June 2019

Which Individual and School-Level Factors Predict Student Perceptions of the School Climate in a Diverse Sample of Charter Schools throughout the Country?

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Abstract

In this study, we examine which student and school characteristics predict students' perceptions of the school climate. Our data come from a survey administered to nearly 3,000 students in grades 4-12 in 18 charter schools throughout the country. The survey asks students about their perceptions of seven distinct aspects of the school's culture and climate: cultural and linguistic competence, learning strategies, rigorous expectations, school safety, sense of belonging, student engagement, and teacher-student relationships. We find substantial *within*-school variation in student perceptions of the school climate, which is explained in part by differences in student race/ethnicity and grade level. This finding suggests that among our diverse sample of charter schools, school climate surveys may be better suited to capture group-level differences in student experiences within a school as opposed to school-level differences. Although there is far less variation in student perceptions of school climate *between* schools, school composition, as measured by the racial/ethnic diversity of the school, is a meaningful predictor of student perceptions of the school's cultural and linguistic competence, student engagement, and sense of belonging. While further analyses are needed, our findings suggest that schools with more diverse student bodies may be better able to foster positive student experiences.

Introduction

School culture and climate (hereafter referred to as "school climate") refers to the values, beliefs, and attitudes that shape the interactions between students, teachers, and administrators (Mitchell et al., 2010). Educational researchers commonly define it as "the quality and character of school life" that is derived from students' and teachers' perceptions and experiences of interpersonal relationships, and organizational, leadership, and instructional practices (Cohen et al., 2009, p. 182). Constructs such as school safety, engagement, and sense of belonging are often used to measure school climate (O'Malley et al., 2015; Thapa et al., 2013), and there is considerable research showing a positive relationship between these constructs and outcomes such as student academic achievement and student behavior (Berkowitz et al., 2016; Roeser et al., 2000; Shukla et al., 2016; Zins et al., 2004;). For example, research suggests that students' sense of belonging positively impacts their confidence and motivation, which in turn can promote positive academic performance (Freeman, Anderman, & Jensen, 2010; Walton & Cohen, 2011). In addition, several studies have found that the strength and quality of students' relationships with their teachers and peers, along with perceptions of belonging within a school community, can promote academic motivation and engagement within school (Furrer & Skinner, 2003).

Researchers have examined school climate constructs from different theoretical and methodological perspectives. While prior literature often focuses on the use of administrative data in order to measure school climate, recent years have seen a growing interest in questionnaires that ask students about their *perceptions* of the school climate (Thapa et al., 2013). Such questionnaires are widely used in cross-cultural studies seeking to provide insight

into important and nuanced constructs, such as differences in individual wellbeing and conscientiousness (Pedersen & Schmidt, 2007).

While student questionnaires do not necessarily provide researchers with an "objective" measure of school climate, that is, what a neutral third party might observe, they provide data on students' perceived reality, or what students report their lived experience to be (Berg, 2015). Social and cognitive psychology research has found that individuals tend to react to experiences as they subjectively perceive them as opposed to how the experiences objectively occur (Bandura, 2001; Haynes, Emmons, & Ben-Avie, 1997). As such, data from student questionnaires can provide important insight into the motivation and meaning behind student behavior (Koth, Bradshaw, & Leaf, 2008). From a practitioner perspective, gathering data on student perceptions of the school climate can provide deeper insight into how experiences and perceptions vary across students, student subgroups, and schools. This in turn can help school leaders identify specific policies, strategies, and resources that can improve aspects of the school climate and, ultimately, student outcomes.

Given the key role a favorable school climate has in fostering positive student outcomes and the important insights students' perceptions of the school climate can provide to practitioners and researchers alike, this report explores how student and school-level factors drive student perceptions of the school climate. Using self-reported data administered to students in 18 charter schools throughout the U.S., we explore how student perceptions of the school climate vary within and across schools. We focus our examination on seven key constructs of school climate: (1) cultural and linguistic competence; (2) learning strategies; (3) rigorous expectations; (4) school safety; (5) sense of belonging; (6) student engagement; and (7) teacher-student relationships. Our findings suggest that most of the variation in student perceptions occurs within

schools as opposed to across schools, whereby student-level factors (e.g., race/ethnicity, grade level) play a role in predicting student survey responses. Across schools, we find that student body composition, in particular the racial/ethnic diversity of the schools, is predictive of student perceptions of the schools' cultural and linguistic competence, student engagement, and sense of belonging.

Background

In this study, we use student questionnaires (also referred to as student surveys and self-reports) to examine student perceptions of the school climate. Social and cognitive psychology literature suggests that self-reported questionnaires provide a strong medium for respondents to communicate their true opinions (Krosnick, 1999). In fact, cognitive researchers suggest that self-report questionnaires "are arguably better suited than any other measure for assessing internal psychological states like feelings of belonging" (Duckworth & Yeager, 2015, p. 5). Further, numerous studies have shown that student perceptions of school climate are predictive of their academic, social, and behavioral outcomes (Fredricks et al., 2011; Gage et al., 2016; Hanson & Kim, 2007; Schierer & Kraut, 1979).

While school climate is generally operationalized as a school-level metric, there is often considerable variation found among student perceptions of school climate *within* a school (Vieno et al, 2005). Koth and colleagues (2008) conducted a multi-level analysis of student, classroom, and school-level predictors of student perceptions of school safety and academic motivation. The authors found that the majority of the variation occurred among students within a school; a smaller proportion occurred between classrooms within a school, and an even smaller proportion occurred between schools. The researchers also found differences in how the variation was partitioned across the two climate constructs, with greater between-school variability in school

safety (27%) compared to conditions that foster academic motivation (5%), suggesting that perceptions of school safety operate more as a cohesive school-level construct compared to conditions that foster students' academic mindsets. This research highlights the importance of examining different constructs of school climate to better understand how variation is partitioned within each construct.

Recent school climate research has also underscored the importance of examining predictors of student perceptions of the school climate at both the student and the school level (Berg & Aber, 2015; Fan et al., 2011). At the student level, factors including grade, gender, race/ethnicity, age, socioeconomic status, and English language learner status have been found to be significant predictors of school climate (Konold et al., 2014; Voight et al., 2015). For example, a recent report of student experiences of school climate in the Iowa City Community School District found statistically significant differences in perceptions of teacher-student relationships among students from different racial/ethnic groups (Bruch et al., 2017). Specifically, the researchers found that Black students consistently reported least favorably on questions about teacher-student relationships compared to students from other racial/ethnic groups. Similarly, other researchers have found that gender and grade-level predict students' perceptions of school climate as well as their behaviors in school (White et al., 2014).

At the school level, researchers have shown that structural factors such as school size (Wilson, 2004; Low & Ryzin, 2014), enrollment (O'Brennan et al., 2014), student-teacher ratio (Voight et al., 2015), and school building condition (Maxwell, 2016) can shape student perceptions of the school climate. Others have looked at student body demographics such as socio-economic status composition (Gustafsson et al., 2016) and racial/ethnic composition (Brault et al., 2014; Fan et al., 2011; Juvonen, Kogachi, & Graham, 2017) to examine variation

in student perceptions of school climate. In particular, there is suggestive evidence that the racial and ethnic composition of a school can influence students' perception of the school climate, such that schools with greater diversity foster more favorable student perceptions of school safety and sense of belonging (Juvonen, Kogachi, & Graham, 2017). Specifically, Juvonen, Kogachi, and Graham (2017) found that as ethnic diversity increased in middle schools, African American, Hispanic, Asian, and White students all reported more favorable perceptions of the school climate (Juvonen, Kogachi, & Graham, 2017). This is a particularly important area to investigate given the growth in the number of Hispanic and African American students as a percentage of the overall school population, combined with an increasing level of school segregation (Orfield, 2014).

