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# Relating school context to measures of psychosocial factors for students in grades 6 through 9

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ABSTRACT

Individual differences in motivation, social engagement, and self-regulation help explain variation in academic outcomes. But less is known about how school context relates to these psychosocial factors (PSFs) and whether it moderates the relationships between PSFs and outcomes. We defined school context as the union of school characteristics (e.g., school size, poverty concentration) and school climate (students' perceptions of relationships with school personnel and school safety). We examined these relationships in a large sample of 6th–9th graders. We also examined how school context relates to measures of student PSFs, and whether it moderates the relationships between PSFs and academic outcomes. School poverty concentration was negatively related to students' perceptions of school safety, and to a lesser extent, perceptions of relationships with school personnel. Students in lower grades had lower perceptions of school climate. Neither the locale of the school nor the concentration of racial/ethnic minority students was related to climate. Higher school safety was positively related to higher motivation, self-regulation, and social engagement. PSF scores were predictive of educational outcomes in the expected directions (e.g., positively predicted grades and standardized test scores; negatively predicted suspension from school and absences). There was little evidence of moderation by school context on outcomes.

## 1. Introduction

Previous studies have established a consistent link between psychosocial factors (PSFs), measured in middle school, and later educational outcomes. However, little is known about the relationships between school context and PSFs, or if the risk associated with low PSFs varies by school context. Although relationships between contextual factors and educational outcomes are documented (see Section 1.2), we know less about how these impact PSFs and/or interact with them to influence outcomes. Using a large sample of middle schools, we examine the relationship between school contextual factors and PSFs. School contextual factors include school characteristics (poverty concentration, size, locale, racial/ethnic minority concentration, grade level, and school transition status) and measures of school climate based on student perceptions of school safety and relationships with school personnel. The school climate measures are regarded as aspects of school context that may be affected by interventions and the actions of school leaders, teachers, and community members. School characteristics, on the other hand, typically are not regarded as malleable. We treat school context as the combination of school characteristics and school climate.

### 1.1. Psychosocial factors

A large number of single-sample studies and several meta-analyses have examined the direct and indirect effects of PSFs and behavioral factors on academic success, highlighting a range of constructs, including self-efficacy, motivation, locus of control, attitude toward learning, attention and persistence, as well as strategy and flexibility (e.g., Grigorenko et al., 2009; Poropat, 2009; Robbins et al., 2004). Other studies have also found that PSFs provide incremental validity over traditional predictors of academic performance such as standardized achievement tests and demographics (e.g., Casillas et al., 2012; Zins, Bloodworth, Weissberg, & Walberg, 2004). Analogous results have been obtained in the postsecondary realm (cf. Robbins, Allen, Casillas, Peterson, & Le, 2006), as well as in the work realm in relation to outcomes such as job performance and retention (e.g., Barrick & Mount, 1991; Judge & Ilies, 2002).

### 1.2. School context factors

School context factors can include a large number of different school- or group-level characteristics. Some of these include ethnic or

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racial makeup of student body, school and student SES, school control (e.g., public or private), and various measures of school climate. These factors have long been of interest to researchers in predicting important educational outcomes. As predictors of dropout, a number of school characteristics (e.g., mean achievement scores, size, percent of minority students, percent of students eligible for free/reduced lunch) showed moderate effects (mean $d = 0.65$) (Kaufman & Bradbury, 1992), whereas measures of school climate showed small effects (mean $d = 0.15$). As predictors of student academic achievement (e.g., grades), both school climate and mean standardized achievement scores (at the school level) showed moderate effects (mean $d = 0.51$) (Kaufman & Bradbury, 1992; Marchant, Paulson, & Rothlisberg, 2001; Worrell & Hale, 2001). Finally, in both qualitative and quantitative studies, students' increased perceptions of school and neighborhood safety have been associated with higher levels of academic performance ($r = 0.17$ to 0.29) (Bridgeland, DiIulio Jr., & Morison, 2006; Henrich, Schwab-Stone, Fanti, Jones, & Ruchkin, 2004).

School climate, in particular, has received a fair amount of research attention. High school educators have rated aspects of school climate as one of the strongest contributors to college and career readiness (ACT, 2011a). A recent meta-analysis (Berkowitz, Moore, Astor, & Benbenishty, 2017) provides a thorough discussion of the changing definition of school climate that is beyond the scope of this paper. The authors note that, originally, the definition focused on teachers representing the overall attitudes of the school, whereas later definitions included concepts of student perspectives, promoting safe learning environments, and the encouragement of teacher-student relationships. However, the authors identified several major themes among the various extant definitions of school climate: "positive teacher-student relationships, sense of safety, and student connectedness to and engagement in school" (p. 7). Our operationalization of school climate includes several of these elements (see Section 2.2.3). The results of the meta-analysis showed that a positive school climate can lessen the negative effects of low socioeconomic status (SES) on academic achievement. The moderating influence of school climate was particularly strong for students from low SES backgrounds, such that these students do better academically when in a positive school climate.

### 1.3. Linking psychosocial factors and school context

Although research linking PSFs to school contexts is lacking, there are certain inferences that can be made. The first stems from the notion that behavior is a function of the person and the environment (Lewin, 1935). One way to account for this interaction is through situational strength ("implicit or explicit cues provided by external entities regarding the desirability of potential behaviors"; Meyer, Dalal, & Hermida, 2010, p. 122). Strong situations have very clear cues about behavioral desirability. For instance, most people know that speaking loudly is not appropriate at a library (a strong situation), and thus even a very extraverted person is likely to remain quiet while visiting one. In contrast, the extent to which loud talking is appropriate at the mall (a weak situation) is less clear. In that situation, it is likely that extraverts will talk more loudly than introverts. As school context factors are indicators of a situation (i.e., school), it is very likely that there will some relationship between them and PSFs, even if there is not enough extant research to provide a clear prediction as to directionality. Additionally, findings of the meta-analysis discussed above (Berkowitz et al., 2017) give precedent for school climate (a school context factor) having a relationship with individual difference variables (i.e., SES background).

The results of the study will increase our understanding of the context-dependence of measured PSFs. It is important to know if there are certain school contexts where students' PSFs are more or less predictive of their academic outcomes, because then the PSFs can be emphasized (or not) accordingly in schools to give students the best chance to succeed. The study will also inform the design of school accountability indicators that seek to isolate the effect of schools on PSFs. These indicators will allow for the identification of the most relevant school contextual factors related to students' academic success, which can then guide the allocation of district and school-level resources to improving the factors (e.g., school climate) that will have the largest impact on students' academic outcomes.

### 1.4. Current study

The goal of this study is to examine the relationships of school contextual factors and student PSFs and whether the relationships between PSFs and educational outcomes vary by school contextual factors. The lack of previous research linking these factors to PSFs precludes the formulation of specific hypotheses about the nature of these relationships, and suggests that parsing out specific research questions will best illuminate the relationships between the variables of interest. To that end, we examine three primary research questions:

RQ1: To what extent do school characteristics explain measures of school climate?
RQ2: Do students' measured PSFs vary systematically with school contextual factors?
RQ3: Is the relationship between PSFs and educational outcomes (grades, standardized test scores, suspension from school, and absences) moderated by school contextual factors?

