

Social-Emotional Learning and Academic Growth: Insights from an Innovative Research-Practice Partnership

Technical Appendix

Appendix A: Sample

The sample for this study consists of students who were surveyed by SSN member organizations in the fall of 2018 and spring of 2019 and who could be matched to their academic records from the NYC Department of Education (NYCDOE). SSN member organizations provide programming in and out of school and to a diverse group of students. Some are higher-achieving students, some lower achieving; they live in neighborhoods across the City and are in grades 6 through 12. Many students voluntarily participate in these programs, attending after-school sessions, while others are automatically enrolled to participate in school-based programs.

This is a sample of opportunity, and there are a number of observed and unobserved differences that may challenge the generalizability of our findings. This sample has higher attendance and a higher proportion of Latinx students than is the case for NYCDOE students generally (see Table A-1 below). SSN students also have a higher GPA than NYCDOE sample at large. However, SSN students have a lower on-track rate, which may appear counterintuitive. We believe these differences may be due to programming differences across grade levels. Many SSN member organizations work to support the transition to high school and target less academically successful 9th graders; at the same time, programming for students in older grades also targets those with higher levels of academic success. Other academic outcomes, such as test scores, are similar for the study sample and NYCDOE students at large, which gives us some confidence that these results may be applicable to students beyond the sample.

Table A-1: Descriptive Statistics for SSN Students and NYCDOE Students, 2018-2019

Variable	SSN Students		NYCDOE	
	High School	Middle School	High School	Middle School
Prior SEL Construct				
Self Regulation	3.5	3.6		
Academic Self-Efficacy	2.8	2.9		
Belonging	4.0	3.7		
Growth Mindset	3.8	3.5		
Interpersonal Skills	5.1	4.7		
Problem Solving	2.9	2.7		
Academic Measures				
Attendance	93.7	96.0	86.0	93.4
GPA (60-100) ^a	82.3		75.9	
ELA Scaled Score		602.8		600.8
Math Scaled Score		601.4		600.7
On-Track 9th Grade	58.0		65.1	
Gender (%)				
Female	53.2	51.5	48.5	48.5
Male	44.7	45.2	50.5	48.5
Race/Ethnicity^b (%)				
Hispanic (any race)	41.5	43.5	39.8	39.1
East Asian (non-Hispanic)	4.2	4.0	16.4	16.6
South Asian (non-Hispanic)	6.4	4.0		
Black (non-Hispanic)	19.9	19.1	26.3	24.5
White (non-Hispanic)	3.6	3.6	13.2	14.4
American Indian or Alaska Native (non-Hispanic)	0.6	1.0		
Native Hawaiian or Other Pacific Islander (non-Hispanic)	1.5	2.3		
Middle Eastern or North African (non-Hispanic)	1.5	2.3	3.1	2.4
Other Demographic Characteristics (%)				
Free Lunch Eligible ^c	74.7	73.4	73.4	72.2
Living in a Structurally Disadvantaged Neighborhood ^d	41.7	38.4	36.4	34.4
Individualized Education Program	9.2	13.0	15.6	15.5
English Language Learner	0.7	1.1	13.0	10.6
Sample size	5,865	1,336	239,732	228,962

Notes: Analyses are based on SSN fall and spring survey data and NYCDOE administrative data from 2018-2019.

a: GPA is calculated by averaging GPA for academic courses weighted by credits; b: Race/Ethnicity for SSN students is from the Student Success Survey; c: Free lunch eligible refers to students whose families meet the free school lunch income thresholds; d: structurally disadvantaged is defined as students living in a bottom quintile census tract from a national distribution of census tract measures.

Appendix B: The SSN Survey

The SSN survey was administered in the fall of 2018 and the spring of 2019 with a response rate of 60 percent for students responding to both the fall and spring surveys. The academic outcomes used in our analysis were measured in the spring of 2018, and the prior academic scores were measured in the spring of 2019.

The SSN survey items by construct table below includes an assessment of their reliability as measured by Cronbach’s Alpha. Intuitively, the alphas examine the tendency of individuals to respond similarly to all of the items of a construct. Statistically, the more reliable a measure, the more positively correlated its items are with one another and the larger the associated Cronbach’s alpha. Alphas range from 0 to 1, and the Research Alliance follows industry convention of accepting an alpha of .70 or higher as sufficiently reliable. We present alphas for each construct, separated by student or teacher and school level, in Table B-1. All survey measures are sufficiently reliable with Cronbach’s alpha above .70.

