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Do school resources influence the relationship between adolescent financial background and their school perceptions?

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Abstract

BACKGROUND—Socioeconomic status (SES) influences students' school perceptions and affects their performance, engagement, and personal beliefs. This study examined the effects of school population SES and school resources on the association between student SES and student perceptions.

METHODS—School liking, classmate social relationships, family affluence, and experience of hunger were assessed in a nationally representative sample of 12,642 students (grades 5–10) in the 2009–10 Health Behavior in School-Aged Children study. School characteristics included school meal program, Title I dollars/student, school resources, and urban/rural status. Multilevel analysis was used.

RESULTS—At the individual level, both school liking and social relationships were negatively associated with student grade level. Boys liked school less and had more positive perceptions of social relationships than girls. Students in rural schools and who experienced hunger liked schools less and had poorer perceptions of social relationships than their respective counterparts. School-level percentage of students eligible for free/reduced meals accounted for 33% of the between-school variance in social relationships.

CONCLUSIONS—Family and school economic characteristics and grade level influenced students' school perceptions. The associations between student SES, school population SES, and school perceptions suggests that school health professionals should recognize and address student economic issues at school.

Keywords

School funding; school psychology; professional preparation of school health personnel

Adolescents' perceptions of school influence their school performance, engagement, and personal beliefs.^{1,2} Positive perceptions of school may inspire students to form a commitment to school, enabling them to benefit from schools' social, emotional, and intellectual skill building.¹ Conversely, students who perceive school negatively are at a greater risk of engaging in risky behaviors such as substance use, truancy, and violence.³ Risky behaviors established during adolescence may last into adulthood.⁴

Subjective perceptions of specific situations influence subsequent behavior;⁵ students' perceptions of their school environment influence their behavior and academic performance.⁶ For example, studies of adolescents show students who like school having higher educational motivation and higher grade point averages than students who do not like school.⁷ The association between school perceptions and academic achievement illustrates the influence that students' school perceptions have on their behavior at school. However, determinants of school perceptions have not been investigated thoroughly.

From an ecological perspective, students' school outcomes are strongly influenced by their neighborhoods, home environment, schools they attend, and resources available to them.^{8,9} Student socioeconomic status (SES) has been associated with poor academic achievement,¹⁰ and specifically SES differences in family and neighborhood characteristics.¹¹ However, it is also possible that student and school SES are related to school perceptions, with consequences for the students' academic performance.

In the United States, school population SES is related to school funding, resources, and demographic composition,¹² and may influence students' perceptions of the school environment. Furthermore, peer groups influence student behaviors, attitudes, and perceptions.¹³ Students attending schools with the majority of the population coming from a low SES household, usually live in neighborhoods with high levels of poverty, unemployment, violence, and crime,¹⁴ and generally have the poorest academic achievement and social skills.^{15,16} In part, this may be attributable to the negative behaviors children from low income neighborhoods observe in their homes and neighborhoods¹⁶ which may result in student norms of negative school behaviors and poorer academic performance. According to findings in the 2011 United States National Assessment of Education Progress (NAEP), 74% of the students eligible for free or reduced meals had math and reading scores below the 25th percentile.¹⁷ Schools with an even distribution of students' individual SES may foster higher academic achievement¹⁸ and protect against negative school perceptions among low SES students. In contrast, in schools where there is an imbalance among SES groups, student attitudes may be overly influenced by the school's dominant SES group. In a study investigating school and individual SES influence on

Australian students' educational outcomes, Perry and McConney¹⁸ found a consistent increase in mathematics and literacy performance across student SES quintiles as school population SES increased. Notably, although high SES students in low SES schools outperformed low SES students in high SES schools, both groups performed significantly better in high SES schools compared to their SES groups in low SES schools.¹⁸ Similarly, Caldas and Bankston¹⁹ demonstrated a collective influence of home and school SES on academic achievement. These findings suggest that the general affluence of the school may have an independent influence on school perceptions in addition to academic achievement.

