Strengthening the Pennsylvania School Climate Survey to Inform School Decisionmaking

Appendix A. Data and methods

Appendix B. Supplemental findings

Appendix C. Additional findings

See https://ies.ed.gov/ncee/rel/Products/Region/midatlantic/Publication/108114 for the full report.

Appendix A. Data and methods

This appendix describes the data, sample and nonresponse analysis, and research methods used in the analyses of this study. It concludes with a discussion of the limitations of the methods and analyses.

Data

The key data sources for this study were the Pennsylvania Department of Education's (PDE) Pennsylvania School Climate Survey, PDE administrative data, and the National Center for Education Statistics' Common Core of Data.

Pennsylvania School Climate Survey. PDE developed the Pennsylvania School Climate Survey, drawing from the Conditions for Learning Survey and the Alaska School Climate and Connectedness Survey, both developed by the American Institutes for Research (2016). PDE offers the survey to all schools in the state on an optional basis. The survey is administered via a web-based instrument to students and school staff. Five different survey instruments measure school climate for elementary school students (typically grades 3-5), middle school students (typically grades 6-8), high school students (typically grades 9-12), classroom teachers, and noninstructional staff.

The three current survey domains are social-emotional learning, student support and academic engagement, and safe and respectful school climate. While the five surveys have the same domain structure, the items making up each domain vary by survey. The social-emotional learning domain covers perceptions of students' social, emotional regulation, and conflict resolution skills; the safe and respectful school climate domain covers perceptions of students' physical and emotional safety; and the student support and academic engagement domain covers perceptions of how much students are listened to, cared about, and helped by teachers and other adults in the school.

Table A1 shows the number of items in each domain for the elementary, middle, and high school student surveys and for the classroom teacher and noninstructional staff surveys. For the exact wording of each item, see tables B10 (for the elementary school survey), B11 (for the middle school survey), B12 (for the high school survey), C8 (for the teacher survey), and C9 (for the noninstructional staff survey). Most items across the surveys have the following response options: strongly disagree, disagree, agree, strongly agree. Exceptions include all 16 items in the social-emotional learning domain of the elementary school survey, which have the following response

options: not like me at all, not much like me, somewhat like me, and very much like me. Other exceptions are three items in the safe and respectful school climate domain of the middle and high school surveys (How safe do you feel outside around the school? How safe do you feel in the hallways and bathrooms of the school? How safe do you feel in your classes?), which have the following response options: not safe, somewhat safe, mostly safe, and very safe.

Table A1. Number of items in the Pennsylvania School Climate Survey, by survey domain and respondent group, 2021/22

Survey version (respondent group)	Social-emotional learning	Safe and respectful school climate	Student support and academic engagement
Elementary school students	16	6	10
Middle school students	11	13	17
High school students	11	13	17
Classroom teachers	11	16	16
Noninstructional staff	11	16	9

Source: Pennsylvania School Climate Survey, 2021/22.

PDE administrative data. The study team gathered publicly available administrative data from PDE that list student and staff counts in each public school district (also called a local education agency) in the state. The study team used these data to create the weights for school climate summary index scores and domain scores, which combine school climate scores from all three respondent types (students, teachers, noninstructional staff). The study team also gathered publicly available administrative data from PDE on schools' proficiency rates in math and reading/language arts. PDE publishes these data every year, and the study team gathered these data for the 2021/22 school year.

Common Core of Data administrative data. The study team gathered data on schools' names, size, student demographics, and urbanicity for the 2021/22 school year from the National Center for Education Statistics' Common Core of Data.

Table A2 describes which variables from these data sources were used in the study analyses. The study team constructed these variables using the raw data from each source.

Table A2. Variables used in the study

Variable	Description
Pennsylvania School Climate Survey	
School climate index score (calculated for students, teachers, and noninstructional staff separately)	School-level average score for survey respondents, by respondent type, calculated from each respondent's average mean score and scaled Rasch score across all three domains. School climate index scores are not calculated for elementary school students because the safe and respectful school climate domain did not meet the reliability threshold.
Social-emotional learning domain score (calculated for students, teachers, and noninstructional staff separately)	School-level average score for survey respondents, by respondent type, calculated from each respondent's mean score and scaled Rasch score for the social-emotional learning domain.
Safe and respectful school climate domain score (calculated for students, teachers, and noninstructional staff separately)	School-level average score for survey respondents, by respondent type, calculated from each respondent's mean score and scaled Rasch score for the safe and respectful school climate domain. The safe and respectful climate domain score is not calculated for elementary students because it did not meet the reliability threshold.
Student support and academic engagement domain score (calculated for students, teachers, and noninstructional staff separately)	School-level average score for survey respondents, by respondent type, calculated from each respondent's mean score and scaled Rasch score for the support and academic engagement domain.

Variable	Description
School climate summary index score (all respondents; group weighted)	School-level average score for all survey respondents combined, calculated from each respondent's average mean score and scaled Rasch score across all three domains. In calculating the average, scores from teachers and noninstructional staff are first combined and weighted by the proportion of each group in the state. The combined score is then averaged with scores from students; both the combined score and the student score are equally weighted. School climate summary index scores are not reported for elementary schools because the safe and respectful school climate domain did not meet the reliability threshold for elementary school students.
School climate summary index score (all respondents; state weighted)	School-level average score for all survey respondents combined, calculated from each respondent's average mean score and scaled Rasch score across all three domains. In calculating the average, scores from students, teachers, and noninstructional staff are weighted by the proportion of each group in the state. School climate summary index scores are not reported for elementary schools because the safe and respectful school climate domain did not meet the reliability threshold for elementary school students.
Social-emotional learning domain score (all respondents; group weighted)	School-level average score for all survey respondents combined, calculated from each respondent's mean score and scaled Rasch score for the social-emotional learning domain. In calculating the average, scores from teachers and noninstructional staff are first combined and weighted by the proportion of each group in the state. The combined score is then averaged with scores from students; both the combined score and the student score are equally weighted.
Social-emotional learning domain score (all respondents; state weighted)	School-level average score for all survey respondents combined, calculated from each respondent's mean score and scaled Rasch score for the social-emotional learning domain. In calculating the average, scores from students, teachers, and noninstructional staff are weighted by the proportion of each group in the state.
Safe and respectful school climate domain score (all respondents; group weighted)	School-level average score for all survey respondents combined, calculated from each respondent's mean score and scaled Rasch score for the safe and respectful school climate domain. In calculating the average, scores from teachers and noninstructional staff are first combined and weighted by the proportion of each group in the state. The combined score is then averaged with scores from students; both the combined score and the student score are equally weighted. Safe and respectful school climate domain scores are not reported for elementary schools because this domain did not meet the reliability threshold for elementary school students.
Safe and respectful school climate domain score (all respondents; state weighted)	School-level average score for all survey respondents combined, calculated from each respondent's mean score and scaled Rasch score for the safe and respectful school climate domain. In calculating the average, scores from students, teachers, and noninstructional staff are weighted by the proportion of each group in the state. Safe and respectful school climate domain scores are not reported for elementary schools because this domain did not meet the reliability threshold for elementary school students.
Student support and academic engagement domain score (all respondents; group weighted)	School-level average score for all survey respondents combined, calculated from each respondent's mean score and scaled Rasch score for the support and academic engagement domain. In calculating the average, scores from teachers and noninstructional staff are first combined and weighted by the proportion of each group in the state. The combined score is then averaged with scores from students, both the combined score and the student score are equally weighted.
Student support and academic engagement domain score (all respondents; state weighted)	School-level average score for all survey respondents combined, calculated from each respondent's mean score and scaled Rasch score for the support and academic engagement domain. In calculating the average, scores from students, teachers, and noninstructional staff are weighted by the proportion of each group in the state.
American Indian/Alaska Native	An indicator for whether an individual student identified their race/ethnicity as American Indian/Alaska Native.
Asian or Pacific Islander	An indicator for whether an individual student identified their race/ethnicity as Asian or Pacific Islander. Consisted of those who selected "Asian" or "Native Hawaiian or other Pacific Islander." These categories were combined due to the small sample sizes of the two groups individually.
Black	An indicator for whether an individual student identified their race/ethnicity as Black.

Variable	Description
Hispanic	An indicator for whether an individual student identified their race/ethnicity as Hispanic.
Multiracial	An indicator for whether an individual student identified their race/ethnicity as multiracial. Consisted of students who either selected "multiracial" or selected more than one race.
White	An indicator for whether an individual student identified their race/ethnicity as White.
Race/ethnicity unknown	An indicator for whether an individual student selected "unavailable/unknown/decline" as their race/ethnicity.
Female	An indicator for whether an individual student identified their gender as female.
Male	An indicator for whether an individual student identified their gender as male.
Gender unknown	An indicator for whether an individual student selected "not listed" for their gender.
Grade level	Grade level selected by a student.
Pennsylvania Department of Education administrative data	
Count of all students in Pennsylvania	Count of all students enrolled in Pennsylvania in the 2021/22 school year.
Count of all teachers in Pennsylvania	Count of all teachers employed in Pennsylvania in the 2021/22 school year.
Count of all noninstructional staff in Pennsylvania	Count of all noninstructional staff employed in Pennsylvania in the 2021/22 school year, including professional personnel and support staff.
Percentage of students in a school proficient in reading/language arts	Percentage of all students enrolled in a school in the 2021/22 school year who were proficient in reading/language arts.
Percentage of students in a school proficient in math	Percentage of all students enrolled in a school in the 2021/22 school year who were proficient in math.
Common Core of Data	
Percentage of female students	Percentage of all students enrolled in a school in the 2021/22 school year who were female.
Percentage of male students	Percentage of all students enrolled in a school in the 2021/22 school year who were male.
Percentage of American Indian/Alaska Native students	Percentage of all students enrolled in a school in the 2021/22 school year who were American Indian or Alaska Native.
Percentage of Asian or Pacific Islander students	Percentage of all students enrolled in a school in the 2021/22 school year who were Asian or Pacific Islander.
Percentage of Black students	Percentage of all students enrolled in a school in the 2021/22 school year who were Black.
Percentage of Hispanic students	Percentage of all students enrolled in a school in the 2021/22 school year who were Hispanic.
Percentage of multiracial students	Percentage of all students enrolled in a school in the 2021/22 school year who were multiracial.
Percentage of White students	Percentage of all students enrolled in a school in the 2021/22 school year who were White.
School urbanicity	Whether a school was urban, suburban, in a town, or rural.
Percentage of students eligible for the National School Lunch Program	Percentage of all students enrolled in a school in the 2021/22 school year who were eligible for the National School Lunch Program.

Source: Authors' compilation.

Sample and nonresponse analysis

Schools could choose whether to administer the school climate survey and which type of respondent (students, teachers, or staff) to administer it to; therefore, the number of participating respondents and schools varies across the analyses. Table A3 provides the sample sizes used for each analysis. Overall, the number of schools participating in the school climate survey in the 2021/22 school year varied based on respondent types.

Table A3. Analysis sample and sample size, by research topic

Research topic	Analysis sample	Sample size
Research topic 1		
Elementary school student survey, 2021/22	Elementary school student respondents	22,077 students, 127 schools
Middle school student survey, 2021/22	Middle school student respondents	22,011 students, 70 schools
High school student survey 2021/22	High school student respondents	29,781 students, 73 schools
Research topics 2 and 3		
Elementary school student survey, 2021/22	Schools with at least 10 student respondents	130 schools
Middle school student survey, 2021/22	Schools with at least 10 student respondents	56 schools
High school student survey 2021/22	Schools with at least 10 student respondents	72 schools
Classroom teacher survey, 2021/22	Schools with at least 5 classroom teacher respondents	236 schools
Noninstructional staff survey, 2021/22	Schools with at least 5 noninstructional staff respondents	196 schools
Summary domain and school index scores, 2021/22	Schools with all the following: • At least 1 respondent from each of the three respondent types • At least 10 student respondents • At least 5 classroom teacher or noninstructional staff respondents	215 schools

Note: The categorization of a school as elementary, middle, or high school may slightly differ between research topic 1 and research topics 2 and 3. Research topic 1 categorized school levels based on the survey form that schools used; this was necessary to conduct the confirmatory factor analyses separately for each school level. Research topics 2 and 3 categorized school levels based on their category in the Common Core of Data because that was the source of the data used to answer questions about school characteristics.

Source: Pennsylvania School Climate Survey, 2021/22 school year.

The study team employed several sample restrictions for the school climate survey data used in the analyses. First, records with missing National Center for Education Statistics school and district identifiers were removed because the responses in those records could not be linked to a school. Applying this restriction to the 2021/22 data resulted in the removal of 0.51 percent (312 surveys) of elementary school student records, 0.42 percent (691 surveys) of middle school student records, and 2.56 percent (2,800 surveys) of high school student records.

Second, duplicate records were removed from the data. Duplicate records occurred because random IDs uniquely identified a device (computer or tablet) used to complete the survey; however, the survey was sometimes administered to multiple students using a shared device. As such, the study team could not confirm whether the unique identifiers represented multiple students or a single student who accidentally took the survey multiple times. To reduce the chances of including multiple responses from a single student while not removing any legitimate unique responses, the study team removed all records with the exact same student and school identifiers, demographic variables, and responses to all survey items. These instances were not very common in the elementary school survey data (2 surveys) but were more common in the middle school data (4.46 percent, or 4,114 surveys) and the high school data (5.11 percent, or 6,701 surveys).

Third, because some schools administered the surveys multiple times during the year (for example, in the fall, winter, and spring), the study team removed respondents from later survey windows to avoid overcounting students in response rates. Respondents were retained from the earliest survey window (fall, winter, or spring) in each school in each year based on the start and end dates of survey administration, provided by PDE. (An alternative approach could have been to construct an average score for each respondent across survey windows, but the data did not include a unique identifier for each respondent, so this was not possible.)

Last, student respondents with listed grade levels that were outside the Common Core of Data–reported grade range for elementary, middle, and high school students were excluded.

For research topics 2 and 3 (approaches to scoring the school climate survey and perceptions of school climate across different groups of students and schools), the study team applied various restrictions based on the respondent type of interest:

- For student outcomes, schools needed to have at least 10 student respondents to be included in the sample. This resulted in 21 schools being dropped.

- For teacher and noninstructional staff outcomes, schools needed to have at least five teacher respondents or five noninstructional staff respondents to be included in the sample. This resulted in 43 schools being dropped for teacher outcomes and 83 schools being dropped for noninstructional staff outcomes.

- For summary score outcomes that combined scores across all three respondent types, schools needed to have at least one response from each of the three respondent types, at least 10 student respondents, and at least 5 teacher or noninstructional staff respondents to be included in the sample. This resulted in 99 schools being dropped.

These reporting requirements are based on PDE's requirements for returning school climate scores to schools and are consistent with the requirements used in Amos and Xue (2021) and in Kozakowski et al. (2023).

Research topic 1 (validity and reliability of the elementary school climate survey) included more schools across the elementary, middle, and high school student surveys than research topics 2 and 3 (see table A3). This happened because research topic 1 included all schools with data, but research topics 2 and 3 limited the sample to schools with at least 10 student respondents, 5 classroom teachers, or 5 noninstructional staff, depending on the analysis. In addition, the categorization of a school as elementary, middle, or high schools may slightly differ between research topic 1 and research topics 2 and 3. Research topic 1 categorized school levels based on the survey form that schools used; this was necessary to conduct the confirmatory factor analyses separately for each school level. Research topics 2 and 3 categorized school levels based on their category in the Common Core of Data because that was the source of the data used to answer questions about school characteristics.

Comparisons of schools in the sample to the remaining schools in Pennsylvania. To see whether findings from the samples used in research topics 2 and 3 would be generalizable to the remaining schools in the state, the study team used independent samples *t*-tests to compare the school-level characteristics for schools in each sample to the school-level characteristics for all other schools in Pennsylvania.

The schools in each sample tended to have fewer Asian or Pacific Islander students and Black students but more Hispanic students and White students compared with other schools in the state (tables A4–A7). In addition, there were fewer urban schools in the samples and more schools in towns compared with the rest of the state.

Table A4. Differences between sample schools with at least 10 student and 5 classroom teacher or noninstitutional staff respondents to the Pennsylvania School Climate Survey and the remaining schools in Pennsylvania, 2021/22

| Characteristic | Sample schools (n = 212–214[a]) | | Remaining schools in Pennsylvania (n = 2,450–2,507[a]) | | Mean difference | | |
	Mean	Standard deviation	Mean	Standard deviation	In percentage points	In effect size units[b]	*p*-value
Gender (% of students)							
Female	48.62	3.32	48.18	5.67	0.44	0.08	.269
Race/ethnicity (% of students)							
American Indian/Alaska Native	0.13	0.24	0.17	0.35	-0.04	0.12	.105
Asian or Pacific Islander	1.44	1.99	3.81	6.51	-2.36*	0.38	< .001
Black	4.65	5.90	15.51	25.21	-10.86*	0.45	< .001
Hispanic	15.93	22.91	11.31	16.38	4.62*	0.27	< .001
Multiracial	4.36	3.12	4.86	3.94	-0.50	0.13	.069
White	73.62	26.42	64.51	31.87	9.11*	0.29	< .001
Urbanicity (% of schools)							
Urban	10.28	30.44	20.9	40.67	-10.62*	0.27	< .001
Suburban	41.12	49.32	46.35	49.88	-5.23	0.10	.141
Town	18.69	39.08	8.66	28.12	10.04*	0.34	< .001
Rural	29.91	45.89	24.09	42.77	5.81	0.14	.058
Socioeconomic status (% of students)							
Eligible for the National School Lunch Program	50.94	27.55	54.65	32.24	-3.71	0.12	.105

* Indicates a statistical difference between the sample mean and the mean for the remaining schools in the state at *p* < .05.

Note: Every analysis sample used in research topics 2 and 3 was compared with the remaining schools in Pennsylvania. The categories reported are those used by the Common Core of Data and do not include some categories used in the Pennsylvania School Climate Survey (such as "not listed" for gender and "unavailable/unknown/decline" for race/ethnicity).

a. The number of schools varies because some schools in the state are missing data from the Common Core of Data for some school characteristics.

b. The effect sizes are reported as absolute values and can be interpreted as follows: 0.0–0.09 is small, 0.10–0.19 is moderate, 0.20–0.29 is substantive, and 0.30 and above is large.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year, and the National Center for Education Statistics' Common Core of Data, 2021/22 school year.

Table A5. Differences between sample schools with at least 10 student respondents to the Pennsylvania School Climate Survey and the remaining schools in Pennsylvania, 2021/22

| Characteristic | Sample schools (n = 255 257[a]) | | Remaining schools in Pennsylvania (n = 2,407–2,464[a]) | | Mean difference | | |
	Mean	Standard deviation	Mean	Standard deviation	In percentage points	In effect size units[b]	*p*-value
Gender (% of students)							
Female	48.48	3.34	48.19	5.71	0.29	0.05	.430
Race/ethnicity (% of students)							
American Indian/Alaska Native	0.13	0.23	0.17	0.35	-0.04	0.11	.083
Asian or Pacific Islander	1.52	2.02	3.84	6.56	-2.32*	0.37	< .001
Black	4.68	6.15	15.70	25.37	-11.02*	0.45	< .001
Hispanic	14.16	21.45	11.42	16.48	2.74*	0.16	.014
Multiracial	4.29	3.12	4.88	3.95	-0.59*	0.15	.021
White	75.35	25.10	64.17	31.98	11.18*	0.36	< .001

| Characteristic | Sample schools (n = 255 257[a]) | | Remaining schools in Pennsylvania (n = 2,407–2,464[a]) | | Mean difference | | |
	Mean	Standard deviation	Mean	Standard deviation	In percentage points	In effect size units[b]	p-value
Urbanicity (% of schools)							
Urban	8.56	28.03	21.27	40.93	-12.71*	0.32	< .001
Suburban	43.58	49.68	46.19	49.86	-2.61	0.05	.425
Town	16.34	37.05	8.73	28.23	7.62*	0.26	< .001
Rural	31.52	46.55	23.82	42.61	7.69*	0.18	.006
Socioeconomic status (% of students)							
Eligible for the National School Lunch Program	50.86	27.47	54.72	32.32	-3.86	0.12	.066

* Indicates a statistical difference between the sample mean and the mean for the remaining schools in the state at *p* < .05.

Note: Every analysis sample used in research topics 2 and 3 was compared with the remaining schools in Pennsylvania. The categories reported are those used by the Common Core of Data and do not include some categories used in the Pennsylvania School Climate Survey (such as "not listed" for gender and "unavailable/unknown/decline" for race/ethnicity).

a. The number of schools varies because some schools in the state are missing data from the Common Core of Data for some school characteristics.

b. The effect sizes are reported as absolute values and can be interpreted as follows: 0.0–0.09 is small, 0.10–0.19 is moderate, 0.20–0.29 is substantive, and 0.30 and above is large.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year, and the National Center for Education Statistics' Common Core of Data, 2021/22 school year.

Table A6. Differences between sample schools with at least five teacher respondents to the Pennsylvania School Climate Survey and the remaining schools in Pennsylvania, 2021/22

| Characteristic | Sample schools (n = 233 235[a]) | | Remaining school in Pennsylvania (n = 2,429–2,486[a]) | | Mean difference | | |
	Mean	Standard deviation	Mean	Standard deviation	In percentage points	In effect size units[b]	p-value
Gender (% of students)							
Female	48.55	3.23	48.18	5.70	0.37	0.07	.327
Race/ethnicity (% of students)							
American Indian/Alaska Native	0.13	0.24	0.17	0.35	-0.04	0.11	.116
Asian or Pacific Islander	1.37	1.93	3.83	6.54	-2.46*	0.39	< .001
Black	4.45	5.72	15.62	25.28	-11.17*	0.46	< .001
Hispanic	16.07	22.82	11.26	16.32	4.81*	0.28	< .001
Multiracial	4.33	3.13	4.87	3.94	-0.54*	0.14	.043
White	73.78	26.38	64.42	31.90	9.36*	0.30	< .001
Urbanicity (% of schools)							
Urban	9.36	29.19	21.08	40.79	-11.72*	0.29	< .001
Suburban	41.28	49.34	46.38	49.88	-5.1	0.10	.134
Town	19.57	39.76	8.49	27.88	11.09*	0.38	< .001
Rural	29.79	45.83	24.05	42.75	5.73	0.13	.051
Socioeconomic status (% of students)							
Eligible for the National School Lunch Program	51.97	27.51	54.58	32.29	-2.61	0.08	.233

Table A7. Differences between sample schools with at least five noninstructional staff respondents to the Pennsylvania School Climate Survey and the remaining schools in Pennsylvania, 2021/22

Characteristic	Sample schools (n = 193 195[a])		Remaining schools in Pennsylvania (n = 2,469-2,526[a])		Mean difference		
	Mean	Standard deviation	Mean	Standard deviation	In percentage points	In effect size units[b]	p-value
Gender (% of students)							
Female	48.49	3.13	48.20	5.67	0.29	0.05	.475
Race/ethnicity (% of students)							
American Indian/Alaska Native	0.12	0.23	0.17	0.35	-0.04	0.12	.106
Asian or Pacific Islander	1.40	1.96	3.79	6.50	-2.39*	0.38	< .001
Black	4.70	5.66	15.42	25.14	-10.72*	0.44	< .001
Hispanic	17.69	23.67	11.21	16.32	6.48*	0.38	< .001
Multiracial	4.37	3.01	4.86	3.94	-0.49	0.13	.091
White	71.84	27.41	64.72	31.81	7.12*	0.23	.002
Urbanicity (% of schools)							
Urban	11.28	31.72	20.74	40.56	-9.46*	0.24	.001
Suburban	42.56	49.57	46.20	49.87	-3.64	0.07	.327
Town	17.95	38.47	8.79	28.32	9.16*	0.31	< .001
Rural	28.21	45.12	24.27	42.88	3.94	0.09	.218
Socioeconomic status (% of students)							
Eligible for the National School Lunch Program	52.32	27.97	54.51	32.19	-2.19	0.07	.359

Response rates. The Pennsylvania School Climate Survey is administered online in a way that respondents had to answer all the questions for the surveys to be submitted; therefore, there is no item-level missingness in the data. However, not all respondents eligible to take the survey in their school took them. If those who responded to the survey had responses that were not representative of their school, the school-level averages of school climate perceptions could be misleading. For example, if White students were more likely to respond to the survey than Black students (and thus were overrepresented among survey respondents) and White students scored their schools higher on student support than other students, the school-level score for the student support domain

would appear higher than if all students responded (Voight et al., 2015). To address this, the study team examined response rates for students and teachers, checked for evidence of nonresponse bias among student respondents, and applied weights to students to adjust for nonresponse, as needed.

The study team calculated response rates for the student and teacher samples of the Pennsylvania School Climate Survey. To count as a respondent, individuals had to answer all items in the survey. The response rate is the number of respondents divided by the number of people eligible to take the survey. The study team calculated the average response rate for schools in the sample, as well as the 25th, 50th, and 75th percentiles of the school distributions to describe the variation in response rates across schools. The study team could not calculate response rates for noninstructional staff because school-level information about the eligible populations of this group was not available. Specifically, the study team could not identify all potential respondents from the noninstructional staff group because of a misalignment between PDE's definition of professional staff under the "Other Certified Staff" category and the survey's definition of staff. PDE's staff category of "Other Certified Staff" excludes noncertified staff, but some staff who responded to the survey were noncertified personnel, such as janitors.