The research questions, and the analytic approach used to address them, are depicted in Fig. 1. Each research question addresses a separate set of linkages shown in the figure. School contextual variables are represented by gray rectangles and student variables are represented by white ovals. Student socio-demographic variables (e.g., ethnicity, gender) are included as covariates in models for student PSFs and student outcomes, but are not of primary interest and so are not

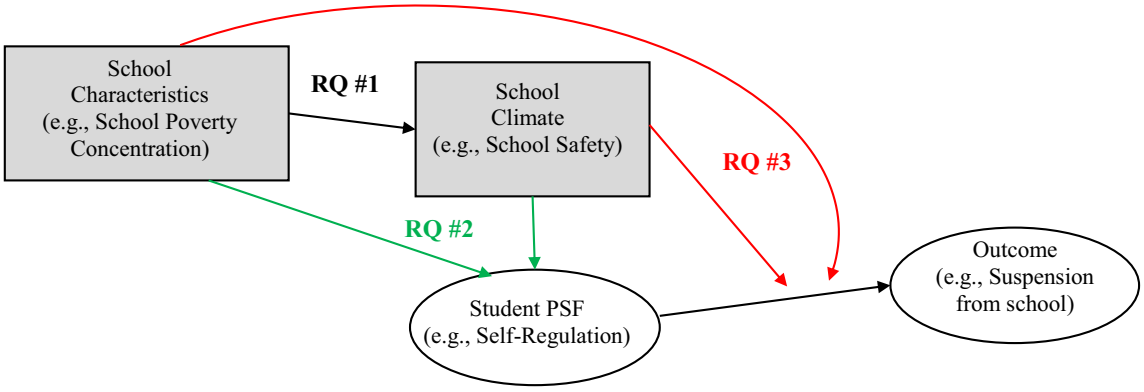


**Fig. 1.** Path diagram of research questions and analysis approach. RQ = research question.

included in Fig. 1.

## 2. Method

### 2.1. Sample

The sample was drawn from a database of students and schools who took the ACT Engage 6–9 assessment. The sample included 121,595 students enrolled in 462 public schools in the United States in grades 6–9. Inclusion criteria for students were 1) completion of the ACT Engage Grades 6–9 assessment (hereafter referred to as *the PSF instrument*) at least once in grades 6–9, 2) no evidence of invalid response patterns (e.g., providing the same response across all items), and 3) membership in a group meeting the school inclusion criteria. The students in the sample belonged to cohorts (expected year of high school completion) of 2015 through 2023. Inclusion criteria for each group (school/grade level/cohort) were 1) must be a public school in the United States, 2) must have assessed at least 50% of the students with the PSF instrument, and 3) must have assessed at least 20 students.

The sample is evenly split by gender and the racial/ethnic mix is 53% white, 30% Hispanic, 8% African American, 2% Asian, and 7% other race (Table 1). The sample is evenly distributed across grade levels, ranging from 22% for grade 6 to 31% for grade 9. The 462 public schools are from 36 states, and the sample is mostly from the South (49%) and Midwest (40%) regions of the United States.

### 2.2. Measures

#### 2.2.1. Student PSFs

The PSF instrument was developed using a rational-empirical approach (Clark & Watson, 1995) and contains 106 items scored using a 6-point, Likert-type scale that ranges from *strongly disagree* to *strongly agree*. Scores for ten scales were obtained by summing 9 to 12 item responses and transforming the sum to a 10–60 scale. The scale scores have demonstrated moderate to high internal consistency (alpha

**Table 1**
Comparing the sample to the population of U.S. public school students in grades 6–9.

| Variable | Sample % | Population % |
|---|---|---|
| Gender | | |
| Female | 49.4 | 48.6 |
| Male | 50.6 | 51.4 |
| Race/ethnicity | | |
| African American | 7.9 | 15.8 |
| Asian | 2.9 | 4.8 |
| Hispanic/Latino | 28.8 | 24.8 |
| White | 53.9 | 50.5 |
| Other | 6.5 | 4.2 |
| Region | | |
| Midwest | 41.5 | 21.1 |
| Northeast | 1.5 | 15.9 |
| South | 48.0 | 38.8 |
| West | 9.0 | 24.2 |
| Grade level | | |
| 6 | 22.3 | 24.3 |
| 7 | 23.8 | 24.7 |
| 8 | 22.2 | 24.8 |
| 9 | 31.6 | 26.2 |
| School locale | | |
| Rural | 24.5 | 18.8 |
| Town | 19.3 | 11.4 |
| Suburban | 27.5 | 40.2 |
| City | 28.8 | 29.6 |

| | Sample mean | Population mean |
|---|---|---|
| School class size | 297.6 | 286.8 |
| School poverty concentration | 0.529 | 0.512 |

**Table 2**
Psychosocial factor (PSF) domains, scale names, definitions, and sample items.

| Domain | Scale name | Definition | Sample item | Alpha |
|---|---|---|---|---|
| Motivation | Academic discipline | Degree to which a student is hardworking and conscientious as evidenced by the amount of effort invested into completing schoolwork. | I turn in my assignments on time. | 0.91 |
| | Commitment to school | Commitment to stay in school and obtain a high school diploma. | I am committed to graduating from high school. | 0.89 |
| | Optimism | A hopeful outlook about the future in spite of difficulties or challenges. | I am confident that everything will turn out all right. | 0.90 |
| Social engagement | Family attitude toward education | Positive family attitude regarding the value of education. | My family supports my efforts in school. | 0.86 |
| | Family involvement | Family involvement in a student's school life and activities. | I talk to my family about schoolwork. | 0.85 |
| | Relationships with school personnel | The extent to which students relate to school personnel as part of their connection to school. | Adults at my school understand my point of view. | 0.89 |
| | School safety climate | School qualities related to students' perception of security at school. | I feel safe at school. | 0.85 |
| Self-regulation | Managing feelings | Tendency to manage duration and intensity of negative feelings (e.g., anger, sadness, embarrassment) and to find appropriate ways to express feelings. | I would walk away if someone wanted to fight me. | 0.89 |
| | Orderly conduct | Tendency to behave appropriately in class and avoid disciplinary action. | I have been sent to the principal's office for misbehaving. | 0.82 |
| | Thinking before acting | Tendency to think about the consequences of one's actions before acting. | I think about what might happen before I act. | 0.85 |

range = 0.81 to 0.90; median = 0.87), as well as incremental validity over demographic, school, and standardized achievement variables (ACT, 2011b; Casillas et al., 2012). The scales fit a three-factor higher-order structure consistent with the broader constructs of motivation, social engagement, and self-regulation (Casillas et al., 2011).

The ten scales, their definitions, sample items, and sample alphas are presented in Table 2. For this study, one item from the Orderly Conduct scale was removed so it could be used as an outcome variable representing suspension from school. The scores under each domain were averaged to derive domain scores. PSF scores for the ten scales and three domains were used for analysis, representing the student PSFs in Fig. 1.

#### 2.2.2. School characteristics

Data on school characteristics was obtained from the National Center for Education Statistics (NCES) Common Core of Data (Glander, 2016). Variables included enrollment for each grade level (class size), locale (rural, town, suburban, or city), proportion of students eligible for free or reduced lunch (used as a measure of school poverty concentration), and proportion of students belonging to racial/ethnic minority groups (African American, Hispanic/Latino, Native American).