While prior studies often examine predictors for a small subset of school climate constructs, our study makes use of student perceptions across seven unique constructs: (1) cultural and linguistic competence; (2) learning strategies; (3) rigorous expectations; (4) school safety; (5) sense of belonging; (6) student engagement; and (7) teacher-student relationships. Using data from student self-reports, we examine how student and school characteristics shape students' perceptions of each construct. In order to illuminate factors that can foster more favorable student experiences, we focus in particular on understanding the relationship between the racial/ethnic diversity of the school and students' perceptions of school culture.

We ask three research questions:

1. How do student perceptions of school climate vary within schools versus between schools?
2. To what extent do individual characteristics influence student perceptions of the school climate?

3. Which school-level factors can help explain differences in student perceptions of school climate across schools?

Data

Student Surveys

In the summer of 2016, TransformEd engaged with NewSchools Venture Fund as part of a practitioner-enabling research partnership. A primary goal of this partnership was to work with 18 charter schools that are part of the NewSchools Invent cohort to help school leaders expand their definition of student success through the collection and analysis of data on student social-emotional skills and school climate.[1] The first step in this partnership was to interview school leaders to identify factors beyond academics that school leaders believed to be most important to students' long-term success. TransformEd then filtered this list through its "Three M framework," narrowing the list to constructs that are *meaningful* (have an impact on long-term student outcomes), *measurable* (can be assessed in a school setting), and *malleable* (can be developed in a school setting) based on existing literature from the fields of economics, psychology, human development, and education.

Next, TransformEd scanned the field to identify a set of survey scales with strong evidence of validity that measured student perceptions of the prioritized constructs. The final set of scales were drawn directly from Panorama Education's school climate survey and the U.S.

[1] The NewSchools Venture Fund (NewSchools) and Transforming Education (TransformEd) partnership began in 2016 and is focused on achieving four key goals: (1) provide actionable data and research to help school leaders expand the definition of student success and to improve outcomes for students on a range of indicators that relate to long-term success; (2) provide support (e.g., resources, connections, ideas, etc.) to help school leaders change practices based on research and data; (3) provide data to NewSchools to help them understand their portfolio on a variety of metrics so they can identify trends and inform their board, investment partners, and funders; and (4) contribute to the broader national dialogue in the field about how to expand the definition of student success in research, policy, and practice.

Department of Education's school climate survey (Buckley, Subedi, & Krachman, 2018).[2] For each item, students selected one of five Likert-type options, (*almost never* to *almost always*).[3] The description of each school climate factor is listed in Table 1; the full survey is included in Appendix A.

Table 1: Definition of scales used to measure student perceptions of the school climate

Constructs	Description	# Items
Cultural & Linguistic Competence	A set of congruent behaviors, attitudes, and policies that come together in a system or agency, and enable educators to work effectively in cross-cultural situations (National Center on Safe Supportive Learning Environments). Example question: *"This school provides instructional materials that reflect my cultural background, ethnicity and identity."*	5
Engagement (Student)	Students' level of attentiveness and investment in their classes (Panorama). Example question: *"In your classes, how eager are you to participate?"*	5
Learning Strategies	Students' deliberate use of strategies to manage their own learning processes in class (Panorama). Example question: *"Before you start on a challenging project, how often do you think about the best way to approach the project?"*	5
Rigorous Expectations	Students' feelings about how much they're held to high expectations around effort, understanding, persistence and performance in class (Panorama). Example question: *"When you feel like giving up on a difficult task, how likely is it that your teachers will make you keep trying?"*	5
School Safety	Perceptions of student physical and psychological safety while at school (Panorama). Example question: *"How likely is it that someone from your school will bully you online?"*	6
Sense of Belonging	How much students feel that they are valued members of the school community (Panorama). Students with a sense of belonging in school feel socially connected, supported, and respected. They trust their teachers and their peers, and they feel like they fit in at school. They are not worried about being treated as a stereotype and are confident that they are seen as a person of value (Romero). Example question: *"How well do people at your school understand you as a person?"*	5
Teacher-Student Relationships	How strong the social connection is between teachers and students within and beyond the classroom (Panorama). Example question: *"If you walked into class upset, how many of your teachers would be concerned?"*	5

[2] For further background on Panorama's school climate survey, please see Gehlbach, McIntyre, Viola, Mascio, & Schueler (2015). For further background on the U.S. Department of Education's school climate survey, please visit https://nces.ed.gov/surveys/edscls/pdf/EDSCLS_Student_Questionnaire_English.pdf

[3] Note that the cultural and linguistic competence scale and school safety scale are reverse coded.

The surveys were administered through an online platform, managed by Panorama Education, to students in grades 4-12 across the 18 NewSchools Invent schools. Students took the survey once in the fall during the first 4-6 weeks of school and once in the spring during the last 4-6 weeks of school. Students were asked to complete both the school culture climate survey and another survey asking about their social-emotional competencies in one sitting, which generally took approximately 45 minutes (Buckley, Subedi, & Krachman, 2018). There was no standard protocol directing administrators and teachers about where and when students should take the surveys; most schools chose to administer both surveys during an advisory or homeroom period to minimize the impact on academic instructional time.

For the purposes of this study, we utilize school climate survey responses from the spring of 2017 only. While we collected data from the fall of 2016, we did not include those results in this study since our objective was to understand drivers of student perceptions of the school at the end of the school year, as opposed to changes in student perceptions over the course of the school year.[4]

Student Rosters

In addition to collecting student responses on the school climate survey, we also collected rosters from each school indicating each student's gender and race/ethnicity, as well as their eligibility for Free and Reduced Priced Lunch (FRPL), English Language Learner services (ELL), Special Education services (SPED), and grade level. We matched this data to students'

[4] Note that responses from the spring of 2018 were still being collected at the time of data analysis.

spring 2017 survey responses using a set of unique student identifiers. We do not collect information on which classroom the survey was administered in, although typically it was administered during an advisory or homeroom period to minimize the impact on academic instructional time.

Analytic sample

Our analytic sample is comprised of students in grades 4-12 who had spring 2017 survey responses and who answered at least one item on each school climate scale. We exclude students who provided the same response (e.g., a 3 on a 5-point Likert scale) on at least 12 consecutive questions (referred to as "satisficing"), in order to reduce threats to the validity of our survey responses and increase the accuracy of statistical estimates (Barge & Gehlbach, 2012; Hamby & Taylor, 2016). See Appendix B for more information about this "satisficing" behavior and the process through which it was identified.

Table 2 shows demographic characteristics of the entire cohort of students who were eligible to take the survey and had student roster data (column 1) and our final analytic sample (column 2).

Table 2. Demographic characteristics of students in total population and analytic sample

	NEWSCHOOLS INVENT COHORT (FALL 2016 ROSTERS)	ANALYTIC SAMPLE (SPRING 2017)
FEMALE	50%	51%
LATINO	42%	52%
BLACK	26%	17%
WHITE	25%	22%
ASIAN	3%	3%
MIDDLE EASTERN NORTH AFRICAN (MENA)[5]	1%	3%
TWO OR MORE RACES	3%	1%
OTHER	<1%	<1%
ELL	12%	18%
FRPL	45%	63%
SPED	9%	8%
TOTAL N (GRADES 4-12)	4,962	2,886

*Demographics are based on students with non-missing data on the survey rosters.