To identify the set of students eligible to take the survey, the study team used student counts from the Common Core of Data for each school. To identify the set of teachers eligible to take the survey, the team used counts of classroom teachers for each school from PDE's Professional Personnel Individual Staff Reports for a given year.

In addition, response rates were calculated only for schools that were included in the analyses for research topics 2 and 3, as these were the analyses that used school-level climate scores. Response rates were calculated for the following samples:

- Schools with at least 10 student respondents for analyses using student school climate scores.

- Schools with at least 5 teacher respondents for analyses using teacher school climate scores.

The study team did not calculate response rates for technical centers (which are categorized as vocational schools in the Common Core of Data) due to a mismatch between enrollment data from the Common Core of Data and the students who took the survey. Specifically, more students took the survey at a technical center than the enrollment data from the Common Core of Data indicated would be possible. This might be due to differences in how enrollment is calculated for students who take courses at both a technical center and a high school. This resulted six technical centers being dropped from the response rate analysis.

In 2021/22 the average school-level response rate was 68 percent for students and 56 percent for teachers (table A8). Student and teacher response rates were also calculated separately by school level. These average response rates ranged from 53 percent to 77 percent for students and from 51 percent to 64 percent for teachers (tables A9 and A10).

Table A8. Response rates to the Pennsylvania School Climate Survey, by sample, 2021/22 (percent)

Sample	Mean	25th percentile	50th percentile	75th percentile
All schools in the student sample (*n* = 253)	68	57	72	85
Schools with at least 10 student respondents (*n* = 252)	68	58	72	85
All schools in the teacher sample (*n* = 234)	56	39	54	71
Schools with at least 5 teacher respondents (*n* = 230)	56	39	55	71

Note: Response rates could be calculated only for schools with comprehensive enrollment data in the Common Core of Data for the grades that took the survey.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year, administrative data from the Pennsylvania Department of Education, 2021/22 school year, and data from the National Center for Education Statistics' Common Core of Data, 2021/22 school year.

Table A9. Student response rates to the Pennsylvania School Climate Survey, by school level, 2021/22 (percent)

School level	Mean	25th percentile	50th percentile	75th percentile
Elementary schools (*n* = 129)	77	66	81	89
All middle schools (*n* = 57)	67	60	71	83
Middle schools with at least 10 student respondents (*n* = 56)	68	60	72	83
High schools (*n* = 66)	53	38	59	69

Note: Response rates could be calculated only for schools with comprehensive enrollment data for the grades that took the survey in the Common Core of Data. No schools were excluded from the elementary and high school samples because all had at least 10 student respondents. One school included in the student sample is not shown in this table because it was classified by the Common Core of Data as "other."

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year, administrative data from the Pennsylvania Department of Education, 2021/22 school year, and data from the National Center for Education Statistics' Common Core of Data, 2021/22 school year.

Table A10. Teacher response rates to the Pennsylvania School Climate Survey, by school level, 2021/22 (percent)

School level	Mean	25th percentile	50th percentile	75th percentile
All elementary schools (*n* = 118)	50	36	49	65
Elementary schools with at least 5 teacher respondents (*n* = 117)	51	36	50	65
All middle schools (*n* = 51)	58	43	63	74
Middle schools with at least 5 teacher respondents (*n* = 50)	59	44	63	74
All high schools (*n* = 64)	63	47	63	82
High schools with at least 5 teacher respondents (*n* = 62)	64	48	64	82

Note: Response rates could be calculated only for schools with comprehensive enrollment data for the grades that took the survey in the Common Core of Data. One school included in the sample is not shown in this table because it was classified by the Common Core of Data as "other."

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year, administrative data from the Pennsylvania Department of Education, 2021/22 school year, and the National Center for Education Statistics' Common Core of Data, 2021/22 school year.

Nonresponse bias analysis. For research topics 2 and 3 the study team examined how the characteristics of students who responded to the survey differ from the characteristics of all eligible students in a school. The characteristics of students in the survey were collected from students' responses to questions about their gender and race/ethnicity in the Pennsylvania School Climate Survey, whereas characteristics of students in the schools were collected from the Common Core of Data.

Some categories of gender and race/ethnicity could not be included in the nonresponse analysis due to differences between the reporting from the survey and the Common Core of Data (table A11). First, the Pennsylvania School Climate Survey includes a response option of "not listed" for gender and an option of "unavailable/unknown/decline" for race/ethnicity, whereas the Common Core of Data does not include these categories. For the Pennsylvania School Climate Survey 3 percent of students reported "not listed" for their gender, and 11 percent of students reported "unavailable/unknown/decline" for their race/ethnicity. Second, the study team had concerns about data quality for the American Indian/Alaska Native category in the Pennsylvania School Climate Survey. Although the Common Core of Data indicates that approximately 0.1 percent of students in the sample schools were American Indian/Alaska Native, more than 3 percent of students selected this option. Based on feedback from PDE, it is likely that students may not have understood the term "American Indian" and selected it by mistake. For these reasons the gender category of "not listed" and the race/ethnicity categories of "unavailable/unknown/decline" and "American Indian/Alaska Native" were not included in the nonresponse analysis.

Table A11. Demographic characteristics of students who completed the Pennsylvania School Climate Survey and the schools that they attended, for schools with at least 10 student respondents, 2021/22

Student characteristic	Average percent in the sample (based on survey responses)	Average percent in sample schools (from the Common Core of Data)
Gender		
Female	48.23	48.54
Male	49.06	51.46
Not listed	2.71	na
Race/ethnicity		
American Indian/Alaska Native	3.47	0.13
Asian or Pacific Islander	1.62	1.52
Black	4.55	4.86
Hispanic	10.93	14.09
Multiracial	7.25	4.21
White	61.09	75.19
Unavailable/unknown/decline	11.09	na

na is not applicable because the Common Core of Data does not include the category.

Note: *n* = 253 schools. This table does not provide mean differences or test for significance because the categories used on the Pennsylvania School Climate Survey do not align with the categories used in the Common Core of Data. The survey had an option of "not listed" for gender and an option of "unavailable/unknown/decline" for race/ethnicity, whereas the Common Core of Data does not include these categories. In addition, the study team had concerns about data quality for the American Indian/Alaska Native category of the survey. Students who selected any of these options were not included in the nonresponse analysis.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year, and the National Center for Education Statistics' Common Core of Data, 2021/22 school year.

To assess nonresponse bias, the study team calculated the differences in standard deviation units between the percentage of students in each intersectional race/ethnicity-gender category who responded to the survey and the percentage of those students in the total eligible sample. The Common Core of Data provides detailed demographic information for students but does not provide this information for teachers or noninstructional staff. Therefore, the nonresponse bias analyses could be conducted only for students. According to National Center for Education Statistics (2022) guidance, the study team considered absolute values of the standardized differences that were greater than 0.05 to be imbalanced.

The study team assessed nonresponse of the intersectional race/ethnicity-gender categories given research that race/ethnicity and gender interact to shape students' experiences in schools (Booth et al., 2022; Tefera et al., 2018). For example, a school could find that among White students, boys and girls have similar perceptions of school climate but that among Black students, girls have lower perceptions of school climate than boys. If this were the case, adjusting for nonresponse of race/ethnicity and gender separately could mask imbalances at the intersection of race/ethnicity and gender that could be meaningful for interpreting perceptions of school climate. Therefore, weighting based on intersectional categories can more comprehensively address nonresponse bias than weighting separately for race/ethnicity and gender.

The average absolute value of the standardized differences was greater than 0.05 for all the intersectional categories of race/ethnicity (Asian or Pacific Islander, Black, Hispanic, multiracial, and White) and gender (female, male). White male respondents were overrepresented in more than half of schools, and multiracial male and female respondents were underrepresented in most schools (table A12).

Table A12. Differences between the race/ethnicity and gender of respondents to the Pennsylvania School Climate Survey within a school and their school's population, for schools with at least 10 student respondents, 2021/22

Race/ethnicity and gender categories[a]	Average percent		Absolute value of average standardized difference[b] (standard deviation units)	Percent of schools	
	In the sample (based on survey responses)	In sample schools (from the Common Core of Data)		With listed group overrepresented (standardized difference > .05)	With listed group underrepresented (standardized difference < – .05)
Asian or Pacific Islander and female	0.80	1.01	0.07	10.67	30.04
Asian or Pacific Islander and male	0.72	0.93	0.07	15.81	28.85
Black and female	2.34	2.59	0.08	20.95	34.39
Black and male	2.53	2.92	0.09	20.16	35.18
Hispanic and female	6.76	6.46	0.09	27.27	26.09
Hispanic and male	7.35	6.18	0.10	42.29	24.11
Multiracial and female	2.15	4.32	0.19	6.72	76.28
Multiracial and male	2.07	4.31	0.21	6.72	74.70
White and female	36.50	35.68	0.08	34.78	16.60
White and male	38.78	35.61	0.10	56.52	11.86

Note: n = 253 schools. The table shows the school-level standardized differences for mean student characteristics between students who responded to the Pennsylvania School Climate Survey in the 2021/22 school year and those who were eligible to respond to the survey. Nonresponse bias was calculated for a subset of schools that took the survey, which included those in the sample for research topics 2 and 3. In addition, technical centers were dropped due to lack of comprehensive data on enrollment in the Common Core of Data (five schools were dropped from response rate analysis).

a. Race/ethnicity and gender categories reported in the Pennsylvania School Climate Survey and the Common Core of Data were not entirely aligned. The Pennsylvania School Climate Survey had a response option of "unavailable/unknown/decline" for race/ethnicity and an option of "not listed" for gender, whereas the Common Core of Data does not include these categories. In addition, the study team had concerns about data quality for the American Indian/Alaska Native category of the survey. Students who selected any of these options were not included in the nonresponse analysis.

b. The average standardized difference between the two means in standard deviation units, using the standard deviation of the school population.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year, and National Center for Education Statistics' Common Core of Data, 2021/22 school year.

Nonresponse weights. Due to nonresponse bias on the Pennsylvania School Climate Survey, the study team created nonresponse weights for students at all schools. Nonresponse weights help make school average scores more representative of the eligible population of students in a school by giving more weight to responding students who are part of a group that is less likely to have responded to the survey. Because the study team used school-level averages of the survey measures, nonresponse weights within schools were constructed using the following weighting class approach:

1. The study team first identified the student characteristics that were imbalanced between the group of eligible students and the group of responding students (those with standardized differences greater than 0.05). For example, a school may have an imbalance among White female, Black female, and Asian female students but have no other imbalances.

2. For each group with an imbalance in each school, the study team calculated nonresponse weights equal to the number of group members in the eligible population of students in the school divided by the number who responded to the survey. In the example above the study team would construct weights for these three groups (White female, Black female, and Asian female students) and a weight for all other students, which was calculated in the same way (number of all other students in the eligible population divided by number of all other students who responded to the survey). This approach enabled the study team to create weights to adjust for the specific groups of students that had imbalances in response rates in a given school. Because

some categories of race/ethnicity and gender from the survey could not be included in the nonresponse analysis, students belonging to these categories were all given a weight of 1. This represents the average weight of all students, regardless of whether their group is underrepresented or overrepresented. In addition, the denominators for the weights described above did not include students from these groups.

The study team then applied nonresponse weights for students when constructing school-level averages of the school climate index and domain scores for research topics 2 and 3. As a sensitivity test the study team also calculated the school climate index and domain scores without nonresponse weights. The results were nearly the same regardless of whether nonresponse weights were applied. For example, all average school climate index scores without nonresponse weights were within 0.01 standard deviation unit of the scores with nonresponse weights. Due to the nearly identical results with both approaches, the appendixes present only the scores with nonresponse weights.

Although the results presented for research topic 1 do not use nonresponse weights to address differences between the students who took the survey and those from their schools, a sensitivity test using nonresponse weights indicated that the results would be nearly identical if nonresponse weights were used. For example, standardized factor loadings differed by no more than .01 when nonresponse weights were used, and the Cronbach's alphas measuring internal consistency reliability were the same when rounded to the hundredths place. No conclusions on the findings from research topic 1 would change with the use of nonresponse weights. Therefore, the results presented on all research topics should generalize to the schools participating in the school climate survey.

Methods for answering the research questions

This section describes the methods used to answer each of the research questions in greater detail:

1. Validity and reliability of the elementary school student survey.

    a. To what extent is the elementary school student survey valid? How does the validity of the elementary school student survey compare with the validity of the middle and high school student surveys?

    b. To what extent is the elementary school student survey reliable? How does the reliability of the elementary school student survey compare with the reliability of the middle and high school student surveys?

2. Approaches to scoring the school climate survey in individual schools.

    a. To what extent did perceptions of school climate vary by respondent type (student, teacher, or noninstructional staff)?

    b. How does the approach to weighting the responses of students and staff in a school affect the distribution of school climate summary index scores among schools?

    c. How does the distribution of schools across performance categories (such as on a scale from 1, least favorable, to 4, most favorable) compare when thresholds are mapped to the survey scales, are based Rasch models, and are based on percentiles?

    d. What is the relationship between scores calculated using Rasch models and scores calculated using averages on the four-point survey scale (mean-based scores)?

3. Perceptions of school climate across students and school groups.

    a. To what extent did perceptions of school climate vary by students' race/ethnicity, gender, and grade?

    b. To what extent did perceptions of school climate vary by school characteristics—namely, school size, student racial/ethnic composition, percentage of students eligible for the National School Lunch Program, average student achievement, and school urbanicity (urban, rural, suburban, or town)?

Research topic 1. To be a school climate measure suitable for fostering supportive learning environments that promote the social-emotional wellness of students and staff, the Pennsylvania School Climate Survey must be valid and reliable—measured in this study using construct validity and internal consistency reliability. Construct validity is defined broadly as the extent to which a measure captures what it is designed to measure (Bagozzi et al., 1991). To assess construct validity, the study team evaluated convergent and discriminant validity, two fundamental aspects of construct validity. Convergent validity indicates that the survey items are closely related to each other and to the underlying construct (Cheung et al., 2023; Kline, 2016). Discriminant validity indicates that the set of survey items presumed to measure different underlying constructs are unrelated or weakly related based on the correlations between the different constructs (Kline, 2016). Internal consistency reliability indicates that a measure consistently produces the same results of an underlying construct, such as the quality of student-teacher relationships (Bland & Altman, 1997; Kline, 2016).

A [2021 study by Regional Educational Laboratory Mid-Atlantic](#) validated the Pennsylvania School Climate Survey for elementary school students, middle school students, high school students, teachers, and noninstructional staff but recommended modifications to the elementary student survey to improve its reliability (Amos & Xue, 2021). The 2021 study validated the three domains and recommended removing survey items with low validity. After the recommended changes were incorporated, the 2021 study established the validity and reliability of the school climate survey for middle school students, high school students, teachers, and noninstructional staff. Though the 2021 study established the validity of the elementary school student survey, it recommended revisions to improve its reliability.

First, the 2021 study recommended adding items to the social-emotional learning domain of the elementary school student survey. In response, PDE revised the items in that domain using the student social-emotional learning scale from the Delaware School Survey (Bear et al., 2021). PDE administered the revised version of the elementary school survey starting in the 2019/20 school year.

Second, the 2021 study recommended changing the number of survey response options on the elementary school student survey from three to four to increase variation in student responses and improve reliability. The elementary school student survey originally had three response options (no, sometimes, and yes), whereas the other surveys had four (for example, strongly disagree, disagree, agree, and strongly agree).

Since the 2019/20 school year, PDE has administered the revised version of the elementary school survey. The current study team assessed the validity and reliability of this revised survey to confirm whether the revisions improved its reliability.

Below are detailed descriptions of the methods used for each research question.

Research question 1a. To assess whether the revised elementary school student survey is valid and how its construct validity compares with that of the middle and high school student surveys, the study team estimated a structural equation model for confirmatory factor analysis (CFA) using Stata 17 software separately for each respondent type (elementary, middle, and high school students for the 2021/22 school year). This model was used to test whether the grouping of items is appropriate in each previously specified domain. The study team

then compared the CFA results of the elementary school student survey to the CFA results of the middle and high school student surveys. To prepare the teacher and noninstructional staff surveys for the analyses in research topics 2 and 3, the study team also estimated CFA models for those surveys. The results from these analyses are reported in appendix C.

The CFA models estimate standardized factor loadings and correlations between latent factors. Standardized factor loadings indicate the strength of the associations between the survey items and the underlying latent construct corresponding to each domain. Latent constructs are theoretical; they exist in the world conceptually but are challenging to observe directly (for example, safe and respectful school climate). Although thresholds can vary slightly when evaluating convergent validity, a common practice in the CFA literature is for all standardized factor loadings to be .40 or greater and ideally .70 or greater (Cheung et al., 2023; Hair et al., 2009; Kline, 2016; Stevens, 2012). Standardized factor loadings that are .70 or greater are good evidence for convergent validity, meaning that the items are closely related to each other and the underlying latent construct (Kline, 2016). Items with factor loadings of less than .40 indicate weaker associations with the latent construct (Stevens, 2012), suggesting that the item is not contributing to the measurement of the latent construct. As a method for improving the overall construct validity, researchers can consider excluding items with factor loadings of less than .40 from the domain.

Correlations between latent factors provide evidence of discriminant validity, the extent to which the individual factors capture different underlying constructs (Kline, 2016). Although consensus can vary, a commonly used criterion for establishing discriminant validity is low-moderate correlation between latent factors, with much of the literature recommending a correlation of .85 or lower (Henseler et al., 2015; Kline, 2016). A high correlation (greater than 0.85) between two latent factors suggests that they measure the same underlying construct–that is, they are not conceptually distinct (Henseler et al., 2015).

The study team used the maximum likelihood estimator to produce the results. Maximum likelihood is the most commonly used estimator in structural equation modeling and assumes multivariate normality. Normality was determined through an examination of skewness and kurtosis values. Distributions of measured survey items were found to be highly skewed (greater than 2.0) or kurtotic (greater than 7.0) (Fabrigar et al., 1999). Based on these criteria, no variables demonstrated severe non-normality. The study team modeled the survey items as continuous variables. The threshold for when to use ordinal or continuous variables for survey items with ordinal response options is somewhat subjective. As a rule of thumb, it is reasonable to use continuous variables when the responses include three to six categories (Robitzsch, 2020), which is the case with the elementary, middle, and high school student surveys.

The analyses also accounted for the clustering of respondents within schools. For each survey the study team estimated three sets of models: initial, revised, and final. Each model included three latent factors that correspond to the three domains of school climate defined in the survey: social-emotional learning, student support and academic engagement, and safe and respectful school climate. The initial model grouped the items into the three domains validated in Amos & Xue (2021) using the elementary, middle, and high school student survey data from the 2021/22 school year. Table A13 presents the three overall model fit criteria that the team considered in assessing whether the data support grouping items into the specified domains (that is, assessing model fit).[1]

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[1] These are standard thresholds used in the structural equation model literature to assess whether the model has acceptable fit.

Table A13. Recommended overall model fit statistics for confirmatory factor analysis

Fit statistic	Recommended fit
Comparative fit index (Bentler, 1990)	Brown (2015) suggests that a value of .90 or above is acceptable.
Tucker-Lewis index (TLI; Tucker & Lewis, 1973)	The TLI is designed to correct for the complexity of the model and is sensitive to small sample sizes. Brown (2015) suggests that a value of .90 or above is acceptable.
Root mean square error of approximation (RMSEA; Steiger & Lind, 1980)	RMSEA is sensitive to model complexity. MacCallum et al. (1996) suggest that .01, .05, and .08 for RMSEA indicate excellent, good, and mediocre fit, respectively.

Source: Authors' compilation.

After fitting initial models, the study team used post hoc empirical and theory-based criteria to improve the overall fit (resulting in the revised models) by considering alternative configurations of indicators. In measurement models it is assumed that each item partially captures the latent construct (true score) and that all other omitted causes or components are due to noise (measurement error, the residual variance in an item not explained by the latent factor). The error terms of items are assumed to be independent of one another and the factors. However, if the error terms are in fact correlated across items, the fit statistics might suggest poor fit even though the item groupings in the domain are appropriate. Therefore, the study team respecified the model to consider the alternative configuration of items by removing restrictions on correlations between error terms and examining modification indices, which suggest how the overall model fit would change if correlations were allowed between error terms.

Based on the revised model results, the study team re-estimated and finalized the models by excluding the additional survey items showing factor loadings of less than .40 and adding covariances between error term indicators based on modification indices and a substantive understanding of the construct and school climate literature. The study team also calculated correlations between latent constructs to assess discriminant validity. The results from the initial, revised, and final CFA models are reported in tables B1–B14 in appendix B.

Research question 1b. Reliability is the extent to which an assessment tool produces consistent results. One way to assess reliability is to examine the tool's internal consistency, or how closely different items in a construct produce similar results. Cronbach's alpha is a measure of the internal consistency of the underlying latent constructs (the domains or factors) in each survey (Cronbach, 1951). Survey domains were considered to have acceptable reliability if they had a Cronbach's alpha of .70 or higher, consistent with standards in the literature (Bland & Altman, 1997).

To assess whether the elementary school survey is reliable and how its reliability compares with that of the middle and high school surveys, the study team calculated Cronbach's alpha using Stata 17 software separately for each domain for each respondent type (elementary, middle, and high school students for the 2021/22 school year). The study team calculated Cronbach's alpha using the set of items included in the final models from the prior analyses (see table B13 in appendix B for a list of items that were dropped). The study team then compared Cronbach's alphas of the 2021/22 elementary school student survey with the Cronbach's alphas of the 2021/22 middle school and high school student surveys. The reliability estimates of the survey domains for each survey are reported in table B15.

Research question 2a. Each item on the survey provided respondents with a four-point scale where 1 represented the least favorable response and 4 represented the most favorable response. Mean scores for each school climate domain were calculated by taking the simple mean across survey items in the domain for each respondent. The three domain scores were then averaged to create an overall school score for each respondent.

To create school-level scores, the respondent-level mean scores for each school climate domain and overall school climate score were averaged within schools for each respondent type (student, teachers, and noninstructional staff). For each school, 12 scores were calculated: four school climate scores (social-emotional learning, safe and respectful school climate, student support and academic engagement, and the school climate index) for each of the three respondent types (students, teachers, and noninstructional staff).

The study team then conducted *t*-tests to assess differences in average school climate index scores between the three respondent types. These *t*-tests adjusted the *p*-values to account for multiple comparisons; otherwise the number of significant findings would increase by chance as more groups were compared.[2] By using paired sample *t*-tests, the study team was able to summarize the within-school differences between different respondent types–testing whether students, teachers, and noninstructional staff in the same school tended to have similar or different perceptions of the school's climate. In addition, the study team calculated Cohen's *d* effect sizes to evaluate the magnitude of differences on a metric that would be comparable to that in other studies. Based on prior studies of school climate, effect size differences between respondent groups are described as follows: an absolute value of 0.0-0.09 is small, 0.10-0.19 is moderate, 0.20-0.29 is substantive, and 0.30 and above is large.

In addition, the study team calculated correlations between student, teacher, and noninstructional staff school climate scores to assess the relationship among respondent groups. To describe the strength of these correlations, the study team used the commonly cited guidance from Cohen (1988): correlations below .30 are low, correlations of .30-.49 are moderate, and correlations of .50 and above are strong. Only schools that had at least 10 student respondents, 5 teacher respondents, and 5 noninstructional staff respondents were included in the sample for these *t*-tests and correlational analyses.

Research question 2b. The study team calculated school-level summary scores for each school climate domain and the overall school climate index. These four summary scores were calculated by weighting and averaging scores across all three respondent types. The study team assessed two approaches to weighting respondent types to create a school climate index score that included students, teachers, and noninstructional staff. First, the study team calculated group-weighted scores, wherein students received a weight of .50, and teachers and noninstructional staff each received a weight of .25. The second weighting approach was the state-weighted approach, wherein students, teachers, and noninstructional staff each received a weight corresponding to their group's proportion out of all students, teachers, and noninstructional staff in the state of Pennsylvania–0.868 for students, 0.066 for teachers, and 0.065 for noninstructional staff. The study team used a proportional approach of weighting according to the group's proportion in the state rather than in the sample of schools used for the study because data on the number of teachers and noninstructional staff were not available for individual schools. Distributions for these summary scores were calculated for both group-weighted and state-weighted scores to assess whether different approaches to weighting affected the distributions.

The study team then calculated the averages, standard deviations, and quartile percentile scores across all schools for all school climate scores (scores by respondent type and summary scores across respondent types). The team calculated these for all school levels (elementary school, middle school, and high school) combined, as well as for each school level separately.

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[2] The study team used the Benjamini-Hochberg correction, which is the approach the What Works Clearinghouse (2020) recommends to adjust for multiple comparisons. The adjustment works by ordering all significance values in a set of tests and comparing each value with a reference value. The reference value is calculated by multiplying a given significance value by the number of hypotheses tested, which is then divided by the rank of the given significance value.