Students' school perceptions also may be influenced by the school's SES, through the resources provided by schools. Psychological, social, and environmental support provided by the schools' resources may stimulate and sustain students' sense of belonging to the school.²⁰ Schools with low SES populations may have less adequate educational resources, including inexperienced or undertrained teachers, insufficient academic materials, deficient health education courses, and a lack of after school recreational activities, which may increase negative school perceptions.²¹ Highly affluent schools can finance school physical activity programs and extracurricular activities; conversely, economically disadvantaged schools frequently have to reduce physical activity programs because of pressure to concentrate on standardized test scores.²² Potentially, schools provide students with learning opportunities, teacher support, and a sense of belonging.²³ As such, high SES schools may provide a reprieve for students from high-risk home environments that is not as available to students attending schools with insufficient resources.

In general, students in higher grades, are more likely to dislike school and have higher rates of truancy, delinquency, and school dropout, and lower academic achievement.²⁴ This vulnerable period marked by increasing self-consciousness and social acceptance may help shape adolescents' school perceptions.²⁵ Furthermore, older students may have more responsibilities, such as increased academic workload, social pressures, and afterschool employment,²⁶ which may negatively influence their school perceptions. This increase in responsibility may disproportionately affect youth from disadvantaged backgrounds, with these youths experiencing greater responsibilities at a younger age than their more affluent peers.²⁷ However, there is little research on the effect of student grade level on students' school perceptions.

Most research has focused on understanding individual and school-based determinants of academic achievement. However, students' school perceptions may influence their motivation to achieve academically. Research is needed that investigates the roles that individual and school level factors play in students' school perceptions. Few studies have looked at the relations of school perceptions with measures of institutional resources and school population SES or the effect of student grade level on school perceptions. Thus, the purpose of this study is to examine whether the associations between student SES and perceptions of school are linked to school population SES and resources, and whether these relations differ across sex, grade level, and urban/rural metropolitan status. We hypothesized that school perceptions are positively associated with student SES, school population SES, and school resources, and negatively associated with student grade level. Finally, we

hypothesized that school population SES and school resources explain variation in student perceptions of school beyond that explained by student SES alone.

METHODS

Participants

The target population for the Health Behavior in School-Aged Children (HBSC) US Survey was all students enrolled in grades 5 to 10 in public and private schools in the 50 states and the District of Columbia during the 2009–10 school year. A 3-stage cluster sampling design was used. The first stage sampling frame contained sampling units (SUs) formed by grouping individual school districts within a county or in adjacent counties. For sampling SUs, the population of SUs was stratified by Census divisions. A sample of SUs was selected within each Census division with probability proportional to total enrollment in grades 5 through 10 in each SU in the Census division. A small number of large SUs were included in the sample with certainty. At the second stage, schools were sampled from each selected SU with probability proportional to the total enrollment in grades 5 through 10. At the third stage, a simple random sample of classes was selected from grades 5 through 10 from selected schools. Participation was 85.5% among 14,620 eligible students, with 12,642 US students who completed the 2009–10 HBS survey. Overall, 314 schools were recruited and African-American and Hispanic students were oversampled to obtain better estimates for those groups.

Instruments

Student-level variables were obtained from the student questionnaires; school level variables were obtained from school administrator questionnaires.

Student-level Variables

School perception—Students' school perceptions were assessed on 2 dimensions: general school perception (liking school) and perceived classmate social relationships. Liking school was measured with a single question "how do you feel about school at present" with responses ranging from (1) I like it a lot, to (4) I don't like it at all. Test-retest reliability of this measure is high at 0.80 to 0.90.^{28,29} Classmate social relationships was measured using a previously validated scale²⁹ consisting of 3 questions: (1) the students in my class(es) enjoy being together, (2) most of the students in my class(es) are kind and helpful, and (3) other students accept me as I am. Options ranged from (1) strongly agree through (5) strongly disagree. The internal consistency coefficient was acceptable ($\alpha = 0.69$), and a composite mean was used. Both variables were coded so that a higher score represented more positive perceptions.