Methods

Prior research suggests that school climate factors operate more as student- or group-level constructs rather than school-level constructs due to the unique way in which students experience and internalize the school climate (Lam et al., 2015; Maehr & Midgley, 1991). We explore this further through our first research question by calculating the intra-class correlation coefficient (ICC). The ICC indicates the proportion of variation that is explained systemically by differences within schools versus between schools (Singer & Willett, 2003). This allows us to explore the extent to which student perceptions within a school are aligned, and whether individual student reports of their school climate operate as a school-level construct of the overall school climate.

[5] While MENA represents a small percent of the population, for the purposes of this study, we include all subgroups with an n-size greater than 30.

We calculated the ICC using the following formula:

$$\rho = \sigma_b^2/(\sigma_b^2 + \sigma_w^2),$$

where σ_b^2 is the between-school component of variance and σ_w^2 is the within-school component of the variance. ICCs are often converted to percentages, such that values closer to 100% suggest that students within a school respond/act identically in terms of the outcome of interest (i.e., all of the variability is found *between* schools rather than *within* schools). Conversely, values closer to 0% indicate that students within a school behave independently of each other in terms of the outcome of interest (i.e., all of the variability is found *within* schools rather than *between* schools).

To address our second research question, exploring differences in student perceptions of the school climate by individual characteristics, we fit a school fixed effects model that includes a set of dichotomous variables indicating students' gender, race/ethnicity, FRPL eligibility, ELL eligibility, and SPED eligibility. We also include grade-level dichotomous variables in order to allow for non-linearity in the relationship between a student's grade level and his/her perceptions of the school climate.

Model 1: $Y_{xit} = \gamma X_{it} + \pi Z_{it} + \omega_t + \varepsilon_i$;

where:

Y_{xit}= Average student score across all items on scale x, for student i, in school t

X_{it} = Vector of student characteristics, including race/ethnicity, gender, FRPL, ELL, SPED eligibility for each student, i, in school t

Z_{it}= Series of dichotomous variables indicating student grade-level, for student i, in school t

ω_t = School fixed effects

ε_i =error term for students within schools

Our third research question, which explores structural factors that predict differences in student perceptions of the school climate across schools, includes both the student-level variables listed above, as well as school-level variables. The selected school-level variables describe the student body composition of the school, including the ethnic diversity of the school and the proportion of students belonging to special populations (e.g., free and reduced-price lunch).

We measured the ethnic diversity of each school based on Simpson's Diversity Index (Simpson, 1949); for the purposes of this study, we refer to it as the Ethnic Diversity Index (EDI). This type of index is used in education research to address questions exploring the relationship between the ethnic diversity of the school and student outcomes (Juvonen, Kogachi, & Graham, 2017; Graham et al., 2009; Juvonen, Nishina, & Graham, 2006) including the impact of adolescents' classroom and neighborhood ethnic diversity on intra- and cross-ethnic friendships within classrooms (Munniksma et al., 2017), and the relationship between school ethnic diversity and students' interethnic relations (Thijs & Verkuyten, 2014).

The EDI accounts for the proportion of students in each racial/ethnic category and takes into account the fact that larger proportions of students in a category may reduce diversity (Graham et al., 2009; McLaughlin et al., 2016; Simpson, 1949). EDI values fall between 0 and 1, with a value of 0 indicating no racial/ethnic diversity in the student body (i.e., 100% of the population identifies as a single racial/ethnic category) and a value of 1 indicating equal proportions of students from each racial/ethnic category in the student body.

We calculated the EDI for each school using the following formula:

EDI = 1 – ((proportion of Asian students)^2 + (proportion of Black students)^2 + (proportion of Hispanic students)^2 + (proportion of White students)^2 + (proportion of MENA students)^2 + (proportion of students with Two or More Races)^2 + (proportion of Other students)^2 + (proportion of students with race not reported)^2).[6]

In addition to the EDI, we also included for each school the percent of male students, FRPL students, ELL students, and SPED students. Table 3 displays the means and ranges of each school-level variable. Note that of the 18 schools, seven schools were K-8 schools, seven schools were middle schools and four schools were high schools.

Table 3. Means and Ranges of School-Level Variables (school n=18)

	Mean	Min	Max
% FRPL	58.73	0	86.36
% SPED	8.25	0	20
% ELL	17.33	0	70.45
Ethnic Diversity index (EDI; %)	44	13	72

Note there are schools in the cohort that are designated as 0%FRPL, 0%ELL or 0%SPED due to missing roster data on studnets' FRPL, ELL, and SPED designation.

We used multi-level modeling to account for the nested nature of students within schools (Raudenbush & Bryk, 2002).[7] Researchers recommend such models when assessing factors influencing student perceptions of the school climate given the hierarchical nature of student survey data (Thapa et al., 2013). We fit these models separately for each of the seven school climate factors in an iterative fashion in order to determine which combination of factors are most predictive of students' perceptions of the school climate.

Our preferred model of interest is as follows:

[6] Less than 1% of students in our analytic sample were missing race/ethnicity information.
[7] We test the sensitivity of our results to model specification by separately fitting OLS regression models for each outcome variable, with clustered standard errors (Angrist & Pischke, 2009).

Model 2: $Y_{xit} = \gamma X_{it} + \pi Z_{it} + \alpha S_t + \sigma L_t + \beta D_t + (\varepsilon_{it} + u_t)$;

where:

Y_{xit}= Average student score across all items on scale x, for student i, in school t

X_{it} = Vector of student characteristics, including race/ethnicity, gender, FRPL, ELL, SPED eligibility for each student, i, in school t

Z_{it}= Series of dichotomous variables indicating student grade-level, for student i, in school t

S_t= Vector of school characteristics including proportion of FRPL, SPED, and ELL students in each school t

L_t = Series of dichotomous variables indicating school level, for each school t

D_t = EDI score for each school t

ε_{it} =error term for students within schools

u_t = error term for schools

Findings

How do student perceptions of school climate vary within and across schools?

Table 4 displays the intra-class correlations (ICC), overall and by school-level. In general we find very little variation in student perceptions of the school climate *between* schools among each of the seven school climate scales.[8] The unadjusted between-school variability across all seven school climate scales reported in the spring (column 1) varies from a low of 4.0%

[8] Since most of the variation in our data occurs within schools rather than between schools, it motivates our decision to use student-level scores rather than school-level scores as our outcome metric. The fact that some of the variability, however, occurs between schools further motivates our decision to use multi-level (hierarchal) modeling, as opposed to regular OLS regression, to account for non-independence of student responses within a school (Raudenbush & Bryk, 2002; Angrist & Pischke, 2009).

