

Online Appendix for “Supporting Teacher Autonomy to Improve Education Outcomes: Experimental Evidence from Brazil”

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Supporting Teacher Autonomy to Improve Education Outcomes in Brazil Reproducibility Check

Part 1: Computational Reproducibility

Required

- ☒ The master script re-creates all results as they appear in the paper.
- ☒ All code runs completely on a new computer.

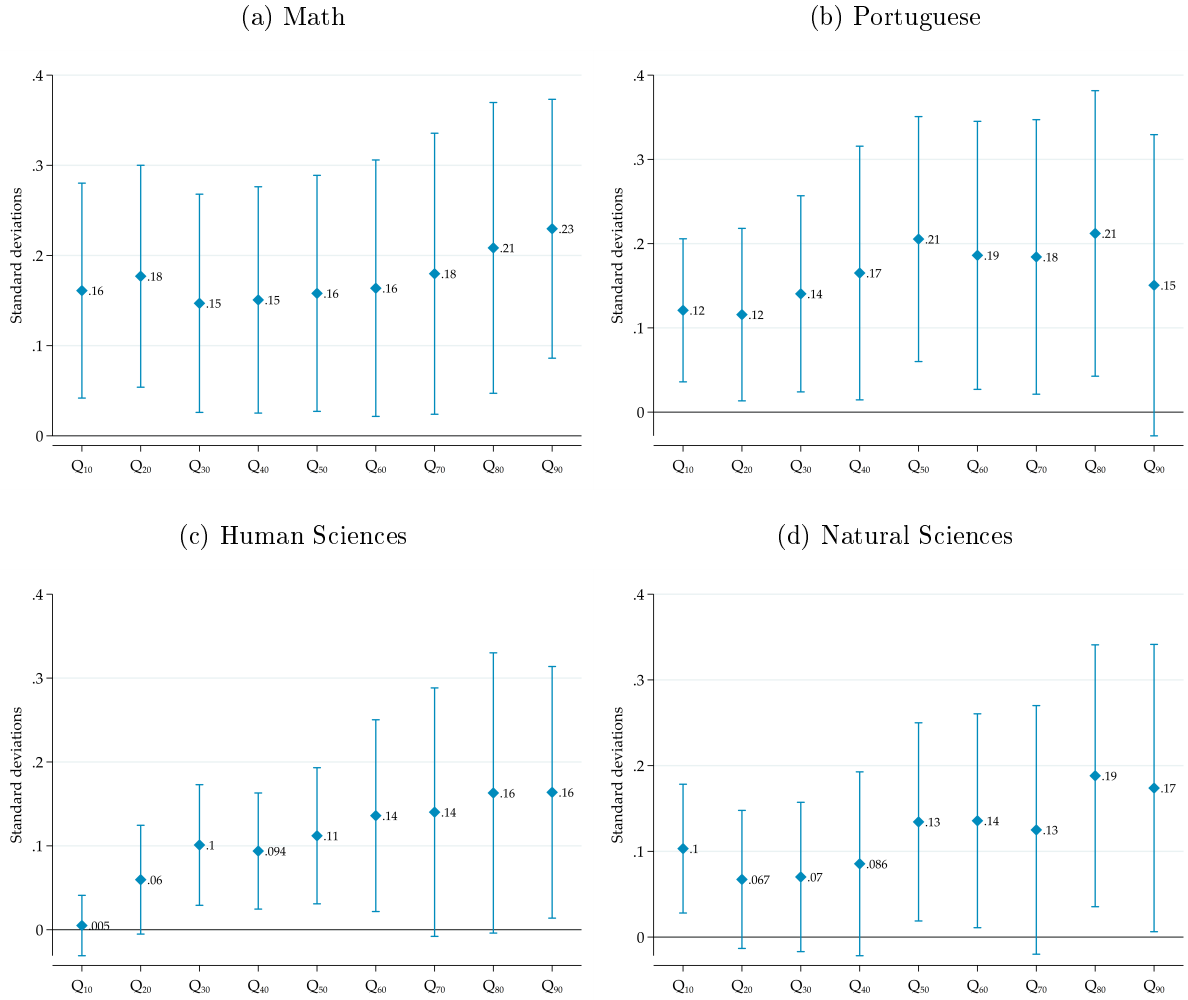
Recommended

- ☐ All in-text numerical citations that are not drawn directly from tables and figures are reproduced.
- ☒ Scripts for data cleaning, variable creation, and analysis are separate.
- ☒ Analysis scripts do not include any data cleaning or variable creation, unless necessary for the creation of a table or graphic.
- ☒ All code is well-commented and formatted, such that one can easily identify functional chunks of code and evaluate whether they correctly implement the econometric or statistical process described.
- ☐ All intermediate data sets can be reproduced from the raw data.
- ☐ All final data sets can be reproduced from the data submitted.

Part 2: Repository Access Information

Microdata Catalog entry:	<input type="text"/>	<input type="checkbox"/> Public
GitHub repository:	<input type="text" value="worldbank/brazil-pip"/>	<input type="checkbox"/> Public
Pre-registration:	<input type="text"/>	<input type="checkbox"/> Public
Pre-analysis plan:	<input type="text"/>	<input type="checkbox"/> Public
Other documentation:	<input type="text"/>	<input type="checkbox"/> Public

Figure C1: Quantile Treatment Effects in 6th Grade – By Subject



Notes: Point estimates of quantile regressions with strata (i.e., region and grade) fixed effects and standard errors clustered at the school level. Confidence intervals are 90%. Quantile treatment effects are expressed in terms of standard deviations from the control group.

