Social and Emotional Skills and Academic Outcomes

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Research Brief

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The Study of Social and Emotional Skills (SSES) is an international effort led by the Organization for Economic Co-operation and Development (OECD). The Houston Independent School District (HISD) served as the only U.S. site for this study. Over 6,400 10-year-old and 15-year-old students from 119 HISD schools participated in the SSES in the fall of 2019. **This brief provides an understanding on whether and how social and emotional skills related to students' academic outcomes.**

Social and emotional (SE) skills refer to the process by which children acquire and effectively apply the knowledge, attitudes, and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions (OECD, 2015). SE skills can lead to improved outcomes in education, employment, health, and well-being (Kankaraš & Suarez-Alvarez, 2019). **In both 10-year-old and 15-year-old students, students who reported higher levels of persistence earned higher course grades in both math and reading. In addition, empathy was negatively associated with 10-year-old students' math grades, and trust was positively associated with 15-year-old students' math grades.**

Key Findings

Students who reported higher levels of persistence earned higher math and reading grades.

- In both 10-year-old and 15-year-old students, students who reported higher levels of persistence earned higher course grades in both math and reading than those who reported lower levels of persistence.

Empathy was negatively associated with 10-year-old students' math grades.

- Self-reported empathy was negatively associated with math grades, with 10-year-old students who reported higher levels of empathy earning lower math grades than those who reported lower levels of empathy.

Trust was positively associated with 15-year-old students' math grades.

- Self-reported trust was positively associated with math grades, with 15-year-old students who reported higher levels of trust earning higher math grades than those who reported lower levels of trust.

Introduction

Background

Mounting evidence shows SE skills can lead to improved academic achievement, employment, health, and well-being (see Kankaraš & Suarez-Alvarez, 2019). In the fall of 2019, more than 6,400 HISD students from 119 campuses participated in the SSES study, an international survey studying the SE skills of 10- and 15-year-old students, led by the Organization for Economic Cooperation and Development (OECD). In this study, most 10-year-old students were in grade 5 and most 15-year-old students were in grade 10. Their parents, selected teachers, and school principals were also surveyed. This brief provides an understanding on whether and how particular skills related to students' academic outcomes (see Brief 1 of the series for more details about the Big Five framework and definitions for each domain and subdomain skill).

Research Questions

To understand the ways in which SE skills are linked to student academic outcomes, this brief addresses the following research question:

How were HISD students' self-reported social and emotional skills associated with their grades in math and reading?

Data and Sample

Data for this study came from the SSES student survey collected in fall 2019. This survey was administered to a randomly-selected group of 10- and 15-year-old students in HISD. Additional data came from the 2019-20 Public Education Information Management System (PEIMS), HISD fall 2019 course grade data, the State of Texas Assessments of Academic Readiness (STAAR) Grades 3-8 Assessments 2018-19 and End-of-Course (EOC) Assessments 2018-2019.

Among the students who completed the survey, 3,280 10-year-old students and 3,071 15-year-old students were included in the study. See Appendix II for more information on the students included in this study.

Academic outcomes

Student academic outcomes were measured using math and reading grades from the fall of 2019. Grades were standardized on a scale of 1-100 to ease interpretability. More details on the academic outcomes can be found in Appendix II.

Measures of social and emotional skills

A set of fifteen social and emotional subdomain skills from the OECD study described above were included in this analysis. Items that measure each of the SE skills are available in an online appendix. These skills include:

- Cooperation (living in harmony with others)

- Empathy (understanding and caring for others and their well-being)

- Trust (assuming others generally have good intentions)

- Assertiveness (able to confidentially voice opinions, needs, and feelings)

- Energy (approaching daily life with energy, excitement, and spontaneity)

- Sociability (able to approach others)

- Emotion Control (effective strategies for regulating temper, anger, and irritation)

- Optimism (positive expectations for self and life)

- Stress Resistance (effectiveness in modulating anxiety and ability to calmly solve problems)

- Creativity (generating novel ways to do or think about things)

- Curiosity (interest in ideas, love of learning, and intellectual exploration)

- Tolerance (open to different points of view, values diversity)

- Persistence (persevere in tasks and activities until they get done)

- Responsibility (able to honor commitments, and be punctual and reliable)

- Self-Control (able to avoid distractions and sudden impulses)

Analytical strategies

To understand the ways in which SE skills are linked to student academic outcomes, this analysis used structural equation modeling (SEM) to examine the relationship between SE skills and student math and reading achievement as indicated by their course grades. Important student demographic, academic, and socioeconomic characteristics were also accounted for in the analyses. Specifically, the following student characteristics were included: grade level, English learner (EL) status, special education status, gender, race/ethnicity, economic disadvantage status, and proficiency on the prior year's reading or math STAAR assessment in spring 2019 (met or exceeded standards). Analyses were conducted separately for 10- and 15-year-olds. Detailed results for all SE skills from the analyses can be found in Appendix I.