School class size, locale, poverty concentration, and proportion of students belonging to racial/ethnic minority groups represent the school characteristics of Fig. 1 and are non-malleable characteristics of the schools and the students they serve. Grade level (6, 7, 8, or 9) and whether the group is in a school transition year were also included as variables of interest. A group of students is in a school transition year if they are in the lowest grade offered by their school; 82% of the sample's 6th graders, 28% of the 7th graders, 0% of the 8th graders, and 95% of the 9th graders were in a school transition year.

#### 2.2.3. School climate

Measures of school climate were obtained by averaging the two PSF measures related to student perceptions of school: *Relationships with School Personnel* (hereafter *school relationships*) and *School Safety Climate* (hereafter *school safety*) (Table 2). The aggregation was done at a "group" level, defined by school, grade level, and cohort of students. For each group, the mean scores were used as measures of school climate. This allows, for example, for climate to vary for students from the same school and grade level, but different cohorts. The school climate measures for each student were based only on the scores of his or her peers (the student's own scores were not included) so that the relationships of school climate and student PSFs are not artificially inflated. These measures represent the school climate variables of Fig. 1.

#### 2.2.4. Socio-demographic variables

The PSF instrument included background questions on gender, race/ethnicity, parent education level (grouped as high school or less, some college less than a bachelor's degree, or bachelor's degree or higher), and whether English is the primary language spoken at home.

#### 2.2.5. Educational outcomes

The survey also asked students to report their grades from the past two years, their absences from school, and whether they have been suspended from school. Three dichotomous outcomes were defined: poor grades (mostly Cs or lower), high absenteeism (3 or more days missed in the last month[1]), and suspension from school.

In addition to the student-reported outcomes, we also examined standardized test scores obtained from official test records. ACT Explore is a standardized achievement test typically taken in 8th or 9th grade, including tests of English, mathematics, reading, and science (ACT, 2013). Subject area scores range from 1 to 25 and the Composite score is calculated as the mean of the four subject area scores. Explore is intended for all students in grades 8 and 9 and focuses on the knowledge and skills that are usually attained by grade 8. Approximately 25% of the schools in the sample administered ACT Explore, and Explore Composite scores were available for 20% of the total student sample (N = 23,513[2]) and were used as an educational outcome.

### 2.3. Statistical analyses

A sequence of multilevel regression models addressed the three research questions depicted by Fig. 1. The models include three levels, with students (level 1) nested within groups (level 2), and groups nested within schools (level 3). Multilevel linear regression (Raudenbush & Bryk, 2002) was used for continuous dependent variables, and multilevel logistic regression (Wong & Mason, 1985) was used for dichotomous dependent variables. To facilitate interpretation and comparisons of regression coefficients, all continuous variables were standardized (mean = 0, standard deviation = 1). For the school context measures, the standardization was done at the group level; for the individual difference measures, the standardization was done at the student level. In all cases, random intercept[3] models are used to account for within-group and within-school correlation.

Model 1 addressed RQ1 by relating the measures of climate to the school and group characteristics. For this analysis, the dependent variables were defined at the group level (combination of school, cohort, and grade level):

Equation 1: Model 1

$$\text{Level 2 (groups):} \quad Y_{gs} = \beta_{0,s} + \sum_{p=1}^{5} X_{p,gs}\beta_p + \varepsilon_{gs}$$

$$\text{Level 3 (schools):} \quad \beta_{0,s} = \beta_0 + \sum_{p=6}^{10} X_{p,s}\beta_p + \tau_{s.}$$

In Eq. (1), $Y_{gs}$ represents the group climate measures, and $g$ indexes group nested within school ($s$). The random school intercept is $\beta_{0,\,s}$. The group-level predictors ($X_1$, $X_2$,… $X_5$) included class size, grade level (3 dummy indicators), and whether the group was in a school transition year. The second level of Model 1 relates the random school intercept to the overall intercept ($\beta_0$) and the school-level predictors ($X_6$, $X_7$,… $X_{10}$). The school-level predictors included school poverty concentration, school minority %, and school locale (3 dummy indicators). The residual error term for level 1 ($\varepsilon_{gs}$) and the unobserved school effect for level 3 ($\tau_s$) are assumed to be normally distributed with unknown variances.

Model 2 addressed RQ2 by relating the school and group context measures (school characteristics and climate measures) to student PSFs. Students are nested within groups, and groups are nested within schools:

Equation 2: Model 2

$$\text{Level 1 (students)} \qquad Y_{igs} = \theta_{0,gs} + \sum_{p=13}^{20} X_{p,igs}\theta_p + \varepsilon_{igs}$$

[1] Our definition of high absenteeism (3 days per month, or approximately 27 days per school year) uses a higher threshold than the U.S. Department of Education's definition of chronic absenteeism (missing at least 15 days in a school year).

[2] Because the availability of Explore scores is determined by the school and not student selection, we are not concerned about biased relationships between student level predictors and Explore Composite scores due to these missing data.

[3] For multilevel linear regression, the random intercept represents the mean of the dependent variable for each group (or school), when all predictors are set to the mean (or, for categorical variables, set to the reference group). For multilevel logistic regression, the random intercept represents the log odds of the outcome, when all predictors are set to the mean (or reference group).

Level 2 (groups) $$\theta_{0,gs} = \theta_{0,s} + \sum_{p=1}^{5} X_{p,gs}\theta_p + \sum_{p=11}^{12} X_{p,gs}\theta_p$$

Level 3 (schools) $$\theta_{0,s} = \theta_0 + \sum_{p=6}^{10} X_{p,s}\theta_p + \omega_s$$

The first level of Model 2 related the student PSFs ($Y_{igs}$) to a group-specific intercept ($\theta_{0,\ gs}$), student-level demographics ($X_{13}$, $X_{14}$,… $X_{20}$), and a residual error term ($\varepsilon_{igs}$). The second level of Model 2 related the group intercept to a random school intercept ($\theta_{0,\ s}$), group characteristics ($X_1$, $X_2$,… $X_5$), and group measures of climate ($X_{11}$ and $X_{12}$). The third level of Model 2 related the random school intercept to an overall intercept, the school characteristics ($X_6$, $X_7$,… $X_{10}$), and an unobserved school effect ($\omega_s$). Model 2 was fit for each PSF measure, so thirteen times total. We restrict our attention to the three models based on the three PSF domain scores.

Model 3 addressed RQ3 by testing whether interactions between the context measures and student PSFs help explain educational outcomes. For this analysis, each outcome was paired with the PSF domain judged to be the most relevant, based on the scale definitions within the three domains (see Table 2). While we recognize that multiple PSFs may be related to outcomes, this analysis strategy resulted in a more manageable number of comparisons and interaction tests. Thus, motivation was paired with poor grades and Explore Composite score, self-regulation with suspension from school, and social engagement with absences. While motivation is related to all of these outcomes (Casillas et al., 2012), self-regulation (i.e., self-control, behaving properly in class) was judged to be most relevant to school suspensions. This is because suspensions are punishments given for misbehavior at school. Social engagement was judged to be most relevant to absences. This is because social engagement in this study is operationalized as a combination of family support for the student's education, the student's relationships with school personnel, and feeling safe at school. It is reasonable to expect that the more a family supports the child going to school, the better relationships a student has with teachers, and the safer a student feels, the more likely the student is to attend school. For each outcome, the model was fit using the PSF measures from the associated domain. Multilevel logistic regression was used for the three dichotomous outcomes (poor grades, suspension from school, and absences) and multilevel linear regression was used for Explore Composite score.