Table B-1: SSN Student SEL Construct by Item Table with Alpha

Measure	Scale	Items	Alpha
Self-Regulation	1 to 5 (Not Confident At All to Extremely Confident)	<p>“Please tell us <i>how confident</i> you are at doing each of the things listed below.”</p> <ul style="list-style-type: none"> ● Get teachers to help me when I get stuck on schoolwork. ● Finish my homework on time. ● Get myself to study when there are other interesting things to do. ● Organize my schoolwork. ● Get myself to do schoolwork. 	.80
Academic Self-Efficacy	1 to 4 (Almost Never to Almost Always)	<p>“Please tell us <i>how often</i> you do some things or feel a certain way. There are NO right or wrong answers.”</p> <ul style="list-style-type: none"> ● I’m confident that I can do a great job on assignments and tests. ● I’m sure I can understand the hardest information in readings. ● I’m sure I can understand the most complicated information presented by the teacher. ● I’m sure I can learn the skills taught in school. 	.77
Growth Mindset	1 to 5 (Not True at All to Completely True)	<p>“Please tell us <i>how true</i> each of the following statements are for you.”</p> <ul style="list-style-type: none"> ● My intelligence is something that I can’t change very much (Reverse). ● Challenging myself won’t make me smarter (Reverse). ● There are some things I am not capable of learning (Reverse). ● If I am not naturally smart in a subject, I will never do well in it (Reverse). 	.82

Interpersonal Skills	1 to 6 (False to True)	<p>“Please tell us <i>how true</i> each of the following statements are for you.”</p> <ul style="list-style-type: none"> ● I can be a good group leader. ● I can appreciate opinions that are different from mine. ● I can work well with others. ● I can solve problems with other students without being aggressive. ● I often think about the feelings of other students. ● I usually work well with other students without being told to. 	.80
Problem Solving	1 to 4 (Almost Never to Almost Always)	<p>“Please tell us <i>how often</i> you do some things or feel a certain way. There are NO right or wrong answers.”</p> <ul style="list-style-type: none"> ● I compare different solutions to find the best one to solve my problem. ● I look at a problem from many different viewpoints (my own, my friends', my family's, etc.). ● When solving a problem, I look at all possible solutions. ● I try to get all the facts before trying to solve a problem. ● I try to look at the long-term results of each possible solution. 	.79
Self- Advocacy	1 to 4 (Almost Never to Almost Always) 1 to 4 (Strongly Disagree to Strongly Agree)	<p>“Please tell us <i>how often</i> you do some things or feel a certain way. There are NO right or wrong answers.”</p> <ul style="list-style-type: none"> ● I think about how to become a better person. ● I stop to think about my day. ● I check with someone (advisor, teacher) to see how I'm doing. ● I set goals for myself. <p>“Please tell us how much you agree to disagree.”</p> <ul style="list-style-type: none"> ● I tell teachers/adults what I need. ● When I disagree with teacher/adults, I tell them. ● When things get hard, I can deal with them. 	.69
Sense of Belonging	1 to 5 (Not at all True to Completely True)	<p>Adult-Youth Belonging</p> <p>“Please tell us <i>how true</i> each of the following statements are for you.”</p> <ul style="list-style-type: none"> ● There's at least one adult in this program I can talk to if I have a problem. ● Adults in this program respect me. <p>Peer Belonging</p> <ul style="list-style-type: none"> ● Other students in this program take my opinions seriously. ● I can really be myself at this program. ● Students at this program are friendly to me. ● Other students here like me the way I am. 	.85

Appendix C: Analytic Framework and Estimates

Analytic Framework

Although SEL research often deals with aggregated, school-level data, we chose to focus on individual students' changes over time in SEL and academic outcomes. This decision was based on our desire to understand SEL as a lever to improve academic performance. Looking at change over time allows us to isolate how improvements in SEL relate to improvements in academics. If we only used a single data point, the relationship between SEL and academic performance could be driven by another, unmeasured factor such as a student's family resources. Looking at growth accounts for prior factors, such as a student's family resources and their previous experiences, which may have affected both SEL and academics. It is important to note that the model analyzes *simultaneous* growth between SEL and academics, and thus we are not certain about the direction of the relationship (i.e., improved SEL could lead to improved academic performance, or improved academic performance could lead to improved SEL). However, there is limited theoretical support for academic performance leading to improvements in SEL.