(learning strategies) to a high of 10.5% (student engagement). Interpreting the latter, an ICC of 10.5 indicates that nearly 11% of the variation in student perceptions of their engagement occurs between schools, while 89% occurs within schools. The between-school variability that exists within our analytic sample is in line with findings by Hough et al. (2017), who examine the ICC of the school climate survey administered in eight of the California CORE districts, to nearly 400,000 students. The authors report school climate ICCs of 7% to 11%, depending on school-level (Hough, Kalogrides, & Loeb, 2017).[9]

Table 4. Percent of variation in student perceptions of school culture factors between schools based on ICC

	Overall	Elementary/K8	Middle school	High school
Cultural & linguistic competence	4.4%	15.4%	2.6%	1.0%
Student engagement	10.5%	7.1%	7.5%	1.8%
Learning strategies	4.0%	2.4%	0.7%	3.7%
Rigorous expectation	5.9%	1.6%	2.3%	8.8%
School safety	7.9%	12.8%	2.0%	3.3%
Sense of belonging	6.0%	7.2%	2.1%	1.6%
Teacher-student relationship	9.3%	4.9%	6.7%	0.3%
N	2884	741	848	1,295

In general, we tend to see greater between-school variation (and less within-school variation) in school climate perceptions among elementary school students compared to secondary school students, suggesting that there is more convergence in the perceptions of younger students of the school culture within a school compared to the perceptions of older

[9] By comparison, the between-school variability of test scores, is generally 30% – 40% (Bloom, Richburg-Hayes, & Black, 2005; Jacob et al., 2010; Zhu et al., 2012; Spybrook et al., 2016), such that there are considerably greater differences in student achievement from school to school compared to differences in student perceptions of the school climate.

students, particularly for cultural and linguistic competence, student engagement, school safety and sense of belonging. For example, the between-school variation of cultural and linguistic competence is 15.4% for elementary/K-8 schools and 1.0% for high schools. If students' perceptions are driven more by their classroom experience than by the school climate overall, then this pattern is not surprising, since elementary school students typically remain with a single teacher for most of the day. An alternative explanation is that elementary schools are often neighborhood schools which lend themselves to greater within-school homogeneity of the student body based on demographic characteristics. However, our sample consists of charter schools that often attract students from different neighborhoods, even at the elementary school level. And in fact, the ethnic and racial diversity of elementary schools in our sample is greater than that of secondary schools (EDI =0.47 in elementary schools; EDI= 0.31 in secondary schools).

To what extent do individual characteristics influence student perceptions of the school climate?

Table 5 provides spring 2017 mean student responses and standard deviations for the seven school climate scales, overall and by student characteristics. There are noteworthy patterns in student responses by student race/ethnicity. In general, Black, MENA, and Latino students have less favorable perceptions of the school climate across the seven scales, while Asian and White students tend to have more favorable perceptions. Based on evidence from a prior report on the measurement properties of the survey, whereby we did not find systematic evidence of differential item functioning across student subgroups (Buckley, Subedi, Krachman & Atwood, 2018), we argue that these differences in perceptions by student race/ethnicity are not simply due to bias in the survey items. As demonstrated by the standard deviations of the means,

which in certain instances are nearly as large as an entire point on a 5-point Likert scale, there remains considerable variation in student perceptions within scales and subgroups.

Table 5. Means and standard deviations on school climate scales

	%	Cultural & Linguistic Competence	Engagement	Learning Strategies	Rigorous Expectations	School Safety	Sense of Belonging	Teacher-Student Relationship
Overall	n=2,886	3.69 (0.75)	2.87 (0.89)	3.52 (0.78)	3.92 (0.78)	3.82 (0.73)	3.26 (0.84)	3.52 (0.98)
Female	51%	3.70 (0.74)	2.86 (0.89)	3.53 (0.79)	3.92 (0.79)	3.82 (0.72)	**3.22** (0.84)	3.54 (1.00)
Male	49%	3.68 (0.77)	2.89 (0.89)	3.51 (0.77)	3.91 (0.77)	3.82 (0.73)	**3.29** (0.83)	3.54 (0.96)
Latino	52%	3.71 (0.74)	**2.81** (0.86)	**3.46** (0.78)	**3.88** (0.78)	**3.86** (0.73)	**3.20** (0.81)	**3.43** (0.96)
Black	17%	**3.49** (0.79)	**2.96** (0.90)	3.50 (0.78)	3.90 (0.81)	**3.62** (0.73)	3.21 (0.89)	3.50 (1.02)
Asian	3%	**3.86** (0.65)	**3.15** (0.86)	**3.76** (0.73)	**4.17** (0.65)	3.88 (0.78)	**3.53** (0.68)	**4.03** (0.79)
White	22%	**3.81** (0.74)	**2.95** (0.91)	**3.62** (0.77)	**4.01** (0.72)	**3.91** (0.68)	**3.38** (0.83)	**3.75** (0.94)
MENA	3%	**3.41** (0.83)	**2.56** (1.00)	3.52 (0.84)	**3.60** (0.91)	**3.65** (0.82)	3.24 (0.89)	**3.16** (1.00)
ELL	18%	3.67 (0.76)	**2.95** (0.86)	**3.45** (0.75)	**3.83** (0.81)	**3.70** (0.76)	3.32 (0.86)	3.55 (0.99)
Non-ELL	82%	3.69 (0.75)	**2.85** (0.89)	**3.53** (0.79)	**3.93** (0.77)	**3.85** (0.72)	3.23 (0.83)	3.50 (0.97)
FRPL	63%	3.67 (0.77)	2.88 (0.88)	3.51 (0.77)	3.91 (0.78)	3.82 (0.74)	3.25 (0.84)	**3.49** (0.98)
Non-FRPL	37%	3.73 (0.74)	2.93 (0.90)	3.60 (0.78)	4.02 (0.73)	3.82 (0.72)	3.32 (0.83)	**3.66** (0.96)
SPED	8%	**3.55** (0.80)	2.90 (0.84)	**3.35** (0.75)	**3.70** (0.81)	**3.65** (0.75)	3.22 (0.91)	3.60 (0.99)
Non-SPED	92%	**3.70** (0.75)	2.87 (0.89)	**3.53** (0.78)	**3.94** (0.77)	**3.84** (0.72)	3.26 (0.83)	3.52 (0.98)

Note: Values bolded in the above table suggest that there are statistically significant differences ($p<0.05$) in the corresponding group's mean CC scales compared to others based on t-test. For example, difference in mean engagement is statistically significant for Latino students compared to non-Latino students in the analytic sample.
Note: We do not report means/SDs for students who identify as "two or more races" or "other" because of the small n-size of those subgroups.

While there is some variation in student responses by special populations (FRPL eligibility, ELL eligibility, SPED eligibility), the largest deviations from the grand mean occur by race/ethnicity. In Figure 1, we provide average scores for each subgroup, by scale, in standard deviation units, in order to illuminate subgroups with particularly large deviations from the grand mean.

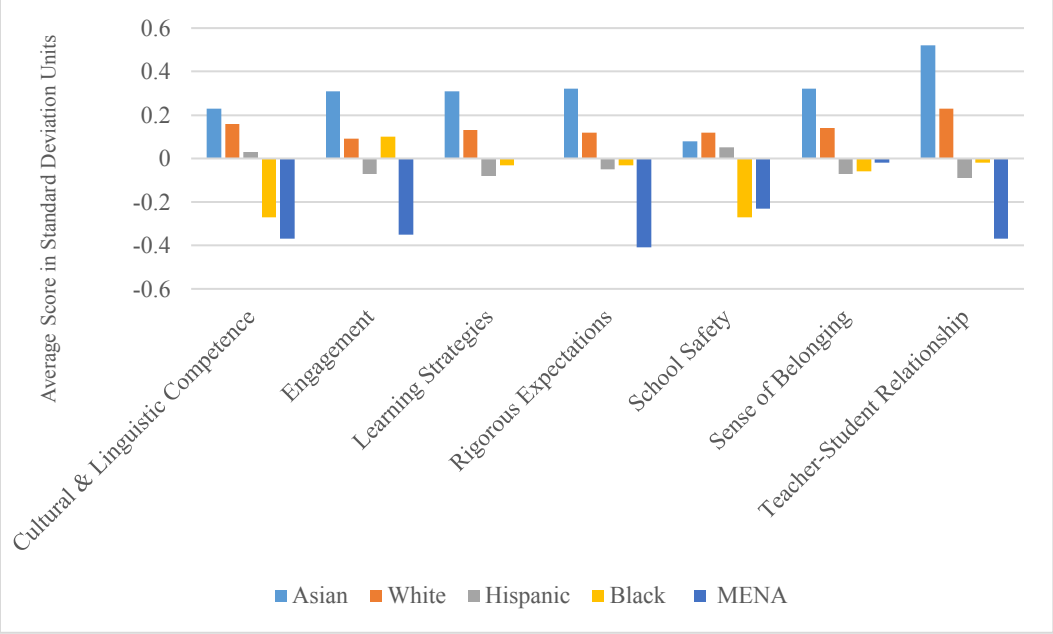
In general, we tend to find the largest deviations by racial/ethnic subgroups in student perceptions of student engagement, rigorous expectations, and teacher-student relationships. Latino students' perceptions typically fall at the mean; this is as expected, given that Latino students make up over half of the population in our analytic sample. Asian students tend to have the most favorable perceptions of the school culture, particularly with regard to teacher-student relationships, whereby their scores are over half a standard deviation above the mean.