Similar to Model 2, students are nested within groups and groups are nested within schools:

Equation 3: Model 3

Level 1 (students): $$Y_{igs} = \mu_{0,gs} + \sum_{p=13}^{20} X_{p,igs}\varphi_p + \mathrm{P}_{igs}\omega + \left(\sum_{p=1}^{12} \mathrm{P}_{igs}X_{p,gs}\alpha_p\right) + \varepsilon_{igs}$$

Level 2 (groups): $$\mu_{0,gs} = \mu_{0,s} + \sum_{p=1}^{5} X_{p,gs}\mu_p + \sum_{p=11}^{12} X_{p,gs}\mu_p$$

Level 3 (schools): $$\mu_{0,s} = \mu_0 + \left(\sum_{p=6}^{10} X_{p,s}\mu_p\right) + \epsilon_s$$

The first level of Model 3 related student outcomes ($Y_{igs}$) to a group-specific intercept ($\mu_{0,\ gs}$), student-level demographics, PSF score ($\mathrm{P}_{igs}$), interactions of PSF score and context variables, and a residual error term ($\varepsilon_{igs}$). The second level of Model 3 related the group intercept to a random school intercept ($\mu_{0,\ s}$), group characteristics, and measures of climate. The third level of Model 3 related the random school intercept to an overall intercept, school characteristics, and the unobserved school effect ($\epsilon_s$).

An $R^2$ measure appropriate for multilevel models with random intercepts was used to describe overall effect size (LaHuis, Hartman, Hakoyama, & Clark, 2014; Nakagawa & Schielzeth, 2013). The $R^2$ measure is defined for all generalized linear mixed models (including multilevel linear and logistic regression) and measures the variance explained by the fixed effects (see eq. 29 of Nakagawa & Schielzeth, 2013). To examine variance explained at each level (student, group, and schools), we present $R^2$ after adding each level of predictors (level 3, then level 2, then level 1). This approach has been proposed by others (LaHuis et al., 2014). In addition to $R^2$, we present its square root (multiple $R$) because it expresses model effect size on the same scale used for individual predictors, and because $R$ is linearly related to measures of real-world impact such as accuracy rates for identification of at-risk students (c.f. Schmidt & Hunter, 2015, pp. 213–214; Allen, Robbins, & Sawyer, 2010).

Some socio-demographic data was missing due to student non-response, including 0.05% for gender, 4.0% for race/ethnicity, 40.9% for parent education level, and 0.03% for whether English is the primary language spoken at home. Variables associated with missing parent education level included race/ethnicity, gender, school poverty concentration, grade level, measures of school climate, and student PSF scores. Multiple imputation, using the SAS MI procedure (Berglund, 2010), was used to impute missing socio-demographic variables.

Descriptive statistics and correlations are provided for selected study variables (Table 3). The unstandardized means, standard deviations, and full correlation matrix of all study variables is provided in the online supplement (see “Mean, SD, Correlations”). Sample data, the PSF instrument, and syntax (i.e., instrument scoring) used in the analyses

**Table 3**
Descriptive statistics and correlations for selected variables.

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. School class size | 1.00 | | | | | | | | | | | |
| 2. School poverty concentration | −0.05 | 1.00 | | | | | | | | | | |
| 3. School minority % | 0.32 | 0.71 | 1.00 | | | | | | | | | |
| 4. School relationships | −0.12 | −0.29 | −0.27 | 1.00 | | | | | | | | |
| 5. School safety | −0.11 | −0.53 | −0.43 | 0.82 | 1.00 | | | | | | | |
| 6. Motivation | 0.00 | −0.14 | −0.09 | 0.18 | 0.19 | 1.00 | | | | | | |
| 7. Self-regulation | 0.06 | −0.20 | −0.11 | 0.19 | 0.22 | 0.60 | 1.00 | | | | | |
| 8. Social engagement | −0.04 | −0.20 | −0.15 | 0.34 | 0.35 | 0.75 | 0.55 | 1.00 | | | | |
| 9. Poor grades | −0.02 | 0.13 | 0.08 | −0.13 | −0.14 | −0.37 | −0.31 | −0.26 | 1.00 | | | |
| 10. Explore composite score | −0.05 | −0.36 | −0.25 | 0.12 | 0.23 | 0.26 | 0.26 | 0.19 | −0.36 | 1.00 | | |
| 11. Suspended | −0.02 | 0.14 | 0.10 | −0.14 | −0.17 | −0.26 | −0.42 | −0.24 | 0.24 | −0.20 | 1.00 | |
| 12. High absences | −0.06 | 0.12 | 0.06 | −0.06 | −0.10 | −0.18 | −0.16 | −0.14 | 0.15 | −0.13 | 0.12 | 1.00 |
| Mean | 297.55 | 0.53 | 0.37 | 40.50 | 43.24 | 51.00 | 43.31 | 46.65 | 0.19 | 15.50 | 0.14 | 0.17 |
| SD | 185.55 | 0.27 | 0.36 | 2.70 | 4.38 | 6.38 | 9.67 | 6.50 | 0.40 | 3.34 | 0.34 | 0.38 |

Note: With $N$ = 121,595, even very small correlations are statistically significant. $|r| > 0.01$ is significant at alpha = 0.01.

**Table 4**
Model 1: relating school characteristics to measures of school climate.

| School characteristic | School relationships | | School safety | |
|---|---|---|---|---|
| | β | 95% CI | β | 95% CI |
| Intercept | −0.84* | −1.09, −0.59 | −0.76* | −0.99, −0.54 |
| School class size | −0.09* | −0.17, −0.01 | −0.15* | −0.23, −0.08 |
| School poverty level | −0.13* | −0.25, −0.02 | −0.45* | −0.55, −0.35 |
| School minority % | −0.02 | −0.13, 0.09 | 0.00 | −0.10, 0.11 |
| School locale | | | | |
| Rural | 0.10 | −0.12, 0.31 | 0.14 | −0.07, 0.34 |
| Town | −0.01 | −0.25, 0.22 | −0.14 | −0.36, 0.08 |
| Suburban | 0.09 | −0.13, 0.32 | −0.01 | −0.23, 0.20 |
| City[a] | | | | |
| Grade level | | | | |
| 6 | 1.33* | 1.12, 1.54 | 1.11* | 0.93, 1.30 |
| 7 | 0.79* | 0.56, 1.02 | 0.80* | 0.59, 1.00 |
| 8 | 0.54* | 0.29, 0.78 | 0.55* | 0.34, 0.77 |
| 9[a] | | | | |
| Transition year | 0.35* | 0.17, 0.54 | 0.34* | 0.19, 0.49 |
| $R^2$ (level 2, level 1 & 2) | 0.050, 0.266 | | 0.231, 0.392 | |
| $R$ (level 2, level 1 & 2) | 0.224, 0.516 | | 0.481, 0.626 | |

Note. N = 842 school/grade level/cohort combinations.
* $p < 0.05$.
[a] Reference group.

are proprietary, and cannot be shared.

## 3. Results

### 3.1. To what extent do school characteristics explain measures of school climate?

As described earlier, student PSF scores for relationships with school personnel and school safety climate were averaged by group (school/grade level/cohort) to derive the school climate measures of *school relationships* and *school safety*. A multilevel linear model was used with groups (level 1) nested within schools (level 2).