Research question 2c. The study team used four approaches to identifying thresholds for defining performance categories. The first was the current approach PDE uses in its score reports. This approach results in three performance categories with thresholds of 2.50 and 3.40. The study team developed the second approach by modifying PDE's current approach, splitting the middle category of that approach into two and aligning thresholds with half-steps in the survey scale. The third approach used thresholds that were estimated from Rasch models and translated into mean score units. The fourth approach is the referenced-based approach, which mapped thresholds to the 25th, 50th, and 75th percentile scores of all schools that took the survey. Table A14 shows all thresholds for each approach.

Table A14. Performance category thresholds for the Pennsylvania School Climate Survey, by scoring approach and respondent type for all school levels

School climate index or domain	Current PDE approach[a] Between categories		Modified PDE approach Between categories			Rasch-identified approach Between categories			Reference-based approach Between categories		
	1 and 2	2 and 3	1 and 2	2 and 3	3 and 4	1 and 2	2 and 3	3 and 4	1 and 2	2 and 3	3 and 4
Elementary school students											
Social-emotional learning	2.50	3.40	2.50	3.00	3.50	na	2.91	3.18	3.25	3.35	3.42
Student support and academic engagement	2.50	3.40	2.50	3.00	3.50	na	2.86	3.23	3.12	3.21	3.27
Middle school students											
School climate index	2.50	3.40	2.50	3.00	3.50	na	2.89	3.32	2.68	2.75	2.83
Social-emotional learning	2.50	3.40	2.50	3.00	3.50	2.40	2.90	3.30	2.55	2.63	2.71
Safe and respectful school climate	2.50	3.40	2.50	3.00	3.50	na	2.91	3.33	2.69	2.81	2.89
Student support and academic engagement	2.50	3.40	2.50	3.00	3.50	na	2.85	na	2.78	2.83	2.88
High school students											
School climate index	2.50	3.40	2.50	3.00	3.50	2.42	2.84	na	2.56	2.64	2.70
Social-emotional learning	2.50	3.40	2.50	3.00	3.50	2.43	2.94	na	2.34	2.44	2.53
Safe and respectful school climate	2.50	3.40	2.50	3.00	3.50	2.46	2.95	3.34	2.74	2.81	2.88
Student support and academic engagement	2.50	3.40	2.50	3.00	3.50	na	2.90	na	2.59	2.68	2.73
Teachers											
School climate index	2.50	3.40	2.50	3.00	3.50	2.39	2.95	3.41	2.68	2.89	3.08
Social-emotional learning	2.50	3.40	2.50	3.00	3.50	2.48	3.00	3.49	2.26	2.48	2.73
Safe and respectful school climate	2.50	3.40	2.50	3.00	3.50	2.41	2.98	3.47	2.91	3.13	3.32
Student support and academic engagement	2.50	3.40	2.50	3.00	3.50	2.30	2.99	3.48	2.87	3.03	3.20
Noninstructional staff											
School climate index	2.50	3.40	2.50	3.00	3.50	2.42	2.98	3.42	2.79	2.98	3.12
Social-emotional learning	2.50	3.40	2.50	3.00	3.50	2.48	3.00	3.50	2.42	2.64	2.82
Safe and respectful school climate	2.50	3.40	2.50	3.00	3.50	2.40	2.98	3.47	3.00	3.22	3.39
Student support and academic engagement	2.50	3.40	2.50	3.00	3.50	2.40	3.00	3.49	2.89	3.08	3.22
Elementary school summary scores (group-weighted)											
Social-emotional learning	2.50	3.40	2.50	3.00	3.50	na	2.87	3.31	2.93	3.03	3.13
Student support and academic engagement	2.50	3.40	2.50	3.00	3.50	na	2.88	3.34	3.09	3.16	3.25

School climate index or domain	Current PDE approach[a]		Modified PDE approach			Rasch-identified approach			Reference-based approach		
	Between categories		Between categories			Between categories			Between categories		
	1 and 2	2 and 3	1 and 2	2 and 3	3 and 4	1 and 2	2 and 3	3 and 4	1 and 2	2 and 3	3 and 4
Elementary school summary scores (state-weighted)											
Social-emotional learning	2.50	3.40	2.50	3.00	3.50	na	2.92	3.18	3.18	3.27	3.34
Student support and academic engagement	2.50	3.40	2.50	3.00	3.50	na	2.87	3.25	3.11	3.20	3.27
Middle school summary scores (group-weighted)											
School climate index	2.50	3.40	2.50	3.00	3.50	2.33	2.92	na	2.66	2.80	2.90
Social-emotional learning	2.50	3.40	2.50	3.00	3.50	2.41	na	na	2.40	2.52	2.66
Safe and respectful school climate	2.50	3.40	2.50	3.00	3.50	2.38	2.94	na	2.76	2.92	3.04
Student support and academic engagement	2.50	3.40	2.50	3.00	3.50	na	2.90	na	2.82	2.95	3.02
Middle school summary scores (state-weighted)											
School climate index	2.50	3.40	2.50	3.00	3.50	na	2.90	na	2.66	2.75	2.84
Social-emotional learning	2.50	3.40	2.50	3.00	3.50	2.39	na	na	2.48	2.60	2.64
Safe and respectful school climate	2.50	3.40	2.50	3.00	3.50	2.41	2.91	na	2.68	2.81	2.90
Student support and academic engagement	2.50	3.40	2.50	3.00	3.50	na	2.87	na	2.79	2.85	2.91
High school summary scores (group-weighted)											
School climate index	2.50	3.40	2.50	3.00	3.50	2.36	2.94	na	2.65	2.72	2.80
Social-emotional learning	2.50	3.40	2.50	3.00	3.50	2.45	na	na	2.32	2.43	2.52
Safe and respectful school climate	2.50	3.40	2.50	3.00	3.50	2.40	2.96	na	2.82	2.93	3.03
Student support and academic engagement	2.50	3.40	2.50	3.00	3.50	na	2.92	na	2.74	2.81	2.90
High school summary scores (state-weighted)											
School climate index	2.50	3.40	2.50	3.00	3.50	2.40	2.93	na	2.61	2.67	2.73
Social-emotional learning	2.50	3.40	2.50	3.00	3.50	2.44	2.94	na	2.34	2.45	2.54
Safe and respectful school climate	2.50	3.40	2.50	3.00	3.50	na	2.94	3.35	2.78	2.85	2.91
Student support and academic engagement	2.50	3.40	2.50	3.00	3.50	na	2.89	na	2.63	2.72	2.77

na represents Rasch-identified thresholds that could not be translated into a mean score because no school in the sample had a Rasch-scaled score at those thresholds. This occurred mostly at the highest and lowest ends of the scale. PDE is Pennsylvania Department of Education.

Note: Thresholds for each respondent type are based on school climate index and domain scores from 130 schools with elementary student respondents, 56 schools with middle school student respondents, 72 schools with high school student respondents, 236 schools with teacher respondents, and 196 schools with noninstructional staff respondents. Group- and state-weighted summary score thresholds for each school level are based on data from 111 elementary schools, 42 middle schools, and 62 high schools. The thresholds for school climate index and the safe and respectful school climate domain are not reported for elementary school students because the safe and respectful school climate domain did not meet the reliability threshold.

a. The current PDE approach has only three performance categories, whereas all other approaches have four.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

To get Rasch-identified thresholds, the study team estimated Rasch scores for each school climate domain and each respondent type (student, teachers, and noninstructional staff) using Winsteps software. For each survey item a Rasch model estimates the likelihood of selecting a response option as a function of the respondent's perception of school climate. These models were also used to identify step values, which are estimates of the point at which respondents switch from being more likely to select one response category to being more likely to select the next response category. The study team used the step values from the Rasch model to define interpretable thresholds for different ranges of the school climate scores and to scale the raw Rasch scores to a more interpretable scale of 1 to 99 (with 1 representing the least favorable score and 99 representing the most favorable score). The study team used a linear transformation to convert Rasch scores for each domain to scale score points on a scale ranging from 1 to 99 points (see Amos & Xue, 2021, for additional details). The Rasch thresholds for performance categories aligned with scaled score points of 20, 50, and 80. Scaled Rasch scores of 20 or lower represent the first and least favorable category, scaled Rasch scores of 21-50 represent the second category, scaled Rasch scores of 51-80 represent the third performance category, and scaled Rasch scores over 80 represent the fourth and most favorable performance category.

To translate these Rasch thresholds into mean score units, the study team first identified the group of respondents (or schools, in the case of summary scores) with scaled Rasch scores at a given threshold (20, 50, or 80) and calculated the weighted median score of that group. This weighted median represents the Rasch threshold translated into mean score units. In cases where respondents or schools did not have scores that were exactly at the threshold, the next closest highest and lowest scores were used to group participants and calculate the weighted median. Table A15 shows the step-by-step procedure for how this translation was conducted.

Table A15. Step-by-step procedures for mapping Rasch-identified thresholds to survey scale

Step	Data level	Description
1	Individual respondent level	Run Rasch models at the domain level for each respondent type separately to find Rasch-identified threshold scores.
2	Individual respondent level	Convert raw Rasch scores to scaled Rasch scores of 1 to 99 with thresholds in raw Rasch units mapped to scaled Rasch values of 20, 50, and 80.
3	Individual respondent level	Translate the respondent by domain-level scaled Rasch threshold scores to survey scale units using the 20, 50, 80 thresholds as benchmarks. To do so, the study team identified the group of individual respondents with scaled Rasch scores at a given threshold (20, 50, or 80) and calculated the weighted median score of that group.
4	Individual respondent level	Calculate school climate index scores as the average of each respondent's average domain scores.
5	School level	Calculate school-level averages of the domain scores and school climate index scores separately for each respondent type.
6	School level	Calculate school climate summary scores, by averaging domain scores and school climate index scores within each school across the three respondent types.
7	School level	For the school climate index scores for each respondent type and all school climate summary scores, compare the 1-99 Rasch scale and 1-4 survey scale to identify thresholds for the overall respondent scores and summary scores in survey scale units using the 20, 50, 80 thresholds as benchmarks and the same translation approach as step 3.

Source: Authors' compilation.

Research question 2d. The study team also assessed the relationship between mean-based scores on the 1-4 survey scale and Rasch scores by calculating correlations between mean-based scores and Rasch scores for each respondent type's domain scores and school climate index score, as well as for school-level summary domain scores and index score. The study team considered correlations above .90 to be very strong and evidence that either score could be used.

Research question 3a. The study team conducted a series of paired sample *t*-tests within schools to assess differences in perceptions of school climate between students of different races/ethnicities, genders, and grades. All *t*-tests used a false discovery rate adjustment (also known as a Benjamini-Hochberg correction) for multiple comparisons. By using paired sample *t*-tests, the study team was able to summarize the within-school difference among student groups–testing whether, across schools, the average of this within-school difference was significantly different from 0. The study team also calculated effect sizes to characterize the magnitude of differences using the same benchmarks as in research question 2a. The race/ethnicity category of American Indian/Alaska Native was excluded from the comparisons due to concerns with this measure (see the discussion of nonresponse analysis in the previous section for more details).

Research question 3b. To identify whether certain school characteristics are related to school climate scores, the study team calculated a series of correlations between school climate scores and school characteristics, such as school size, student racial/ethnic composition, proportion of students eligible for the National School Lunch Program, proficiency rates for reading/language arts in 2020/21, and proficiency rates for math in 2020/21. The study team characterized the strength of the correlations using the same guidance that was used for correlations between respondent groups (Cohen, 1988). Because urbanicity is a categorical variable, the study team used *t*-tests to compare school climate scores across the four types of urbanicity (urban, suburban, town, and rural) and calculated effect sizes of these differences.

Limitations

This study analyzes the Pennsylvania School Climate Survey for the population of students who took the survey in participating schools in the 2021/22 school year. Because the sample of schools used for this analysis is small (only about 11 percent of all Pennsylvania public schools, excluding charter schools, participated in the 2021/22 survey), the findings do not generalize to all public schools in Pennsylvania. Because schools take the survey on a voluntary basis, the schools that took the survey may be different from those that did not take it. For example, schools that took the survey may be more interested in improving their school climate than the general population of Pennsylvania schools.

Furthermore, not all students, educators, and noninstructional staff in each school responded to the survey, so the analyses may not be representative of all possible respondents in a school. Although nonresponse weights help address this limitation, the study team cannot account for all potential differences between respondents and nonrespondents. In addition, nonresponse weights could be implemented only for students, because demographic data are not available for teachers and noninstructional staff at the school level. Therefore, it is possible that the school climate scores for teachers and for noninstructional staff, including index scores that combine responses for all respondent types, do not represent the entire population of teachers or noninstructional staff in the schools that took the survey, especially given that response rates for teachers in schools were low (less than 85 percent, the standard set by the National Center for Education Statistics, 2012).

In addition, the study compares the school climate scores of students, teachers, and noninstructional staff. A previous study by Regional Educational Laboratory Mid-Atlantic established the validity of the middle and high school student surveys and the teacher and noninstructional staff surveys (Amos & Xue, 2021), and the current study confirmed the validity of the middle and high school student surveys in a more recent school year. Each of these surveys showed acceptable model fit with the same three survey domains that include items covering the same topics. However, the surveys differ in the number of items included in the domain and in the way that the certain items are phrased. For example, teachers respond to "I really care about my students," whereas students respond to "My teachers really care about me." Each respondent is evaluating school climate from their perspective and answering a slightly different set of items based on that perspective. Although comparisons

between respondents are all on the same scale, they should be interpreted with some caution due to the differences in their survey forms. The comparisons made between these groups in this study are meant to inform decisions about how to weight students, teachers, and noninstructional staff when forming an index score.

This work was also limited in scope. The methods used to answer research topic 1 focus on only one type of validity (construct validity, using CFA) and one type of reliability (internal consistency). The study team did not explore other types of validity, such as predictive validity (the extent to which school climate scores predict other outcomes that are theoretically related to school climate), or other types of reliability, such as test-retest reliability (the extent to which the survey produces the same results when taken at different points in time under the same conditions, including the same respondent in the same school). In addition, the study focused on just two approaches to weighting students, teachers, and noninstructional staff and four approaches to defining school performance categories when many other approaches could have been tested. These approaches may provide a starting point for PDE's consideration, which could lead to further refinement and testing to ensure PDE is fully satisfied with the final approaches selected.

Lastly, the study used CFA at the individual student and teacher levels even though individuals were nested within schools. As is common practice in school climate research, this study assumed that the factor structure estimated at the individual level would be similar to the factor structure estimated at the school level. However, it is possible that this assumption leads to faulty conclusions about school climate. Future research on school climate could examine the extent to which factor loadings are equal at the individual and school levels.

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Appendix B. Supplemental findings

This appendix provides supplemental findings, organized by research question.

Research question 1a

To assess the validity of the elementary school student survey and compare it with the validity of the middle and high school student surveys, the study team estimated structural equation models for confirmatory factor analysis (CFA) for each respondent type using 2021/22 data (see appendix A for details). The initial models for the 2021/22 elementary, middle, and high school student surveys demonstrated poor fit (table B1; see table A13 in appendix A for model fit criteria). This meant that the models needed to be modified to further improve fit. Although the factor loadings for all the items included in the initial model of the elementary school student survey were within the acceptable range (.40 or greater) (table B2), the initial models for the middle and high school student surveys included several items with factor loadings below the threshold for acceptable fit (that is, less than .40) (tables B3 and B4). This suggests that these items contribute little to the measurement of the latent constructs. Following the approach used in Amos and Xue (2021), the current study team removed these items from the measurement model. The revised models, which were estimated next, dropped these items from the middle and high school student surveys and included modifications to improve fit for the elementary, middle, and high school student surveys.

Table B1. Fit statistics for the initial models

Fit statistic	Suggested	Elementary school student survey	Middle school student survey	High school student survey
Comparative fit index	≥ .90	.83^	.78^	.74^
Tucker-Lewis index	≥ .90	.82^	.77^	.72^
Root mean square error of approximation	< .05-.08	.06	.07	.08^

^ Fit statistic does not meet the suggested threshold.

Note: Based on survey data from 127 elementary schools, 70 middle schools, and 73 high schools.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B2. Factor loadings for items in the 2021/22 elementary school student survey, initial model

Item	Factor loading	Standard error
Social-emotional learning		
Eq10rwot: I respect what others think.	.64	.008
Eq11cman: I can control my anger.	.58	.009
Eq12kto: I am kind to others.	.71	.008
Eq13tconsq: I think about the consequences of what I do.	.59	.008
Eq14uhof: I try to understand how others think and feel.	.64	.009
Eq15cmwu: I can calm myself when upset.	.53	.008
Eq16hlpo: I help others.	.64	.009
Eq1rhpa: I feel responsible for how I act.	.58	.013
Eq2thof: I think about how others feel.	.60	.009
Eq3chib: I can control how I behave.	.59	.009
Eq4scwo: I am good at solving conflicts with others.	.50	.008
Eq5drfw: I am good at deciding right from wrong.	.57	.010
Eq6chof: I care about how others feel.	.65	.009

Item	Factor loading	Standard error
Eq7tbact: I think before I act.	.66	.005
Eq8gawo: I get along well with others.	.59	.009
Eq9mgdc: I make good decisions.	.70	.006
Student support and academic engagement		
Eq10fair: Teachers and other staff in this school are fair to all students.	.60	.009
Eq11givh: Teachers and other staff in this school are willing to give students help.	.52	.012
Eq43care: My teachers really care about me.	.65	.010
Eq47hmwk: The homework I get from my teachers helps me learn.	.57	.008
Eq51difs: I wish I went to a different school.	.48	.010
Eq64ntct: My teachers notice if I have trouble learning something.	.51	.010
Eq65hlpi: My teachers help me do better on my school work.	.61	.009
Eq66trtd: My teachers treat some students better than others.	.52	.011
Eq67topc: My teachers give me work that is interesting.	.50	.009
Eq69ubrd: I am bored in school.	.51	.009
Safe and respectful school climate		
Eq13blly: Students at my school are bullied.	.47	.015
Eq15tsed: Students at my school are teased, picked on, made fun of, or called names.	.47	.016
Eq19sfos: I feel safe outside around the school.	.49	.012
Eq20sfhl: I feel safe in the hallways and bathrooms of the school.	.51	.012
Eq21sfcs: I feel safe in my classroom.	.56	.013
Eq26trtr: Most students in my school treat each other with respect.	.57	.011

Note: All factor loadings are in the acceptable range (.40 or greater) and significant at $p < .01$. Factor loadings are (completely) standardized estimates obtained using the standardized option of the SEM command in Stata. Based on survey data from 127 elementary schools.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B3. Factor loadings for items in the 2021/22 middle school student survey, initial model

Item	Factor loading	Standard error
Social-emotional learning		
Mq27stpt: Students in my school stop and think before doing anything when they get angry.	.58	.009
Mq28grpp: Students in my school do their share of the work when we have group projects.	.44	.012
Mq29givu: Students in my school give up when they can't solve a problem easily.	.56	.010
Mq30argu: Students in my school get into arguments when they disagree with people.	.62	.007
Mq31dbst: Students in my school do their best, even when their school work is difficult.	.63	.010
Mq32okfg: Students in my school think it's OK to fight if someone insults them.	.67	.007
Mq33dohw: Students in my school do all their homework.	.51	.012
Mq34symn: Students in my school say mean things to other students when they think the other students deserve it.	.70	.006
Mq35wkot: Students in my school try to work out their disagreements with other students by talking to them.	.59	.010
Mq36okch: Students in my school think it's OK to cheat if other students are cheating.	.66	.007
Mq37dogd: Students in my school try to do a good job on school work, even when it is not interesting.	.62	.014

Item	Factor loading	Standard error
Student support and academic engagement		
Mq38cnct: My teachers often connect what I am learning to life outside the classroom.	.59	.009
Mq40shid: My teachers encourage students to share their ideas about things we are studying in class.	.62	.009
Mq43care: My teachers really care about me.	.68	.009
Mq44mkup: My teachers help me make up work after an excused absence.	.65	.008
Mq47hmwk: My teachers often assign homework that helps me learn.	.66	.007
Mq49adtb: Adults in this school are often too busy to give students extra help.	.45	.016
Mq50ruls: Adults in this school apply the same rules to all students equally.	.61	.008
Mq51difs: I wish I went to a different school.	.50	.011
Mq52exth: I can get extra help at school outside of my regular classes.	.45	.011
Mq53cnsl: A counselor at this school has helped me plan for life after high school.	.35^	.011
Mq55extra: Adults in this school are usually willing to take the time to give students extra help.	.68	.007
Mq64ntct: Teachers notice if I have trouble learning something.	.61	.010
Mq65hlpi: This school will help me improve my work if I do poorly on an assignment.	.66	.006
Mq66trtd: This school treats some students better than others.	.53	.011
Mq67topc: In my classes, the topics we are studying are interesting and challenging.	.55	.009
Mq68mkth: This class really makes me think.	.51	.013
Mq69ubrd: I am usually bored in this class.	.46	.014
Safe and respectful school climate		
Mq13blly: Students at this school are often bullied.	.72	.008
Mq14thrn: Students at this school are often threatened.	.68	.009
Mq15tsed: Students at this school are often teased or picked on.	.68	.006
Mq16blyc: Students at this school are often bullied because of certain characteristics (for example, race, religion, or weight).	.67	.008
Mq18sthm: I sometimes stay home because I don't feel safe at school.	.46	.012
Mq19sfos: How safe do you feel outside around the school?	.38^	.012
Mq20sfhl: How safe do you feel in the hallways and bathrooms of the school?	.48	.013
Mq21sfcs: How safe do you feel in your classes?	.44	.013
Mq22dntc: Students in my school don't really care about each other.	.60	.010
Mq23ptth: Students in my school like to put others down.	.73	.007
Mq24dntg: Students in my school don't get along together well.	.63	.007
Mq25lkot: Students in my school just look out for themselves.	.47	.011
Mq26trtr: Students in my school treat each other with respect.	.48	.014

^ Factor loading is not in the acceptable range (that is, it is less than .40).

Note: Factor loadings are (completely) standardized estimates obtained using the standardized option of the SEM command in Stata. All loadings are significant at $p < .01$. Based on survey data from 70 middle schools.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B4. Factor loadings for items in the 2021/22 high school student survey, initial model

Item	Factor loading	Standard error
Social-emotional learning		
Hq27stpt: Students in my school stop and think before doing anything when they get angry.	.54	.011
Hq28grpp: Students in my school do their share of the work when we have group projects.	.47	.013
Hq29givu: Students in my school give up when they can't solve a problem easily.	.57	.011
Hq30argu: Students in my school get into arguments when they disagree with people.	.63	.011
Hq31dbst: Students in my school do their best, even when their school work is difficult.	.59	.012
Hq32okfg: Students in my school think it's OK to fight if someone insults them.	.66	.008
Hq33dohw: Students in my school do all their homework.	.58	.011
Hq34symn: Students in my school say mean things to other students when they think the other students deserve it.	.70	.009
Hq35wkot: Students in my school try to work out their disagreements with other students by talking to them.	.56	.010
Hq36okch: Students in my school think it's OK to cheat if other students are cheating.	.64	.010
Hq37dogd: Students in my school try to do a good job on school work, even when it is not interesting.	.60	.011
Student support and academic engagement		
Hq38cnct: My teachers often connect what I am learning to life outside the classroom.	.65	.012
Hq40shid: My teachers encourage students to share their ideas about things we are studying in class.	.67	.008
Hq43care: My teachers really care about me.	.71	.008
Hq44mkup: My teachers help me make up work after an excused absence.	.69	.007
Hq47hmwk: My teachers often assign homework that helps me learn.	.69	.008
Hq49adtb: Adults in this school are often too busy to give students extra help.	.42	.019
Hq50ruls: Adults in this school apply the same rules to all students equally.	.55	.009
Hq51difs: I wish I went to a different school.	.44	.018
Hq52exth: I can get extra help at school outside my regular classes.	.51	.009
Hq53cnsl: A counselor at this school has helped me plan for life after high school.	.39^	.012
Hq54advw: When students in this school already know the material that is being taught, the teacher gives them more advanced assignments.	.36^	.012
Hq55extra: Adults in this school are usually willing to take the time to give students extra help.	.67	.006
Hq64ntct: Teachers notice if I have trouble learning something.	.65	.007
Hq65hlpi: This school will help me improve my work if I do poorly on an assignment.	.70	.007
Hq67topc: The topics we are studying are interesting and challenging.	.63	.012
Hq68mkth: This class really makes me think.	.59	.012
Hq69ubrd: I am usually bored in this class.	.44	.023
Safe and respectful school climate		
Hq13blly: Students at this school are often bullied.	.78	.009
Hq14thrn: Students at this school are often threatened.	.74	.010
Hq15tsed: Students at this school are often teased or picked on.	.75	.010
Hq16blyc: Students at this school are often bullied because of certain characteristics (for example, race, religion, or weight).	.73	.010

Item	Factor loading	Standard error
Hq18sthm: I sometimes stay home because I don't feel safe at school.	.51	.008
Hq19sfos: How safe do you feel outside around the school?	.45	.011
Hq20sfhl: How safe do you feel in the hallways and bathrooms of the school?	.53	.010
Hq21sfcs: How safe do you feel in your classes?	.47	.010
Hq22dntc: Students in my school don't really care about each other.	.62	.009
Hq23ptth: Students in my school like to put others down.	.75	.006
Hq24dntg: Students in my school don't get along together well.	.68	.007
Hq25lkot: Students in my school just look out for themselves.	.58	.011
Hq26trtr: Students in my school treat each other with respect.	.46	.016

^ Factor loading is not in the acceptable range (that is, it is less than .40).

