

What is the Value Added by High-School Infrastructure and Teacher Qualities on Student Grades?

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Abstract

The assumption that high-school infrastructure and teacher quality have positive impacts on academic attainments was challenged when Massey and Fischer disclosed a double paradox. First, infrastructure quality has a negative effect on high school GPA (Massey, Charles, Lundy, and Fischer, 2003) and a positive effect on college GPA (Fischer, 2007). And second, teacher quality does not impact GPA, but teachers' disciplinary practices do. How can the same infrastructure have opposite effects on grades when one looks at high school versus college? And why does teacher quality not matter, but disciplinary behavior does matter, to academic performance? Using data from the National Longitudinal Survey of Freshmen, this study analyzes particular measures of school infrastructure to ascertain their effects on grades in high school and college. Our results suggest that the aspect of infrastructure quality that positively affected freshman GPA was overall school quality, while the aspects that negatively affected high school GPA were library quality and school's reputation in the community. Further, teacher quality was not found to be a positive and significant predictor of GPA at either the high school or university level. However, teachers' disciplinary practices, when perceived as either "fair" or "strict" by students, did matter. When discipline was perceived as "fair", there was a positive correlation with high school GPA, and conversely when it was perceived as being "strict" there was a negative impact on high school GPA. This research provides new evidence regarding how particular aspects of infrastructure and teacher qualities precisely affect GPA at both high school and college levels. Studies that do not work with these measures will misestimate the impact of school resources on outcomes.

Keywords: GPA; school resources; infrastructure; teacher quality; teacher disciplinary practices; public schools; private schools; religious schools; value added.

INTRODUCTION

In light of continual discussions regarding amounts of educational spending at both the federal and state levels, in particular on school infrastructure and teacher's pay, the authors sought to ascertain the effectiveness such factors had on student outcomes. Investing in a school's teachers and infrastructure is meant to positively impact student performance through both personal well-being and academic achievement. Yet, counter intuitively, distinguished researchers have discovered the opposite result when working with a longitudinal study of students at very selective colleges. In the Source of the River, it was found, in a longitudinal study of students at elite universities, that school quality infrastructure had a negative effect on

high school grade point average (Massey, 2003). Paradoxically, an article that used the same NLSF data set reports a converse effect on first year of college GPA. In "Settling into Campus Life: Differences by Race/Ethnicity in College Involvement and Outcomes", school quality infrastructure had a positive and significant effect on college GPA (Fischer, 2007). As a student's high school GPA has long been established as the most important determinant of success in college (Atkinson, 2012), we sought to more closely understand the paradox of school infrastructure quality's opposite effects on high school versus first year of college GPA. As overall school quality encompasses both school infrastructure and teacher quality, we further hypothesized that better teacher quality would positively predict a student's high school and college GPA. Therefore both school infrastructure quality and teacher quality indices were tested in relation to three measures of student outcomes: high school and first year of college GPA as well as student reported self-efficacy. In order to more deeply uncover the reasoning behind such as paradox and perhaps demystify certain assumptions of the importance of school infrastructure or teacher quality, both indices were broken down into individual variables each tested in order to more closely identify specific influences. Furthering initial studies set forth in "Settling into Campus Life: Differences by Race/Ethnicity in College Involvement and Outcomes" and Source of the River, we added the SAT variable to test significance in relation to HSGPA and freshman college GPA. As the accuracy of the SAT to be a measure of academic achievement has been held in national debate, we wanted to further test the relation to see if SAT might instead reflect class or income stratification.

LITERATURE REVIEW

Despite past research studies measuring the effects of different school and teaching styles on various measures of student success, there appeared to be limited knowledge comparing school effects on high school grades and first-year college grades. Perhaps stemming from a report by James S. Coleman (1966), titled Equality of Educational Opportunity but commonly referred to as the "Coleman Report", illuminating that school effects were minimal and statistically insignificant once controlled for by family socioeconomic status, the disputed significance of school effects has since been contested. These results were viewed controversially and led to further research into input-output relationships of school and neighborhood effects on student performance.