School and group characteristics accounted for much of the variation in school relationships (Table 4). A majority of the total explained variance of school safety was explained by the school characteristics (level 2 $R = 0.48$, total $R = 0.63$). Less than half of the total explained variance of school relationships was explained by the school characteristics (level 2 $R = 0.22$, total $R = 0.52$). There was considerable variation in both measures of school climate across grade levels, with both measures decreasing drastically with grade level. Surprisingly, both school relationships (β = 0.35) and school safety (β = 0.34) were considerably higher when measured during a school transition year. For example, school relationships were 0.35 group-level standard deviations higher for groups who were in a school transition year.

School poverty concentration was negatively related to both measures of school climate, but had a stronger relationship with school safety (β = −0.45) than school relationships (β = −0.13). School safety dropped by 0.45 group-level standard deviations for each standard deviation increase in school poverty concentration. Larger school class sizes were related to lower school climate scores, but neither school locale nor school racial/ethnic minority concentration helped explain the school climate measures.

Fig. 2 is a scatterplot showing how school safety varies by school poverty concentration and grade level for the 842 groups in the sample. Fig. 2 only captures two of the school characteristics (grade level and poverty concentration) and is shown to illustrate the strength of the relationship with the school safety measure. The trend lines for each grade level show how school safety decreases with both grade level and school poverty concentration. For example, a 6th grade group from a school with 70% of students eligible for free or reduced lunch is expected to have the same school safety score (~45) as a 9th grade group from a school with no students eligible for free or reduced lunch. In sum, school poverty concentration, grade level, and class size account for the majority of variance in the school climate indicators in this study, but the locale of the school and school minority concentration did not account for significant variance in the school climate measures.

### 3.2. Do students' measured PSFs vary systematically with school contextual factors?

Students' PSF scores were regressed on the school characteristics, school climate measures, and student socio-demographic variables (Table 5). Students (level 1) were assumed to be nested within groups (level 2), and groups nested within schools (level 3). The multilevel model was fit for all PSF measures (ten scales and three domains) but we focus only on the domain scores to summarize the results. Because socio-demographic variables are used for covariates and are not of primary interest, results are not shown to conserve space. Full results for each PSF scale are available in the online supplement (see "Regression models for PSFs").

The full model explained more variation in students' social engagement scores (Multiple $R = 0.37$), relative to self-regulation ($R = 0.34$) and motivation scores ($R = 0.25$). Group and school characteristics accounted for a majority of the explained variance (level 2 & 3 $R = 0.19, 0.35, 0.25$) for motivation, social engagement, and self-regulation, respectively. The remainder was explained by the student socio-demographic variables.

Higher school poverty concentration was related to lower student PSF scores, while higher school racial/ethnic minority concentration was related to higher student PSF scores. The relationships were strongest for the self-regulation domain (β = −0.08 for school poverty, β = 0.06 for school minority concentration). Relative to students attending city schools, students in rural schools had lower self-regulation (β = −0.10). Motivation and social engagement scores decreased with grade level, while self-regulation scores were higher for grades 6 and 9, relative to grades 7 and 8. Note that the regression coefficients are beta weights, and those observed for students' PSF scores represent small effect sizes.

For all three domains, student PSFs increased with the school climate measures. However, the relationship between school safety and student PSFs was much stronger than the relationships between school relationships and student PSFs. Motivation increased by 0.10 standard deviations for each unit increase in school safety, and increased by 0.02 standard deviations for each unit increase in school relationships. A similar pattern was observed for self-regulation scores (β = 0.12 for school safety, β = 0.02 for school relationships). Students' social engagement scores were most sensitive to changes in school climate (β = 0.21 for school safety, β = 0.08 for school relationships). In sum, relationships with student PSFs were stronger for the school climate measures than for school poverty concentration. School minority concentration and school climate had a positive relationship with student PSF scores, while the contextual factors of student grade level and school poverty level had a negative relationship with student PSF scores.

### 3.3. Is the relationship between PSFs and educational outcomes moderated by school contextual factors?

The PSF measures used for this study were designed to help identify students at risk of adverse educational outcomes, such as failing grades, behavior issues, and dropout. If the relationship of student PSFs and student outcomes depends on school context, this would be evidence that the interpretations made with the PSF measures may not be as valid for some school contexts. Interaction tests are used to test whether the relationship of PSFs and educational outcomes varies by school context.

Table 6 provides the multilevel regression results for the four

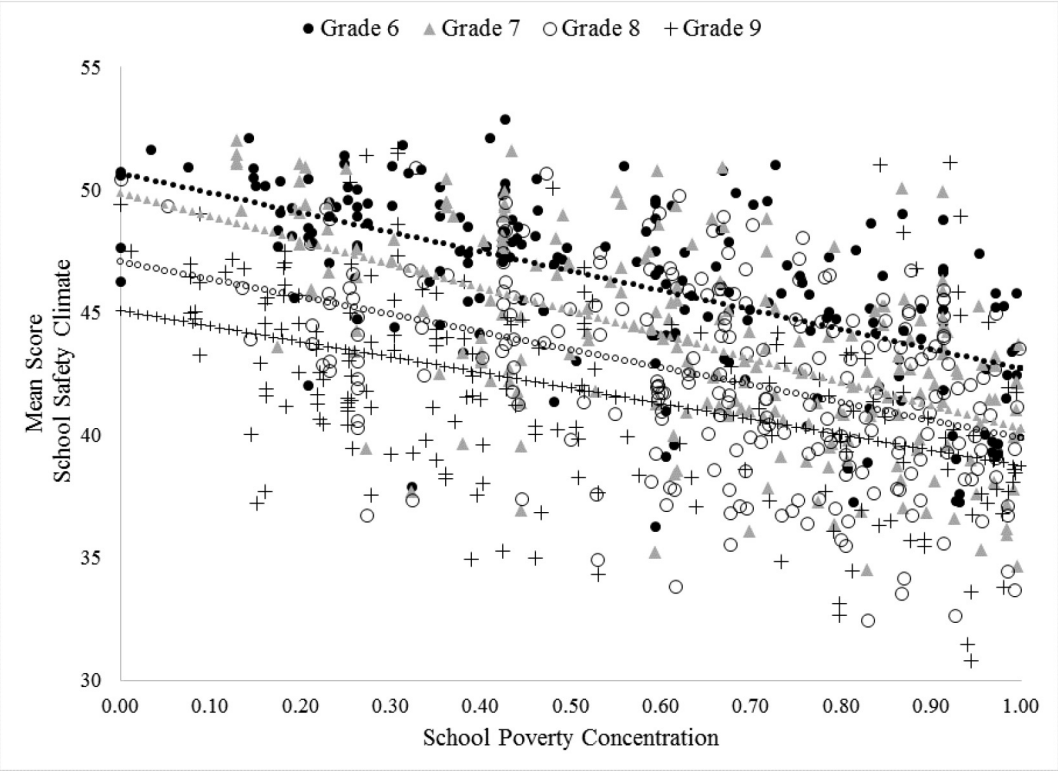


**Fig. 2.** Scatterplot of group school safety by school poverty concentration and grade level (N = 842 groups). The school safety scores are reported on the original 10–60 scale, not the standardized scale used for analyses.