Our models also account for students' background characteristics, including their gender, race, and socio-economic status. We include gender and race in our model to account for the ways that sexism and racism may have shaped students' experiences and outcomes. Similarly, including socio-economic status helps account for the resources that students' families may have. Our models also account for the schools that students attend and the programs they are enrolled in. We hold constant pre-survey scores for students' SEL and their academic outcomes. This approach allows us to examine the connection between SEL growth and academic growth for students in our sample, accounting for many of their differing experiences inside and outside of school. Due to missing variables, the sample we use in the growth models is somewhat smaller in size than the full study sample. However, the observable characteristics are not statistically significantly different from the full sample described in Appendix A.

Table C-1 presents the effects of the multi-level model we ran. The table includes the estimates, which describe how the predictors relate to the outcomes, and their p-values.

Subgroup Analyses

Estimates for the subgroup analyses on neighborhood disadvantage and special education status were calculated by running separate models for each subgroup and comparing the effect sizes for each of the significant parameters—in this case, *Growth Mindset* and *Self-Regulation*. See Tables C-2 and C-3.

Table C-1: Effects of Growth in SEL on Growth in Student Performance

	Middle School						Grade 9						Grades 10-12			
	Attendance		ELA		Math		Attendance		GPA		On-Track		Attendance		GPA	
	<i>Estimate</i>	<i>p-value</i>	<i>Estimate</i>	<i>p-value</i>	<i>Estimate</i>	<i>p-value</i>	<i>Estimate</i>	<i>p-value</i>	<i>Estimate</i>	<i>p-value</i>	<i>Estimate</i>	<i>p-value</i>	<i>Estimate</i>	<i>p-value</i>	<i>Estimate</i>	<i>p-value</i>
Intercept	0.12	0.07	-0.07	0.58	-0.39	0.01	0.26	0.01	-0.06	0.74	0.49	0.00	-1.43	<.0001	-4.74	<.0001
Prior SEL Construct																
Academic Behavior	0.00	0.98	-0.02	0.58	-0.04	0.20	0.04	0.09	0.19	<.0001	0.07	0.02	0.03	0.20	0.06	0.00
Academic Self-Efficacy	0.01	0.71	-0.04	0.15	0.06	0.08	-0.05	0.04	-0.03	0.55	-0.04	0.16	-0.02	0.48	0.04	0.06
Sense of Belonging	0.01	0.52	0.00	1.00	0.01	0.65	0.00	0.93	-0.01	0.77	-0.05	0.10	0.03	0.33	-0.01	0.79
Growth Mindset	-0.01	0.45	0.06	0.04	0.02	0.42	-0.02	0.26	0.00	0.90	0.02	0.38	-0.02	0.28	0.04	0.01
Interpersonal Skills	0.01	0.56	0.04	0.18	-0.01	0.74	0.04	0.06	0.06	0.18	0.02	0.51	-0.02	0.49	-0.06	0.01
Problem Solving	-0.03	0.09	0.01	0.80	-0.02	0.59	-0.01	0.60	-0.05	0.30	-0.04	0.16	-0.02	0.44	0.02	0.29
Growth in SEL																
Academic Behavior	0.01	0.50	-0.01	0.78	0.01	0.82	0.04	0.04	0.11	0.01	0.01	0.74	0.01	0.81	0.06	0.01
Academic Self-Efficacy	0.01	0.45	0.06	0.05	0.07	0.03	0.04	0.10	0.06	0.19	0.07	0.01	0.01	0.72	-0.01	0.53
Sense of Belonging	0.00	0.78	0.01	0.64	0.00	0.95	-0.03	0.27	-0.05	0.31	-0.01	0.79	-0.04	0.11	-0.02	0.31
Growth Mindset	0.03	0.03	0.12	<.0001	0.05	0.08	0.02	0.38	0.09	0.02	0.03	0.25	0.03	0.17	0.06	0.00
Interpersonal Skills	-0.01	0.58	0.04	0.22	-0.02	0.52	0.01	0.50	0.01	0.89	0.01	0.75	0.02	0.48	0.02	0.50
Problem Solving	-0.01	0.68	-0.02	0.55	0.03	0.32	-0.03	0.22	0.01	0.91	-0.02	0.50	-0.01	0.65	0.01	0.67
Prior Academic Measure																
Math (Scale Score)	0.50	<.0001	0.52	<.0001	0.51	<.0001	0.42	<.0001	0.17	0.00	0.06	0.05	0.41	<.0001	0.00	0.88
GPA (60-100) ^a													0.01	<.0001	0.07	<.0001
Student Characteristics																
No Free Lunch ^b	0.02	0.57	0.08	0.22	0.07	0.26	0.03	0.51	-0.01	0.95	-0.04	0.43	0.07	0.17	0.04	0.33
Male	-0.03	0.18	0.25	<.0001	-0.15	0.00	-0.05	0.15	0.16	0.02	-0.04	0.31	-0.09	0.02	0.12	0.00
No IEP	0.03	0.41	0.22	0.00	0.41	<.0001	-0.11	0.03	0.15	0.17	0.08	0.24	0.04	0.53	0.05	0.28
Race/Ethnicity^c																
American Indian or Alaska Native	0.22	0.04	-0.30	0.17	-0.31	0.16	0.01	0.93	0.37	0.27	0.14	0.49	-0.11	0.68	0.00	.