While Black students' perceptions tend to fall near the mean for most scales, their perceptions of the cultural and linguistic competence and school safety are nearly a quarter of a standard deviation below the mean, on average. Differences between Black and White students in their perception of the school climate vary by as little as -0.01 standard deviation units on the student engagement scale (Black students report slightly more favorable perceptions relative to White students), and as much as 0.43 standard deviation units on the cultural and linguistic competence scale (Black students' reported perceptions of the school culture and linguistic competence is nearly half a standard deviation below that of White students).[10] MENA students

[10] Even with scales that show larger Black-White racial gaps in student perceptions (e.g., cultural and linguistic competence and school safety), the gaps are still less than those typically found with achievement tests. In national studies of the academic achievement gap, the Black-White differential among 5th graders tends to be as large as 0.75 to 1 standard deviation on nationally representative ELA and mathematics achievement tests (Reardon, 2007). The Black-White test scores gaps in our own sample, based on students in grades 4-9 who have interim test scores based

tend to report perceptions that fall below the mean for most scales, with the exception of learning strategies and sense of belonging, in which their perceptions are close to the mean. Similarly to Black students, MENA students report close to a quarter of a standard deviation below the mean on school safety and more than a quarter of a standard deviation below the mean on cultural and linguistic competence.

Figure 1. Average school climate scores in standard deviation units by subgroup and scale



In Table 6, we present the results from fitting a school fixed effects model to the data. Building on our results from Table 5, we find that even controlling for other individual characteristics, race/ethnicity continues to predict student perceptions of certain aspects of the school climate, in line with our descriptive results above.[11] For example, we find that within schools, Black students and students of Middle Eastern and North African (MENA) descent tend

on NWEA's MAP assessment, are smaller than those found in a nationally representative sample (0.63 standard deviations in Mathematics (n=559) and 0.58 standard deviations in Reading (n=552)), but still larger than Black-White gaps in student perceptions of the school climate.

[11] Recall that the white race/ethnicity category is the omitted category in our regression model.

to have less favorable perceptions relative to White students of the school's cultural and linguistic competence, school safety, and teacher-student relationships. Further, Asian students tend to have more favorable perceptions of the school climate relative to White students for each school climate factor with the exception of school safety. Our results, showing that student race/ethnicity plays a significant role in explaining the variation in perceptions of school climate, even controlling for other individual characteristics, accords with prior literature (Koth, Bradshaw, & Leaf, 2008).

Our coefficients on the set of grade-level dichotomous variables are significant and meaningful, suggesting that there are differences in student perceptions of their school's climate by grade level. This means, for example, that how fifth graders and sixth graders experience the climate of a school can be quite different. This is in line with prior literature that has shown that students' grade level is a significant predictor of their perceptions of the school climate (White et al., 2014).[12]

[12] When we fit an OLS regression model (Appendix C, Table 1c), we find that student grade-level accounts for a considerable portion of the variation in student school climate perceptions, such that adding it to our set of student-level demographic variables increases the variation explained by nearly threefold.

Table 6. Within-school estimates of student school climate perceptions by student factors

	Cultural & Linguistic Comp	Engagement	Learning Strategies	Rigorous Expectations	School Safety	Sense Of Belonging	Teacher-Student Rel't
FRPL	-0.057	**0.07~**	0.01	-0.03	0.003	0.06	-0.02
	(0.04)	(0.03)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)
SPED	-0.09	0.03	**-0.16****	**-0.18***	**-0.10***	-0.04	0.03
	(0.07)	(0.07)	(0.05)	(0.07)	(0.04)	(0.06)	(0.08)
Female	0.02	-0.01	0.02	0.02	-0.002	-0.07	-0.02
	(0.04)	(0.05)	(0.02)	(0.03)	(0.03)	(0.05)	(0.06)
Black	**-0.23****	-0.002	-0.05	-0.08	**-0.19****	-0.10	**-0.22****
	(0.06)	(0.08)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)
Hispanic	-0.04	0.005	-0.05	-0.05	-0.06	0.03	-0.09
	(0.05)	(0.05)	(0.06)	(0.05)	(0.05)	(0.06)	(0.06)
Asian	**0.12~**	**0.30****	**0.19***	**0.17****	0.007	**0.26****	**0.35****
	(0.06)	(0.05)	(0.08)	(0.04)	(0.10)	(0.08)	(0.09)
MENA	**-0.21****	**-0.17***	-0.06	**-0.32****	**-0.20****	-0.05	**-0.32***
	(0.06)	(0.07)	(0.08)	(0.11)	(0.05)	(0.04)	(0.12)
Grade 5	-0.06	-0.16	-0.05	-0.06	-0.004	-0.07	-0.17
	(0.07)	(0.11)	(0.06)	(0.06)	(0.11)	(0.06)	(0.13)
Grade 6	-0.17	**-0.33****	-0.04	-0.10	-0.06	**-0.18****	**-0.41****
	(0.11)	(0.10)	(0.05)	(0.09)	(0.12)	(0.06)	(0.08)
Grade 7	**-0.31***	**-0.48****	**-0.15****	**-0.35****	-0.10	**-0.40****	**-0.68****
	(0.13)	(0.07)	(0.05)	(0.07)	(0.21)	(0.07)	(0.09)
Grade 8	**-0.35***	**-0.61****	**-0.23****	**-0.39****	0.02	**-0.69****	**-0.86****
	(0.16)	(0.07)	(0.05)	(0.08)	(0.23)	(0.07)	(0.12)
Grade 9	**-0.29~**	**-0.42****	-0.07	**-0.30****	**0.42~**	**-0.50****	**-0.70****
	(0.15)	(0.07)	(0.07)	(0.08)	(0.22)	(0.08)	(0.11)
Grade 10	**-0.34***	**-0.52****	-0.11	**-0.42****	**0.45~**	**-0.56****	**-0.78****
	(0.15)	(0.08)	(0.07)	(0.09)	(0.22)	(0.09)	(0.11)
Grade 11	-0.23	-0.53**	-0.08	-0.40**	0.57*	-0.48**	-0.65**
	(0.14)	(0.07)	(0.10)	(0.09)	(0.22)	(0.09)	(0.13)
Grade 12	**-0.34***	**-0.44****	0.034	**-0.36****	**0.54***	**-0.46****	**-0.46****
	(0.14)	(0.06)	(0.05)	(0.07)	(0.22)	(0.07)	(0.09)
Constant	**4.00****	**3.20****	**3.63****	**4.22****	**3.75****	**3.60****	**4.14****
	(0.12)	(0.09)	(0.07)	(0.07)	(0.17)	(0.09)	(0.11)
N (students)	2,881	2,880	2,883	2,884	2,885	2,885	2,884
N (schools)	18	18	18	18	18	18	18

	Cultural & Linguistic Comp	Engagement	Learning Strategies	Rigorous Expectations	School Safety	Sense Of Belonging	Teacher-Student Rel't
R-squared	0.062	0.047	0.022	0.044	0.079	0.030	0.046

Standard errors in parentheses (~ p<0.1, * p<0.05, ** p<0.01)

Note. Each column represents a final model for each of the 7 school climate scales. The columns show estimates of covariates for student demographics, grade level from a school-fixed effects model. Students with race/ethnicity identified as "other" and "two or more races" were excluded due to small n-size. R-squared values cannot be computed in a school-fixed effects model; instead, we provide R-squared values based on the areg procedure in STATA which gives the correct R-squared values by including estimates of group effects in the model.