Student SES—The Family Affluence Scale (FAS) was measured by asking adolescents 4 questions on family material wealth:³⁰ (cars owned (0=None, 1=Yes, and 2=Two or more); computers owned (0=None, 1=One, 2=Two, and 3=More than two); whether the student had his/her own bedroom (0=No and 1=Yes); and the number of family vacations in the last 12 months (0=Not at all, 1=Once, 2=Twice, and 3=More than twice). Students were then categorized as low (< 4), moderate (5 or 6), and high family affluence (7 or 8).³¹ In a second

single item, how frequently the adolescent experiences hunger (goes to bed or school hungry, 1=always – 4=Never), was also assessed.

School-level Variables

School population SES—School administrators answered questions from the US HBSC school administrator questionnaire, regarding the number of students eligible for free/reduced priced meals and amount of Title I dollars received per student. Percentage of students who were eligible for free/reduced priced meals was calculated by dividing the number of eligible students in a school by total enrolled students in the school. The measures for free/reduced priced meals³² and Title I dollars received per student³³ were derived from previous studies that measured school-level characteristics.

School location—Based on geographic data, the location of the school was coded as urban, rural, or suburban.

School resources—The HBSC school administrator questionnaire assessed whether or not the school had 11 physical activity facilities within the school, the schoolyard (within 200 meters), or the school neighborhood (200 yards to 2000 yards), and whether or not students had access to these facilities during unstructured school time. Examples include: gymnasium/sport hall, swimming facilities, football and/or soccer field, open unmarked field space, playground equipment, and activity trails. The sum of number of physical activity resources present and, separately, and the sum of the number of physical activity facilities to which students had access were calculated, with possible scores ranging from 0 to 11. Items measuring physical activity resources have been reported in previous studies.³⁴

Administrators also reported whether or not the school provided staff development opportunities for administrators, teachers, and/or cafeteria staff on the following topics: nutrition, physical activity, and information and communication technology/computer (ICT) use. The “yes” responses to the 9 items (3 topic areas by 3 different staff groups) were summed.

To assess the breadth of content covered in health education courses administrators indicated whether or not 16 topics were covered in required courses for grades 6 to 10. The 16 topics were categorized into 5 dichotomous groups: general health (eg, injury prevention, physical activity, nutrition); mental health (eg, suicide prevention, emotional health); violence prevention (eg, bullying prevention, fighting prevention) sexual health (eg, human immunodeficiency virus (HIV) prevention, human sexuality); substance use (eg, tobacco, alcohol, or other drug use prevention). Dichotomous variables were created indicating the presence of any course within a category: 0= no and 1= yes.

Procedure

Trained research assistants administered the HBSC surveys, and participants completed the survey anonymously. Youth and parental assent/consent were obtained consistent with the requirements of each school district.

Data Analysis

Features of complex survey design (ie, stratification, clustering and sampling weights) were taken into account in all SAS and Mplus procedures. Bivariate linear regression was used to estimate the associations among students' school perceptions, grade level, race/ethnicity, sex, student SES, school population SES, school resources, and school location. Variables significant at $p < .10$ were included in the subsequent regression models.

A multilevel analysis approach was used to quantify associations between school perceptions (school liking and perceptions of classmate social relationships) and student SES, school population SES, and school resources. A series of the models were estimated and selected based on the Hox 5-step procedure³⁵ using school liking and, separately, classmate social relationships as the dependent variable. The between-school variation in school perceptions was assessed without including explanatory variables at the student or school level and intra-class correlation coefficients (ICCs) were calculated. The contributions of the student-level variables were assessed with the variance of all slopes fixed. School-level variables were then added to the model. In the next step, the random coefficient model was run with the slopes of the student-level variables allowed to vary (random effects). In the final model, cross-level interactions between school and student-level variables were examined.

Multilevel analyses were performed using Mplus 7.³⁶ In all analyses, maximum likelihood parameter estimates with standard errors (MLR) were estimated, which are robust to deviations from normality and non-independence of observations. Deviance tests were conducted to compare nested models to test the model improvement and determine parsimonious models. Model fit was also assessed using Akaike's information criterion (AIC) and Schwarz's Bayesian Information Criterion (BIC), smaller values of which represents a better fit of hypothesized model.³⁷

RESULTS

Sample Characteristics

The sample consisted of 12,642 adolescents, with 48% girls, 50% Caucasian Americans, 17% African Americans, and 20% Hispanic Americans. The weighted mean age of the sample was 13.4 years ($SE = 0.1$). The demographic summary of participants is shown in Table 1.