In "Settling into Campus Life: Differences by Race/Ethnicity in College Involvement and Outcomes", by Mary J. Fischer (year), school infrastructure quality had a positive and significant effect on college GPA. However, the same infrastructure quality variable had a negative and significant effect on high school GPA. Given that high school GPA was found again to be the best predictor of college GPA, Fischer's results present contradictions regarding the effects of infrastructure.

Source of the River by Douglas S. Massey, Camille Z. Charles, Garvey F. Lundy, and Mary J. Fischer uses the National Longitudinal Survey of Freshmen to ascertain varying effects of school infrastructure quality and teacher quality on different dimensions of college preparation and self-esteem, among other research questions. In terms of confidence in their educational success, African Americans were found to be highest reporting with an index value of 36.65, then Asians (36.01), Latinos (35.42), and whites (34.57). Additionally, blacks and Latinos generally report the highest levels of self-confidence, self-efficacy, and self-esteem. Another measure of student achievement, one's high school GPA, was found to be strongly and positively related to the equality of academic support received in high school and the degree of

peer support for academic effort. Given that these things are thought to matter, Massey et al. found them negatively correlated to the quality of school infrastructure.

Within “The Impact of Differential Expenditures on School Performance” (1989), Eric Hanushek summarizes 187 studies of educational production functions using this input-output relation based on family inputs (measured by socio-demographic characteristics of the families i.e. parental education, income, and family size), peer inputs (typically aggregate summaries of the socio-demographic characteristics of other students in the school), and school inputs (measures of the teachers’ characteristics i.e. education level, experience, sex, race, etc. as well as school’s organization i.e. class sizes, facilities, administrative expenditures). Within his summary he found that teacher education was statistically significant in 8 of 113 studies, teacher experience was within 40 of 140, expenditures per pupil was in 13 of 65 studies, administrative inputs 7 within 61, and facilities was in 7 of 74 studies. Ultimately, Hanushek concludes the summary of his research proves expenditures are not systematically related to student achievement. Additionally, significant differences in teachers’ performance over the year have not been captured by any account of difference in their backgrounds or classroom behaviors. Thus there is continued existence of a waste of resources and inefficient operation of schools.

In a report analyzing Texas high schools in terms of school condition rating and age on science, math, and English test scores, the findings included a 4-9 percent difference between students in schools in the worst versus best condition, with a 5-9 percent difference between students in the oldest or newest schools respectively. Additionally, there was a four percentage point difference in the graduation rates of a student in a worse condition, older school, in comparison to a reported “best condition”, newest school (Blincoe, 2008). Contrastingly, a report conducted in Wyoming public schools found no discernible relationship between test score and building condition scores (Picus, Marion, Calvo & Glenn, 2005). The variances in these reported results of building conditions on a measure of student achievement, such as test scores, implied that building condition was not a reliable sole determinant of student achievement.

Similarly, “Capital at Home and at School: Effects on Student Achievement” (2001), analyzed the effects of both family and school capital on student math and reading achievement using a merged data set of the National Longitudinal Survey of Youth with the Merged Child-Mother Data for 1992 and 1994. In comparing changes in math achievement, Parcel and Dufur found family social capital is important in that better home environments contributed to increases in achievement whereas higher maternal working hours are negatively associated with math achievement. In terms of school effects, it was concluded that attending a private school resulted in comparably higher math scores as well as attending a school with a better physical environment. Conversely, attending a “troubled” school had negative effects on achievement scores.

In seeking to understand the motivating factors contributing to academic success, most teachers and educators look for high degrees of self-esteem and self-efficacy. As one would assume that greater degrees of self-efficacy result in better academic performance, a few well-regarded studies have looked at how factors within a school environment might affect such psychological measures. One such study conducted in the Flemish secondary school system investigated the importance of school infrastructure of the self-reported subjective well-being of secondary school students (Cuyvers, De Weerd, Dupont, Mols, and Nuytte, 2011). Regardless of student characteristics such as gender, grade, type of education, or an urbanized

versus rural characterization, the authors found higher average self-esteem scores for students who enjoyed good quality school infrastructure compared to those reporting that of a poorer quality. In a report by Clare Ulrich (2004), design and quality of school settings were noted to be particularly critical in directly affecting a child's self-identity, self-esteem, and academic performance.