Note: Factor loadings are (completely) standardized estimates obtained using the standardized option of the SEM command in Stata. All loadings are significant at $p < .01$. Based on survey data from 73 high schools.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B5 shows model fit statistics for the revised models. Tables B6–B8 show the factor loadings for the revised models. For the middle and high school student surveys the study team first revised the models by excluding survey items with factor loadings of less than .40 and by allowing correlations between error term indicators based on modification indices provided in the initial CFA output. Specifically, the study team examined modification indices, which approximate the change in the model's goodness-of-fit value if a particular path (i.e., correlations between error terms) were added. In the output, paths are listed only if the modification index is significant at the .05 level. Based on the output, the study team observed many statistically significant omitted paths and further examined the paths with the largest modification indices.

For the paths with the largest modification indices, in which correlations would be allowed between error terms, the study team considered whether these modifications were plausible based on its substantive understanding of the construct and school climate literature. For the middle school student survey the study team found that adding several correlations between error term indicators in the social-emotional learning domain (e.g., Mq31dbst: Students in my school do their best, even when their school work is difficult, and Mq37dogd: Students in my school try to do a good job on school work, even when it is not interesting), the student support and academic engagement domain (e.g., Mq67topc: In my classes, the topics we are studying are interesting and challenging, and Mq68mkth: This class really makes me think), and the safe and respectful school climate domain (e.g., Mq13blly: Students at this school are often bullied, and Mq15tsed: Students at this school are often teased or picked on) improved the model's fit. Similarly, for the high school student survey the study team also found that allowing several correlations between error term indicators in each of the three domains also improved the model's fit. The revised models for the middle and high school student surveys showed better overall fit. However, the results revealed additional items with factor loadings of less than .40.

The study team applied the same respecification approach to the elementary school student survey that it applied to the middle and high school student surveys. For the paths with the largest modification indices, the study team considered whether these modifications were plausible. It found that adding several correlations between error term indicators in the social-emotional learning domain (e.g., Eq2thof: I think about how others feel, and Eq6chof: I care about how others feel) and slightly fewer covariances in the safe and respectful school climate domain (e.g., Eq19sfos: I feel safe outside around the school, and Eq20sfhl: I feel safe in the hallways and bathrooms of the school) improved the model's fit. The revised model for the elementary school student survey showed better overall fit. However, the results revealed two items with factor loadings of less than .40.

Table B5. Fit statistics for the revised models

Fit statistic	Suggested	Elementary school student survey	Middle school student survey	High school student survey
Comparative fit index	≥ .90	.91	.91	.92
Tucker-Lewis index	≥ .90	.91	.90^a	.90
Root mean square error of approximation	< .05–.08	.04	.04	.05[b]

^ Fit statistic does not meet the suggested threshold.

Note: Based on survey data from 127 elementary schools, 70 middle schools, and 73 high schools.

a. At 0.899, the Tucker-Lewis index for the middle school student survey falls just below the suggested threshold and is thus labeled with a caret.

b. At .048, the root mean square error of approximation for the high school student survey falls just below the suggested threshold and is thus not labeled with a caret.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B6. Factor loadings for items in the 2021/22 elementary school student survey, revised model

Item	Factor loading	Standard error
Social-emotional learning		
Eq10rwot: I respect what others think.	.64	.008
Eq11cman: I can control my anger.	.56	.009
Eq12kto: I am kind to others.	.70	.008
Eq13tconsq: I think about the consequences of what I do.	.60	.008
Eq14uhof: I try to understand how others think and feel.	.61	.009
Eq15cmwu: I can calm myself when upset.	.52	.008
Eq16hlpo: I help others.	.63	.009
Eq1rhpa: I feel responsible for how I act.	.59	.012
Eq2thof: I think about how others feel.	.56	.009
Eq3chib: I can control how I behave.	.59	.009
Eq4scwo: I am good at solving conflicts with others.	.50	.008
Eq5drfw: I am good at deciding right from wrong.	.58	.010
Eq6chof: I care about how others feel.	.62	.009
Eq7tbact: I think before I act.	.68	.005
Eq8gawo: I get along well with others.	.60	.009
Eq9mgdc: I make good decisions.	.71	.006
Student support and academic engagement		
Eq10fair: Teachers and other staff in this school are fair to all students.	.60	.008
Eq11givh: Teachers and other staff in this school are willing to give students help.	.52	.012
Eq43care: My teachers really care about me.	.65	.009
Eq47hmwk: The homework I get from my teachers helps me learn.	.57	.008
Eq51difs: I wish I went to a different school.	.48	.010
Eq64ntct: My teachers notice if I have trouble learning something.	.51	.010
Eq65hlpi: My teachers help me do better on my school work.	.61	.009
Eq66trtd: My teachers treat some students better than others.	.51	.011
Eq67topc: My teachers give me work that is interesting.	.50	.009
Eq69ubrd: I am bored in school.	.50	.009

Item	Factor loading	Standard error
Safe and respectful school climate		
Eq13blly: Students at my school are bullied.	.35^	.011
Eq15tsed: Students at my school are teased, picked on, made fun of, or called names.	.38^	.011
Eq19sfos: I feel safe outside around the school.	.45	.012
Eq20sfhl: I feel safe in the hallways and bathrooms of the school.	.47	.012
Eq21sfcs: I feel safe in my classroom.	.60	.011
Eq26trtr: Most students in my school treat each other with respect.	.55	.010

^ Factor loading is not in the acceptable range (that is, it is less than .40).

Note: Factor loadings are (completely) standardized estimates obtained using the standardized option of the SEM command in Stata. All loadings are significant at $p < .01$. Based on survey data from 127 elementary schools.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B7. Factor loadings for items in the 2021/22 middle school student survey, revised model

Item	Factor loading	Standard error
Social-emotional learning		
Mq27stpt: Students in my school stop and think before doing anything when they get angry.	.54	.009
Mq28grpp: Students in my school do their share of the work when we have group projects.	.40	.014
Mq29givu: Students in my school give up when they can't solve a problem easily.	.55	.010
Mq30argu: Students in my school get into arguments when they disagree with people.	.62	.007
Mq31dbst: Students in my school do their best, even when their school work is difficult.	.61	.014
Mq32okfg: Students in my school think it's OK to fight if someone insults them.	.70	.007
Mq33dohw: Students in my school do all their homework.	.46	.011
Mq34symn: Students in my school say mean things to other students when they think the other students deserve it.	.74	.007
Mq35wkot: Students in my school try to work out their disagreements with other students by talking to them.	.53	.012
Mq36okch: Students in my school think it's OK to cheat if other students are cheating.	.67	.007
Mq37dogd: Students in my school try to do a good job on school work, even when it is not interesting.	.60	.015
Student support and academic engagement		
Mq38cnct: My teachers often connect what I am learning to life outside the classroom.	.58	.009
Mq40shid: My teachers encourage students to share their ideas about things we are studying in class.	.62	.009
Mq43care: My teachers really care about me.	.69	.009
Mq44mkup: My teachers help me make up work after an excused absence.	.66	.008
Mq47hmwk: My teachers often assign homework that helps me learn.	.66	.007
Mq49adtb: Adults in this school are often too busy to give students extra help.	.45	.016
Mq50ruls: Adults in this school apply the same rules to all students equally.	.60	.009
Mq51difs: I wish I went to a different school.	.50	.012
Mq52exth: I can get extra help at school outside of my regular classes.	.44	.011
Mq55extra: Adults in this school are usually willing to take the time to give students extra help.	.67	.007
Mq64ntct: Teachers notice if I have trouble learning something.	.59	.011
Mq65hlpi: This school will help me improve my work if I do poorly on an assignment.	.65	.007

Item	Factor loading	Standard error
Mq66trtd: This school treats some students better than others.	.51	.011
Mq67topc: In my classes, the topics we are studying are interesting and challenging.	.53	.010
Mq68mkth: This class really makes me think.	.49	.013
Mq69ubrd: I am usually bored in this class.	.44	.015
Safe and respectful school climate		
Mq13blly: Students at this school are often bullied.	.63	.011
Mq14thrn: Students at this school are often threatened.	.65	.011
Mq15tsed: Students at this school are often teased or picked on.	.63	.008
Mq16blyc: Students at this school are often bullied because of certain characteristics (for example, race, religion, or weight).	.60	.012
Mq18sthm: I sometimes stay home because I don't feel safe at school.	.38^	.014
Mq20sfhl: How safe do you feel in the hallways and bathrooms of the school?	.42	.013
Mq21sfcs: How safe do you feel in your classes?	.39^	.012
Mq22dntc: Students in my school don't really care about each other.	.61	.012
Mq23ptth: Students in my school like to put others down.	.75	.007
Mq24dntg: Students in my school don't get along together well.	.61	.008
Mq25lkot: Students in my school just look out for themselves.	.46	.012
Mq26trtr: Students in my school treat each other with respect.	.56	.011

^ Factor loading is not in the acceptable range (that is, it is less than .40).

Note: Factor loadings are (completely) standardized estimates obtained using the standardized option of the SEM command in Stata. All loadings are significant at $p < .01$. Based on survey data from 70 middle schools.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B8. Factor loadings for items in the 2021/22 high school student survey, revised model

Item	Factor loading	Standard error
Social-emotional learning		
Hq27stpt: Students in my school stop and think before doing anything when they get angry.	.49	.015
Hq28grpp: Students in my school do their share of the work when we have group projects.	.44	.016
Hq29givu: Students in my school give up when they can't solve a problem easily.	.59	.011
Hq30argu: Students in my school get into arguments when they disagree with people.	.66	.010
Hq31dbst: Students in my school do their best, even when their school work is difficult.	.50	.017
Hq32okfg: Students in my school think it's OK to fight if someone insults them.	.71	.008
Hq33dohw: Students in my school do all their homework.	.48	.016
Hq34symn: Students in my school say mean things to other students when they think the other students deserve it.	.76	.007
Hq35wkot: Students in my school try to work out their disagreements with other students by talking to them.	.47	.014
Hq36okch: Students in my school think it's OK to cheat if other students are cheating.	.65	.010
Hq37dogd: Students in my school try to do a good job on school work, even when it is not interesting.	.52	.015
Student support and academic engagement		
Hq38cnct: My teachers often connect what I am learning to life outside the classroom.	.63	.013
Hq40shid: My teachers encourage students to share their ideas about things we are studying in class.	.67	.009

Item	Factor loading	Standard error
Hq43care: My teachers really care about me.	.72	.009
Hq44mkup: My teachers help me make up work after an excused absence.	.71	.007
Hq47hmwk: My teachers often assign homework that helps me learn.	.69	.008
Hq49adtb: Adults in this school are often too busy to give students extra help.	.43	.019
Hq50ruls: Adults in this school apply the same rules to all students equally.	.55	.009
Hq51difs: I wish I went to a different school.	.44	.018
Hq52exth: I can get extra help at school outside my regular classes.	.48	.009
Hq55extra: Adults in this school are usually willing to take the time to give students extra help.	.66	.006
Hq64ntct: Teachers notice if I have trouble learning something.	.63	.008
Hq65hlpi: This school will help me improve my work if I do poorly on an assignment.	.68	.007
Hq67topc: The topics we are studying are interesting and challenging.	.60	.013
Hq68mkth: This class really makes me think.	.55	.013
Hq69ubrd: I am usually bored in this class.	.43	.023
Safe and respectful school climate		
Hq13blly: Students at this school are often bullied.	.72	.011
Hq14thrn: Students at this school are often threatened.	.71	.011
Hq15tsed: Students at this school are often teased or picked on.	.71	.011
Hq16blyc: Students at this school are often bullied because of certain characteristics (for example, race, religion, or weight).	.69	.011
Hq18sthm: I sometimes stay home because I don't feel safe at school.	.47	.009
Hq19sfos: How safe do you feel outside around the school?	.39^	.012
Hq20sfhl: How safe do you feel in the hallways and bathrooms of the school?	.48	.011
Hq21sfcs: How safe do you feel in your classes?	.41	.011
Hq22dntc: Students in my school don't really care about each other.	.61	.009
Hq23ptth: Students in my school like to put others down.	.77	.006
Hq24dntg: Students in my school don't get along together well.	.68	.008
Hq25lkot: Students in my school just look out for themselves.	.58	.011
Hq26trtr: Students in my school treat each other with respect.	.52	.014

^ Factor loading is not in the acceptable range (that is, it is less than .40).

Note: Factor loadings are (completely) standardized estimates obtained using the standardized option of the SEM command in Stata. All loadings are significant at $p < .01$. Based on survey data from 73 high schools.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

After the items with factor loadings of less than .40 were excluded in the revised models and the model was respecified, the final models demonstrated acceptable overall model fit for each of the three 2021/22 student surveys (table B9). The comparative fit index and the Tucker-Lewis index estimates are at or above the acceptable limit of 0.90, and the root mean square error of approximation estimates are below the suggested threshold for the models (.05). The factor loading for every item in the final models for the elementary, middle, and high school student surveys was also at or above the threshold for acceptability (.40) (tables B10–B12).

Table B9. Fit statistics for the final models

Fit statistics	Suggested	Elementary school student survey	Middle school student survey	High school student survey
Comparative fit index	≥ .90	.92	.92	.91
Tucker-Lewis index	≥ .90	.91	.91	.90
Root mean square error of approximation	< .05-.08	.04	.04	.05

Note: All statistics in the table meet the suggested threshold. Based on survey data from 127 elementary schools, 70 middle schools, and 73 high schools.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B10. Factor loadings for items in the 2021/22 elementary school student survey, final model

Item	Factor loading	Standard error
Social-emotional learning		
Eq10rwot: I respect what others think.	.64	.008
Eq11cman: I can control my anger.	.56	.009
Eq12kto: I am kind to others.	.70	.008
Eq13tconsq: I think about the consequences of what I do.	.60	.008
Eq14uhof: I try to understand how others think and feel.	.61	.009
Eq15cmwu: I can calm myself when upset.	.52	.008
Eq16hlpo: I help others.	.63	.009
Eq1rhpa: I feel responsible for how I act.	.59	.012
Eq2thof: I think about how others feel.	.56	.009
Eq3chib: I can control how I behave.	.59	.009
Eq4scwo: I am good at solving conflicts with others.	.50	.008
Eq5drfw: I am good at deciding right from wrong.	.58	.010
Eq6chof: I care about how others feel.	.62	.009
Eq7tbact: I think before I act.	.68	.005
Eq8gawo: I get along well with others.	.60	.009
Eq9mgdc: I make good decisions.	.71	.006
Student support and academic engagement		
Eq10fair: Teachers and other staff in this school are fair to all students.	.60	.009
Eq11givh: Teachers and other staff in this school are willing to give students help.	.53	.012
Eq43care: My teachers really care about me.	.65	.009
Eq47hmwk: The homework I get from my teachers helps me learn.	.57	.008
Eq51difs: I wish I went to a different school.	.47	.010
Eq64ntct: My teachers notice if I have trouble learning something.	.52	.010
Eq65hlpi: My teachers help me do better on my school work.	.62	.009
Eq66trtd: My teachers treat some students better than others.	.51	.011
Eq67topc: My teachers give me work that is interesting.	.50	.009
Eq69ubrd: I am bored in school.	.50	.009
Safe and respectful school climate		
Eq19sfos: I feel safe outside around the school.	.46	.013
Eq20sfhl: I feel safe in the hallways and bathrooms of the school.	.48	.013
Eq21sfcs: I feel safe in my classroom.	.61	.012

Item	Factor loading	Standard error
Eq26trtr: Most students in my school treat each other with respect.	.51	.010

Note: All factor loadings are in the acceptable range (.40 or greater) and significant at *p* < .01. Factor loadings are (completely) standardized estimates obtained using the standardized option of the SEM command in Stata. Based on survey data from 127 elementary schools.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B11. Factor loadings for items in the 2021/22 middle school student survey, final model

Item	Factor loading	Standard error
Social-emotional learning		
Mq27stpt: Students in my school stop and think before doing anything when they get angry.	.54	.009
Mq28grpp: Students in my school do their share of the work when we have group projects.	.41	.014
Mq29givu: Students in my school give up when they can't solve a problem easily.	.55	.010
Mq30argu: Students in my school get into arguments when they disagree with people.	.63	.007
Mq31dbst: Students in my school do their best, even when their school work is difficult.	.61	.014
Mq32okfg: Students in my school think it's OK to fight if someone insults them.	.70	.007
Mq33dohw: Students in my school do all their homework.	.46	.011
Mq34symn: Students in my school say mean things to other students when they think the other students deserve it.	.75	.007
Mq35wkot: Students in my school try to work out their disagreements with other students by talking to them.	.53	.012
Mq36okch: Students in my school think it's OK to cheat if other students are cheating.	.67	.007
Mq37dogd: Students in my school try to do a good job on school work, even when it is not interesting.	.60	.015
Student support and academic engagement		
Mq38cnct: My teachers often connect what I am learning to life outside the classroom.	.58	.009
Mq40shid: My teachers encourage students to share their ideas about things we are studying in class.	.62	.009
Mq43care: My teachers really care about me.	.69	.009
Mq44mkup: My teachers help me make up work after an excused absence.	.66	.008
Mq47hmwk: My teachers often assign homework that helps me learn.	.66	.007
Mq49adtb: Adults in this school are often too busy to give students extra help.	.45	.016
Mq50ruls: Adults in this school apply the same rules to all students equally.	.60	.009
Mq51difs: I wish I went to a different school.	.49	.012
Mq52exth: I can get extra help at school outside of my regular classes.	.44	.011
Mq55extra: Adults in this school are usually willing to take the time to give students extra help.	.67	.007
Mq64ntct: Teachers notice if I have trouble learning something.	.60	.011
Mq65hlpi: This school will help me improve my work if I do poorly on an assignment.	.65	.007
Mq66trtd: This school treats some students better than others.	.51	.011
Mq67topc: In my classes, the topics we are studying are interesting and challenging.	.53	.010
Mq68mkth: This class really makes me think.	.49	.013
Mq69ubrd: I am usually bored in this class.	.44	.015
Safe and respectful school climate		
Mq13blly: Students at this school are often bullied.	.62	.011
Mq14thrn: Students at this school are often threatened.	.64	.011

Item	Factor loading	Standard error
Mq15tsed: Students at this school are often teased or picked on.	.62	.009
Mq16blyc: Students at this school are often bullied because of certain characteristics (for example, race, religion, or weight).	.59	.012
Mq20sfhl: How safe do you feel in the hallways and bathrooms of the school?	.42	.013
Mq22dntc: Students in my school don't really care about each other.	.61	.012
Mq23ptth: Students in my school like to put others down.	.76	.007
Mq24dntg: Students in my school don't get along together well.	.61	.008
Mq25lkot: Students in my school just look out for themselves.	.46	.012
Mq26trtr: Students in my school treat each other with respect.	.56	.011

Note: All factor loadings are in the acceptable range (.40 or greater) and significant at $p < .01$. Factor loadings are (completely) standardized estimates obtained using the standardized option of the SEM command in Stata. Based on survey data from 70 middle schools.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B12. Factor loadings for items in the 2021/22 high school student survey, final model

Item	Factor loading	Standard error
Social-emotional learning		
Hq27stpt: Students in my school stop and think before doing anything when they get angry.	.49	.015
Hq28grpp: Students in my school do their share of the work when we have group projects.	.44	.016
Hq29givu: Students in my school give up when they can't solve a problem easily.	.59	.011
Hq30argu: Students in my school get into arguments when they disagree with people.	.66	.010
Hq31dbst: Students in my school do their best, even when their school work is difficult.	.50	.017
Hq32okfg: Students in my school think it's OK to fight if someone insults them.	.71	.008
Hq33dohw: Students in my school do all their homework.	.48	.016
Hq34symn: Students in my school say mean things to other students when they think the other students deserve it.	.76	.007
Hq35wkot: Students in my school try to work out their disagreements with other students by talking to them.	.47	.014
Hq36okch: Students in my school think it's OK to cheat if other students are cheating.	.65	.010
Hq37dogd: Students in my school try to do a good job on school work, even when it is not interesting.	.52	.015
Student support and academic engagement		
Hq38cnct: My teachers often connect what I am learning to life outside the classroom.	.63	.013
Hq40shid: My teachers encourage students to share their ideas about things we are studying in class.	.67	.009
Hq43care: My teachers really care about me.	.72	.009
Hq44mkup: My teachers help me make up work after an excused absence.	.71	.007
Hq47hmwk: My teachers often assign homework that helps me learn.	.69	.008
Hq49adtb: Adults in this school are often too busy to give students extra help.	.43	.019
Hq50ruls: Adults in this school apply the same rules to all students equally.	.55	.009
Hq51difs: I wish I went to a different school.	.44	.018
Hq52exth: I can get extra help at school outside my regular classes.	.48	.009
Hq55extra: Adults in this school are usually willing to take the time to give students extra help.	.66	.006
Hq64ntct: Teachers notice if I have trouble learning something.	.63	.008
Hq65hlpi: This school will help me improve my work if I do poorly on an assignment.	.68	.007

Item	Factor loading	Standard error
Hq67topc: The topics we are studying are interesting and challenging.	.60	.013
Hq68mkth: This class really makes me think.	.55	.013
Hq69ubrd: I am usually bored in this class.	.43	.023
Safe and respectful school climate		
Hq13blly: Students at this school are often bullied.	.72	.011
Hq14thrn: Students at this school are often threatened.	.71	.011
Hq15tsed: Students at this school are often teased or picked on.	.71	.011
Hq16blyc: Students at this school are often bullied because of certain characteristics (for example, race, religion, or weight).	.69	.011
Hq18sthm: I sometimes stay home because I don't feel safe at school.	.47	.009
Hq20sfhl: How safe do you feel in the hallways and bathrooms of the school?	.48	.011
Hq21sfcs: How safe do you feel in your classes?	.41	.011
Hq22dntc: Students in my school don't really care about each other.	.61	.009
Hq23ptth: Students in my school like to put others down.	.77	.006
Hq24dntg: Students in my school don't get along together well.	.68	.008
Hq25lkot: Students in my school just look out for themselves.	.58	.011
Hq26trtr: Students in my school treat each other with respect.	.52	.014

Note: All factor loadings are in the acceptable range (.40 or greater) and significant at $p < .01$. Factor loadings are (completely) standardized estimates obtained using the standardized option of the SEM command in Stata. Based on survey data from 73 high schools.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B13 summarizes all survey items that were removed from the final models due to low factor loadings.

Table B13. Survey items with factor loadings of less than .40 removed for the final models

Survey	Domain	Survey item	Removed after initial model	Removed after revised model
Elementary school student survey	Safe and respectful school climate	Eq13blly: Students at my school are bullied.		X
		Eq15tsed: Students at my school are teased, picked on, made fun of, or called names.		X
Middle school student survey	Student support and academic engagement	Mq53cnsl: A counselor at this school has helped me plan for life after high school.	X	
	Safe and respectful school climate	Mq18sthm: I sometimes stay home because I don't feel safe at school.		X
		Mq19sfos: How safe do you feel outside around the school?	X	
		Mq21sfcs: How safe do you feel in your classes?		X
High school student survey	Student support and academic engagement	Hq53cnsl: A counselor at this school has helped me plan for life after high school.	X	
		Hq54advw: When students in this school already know the material that is being taught, the teacher gives them more advanced assignments.	X	
	Safe and respectful school climate	Hq19sfos: How safe do you feel outside around the school?		X

Note: Based on survey data from 127 elementary schools, 70 middle schools, and 73 high schools.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B14 shows correlations between the latent factors for the final models across surveys. The correlations between the latent factors were .85 or lower for all surveys, suggesting that the factors exhibit discriminant validity, meaning the latent factors are presumed to be measuring conceptually distinct underlying constructs (Henseler et al., 2015; Kline, 2016). However, on the elementary school student survey two domains had a correlation close to the acceptable threshold: the student support and academic engagement domain and the safe and respectful school climate domain.

Table B14. Correlations between latent factors for the surveys in 2021/22

	Correlation between:		
Survey	Domains 1 and 2: Social-emotional learning, and student support and academic engagement	Domains 1 and 3: Social-emotional learning, and safe and respectful school climate	Domains 2 and 3: Student support and academic engagement, and safe and respectful school climate
Elementary school student survey	.59	.57	.84
Middle school student survey	.53	.78	.46
High school student survey	.47	.79	.42

Note: All correlations in the table are in the low-moderate range (.85 or lower). Based on survey data from 127 elementary schools, 70 middle schools, and 73 high schools.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Research question 1b

To assess whether the elementary school student survey is reliable and how the reliability compares with that of the middle and high school student surveys, the study team calculated Cronbach's alpha for each domain for each respondent type (elementary school students, middle school students, and high school students, classroom teachers, and noninstructional staff). Table B15 shows the reliability estimates of the survey domains for each of the student surveys. The reliability estimates of the staff surveys are reported in appendix C.

Every domain across all the surveys met the threshold for acceptable reliability (.70 or higher), with Cronbach's alphas of at least 0.80, except the safe and respectful school climate domain of the elementary school student survey, which has a Cronbach's alpha of .63. This implies a lack of internal consistency among the items in this domain.