Relations between School Liking, Student SES, and School Characteristics

In the bivariate analysis (Table 2), students in grades 7–10 liked school less than students in the 5th grade. Boys liked school less than girls and students in rural schools liked school less than students in urban schools. School liking was associated with student SES, as measured by affluence and experience of hunger, such that lower affluence was associated with liking school less. Because no association was found ($p < .10$), school population SES variables were not included in the subsequent regressions. Students attending schools offering sexual health topics in health education courses liked school less than students attending schools offering no sexual health topics.

The ICC for school effects is 0.07. Result of the deviance test shows that the model with fixed effects of 4 student-level variables (sex, grade level, student SES, and experience of hunger) substantially improved the fit of the model ($\chi^2 = 317.03$, $df = 9$, $p < .001$) compared to the null model (Table 3, Model 2). The addition of the school-level variables (ie, school location and sexual health class) did not significantly improve the model (Model 3; $\chi^2 = 3.73$, $df = 3$, $p > .05$), and therefore, were not included in subsequent models. In the random effects model (Model 4), student-level slopes were allowed to vary; the deviance test shows that the model was substantially improved over Model 2 ($\chi^2 = 61.61$, $df = 18$, $p < .001$) with the smallest AIC and BIC values. The addition of the cross-level interactions did not significantly improve the model fit (data not shown, $\chi^2 = 1.59$, $df = 6$, $p > .05$). Therefore, we considered Model 4 the final model for school liking. In Model 4, sex, grade level, and experiencing hunger were significantly associated with school liking. Boys liked school less than girls and students in 7th, 8th, 9th, and 10th grades liked school less than students in the 5th grade. Students who experienced hunger liked school less and students with moderate SES liked school less than students with a high SES. Compared to the null model, student-level residual variance was reduced by 7% [(0.732–0.679)/0.732]. School-level residual variance was reduced by 43% [(0.056–0.032)/0.056]; however, the reduced variance was not ascribed to the addition of school-level variables. The slopes of sex and going to bed or school hungry had significant variance between schools but non-significant cross-level interactions indicated that the current school-level variables did not account for the variation.

Relations between Classmate Social Relationships, Student SES, and School Characteristics

In the bivariate analysis, students in grades 7–10 had poorer perceptions of classmate social relationships compared to 5th grade students. Boys had more positive perceptions of classmate social relationships than girls. Students with low SES had poorer perceptions of classmate social relationships than students with high SES. Similarly, both measures of school SES indicated that lower school SES was associated with poorer perceptions of classmate social relationships. Students attending schools offering sexual health topics had more negative perceptions of classmate social relationships than students attending schools offering no sexual health topics. Compared to students with less access, students with more access to physical activity resources had better perceptions of classmate social relationships (Table 2).

Table 4 shows the results of multilevel analysis for classmate social relationships. The ICC indicated that 7% of variance in perceived classmate social relationships was between schools. The results of the deviance test shows that the fixed effects model with the 4 student-level variables (sex, grade level, student SES, and experienced hunger) significantly improved model fit ($\chi^2 = 219.83$, $df = 9$, $p < .001$) compared to the null model (Table 4, Model 2). The addition of the school-level variable (percentage of students eligible for free/reduced meals) substantially reduced the school-level variance by 33% [(0.038 – 0.026)/0.038] and improved the model fit compared to Model 2 (Model 3, $\chi^2 = 3972.47$, $df = 1$, $p < .001$). The random effects model (Model 4), in which the slopes of the student-level variables were allowed to vary, significantly improved model fit over Model 3 ($\chi^2 = 85.04$,

df = 18, $p < .001$) with the smallest AIC and BIC values. The last model examined the cross-level interactions and did not significantly improve model fit ($\chi^2 = 9.06$, df = 7, $p > .05$, data not shown). Therefore, we considered Model 4 the final model for classmate social relationships. In Model 4, sex, grade level, and experience of hunger were significantly associated with classmate social relationships. Boys had more positive perceptions of classmate social relationships than girls. Students in the 7th, 8th, 9th, and 10th grades had poorer perceptions of classmate social relationships than students in the 5th grade. Students who experienced hunger reported poorer perceptions of classmate social relationships than those who did not experience hunger. The slopes of sex and experienced hunger have significant variance between schools but the school-level variable did not account for the variation because the interactions were not significant.