Within a University of Georgia study (Cornwell, Mustard, & Van Parys, 2008) as SAT scores continued to be used as a measure representing student achievement in high school, we believe SAT scores could possibly capture differences between high schools. In a study at University of Georgia, unique in being a flagship public university, Cornwell, Mustard and Van Parys (2008) and Soares (2012) aimed to assess the relevance of the updated SAT to a university's ability to predict the academic performance of applicants broken down by gender and race. Ultimately, it was concluded that once high school dummy variables were included, the SAT score's ability to predict was no longer significant.

ANALYTIC STRATEGY, DATA, AND METHODS

Given that school quality negatively affected high school GPA (Massey et al. 2003), but positively affected first-year of college GPA (Fischer 2007), we sought to determine which individual variables significantly influenced one's high school and first year of college GPA as well as measures of self-efficacy. By breaking down the school infrastructure quality and teacher quality indices, similar to that used in Source of the River, we hoped to gain a greater explanation for why better school quality infrastructure might result in lowered GPA, as better resources would be expected to positively impact student achievement. Additionally, teacher quality was hypothesized to positively affect both GPA as well as measures of self-efficacy. In order to test these hypotheses, the authors analyzed the cohort of first-time freshmen at selective colleges and universities through data taken from the National Longitudinal Survey of Freshmen. The National Longitudinal Survey of Freshmen was conducted using a sample of 3,924 freshmen taken from 28 elite selective colleges and universities. These institutions included a mix of public and private research universities, as well as private liberal arts universities. The participants were surveyed before the start of their freshman year of college in the fall of 1999, and continued to be monitored through the spring of their senior year, with a total of five waves administered. While the NLSF was conducted in five waves, the authors focused on the results recording measures of self-efficacy and GPA from the end of high school to one's first year of college. In looking at this portion of the dataset, the authors re-examined the effects of school infrastructure and teacher quality on a student's self-reported high school and freshman year GPA, as well as measures of self-efficacy using an ordinary least square regression model. Due to various missing data, the remaining sample consisted of 2,864 participants. As past research using this dataset has provided the overall effects of both school infrastructure and teacher quality on students' high school and freshman year GPA, we deconstructed such indices into individual variables such that infrastructure quality is comprised of questions regarding "school buildings", "classroom quality", "audio-visual equipment", "library quality", "computer quality", "overall school quality", and "school community reputation". Similarly, the index for teacher quality encompasses the following individual variables: "teacher interest", "teacher preparedness", "strict discipline", "fair discipline", and "school spirit". Therefore, both overall school infrastructure and teacher quality as well as their respective individual variables were used as test variables in relation to high school and college GPA and student-reported measures of self-efficacy. In terms of dependent variables, high school GPA was coded in an index on a 24-point scale constructed from six items asking if the student received mostly D's (1), C's (2), B's (3), or A's (4) in

subjects including history, foreign language, natural sciences, social sciences, mathematics, and English. Freshman GPA was assembled from a 13-point scale used in Source of the River in which “1” denoted 1-9.85, “2” meant 9.86-10.67, “3” signified 10.69-11.23, “4” represented 11.25-11.89, and “5” denoted 11.90-13.00. In addition, self-efficacy was constructed as an 11-point scale using dummy variables measuring different facets of self-efficacy modeled from the self-efficacy scales used by Massey et. al. Lastly, “college aspirations” was included in which “1” was coded for having higher self-efficacy for each of the variables.

This study controlled for ethnicity, gender, parents’ education, income (middle class was omitted), number of household members, as well as high school and university type. There were three types of high schools within the dataset: private religious, private secular and public high school. Additionally, there were three categorizations of colleges or universities attended: private research, public research, or a liberal arts university.

FINDINGS

Descriptive Results

In Table 1, we present descriptive results on the self-reported ratings of the infrastructure quality and teacher quality of the high schools attended by the participants. From these results, we can see the top evaluations of private secular high schools as they have the highest scores for each element in infrastructure quality and every element of teacher quality, except strict discipline and school spirit. Table 1 is not an APA table.