Which school-level factors can help explain differences in how students perceive aspects of the school climate across schools?

Next, we explore which school-level factors explain differences in student perceptions of the school climate *between* schools, holding constant individual factors (Table 7). We find that, controlling for student-level characteristics, students in schools with greater racial/ethnic diversity, as measured by the EDI, report more favorable perceptions of the cultural and linguistic competence of the school, student engagement, and sense of belonging.[13] For example, holding all else equal, students in schools with an EDI score in the fourth quartile of the distribution have sense of belonging scores that are 0.40 points higher on a 5-point Likert scale, or nearly half a standard deviation, compared to students in schools with an EDI score in the first quartile of the distribution.[14]

Beyond the racial/ethnic diversity of the school, differences in the percentages of special populations between schools also predict student perceptions of the school climate. Specifically, schools with a greater proportion of students who are eligible for free lunch tend to have more positive student perceptions of aspects of the school climate. For example, in schools with a high percentage of FRPL students (80%), student perceptions of the cultural and linguistic competence are nearly 0.20 points higher (on a 1-5 Likert scale) compared to schools with a low percentage of FRPL students (20%), holding all else equal. Conversely, schools with a greater

[13] Note that this finding does not appear to be driven simply by a higher proportion of White or Asian students in schools with higher EDI. In fact, two of the schools with the highest EDI score have a greater percentage of minority students (Black and/or Latino) compared to White and/or Asian students.
[14] Schools in the fourth quartile of the EDI distribution have an EDI score of 0.66, while schools in the first quartile of the EDI distribution have a score of 0.21.

proportion of students who are designated as requiring special education and a greater proportion of students designated as English Language Learners tend to have less favorable student perceptions of the school climate (American Psychological Association, 2012). Lastly, middle school students and high school students tend to have less favorable perceptions of the school climate relative to elementary/K-8 students.

Finally, we fit an OLS model with clustered standard errors to determine how groupings of predictors systematically account for the variation in school climate constructs (Appendix C Table 1c).[15] We find that student-level predictors account for more of the variation in student perceptions of the school climate than school-level predictors.[16] That said, the total set of student and school-level variables in our final model only explains between 5% and 10% of the variation in student school climate responses across scales, suggesting that there still remains a substantial portion of unexplained variation in student perceptions of the school climate. In other words, there are other factors affecting how a student perceives the school climate of the school that go beyond the individual and school-level characteristics that can be accounted for in our dataset.

[15]Fitting an OLS model with clustered standard errors also allows us to test the sensitivity of our results to model specification; in doing so, we find substantively similar results to our main findings.
[16] This results is evident by changes in the R-squared (a measure of the total variation explained by the set of predictors included in the model) when we systematically add groupings of student and school-level factors to the model.

Table 7. Estimates of student school climate perceptions by student and school-level factors

	CULTURAL & LINGUISTIC COMP	ENGAGEMENT	LEARNING STRATEGIES	RIGOROUS EXPECTATIONS	SCHOOL SAFETY	SENSE OF BELONGING	TEACHER – STUDENT REL'T
SCHOOL EDI	**0.71***	**0.63***	-0.20	-0.18	0.06	**0.90****	0.34
	(-0.30)	(-0.31)	(-0.18)	(-0.17)	(-0.25)	(-0.19)	(-0.38)
SCHOOL FRPL	**0.31~**	**0.40****	0.14	**0.34*****	-0.04	**0.21****	**0.62*****
	(-0.17)	(-0.17)	(-0.09)	(-0.09)	(-0.14)	(-0.09)	(-0.21)
SCHOOL SPED	-0.76	-0.85	**-0.78****	**-1.03*****	**-1.97*****	**-1.07*****	0.72
	(-0.76)	(-0.75)	(-0.32)	(-0.31)	(-0.62)	(-0.33)	(-0.96)
SCHOOL ELL	**-0.42~**	**-0.47****	**-0.56*****	**-0.30****	**-0.33~**	**-0.34****	**-0.55~**
	(-0.23)	(-0.24)	(-0.14)	(-0.14)	(-0.20)	(-0.15)	(-0.29)
MIDDLE SCHOOL	-0.06	**-0.38****	**-0.12~**	-0.08	0.11	**-0.30****	-0.01
	(-0.12)	(-0.12)	(-0.07)	(-0.07)	(-0.10)	(-0.07)	(-0.15)
HIGH SCHOOL	0.12	**-0.37****	**-0.32****	**-0.11**	**-0.21***	-0.02	-0.22
	(-0.12)	(-0.12)	(-0.08)	(-0.07)	(-0.10)	(-0.08)	(-0.15)
FRPL	-0.06	**0.10~**	0.01	-0.03	0.01	0.06	-0.02
	(-0.03)	(-0.04)	(-0.04)	(-0.03)	(-0.03)	(-0.04)	(-0.04)
SPED	**-0.09***	0.03	**-0.16****	**-0.18****	**-0.10***	-0.04	0.03
	(-0.05)	(-0.06)	(-0.05)	(-0.05)	(-0.05)	(-0.06)	(-0.06)
GENDER	0.02	-0.01	0.01	0.02	0.00	**-0.07***	-0.02
	(-0.03)	(-0.03)	(-0.03)	(-0.03)	(-0.03)	(-0.03)	(-0.03)
BLACK	**-0.2*****	0.02	-0.06	-0.05	**-0.22****	-0.07	**-0.20****
	(-0.05)	(-0.06)	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.06)
HISPANIC	(-0.03	0.02	-0.05	-0.06	-0.07	0.05	-0.07
	(-0.05)	(-0.06)	(-0.05)	(-0.05)	(-0.05)	(-0.05)	(-0.06)
ASIAN	0.11	**0.31****	**0.18***	**0.158~**	-0.01	**0.255****	**0.358****
	(-0.09)	(-0.10)	(-0.09)	(-0.09)	(-0.08)	(-0.10)	(-0.11)
MENA	**-0.24****	**-0.20~**	-0.07	**-0.34****	**-0.22***	-0.10	**-0.35****
	(-0.09)	(-0.11)	(-0.09)	(-0.09)	(-0.09)	(-0.10)	(-0.12)
GRADE5	-0.09	**-0.18***	-0.07	-0.08	-0.04	-0.10	**-0.18***
	(-0.06)	(-0.07)	(-0.06)	(-0.06)	(-0.06)	(-0.06)	(-0.08)
GRADE6	**-0.18***	**-0.33****	-0.07	-0.11	-0.09	**-0.20***	**-0.40****