Key Findings

1 **Higher levels of self-reported persistence were associated with higher math and reading grades for both 10-year-old and 15-year-old students.**

Self-reported persistence was positively associated with math and reading grades for both 10- and 15-year-olds students (Figures 1 and 2). Persistence measures perseverance in tasks and activities. It refers to the ability to continue and complete tasks and activities despite challenges and distractions. As shown in Figures 1 and 2, students who reported higher levels of persistence also had higher grades in math and reading than those who reported lower levels of persistence. Specifically, 10-year-old students exhibiting the highest level of persistence earned math grades 10% higher than students exhibiting the lowest level of persistence. Similarly, 15-year-old students who reported the high-

est level of persistence earned math grades 13% higher than students who reported the lowest level of the skill.

For both the 10- and 15-year-old students, the relationship between persistence and reading grades was stronger than the relationship between persistence and math grades. Ten-year-old students exhibiting the highest level of persistence earned reading grades 12% higher than students exhibiting the lowest level of persistence. Fifteen-year-old students who reported the highest level of persistence earned reading grades 16% higher than students who reported the lowest level of the skill.

FIGURE **1** **Estimated relationship between math and reading grades and persistence (10-year-olds)**
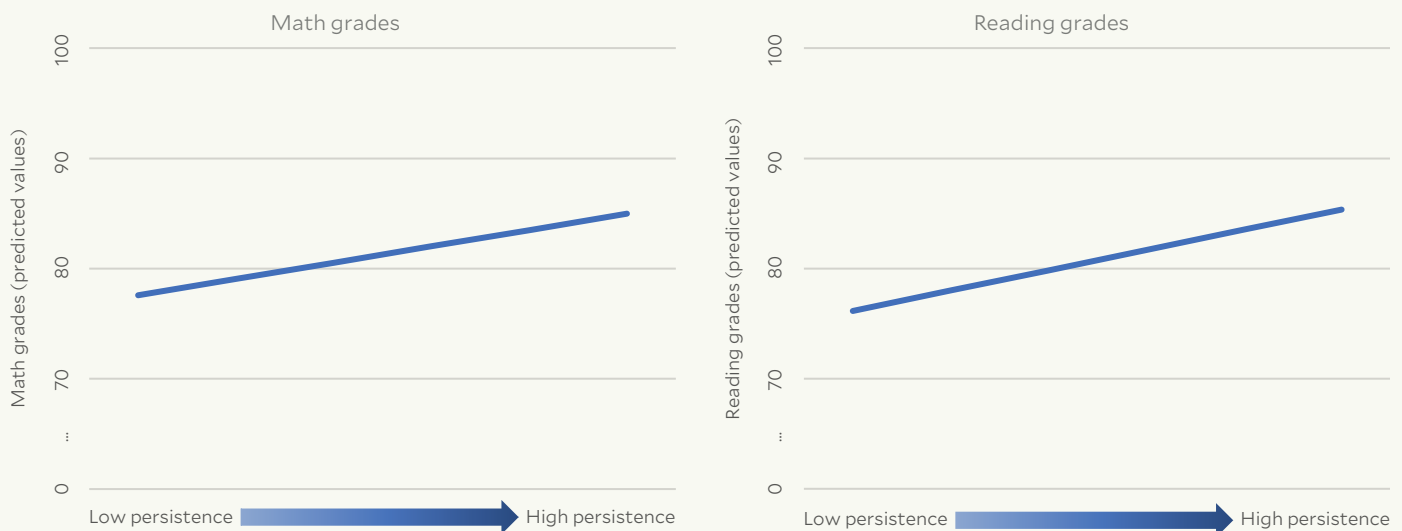
FIGURE 2 **Estimated relationship between math and reading grades and persistence (15-year-olds)**
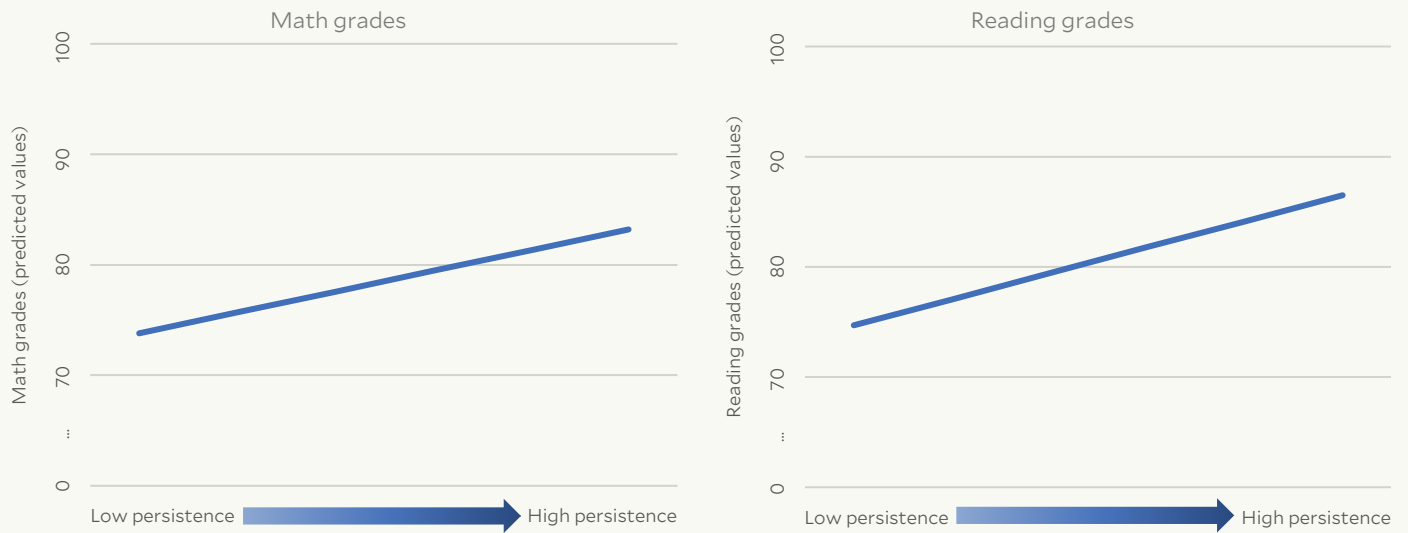
2 **Empathy was negatively associated with 10-year-old students' math grades.**

For 10-year-olds, self-reported empathy was negatively associated with math grades. The skill of empathy describes understanding and caring for others and their well-being (OECD, 2021a). As demonstrated in Figure 3, 10-year-old students who reported higher levels of empathy earned lower math grades than those who reported lower levels of empathy. Ten-year-old students exhibiting the highest level of empathy had math grades 8% lower than students exhibiting the lowest level of the skill.