**Table 5**
Model 2: relating school characteristics, measures of school climate, and student socio-demographics to student PSFs.

| Predictor | Motivation | | Social engagement | | Self-regulation | |
|---|---|---|---|---|---|---|
| | β | 95% CI | β | 95% CI | β | 95% CI |
| Intercept | 0.17* | 0.13, 0.22 | 0.08* | 0.06, 0.11 | 0.33* | 0.29, 0.38 |
| School class size | 0.02* | 0.00, 0.03 | 0.01* | 0.00, 0.01 | 0.05* | 0.03, 0.06 |
| School poverty level | −0.03* | −0.05, −0.01 | −0.03* | −0.04, −0.01 | −0.08* | −0.10, −0.06 |
| School minority % | 0.05* | 0.03, 0.07 | 0.04* | 0.02, 0.05 | 0.06* | 0.04, 0.08 |
| School locale | | | | | | |
| Rural | −0.01 | −0.04, 0.03 | −0.02 | −0.03, 0.00 | −0.10* | −0.14, −0.06 |
| Town | 0.02 | −0.02, 0.05 | 0.00 | −0.02, 0.02 | −0.02 | −0.06, 0.02 |
| Suburban | 0.00 | −0.04, 0.03 | −0.01 | −0.03, 0.01 | −0.04* | −0.08, −0.00 |
| City[a] | | | | | | |
| Grade level | | | | | | |
| 6 | 0.15* | 0.12, 0.19 | 0.18* | 0.16, 0.20 | 0.04 | −0.00, 0.08 |
| 7 | 0.08* | 0.04, 0.12 | 0.12* | 0.09, 0.14 | −0.06* | −0.10, −0.02 |
| 8 | 0.04* | 0.00, 0.08 | 0.05* | 0.03, 0.08 | −0.06* | −0.10, −0.02 |
| 9[a] | | | | | | |
| Transition year | −0.01 | −0.04, 0.02 | 0.00 | −0.02, 0.02 | 0.02 | −0.01, 0.06 |
| School relationships | 0.02* | 0.01, 0.04 | 0.08* | 0.07, 0.10 | 0.02* | 0.00, 0.04 |
| School safety | 0.10* | 0.08, 0.12 | 0.21* | 0.20, 0.23 | 0.12* | 0.10, 0.14 |
| $R^2$ (level 3, level 2&3, level 1 & 2 & 3) | 0.014, 0.037, 0.062 | | 0.029, 0.125, 0.137 | | 0.037, 0.064, 0.114 | |
| $R$ (level 3, level 2 & 3, level 1 & 2 & 3) | 0.118, 0.193, 0.250 | | 0.170, 0.354, 0.370 | | 0.193, 0.252, 0.338 | |

Note. N = 121,595 students.
* $p < 0.05$.
[a] Reference group.

outcomes (poor grades, Explore Composite score, suspension from school, and absences). Models were fit for each student PSF measure (ten scales and three domains) but we focus only on the domain scores to summarize the results. Again, the results for the socio-demographic covariates are not shown to conserve space. Full results for each PSF scale are available in the online supplement (see "Regression models for outcomes"). Three of the four outcomes are coded as adverse outcomes (e.g., poor grades instead of good grades), so positive regression coefficients suggest greater risk. The overall rates of adverse outcomes were 19% for poor grades, 14% for suspension from school, and 17% for high absenteeism. Positive regression coefficients for Explore Composite score suggest greater academic readiness.

For absences and Explore Composite score, the school and group characteristics accounted for most of the explained variance. After entering the level 2 (groups) and 3 (schools) predictors, $R$ was 0.38 for Explore Composite and 0.21 for absences. After entering the level 1

**Table 6**
Model 3: testing moderating effects of school context and PSFs on educational outcomes.

| Predictor | Educational outcome (PSF tested) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Poor grades (motivation) | | Explore composite (motivation) | | Suspension (self-regulation) | | High absence (social engagement) | |
| | β | 95% CI | β | 95% CI | β | 95% CI | β | 95% CI |
| Intercept | −2.07* | −2.19, −1.95 | 0.51* | 0.35, 0.66 | −2.62* | −2.75, −2.49 | −1.80* | −1.91, −1.69 |
| School class size | −0.07* | −0.11, −0.04 | 0.03 | −0.01, 0.07 | −0.08* | −0.12, −0.05 | −0.07* | −0.10, −0.04 |
| School poverty level | 0.21* | 0.15, 0.26 | −0.23* | −0.29, −0.17 | 0.20* | 0.15, 0.26 | 0.14* | 0.09, 0.19 |
| School minority % | −0.15* | −0.20, −0.09 | −0.01 | −0.07, 0.05 | 0.01 | −0.04, 0.07 | −0.07* | −0.12, −0.02 |
| School locale | | | | | | | | |
| Rural | −0.01 | −0.10, 0.08 | 0.01 | −0.11, 0.12 | −0.24* | −0.33, −0.15 | −0.10* | −0.18, −0.01 |
| Town | −0.01 | −0.11, 0.09 | −0.04 | −0.16, 0.08 | −0.27* | −0.37, −0.18 | 0.01 | −0.08, 0.11 |
| Suburban | −0.04 | −0.13, 0.05 | 0.05 | −0.09, 0.18 | −0.03 | −0.12, 0.05 | −0.10* | −0.19, −0.01 |
| City[a] | | | | | | | | |
| Grade level | | | | | | | | |
| 6 | −0.24* | −0.34, −0.14 | −0.28* | −0.41, −0.16 | −0.44* | −0.55, −0.33 | 0.34* | 0.24, 0.44 |
| 7 | −0.09 | −0.20, 0.01 | −0.27* | −0.39, −0.14 | −0.35* | −0.47, −0.23 | 0.40* | 0.30, 0.50 |
| 8 | −0.01 | −0.12, 0.10 | −0.06 | −0.20, 0.08 | −0.15* | −0.28, −0.03 | 0.30* | 0.19, 0.40 |
| 9[a] | | | | | | | | |
| Transition year | 0.03 | −0.05, 0.12 | −0.15* | −0.23, −0.08 | 0.01 | −0.09, 0.12 | −0.02 | −0.10, 0.06 |
| School relationships | −0.01 | −0.05, 0.04 | 0.04 | −0.00, 0.09 | −0.07* | −0.13, −0.02 | 0.08* | 0.04, 0.13 |
| School safety | −0.08* | −0.13, −0.03 | −0.02 | −0.08, 0.05 | −0.08* | −0.14, −0.02 | −0.20* | −0.25, −0.16 |
| PSF | −0.87* | −0.94, −0.81 | 0.15* | 0.09, 0.22 | −1.31* | −1.40, −1.22 | −0.32* | −0.38, −0.25 |
| Interactions with PSF | | | | | | | | |
| School class size | −0.02* | −0.04, −0.00 | 0.02* | 0.01, 0.04 | −0.03* | −0.05, −0.01 | −0.02 | −0.03, 0.00 |
| School poverty level | 0.08* | 0.05, 0.10 | −0.02 | −0.04, 0.00 | 0.06* | 0.02, 0.10 | 0.02 | −0.01, 0.04 |
| School minority % | 0.03 | −0.00, 0.05 | 0.00 | −0.02, 0.03 | 0.00 | −0.04, 0.03 | −0.03* | −0.06, −0.00 |
| School locale | | | | | | | | |
| Rural | 0.07* | 0.02, 0.11 | 0.04* | 0.01, 0.08 | 0.11* | 0.05, 0.17 | −0.02 | −0.06, 0.03 |
| Town | −0.03 | −0.08, 0.01 | 0.08* | 0.05, 0.12 | 0.08* | 0.02, 0.14 | 0.00 | −0.05, 0.04 |
| Suburban | 0.01 | −0.03, 0.06 | 0.02 | −0.02, 0.06 | 0.08* | 0.02, 0.13 | −0.01 | −0.05, 0.04 |
| City[a] | | | | | | | | |
| Grade level | | | | | | | | |
| 6 | 0.14* | 0.08, 0.20 | 0.02 | −0.03, 0.08 | 0.15* | 0.07, 0.23 | 0.08* | 0.02, 0.14 |
| 7 | 0.03 | −0.03, 0.09 | 0.02 | −0.03, 0.08 | 0.15* | 0.06, 0.23 | 0.04 | −0.02, 0.10 |
| 8 | −0.02 | −0.09, 0.05 | 0.05 | −0.02, 0.12 | 0.07 | −0.02, 0.16 | 0.02 | −0.05, 0.09 |
| 9[a] | | | | | | | | |
| Transition year | 0.01 | −0.05, 0.06 | −0.03 | −0.07, 0.01 | −0.01 | −0.08, 0.07 | −0.02 | −0.07, 0.04 |
| School relationships | 0.02 | −0.01, 0.05 | 0.03* | 0.00, 0.05 | −0.07* | −0.11, −0.04 | −0.01 | −0.04, 0.02 |
| School safety | −0.03 | −0.06, 0.00 | 0.00 | −0.03, 0.03 | 0.03 | −0.01, 0.07 | −0.02 | −0.05, 0.02 |
| $R^2$ (level 3, level 2 & 3, level 1 & 2 & 3) | 0.037, 0.057, 0.262 | | 0.131, 0.143, 0.233 | | 0.049, 0.085, 0.400 | | 0.033, 0.046, 0.079 | |
| $R$ (level 3, level 2 & 3, level 1 & 2 & 3) | 0.192, 0.238, 0.511 | | 0.362, 0.378, 0.482 | | 0.221, 0.292, 0.633 | | 0.181, 0.214, 0.280 | |