Table B15. Reliability estimates for each domain, by survey (final models)

Domain	Number of items	Cronbach's alpha
Elementary school student survey		
Social-emotional learning	16	.90
Student support and academic engagement	10	.80
Safe and respectful school climate	4	.63^
Middle school student survey		
Social-emotional learning	11	.86
Student support and academic engagement	16	.89
Safe and respectful school climate	10	.86
High school student survey		
Social-emotional learning	11	.86
Student support and academic engagement	15	.89
Safe and respectful school climate	12	.89

^ Cronbach's alpha is lower than .70.

Note: Based on survey data from 127 elementary schools, 70 middle schools, and 73 high schools.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Research question 2a

This research question asked to what extent school climate perceptions varied by role (student, teacher, or noninstructional staff). The main report presents mean differences of school climate index scores for middle school students, high school students, teachers, and noninstructional staff. To supplement those findings, table B16 displays the means, standard deviations, and percentile scores for individual school climate domains across school levels. Tables B17–B19 display these statistics for each school level separately.

Table B16. Descriptive statistics for schools' school climate domain scores, by respondent type, at all school levels

School climate index or domain	Mean	Standard deviation	25th percentile	50th percentile	75th percentile
Student survey (N = 258 schools for all school levels; N = 128 schools for middle and high schools only)ᵃ					
School climate index (N = 128)	2.71	0.17	2.59	2.69	2.78
Social-emotional learning (N = 258)	2.93	0.43	2.51	2.97	3.36
Safe and respectful school climate (N = 128)	2.82	0.18	2.71	2.81	2.89
Student support and academic engagement (N = 258)	2.98	0.26	2.74	2.99	3.22
Teacher survey (N = 236 schools)					
School climate index	2.88	0.28	2.68	2.89	3.08
Social-emotional learning	2.49	0.32	2.26	2.48	2.73
Safe and respectful school climate	3.11	0.30	2.91	3.13	3.32
Student support and academic engagement	3.03	0.27	2.87	3.03	3.20
Noninstructional staff survey (N = 196 schools)					
School climate index	2.95	0.26	2.79	2.98	3.12
Social-emotional learning	2.61	0.29	2.42	2.64	2.82
Safe and respectful school climate	3.17	0.28	3.00	3.22	3.39
Student support and academic engagement	3.05	0.26	2.89	3.08	3.22

Note: Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. The samples for the school climate index and the safe and respectful school climate domain do not include 130 elementary schools because the safe and respectful school climate domain did not meet the reliability threshold for elementary school students and the school climate index for elementary school students could not be calculated without that domain score.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B17. Descriptive statistics for school climate domains, by respondent type, in elementary schools

School climate index or domain	Mean	Standard deviation	25th percentile	50th percentile	75th percentile
Student survey (N = 130 schools)					
Social-emotional learning	3.32	0.16	3.25	3.35	3.42
Student support and academic engagement	3.20	0.12	3.12	3.21	3.27
Teacher survey (N = 118 schools)					
School climate index	3.02	0.23	2.89	3.04	3.17
Social-emotional learning	2.68	0.25	2.55	2.71	2.84
Safe and respectful school climate	3.25	0.25	3.12	3.29	3.43
Student support and academic engagement	3.13	0.26	2.96	3.13	3.26

School climate index or domain	Mean	Standard deviation	25th percentile	50th percentile	75th percentile
Noninstructional staff survey (*N* = 109 schools)					
School climate index	3.04	0.22	2.93	3.07	3.20
Social-emotional learning	2.74	0.24	2.58	2.79	2.89
Safe and respectful school climate	3.28	0.22	3.16	3.32	3.44
Student support and academic engagement	3.11	0.25	2.97	3.12	3.28

Note: Statistics for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Statistics for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B18. Descriptive statistics for school climate domains, by respondent type, in middle schools

School climate index or domain	Mean	Standard deviation	25th percentile	50th percentile	75th percentile
Student survey (*N* = 56 schools)					
School climate index	2.77	0.17	2.68	2.75	2.83
Social-emotional learning	2.66	0.21	2.55	2.63	2.71
Safe and respectful school climate	2.81	0.19	2.69	2.81	2.89
Student support and academic engagement	2.85	0.12	2.78	2.83	2.88
Teacher survey (*N* = 50 schools)					
School climate index	2.76	0.28	2.61	2.76	2.95
Social-emotional learning	2.32	0.29	2.16	2.30	2.51
Safe and respectful school climate	2.96	0.30	2.80	2.99	3.17
Student support and academic engagement	2.98	0.27	2.79	2.98	3.16
Noninstructional staff survey (*N* = 32 schools)					
School climate index	2.82	0.30	2.58	2.85	3.02
Social-emotional learning	2.44	0.31	2.16	2.46	2.66
Safe and respectful school climate	3.04	0.35	2.76	3.08	3.31
Student support and academic engagement	2.99	0.31	2.78	3.00	3.23

Note: Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B19. Descriptive statistics for school climate domains, by respondent type, in high schools

School climate index or domain	Mean	Standard deviation	25th percentile	50th percentile	75th percentile
Student survey (*N* = 72 schools)					
School climate index	2.65	0.16	2.56	2.64	2.70
Social-emotional learning	2.45	0.18	2.34	2.44	2.53
Safe and respectful school climate	2.82	0.17	2.74	2.81	2.88
Student support and academic engagement	2.69	0.15	2.59	2.68	2.73
Teacher survey (*N* = 68 schools)					
School climate index	2.72	0.22	2.58	2.71	2.86
Social-emotional learning	2.28	0.24	2.12	2.30	2.43

School climate index or domain	Mean	Standard deviation	25th percentile	50th percentile	75th percentile
Safe and respectful school climate	2.97	0.25	2.81	3.01	3.13
Student support and academic engagement	2.91	0.22	2.79	2.89	3.06
Noninstructional staff survey (N = 55 schools)					
School climate index	2.83	0.23	2.69	2.86	3.02
Social-emotional learning	2.47	0.25	2.32	2.51	2.67
Safe and respectful school climate	3.05	0.25	2.85	3.10	3.24
Student support and academic engagement	2.98	0.23	2.85	2.95	3.16

Note: Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

As noted in the main report, overall school climate index scores varied according to respondent type, with noninstructional staff reporting the highest perception of school climate, followed by teachers then students. However, there were some differences in patterns across domains and school levels. For example, students reported more positive perceptions on the social-emotional learning domain than both teachers and noninstructional staff. Tables B20–B23 provide details of these comparisons.

Table B20. Differences in school climate, by respondent type, for all school levels

Respondent-type comparison		Average within school mean difference[a]	Standard deviation of the mean difference	Effect size[b]	p-value	Number of schools
Category 1	Category 2					
School climate index						
Student	Teacher	-0.05*	0.21	0.24	0.040	79
Student	Noninstructional staff	-0.15*	0.23	0.74	< 0.001	79
Teacher	Noninstructional staff	-0.11*	0.16	0.42	< 0.001	79
Social-emotional learning						
Student	Teacher	0.45*	0.32	1.17	< 0.001	180
Student	Noninstructional staff	0.33*	0.37	0.90	< 0.001	180
Teacher	Noninstructional staff	-0.11*	0.19	0.37	< 0.001	180
Safe and respectful school climate						
Student	Teacher	-0.15*	0.21	0.68	< 0.001	79
Student	Noninstructional staff	-0.24*	0.24	1.02	< 0.001	79
Teacher	Noninstructional staff	-0.09*	0.18	0.31	< 0.001	79
Student support and academic engagement						
Student	Teacher	-0.05*	0.29	0.20	0.020	180
Student	Noninstructional staff	-0.07*	0.30	0.27	0.007	180
Teacher	Noninstructional staff	-0.02	0.19	0.06	0.249	180

* Indicates a statistically different mean difference at $p < .05$. All t-tests were conducted with a false discovery rate correction to account for multiple comparisons.

Note: Only schools with at least 10 student respondents, 5 teacher respondents, and 5 noninstructional staff respondents were included in the analysis. Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. The average within-school mean difference is reported in survey units.

b. The effect sizes are reported as absolute values and can be interpreted as follows: 0.0–0.09 is small, 0.10–0.19 is moderate, 0.20–0.29 is substantive, and 0.30 and above is large.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B21. Differences in school climate, by respondent type, for elementary schools

Respondent-type comparison		Average within school mean difference[a]	Standard deviation of the mean difference	Effect size[b]	p-value	Number of schools
Category 1	Category 2					
Social-emotional learning						
Student	Teacher	0.64*	0.25	2.95	< 0.001	101
Student	Noninstructional staff	0.57*	0.25	2.73	< 0.001	101
Teacher	Noninstructional staff	-0.07*	0.18	0.28	< 0.001	101
Student support and academic engagement						
Student	Teacher	0.06	0.27	0.28	0.051	101
Student	Noninstructional staff	0.07*	0.25	0.38	0.010	101
Teacher	Noninstructional staff	0.01	0.19	0.06	0.424	101

* Indicates a statistically different mean difference at $p < .05$. All t-tests were conducted with a false discovery rate correction to account for multiple comparisons.

Note: Only schools with at least 10 student respondents, 5 teacher respondents, and 5 noninstructional staff respondents were included in the analysis. Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score. Mean school climate scores represent simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. The average within-school mean difference is reported in survey units.

b. The effect sizes are reported as absolute values and can be interpreted as follows: 0.0-0.09 is small, 0.10-0.19 is moderate, 0.20-0.29 is substantive, and 0.30 and above is large.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B22. Differences in school climate, by respondent type, for middle schools

Respondent-type comparison		Average within school mean difference[a]	Standard deviation of the mean difference	Effect size[b]	p-value	Number of schools
Category 1	Category 2					
School climate index						
Student	Teacher	-0.01	0.25	0.02	0.907	26
Student	Noninstructional staff	-0.09	0.27	0.39	0.129	26
Teacher	Noninstructional staff	-0.09*	0.15	0.28	0.017	26
Social-emotional learning						
Student	Teacher	0.30*	0.26	1.26	< 0.001	26
Student	Noninstructional staff	0.16*	0.27	0.67	0.004	26
Teacher	Noninstructional staff	-0.14*	0.18	0.44	0.001	26
Safe and respectful school climate						
Student	Teacher	-0.16*	0.25	0.59	0.004	26
Student	Noninstructional staff	-0.26*	0.28	0.93	< 0.001	26
Teacher	Noninstructional staff	-0.10*	0.15	0.29	0.003	26
Student support and academic engagement						
Student	Teacher	-0.17*	0.29	0.74	0.012	26
Student	Noninstructional staff	-0.19*	0.32	0.78	0.012	26
Teacher	Noninstructional staff	-0.02	0.18	0.06	0.580	26

* Indicates a statistically different mean difference at $p < .05$. All t-tests were conducted with a false discovery rate correction to account for multiple comparisons.

Note: Only schools with at least 10 student respondents, 5 teacher respondents, and 5 noninstructional staff respondents were included in the analysis. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. The average within-school mean difference is reported in survey units.

b. The effect sizes are reported as absolute values and can be interpreted as follows: 0.0-0.09 is small, 0.10-0.19 is moderate, 0.20-0.29 is substantive, and 0.30 and above is large.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B23. Differences in school climate, by respondent type, for high schools

Respondent-type comparison		Average within school mean difference[a]	Standard deviation of the mean difference	Effect size[b]	*p*-value	Number of schools
Category 1	Category 2					
School climate index						
Student	Teacher	-0.07*	0.18	0.37	0.007	53
Student	Noninstructional staff	-0.18*	0.20	0.96	< 0.001	53
Teacher	Noninstructional staff	-0.11*	0.17	0.52	< 0.001	53
Social-emotional learning						
Student	Teacher	0.16*	0.20	0.76	< 0.001	53
Student	Noninstructional staff	-0.03	0.23	0.13	0.377	53
Teacher	Noninstructional staff	-0.19*	0.19	0.77	< 0.001	53
Safe and respectful school climate						
Student	Teacher	-0.15*	0.18	0.74	< 0.001	53
Student	Noninstructional staff	-0.23*	0.22	1.09	< 0.001	53
Teacher	Noninstructional staff	-0.08*	0.19	0.32	0.003	53
Student support and academic engagement						
Student	Teacher	-0.21*	0.20	1.23	< 0.001	53
Student	Noninstructional staff	-0.29*	0.23	1.51	< 0.001	53
Teacher	Noninstructional staff	-0.07*	0.18	0.35	< 0.001	53

* Indicates a statistically different mean difference at *p* < .05. All *t*-tests were conducted with a false discovery rate correction to account for multiple comparisons.

Note: Only schools with at least 10 student respondents, 5 teacher respondents, and 5 noninstructional staff respondents were included in the analysis. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. The average within-school mean difference is reported in survey units.

b. The effect sizes are reported as absolute values and can be interpreted as follows: 0.0–0.09 is small, 0.10–0.19 is moderate, 0.20–0.29 is substantive, and 0.30 and above is large.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

The main report also noted that school climate index scores among all three respondent types in middle schools and high schools were moderately or strongly correlated. Tables B24–B26 provide more information on these findings and display the correlation findings for each school level and domain.

Table B24. Correlations between student and teacher scores, by school level

School level	Pearson's *r*[a]	*p*-value	95% confidence interval	
			Lower	Upper
Overall school climate index				
Middle and high schools	0.56*	< 0.001	0.39	0.70
Middle schools	0.70*	< 0.001	0.42	0.85
High schools	0.57*	< 0.001	0.35	0.73
Social-emotional learning				
All schools	0.68*	< 0.001	0.59	0.75
Elementary schools	0.37*	< 0.001	0.19	0.53
Middle schools	0.64*	< 0.001	0.33	0.82
High schools	0.55*	< 0.001	0.33	0.71
Safe and respectful school climate				
Middle and high schools	0.69*	< 0.001	0.55	0.79

School level	Pearson's r[a]	p-value	95% confidence interval	
			Lower	Upper
Middle schools	0.79*	< 0.001	0.59	0.90
High schools	0.65*	< 0.001	0.46	0.78
Student support and academic engagement				
All schools	0.44*	< 0.001	0.31	0.55
Elementary schools	0.18	0.072	-0.02	0.36
Middle schools	0.30	0.140	-0.10	0.61
High schools	0.35*	0.010	0.09	0.57

* Indicates a correlation value that is statistically different from 0 at $p < .05$.

Note: Only schools with at least 10 student respondents, 5 teacher respondents, and 5 noninstructional staff respondents were included in the analysis. Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score. Mean school climate scores represent simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. Pearson's r is a measure of the strength of the correlation between two variables and can be interpreted as follows: below .30 is low, .30-.49 is moderate, and .50 and above is strong.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B25. Correlations between student and noninstructional staff scores, by school level

School level	Pearson's r[a]	p-value	95% confidence interval	
			Lower	Upper
Overall school climate index				
Middle and high schools	0.47*	< 0.001	0.27	0.62
Middle schools	0.61*	0.001	0.29	0.80
High schools	0.47*	< 0.001	0.23	0.66
Social-emotional learning				
All schools	0.56*	< 0.001	0.45	0.65
Elementary schools	0.29*	0.003	0.10	0.46
Middle schools	0.60*	0.001	0.28	0.80
High schools	0.44*	0.001	0.19	0.64
Safe and respectful school climate				
Middle and high schools	0.58*	< 0.001	0.41	0.71
Middle schools	0.71*	< 0.001	0.45	0.86
High schools	0.52*	< 0.001	0.29	0.70
Student support and academic engagement				
All schools	0.34*	< 0.001	0.20	0.46
Elementary schools	0.23*	0.023	0.03	0.40
Middle schools	0.20	0.320	-0.20	0.55
High schools	0.31*	0.027	0.04	0.53

* Indicates a correlation value that is statistically different from 0 at $p < .05$.

Note: Only schools with at least 10 student respondents, 5 teacher respondents, and 5 noninstructional staff respondents were included in the analysis. Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. Pearson's r is a measure of the strength of the correlation between two variables and can be interpreted as follows: below .30 is low, .30-.49 is moderate, and .50 and above is strong.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B26. Correlations between teacher and noninstructional staff scores, by school level

School level	Pearson's r[a]	p-value	95% confidence interval	
			Lower	Upper
Overall school climate index				
Middle and high schools	0.79*	< 0.001	0.69	0.86
Middle schools	0.89*	< 0.001	0.77	0.95
High schools	0.69*	< 0.001	0.51	0.81
Social-emotional learning				
All schools	0.80*	< 0.001	0.75	0.85
Elementary schools	0.72*	< 0.001	0.61	0.80
Middle schools	0.84*	< 0.001	0.67	0.93
High schools	0.68*	< 0.001	0.51	0.81
Safe and respectful school climate				
Middle and high schools	0.81*	< 0.001	0.72	0.87
Middle schools	0.91*	< 0.001	0.81	0.96
High schools	0.71*	< 0.001	0.55	0.82
Student support and academic engagement				
All schools	0.75*	< 0.001	0.68	0.81
Elementary schools	0.73*	< 0.001	0.63	0.81
Middle schools	0.83*	< 0.001	0.66	0.92
High schools	0.63*	< 0.001	0.43	0.77

* Indicates a correlation value that is statistically different from 0 at p < .05.

Note: Only schools with at least 10 student respondents, 5 teacher respondents, and 5 noninstructional staff respondents were included in the analysis. Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. Pearson's r is a measure of the strength of the correlation between two variables and can be interpreted as follows: below .30 is low, .30–.49 is moderate, and .50 and above is strong.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Research question 2b

To calculate school-level summary scores for each school climate domain and the school climate index that combined school-level scores across all three respondent types (students, teachers, and noninstructional staff), the study team assessed two approaches to weighting respondent types: equally weighting students and staff (group weighted) and weighting according to respondent proportions in the state (state weighted). The main report presents density plots that show how the two approaches overall resulted in similar distributions of school climate summary index scores, with a slightly flatter distribution (lower kurtosis) for group-weighted scores than for state-weighted scores. To supplement the distribution of school climate summary scores that are presented in the main report, table B27 displays the means, standard deviations, and percentile scores for school climate summary domains scores across school levels using the two weighting approaches. Tables B28–B30 display these statistics for each school level separately. Like the domain and overall school climate scores by respondent type, the summary domain and school climate scores demonstrated little variability.

Table B27. Descriptive statistics for group-weighted and state-weighted summary domain scores across all school levels

Summary school climate index or domain	Mean	Standard deviation	25th percentile	50th percentile	75th percentile
Group weighted (*N* = 215 schools for all school levels; *N* = 104 schools for middle and high schools only)[a]					
School climate index (*N* = 104)	2.75	0.17	2.65	2.75	2.86
Social-emotional learning (*N* = 215)	2.75	0.33	2.47	2.75	3.04
Safe and respectful school climate (*N* = 104)	2.91	0.19	2.81	2.92	3.04
Student support and academic engagement (*N* = 215)	3.02	0.21	2.85	3.03	3.17
State weighted (*N* = 215 schools for all schools; *N* = 104 schools for middle and high schools only)[a]					
School climate index (*N* = 104)	2.71	0.14	2.62	2.69	2.77
Social-emotional learning (*N* = 215)	2.88	0.40	2.49	2.92	3.28
Safe and respectful school climate (*N* = 104)	2.84	0.16	2.74	2.84	2.91
Student support and academic engagement (*N* = 215)	2.99	0.24	2.77	2.98	3.21

Note: Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. Statistics for the school climate index and the safe and respectful school climate domain do not include 111 elementary schools with student respondents because the safe and respectful school climate domain did not meet the reliability threshold for elementary school students and the school climate index for elementary school students could not be calculated without that domain score.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B28. Descriptive statistics for group-weighted and state-weighted summary domain scores for elementary schools

Summary school climate domain	Mean	Standard deviation	25th percentile	50th percentile	75th percentile
Group weighted (*N* = 111)					
Social-emotional learning	3.01	0.17	2.93	3.03	3.13
Student support and academic engagement	3.16	0.15	3.09	3.16	3.25
State weighted (*N* = 111)					
Social-emotional learning	3.23	0.16	3.18	3.27	3.34
Student support and academic engagement	3.19	0.12	3.11	3.20	3.27

Note: Statistics for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Statistics for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perceptions of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and their school's population.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B29. Descriptive statistics for group-weighted and state-weighted summary domain scores for middle schools

Summary school climate index or domain	Mean	Standard deviation	25th percentile	50th percentile	75th percentile
Group-weighted (*N* = 42)					
School climate index	2.78	0.17	2.66	2.80	2.90
Social-emotional learning	2.51	0.18	2.40	2.52	2.66
Safe and respectful school climate	2.89	0.21	2.76	2.92	3.04
Student support and academic engagement	2.93	0.16	2.82	2.95	3.02

Summary school climate index or domain	Mean	Standard deviation	25th percentile	50th percentile	75th percentile
State-weighted (*N* = 42)					
School climate index	2.74	0.12	2.66	2.75	2.84
Social-emotional learning	2.58	0.13	2.48	2.60	2.64
Safe and respectful school climate	2.80	0.15	2.68	2.81	2.90
Student support and academic engagement	2.85	0.09	2.79	2.85	2.91

Note: Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B30. Descriptive statistics for group-weighted and state-weighted summary domain scores for high schools

Summary school climate index or domain	Mean	Standard deviation	25th percentile	50th percentile	75th percentile
Group-weighted (*N* = 62)					
School climate index	2.73	0.16	2.65	2.72	2.80
Social-emotional learning	2.43	0.18	2.32	2.43	2.52
Safe and respectful school climate	2.93	0.18	2.82	2.93	3.03
Student support and academic engagement	2.82	0.15	2.74	2.81	2.90
State-weighted (*N* = 62)					
School climate index	2.68	0.15	2.61	2.67	2.73
Social-emotional learning	2.46	0.17	2.34	2.45	2.54
Safe and respectful school climate	2.86	0.17	2.78	2.85	2.91
Student support and academic engagement	2.73	0.14	2.63	2.72	2.77

Note: Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Research question 2c

The study team assessed four approaches to defining performance categories that describe the extent to which perceptions of school climate were favorable: the current PDE approach, the modified PDE approach, the Rasch-identified approach, and the reference-based approach. The main report describes these four approaches in detail and presents the distribution of state-weighted school climate summary index score performance categories according to the four threshold approaches.

Table B31 displays the distributions of schools into performance categories using three of these approaches to identifying thresholds (current PDE approach, modified PDE approach, Rasch identified) for each school climate domain by respondent type, and tables B32–B34 display this information for each school level separately. Tables B35–B38 display the distributions of schools into performance categories using different approaches to identifying thresholds for the school climate index and domain scores that combine across respondent types. These results are shown by approach to weighting students and staff within schools across all school levels, elementary schools, middle schools, and high schools, respectively. These tables do not include the reference-based approach because the distribution will always lead to 25 percent of schools in each category.

Across all school levels, domains, and respondent types, the current PDE approach to defining performance categories resulted in the least amount of variation, with most scores falling into a single category. The modified PDE approach and Rasch-identified approach resulted in more schools spread across lower and higher performance categories. In addition, for all three approaches to identifying thresholds, there was more variation in performance categories for the individual domains than for the school climate index and for the individual respondent types than for the summary scores that combine across respondent types.

Table B31. Percentage of schools in each performance category at all school levels, by respondent type, domain, and approach to defining performance categories

Approach to defining performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
School climate index				
Students (*N* = 128 schools)				
Current PDE approach	7.81	92.19	0.00	na
Modified PDE approach	7.81	85.94	6.25	0.00
Rasch-identified approach	0.78	89.06	9.38	0.78
Teachers (*N* = 236 schools)				
Current PDE approach	7.63	88.98	3.39	na
Modified PDE approach	7.63	57.63	33.90	0.85
Rasch-identified approach	4.24	53.81	38.98	2.97
Noninstructional staff (*N* = 196 schools)				
Current PDE approach	5.61	92.86	1.53	na
Modified PDE approach	5.61	47.45	46.43	0.51
Rasch-identified approach	1.02	46.94	51.02	1.02
Social-emotional learning				
Students (*N* = 258 schools)				
Current PDE approach	24.03	59.69	16.28	na
Modified PDE approach	24.03	26.36	47.29	2.33
Rasch-identified approach	13.95	35.27	6.20	44.57
Teachers (*N* = 236 schools)				
Current PDE approach	51.70	48.31	0.00	na
Modified PDE approach	51.70	44.07	4.24	0.00
Rasch-identified approach	47.46	48.31	4.24	0.00
Noninstructional staff (*N* = 196 schools)				
Current PDE approach	31.63	67.86	0.51	na
Modified PDE approach	31.63	63.27	5.10	0.00
Rasch-identified approach	27.55	66.84	5.10	0.51
Safe and respectful school climate				
Students (*N* = 128 schools)				
Current PDE approach	2.34	96.88	0.78	na
Modified PDE approach	2.34	87.50	10.16	0.00
Rasch-identified approach	0.78	81.25	15.63	2.34

Approach to defining performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
Teachers (*N* = 236 schools)				
Current PDE approach	2.97	78.39	18.64	na
Modified PDE approach	2.97	29.24	60.17	7.63
Rasch-identified approach	1.70	27.12	54.66	16.53
Noninstructional staff (*N* = 196 schools)				
Current PDE approach	1.02	77.04	21.94	na
Modified PDE approach	1.02	24.49	65.82	8.67
Rasch-identified approach	0.51	21.43	59.18	18.88
Student support and academic engagement				
Students (*N* = 258 schools)				
Current PDE approach	0.00	99.23	0.78	na
Modified PDE approach	0.00	50.39	49.23	0.39
Rasch-identified approach	0.00	39.92	38.37	21.71
Teachers (*N* = 236 schools)				
Current PDE approach	2.54	88.98	8.48	na
Modified PDE approach	2.54	43.22	49.15	5.09
Rasch-identified approach	0.85	34.75	56.78	7.63
Noninstructional staff (*N* = 196 schools)				
Current PDE approach	2.04	90.82	7.14	na
Modified PDE approach	2.04	38.78	55.61	3.57
Rasch-identified approach	0.51	35.71	59.18	4.59

na is not applicable; the current PDE approach does not have a fourth (most favorable) performance category. PDE is Pennsylvania Department of Education.