Variable	Private Religious High School	Private Secular High School	Public High School
School Buildings	3.0571	3.3412	2.8926
Classroom Quality	3.0269	3.2367	2.8691
Audio-Visual Equipment	2.8843	3.1194	2.9080
Library Quality	2.9049	3.1770	2.8243
Computer Quality	3.2444	3.4435	3.1440
Teacher Interest	3.5594	3.6290	3.2276
Teacher Preparedness	3.4580	3.6098	3.2662
Strict Discipline	3.0491	2.9743	2.7426
Fair Discipline	2.6577	2.7842	2.6104
School Spirit	3.0349	2.7249	2.8690
Overall School Quality	3.3930	3.5352	3.1746
School Community Reputation	3.6054	3.7484	3.3432

Multivariate Regression Results

Model 3 in Table 2 shows that students from private secular high schools will tend to have lower GPAs, all else being equal, than students who attend public high schools. In reference to Table 1, private secular high schools also generally received the highest ratings in “overall school quality”, “school buildings”, “audio-visual equipment”, and “library quality”.

Model 1 in Table 2 confirms our hypothesis that teacher quality is a strong and positive predictor of self-efficacy. In fact, teacher quality was the strongest predictor of self-efficacy as the coefficient of .143 indicates that with each 1-point increase on our 5-point teacher quality scale, students' reported self-efficacy increases .143 points on our 11-point self-efficacy scale. Further, self-efficacy was shown to be a significant predictor of both freshman and high school GPA. For high school GPA, self-efficacy was among the strongest predictors with a coefficient of .101. Since teacher quality was a strong predictor of self-efficacy, and self-efficacy was a strong predictor of high school GPA, we tested an interaction term of teacher quality * self-efficacy in our high school GPA and freshman GPA models. However, we did not find teacher quality to be mediated by self-efficacy in their effects on either freshman or high school GPA. In order to specifically gauge what element within teacher quality affected self-efficacy, we broke down teacher quality and entered each variable that comprised that index into all three of our models. Fair discipline was found to be a strong, significant, and positive predictor of both self-efficacy and high school GPA, while strict discipline was a significant and negative predictor of high school GPA. Additionally, school spirit was found to be a positive predictor of self-efficacy.

Table 2 displays a paradox found by Massey et. al, which is that black and Hispanic students report significantly higher levels of self-efficacy than white students, with a .125 and .068 point advantage, respectively, all else being equal. However, black and Hispanic students have significantly lower GPAs at both the high school and freshman level than white students. To see if the black students' self-efficacy mediated their GPA, we entered an interaction term of blacks * self-efficacy into our freshman GPA and high school GPA models, but in both models, the interaction term was found not significant.

In examining Model 3, it is evident that parent's education reflects expected tendencies, except that only father's higher levels of education come through as significant. Having a father who is a college graduate, who has completed some of a professional or graduate degree, or who has fully attained a professional or graduate degree has a positive and significant effect on one's high school GPA. However, having a mother who has attained any of the noted education levels was not to be significant in predicting one's high school GPA.

Additionally, our multivariate results illustrate the weak but still statistically significant impact of the SAT in predicting freshman GPA. Further, the addition of the SAT score variable to our models did not confirm the finding of the University of Georgia study; the SAT did not remove the effects of high school variables, but instead suggests that infrastructure quality is distinct from SES or neighborhood effects.

Table 2: Ordinary Least Regression on Measures of Infrastructure Quality and Teacher Quality for Student Outcomes

	Model 1: Self-Efficacy	Model 1: Self-Efficacy (with SAT)	Model 2: Freshman GPA	Model 2: Freshman GPA (with SAT)	Model 3: High School GPA
Variable	Beta	Beta	Beta	Beta	Beta
Infrastructure Quality	.033	.034	.063**	.036	-.108***
School Buildings	.039	.057	-.003	-.003	.019
Classroom Quality	-.019	-.065	.027	.039	.002