DISCUSSION

Using nationally representative data, this study examined relations among school characteristics, student SES, and school perceptions and explored the unique contributions of school resources and school population SES to the understanding of school perceptions beyond what was explained by student SES. Student perceptions influence their behavior at school, specifically academic performance.⁶ Consistent with previous research, our findings indicate that school perceptions were associated with student SES.^{10,11} One possible explanation is that stressors experienced by students in impoverished home environments, contribute to the students' negative perceptions.³⁸

Similar to previous research on academic achievement,¹⁹ we found the composition of the school population, particularly school SES, predicted student perceptions of classmate social relationships beyond the effect of individual student SES. This suggests that the dominant SES group may influence students' perceptions. A student attending a school with students from a higher SES background tended to increase his/her academic achievement, regardless of SES, race, or other factors.¹⁹ Our results support similar inferences regarding the influences of student SES and school population SES on perceptions of student social relationships. Students from a range of personal economic circumstances who go to a low SES school are more likely to have negative perceptions of the school.

We found that students in higher grades had poorer school perceptions than students in 5th grade and this difference had a greater magnitude in the higher grades. One explanation is that as students become older they gain more responsibilities.²⁶ As a result, older students may find school less engaging and unrelated to their current interests. Additionally, secondary schools have higher incidences of bullying, victimization, and dating violence than elementary schools;^{39,40} thus, older students' may have poorer perceptions of classmate social relationships because of social issues within the school context. Therefore, it may be especially important that teachers and school administrators develop supportive relationships with students in higher grades. Wentzel⁴¹ found evidence that perceptions of highly supportive relationships with teachers were related to multiple aspects of students' school motivation, including academic interest and motivation to adhere to classroom goals and norms.

Finding no significant associations between the amount of physical activity resources, staff development, and school affluence on school liking was unexpected and suggests that there may be other school resource variables that were not examined that influence school liking. Studies researching school turnover found that teachers leave schools with a majority of minority, low-achieving, and low-income students at higher rates than economically or academically advanced schools.⁴² Economically disadvantaged schools may have to focus funds on resources that will raise standardized test scores which may draw resources away from other areas.²² For example, insufficient janitorial staff to maintain school sanitation may create an atmosphere of disarray and non-caring. Limited special-interest clubs and extracurricular activities may leave students with fewer opportunities to pursue social and personal interests and result in students liking school less. Future research in alternate school characteristic variables, school population SES, and student SES may identify relevant resources to target to improve students' perceptions of schools.

One of the strengths of this study is the use of 2-level data (ie, school and student levels) allowed us to conduct multilevel analysis, a more effective approach to explain how higher level (ie, school level) variables affect lower level (ie, students level) outcomes. A typical ICC for school effects ranges from 0.05 to 0.20 in educational research.⁴³ In the study, the ICCs for both dependent variables were 0.07 indicating 7% of variation in school liking and perceived classmate social relationships were between schools. Future studies examining individual and alternative school-level variables could apply multilevel analysis to account better for the variation between schools.

Limitations

This study has several limitations. The cross-sectional nature restricts causal inferences regarding relations between school outcome variables and their correlates. Longitudinal analyses can confirm current observations, and are recommended for future research. As noted above, the examination of school perceptions is multifaceted, and these analyses consider only 2 possible determinants. Therefore, future research should examine a broader array of student school perceptions as well as a more comprehensive assessment of school-based and culturally-based factors that may be associated with students' school perceptions.

Despite these limitations, this study contributes to the literature by examining the gap between school perceptions of high and low income students. We explored the influence of school population SES and grade level on students' school perceptions. The nationally representative sample indicates our results reflect the experience of the United States' adolescent population.