FIGURE 3 **Predicted values of math grades by empathy (10-year-olds)**
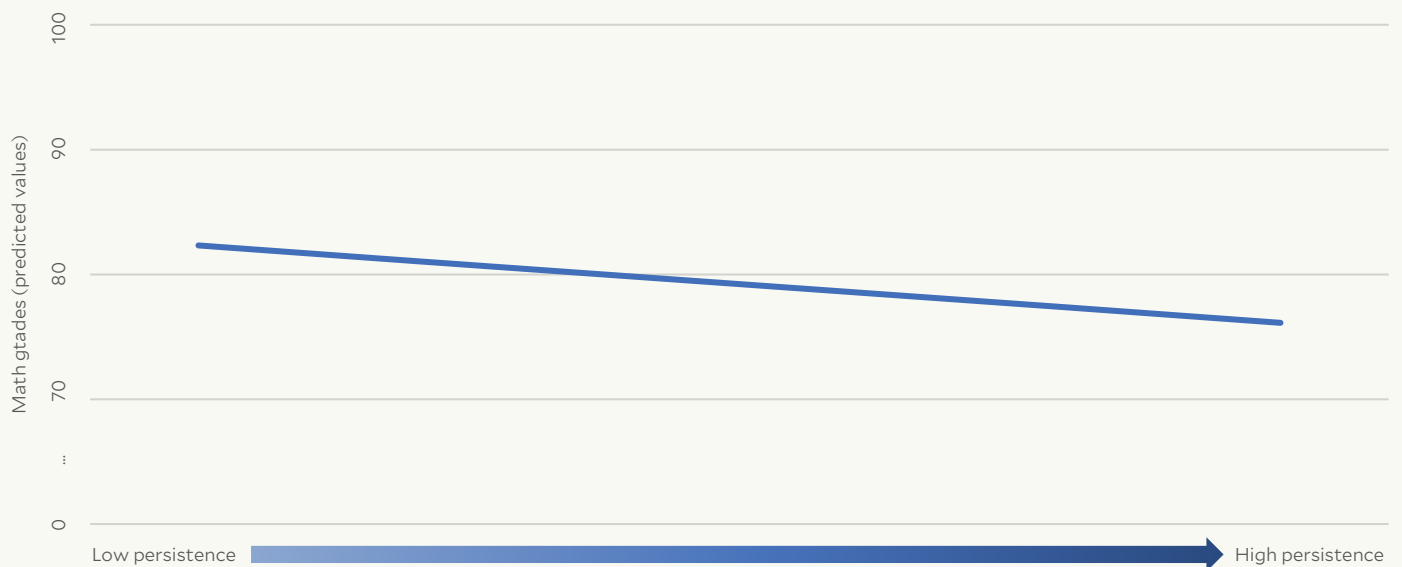
3 **Trust was positively associated with 15-year-old students' math grades.**

For 15-year-old students, self-reported trust was positively associated with math grades, as demonstrated in Figure 4. Students who reported high levels of trust were those who assume others generally have good intentions and forgive those who have done wrong (OECD, 2021a). Ten-year-old students exhibiting the highest level of trust earned math grades 10% higher than students exhibiting the lowest level of the skill.

FIGURE 4 **Predicted values of math grades by Trust (15-year-olds)**
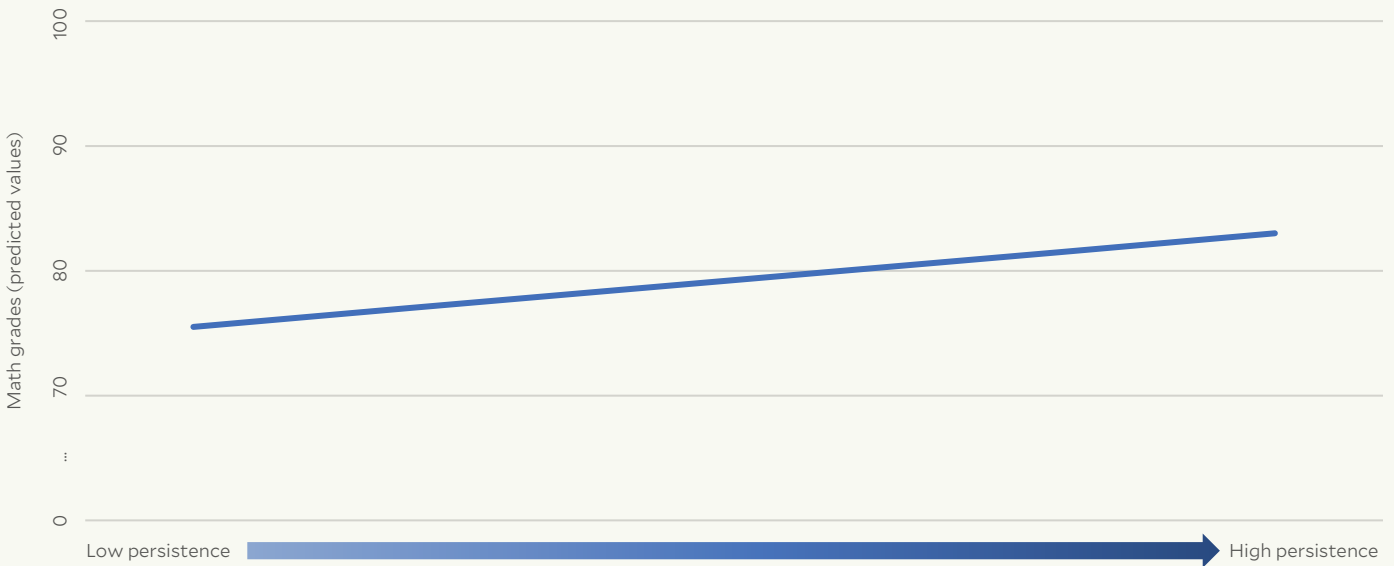
Conclusion and Recommendations