Audio-Visual Equipment	-.007	-.002	.021	.015	-.028
Library Quality	-.006	-.006	.017	.013	-.102***
Computer Quality	.047*	.045	-.025	-.021	-.018
Overall School Quality	.028	.058	.047	.011	-.005
School Community Reputation	-.009	-.004	.019	.007	-.062**
Teacher Quality	.143***	.158***	-.006	.016	.017
Teacher Interest	.034	.039	.019	-.005	.025
Teacher Preparedness	.036	.051	.015	.013	-.001
Strict Discipline	.029	.038	-.016	.001	-.088***
Fair Discipline	.073**	.068**	-.014	.004	.095***
School Spirit	.062**	.049*	-.023	.018	-.008
Asians	-.046	-.032	.016	-.006	-.005
Blacks	.125***	.133***	-.168***	-.098***	-.277***
Hispanics	.068**	.076**	-.112***	-.085***	-.126***
Mom Grade School	-.032	-.013	-.034	-.020	.008
Dad Grade School	.014	.010	.002	.001	.026
Mom Some High School	-.002	-.007	.008	-.081	-.011
Dad Some High School	-.006	-.012	-.004	-.014	.021
Mom Some College	-.009	.028	-.004	-.007	.016
Dad Some College	.005	-.005	.014	.005	.034
Mom College Grad	-.018	.004	.023	.016	-.019
Dad College Grad	-.010	-.049	.027	.002	.077*
Mom Some Post Grad	-.047*	-.041	.050*	.023	.034
Dad Some Post Grad	.022	.010	.033	.040	.040
Mom Graduate/ Professional Degree	.003	.041	.076*	.053	.035
Dad Graduate/ Professional Degree	.003	-.053	.094**	.069	.072*
Low Income	.009	.037	-.012	-.014	-.024
Upper Middle Income	.049*	.062*	.000	-.006	-.049*
Upper Income	.039	.049*	-.007	.011	-.009
Rich Income	.063**	.065**	-.002	-.004	-.073***

Number of Household Members	-.014	-.065	.033	.031	.072
Number of Household Members in Workforce	.006	.008	-.007	.009	-.042
Number of Children 18 or Under in Household	.021	.087	-.013	-.001	-.060
Number of Younger Siblings in Household	-.036	-.031	-.020	-.035	.063
Number of Older Siblings in Household	.016	.038	.022	.033	.004
Number of Household Members in School	.011	-.027	-.002	-.006	-.021
Mom Only Household	-.024	-.067**	-.007	.000	-.035
Dad Only Household	.000	-.013	-.014	-.014	-.007
No Parent Household	-.060**	-.053*	.015	.018	-.053**
Neighborhood Disorder	-.055**	-.069**	.004	-.015	-.044*
Private Religious High School	.010	.004	-.029	.000	.004
Private Secular High School	.004	.024	.009	.015	-.073***
Liberal Arts College	.000	-.004	.028	.015	-.050*
Private University	-.012	-.027	.069***	.033	.072***
Female	.107***	.090***	-.004	.029	.069***
Foreign Born	-.037	-.037	.002	-.025	-.003
High School GPA	.107***	.107***	.313***	.251***	-----
Self-Efficacy	-----	-----	.034	.042*	.101***
SAT	-----	-.007	-----	.212***	-----

* $p < .05$ ** $p < .01$ *** $p < .00$

Just as was reported by Massey et. al, infrastructure quality positively predicted freshman GPA, and negatively predicted high school GPA. Moreover, when we entered each element of our infrastructure scale into all three of our models, we found that the only significant positive predictor of freshman GPA was overall school quality. As for high school quality, only “library quality” and “school community reputation” were significant negative predictors. Although infrastructure was not a significant predictor of self-efficacy, computer quality was found to be a significant and positive predictor of self-efficacy.

CONCLUSION

The results of this study replicated initial findings by Source of the River in that better school quality infrastructure negatively affects high school GPA (Massey et al. 2003). However, infrastructure quality did not positively affect one's freshman year GPA, which contradicts previous research findings (Fischer, 2007). After testing the individual variables within the school quality infrastructure index, we found this initial paradox to be misleading as there were several important underlying stories in considering the individual variables. "Library quality" and "school community reputation" were found to negatively predict high school GPA. Contrary to its face value, this paradox does not mean better resources result in a poorer education, but rather indicate a school environment in which greater resources correlates with private secular schools whose graduates have lower HSGPAs in this dataset.