IMPLICATIONS FOR SCHOOL HEALTH

Through the investigation of school perceptions, which are one determinant of academic achievement, this study extends previous research in academic disparities. Schools face many economic restraints that can make implementing changes difficult. However, school health professionals should recognize and address student economic issues at school by establishing a positive teacher-student relationship to create a space where students feel safe to express any environmental or socioeconomic issues they may face outside of school.

Furthermore, because students' school perceptions change over time, efforts are needed to maintain interest in the relevance of school for students in higher grades. Programs or curricula that modify the current educational context by promoting a communal and health educational environment, such as student participation in school policy management and promotion of cooperative learning strategies, may help to keep students in higher grades engaged.⁴⁴ Additionally, students' increased negative school perceptions may reflect their need for interpersonal competence when encountering problems in school, such as establishing friendships and avoiding bullying or violence. Social skill training should be enhanced when student are shifting from preadolescence to adolescence. Promoting interpersonal competence and educational success through extracurricular activity participation may improve students' school perceptions as they reach higher grades.⁴⁵ Furthermore, school health professionals and administrators should be aware of the influence of school population composition on students' school perceptions. Our results suggest that student economic resources affect the peer environment, and thus, may influence school perceptions. Therefore, school policymakers should promote economic diversity in school population composition and consider specialized programs and classes that promote economic awareness. Schools that promote economic diversity will allow students and teachers from diverse backgrounds to integrate through interactions and coursework. Consequently, students' school perceptions will be less dependent on the perceptions of the school's dominant SES group.

Human Subjects Approval Statement

The HBSC study protocol was approved by the Institutional Review Board of the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development.

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Table 1

Demographic Information of Students and Schools in the 2009–10 US HBSC Survey

	N	Weighted %	Mean	S.E.
Student Traits (N = 12,642)				
Grade				
5	1717	16.43		
6	2050	15.49		
7	2421	16.42		
8	2475	16.44		
9	2072	18.31		
10	1907	16.91		
Race/Ethnicity				
Hispanic	3407	19.90		
Non-Hispanic African Americans	2302	16.61		
Non-Hispanic Whites	5334	50.39		
Other	1458	13.09		
Sex				
Boys	6502	51.98		
Girls	6136	48.02		
Going to Bed/School Hungry				
Always	216	1.64		
Often	506	4.02		
Sometimes	2712	21.28		
Never	8963	73.07		
Family Affluence				
Low	3431	25.37		
Moderate	5850	47.95		
High	3176	26.67		
School Characteristics (N=314)				
School Population SES				
Title 1 Dollars per Student	253		343.79	38.22
% of Free/Reduced Meals	244		44.13	4.36
School Resources				
General Health Topics	242	75.22		
Mental Health Topics	192	58.19		
General Mental Health Topics	242	75.22		
Sexual Health Topics	203	55.95		
Substance Use Topics	238	73.31		
Violence Prevention Topics	205	64.07		
Staff Development Effort	314		3.19	0.24
Physical Activity Resource Access	282		4.90	0.24
Physical Activity Resource	282		3.97	0.26

	N	Weighted %	Mean	S.E.
School Location				
Urban	3837	27.59		
Suburban	4573	43.62		
Rural	3247	28.80		

[†]The numbers may not add to the total due to missing values.

Table 2
Bivariate Associations between School Perceptions and Student SES and School Population SES