Table C1: Impact on Student Learning – Controlling for Students’ Characteristics

	(1) Average	(2) Math	(3) Portuguese	(4) Human Sciences	(5) Natural Sciences
All schools					
Treatment	0.025 (0.045)	0.048 (0.053)	0.011 (0.055)	-0.010 (0.042)	0.047 (0.042)
Number of observations	7501	6735	6738	6473	6468
Number of clusters	247	246	246	246	246
Mean dep. var. control group	183.110	172.557	191.239	183.849	183.181
SD dep. var. control group	41.531	47.868	53.273	49.299	42.794
5th grade – Primary schools					
Treatment	-0.083 (0.073)	-0.082 (0.087)	-0.134* (0.073)	-0.076 (0.078)	-0.074 (0.078)
Number of observations	1865	1719	1721	1748	1746
Number of clusters	89	89	89	89	89
Mean dep. var. control group	161.031	161.372	178.781	156.159	151.470
SD dep. var. control group	35.929	44.061	58.953	36.943	28.855
6th grade – Lower secondary schools					
Treatment	0.136** (0.061)	0.180** (0.069)	0.152* (0.080)	0.084 (0.059)	0.118* (0.063)
Number of observations	3002	2679	2680	2749	2748
Number of clusters	97	96	96	97	97
Mean dep. var. control group	163.481	152.810	172.690	161.140	171.146
SD dep. var. control group	32.253	43.631	47.617	36.038	35.516
10th grade – Upper secondary schools					
Treatment	-0.042 (0.076)	-0.033 (0.093)	-0.063 (0.100)	-0.091 (0.067)	0.020 (0.058)
Number of observations	2634	2337	2337	1976	1974
Number of clusters	61	61	61	60	60
Mean dep. var. control group	218.601	201.511	219.796	236.099	225.179
SD dep. var. control group	27.325	40.126	41.401	27.222	24.689

Notes: *Significant at 10%. **Significant at 5%. ***Significant at 1%. Unit of observation: student. All regressions are OLS with strata fixed effects and control for students’ characteristics, such as age, gender and race dummies (white, indigenous, black, or *pardo*), whether they receive *Bolsa Família*, and whether they use school transportation. Standard errors clustered at the school level in parentheses.