Conclusion

The purpose of this brief was to examine whether and to what extent social and emotional skills related to students' academic outcomes. For both age cohorts of students, self-reported persistence was associated with both math and reading grades, with students who reported higher levels of persistence also earning higher course grades in both math and reading. This finding is aligned with the psychological and behavioral economic research that has identified consistent effects of students' perseverance on academic performance in math and reading through improved engagement and sustained deliberative practice (see Bettinger et al., 2018 and Credé et al., 2017).

There were other SE skills connected to math grades. The specific relationships and patterns varied by age cohort and SE skill. For 15-year-olds, self-reported trust was also positively associated with math grades, with 15-year-old students who reported higher levels of trust earning higher math grades. Research considers trust as a bond that encourages social networks, which may lead to improved teacher-student relationships and student outcomes (Durnford, 2010). Success in math is connected to an acceptance of making mistakes (OECD, 2021a). Students who reported being more trusting might have felt more confident about their relationships with others, about making mistakes in front of others (or learning from them), and about their abilities (OECD, 2021a).

For 10-year-olds, self-reported empathy was negatively associated with math grades. Literature on the association between empathy and academic performance contends that empathetic understanding is a skill that enhances both critical thinking skills and creativity, as the skill demonstrates persistent and engaged examination of an issue with flexibility (Gallo, 1989). In this study, however, we found that 10-year-old students who reported higher levels of empathy tended to receive lower math grades. Other study sites found similar patterns (see OECD, 2021b), which suggests additional research may be needed to understand the relationship.

While not all SE skills showed a positive relationship with student grades in this study, it does not mean that the other social and emotional skills we examined were not beneficial for students. Instances where there were no relationships between certain SE skills and grades may simply reflect that some skills have a stronger relationship with the outcome.
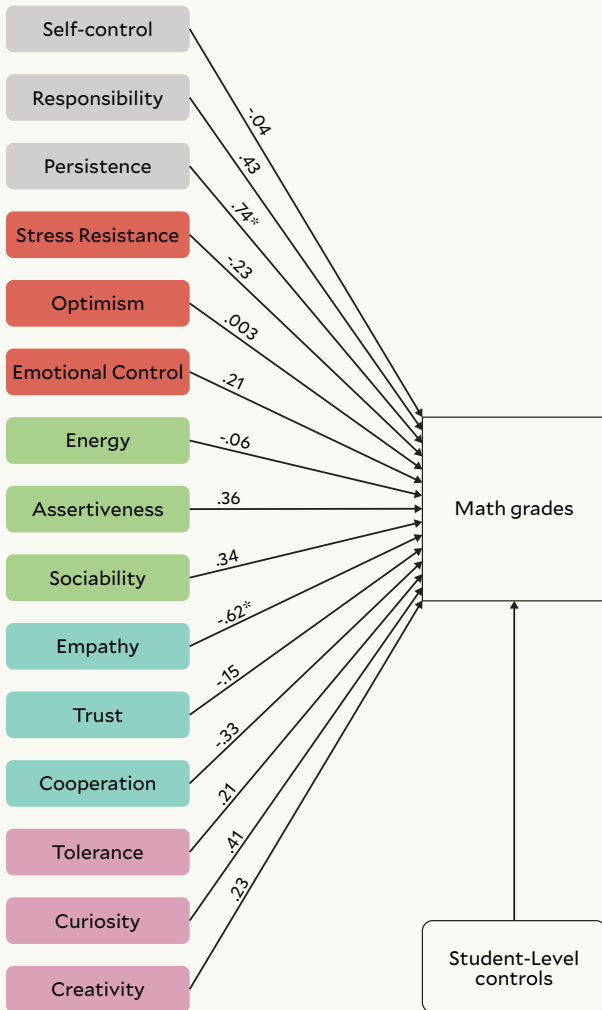
Recommendations

- **Identify opportunities to help students develop skills associated with persistence, such as working on tasks until finished, and not giving up easily when things get hard.**

- **Consider programming and opportunities for high school students that promote and allow for trust-building among peers and campus adults.**

Appendix I: Structural Equation Modeling Results

Structural equation modeling (SEM) with maximum likelihood with missing values (MLMV) estimators was used to retrieve as much information as possible from observations containing missing values. Figure

A1.1 to A1.4 illustrate the coefficients and significance level between each of the SE skills and math and reading grades.