	Liking School (N = 12,283)			Classmate Social Relationships (N = 12,090)		
	B	S.E.	P	B	S.E.	P
Student Traits						
Grade						
5	ref	ref	ref	ref	Ref	ref
6	-0.03	0.06	0.65	-0.08	0.06	0.18
7	-0.25	0.05	<.001	-0.14	0.06	<.05
8	-0.34	0.05	<.001	-0.17	0.05	<.001
9	-0.31	0.05	<.001	-0.25	0.05	<.001
10	-0.43	0.05	<.001	-0.33	0.06	<.001
Race/Ethnicity						
White	ref	ref	ref	ref	ref	ref
Hispanic	-0.01	0.04	0.88	-0.004	0.04	0.92
African Americans	0.03	0.04	0.32	-0.03	0.03	0.39
Other	0.01	0.04	0.71	-0.01	0.04	0.82
Boys vs. Girls	-0.11	0.02	<.001	0.10	0.02	<.001
Student SES						
High Affluence	ref	ref	ref	ref	ref	ref
Moderate Affluence	-0.08	0.03	<.01	-0.15	0.03	<.001
Low Affluence	-0.19	0.04	<.001	-0.25	0.04	<.001
Going to Bed/School Hungry	-0.16	0.02	<.001	-0.14	0.02	<.001
School Characteristics						
School Population SES						
% Free/Reduced Meals	-0.001	0.001	0.14	-0.003	0.0007	<.001
Title 1 Dollars per Student	0.00004	0.00007	0.55	-0.0001	0.00007	<.10
School Resources						
General Health Topics (Yes vs. No)	-0.02	0.04	0.59	-0.02	0.04	0.65
Mental Health Topics (Yes vs. No)	-0.04	0.04	0.30	-0.02	0.04	0.64
Sexual Health Topics (Yes vs. No)	-0.08	0.04	<.05	-0.08	0.04	<.05

	Liking School (N = 12,283)			Classmate Social Relationships (N = 12,090)		
	B	S.E.	P	B	S.E.	P
Substance Use Topics (Yes vs. No)	-0.03	0.04	0.53	-0.01	0.04	0.75
Violence Prevention Topics (Yes vs. No)	-0.01	0.04	0.53	-0.01	0.04	0.59
Staff Development Effort	-0.001	0.01	0.85	0.0004	0.01	0.95
Physical Activity Resource Access	0.02	0.01	0.18	0.02	0.01	<.10
Physical Activity Resource	0.02	0.01	0.11	0.01	0.01	0.18
School Location						
Urban	ref	ref	ref	ref	ref	ref
Suburban	-0.05	0.04	0.30	0.03	0.05	0.45
Rural	-0.12	0.05	<.05	-0.0004	0.05	0.99

Table 3
Multilevel Regression of School Liking as a Function of Student and School Resources

	Model 1 (N = 12,282)		Model 2 (N = 12,072)		Model 3 (N = 12,072)		Model 4 (N = 12,072)	
	Coefficients	SE	Coefficients	SE	Coefficients	SE	Coefficients	SE
Student-level fixed effect								
Intercept	3.10***	0.03	3.30***	0.05	3.33***	0.05	3.31***	0.05
Boys vs. Girls			-0.13***	0.03	-0.13***	0.03	-0.13**	0.03
Grade								
5			Ref		Ref		Ref	
6			-0.03	0.07	-0.04	0.07	-0.05	0.07
7			-0.24***	0.06	-0.26***	0.06	-0.25***	0.06
8			-0.35***	0.06	-0.37***	0.07	-0.35***	0.06
9			-0.33***	0.05	-0.34***	0.06	-0.33***	0.06
10			-0.47***	0.05	-0.48***	0.05	-0.47***	0.05
Student SES								
High Affluence			Ref					
Moderate Affluence			-0.07 [†]	0.04	-0.07 [†]	0.04	-0.06	0.04
Low Affluence			-0.01	0.04	0.01	0.03	0.01	0.03
Hunger			-0.16***	0.02	-0.16***	0.02	-0.15***	0.02
School-level fixed effect								
School location								
Urban					Ref			
Suburban					-0.01	0.05		
Rural					-0.08	0.05		
Sexual health class					0.05	0.05		
Random effect (variance estimates)								
Student-level residuals	0.732***		0.709***	0.048	0.709***	0.020	0.679***	0.01
School-level residuals	0.056***		0.031***	0.007	0.030***	0.007	0.032*	0.01

	Model 1 (N = 12,282)		Model 2 (N = 12,072)		Model 3 (N = 12,072)		Model 4 (N = 12,072)	
	Coefficients	SE	Coefficients	SE	Coefficients	SE	Coefficients	SE
Slopes for sex							0.04 [*]	0.01
Slopes for Grade 6 vs. 5							0.09 [†]	0.05
Slopes for Grade 7 vs. 5							0.02	0.15
Slopes for Grade 8 vs. 5							0.01	0.15
Slopes for Grade 9 vs. 5							0.01	0.01
Slopes for Grade 10 vs. 5							0.01	0.01
Slopes for M vs. H Affluence							0.02	0.02
Slopes for L vs. H Affluence							0.01	0.01
Slopes for Hunger							0.02 [*]	0.01
Deviance test								
Estimated parameters (n)	3		12		15		30	
Hierarchical model testing ^a								
H0 value	-15729.8		-15211.1		-15205.8		-15153.1	
H0 factor	3.3412		3.2895		3.1998		2.4456	
χ^2 value			317.03		3.73		61.61 ^b	
df			9		3		18	
p value			<.001		>.05		<.001	