Black or African-American	0.07	0.26	-0.20	0.11	-0.07	0.57	0.07	0.38	-0.18	0.26	0.01	0.90	0.17	0.11	-0.24	0.25
East Asian	0.14	0.02	-0.06	0.61	0.53	<.000 1	0.09	0.30	0.39	0.03	0.02	0.87	0.17	0.15	-0.06	0.49
Hispanic or Latino	0.01	0.90	-0.28	0.02	0.01	0.93	-0.02	0.77	-0.14	0.35	0.01	0.92	0.13	0.22	0.13	0.15
Middle Eastern or North African	-0.13	0.33	0.41	0.13	0.00	0.99	-0.05	0.67	0.13	0.56	-0.08	0.57	0.06	0.74	-0.02	0.79
Native Hawaiian or Other Pacific Islander	0.11	0.64	-0.55	0.26	-0.96	0.04	0.65	0.01	-0.16	0.76	0.23	0.46	-0.26	0.71	0.16	0.22
South Asian	0.09	0.23	-0.36	0.02	0.59	0.00	0.02	0.78	0.18	0.34	0.07	0.54	0.16	0.15	-0.72	0.02
White	0.00	.	0.00	.	0.00	.	0.00	.	0.00	.	0.00	.	0.00	.	-0.03	0.76
Neighborhood Characteristics^d																
Does not live in a structurally challenged neighborhood	-0.01	0.70	-0.02	0.71	0.03	0.56	0.06	0.11	0.17	0.02	0.11	0.01	0.07	0.09	-0.03	0.29

Notes: Analyses are based on SSN fall and spring survey data and NYCDOE administrative data

a: GPA is calculated by averaging GPA for academic courses weighted by credits; b: Students whose families do not meet the free school lunch income thresholds; c: Race/Ethnicity from the Student Success Survey; d: structurally disadvantaged is defined as students living in a bottom quintile census tract from a national distribution of census tract measures

Table C-2: Estimates for High School Students With and Without Structural Neighborhood Disadvantage

	Students who do not live in structurally challenged neighborhoods		Students who live in structurally challenged neighborhoods	
	<i>Estimate</i>	<i>p-value</i>	<i>Estimate</i>	<i>p-value</i>
Intercept	-5.48	<.0001	-4.94	<.0001
Prior SEL Construct	0.08	0.00	0.04	0.17
Academic Behavior	0.00	0.97	0.07	0.01
Academic Self-Efficacy	0.00	0.98	-0.02	0.51
Sense of Belonging	0.05	0.03	0.03	0.32
Growth Mindset	-0.08	0.01	-0.02	0.60
Interpersonal Skills	0.05	0.05	-0.03	0.38
Problem Solving	0.03	0.36	0.09	0.01
Growth in SEL	0.01	0.72	-0.04	0.22
Academic Behavior	-0.02	0.42	-0.02	0.47
Academic Self-Efficacy	0.05	0.02	0.07	0.00
Sense of Belonging	0.04	0.20	-0.01	0.77
Growth Mindset	-0.01	0.78	0.03	0.34
Interpersonal Skills	-0.02	0.39	0.02	0.37
Problem Solving	0.07	<.0001	0.07	<.0001
Prior Academic Measure				
GPA ^a	0.07	<.0001	0.07	<.0001
Student Characteristics				
No Free Lunch ^b	0.05	0.26	0.01	0.84
Male	0.14	0.00	0.10	0.03
Grade Level				
10	0.01	0.96	-0.65	0.27
11	0.12	0.43	-0.59	0.32
12	0.11	0.50	-0.68	0.24
Alternative Schools	0.46	0.02	-0.31	0.71
10th CTT ^c	0.59	0.27	-0.06	0.91
11th CTT ^d	.	.	-1.10	0.07
12th CTT ^e	NA	NA	-0.79	0.18