FIGURE A1.1 Relationship between SE skills and math grades (10-year-olds)

Self-control
Responsibility .04
Persistence .43
Stress Resistance .74*
Optimism .23
Emotional Control .003
Energy .21
Assertiveness -.06
Sociability .36
Empathy .34
Trust -.62*
Cooperation -.15
Tolerance -.33
Curiosity .21
Creativity .41
.23
→ Math grades
Student-Level controls

Note: *p < 0.05, **p < 0.01. Numbers shown are the standardized coefficients from SEM model, conditioning on student-level controls (see a list of control variables on page 3). Full SEM results are available upon request.

FIGURE A1.2 Relationship between SE skills and reading grades (10-year-olds)

Self-control
Responsibility .37
Persistence .18
Stress Resistance .92*
Optimism -.09
Emotional Control -.27
Energy .06
Assertiveness .0001
Sociability .19
Empathy .38
Trust -.12
Cooperation .26
Tolerance -.12
Curiosity .21
Creativity .28
.27
→ Reading grades
Student-Level controls

Note: *p < 0.05, **p < 0.01 Numbers shown are the standardized coefficients from SEM model, conditioning on student-level controls (see a list of control variables on page 3). Full SEM results are available upon request.

Relationship between SE skills and math grades (15-year-olds)

Self-control
Responsibility
Persistence
Stress Resistance .37
Optimism .16
Emotional Control .94**
Energy -.76
Assertiveness .52
Sociability .28
Empathy .48
Trust .17
Cooperation -.35
Tolerance -.68
Curiosity .75*
Creativity .09
.00
.64
-.65

Math grades

Student-Level controls

Note: *p < 0.05, **p < 0.01 Numbers shown are the standardized coefficients from SEM model, conditioning on student-level controls (see a list of control variables on page 3). Full SEM results are available upon request.

Relationship between SE skills and reading grades (15-year-olds)

Self-control
Responsibility
Persistence
Stress Resistance -.02
Optimism .12
Emotional Control 1.18**
Energy -.62
Assertiveness .61
Sociability .35
Empathy -.06
Trust .07
Cooperation -.04
Tolerance -.56
Curiosity .45
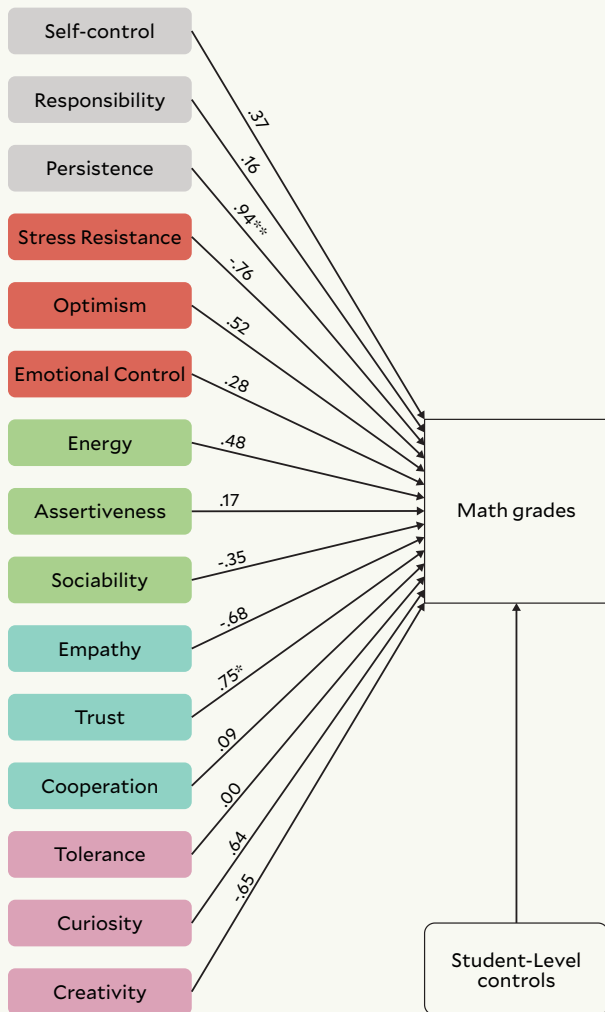Creativity -.18
-.08
.78
-.25