Note. For this analysis, one PSF is tested for each outcome. Each outcome is paired with the PSF domain expected to have the strongest relationship with the outcome.
* $p < 0.05$.
[a] Reference group.

(student) predictors, the total $R$ was 0.48 for Explore Composite and 0.28 for absences. For poor grades and suspension from school, the school and group characteristics accounted for a smaller portion of the explained variance (for poor grades, level 2 & 3 $R = 0.24$, total $R = 0.51$; for suspension from school, level 2 & 3 $R = 0.29$, total $R = 0.63$).

For all four outcomes, higher school poverty concentration was related to adverse outcomes. For example, the logistic regression coefficient for poor grades was β = 0.21. This means that the odds of poor grades increased by a factor of 1.23 for each standard deviation increase in school poverty concentration.[4] Higher school minority concentration was related to lower risk of poor grades and lower risk of absences. Risk of suspension from school was lower for students from rural and town locales, relative to students from city and suburban schools. Students in lower grade levels had less risk of poor grades and suspension, but greater risk of absences.

Higher school safety was related to lower risk of poor grades, suspension, and absences. For each standard deviation increase in school safety, the odds of high absences decreased by a factor of 0.82. Higher school relationships were related to lower suspension rates and higher absence rates. For each standard deviation increase in school relationships, the odds of suspension decreased by a factor of 0.93.

Student PSF scores were predictive of the outcomes, with coefficients in the expected directions. Motivation predicted poor grades (β = −0.87) and Explore Composite score (β = 0.15), self-regulation predicted suspension (β = −1.31), and social engagement predicted high absences (β = −0.32). Several interactions of student PSFs and school context variables were significant, suggesting some differences in relationships of PSF and outcomes across school contexts. Higher school poverty concentration was associated with smaller relationships between PSF and poor grades (β = 0.08) and suspension (β = 0.06). The relationship of self-regulation and suspension was strongest for students from city schools, and the relationship of motivation and test scores was strongest for students from rural and town locales. The relationship of self-regulation and suspension increased with student grade level and higher school relationships.

Even though many of the interactions of student PSFs and school context were significant, in most cases the size of the interaction was small in comparison to the main effect of the PSF. For example, in Fig. 3, we plot the relationship of self-regulation score and the probability of suspension from school. The probabilities are computed using the parameter estimates from Table 6, with assumed values of 0 for the variables not contrasted in the figure. (Note that all continuous variables have a mean of 0 and categorical variables are all 0 for the

[4] Odds ratio = exp(0.21) = 1.23

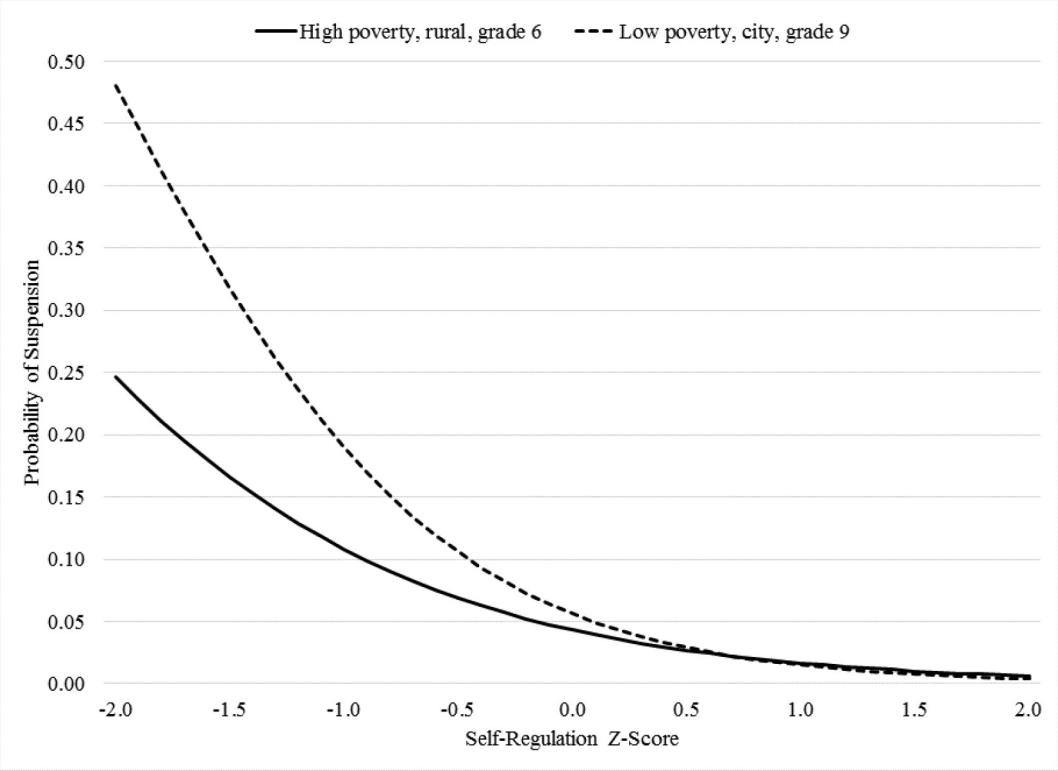


**Fig. 3.** Moderating effects of school poverty, locale, and grade level on relationship of self-regulation and suspension from school.

reference group). The relationship is plotted for two groups of schools: 1) high-poverty (one standard deviation above the mean), rural, grade 6 and 2) low-poverty (one standard deviation below the mean), city, grade 9. The two groups were chosen based on the results of the interaction tests. Group 1 (solid line) represents school context associated with the smallest relationships of self-regulation, whereas group 2 (dotted line) represents school context associated with the largest relationships of self-regulation. Consequently, the slope for group 2 is most pronounced. However, for both groups of schools, higher self-regulation scores are associated with lower probability of being suspended from school. In sum, the relationships of the PSFs to the academic outcomes do not appear to be strongly moderated by the school contextual variables.