	CULTURAL & LINGUISTIC COMP	ENGAGEMENT	LEARNING STRATEGIES	RIGOROUS EXPECTATIONS	SCHOOL SAFETY	SENSE OF BELONGING	TEACHER – STUDENT REL'T
	(-0.07)	(-0.08)	(-0.07)	(-0.07)	(-0.07)	(-0.08)	(-0.09)
GRADE7	**-0.32****	**-0.51****	**-0.20****	**-0.39****	**-0.13~**	**-0.43****	**-0.67****
	(-0.07)	(-0.08)	(-0.07)	(-0.07)	(-0.07)	(-0.07)	(-0.09)
GRADE8	**-0.34****	**-0.63****	**-0.28****	**-0.44****	0.00	**-0.70****	**-0.83****
	(-0.08)	(-0.10)	(-0.08)	(-0.08)	(-0.08)	(-0.09)	(-0.11)
GRADE9	**-0.23****	**-0.44****	-0.12	**-0.36****	**0.40****	**-0.52****	**-0.67****
	(-0.09)	(-0.10)	(-0.09)	(-0.09)	(-0.08)	(-0.09)	(-0.12)
GRADE10	**-0.34****	**-0.54****	-0.16*	**-0.48****	**0.43****	**-0.58****	**-0.74****
	(-0.10)	(-0.11)	(-0.09)	(-0.09)	(-0.09)	(-0.10)	(-0.12)
GRADE11	-0.24*	-0.55**	-0.14	**-0.434****	**0.54****	**-0.51****	**-0.64****
	(-0.10)	(-0.11)	(-0.10)	(-0.10)	(-0.09)	(-0.11)	(-0.13)
GRADE12	**-0.34****	**-0.46****	-0.02	**-0.40****	**0.52****	**-0.48****	**-0.44****
	(-0.12)	(-0.14)	(-0.12)	(-0.12)	(-0.11)	(-0.13)	(-0.15)
CONSTANT	3.69**	3.18**	4.02**	4.34**	4.10**	3.36**	3.80**
	(-0.20)	(-0.20)	(-0.11)	(-0.10)	(-0.17)	(-0.11)	(-0.25)
RANDOM EFFECTS							
σ^2_μ	0.01	0.01	0	0	0.01	0	0.02
σ^2_ε	0.53	0.70	0.58	0.56	0.46	0.64	0.84
N (STUDENTS)	2881	2880	2883	2884	2885	2885	2884
N (SCHOOLS)	18	18	18	18	18	18	18

Standard errors in parentheses (~ p<0.1, * p<0.05, ** p<0.01)

Note. Each column represents a final model for each of the 7 school climate scales. The columns show estimates of covariates for student demographics, grade level, school characteristics and school-level configuration from multi-level models. All models include school-level random effects, and we fit the model via maximum likelihood (MLE). Students with race/ethnicity identified as "other" and "two or more races" were excluded due to small n-size. School characteristics of FRPL, ELL and SPED are operationalized as proportions in our models, instead of percentages, to report the coefficient estimates with two decimal places.

Discussion

Within our sample of schools, there exists considerable within-school variability in student perceptions of the school climate, such that most of the variation in student responses is found *within* schools as opposed to *between* schools. Some of the differences in student perceptions *within* a school can be explained by a student's race/ethnicity, in line with prior literature (Konold et al., 2014; Voight et al., 2015). In particular, Black/African American students and MENA students tend to have less favorable perceptions of the school climate relative to White and Asian students. Additional variation in school climate perceptions within schools can be explained by a student's grade level, such that students in different grades within a school tend to have different perceptions of the school climate. The findings from this study reinforce the importance of dissagregrating survey results by students' grade-level and race/ethnicity (Koth et al., 2008; Holahan & Batey, 2019)

While we find far less variation in student responses of the school climate *between* schools, the demographic composition of a school matters, such that students in schools with greater racial/ethnic diversity, as measured by the EDI, report more favorable perceptions of educators' cultural/linguistic competence as well as their own academic engagement and sense of belonging. What is uncertain is the extent to which schools with a higher EDI also have other practices and policies in place at increasing student feelings of inclusion and engagement that are driving more favorable student perceptions.

Even accounting for school-level characteristics, there still remains a substantial amount of unexplained variation in students' perceptions of the school climate. This could be perceived in a positive light, in that an individual student's access to strong learning strategies or connection with one's teacher is not entirely dependent on the student's demographic profile or

the school composition. It further suggests the importance of understanding which other factors are influencing student perceptions, including classroom-level factors.

Conclusion

The variation found in students' school climate perceptions within a school, and the significance of student race/ethnicity and grade-level in predicting that variation, suggests that to be a useful tool for practitioners, data from school climate surveys such as ours should be disaggregated in order to illuminate important variation within schools. Simply looking at aggregate data may cause practitioners to miss important differences in the experiences of students within the school. To further unpack survey results, practitioners can engage in facilitated conversations with students about their perceptions of the school environment and involve students in decisions about school climate-related practices and supports.

The positive relationship between the racial/ethnic diversity of the student body and student perceptions of school climate suggest that policies and practices geared towards creating more heterogeneous student bodies along racial/ethnic lines may have the added benefit of improving student perceptions of the school climate. Alternatively, it may be that CMO and charter school leaders devoted to creating more hetergoengeous student bodies are also implementing policies and practices that create more favorable school climates. More work needs to be done to understand whether a diverse student body leads to more favorable student perceptions of constructs like sense of belonging, and if so, why. We plan to investigate this question through future research in which we identify schools in which students across all racial/ethnic subgroups have positive perceptions of school climate, in order to explore the practices and policies those schools have in place.

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Appendix A

Table A1. School climate survey items and scales

Construct	Items	Response Options
Cultural and Linguistic Competence (*reverse coded*)	This school provides instructional materials that reflect my cultural background, ethnicity and identity.	Strongly Agree to Strongly Disagree
	Adults working at this school treat all students respectfully.	
	People of different cultural backgrounds, races or ethnicities get along well at	
	All students are treated the same, regardless of whether their parents are rich	
	Boys and girls are treated equally well.	
Teacher-Student Relationship	How many of your teachers are respectful towards you?	None of my teachers to All of my teachers
	If you walked into class upset, how many of your teachers would be concerned?	
	If you came back to visit class three years from now, how many of your teachers	
	When your teachers ask how you are doing, how many of them are really interested in your answer?	
	How many of your teachers would you be excited to have again in the future?	
School Safety (*reverse coded*)	How often are people disrespectful to others at your school?	Almost never to Almost always
	How often do students get into physical fights at your school?	Almost never to Almost always
	How likely is it that someone from your school will bully you online?	Not at all likely to Extremely likely
	How often do you worry about violence at your school?	Almost never to Almost always
	If a student is bullied in school, how difficult is it for him/her to get help from an adult?	Not at all difficult to Extremely difficult
	At your school, how unfairly do the adults treat the students?	Not at all unfairly to Extremely unfairly
Sense of Belonging	How well do people at your school understand you as a person?	Do not understand at all to Completely Understand
	How connected do you feel to the adults at your school?	Not at all connected to Extremely connected
	How much respect do students in your school show you?	No respect at all to A tremendous amount of respect

	How much do you matter to others at this school?	Do not matter at all to Matter a tremendous amount
	Overall, how much do you feel like you belong at your school?	Do not belong at all to Completely belong
Learning Strategies	When you get stuck while learning something new, how likely are you to try a different strategy?	Not at all likely to Extremely likely
	How confident are you that you can choose an effective strategy to get your schoolwork done well?	Not at all confident to Extremely confident
	Before you start on a challenging project, how often do you think about the best way to approach the project?	Almost never to Almost always
	Overall, how well do your learning strategies help you learn more effectively?	Not well at all to Extremely well
	How often do you use strategies to learn more effectively?	Almost never to Almost always
Student Engagement	How excited are you about going to your classes?	Not at all excited to Extremely excited
	How often do you get so focused on activities in your classes that you lose track of time?	Almost never to Almost always
	In your classes, how eager are you to participate?	Not at all eager to Extremely eager
	When you are not in school, how often do you talk about ideas from your classes?	Almost never to Almost always
	Overall, how interested are you in your classes?	Not at all interested to Extremely interested
Rigorous Expectations	How often do your teachers make you explain your answers?	Almost never to Almost always
	When you feel like giving up on a difficult task, how likely is it that your teachers will make you keep trying?	Not at all likely to Extremely likely
	How much do your teachers encourage you to do your best?	Do not encourage me at all to Encourage me a tremendous amount
	How often do your teachers take time to make sure you understand the material?	Almost never to Almost always
	Overall, how high are your teachers' expectations of you?	Not high at all to Extremely high

Appendix B

We identified a total of 206 students out of the 3,092 as "satisficers" because they provided the same response option across a set of 12 consecutive items. For example, a student is identified as a satisficer if she selects the fourth response option on questions 4-16. The removal of "satisficers" is based on the theory that, given the interspersion of reverse-coded items throughout the school climate survey, students would be highly unlikely to choose the same response option if they were answering honestly.