Reading grades

Student-Level controls
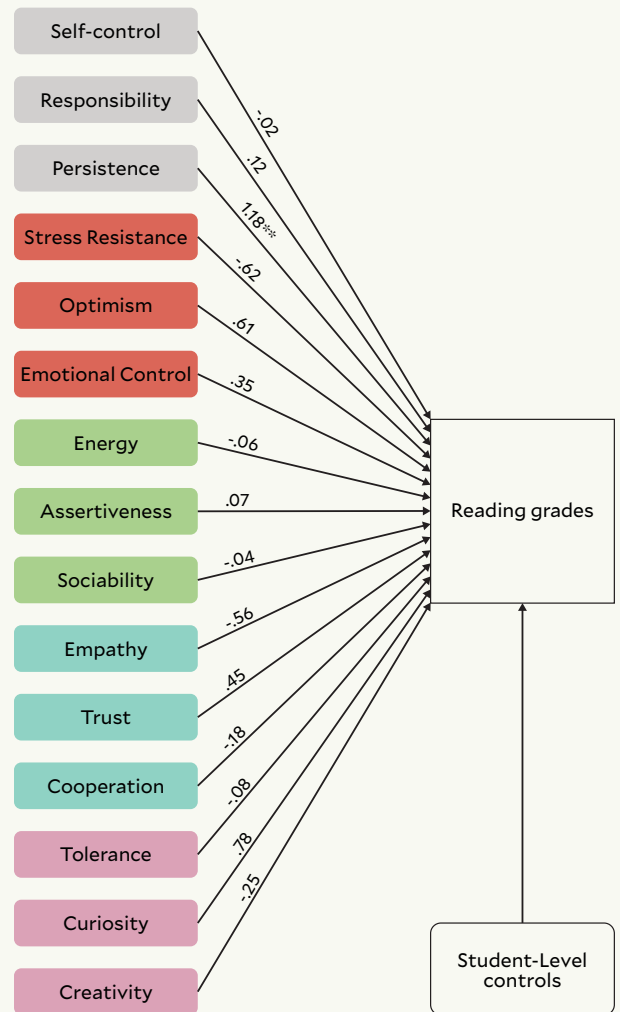
Note: *p < 0.05, **p < 0.01 Numbers shown are the standardized coefficients from SEM model, conditioning on student-level controls (see a list of control variables on page 3). Full SEM results are available upon request.

Appendix II: Technical Notes

Analytical Samples

10-Year-Old Student Respondents Profile

Student Group	N	Percent
Overall	3280[1]	100
Grade[2]		
Grade 3	11	0.34
Grade 4	389	11.86
Grade 5	2683	81.80
Grade 6	197	6.01
Gender		
Male	1623	49.48
Female	1657	50.52
Race/Ethnicity		
Asian/PI	84	2.56
Black	747	22.77
Hispanic	2235	68.14
White	214	6.52
Economic Disadvantaged Status		
No	522	15.91
Yes	2758	84.09
English Learner (EL) Status		
Not Current EL	1931	58.87
Current EL	1349	41.13
At-Risk Status		
No	1002	30.55
Yes	2278	69.45
Special Education Status		
No	3023	92.16
Yes	257	7.84

[1] Analytical samples were based on the following exclusions. Students were excluded if (1) the demographic information was not captured in Public Education Information Management System (PEIMS) 2019-20 data; (2) survey responses were invalid or missing; or (3) students identified as Native American or multiracial.

[2] As shown above, most 10-year-old students in this study were in grade 5.

15-Year-Old Student Respondents Profile

Student Group	N	Percent
Overall	3071[1]	100
Grade[2]		
Grade 8	5	0.16
Grade 9	579	18.85
Grade 10	2228	72.55
Grade 11	241	7.85
Grade 12	18	0.59
Gender		
Male	1457	47.44
Female	1614	52.56
Economic Disadvantaged Status		
Asian/PI	117	3.81
Black	781	25.43
Hispanic	1984	64.60
White	189	6.15
Economic Disadvantaged Status		
No	627	20.42
Yes	2444	79.58
English Learner (EL) Status		
Not Current EL	2525	82.22
Current EL	546	17.78
At-Risk Status		
No	1071	34.87
Yes	2000	65.13
Special Education Status		
No	2934	95.54
Yes	137	4.46

[1] Analytical samples were finalized based on the following exclusions. Students were excluded if (1) the demographic information was not captured in Public Education Information Management System (PEIMS) 2019-20 data; (2) survey responses were invalid or missing; or (3) students identified as Native American or multiracial.