^a Each model was compared to the immediate previous model unless specified and the difference was tested using the Satorra-Bentler Scaled Chi-square at <http://www.statmodel.com/chidiff.shtml>;

^b compared to Model 4 to Model 2;

^c % Meals refers to percentage of students eligible for free/reduced meals; hunger refers to going to bed/school hungry;

^d Model 4 was used as the final model for data interpretation

* p < .05,

** p < .01,

*** p < .001,

[†] from p < .05 to p < .10

Table 4
Multilevel Regression of Classmate Social Relationships as a Function of Student and School Resources

	Model 1 (N = 12,089)		Model 2 (N = 11,899)		Model 3 (N = 9270)		Model 4 (N = 9270)	
	Coefficients	SE	Coefficients	SE	Coefficients	SE	Coefficients	SE
Student-level fixed effect								
Intercept	3.77***	0.03	3.98***	0.05	3.95***	0.05	3.97***	0.05
Boys vs. Girls			0.10***	0.03	0.09***	0.03	0.09**	0.03
Grade								
5			Ref		Ref		Ref	
6			-0.12*	0.06	-0.08	0.06	-0.06	0.06
7			-0.09	0.08	-0.08	0.08	-0.09	0.09
8			-0.21***	0.05	-0.19***	0.06	-0.16*	0.06
9			-0.32***	0.05	-0.32***	0.05	-0.31***	0.05
10			-0.34***	0.07	-0.40***	0.06	-0.39***	0.06
Student SES								
High Affluence			Ref		Ref		Ref	
Moderate Affluence			-0.14**	0.03	-0.10 [†]	0.05	-0.10 [†]	0.05
Low Affluence			-0.08 [†]	0.05	-0.05	0.04	0.05	0.04
Hunger			-0.15***	0.03	-0.14***	0.03	-0.16***	0.03
School-level fixed effect								
% Meals					-0.003***	0.001	-0.004***	0.04
Random effect (variance estimates)								
Student-level residuals	0.713***		0.697***	0.023	0.707***	0.027	0.676***	0.028
School-level residuals	0.057***		0.038***	0.007	0.026***	0.006	0.031**	0.022
Slopes for sex							0.01	0.02
Slopes for Grade 6 vs. 5							0.02	0.02
Slopes for Grade 7 vs. 5							0.09	0.09
Slopes for Grade 8 vs. 5							0.08	0.10

	Model 1 (N = 12,089)	Model 2 (N = 11,899)	Model 3 (N = 9270)	Model 4 (N = 9270)
	Coefficients	SE	Coefficients	SE
Slopes for Grade 9 vs. 5				0.004
Slopes for Grade 10 vs. 5				0.01
Slopes for M vs. H Affluence				0.01
Slopes for L vs. H Affluence				0.01
Slopes for Hunger				0.03*
Deviance test				
Estimated parameters (n)	3	12	13	31
Hierarchical model testing ^a				
H0 value	-15328.0	-14912.8	-11651.8	-11591.5
H0 factor	3.9301	3.8156	3.3958	2.2478
χ^2 value		219.83	3972.47	85.04
df		9	1	18
p value		<.001	<.001	<.001

^a Each model was compared to the immediate previous model and the difference was tested using the Satorra–Bentler Scaled Chi-Square at <http://www.statmodel.com/chidiff.shtml>;

^b % Meals refers to percentage of students eligible for free/reduced Meals;

^c Hunger refers to going to bed/school hungry;

^d Model 4 was used as the final model for data interpretation

* p < .05,

** p < .01,

*** p < .001,

[†] from p < .05 to p < .10