The results of this study support the assumption that high self-efficacy is synonymous with a higher GPA. Although black and Hispanic students earned lower grades at both the high school and college level, yet reported the highest levels of self-efficacy among the various ethnicity groups, self-efficacy was a strong predictor of freshman GPA, but an especially strong predictor of high school GPA. Also, by breaking down the school infrastructure and teacher quality indices, we found school spirit, and fair discipline to positively affect self-efficacy.

We included SAT scores in our regression models because neither Massey nor Fischer's regression models included SAT scores, despite its role in college admissions for two-thirds of America's four year degree granting institutions (Colleges and Universities, 2014; Soares, 2012). Although it has been shown that SAT scores are biased by their linear relation to family income, adding the SAT variable was a way to capture a proxy for school SES composition, as shown by the University of Georgia study of the 2005 version of the SAT (Cornwell et al, 2008; Soares, 2012). Our findings show a difference from the Georgia study that the high school effects were not removed when adding SAT. Therefore infrastructure quality must be considered distinct from possible SES or neighborhood effects influenced by SAT score. Despite the SAT's biases, it remains important to include an SAT variable in predicting academic performance at the high school or collegiate level.

While individual variables within the school infrastructure quality index were found to be significant in negatively or positively affecting high school or freshman year GPA, respectively, we additionally found that teacher quality, specifically a reported fair discipline, was positively influential on high school GPA. We found this touted the importance of teacher quality to both high school and college academic success, specifically in the type of teaching approach and environment. Further, strict discipline had a negative influence on one's high school GPA. This showed that having an environment perceived as fair within one's high school GPA, regardless of the type of high school, is most important in nurturing the students' academic success.

This study provides a disclaimer to the notion that better school infrastructure quality negatively affects one's high school GPA by more deeply identifying the relationship that one's school experience, created by school infrastructure and teacher quality, has on both the high school and college GPAs. Further research could test these effects on students attending a more varied mix of universities, instead of simply tier 1 universities. Lastly, additional research involving a greater breadth of infrastructure quality and teacher quality characteristics could provide supplemental information advantageous to improving student development and academic success.

APPENDICES
APPENDIX A

Variable Name	Mean	Standard Deviation
Liberal Arts College	.095	.294
Private Research University	.585	.493
Public University	.320	.466
Female	.581	.493
Asian	.244	.430
Black	.268	.443
White	.254	.436
Hispanic	.233	.423
Neighborhood Disorder	2.912	3.556
Self-Efficacy	9.012	1.862
Infrastructure Quality	5.442	1.841
School Buildings	3.004	.852
Classroom Quality	2.969	.763
Audio-Visual Equipment	2.948	.928
Library Quality	2.909	.915
Computer Quality	3.224	.853
Overall School Quality	3.285	.713
School Community Reputation	3.461	.825
Teacher Quality	3.755	1.237
Teacher Interest	3.359	.711
Teacher Preparedness	3.363	.661
Strict Discipline	2.854	.796
Fair Discipline	2.652	.841
School Spirit	2.899	.958
High School GPA	22.246	1.961
Freshman GPA	3.003	1.412
Mom Grade School	.024	.153
Mom Some High School	.017	.130
Mom High School Graduate	.141	.348
Dad Grade School	.027	.161
Dad Some High School	.019	.137
Dad High School Graduate	.120	.325
Mom Some College	.173	.378
Dad Some College	.106	.308
Mom College Graduate	.308	.462
Dad College Graduate	.252	.434
Mom Some Post-Grad	.041	.198
Dad Some Post-Grad	.029	.169
Mom Graduate/Professional Degree	.296	.456
Dad Graduate/Professional Degree	.447	.497
Low Income	.17	.380

Middle Income	.44	.497
Upper Middle Income	.21	.407
Upper Income	.07	.256
Rich	.10	.302
Number of Household Members	4.09	1.323
Number of Household Members in Workforce	1.91	.855
Number of Children 18 or Under in Household	1.86	.964
Number of Younger Siblings in Household	.78	.911
Number of Older Siblings in Household	.25	.522
Number of Household Members in School	2.17	1.097
Mom Only Household	.229	.420
Dad Only Household	.033	.178
Two Parent Household	.713	.452
No Parent Household	.025	.156
Private Secular High School	.12	.327
Private Religious High School	.16	.369