Note: Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the overall school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B32. Percentage of elementary schools in each performance category, by respondent type, domain, and approach to defining performance categories

Approach to defining performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
School climate index				
Teachers (*N* = 118 schools)				
Current PDE approach	2.54	91.53	5.93	na
Modified PDE approach	2.54	38.98	56.78	1.70
Rasch-identified approach	1.70	33.05	60.17	5.09
Noninstructional staff (*N* = 109 schools)				
Current PDE approach	0.92	96.33	2.75	na
Modified PDE approach	0.92	36.70	61.47	0.92
Rasch-identified approach	0.00	33.95	64.22	1.84

Approach to defining performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
Social-emotional learning				
Students (*N* = 130 schools)				
Current PDE approach	0.00	69.23	30.77	na
Modified PDE approach	0.00	4.62	90.77	4.62
Rasch-identified approach	0.00	4.62	8.46	86.92
Teachers (*N* = 118 schools)				
Current PDE approach	22.88	77.12	0.00	na
Modified PDE approach	22.88	69.49	7.63	0.00
Rasch-identified approach	18.64	73.73	7.63	0.00
Noninstructional staff (*N* = 109 schools)				
Current PDE approach	16.51	82.57	0.92	na
Modified PDE approach	16.51	75.23	8.26	0.00
Rasch-identified approach	12.84	77.98	8.26	0.92
Safe and respectful school climate				
Teachers (*N* = 118 schools)				
Current PDE approach	0.85	66.10	33.05	na
Modified PDE approach	0.85	13.56	71.19	14.41
Rasch-identified approach	0.85	11.02	57.63	30.51
Noninstructional staff (*N* = 109 schools)				
Current PDE approach	0.00	66.06	33.95	na
Modified PDE approach	0.00	11.93	75.23	12.84
Rasch-identified approach	0.00	10.09	66.97	22.94
Student support and academic engagement				
Students (*N* = 130 schools)				
Current PDE approach	0.00	98.46	1.54	na
Modified PDE approach	0.00	8.46	90.77	0.77
Rasch-identified approach	0.00	0.77	56.15	43.08
Teachers (*N* = 118 schools)				
Current PDE approach	0.85	84.75	14.41	na
Modified PDE approach	0.85	31.36	59.32	8.48
Rasch-identified approach	0.00	16.95	70.34	12.71
Noninstructional staff (*N* = 109 schools)				
Current PDE approach	1.84	87.16	11.01	na
Modified PDE approach	1.84	28.44	64.22	5.51
Rasch-identified approach	0.00	26.61	66.06	7.34

na is not applicable; the current PDE approach does not have a fourth (most favorable) performance category. PDE is Pennsylvania Department of Education.

Note: Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the overall school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B33. Percentage of middle schools in each performance category, by respondent type, domain, and approach to defining performance categories

Approach to defining performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
School climate index				
Students (*N* = 56 schools)				
Current PDE approach	0.00	100.00	0.00	na
Modified PDE approach	0.00	92.86	7.14	0.00
Rasch-identified approach	0.00	89.29	8.93	1.79
Teachers (*N* = 50 schools)				
Current PDE approach	14.00	84.00	2.00	na
Modified PDE approach	14.00	72.00	14.00	0.00
Rasch-identified approach	10.00	64.00	24.00	2.00
Noninstructional staff (*N* = 32 schools)				
Current PDE approach	12.50	87.50	0.00	na
Modified PDE approach	12.50	59.38	28.13	0.00
Rasch-identified approach	3.13	59.38	37.50	0.00
Social-emotional learning				
Students (*N* = 56 schools)				
Current PDE approach	21.43	75.00	3.57	na
Modified PDE approach	21.43	73.21	5.36	0.00
Rasch-identified approach	1.79	91.07	3.57	3.57
Teachers (*N* = 50 schools)				
Current PDE approach	74.00	26.00	0.00	na
Modified PDE approach	74.00	24.00	2.00	0.00
Rasch-identified approach	70.00	28.00	2.00	0.00
Noninstructional staff (*N* = 32 schools)				
Current PDE approach	53.13	46.88	0.00	na
Modified PDE approach	53.13	46.88	0.00	0.00
Rasch-identified approach	50.00	50.00	0.00	0.00
Safe and respectful school climate				
Students (*N* = 56 schools)				
Current PDE approach	1.79	96.43	1.79	na
Modified PDE approach	1.79	91.07	7.14	0.00
Rasch-identified approach	0.00	75.00	21.43	3.57
Teachers (*N* = 50 schools)				
Current PDE approach	8.00	86.00	6.00	na
Modified PDE approach	8.00	44.00	46.00	2.00
Rasch-identified approach	4.00	42.00	50.00	4.00
Noninstructional staff (*N* = 32 schools)				
Current PDE approach	3.13	84.38	12.50	na
Modified PDE approach	3.13	43.75	43.75	9.38
Rasch-identified approach	3.13	34.38	37.50	25.00

Approach to defining performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
Student support and academic engagement				
Students (_N_ = 56 schools)				
Current PDE approach	0.00	100.00	0.00	na
Modified PDE approach	0.00	91.07	8.93	0.00
Rasch-identified approach	0.00	62.50	37.50	0.00
Teachers (_N_ = 50 schools)				
Current PDE approach	4.00	92.00	4.00	na
Modified PDE approach	4.00	48.00	46.00	2.00
Rasch-identified approach	2.00	42.00	52.00	4.00
Noninstructional staff (_N_ = 32 schools)				
Current PDE approach	3.13	93.75	3.13	na
Modified PDE approach	3.13	46.88	46.88	3.13
Rasch-identified approach	3.13	40.63	53.13	3.13

na is not applicable; the current PDE approach does not have a fourth (most favorable) performance category. PDE is Pennsylvania Department of Education.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B34. Percentage of high schools in each performance category, by respondent type, domain, and approach to defining performance categories

Approach to defining performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
School climate index				
Students (_N_ = 72 schools)				
Current PDE approach	13.89	86.11	0.00	na
Modified PDE approach	13.89	80.56	5.56	0.00
Rasch-identified approach	1.39	88.89	9.72	0.00
Teachers (_N_ = 68 schools)				
Current PDE approach	11.77	88.24	0.00	na
Modified PDE approach	11.77	79.41	8.82	0.00
Rasch-identified approach	4.41	82.35	13.24	0.00
Noninstructional staff (_N_ = 55 schools)				
Current PDE approach	10.91	89.09	0.00	na
Modified PDE approach	10.91	61.82	27.27	0.00
Rasch-identified approach	1.82	65.46	32.73	0.00
Social-emotional learning				
Students (_N_ = 72 schools)				
Current PDE approach	69.44	30.56	0.00	na
Modified PDE approach	69.44	29.17	1.39	0.00
Rasch-identified approach	48.61	47.22	4.17	0.00
Teachers (_N_ = 68 schools)				
Current PDE approach	85.29	14.71	0.00	na
Modified PDE approach	85.29	14.71	0.00	0.00
Rasch-identified approach	80.88	19.12	0.00	0.00

Approach to defining performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
Noninstructional staff (*N* = 55 schools)				
Current PDE approach	49.09	50.91	0.00	na
Modified PDE approach	49.09	49.09	1.82	0.00
Rasch-identified approach	43.64	54.55	1.82	0.00
Safe and respectful school climate				
Students (*N* = 72 schools)				
Current PDE approach	2.78	97.22	0.00	na
Modified PDE approach	2.78	84.72	12.50	0.00
Rasch-identified approach	1.39	86.11	11.11	1.39
Teachers (*N* = 68 schools)				
Current PDE approach	2.94	94.12	2.94	na
Modified PDE approach	2.94	45.59	51.47	0.00
Rasch-identified approach	1.47	44.12	52.94	1.47
Noninstructional staff (*N* = 55 schools)				
Current PDE approach	1.82	94.55	3.64	na
Modified PDE approach	1.82	38.18	60.00	0.00
Rasch-identified approach	0.00	36.36	56.36	7.27
Student support and academic engagement				
Students (*N* = 72 schools)				
Current PDE approach	0.00	100.00	0.00	na
Modified PDE approach	0.00	94.44	5.56	0.00
Rasch-identified approach	0.00	93.06	6.94	0.00
Teachers (*N* = 68 schools)				
Current PDE approach	4.41	94.12	1.47	na
Modified PDE approach	4.41	60.29	33.82	1.47
Rasch-identified approach	1.47	60.29	36.77	1.47
Noninstructional staff (*N* = 55 schools)				
Current PDE approach	1.82	96.36	1.82	na
Modified PDE approach	1.82	54.55	43.64	0.00
Rasch-identified approach	0.00	50.91	49.09	0.00

na is not applicable; the current PDE approach does not have a fourth (most favorable) performance category. PDE is Pennsylvania Department of Education.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B35. Percentage of schools in each performance category at all school levels for the school climate summary index and domain scores, by weighting approach and domain, at all school levels

Method for selecting performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
Group-weighted				
School climate summary index (*N* = 104)				
Current PDE approach	5.77	94.23	0.00	na
Modified PDE approach	5.77	87.50	6.73	0.00
Rasch-identified approach	1.92	86.54	11.54	0.00

Method for selecting performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
Social-emotional learning (N = 215)				
Current PDE approach	28.84	71.16	0.00	na
Modified PDE approach	28.84	41.86	29.30	0.00
Rasch-identified approach	21.86	36.28	41.40	0.47
Safe and respectful school climate (N = 104)				
Current PDE approach	1.92	98.08	0.00	na
Modified PDE approach	1.92	63.46	34.62	0.00
Rasch-identified approach	1.92	52.89	45.19	0.00
Student support and academic engagement (N = 215)				
Current PDE approach	0.47	96.74	2.79	na
Modified PDE approach	0.47	45.58	53.02	0.93
Rasch-identified approach	0.00	33.49	61.40	5.12
State-weighted				
School climate summary index (N = 104)				
Current PDE approach	4.81	95.19	0.00	na
Modified PDE approach	4.81	91.35	3.85	0.00
Rasch-identified approach	0.96	93.27	5.77	0.00
Social-emotional learning (N = 215)				
Current PDE approach	25.58	69.30	5.12	na
Modified PDE approach	25.58	27.44	46.98	0.00
Rasch-identified approach	15.81	34.42	10.70	39.07
Safe and respectful school climate (N = 104)				
Current PDE approach	1.92	98.08	0.00	na
Modified PDE approach	1.92	85.58	12.50	0.00
Rasch-identified approach	0.96	80.77	17.31	0.96
Student support and academic engagement (N = 215)				
Current PDE approach	0.00	99.07	0.93	na
Modified PDE approach	0.00	50.70	49.30	0.00
Rasch-identified approach	0.00	38.14	45.58	16.28

na is not applicable; the current PDE approach does not have a fourth (most favorable) performance category. PDE is Pennsylvania Department of Education.

Note: Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the overall school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B36. Percentage of elementary schools in each performance category for the school climate summary index and domain scores, by weighting approach and domain

Method for selecting performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
Group-weighted (N = 111)				
Social-emotional learning				
Current PDE approach	0.00	100.00	0.00	na
Modified PDE approach	0.00	43.24	56.76	0.00
Rasch-identified approach	0.00	18.92	80.18	0.90

Method for selecting performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
Student support and academic engagement				
Current PDE approach	0.00	94.60	5.41	na
Modified PDE approach	0.00	12.61	85.59	1.80
Rasch-identified approach	0.00	5.41	84.69	9.91
State-weighted (*N* = 111)				
Social-emotional learning				
Current PDE approach	0.00	90.09	9.91	na
Modified PDE approach	0.00	9.01	90.99	0.00
Rasch-identified approach	0.00	5.41	18.92	75.68
Student support and academic engagement				
Current PDE approach	0.00	98.20	1.80	na
Modified PDE approach	0.00	8.11	91.89	0.00
Rasch-identified approach	0.00	0.90	67.57	31.53

na is not applicable; the current PDE approach does not have a fourth (most favorable) performance category. PDE is Pennsylvania Department of Education.

Note: Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the overall school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B37. Percentage of middle schools in each performance category for the school climate summary index and domain scores, by weighting approach and domain

Method for selecting performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
Group-weighted (*N* = 42)				
School climate summary index				
Current PDE approach	2.38	97.62	0.00	na
Modified PDE approach	2.38	90.48	7.14	0.00
Rasch-identified approach	2.38	80.95	16.67	0.00
Social-emotional learning				
Current PDE approach	50.00	50.00	0.00	na
Modified PDE approach	50.00	50.00	0.00	0.00
Rasch-identified approach	26.19	73.81	0.00	0.00
Safe and respectful school climate				
Current PDE approach	2.38	97.62	0.00	na
Modified PDE approach	2.38	59.52	38.10	0.00
Rasch-identified approach	2.38	52.38	45.24	0.00
Student support and academic engagement				
Current PDE approach	2.38	97.62	0.00	na
Modified PDE approach	2.38	69.05	28.57	0.00
Rasch-identified approach	0.00	40.48	59.52	0.00

Method for selecting performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
State-weighted (N = 42)				
School climate summary index				
Current PDE approach	2.38	97.62	0.00	na
Modified PDE approach	2.38	97.62	0.00	0.00
Rasch-identified approach	0.00	95.24	4.76	0.00
Social-emotional learning				
Current PDE approach	26.19	73.81	0.00	na
Modified PDE approach	26.19	73.81	0.00	0.00
Rasch-identified approach	7.14	92.86	0.00	0.00
Safe and respectful school climate				
Current PDE approach	2.38	97.62	0.00	na
Modified PDE approach	2.38	88.10	9.52	0.00
Rasch-identified approach	2.38	76.19	21.43	0.00
Student support and academic engagement				
Current PDE approach	0.00	100.00	0.00	na
Modified PDE approach	0.00	100.00	0.00	0.00
Rasch-identified approach	0.00	59.52	40.48	0.00

na is not applicable; the current PDE approach does not have a fourth (most favorable) performance category. PDE is Pennsylvania Department of Education.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B38. Percentage of high schools in each performance category for the school climate summary index and domain scores, by weighting approach and domain

Method for selecting performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
Group-weighted (N = 62)				
School climate summary index				
Current PDE approach	8.07	91.94	0.00	na
Modified PDE approach	8.07	85.48	6.45	0.00
Rasch-identified approach	1.61	90.32	8.07	0.00
Social-emotional learning				
Current PDE approach	66.13	33.87	0.00	na
Modified PDE approach	66.13	33.87	0.00	0.00
Rasch-identified approach	58.07	41.94	0.00	0.00
Safe and respectful school climate				
Current PDE approach	1.61	98.39	0.00	na
Modified PDE approach	1.61	66.13	32.26	0.00
Rasch-identified approach	1.61	53.23	45.16	0.00
Student support and academic engagement				
Current PDE approach	0.00	100.00	0.00	na
Modified PDE approach	0.00	88.71	11.29	0.00
Rasch-identified approach	0.00	79.03	20.97	0.00

Method for selecting performance categories	Category 1 (least favorable)	Category 2	Category 3	Category 4 (most favorable)
State-weighted (N = 62)				
School climate summary index				
Current PDE approach	6.45	93.55	0.00	na
Modified PDE approach	6.45	87.10	6.45	0.00
Rasch-identified approach	1.61	91.94	6.45	0.00
Social-emotional learning				
Current PDE approach	70.97	29.03	0.00	na
Modified PDE approach	70.97	29.03	0.00	0.00
Rasch-identified approach	50.00	46.77	3.23	0.00
Safe and respectful school climate				
Current PDE approach	1.61	98.39	0.00	na
Modified PDE approach	1.61	83.87	14.52	0.00
Rasch-identified approach	0.00	83.87	14.52	1.61
Student support and academic engagement				
Current PDE approach	0.00	100.00	0.00	na
Modified PDE approach	0.00	93.55	6.45	0.00
Rasch-identified approach	0.00	90.32	9.68	0.00

na is not applicable; the current PDE approach does not have a fourth (most favorable) performance category. PDE is Pennsylvania Department of Education.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Research question 2d

The study team assessed the relationship between mean scores on the 1-4 survey scale and Rasch scores. The main report describes the very high correlations found. Table B39 displays the correlations between mean scores and scaled Rasch scores for each school climate domain and overall school climate for each respondent type. Tables B40–B42 display this information for each school level separately. Table B43 displays the correlations between mean scores and scaled Rasch scores for each school climate summary domain and overall school climate for all respondent types combined, by weighting approach (group-weighted or state-weighted). Tables B44–B46 display this information for each school level separately. All correlations–regardless of domain, respondent type, school level, or weighting approach (for summary scores)–were very high (above the .90 benchmark).

Table B39. Correlations between mean scores and scaled Rasch scores, by respondent type and school climate domain, at all school levels

School climate index or domain	Pearson r[a]	p-value	95% confidence interval	
			Lower	Upper
Students (N = 258 schools for all school levels; N = 128 schools for middle and high schools only)[b]				
School climate index (N = 128)	.99	< .001	.99	.99
Social-emotional learning (N = 258)	.99	< .001	.99	1.00
Safe and respectful school climate (N = 128)	.99	< .001	.99	.99
Student support and academic engagement (N = 258)	.99	< .001	.99	.99

School climate index or domain	Pearson r[a]	p-value	95% confidence interval	
			Lower	Upper
Teachers (*N* = 236 schools)				
School climate index	1.00	< .001	.99	1.00
Social-emotional learning	.98	.001	.98	.99
Safe and respectful school climate	.99	< .001	.99	1.00
Student support and academic engagement	.99	< .001	.99	.99
Noninstructional staff (*N* = 196 schools)				
School climate index	.99	< .001	.99	1.00
Social-emotional learning	.99	< .001	.99	1.00
Safe and respectful school climate	.99	< .001	.99	.99
Student support and academic engagement	.99	< .001	.99	.99

a. Pearson's *r* is a measure of the strength of the correlation between two variables and can be interpreted as follows: below .30 is low, .30-.49 is moderate, and .50 and above is strong.

b. Results for the school climate index and the safe and respectful school climate domain do not include 130 elementary schools with student respondents because the safe and respectful school climate domain did not meet the reliability threshold for elementary school students and the school climate index for elementary school students could not be calculated without that domain score.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B40. Correlations between mean scores and scaled Rasch scores, by respondent type and school climate domain, for elementary schools

School climate index or domain	Pearson r[a]	p-value	95% confidence interval	
			Lower	Upper
Students (*N* = 130 schools)				
Social-emotional learning	.96	< .001	.94	.97
Student support and academic engagement	.97	< .001	.96	.98
Teachers (*N* = 118 schools)				
School climate index	.99	< .001	.99	1.00
Social-emotional learning	1.00	< .001	1.00	1.00
Safe and respectful school climate	.99	< .001	.99	1.00
Student support and academic engagement	.99	< .001	.99	.99
Noninstructional staff (*N* = 109 schools)				
School climate index	.99	< .001	.99	1.00
Social-emotional learning	1.00	< .001	.99	1.00
Safe and respectful school climate	.99	< .001	.99	.99
Student support and academic engagement	.99	< .001	.99	.99

Note: Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score.

a. Pearson's *r* is a measure of the strength of the correlation between two variables and can be interpreted as follows: below .30 is low, .30-.49 is moderate, and .50 and above is strong.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B41. Correlations between mean scores and scaled Rasch scores, by respondent type and school climate domain, for middle schools

School climate index or domain	Pearson r [a]	p-value	95% confidence interval	
			Lower	Upper
Students (_N_ = 56 schools)				
School climate index	.99	< .001	.99	1.00
Social-emotional learning	.99	< .001	.98	.99
Safe and respectful school climate	1.00	< .001	.99	1.00
Student support and academic engagement	.98	< .001	.97	.99
Teachers (_N_ = 50 schools)				
School climate index	.99	< .001	.99	1.00
Social-emotional learning	.96	< .001	.92	.97
Safe and respectful school climate	.99	< .001	.99	1.00
Student support and academic engagement	.99	< .001	.98	.99
Noninstructional staff (_N_ = 32 schools)				
School climate index	.99	< .001	.99	1.00
Social-emotional learning	.99	< .001	.99	1.00
Safe and respectful school climate	.99	< .001	.98	.99
Student support and academic engagement	.99	< .001	.98	.99

a. Pearson's r is a measure of the strength of the correlation between two variables and can be interpreted as follows: below .30 is low, .30–.49 is moderate, and .50 and above is strong.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B42. Correlations between mean scores and scaled Rasch scores by respondent type and school climate domain for high schools

School climate index or domain	Pearson r [a]	p-value	95% confidence interval	
			Lower	Upper
Students (_N_ = 72 schools)				
School climate index	1.00	< .001	.99	1.00
Social-emotional learning	.99	< .001	.99	1.00
Safe and respectful school climate	1.00	< .001	.99	1.00
Student support and academic engagement	.99	< .001	.98	.99
Teachers (_N_ = 68 schools)				
School climate index	1.00	< .001	1.00	1.00
Social-emotional learning	.96	< .001	.93	.97
Safe and respectful school climate	1.00	< .001	.99	1.00
Student support and academic engagement	.99	< .001	.99	.99
Noninstructional staff (_N_ = 55 schools)				
School climate index	1.00	< .001	.99	1.00
Social-emotional learning	.99	< .001	.99	1.00
Safe and respectful school climate	.99	< .001	.99	1.00
Student support and academic engagement	.99	< .001	.99	1.00

a. Pearson's r is a measure of the strength of the correlation between two variables and can be interpreted as follows: below .30 is low, .30–.49 is moderate, and .50 and above is strong.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B43. Mean summary score and scaled Rasch summary score correlations for group-weighted and state-weighted domain and school indices

Summary school climate index or domain	Pearson r[a]	p-value	95% confidence interval Lower	95% confidence interval Upper
Group-weighted (N = 215 schools for all school levels; N = 104 schools for middle and high schools only)[b]				
School climate summary index (N = 104)	.99	< .001	.99	1.00
Social-emotional learning (N = 215)	.99	< .001	.98	.99
Safe and respectful school climate (N = 104)	.99	< .001	.99	1.00
Student support and academic engagement (N = 215)	.99	< .001	.99	.99
State-weighted (N = 215; ^N = 104)				
School climate summary index ^	.99	< .001	.99	1.00
Social-emotional learning	.99	< .001	.99	1.00
Safe and respectful school climate ^	.99	< .001	.99	.99
Student support and academic engagement	.99	< .001	.99	.99

a. Pearson's r is a measure of the strength of the correlation between two variables and can be interpreted as follows: below .30 is low, .30–.49 is moderate, and .50 and above is strong.

b. Results for the school climate index and the safe and respectful school climate domain do not include 111 elementary schools with student respondents because the safe and respectful school climate domain did not meet the reliability threshold for elementary school students and the school climate index for elementary school students could not be calculated without that domain score.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B44. Mean summary score and scaled Rasch summary score correlations for group-weighted and state-weighted domain and school indices of elementary schools

Summary school climate index or domain	Pearson r[a]	p-value	95% confidence interval Lower	95% confidence interval Upper
Group-weighted (N = 111)				
Social-emotional learning	.97	< .001	.96	.98
Student support and academic engagement	.99	< .001	.98	.99
State-weighted (N = 111)				
Social-emotional learning	.96	< .001	.95	.97
Student support and academic engagement	.97	< .001	.96	.98

Note: Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score.

a. Pearson's r is a measure of the strength of the correlation between two variables and can be interpreted as follows: below .30 is low, .30–.49 is moderate, and .50 and above is strong.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B45. Mean summary score and scaled Rasch summary score correlations for group-weighted and state-weighted domain and school indices of middle schools

Summary school climate index or domain	Pearson r[a]	p-value	95% confidence interval Lower	95% confidence interval Upper
Group-weighted (N = 42)				
School climate summary index	.99	< .001	.99	1.00
Social-emotional learning	.99	< .001	.98	.99
Safe and respectful school climate	1.00	< .001	.99	1.00
Student support and academic engagement	.99	< .001	.98	1.00

Summary school climate index or domain	Pearson r[a]	p-value	95% confidence interval	
			Lower	Upper
State-weighted (N = 42)				
School climate summary index	1.00	< .001	1.00	1.00
Social-emotional learning	1.00	< .001	.99	1.00
Safe and respectful school climate	1.00	< .001	1.00	1.00
Student support and academic engagement	.99	< .001	.98	1.00

a. Pearson's r is a measure of the strength of the correlation between two variables and can be interpreted as follows: below .30 is low, .30–.49 is moderate, and .50 and above is strong.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B46. Mean summary score and scaled Rasch summary score correlations for group-weighted and state-weighted domain and school indices of high schools

Summary school climate index or domain	Pearson r[a]	p-value	95% confidence interval	
			Lower	Upper
Group-weighted (N = 62)				
School climate summary index	1.00	< .001	.99	1.00
Social-emotional learning	.99	< .001	.98	.99
Safe and respectful school climate	.99	< .001	.99	1.00
Student support and academic engagement	.99	< .001	.99	1.00
State-weighted (N = 62)				
School climate summary index	1.00	< .001	.99	1.00
Social-emotional learning	.99	< .001	.99	1.00
Safe and respectful school climate	1.00	< .001	.99	1.00
Student support and academic engagement	.99	< .001	.99	1.00

a. Pearson's r is a measure of the strength of the correlation between two variables and can be interpreted as follows: below .30 is low, .30–.49 is moderate, and .50 and above is strong.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Research question 3a

This research question asks about differences in perceptions of school climate across student racial/ethnic groups, gender groups, and grade levels. The main report presents the mean school climate index scores across different groups and findings about statistical differences between groups' scores. This section presents detailed tables of t-test results used to examine these differences.