We conducted chi-square tests to determine if the proportion of the satisficers within each subgroup was significantly different from the proportion of students in a given subgroup in the analytic sample. Chi-square statistics indicate that students who were male, Black/African American, and eligible for SPED disproportionately satisficed. Further, students from two schools were found to have disproportionately satisficed. Table B1 shows the proportion of satisficers in each of these groups relative to the analytic sample.

Table B1. Proportion of satisficers in each identified subgroup and in the full sample.

Male	67% (n=138)	50% (n=1,557)
Black or African American	27% (n=55)	18% (n=558)
Special Needs (SPED)	13% (n=26)	9% (n=264)
School: A	18% (n=38)	10% (n=322)
School: B	12% (n=24)	7% (n=217)
N	206	3,092

Appendix C

Table C1. Estimates of student school climate perceptions by student and school-level factors

	Cultural & Linguistic Comp	Engagement	Learning Strategies	Rigorous Expectations	School Safety	Sense Of Belonging	Teacher-Student Rel't
EDI	**0.84***	**0.75****	**-0.20~**	-0.18	0.18	**0.90****	0.42
	(0.34)	(0.22)	(0.11)	(0.16)	(0.40)	(0.16)	(0.34)
FRPL	-0.05	**0.07~**	0.01	-0.03	0.01	0.06	-0.02
	(0.04)	(0.03)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)
SPED	-0.10	0.03	**-0.16****	**-0.18***	**-0.10***	-0.04	0.03
	(0.07)	(0.07)	(0.05)	(0.07)	(0.04)	(0.06)	(0.08)
Gender	0.009	-0.01	0.01	0.02	-0.008	-0.07	-0.03
	(0.04)	(0.04)	(0.02)	(0.03)	(0.03)	(0.05)	(0.05)
Black	-0.25*	0.05	-0.06	-0.05	**-0.24****	-0.07	**-0.17***
	(0.06)	(0.08)	(0.05)	(0.05)	(0.06)	(0.06)	(0.07)
Hispanic	-0.01	0.04	-0.05	-0.06	-0.09~	0.05	-0.01
	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)	(0.06)	(0.07)
Asian	0.11	**0.30****	**0.18***	**0.16****	-0.03	**0.26****	**0.37****
	(0.07)	(0.05)	(0.08)	(0.04)	(0.12)	(0.08)	(0.08)
MENA	**-0.32****	**-0.28****	-0.07	**-0.34****	**-0.24****	**-0.10***	**-0.46****
	(0.08)	(0.06)	(0.077)	(0.10)	(0.06)	(0.04)	(0.13)
Grade5	**-0.14***	**-0.22***	-0.07	-0.08	-0.08	**-0.10~**	**-0.22~**
	(0.06)	(0.10)	(0.05)	(0.06)	(0.09)	(0.05)	(0.12)
Grade6	**-0.20~**	**-0.34****	**-0.07~**	-0.11	-0.15	**-0.19****	**-0.38****
	(0.11)	(0.10)	(0.04)	(0.07)	(0.11)	(0.06)	(0.09)
Grade7	-0.36**	-0.55**	-0.20**	-0.40**	-0.20	**-0.43****	**-0.68****
	(0.12)	(0.06)	(0.04)	(0.05)	(0.18)	(0.06)	(0.08)
Grade8	-0.34*	-0.65**	-0.28**	-0.44**	-0.06	-0.70**	-0.79**
	(0.13)	(0.08)	(0.03)	(0.06)	(0.19)	(0.06)	(0.11)
Grade9	**-0.27***	**-0.46****	**-0.12***	**-0.36****	**0.37~**	**-0.52****	**-0.62****
	(0.14)	(0.08)	(0.05)	(0.06)	(0.19)	(0.07)	(0.11)
Grade10	**-0.32***	**-0.56****	**-0.16***	**-0.48****	**0.40***	**-0.58****	**-0.69****
	(0.13)	(0.08)	(0.07)	(0.09)	(0.18)	(0.09)	(0.11)
Grade11	**-0.27***	**-0.59****	**-0.14**	**-0.43****	**0.47***	**-0.51****	**-0.64****
	(0.11)	(0.07)	(0.09)	(0.08)	(0.19)	(0.07)	(0.11)
Grade12	**-0.35****	**-0.48****	**-0.02**	**-0.40****	**0.46***	**-0.48****	**-0.41****
	(0.11)	(0.06)	(0.04)	(0.05)	(0.18)	(0.06)	(0.08)

	Cultural & Linguistic Comp	Engagement	Learning Strategies	Rigorous Expectations	School Safety	Sense Of Belonging	Teacher-Student Rel't
School FRPL	**0.27~**	**0.36****	**0.14***	**0.34****	0.004	**0.212****	**0.49***
	(0.14)	(0.12)	(0.06)	(0.087)	(0.12)	(0.0007)	(0.002)
School SPED	**-1.00***	**-1.02***	**-0.78****	**-1.03****	**-2.04****	**-1.07****	0.61
	(0.39)	(0.42)	(0.16)	(0.32)	(0.47)	(0.219)	(0.36)
School ELL	-0.28	-0.49**	-0.56**	-0.30*	-0.36	-0.34**	-0.41~
	(0.18)	(0.15)	(0.070)	(0.12)	(0.21)	(0.11)	(0.23)
Middle School	-0.13	**-0.45****	**-0.12~**	-0.08	0.13	**-0.30****	-0.14
	(0.12)	(0.15)	(0.06)	(0.08)	(0.13)	(0.08)	(0.15)
High School	0.15	**-0.31****	**-0.32****	**-0.11****	-0.15	-0.02	**-0.23~**
	(0.10)	(0.07)	(0.03)	(0.04)	(0.10)	(0.06)	(0.11)
Constant	3.63**	3.14**	4.02**	4.34**	4.03**	3.36**	3.78**
	(0.16)	(0.14)	(0.06)	(0.07)	(0.15)	(0.09)	(0.21)
N (students)	2,881	2,880	2,883	2,884	2,885	2,885	2,884
R-squared	0.051	0.103	0.050	0.080	0.108	0.087	0.113

Standard errors in parentheses (~ p<0.1, * p<0.05, ** p<0.01)

Note. Each column represents a final model for each of the 7 school climate scales. The columns show estimates of covariates for student and school characteristics from an OLS regression model. Figures in parentheses contain clustered standard errors. Students with race/ethnicity identified as "other" and "two or more races" were excluded due to small n-size. School characteristics of FRPL, ELL and SPED are operationalized as proportions in our model instead of percentages to adjust coefficient size to two decimal places