APPENDIX B

Name of Variable	Description of Variable
Dependent or Outcome Variables	
High School GPA	An index on a 24 point scale constructed from 6 items asking if the student received mostly D's (1), C's (2), B's (3), or A's (4) in subjects including history, foreign language, natural sciences, social sciences, mathematics, and English
Freshman GPA	A variable derived from the 13 point scale used in <i>Source of the River</i> . 1: 1 - 9.85 2: 9.86 - 10.67 3: 10.69 - 11.23 4: 11.25 - 11.89 5: 11.90 - 13.00
Self-Efficacy	An index on an 11 point scale constructed from dummy variables measuring different facets of self-efficacy and college aspirations; 1 being coded as having higher self-efficacy for each of the variables
SAT	An index using SAT Reading and Math scores in a combined total on a 1600 point scale.

Independent or Test Variables	
Infrastructure Quality	An index on a 7 point scale constructed from dummy variables measuring different facets of infrastructure quality; 1 was coded as better infrastructure for each of the variables
School Buildings	A dummy variable from a 5-point scale, in which 0-2 is coded as 0 and 3 & 4 is coded as 1.
Classroom Quality	A dummy variable from a 5-point scale, in which 0-2 is coded as 0 and 3 & 4 is coded as 1.
Audio-Visual Equipment	A dummy variable from a 5-point scale, in which 0-2 is coded as 0 and 3 & 4 is coded as 1.
Library Quality	A dummy variable from a 5-point scale, in which 0-2 is coded as 0 and 3 & 4 is coded as 1.
Computer Quality	A dummy variable from a 5-point scale, in which 0-2 is coded as 0 and 3 & 4 is coded as 1.
Overall School Quality	A dummy variable from a 5-point scale, in which 0-2 is coded as 0 and 3 & 4 is coded as 1.
School Community Reputation	A dummy variable from a 5-point scale, in which 0-2 is coded as 0 and 3 & 4 is coded as 1.
Teacher Quality	An index on a 5 point scale constructed from dummy variables measuring different facets of teacher quality; 1 was coded as better teacher quality for each of the variables
Teacher Interest	A dummy variable from a 5-point scale, in which 0-2 is coded as 0 and 3 & 4 is coded as 1.
Teacher Preparedness	A dummy variable from a 5-point scale, in which 0-2 is coded as 0 and 3 & 4 is coded as 1.
Strict Discipline	A dummy variable from a 5-point scale, in which 0-2 is coded as 0 and 3 & 4 is coded as 1.
Fair Discipline	A dummy variable from a 5-point scale, in which 0-2 is coded as 0 and 3 & 4 is coded as 1.
School Spirit	A dummy variable from a 5-point scale, in which 0-2 is coded as 0 and 3 & 4 is coded as 1.

Control Variables	
Race	A set of dichotomous variables, in which the labeled race (whites, hispanics, blacks, asians) was coded as 1, and the other non-included races were coded as 0
Gender	Coded 1 for women and 0 for men
Parents' Education	A set of dichotomous variables, in which the labeled attainment of education by the labeled parent (grade school, some high school, high school graduate, some college, college grad, some post-grad, graduate/professional degree) was coded as 1, and every other option was coded as 0
Income	A set of dichotomous variables, in which the labeled socioeconomic class (low inc, mdinc, midinc, uppermid, or upper) was coded as 1, and the other options were coded as 0
Family Structure	A series of continuous variables reflecting actual quantities of family members in various contexts, except for the parents present in the household at the time of their senior year. The parents present variables are a set of dichotomous variables, in which the labeled parental situation (mom only household, dad only household, two parent household, no parent household) was coded as 1, and the other options were coded as 0
Neighborhood Disorder	An index on a 14 point scale constructed from dummy variables measuring different facets of neighborhood disorder; 1 was coded as more neighborhood disorder for each of the variables
Type of college	A set of dichotomous variables, in which the labeled type of college (liberal arts, private research, or public) was coded as 1, and the other options were coded as 0
Type of high school	A set of dichotomous variables, in which the labeled type of high school (private religious, private secular, or public) was coded as 1, and the other options were coded as 0
Foreign Born	Coded 1 for being born in a country other than the United States, and 0 for US born students

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