Table B47 displays the average within-school difference, standard deviation of this difference, and t-test results for each racial/ethnic group comparison for each domain and overall school climate. Asian or Pacific Islander students tended to report more favorable perceptions of overall school climate, safe and respectful school climate, and student support and academic engagement than other racial/ethnic groups. Multiracial students tended to report less favorable perceptions than all (or nearly all) other racial/ethnic groups for overall school climate and all three school climate domains. Hispanic students also tended to report less favorable perceptions than White students or those of unknown race/ethnicity, especially for the overall school climate index and the student support and academic engagement domain. Black students reported less favorable perceptions of student support and academic engagement than White students.

Table B47. Differences in student school climate by race/ethnicity for all school levels

Race/ethnicity comparison		Average within school mean difference[a]	Standard deviation of the mean difference	Effect size[b]	*p*-value	Number of schools
Category 1	Category 2					
Overall school climate index						
Asian or Pacific Islander	Black	0.09*	0.19	0.46	.004	52
Asian or Pacific Islander	Hispanic	0.10*	0.16	0.57	< .001	56
Asian or Pacific Islander	Multiracial	0.14*	0.18	0.76	< .001	57
Asian or Pacific Islander	White	0.08*	0.13	0.50	< .001	58
Asian or Pacific Islander	Unknown	0.07*	0.18	0.36	.010	53
Black	Hispanic	0.02	0.16	0.08	.423	78
Black	Multiracial	0.05*	0.15	0.26	.007	80
Black	White	0.00	0.15	0.02	.816	81
Black	Unknown	-0.02	0.18	0.09	.422	78
Hispanic	Multiracial	0.04*	0.17	0.21	.048	98
Hispanic	White	-0.03	0.16	0.18	.063	100
Hispanic	Unknown	-0.04	0.20	0.22	.056	93
Multiracial	White	-0.07*	0.13	0.39	< .001	114
Multiracial	Unknown	-0.10*	0.18	0.47	< .001	104
White	Unknown	-0.02	0.15	0.10	.204	107
Social-emotional learning						
Asian or Pacific Islander	Black	0.03	0.30	0.08	.425	71
Asian or Pacific Islander	Hispanic	0.03	0.29	0.06	.534	73
Asian or Pacific Islander	Multiracial	0.08*	0.30	0.19	.036	82
Asian or Pacific Islander	White	0.03	0.26	0.07	.367	83
Asian or Pacific Islander	Unknown	0.00	0.28	0.01	.897	78
Black	Hispanic	0.03	0.24	0.07	.313	131
Black	Multiracial	0.04	0.24	0.09	.102	144
Black	White	-0.03	0.22	0.06	.278	147
Black	Unknown	-0.06*	0.26	0.14	.036	142
Hispanic	Multiracial	0.03	0.25	0.06	.313	162
Hispanic	White	-0.04*	0.21	0.10	.036	165
Hispanic	Unknown	-0.07*	0.25	0.17	.003	157
Multiracial	White	-0.07*	0.19	0.15	< .001	222
Multiracial	Unknown	-0.09*	0.25	0.22	< .001	209
White	Unknown	0.00	0.21	0.01	.886	221
Safe and respectful school climate						
Asian or Pacific Islander	Black	0.08*	0.24	0.35	.048	52
Asian or Pacific Islander	Hispanic	0.11*	0.21	0.53	.001	56
Asian or Pacific Islander	Multiracial	0.12*	0.20	0.59	< .001	57
Asian or Pacific Islander	White	0.04	0.18	0.23	.142	58
Asian or Pacific Islander	Unknown	0.09*	0.21	0.41	.008	53
Black	Hispanic	0.02	0.24	0.09	.461	78

Race/ethnicity comparison		Average within school mean difference[a]	Standard deviation of the mean difference	Effect size[b]	p-value	Number of schools
Category 1	Category 2					
Black	Multiracial	0.05*	0.18	0.20	.048	80
Black	White	-0.03	0.20	0.16	.201	81
Black	Unknown	0.00	0.21	0.01	.923	78
Hispanic	Multiracial	0.02	0.24	0.11	.353	98
Hispanic	White	-0.08*	0.22	0.38	.002	100
Hispanic	Unknown	-0.04	0.26	0.15	.239	93
Multiracial	White	-0.09*	0.18	0.44	< .001	114
Multiracial	Unknown	-0.07*	0.22	0.31	.005	104
White	Unknown	0.02	0.17	0.11	.239	107
Student support and academic engagement						
Asian or Pacific Islander	Black	0.11*	0.22	0.39	< .001	71
Asian or Pacific Islander	Hispanic	0.11*	0.21	0.40	< .001	73
Asian or Pacific Islander	Multiracial	0.13*	0.27	0.48	< .001	82
Asian or Pacific Islander	White	0.05	0.22	0.19	.054	83
Asian or Pacific Islander	Unknown	0.06*	0.24	0.24	.032	78
Black	Hispanic	-0.01	0.21	0.02	.717	131
Black	Multiracial	0.02	0.23	0.07	.290	144
Black	White	-0.06*	0.19	0.21	< .001	147
Black	Unknown	-0.05*	0.22	0.17	.009	142
Hispanic	Multiracial	0.03	0.21	0.10	.091	162
Hispanic	White	-0.06*	0.17	0.23	< .001	165
Hispanic	Unknown	-0.06*	0.21	0.21	.001	157
Multiracial	White	-0.09*	0.17	0.29	< .001	222
Multiracial	Unknown	-0.06*	0.22	0.19	< .001	209
White	Unknown	0.03*	0.17	0.12	.005	221

* Indicates a statistically different mean difference at a p-value of less than .05. All t-tests were conducted with a false discovery rate correction to account for multiple comparisons.

Note: Only schools with at least five students of the reported race/ethnicity were included in the analysis. Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. The average within-school mean difference is reported in survey units.

b. The effect sizes are reported as absolute values and can be interpreted as follows: 0.0–0.09 is small, 0.10–0.19 is moderate, 0.20–0.29 is substantive, and 0.30 and above is large.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B48 displays the t-test findings for gender comparisons for each domain and overall school climate, as well as the average within-school difference and standard deviation of this difference for each student group pairing. Girls reported less favorable scores than boys for the school climate index and safe and respectful school climate domain. Both girls and boys reported more favorable perceptions of overall school climate and each of the domains compared with students who did not report their gender. Students who did not report their gender represented approximately 3 percent of the sample.

Table B48. Differences in school climate, by gender, for all school levels

Gender comparison		Average within school mean difference[a]	Standard deviation of the mean difference	Effect size[b]	p-value	Number of schools
Category 1	Category 2					
Overall school climate index						
Female	Male	-0.09*	0.08	0.54	< .001	121
Female	Unknown	0.25*	0.14	1.37	< .001	99
Male	Unknown	0.33*	0.14	1.97	< .001	99
Social-emotional learning						
Female	Male	0.03*	0.15	0.08	< .001	246
Female	Unknown	0.24*	0.18	0.53	< .001	134
Male	Unknown	0.26*	0.19	0.66	< .001	134
Safe and respectful school climate						
Female	Male	-0.19*	0.10	1.15	< .001	121
Female	Unknown	0.28*	0.19	1.36	< .001	99
Male	Unknown	0.47*	0.20	2.37	< .001	99
Student support and academic engagement						
Female	Male	0.04*	0.10	0.15	< .001	246
Female	Unknown	0.26*	0.20	0.93	< .001	134
Male	Unknown	0.23*	0.20	0.89	< .001	134

* Indicates a statistically different mean difference at $p < .05$. All t-tests were conducted with a false discovery rate correction to account for multiple comparisons.
Note: Only schools with at least five students of the reported gender were included in the analysis. Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.
a. The average within-school mean difference is reported in survey units.
b. The effect sizes are reported as absolute values and can be interpreted as follows: 0.0-0.09 is small, 0.10-0.19 is moderate, 0.20-0.29 is substantive, and 0.30 and above is large.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Tables B49-B51 display the average within-school difference, standard deviation of this difference, and effect size of the difference for grade comparisons within each school level for each domain and overall school climate for each student group pairing. In elementary and middle schools, students from lower grade levels reported more favorable school climate than students from higher grade levels. For example, in elementary schools, grade 3 students reported higher social-emotional learning and higher student support and academic engagement than students in grade 4 or grade 5. Grade 4 students also reported higher student support and academic engagement than grade 5 students. In middle schools, grade 6 students reported more favorable scores for overall school climate as well as for each of the three domains than grade 7 or grade 8 students. Grade 7 students reported more favorable overall school climate, social-emotional learning, and student support and academic engagement than grade 8 students. In high schools, the differences between grade levels were smaller and did not show a consistent pattern. The only differences with a substantive or large effect size were for overall school climate, where grade 10 students reported more favorably than grade 11, and social-emotional learning, where grades 9 and 10 each reported more favorably than grade 11.

Table B49. Differences in student school climate, by grade, for elementary schools

Grade comparison		Average within school mean difference[a]	Standard deviation of the mean difference	Effect size[b]	p-value	Number of schools
Category 1	Category 2					
Social-emotional learning						
Grade 3	Grade 4	0.05*	0.14	0.35	.002	93
Grade 3	Grade 5	0.06*	0.15	0.43	.001	92
Grade 4	Grade 5	0.01	0.15	0.07	.485	101
Student support and academic engagement						
Grade 3	Grade 4	0.07*	0.15	0.55	< .001	93
Grade 3	Grade 5	0.17*	0.19	1.07	< .001	92
Grade 4	Grade 5	0.09*	0.20	0.60	< .001	101

* Indicates a statistically different mean difference at $p < .05$. All t-tests were conducted with a false discovery rate correction to account for multiple comparisons.

Note: Only schools with at least five students in the reported grade were included in the analysis. Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. The average within-school mean difference is reported in survey units.

b. The effect sizes are reported as absolute values and can be interpreted as follows: 0.0–0.09 is small, 0.10–0.19 is moderate, 0.20–0.29 is substantive, and 0.30 and above is large.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B50. Differences in student school climate, by grade, for middle schools

Grade comparison		Average within school mean difference[a]	Standard deviation of the mean difference	Effect size[b]	p-value	Number of schools
Category 1	Category 2					
Overall school climate index						
Grade 6	Grade 7	0.15*	0.13	0.93	< .001	46
Grade 6	Grade 8	0.20*	0.14	1.28	< .001	45
Grade 7	Grade 8	0.05*	0.15	0.32	.016	52
Social-emotional learning						
Grade 6	Grade 7	0.20*	0.15	1.08	< .001	46
Grade 6	Grade 8	0.27*	0.15	1.46	< .001	45
Grade 7	Grade 8	0.07*	0.15	0.40	.002	52
Safe and respectful school climate						
Grade 6	Grade 7	0.13*	0.16	0.68	< .001	46
Grade 6	Grade 8	0.13*	0.17	0.70	< .001	45
Grade 7	Grade 8	0.00	0.17	0.02	.845	52
Student support and academic engagement						
Grade 6	Grade 7	0.12*	0.14	0.87	< .001	46
Grade 6	Grade 8	0.20*	0.14	1.54	< .001	45
Grade 7	Grade 8	0.08*	0.16	0.56	.001	52

* Indicates a statistically different mean difference at $p < .05$. All t-tests were conducted with a false discovery rate correction to account for multiple comparisons.

Note: Only schools with at least five students in the reported grade were included in the analysis. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. The average within-school mean difference is reported in survey units.

b. The effect sizes are reported as absolute values and can be interpreted as follows: 0.0–0.09 is small, 0.10–0.19 is moderate, 0.20–0.29 is substantive, and 0.30 and above is large.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table B51. Differences in student school climate, by grade, for high schools

Grade comparison		Average within-school mean difference[a]	Standard deviation of the mean difference	Effect size[b]	*p*-value	Number of schools
Category 1	Category 2					
Overall school climate index						
Grade 9	Grade 10	-0.01	0.11	0.11	.616	60
Grade 9	Grade 11	0.01	0.12	0.11	.616	60
Grade 9	Grade 12	-0.01	0.13	0.09	.616	59
Grade 10	Grade 11	0.03	0.10	0.23	.283	62
Grade 10	Grade 12	0.01	0.11	0.05	.666	61
Grade 11	Grade 12	-0.02	0.11	0.18	.368	62
Social-emotional learning						
Grade 9	Grade 10	-0.01	0.14	0.04	.740	60
Grade 9	Grade 11	0.03	0.12	0.26	.081	60
Grade 9	Grade 12	0.01	0.13	0.05	.740	59
Grade 10	Grade 11	0.04	0.13	0.31	.070	62
Grade 10	Grade 12	0.01	0.13	0.10	.552	61
Grade 11	Grade 12	-0.03	0.13	0.19	.207	62
Safe and respectful school climate						
Grade 9	Grade 10	-0.02	0.12	0.15	.455	60
Grade 9	Grade 11	0.00	0.15	0.01	.926	60
Grade 9	Grade 12	-0.02	0.16	0.14	.455	59
Grade 10	Grade 11	0.02	0.15	0.16	.455	62
Grade 10	Grade 12	0.00	0.14	0.02	.926	61
Grade 11	Grade 12	-0.02	0.14	0.13	.455	62
Student support and academic engagement						
Grade 9	Grade 10	-0.01	0.14	0.10	.733	60
Grade 9	Grade 11	0.00	0.17	0.01	.984	60
Grade 9	Grade 12	-0.02	0.17	0.14	.733	59
Grade 10	Grade 11	0.01	0.12	0.12	.733	62
Grade 10	Grade 12	0.00	0.15	0.00	.984	61
Grade 11	Grade 12	-0.02	0.15	0.14	.733	62

* Indicates a statistically different mean difference at *p* < .05. All *t*-tests were conducted with a false discovery rate correction to account for multiple comparisons.

Note: Only schools with at least five students in the reported grade were included in the analysis. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. The average within-school mean difference is reported in survey units.

b. The effect sizes are reported as absolute values and can be interpreted as follows: 0.0-0.09 is small, 0.10-0.19 is moderate, 0.20-0.29 is substantive, and 0.30 and above is large.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Research question 3b

This research question asks about variation in perceptions of school climate according to school characteristics, including school size, student demographic characteristics, student achievement, and urbanicity. The main report presents correlations between the state-weighted school climate index score and school characteristics.

This section provides descriptive statistics for the school characteristics examined; correlations between school characteristics and school climate summary scores, including correlations between school size and school climate scores at each school level; and *t*-test results that compare school climate scores by urbanicity.

Table B52 displays correlations and 95 percent confidence intervals of school characteristics with summary domain scores. Larger schools had lower school climate and domain scores, with moderate correlations of less than –.30 for each correlation. The strongest correlations between school characteristics and school climate were in the safe and respectful school climate domain. Schools that had higher percentages of Black students, multiracial students, and students eligible for the National School Lunch Program had lower safe and respectful school climate scores, while schools with higher percentages of White students and students proficient in math and reading/language arts had higher safe and respectful school climate scores.

Table B52. Correlations between state-weighted summary scores and school characteristics

School characteristic	Pearson's r[a]	p-value	95% confidence interval Lower	Upper
Overall school climate index (N = 104)				
School size	–.44*	< .001	–.59	–.28
Percentage of Asian or Pacific Islander students	–.01	.903	–.20	.18
Percentage of Black students	–.36*	< .001	–.52	–.18
Percentage of Hispanic students	–.11	.274	–.30	.09
Percentage of multiracial students	–.22*	.027	–.39	–.03
Percentage of White students	.22*	.027	.03	.39
Percentage of students eligible for free or reduced-price lunch	–.13	.186	–.32	.06
Percentage of students proficient in math	–.02	.872	–.21	.18
Percentage of students proficient in reading/ language arts	.19	.058	–.01	.38
Social-emotional learning (N = 215)				
School size	–.43*	< .001	–.54	–.32
Percentage of Asian or Pacific Islander students	.06	.427	–.08	.19
Percentage of Black students	–.12	.076	–.25	.01
Percentage of Hispanic students	–.06	.400	–.19	.08
Percentage of multiracial students	.16*	.017	.03	.29
Percentage of White students	.05	.433	–.08	.19
Percentage of students eligible for free or reduced-price lunch	–.01	.877	–.15	.12
Percentage of students proficient in math	.02	.788	–.12	.15
Percentage of students proficient in reading/ language arts	–.09	.175	–.23	.04
Safe and respectful school climate (N = 104)				
School size	–.34*	< .001	–.50	–.15
Percentage of Asian or Pacific Islander students	.04	.700	–.16	.23
Percentage of Black students	–.44*	< .001	–.58	–.26
Percentage of Hispanic students	–.20*	.025	–.40	–.03
Percentage of multiracial students	–.30*	.002	–.47	–.11

School characteristic	Pearson's r[a]	p-value	95% confidence interval	
			Lower	Upper
Percentage of White students	.34*	< .001	.16	.50
Percentage of students eligible for free or reduced-price lunch	-.31*	.001	-.48	-.13
Percentage of students proficient in math	.35*	< .001	.16	.51
Percentage of students proficient in reading/language arts	.39*	< .001	.21	.55
Student support and academic engagement (N = 215)				
School size	-.43*	< .001	-.53	-.31
Percentage of Asian or Pacific Islander students	.07	.323	-.07	.20
Percentage of Black students	-.14*	.043	-.27	.00
Percentage of Hispanic students	-.05	.468	-.18	.09
Percentage of multiracial students	.14*	.037	.01	.27
Percentage of White students	.05	.448	-.08	.19
Percentage of students eligible for free or reduced-price lunch	-.00	.949	-.14	.13
Percentage of students proficient in math	.02	.817	-.12	.15
Percentage of students proficient in reading/language arts	-.08	.282	-.21	.06

* Indicates a correlation value that is statistically different from 0 at $p < .05$.

Note: Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. Pearson's r is a measure of the strength of the correlation between two variables and can be interpreted as follows: below .30 is low, .30–.49 is moderate, and .50 and above is strong.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year, administrative data from the Pennsylvania Department of Education, 2021/22 school year, and the National Center for Education Statistics' Common Core of Data, 2021/22 school year.

Table B53 displays correlations and 95 percent confidence intervals of school size with summary domain scores for each school level separately. The study team conducted this analysis to assess whether school climate was related to school size within each school level, given that elementary schools tend to be smaller, high schools tend to be larger, and middle schools tend to fall somewhere between. The results show that there was a negative relationship between school climate and school size at all school levels but was strongest in high schools.

Table B53. Correlations between summary scores and school size by school level

School level	Pearson's r[a]	p-value	95% confidence interval		Number of schools
			Lower	Upper	
Overall school climate index					
Middle schools	-.29	.066	-.54	.02	42
High schools	-.46*	.000	-.64	-.24	62
Social-emotional learning					
Elementary schools	-.40*	.000	-.55	-.23	111
Middle schools	-.29	.066	-.54	.02	42
High schools	-.47*	.000	-.65	-.25	64

School level	Pearson's r[a]	p-value	95% confidence interval		Number of schools
			Lower	Upper	
Safe and respectful school climate					
Middle schools	-.25	.105	-.52	.05	42
High schools	-.46*	.000	-.63	-.23	62
Student support and academic engagement					
Elementary schools	-.23*	.014	.40	-.05	111
Middle schools	-.28	.074	-.54	.03	42
High schools	-.37*	.003	-.57	-.14	64

* Indicates a correlation value that is statistically different from zero at $p < .05$.

Note: Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. Pearson's r is a measure of the strength of the correlation between two variables and can be interpreted as follows: below .30 is low, .30-.49 is moderate, and .50 and above is strong.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year, administrative data from the Pennsylvania Department of Education, 2021/22 school year, and the National Center for Education Statistics' Common Core of Data, 2021/22 school year.

Table B54 displays comparisons of overall school climate scores and individual school climate domains across school urbanicity. Urban schools had higher overall school climate and safe and respectful school climate scores than all other urbanicity categories, and suburban schools had higher scores than either town or rural schools.

Table B54. Differences in school climate, by school urbanicity

Urbanicity comparison		Mean difference[a]	Standard deviation of the mean difference	Effect size[b]	p-value	Number of schools
Category 1	Category 2					
Overall school climate index						
Urban	Suburban	0.06	0.27	0.22	.282	51
Urban	Town	0.11*	0.19	0.60	.049	30
Urban	Rural	0.11*	0.21	0.49	.050	39
Suburban	Town	-0.05	0.13	0.41	.176	65
Suburban	Rural	0.04	0.13	0.34	.187	74
Town	Rural	-0.01	0.15	0.05	.850	53
Social-emotional learning						
Urban	Suburban	-0.01	0.66	0.01	.911	110
Urban	Town	0.00	0.44	0.01	.975	62
Urban	Rural	0.05	0.54	0.09	.576	87
Suburban	Town	-0.01	0.35	0.04	.873	128
Suburban	Rural	0.06	0.38	0.15	.387	153
Town	Rural	0.05	0.45	0.10	.562	105
Safe and respectful school climate						
Urban	Suburban	0.15*	0.31	0.49	.020	51
Urban	Town	0.18*	0.22	0.83	.008	30
Urban	Rural	0.20*	0.23	0.84	.001	39

Urbanicity comparison		Mean difference[a]	Standard deviation of the mean difference	Effect size[b]	p-value	Number of schools
Category 1	Category 2					
Suburban	Town	-0.03	0.14	0.20	.502	65
Suburban	Rural	0.04	0.15	0.29	.264	74
Town	Rural	0.01	0.16	0.08	.757	53
Student support and academic engagement						
Urban	Suburban	0.00	0.39	0.00	.995	110
Urban	Town	0.02	0.27	0.08	.723	62
Urban	Rural	0.03	0.33	0.09	.624	87
Suburban	Town	-0.02	0.21	0.10	.651	128
Suburban	Rural	0.03	0.23	0.12	.489	153
Town	Rural	0.01	0.28	0.02	.892	105

* Indicates a statistically different mean difference at $p < .05$. All t-tests were conducted with a false discovery rate correction to account for multiple comparisons.

Note: Results for the safe and respectful school climate domain are not reported for elementary school students because it did not meet the reliability threshold. Results for the school climate index for elementary school students are not reported because the index could not be calculated without the safe and respectful school climate domain score. Mean school climate scores are simple averages of survey items that had a scale of 1 (strongly disagree) to 4 (strongly agree). In all domains 1 is the most negative perception of school climate, and 4 is the most positive. Student school climate scores were weighted to account for imbalances between the racial/ethnic and gender composition of respondents and that of their school's population.

a. The mean difference is reported in survey units.

b. The effect sizes are reported as absolute values and can be interpreted as follows: 0.0-0.09 is small, 0.10-0.19 is moderate, 0.20-0.29 is substantive, and 0.30 and above is large.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year, administrative data from the Pennsylvania Department of Education, 2021/22 school year, and the National Center for Education Statistics' Common Core of Data, 2021/22 school year.

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Appendix C. Additional findings

This appendix provides findings related to analyses of the validity and reliability of the 2021/22 classroom teacher and noninstructional staff surveys. The study team conducted these analyses to prepare the data for research topics 2 and 3 of the main analysis. Because the study team conducted analyses of the validity and reliability of the 2021/22 elementary, middle, and high school student surveys for research topic 1, they used identical methods to validate the classroom teacher and noninstructional staff surveys for the 2021/22 year and removed survey items that did not meet the threshold used for the student surveys. This way, the same criteria were used to determine which survey items were included when calculating survey scores for individual respondent groups and schoolwide summary scores for research topics 2 and 3. For a detailed description of the methods used for this section, see the methods for research questions 1a and 1b in appendix A. The samples for these analyses are 6,390 classroom teacher survey responses from 262 schools and 2,752 noninstructional staff survey responses from 259 schools.

Validity of the classroom teacher and noninstructional staff surveys

To assess the validity of the classroom teacher and noninstructional staff surveys, the study team estimated structural equation models for confirmatory factor analysis (CFA) using 2021/22 data. The initial models for the surveys demonstrated poor fit (table C1; see table A13 in appendix A for model fit criteria). This meant the models needed to be modified to further improve fit. Following the approach used in Amos and Xue (2021) and for the student surveys in this study, the study team suggested removing items with factor loadings below the acceptable 0.40 cutoff from the measurement model (tables C2 and C3). The revised models, which were estimated next, dropped these items to improve fit.