[2] As shown above, most 15-year-old students in this study were in grade 10.

Math and Reading Course Grades

The course grades data came directly from HISD and is different from the official end-of-year course grades data that the Houston Education Research Consortium typically receives. Grade selection was slightly different for elementary and secondary campuses. All elementary campuses had a nine-week grading cycle. For schools with nine-week grading cycles, the researchers used the cycle one grades, which covered end of August to end of October. Most secondary schools had a six-week grading cycle. For schools with six-week grading cycles, the researchers used the cycle 2 grades, which covered early October to early November.

To generate consistent performance measures on reading and math, a series of rules were applied. The researchers first categorized all courses offered based on subject areas and course descriptions. Among over 600 courses offered, 116 language arts related courses (i.e., English language arts, Reading, Writing) were categorized under reading and 59 math related courses (i.e., General math, Algebra, Geometry, Calculus) were categorized under math. Then, the researchers identified applicable reading and math courses for each of the sampled students. If a student had two or more courses within the same category, the course with the highest grade was kept. About 10% of students in each cohort had letter grades for applicable courses. Next, letter grades were converted to numeric grades based on HISD conversion guidelines.[1] For ease of interpretation, coefficients shown in Figure A.1 – A.4 were re-scaled to a grade range of 1 to 100 points for the students who had letter grades in the data.

Grading Scheme	Converted Score	Note
A	95	This conversion only applies to the students who received letter grades. The wide majority of students had numeric grades and those grades were sustained.
B	85	
C/D	75	
F	60	

Survey Weights

All analyses in this study have accounted for survey weights to calculate appropriate estimates of sampling error and to make valid estimates and inferences about the population.

The final student weight indicates the relative contribution of that unit (student) to the estimated outcomes of the survey. It is the product of a design or base weight and of one or many adjustment factors. The former is the inverse of the selection probability and the latter compensates for random non-response and other random occurrences that could, if not accounted for, introduce bias in the estimates. These design weights and adjustment factors are specific to each stage of the sample design.

In addition, a cluster sampling technique, the Jackknife repeated replication (JRR), was used for estimating the variation arising from the selection of students under a multi-stage stratified cluster sample design. The sampling variance and standard error can be estimated for any statistic derived from the sample, including means, percentages, standard deviations, correlations, regression coefficients and mean differences. For each cohort, 76 replicate weights were computed (38 sampling zones of two schools or pseudo-schools each) regardless of the number of sampling zones. For more descriptions on survey weights, please refer to the SSES Technical Report (OECD 2021b).

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1   Conversion guidelines were based on grading scale in the 2020-2021 HISD School Guidelines on pp. XV-7: https://www.houstonisd.org/site/default.aspx?PageType=3&ModuleInstanceID=228302&ViewID=C9E0416E-F0E7-4626-AA7B-C14D59F72F85&RenderLoc=0&FlexDataID=191356&PageID=31617&Comments=true

Survey items measuring Persistence, Sociability, Empathy and Trust

Persistence	Empathy	Trust
- Keep working on a task until it is finished - Make sure that I finish tasks - Give up easily* - Finish things that I start - Stop when work becomes too hard* - Hate leaving tasks like homework or chores unfinished - Finish things even if they are hard	- Helpful and unselfish with others - Important to me that my friends are okay - Can sense how others feel - Know how to comfort others - Understand what others want - Warm toward others	- Think most of my classmates keep their promises - Believe that my friends can keep my secrets - Do not trust people* - Believe that other people will help me - Believe that most people are honest - Trust others

*Reverse-coded items. Measures for all skills are available online.

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The Houston Education Research Consortium (HERC) is a research-practice partnership between the Kinder Institute for Urban Research and 11 Houston-area school districts. HERC aims to improve the connection between education research and decision making for the purpose of equalizing outcomes by race, ethnicity, economic status, and other factors associated with inequitable educational opportunities.

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