Adult Ed	NA	NA	0.00	.
Student with Disability	0.01	0.88	0.09	0.24
Race/Ethnicity^f				
American Indian or Alaska Native	-0.24	0.37	-0.14	0.81
Black or African-American	-0.07	0.40	-0.02	0.97
East Asian	0.14	0.15	0.08	0.87
Hispanic or Latino	-0.06	0.45	0.02	0.96
Middle Eastern or North African	0.10	0.46	0.24	0.70
Native Hawaiian or Other Pacific Islander	-1.60	0.00	-0.17	0.79
South Asian	-0.04	0.66	-0.01	0.98
White

Notes: Analyses are based on SSN fall and spring survey data and NYCDOE administrative data; NA denotes that that group of students are not present in the sample, "." denotes a reference category for the statistical model. a: GPA is calculated by averaging GPA for academic courses weighted by credits; b: Students whose families do not meet the free school lunch income thresholds; c: Students in 10th grade Collaborative Team Teaching classes; d: Students in 11th grade Collaborative Team Teaching classes; e: 12th grade Collaborative Team Teaching classes; g: Race/Ethnicity from the Student Success Survey; h: structurally disadvantaged is defined as students living in a bottom quintile census tract from a national distribution of census tract measures.

Table C-3: Estimates for High School Students With and Without Individual Education Plans

	Students without Disabilities		Students with Disabilities	
	Estimate	p-value	Estimate	p-value
Intercept	-6.79	<.0001	-3.42	0.00
Prior SEL Construct				
Academic Behavior	0.06	0.00	0.03	0.71
Academic Self-Efficacy	0.02	0.46	0.18	0.01
Sense of Belonging	-0.01	0.78	0.04	0.60
Growth Mindset	0.04	0.03	0.03	0.59
Interpersonal Skills	-0.04	0.10	-0.09	0.22
Problem Solving	0.01	0.53	0.02	0.79
Growth in SEL				
Academic Behavior	0.05	0.03	0.20	0.02
Academic Self-Efficacy	-0.01	0.78	-0.12	0.14
Sense of Belonging	-0.03	0.18	0.01	0.84
Growth Mindset	0.05	0.00	0.12	0.05
Interpersonal Skills	0.00	0.88	0.03	0.65
Problem Solving	0.03	0.23	-0.09	0.28
Prior Academic Measures				
GPA (60-100) ^a	0.07	<.0001	0.05	<.0001
Student Characteristics				
No Free Lunch ^b	0.05	0.26	0.04	0.79
Male	0.11	0.00	0.10	0.35
Grade Level	1.26	0.01	-0.63	0.31
10	1.31	0.01	-0.48	0.44
11	1.25	0.01	-0.15	0.81
12	1.41	0.06	NA	NA
Ungraded ^c	1.60	0.00	0.06	0.93
Alternative Schools	NA	NA	0.29	0.75
10th CTT ^d	NA	NA	-1.02	0.12
11th CTT ^e	NA	NA	-0.61	0.33
12th CTT ^f	NA	NA	.	.
Adult Ed	.	.	NA	NA
Race/Ethnicity^g				
American Indian or Alaska Native	-0.21	0.35	NA	NA
Black or African-American	0.01	0.94	-0.76	0.30
East Asian	0.15	0.11	-0.78	0.06
Hispanic or Latino	0.01	0.93	-0.14	0.76
Middle Eastern or North African	0.16	0.23	-0.53	0.19
Native Hawaiian or Other Pacific Islander	-0.68	0.03	0.14	0.85

South Asian	0.02	0.79	-0.73	0.13
White
Neighborhood Characteristics^h				
Does not live in a structurally challenged neighborhood	-0.04	0.25	0.00	0.99

Notes: Analyses are based on SSN fall and spring survey data and NYCDOE administrative data; NA denotes that that group of students are not present in the sample, "." denotes a reference category for the statistical model. a: GPA is calculated by averaging GPA for academic courses weighted by credits; b: Students whose families do not meet the free school lunch income thresholds; c: Ungraded are special education classes, these students were in general education classes in the fall and in special education at the end of the year; these students do not yet have IEPs.; d: Students in 10th grade Collaborative Team Teaching classes; e: Students in 11th grade Collaborative Team Teaching classes; f: 12th grade Collaborative Team Teaching classes; g: Race/Ethnicity from the Student Success Survey; h: structurally disadvantaged is defined as students living in a bottom quintile census tract from a national distribution of census tract measures