Table C1. Fit statistics for the initial models

Statistic	Suggested	Classroom teacher survey	Noninstructional staff survey
Comparative fit index	≥ .90	.75^	.81^
Tucker-Lewis index	≥ .90	.74^	.79^
Root mean square error of approximation	< .05–.08	.08a	.08^

^ Fit statistic does not meet the suggested threshold.

Note: Based on survey data from 262 schools with classroom teacher survey responses and 259 schools with noninstructional staff survey responses.

a. At .0797, the root mean square error of approximation falls just below the suggested threshold and is thus not labeled with a caret.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table C2. Factor loadings for items in the 2021/22 classroom teacher survey, initial model

Item	Factor loading	Standard error
Social-emotional learning		
Sq27stpt: Students in my school stop and think before doing anything when they get angry.	.70	.013
Sq28grpp: Students in my school do their share of the work on group projects.	.65	.011
Sq29givu: Students in my school give up when they can't solve a problem easily.	.66	.012
Sq30argu: Students in my school get into arguments when they disagree with people.	.69	.012
Sq31dbst: Students in my school do their best, even when their school work is difficult.	.72	.010
Sq32okfg: Students in my school think it's OK to fight if someone insults them.	.76	.012
Sq33dohw: Students in my school do all their homework.	.65	.012
Sq34symn: Students in my school say mean things to other students when they think the other students deserve it.	.74	.012

Item	Factor loading	Standard error
Sq35wkot: Students in my school try to work out their disagreements with other students by talking to them.	.65	.012
Sq36okch: Students in my school think it's OK to cheat if other students are cheating.	.68	.014
Sq37dogd: Students in my school try to do a good job on school work, even when it is not interesting.	.70	.010
Student support and academic engagement		
Sq40shid: I encourage students to share their ideas about things we are studying in class.	.46	.019
Sq42prep: I prepare all students for success in the next grade, in college, or in a job.	.50	.018
Sq43care: I really care about my students.	.34^	.021
Sq44mkup: I help my students make up work after an excused absence.	.40^a	.026
Sq45fdbk: I give my students feedback on class assignments that helps improve their work.	.43	.024
Sq46acom: I provide accommodations to students who need them.	.38^	.022
Sq48chwk: I believe all students can do challenging school work.	.40^b	.017
Sq54advw: When students in this school already know the material that is being taught, they are given more advanced assignments.	.57	.014
Sq70asks: The principal asks students about their ideas.	.55	.020
Sq71effc: Students and parents receive effective communication about academic progress.	.54	.017
Sq72frtr: When students break rules, they are treated fairly.	.65	.016
Sq73hpwk: I am happy working at this school.	.70	.014
Sq74schp: This school is making steady progress implementing rigorous academic standards.	.72	.014
Sq76stfa: In this school, staff members have a 'can do' attitude.	.61	.017
Sq78hnra: Students in this school are encouraged to take advanced classes, such as honors, Advanced Placement (AP), or International Baccalaureate (IB), or classes that lead to professional certification.	.36^	.023
Sq79poss: This school provides positive experiences for students.	.75	.011
Safe and respectful school climate		
Sq7crime: This school is badly affected by crime and violence in the community.	.55	.021
Sq8posp: This school provides positive experiences for parents/community members.	.56	.017
Sq9welcm: This school provides a welcoming environment.	.65	.018
Sq14thrn: Students at this school are often threatened.	.68	.016
Sq16blyc: Students at this school are often bullied because of certain characteristics (for example, their race, religion, weight, or sexual orientation).	.62	.014
Sq17sfen: This school provides a safe environment for teaching and learning.	.71	.017
Sq19sfos: How safe do you feel outside around the school?	.54	.021
Sq20sfhl: How safe do you feel in the hallways and bathrooms of the school?	.67	.019
Sq21sfcs: How safe do you feel in classroom or work area?	.59	.019
Sq22dntc: Students in my school don't really care about each other.	.73	.011
Sq23ptth: Students in my school like to put others down.	.75	.012
Sq24dntg: Students in my school don't get along together very well.	.73	.012
Sq25lkot: Students in my school just look out for themselves.	.72	.011
Sq26trtr: Students in my school treat each other with respect.	.72	.012
Sq75stfi: School staff members have a lot of informal opportunities to influence what happens here.	.51	.021

Item	Factor loading	Standard error
Sq80stfs: School staff members are supported by administration.	.56	.025

Table C3. Factor loadings for items in the 2021/22 noninstructional staff survey, initial model

Item	Factor loading	Standard error
Social-emotional learning		
Sq27stpt: Students in my school stop and think before doing anything when they get angry.	.70	.016
Sq28grpp: Students in my school do their share of the work on group projects.	.64	.017
Sq29givu: Students in my school give up when they can't solve a problem easily.	.73	.013
Sq30argu: Students in my school get into arguments when they disagree with people.	.76	.012
Sq31dbst: Students in my school do their best, even when their school work is difficult.	.69	.016
Sq32okfg: Students in my school think it's OK to fight if someone insults them.	.77	.014
Sq33dohw: Students in my school do all their homework.	.65	.016
Sq34symn: Students in my school say mean things to other students when they think the other students deserve it.	.77	.012
Sq35wkot: Students in my school try to work out their disagreements with other students by talking to them.	.70	.016
Sq36okch: Students in my school think it's OK to cheat if other students are cheating.	.68	.014
Sq37dogd: Students in my school try to do a good job on school work, even when it is not interesting.	.70	.014
Student support and academic engagement		
Sq54advw: When students in this school already know the material that is being taught, they are given more advanced assignments.	.58	.019
Sq70asks: The principal asks students about their ideas.	.62	.019
Sq71effc: Students and parents receive effective communication about academic progress.	.62	.020
Sq72frtr: When students break rules, they are treated fairly.	.70	.014
Sq73hpwk: I am happy working at this school.	.72	.014
Sq74schp: This school is making steady progress implementing rigorous academic standards.	.77	.011
Sq76stfa: In this school, staff members have a 'can do' attitude.	.65	.015
Sq78hnra: Students in this school are encouraged to take advanced classes, such as honors, Advanced Placement (AP), or International Baccalaureate (IB), or classes that lead to professional certification.	.39^	.026
Sq79poss: This school provides positive experiences for students.	.80	.011
Safe and respectful school climate		
Sq7crime: This school is badly affected by crime and violence in the community.	.52	.022
Sq8posp: This school provides positive experiences for parents/ community members.	.59	.021
Sq9welcm: This school provides a welcoming environment.	.63	.020
Sq14thrn: Students at this school are often threatened.	.67	.016
Sq16blyc: Students at this school are often bullied because of certain characteristics (for example, their race, religion, weight, or sexual orientation).	.64	.016
Sq17sfen: This school provides a safe environment for teaching and learning.	.67	.021
Sq19sfos: How safe do you feel outside around the school?	.55	.023

Item	Factor loading	Standard error
Sq20sfhl: How safe do you feel in the hallways and bathrooms of the school?	.65	.020
Sq21sfcs: How safe do you feel in classroom or work area?	.59	.022
Sq22dntc: Students in my school don't really care about each other.	.71	.019
Sq23ptth: Students in my school like to put others down.	.77	.014
Sq24dntg: Students in my school don't get along together very well.	.77	.012
Sq25lkot: Students in my school just look out for themselves.	.73	.013
Sq26trtr: Students in my school treat each other with respect.	.71	.015
Sq75stfi: School staff members have a lot of informal opportunities to influence what happens here.	.54	.020
Sq80stfs: School staff members are supported by administration.	.59	.024

^ Factor loading is not in the acceptable range (that is, it is less than .40).

Note: Factor loadings are (completely) standardized estimates. All loadings are significant at $p < .01$. Based on survey data from 259 schools.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table C4 shows model fit statistics for the revised models. Tables C5 and C6 show the factor loadings for the revised models. The study team first revised the models by excluding survey items with factor loadings of less than .40 and adding covariances between error term indicators based on modification indices provided in the initial CFA output.

Table C4. Fit statistics for the revised models

Statistic	Suggested	Classroom teacher survey	Noninstructional staff survey
Comparative fit index	≥ .90	.80^	.81^
Tucker-Lewis index	≥ .90	.78^	.79^
Root mean square error of approximation	< .05–.08	.08^	.08^

^ Fit statistic does not meet the suggested threshold.

Note: Based on survey data from 262 schools with classroom teacher survey responses and 259 schools with noninstructional staff survey responses.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table C5. Factor loadings for items in the 2021/22 classroom teacher survey, revised model

Item	Factor loading	Standard error
Social-emotional learning		
Sq27stpt: Students in my school stop and think before doing anything when they get angry.	.70	.013
Sq28grpp: Students in my school do their share of the work on group projects.	.65	.011
Sq29givu: Students in my school give up when they can't solve a problem easily.	.66	.012
Sq30argu: Students in my school get into arguments when they disagree with people.	.69	.012
Sq31dbst: Students in my school do their best, even when their school work is difficult.	.72	.010
Sq32okfg: Students in my school think it's OK to fight if someone insults them.	.76	.012
Sq33dohw: Students in my school do all their homework.	.65	.012
Sq34symn: Students in my school say mean things to other students when they think the other students deserve it.	.73	.012
Sq35wkot: Students in my school try to work out their disagreements with other students by talking to them.	.65	.012
Sq36okch: Students in my school think it's OK to cheat if other students are cheating.	.68	.014
Sq37dogd: Students in my school try to do a good job on school work, even when it is not interesting.	.70	.010

Item	Factor loading	Standard error
Student support and academic engagement		
Sq40shid: I encourage students to share their ideas about things we are studying in class.	.40^a	.017
Sq42prep: I prepare all students for success in the next grade, in college, or in a job.	.44	.016
Sq45fdbk: I give my students feedback on class assignments that helps improve their work.	.35^	.021
Sq54advw: When students in this school already know the material that is being taught, they are given more advanced assignments.	.57	.014
Sq70asks: The principal asks students about their ideas.	.57	.020
Sq71effc: Students and parents receive effective communication about academic progress.	.53	.018
Sq72frtr: When students break rules, they are treated fairly.	.67	.013
Sq73hpwk: I am happy working at this school.	.72	.012
Sq74schp: This school is making steady progress implementing rigorous academic standards.	.74	.011
Sq76stfa: In this school, staff members have a 'can do' attitude.	.62	.018
Sq79poss: This school provides positive experiences for students.	.76	.010
Safe and respectful school climate		
Sq7crime: This school is badly affected by crime and violence in the community.	.55	.022
Sq8posp: This school provides positive experiences for parents/community members.	.56	.017
Sq9welcm: This school provides a welcoming environment.	.65	.018
Sq14thrn: Students at this school are often threatened.	.68	.016
Sq16blyc: Students at this school are often bullied because of certain characteristics (for example, their race, religion, weight, or sexual orientation).	.62	.014
Sq17sfen: This school provides a safe environment for teaching and learning.	.72	.017
Sq19sfos: How safe do you feel outside around the school?	.54	.021
Sq20sfhl: How safe do you feel in the hallways and bathrooms of the school?	.67	.019
Sq21sfcs: How safe do you feel in classroom or work area?	.59	.019
Sq22dntc: Students in my school don't really care about each other.	.72	.011
Sq23ptth: Students in my school like to put others down.	.75	.012
Sq24dntg: Students in my school don't get along together very well.	.72	.012
Sq25lkot: Students in my school just look out for themselves.	.71	.011
Sq26trtr: Students in my school treat each other with respect.	.71	.012
Sq75stfi: School staff members have a lot of informal opportunities to influence what happens here.	.52	.020
Sq80stfs: School staff members are supported by administration.	.56	.024

^ Factor loading is not in the acceptable range (that is, it is less than .40).

Note: Factor loadings are (completely) standardized estimates. All loadings are significant at $p < .01$. Based on survey data from 262 schools.

a. The factor loading fell just below the threshold, at .397; for this reason, it is labeled with a caret.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table C6. Factor loadings for 2021/22 noninstructional staff survey, revised model

Item	Factor loading	Standard error
Social-emotional learning		
Sq27stpt: Students in my school stop and think before doing anything when they get angry.	.70	.016
Sq28grpp: Students in my school do their share of the work on group projects.	.64	.017
Sq29givu: Students in my school give up when they can't solve a problem easily.	.73	.013
Sq30argu: Students in my school get into arguments when they disagree with people.	.76	.012

Item	Factor loading	Standard error
Sq31dbst: Students in my school do their best, even when their school work is difficult.	.69	.016
Sq32okfg: Students in my school think it's OK to fight if someone insults them.	.77	.014
Sq33dohw: Students in my school do all their homework.	.65	.016
Sq34symn: Students in my school say mean things to other students when they think the other students deserve it.	.77	.012
Sq35wkot: Students in my school try to work out their disagreements with other students by talking to them.	.70	.016
Sq36okch: Students in my school think it's OK to cheat if other students are cheating.	.68	.014
Sq37dogd: Students in my school try to do a good job on school work, even when it is not interesting.	.70	.014
Student support and academic engagement		
Sq54advw: When students in this school already know the material that is being taught, they are given more advanced assignments.	.58	.020
Sq70asks: The principal asks students about their ideas.	.61	.019
Sq71effc: Students and parents receive effective communication about academic progress.	.62	.020
Sq72frtr: When students break rules, they are treated fairly.	.70	.014
Sq73hpwk: I am happy working at this school.	.72	.014
Sq74schp: This school is making steady progress implementing rigorous academic standards.	.77	.011
Sq76stfa: In this school, staff members have a 'can do' attitude.	.65	.016
Sq79poss: This school provides positive experiences for students.	.80	.011
Safe and respectful school climate		
Sq7crime: This school is badly affected by crime and violence in the community.	.52	.022
Sq8posp: This school provides positive experiences for parents/ community members.	.59	.021
Sq9welcm: This school provides a welcoming environment.	.63	.020
Sq14thrn: Students at this school are often threatened.	.67	.016
Sq16blyc: Students at this school are often bullied because of certain characteristics (for example, their race, religion, weight, or sexual orientation).	.64	.016
Sq17sfen: This school provides a safe environment for teaching and learning.	.67	.021
Sq19sfos: How safe do you feel outside around the school?	.55	.023
Sq20sfhl: How safe do you feel in the hallways and bathrooms of the school?	.65	.020
Sq21sfcs: How safe do you feel in classroom or work area?	.59	.022
Sq22dntc: Students in my school don't really care about each other.	.71	.019
Sq23ptth: Students in my school like to put others down.	.77	.014
Sq24dntg: Students in my school don't get along together very well.	.77	.012
Sq25lkot: Students in my school just look out for themselves.	.73	.013
Sq26trtr: Students in my school treat each other with respect.	.71	.015
Sq75stfi: School staff members have a lot of informal opportunities to influence what happens here.	.54	.020
Sq80stfs: School staff members are supported by administration.	.59	.024

Note: All factor loadings are in the acceptable range (.40 or greater) and significant at $p < .01$. Factor loadings are (completely) standardized estimates. Based on survey data from 259 schools.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

After excluding the items with factor loadings of less than .40 in the revised models and remodeling based on the modification indices, the final models demonstrated acceptable overall model fit for both of the surveys (table

C7), and the factor loadings for each item included in the final models were above the acceptable .40 cutoff (tables C8 and C9).

Table C7. Fit statistics for the final models

Statistic	Suggested	Classroom teacher survey	Noninstructional staff survey
Comparative fit index	≥ .90	.91	.91
Tucker-Lewis index	≥ .90	.90	.90
Root mean square error of approximation	< .05–.08	.06	.06

Note: All statistics met the threshold for validity. Based on survey data from 262 schools with classroom teacher survey responses and 259 schools with noninstructional staff survey responses.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table C8. Factor loadings for items in the 2021/22 classroom teacher survey, final model

Item	Factor loading	Standard error
Social-emotional learning		
Sq27stpt: Students in my school stop and think before doing anything when they get angry.	.70	.013
Sq28grpp: Students in my school do their share of the work on group projects.	.65	.011
Sq29givu: Students in my school give up when they can't solve a problem easily.	.65	.012
Sq30argu: Students in my school get into arguments when they disagree with people.	.68	.012
Sq31dbst: Students in my school do their best, even when their school work is difficult.	.70	.010
Sq32okfg: Students in my school think it's OK to fight if someone insults them.	.76	.012
Sq33dohw: Students in my school do all their homework.	.65	.012
Sq34symn: Students in my school say mean things to other students when they think the other students deserve it.	.73	.012
Sq35wkot: Students in my school try to work out their disagreements with other students by talking to them.	.66	.012
Sq36okch: Students in my school think it's OK to cheat if other students are cheating.	.68	.014
Sq37dogd: Students in my school try to do a good job on school work, even when it is not interesting.	.69	.010
Student support and academic engagement		
Sq42prep: I prepare all students for success in the next grade, in college, or in a job.	.41	.015
Sq54advw: When students in this school already know the material that is being taught, they are given more advanced assignments.	.56	.015
Sq70asks: The principal asks students about their ideas.	.55	.022
Sq71effc: Students and parents receive effective communication about academic progress.	.52	.019
Sq72frtr: When students break rules, they are treated fairly.	.67	.013
Sq73hpwk: I am happy working at this school.	.72	.012
Sq74schp: This school is making steady progress implementing rigorous academic standards.	.74	.011
Sq76stfa: In this school, staff members have a 'can do' attitude.	.61	.019
Sq79poss: This school provides positive experiences for students.	.76	.010
Safe and respectful school climate		
Sq7crime: This school is badly affected by crime and violence in the community.	.53	.023
Sq8posp: This school provides positive experiences for parents/community members.	.58	.017
Sq9welcm: This school provides a welcoming environment.	.67	.017
Sq14thrn: Students at this school are often threatened.	.66	.018

Item	Factor loading	Standard error
Sq16blyc: Students at this school are often bullied because of certain characteristics (for example, their race, religion, weight, or sexual orientation).	.59	.016
Sq17sfen: This school provides a safe environment for teaching and learning.	.72	.017
Sq19sfos: How safe do you feel outside around the school?	.51	.021
Sq20sfhl: How safe do you feel in the hallways and bathrooms of the school?	.64	.020
Sq21sfcs: How safe do you feel in classroom or work area?	.55	.018
Sq22dntc: Students in my school don't really care about each other.	.67	.012
Sq23ptth: Students in my school like to put others down.	.70	.013
Sq24dntg: Students in my school don't get along together very well.	.66	.013
Sq25lkot: Students in my school just look out for themselves.	.66	.012
Sq26trtr: Students in my school treat each other with respect.	.70	.014
Sq75stfi: School staff members have a lot of informal opportunities to influence what happens here.	.55	.020
Sq80stfs: School staff members are supported by administration.	.60	.023

Note: All factor loadings are in the acceptable range (.40 or greater) and significant at $p < .01$. Factor loadings are (completely) standardized estimates. Based on survey data from 262 schools.

Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table C9. Factor loadings for items in the 2021/22 noninstructional staff survey, final model

Item	Factor loading	Standard error
Social-emotional learning		
Sq27stpt: Students in my school stop and think before doing anything when they get angry.	.70	.016
Sq28grpp: Students in my school do their share of the work on group projects.	.64	.017
Sq29givu: Students in my school give up when they can't solve a problem easily.	.72	.013
Sq30argu: Students in my school get into arguments when they disagree with people.	.77	.012
Sq31dbst: Students in my school do their best, even when their school work is difficult.	.67	.016
Sq32okfg: Students in my school think it's OK to fight if someone insults them.	.77	.014
Sq33dohw: Students in my school do all their homework.	.65	.016
Sq34symn: Students in my school say mean things to other students when they think the other students deserve it.	.77	.012
Sq35wkot: Students in my school try to work out their disagreements with other students by talking to them.	.70	.016
Sq36okch: Students in my school think it's OK to cheat if other students are cheating.	.68	.014
Sq37dogd: Students in my school try to do a good job on school work, even when it is not interesting.	.68	.014
Student support and academic engagement		
Sq54advw: When students in this school already know the material that is being taught, they are given more advanced assignments.	.57	.020
Sq70asks: The principal asks students about their ideas.	.61	.019
Sq71effc: Students and parents receive effective communication about academic progress.	.61	.020
Sq72frtr: When students break rules, they are treated fairly.	.70	.014
Sq73hpwk: I am happy working at this school.	.73	.014
Sq74schp: This school is making steady progress implementing rigorous academic standards.	.76	.011
Sq76stfa: In this school, staff members have a 'can do' attitude.	.65	.016
Sq79poss: This school provides positive experiences for students.	.81	.011

Item	Factor loading	Standard error
Safe and respectful school climate		
Sq7crime: This school is badly affected by crime and violence in the community.	.50	.023
Sq8posp: This school provides positive experiences for parents/ community members.	.61	.021
Sq9welcm: This school provides a welcoming environment.	.65	.019
Sq14thrn: Students at this school are often threatened.	.64	.018
Sq16blyc: Students at this school are often bullied because of certain characteristics (for example, their race, religion, weight, or sexual orientation).	.61	.018
Sq17sfen: This school provides a safe environment for teaching and learning.	.68	.020
Sq19sfos: How safe do you feel outside around the school?	.51	.023
Sq20sfhl: How safe do you feel in the hallways and bathrooms of the school?	.62	.021
Sq21sfcs: How safe do you feel in classroom or work area?	.56	.021
Sq22dntc: Students in my school don't really care about each other.	.64	.020
Sq23ptth: Students in my school like to put others down.	.72	.016
Sq24dntg: Students in my school don't get along together very well.	.70	.015
Sq25lkot: Students in my school just look out for themselves.	.67	.015
Sq26trtr: Students in my school treat each other with respect.	.70	.017
Sq75stfi: School staff members have a lot of informal opportunities to influence what happens here.	.58	.019
Sq80stfs: School staff members are supported by administration.	.64	.022

Note: All factor loadings are in the acceptable range (.40 or greater) and significant at $p < .01$. Factor loadings are (completely) standardized estimates. Based on survey data from 259 schools.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table C10 summarizes all survey items that were removed from the final models due to low factor loadings.

Table C10. Removed survey items with less than .40 factor loadings for the final models

Survey	Domain	Survey item	Removed after initial model	Removed after revised model
Classroom teacher survey	Student support and academic engagement	Sq40shid: I encourage students to share their ideas about things we are studying in class.		X
		Sq43care: I really care about my students.	X	
		Sq44mkup: I help my students make up work after an excused absence.	X	
		Sq45fdbk: I give my students feedback on class assignments that helps improve their work.		X
		Sq46acom: I provide accommodations to students who need them.	X	
		Sq48chwk: I believe all students can do challenging school work.	X	
		Sq78hnra: Students in this school are encouraged to take advanced classes, such as honors, Advanced Placement (AP), or International Baccalaureate (IB), or classes that lead to professional certification.	X	
Noninstructional staff survey	Student support and academic engagement	Sq78hnra: Students in this school are encouraged to take advanced classes, such as honors, Advanced Placement (AP), or International Baccalaureate (IB), or classes that lead to professional certification.	X	

Note: Based on survey data from 262 schools with classroom teacher survey responses and 259 schools with noninstructional staff survey responses.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Table C11 shows correlations between the latent factors for the final models across surveys. Correlations between the latent factors were above .85 for some of the latent factors. This suggests that the latent factors may be measuring the same underlying construct. However, the study team did not combine highly correlated domains because the domain correlations fell below the threshold in Amos and Xue (2021), which was based on more years of data. This also ensured that the domains across the student, classroom teacher, and noninstructional staff surveys were consistent with one another.

Table C11. Correlations between latent factors for the surveys in 2021/22

	Correlations between:		
Survey	Domains 1 and 2 Social-emotional learning, and student support and academic engagement	Domains 1 and 3: Social-emotional learning, and safe and respectful school climate	Domains 2 and 3: Student support and academic engagement, and safe and respectful school climate
Classroom teacher survey	.70	.87^	.87^
Noninstructional staff survey	.64	.85^	.86^

^ Correlation does not meet the threshold (under .85).
Note: Based on survey data from 262 schools with classroom teacher survey responses and 259 schools with noninstructional staff survey responses.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Reliability of the classroom teacher and noninstructional staff surveys

To assess the reliability of the classroom teacher and noninstructional staff surveys, the study team calculated Cronbach's alpha for each survey domain for each respondent type in 2021/22. Table C12 shows the reliability estimates of the survey domains for each survey. The domains in each of the surveys met the threshold for acceptable reliability (.70 or greater), with alphas of at least 0.85.

Table C12. Reliability estimates for each domain, by survey

Domain	Number of items	Cronbach's alpha
Classroom teacher survey		
Social-emotional learning	11	.91
Student support and academic engagement	9	.85
Safe and respectful school climate	16	.92
Noninstructional staff survey		
Social-emotional learning	11	.92
Student support and academic engagement	8	.87
Safe and respectful school climate	16	.92

Note: All Cronbach's alpha estimates in the table meet the threshold for acceptable reliability (.70 or greater). Based on survey data from 262 schools with classroom teacher survey responses and 259 schools with noninstructional staff survey responses.
Source: Analysis of data from the Pennsylvania School Climate Survey, 2021/22 school year.

Reference

Amos, L., & Xue, Y. (2021). *Development of Pennsylvania Department of Education school climate index summary*. Regional Educational Laboratory Mid-Atlantic. https://ies.ed.gov/ncee/edlabs/regions/midatlantic/pdf/REL_MA_5.2.5_School_Climate_memo_508c.pdf