives of prior research, the study employed a multilevel framework to examine the influence of both the individual- and school-level factors on students' perceived school climate. The study makes an important contribution to the literature by examining the roles of a wide range of social and academic risk factors at the individual level, as well as school structure and social composition features at the school level, in predicting students' perceived school climate. Furthermore, the study addressed the researchers' methodological concerns of potential incomplete interpretations of the main effects by assessing the interaction effects among the predictors at both the individual and school level. Importantly, these relations were examined using a large and diverse sample of participants, allowing us to generate nationally representative results.

In accordance with prior research (Koth et al., 2008; Vieno et al., 2005), the present study revealed significant variations in student perceptions of school climate at both the individual and school levels, with the majority (more than 80%) of the variance being explained by the individual-level factors. The findings also showed that the relationships between the individual-level social and academic factors and students' perceived school climate did not vary significantly across schools (i.e., the slopes did not vary significantly). This indicates fairly robust relationships between these predictors and students' perceived school climate across schools. In other words, how these social and academic risk factors relate to students' perceived school climate does not depend on the school-level characteristics, such as school enrollment, school sector, or school socioeconomic composition.

A unique contribution of the present study stems from its empirical support for the conclusion that individual-level social and academic risk factors are predictive of students' perceived school climate. First of all, the present study adds to the literature by providing specific information of gender and ethnic differences on different aspects of students' perceived school climate. Our findings indicated that male students perceived school rules to be less fair and clear and teacher–student relationship to be less supportive and warm than female students. Hispanic and Asian students reported less favorable perceptions of school order, safety, and discipline, and students who were Native American, Hawaiian, multiracial, or of other races reported less favorable perceptions of the teacher–student relationship. Conversely, the perceptions of African American students were more favorable toward the fairness and clarity of school rules. These results confirm previous findings suggesting that student gender and race are associated with student perceptions of school climate (Griffith, 1999, 2000; Koth et al., 2008). Moreover, the results provide new evidence that students in different ethnic groups perceive different aspects of school climate in different ways. Therefore, the results underscore the importance of examining different aspects of school climate and different ethnic groups separately and provide an empirical example of how examining a general measure of school climate or minority status can result in the loss of valuable information to educators.

Secondly, a wide range of social and academic risk was identified that was related to students' perceived school climate. Specifically, the results suggested that parents' education level, the number of siblings who dropped out of high school, whether the student or his or her mother was born

outside of the United States, and whether a student had behavior problems at school were all significant predictors of students' perceptions of school order, safety, and discipline. Students who were from a single-parent family, were held back a grade, and had behavior problems at school had less favorable perceptions toward their teacher–student relationships. Moreover, students who had behavior problems at school also perceived school rules to be less fair and clear. Because limited research has examined the relations between risk factors and student perceptions of school climate, a large portion of these findings has not been previously reported and, therefore, supplements the existing body of literature. These research findings imply that interventions aiming to improve student perceptions of school may be most effective if they target students who experience certain risk conditions. The findings could convey practical significance in that they provide potential areas for intervention to improve student perceptions of schools because student academic risk factors, such as school behavior problems and grade retention, can be amenable to change.

We also detected several significant interaction effects among the predictors of students' perceived school climate. A closer observation of the interaction effects draws our attention to variables including having behavior problems at school, changing schools, repeating a grade, and having siblings who dropped out of school. The findings of the present study argue strongly for giving more attention to students who have had behavior problems at school when considering how to promote a more positive school climate for two reasons. First, students' having behavior problems at school significantly predicted all three aspects of perceived school climate. Second, five of the seven significant interaction effects involved this factor, which complicated the interpretations of its effects. For example, although the main effects of the results concur with many researchers' concerns that grade retention can be ineffective (Jimerson et al., 2006), our study provides new evidence that changing schools or repeating a grade may lessen the negative perceptions of school climate for students who had behavior problems at school. Although it is unclear why this occurred, we suspect it might be attributed to the fact that both school change and grade retention result in the change of learning environment and social influence. It is possible that the new environment lessened the cumulated negative feelings toward certain teachers or peer groups in school for students who had behavior problems. Moreover, it was also evident that the risk factor of school behavior problems, coupled with a higher number of siblings who dropped out of school, was detrimental to students' perceived school climate.

At the school level, the results of the present study converge with some prior findings but depart from some others. First, school enrollment and % FARMs were found to be nonsignificant predictors for student perceptions of school climate. These findings are consistent with previous findings indicating that school size has no relation to student perceptions of school climate (Vieno et al., 2005) and school % FARMs does not relate to students' perceived school order, discipline, and motivation climate (Koth et al., 2008). Second, the results indicated that students in both private and Catholic schools reported more positive perceptions on all three aspects of school climate that were examined. Although research suggests that students report more positive academic outcomes in Catholic and private school (e.g., Coleman & Hoffer, 1987; Lubienski & Lubienski, 2006), Vieno and colleagues (2005) reported that students in private schools and those in public schools reported similar perceptions on school sense of community, a similar construct of school climate. Future research continuing to explore how school-level characteristics relate to student perceptions of school climate is warranted.

Although our study provides important information on student perceptions of school climate, we acknowledge that the current study is limited in certain respects. First, because ELS: 2002 collected most measures on students' perceived school climate at only the first wave of data collection, we were not able to conduct a longitudinal investigation and assess any change in the predictive power of the individual- and school-level predictors on students' perceived school climate that might occur

throughout adolescents' transitional years. For the same reason, the data do not allow for any causal conclusions about the relations. Second, although the present study examined an encompassing set of risk factors, no single study can address every possible risk factor due to the limited scope of a study. Future research examining risk factors that are more amenable to change to build more effective individual interventions is desired. Last, despite our efforts to assess multiple aspects of students' perceived school climate, there are other important aspects that deserve researchers' attention, such as school motivational climate. Future studies examining other aspects of this construct might serve to further clarify the associations between school- and individual-level characteristics and students' perceived school climate. Notwithstanding, the study complements and extends earlier studies by revealing that various individual-level social and academic risk factors play a significant role in student perceptions of school climate.

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