## 4. Discussion

### 4.1. Research questions

The purpose of this study was to examine how school context variables relate to student PSFs, and whether they moderate the established relationship between PSFs and academic outcomes. To this end, three research questions were proposed. We discuss each of them in turn.

#### 4.1.1. To what extent do school characteristics explain measures of school climate?

School characteristics were predictive of the two school climate indicators in this study (school relationships and school safety), with school climate scores consistently lower for groups in higher grade levels. One interesting finding was that both school relationships and school safety were considerably higher when measured during a school transition year. Perhaps schools focus more resources on those students in transition grades in order to help those students adjust, and focus fewer resources on other grades. Another possible explanation is that students in a transition year benefit from the novelty of being in a new school environment. Developing new friendships and interacting with different school personnel might lead to positive perceptions of school safety and school relationships. Students new to a school may be less likely to suffer from lingering effects (e.g., bad reputation) from negative school experiences that occurred in the past.

School poverty concentration was negatively related to both of the school climate indicators. The school safety indicator, in particular, decreased as both poverty and grade level increased. Other research has shown that positive behaviors and attitudes tend to decrease around 8th–9th grade, before increasing again at 10th grade (e.g., Soto, John, Gosling, & Potter, 2011). These results could therefore be a part of this larger trend, as school safety climate was self-assessed as an attitude by the student participants. This could suggest that these developmental trends are difficult to counteract, and that because they eventually correct themselves, there is not a lot of pressure on educators to allocate resources to these factors. However, when there are more supportive services designed to combat poverty and provide resources to students, the negative developmental trends take a less pronounced dip (or merely flatten) and begin to increase again sooner than they would otherwise (Way, McCormick, & Kearns, 2016).

#### 4.1.2. Do students' measured PSFs vary systematically with school context factors?

Several of the school context factors were associated with the PSFs. Motivation and social engagement scores decreased with grade level, although self-regulation was higher in grade 9 than in grades 7 and 8. These results fit with the common developmental trends noted in Section 4.1.1. Higher school poverty concentration was related to lower student PSF scores, while higher school racial/ethnic minority concentration was related to higher student PSF scores. This is an interesting finding, especially as poverty concentration and minority status tend to covary (House & Williams, 2000). This finding supports a hopeful message that schools with high concentrations of minority students are just as capable of fostering positive psychosocial factors as predominantly white schools, once SES differences are addressed.

There was a positive relationship between the two indicators of school climate and the student PSFs, with the relationships between school safety and PSFs being stronger than the relationships between school relationships and PSFs. While the school safety measure did not directly measure peer victimization or bullying, we hypothesize that students are more likely to experience peer victimization or bullying in unsafe school environments, and this could lead to lower PSF scores and adverse educational outcomes. Other research suggests that emotional regulation (Gardner, Betts, Stiller, & Coates, 2017) and resilience (Zhou, Liu, Niu, Sun, & Fan, 2017) can mediate effects of peer victimization. More research is needed to understand how our measure of school safety relates to incidence of bullying, and whether student PSFs mediate the negative effects of bullying.

The stronger predictive relationships of school safety could also be due to the subjective nature of how school safety was assessed in this study. Student perceptions of school relationships, although subjectively self-assessed, are more dependent on school adults actively engaging with the students than student perceptions of school safety. Thus, they have slightly less in common with the PSFs than perceptions of school safety, both of which are more reliant on students reflecting on their own attitudes and behavior.

#### *4.1.3. Is the relationship between PSFs and educational outcomes (grades, standardized test scores, suspension from school, and absences) moderated by school context factors?*

The relationships between PSFs and educational outcomes in this study were moderated by school context factors, but in most cases, the interactions were small in comparison to be the main effect of the PSF. This suggests that the PSFs and school context factors are more important in and of themselves when predicting outcomes of interest than combinations of these factors. There were a couple of school context factor relationships with outcomes worth noting. First, higher school minority concentration was related to lower risk of poor grades and lower risk of absences. Second, higher perceptions of school safety were related to lower risk of poor grades, suspension, and absences. This fits with previous findings showing that students who feel safe have better academic outcomes (e.g., Lacoe, 2013; Milam, Furr-Holden, & Leaf, 2010; Skiba, Simmons, Peterson, & Forde, 2006).

### *4.2. Implications for comparing and interpreting PSFs across different school contexts*

These results have several implications for interpreting PSFs in different school contexts. The first is that the level of PSFs will, on average, depend on the grade level in question. The findings of this study and others (e.g., Soto et al., 2011) suggest that seeing lower levels of PSFs in 8th or 9th grade is not as alarming as one might expect, and furthermore, efforts can be undertaken to mitigate these trends. It is also encouraging that, all else being equal, school minority concentration is associated with higher PSFs and less risk of poor grades and absences. Instead, school poverty concentration appears to be a risk factor for lower PSFs in students. This is not a novel finding, as research has long shown that poverty concentration has negative impacts on educational outcomes (Anderson, Hollinger, & Conary, 1992), and that even higher-SES students' skills suffer when placed in schools with high poverty concentrations (NAACP & NYACLU, 2001). Thus, to have the most impact, resources aimed at improving students' school and college readiness should be focused on schools with higher poverty concentrations (assuming they are as effective at these schools).

### *4.3. Study limitations and future directions*

There were several limitations that should be considered when interpreting the results. Although the PSF instrument used in this study encompassed a wide range of psychosocial skills, it was the only instrument used. Incorporating more instruments in future studies would allow for a more thorough examination of the relationships between school contexts and PSFs. Additionally, students self-reported three of the four academic outcomes, rather than schools or teachers providing more objective, other-report data. This is less of a concern for a preliminary examination of the relationships between the variables in this study, especially given the long history of PSFs being predictive of academic outcomes (e.g., Poropat, 2009). One area where this may have been more impactful in this study is the reliance on student self-ratings for measures of school climate. Although there are more objective methods to assess school safety (number of bullying incidents, accidents, etc.), it is likely that the perception of safety is more important for determining individual outcomes. This is one potential explanation for the instances of larger relationships of school safety climate with PSFs and outcomes as compared to school relationships. Finally, the study was not designed to detect causal relationships among the study variables. The use of cross-sectional data with no experimental manipulation of school contextual factors makes it impossible to conclude that the relationships of school contextual variables and student PSFs are causal. Future research will help to address some of these limitations and clarify the relationships between PSFs and school context variables and how the latter may moderate the established relationships between PSFs and academic outcomes.

### *4.4. Conclusions*

This study is among the first to examine the relationship between school context variables and PSFs, and whether they interact to explain academic outcomes. There were a number of interesting relationships between PSFs and school context variables, as well as between those variables and outcomes. However, the interactions were less substantial than the main effects, supporting the importance of PSFs across school contexts. Future research can further explore the nature of these relationships by building on these findings and addressing the limitations of this study.

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