Table C2: Impact on Student Learning – Blocked Difference-in-Means

	(1) Average	(2) Math	(3) Portuguese	(4) Human Sciences	(5) Natural Sciences
All schools					
Treatment	-0.010 (0.058)	-0.018 (0.065)	-0.022 (0.078)	-0.010 (0.046)	0.024 (0.041)
Number of observations	12760	11366	11365	10885	10879
Number of clusters	264	264	264	264	264
Mean dep. var. control group	184.052	172.693	190.234	186.477	185.329
SD dep. var. control group	41.081	46.528	52.637	49.517	42.864
5th grade – Primary schools					
Treatment	-0.123 (0.097)	-0.124 (0.108)	-0.134 (0.100)	-0.121 (0.098)	-0.130 (0.090)
Number of observations	3179	2885	2885	2977	2978
Number of clusters	92	92	92	92	92
Mean dep. var. control group	157.452	157.540	173.368	154.288	149.499
SD dep. var. control group	36.022	43.798	60.456	37.359	28.700
6th grade – Lower secondary schools					
Treatment	0.140** (0.069)	0.154* (0.081)	0.163* (0.083)	0.095 (0.061)	0.124* (0.066)
Number of observations	4511	4014	4013	4134	4131
Number of clusters	99	99	99	99	99
Mean dep. var. control group	162.845	151.930	172.451	160.075	170.685
SD dep. var. control group	31.523	42.024	47.502	35.775	35.164
10th grade – Upper secondary schools					
Treatment	-0.061 (0.092)	-0.084 (0.102)	-0.094 (0.133)	-0.043 (0.075)	0.022 (0.059)
Number of observations	5070	4467	4467	3774	3770
Number of clusters	73	73	73	73	73
Mean dep. var. control group	215.446	198.009	214.086	233.701	223.680
SD dep. var. control group	26.923	38.838	41.371	26.369	23.650

Notes: *Significant at 10%. **Significant at 5%. ***Significant at 1%. Unit of observation: student. Coefficients are sample-weighted average treatment effects of the within-block difference-in-means (Blocked DIM). Standard errors clustered at the school level in parentheses.

Table C3: Impact on Student Learning – Interaction-Weighted Estimator (IWE)

	(1) Average	(2) Math	(3) Portuguese	(4) Human Sciences	(5) Natural Sciences
5th grade – Primary schools					
Treatment	-0.064 (0.084)	-0.064 (0.094)	-0.088 (0.088)	-0.067 (0.084)	-0.071 (0.081)
Percentage difference between IWE and OLS	-4.617	-4.112	-2.815	-4.536	-4.150
P-value for joint test of equality between IWE and OLS	0.107	0.064	0.146	0.103	0.038
P-value for joint Wald Test for interactions	0.556	0.557	0.655	0.547	0.401
6th grade – Lower secondary schools					
Treatment	0.145** (0.061)	0.177** (0.072)	0.157** (0.073)	0.102* (0.054)	0.121** (0.062)
Percentage difference between IWE and OLS	-0.679	-0.101	-0.788	-0.577	-1.095
P-value for joint test of equality between IWE and OLS	0.703	0.723	0.459	0.756	0.661
P-value for joint Wald Test for interactions	0.956	0.931	0.872	0.957	0.924

Notes: *Significant at 10%. **Significant at 5%. ***Significant at 1%. Unit of observation: student. All estimates are IWE as in ? . Standard errors clustered at the school level in parentheses. We only show results for 5th and 6th grade, because 10th grade has one stratum with no variation in treatment assignment.

Table C4: Impact on Student Learning – Regression-Weighted Estimator (RWE)

	(1) Average	(2) Math	(3) Portuguese	(4) Human Sciences	(5) Natural Sciences
All schools					
Treatment	0.034 (0.044)	0.045 (0.050)	0.031 (0.056)	0.011 (0.038)	0.044 (0.038)
Percentage difference between RWE and OLS	5.428	8.406	9.503	-11.609	0.050
P-value for joint test of equality between RWE and OLS	0.423	0.134	0.334	0.394	0.991
5th grade – Primary schools					
Treatment	-0.065 (0.087)	-0.065 (0.097)	-0.088 (0.090)	-0.067 (0.087)	-0.071 (0.084)
Percentage difference between RWE and OLS	-4.334	-3.803	-2.605	-4.230	-3.891
P-value for joint test of equality between RWE and OLS	0.091	0.131	0.175	0.109	0.056
6th grade – Lower secondary schools					
Treatment	0.145** (0.061)	0.177** (0.073)	0.157** (0.075)	0.102* (0.054)	0.121** (0.062)
Percentage difference between RWE and OLS	-0.663	-0.107	-0.752	-0.569	-1.053
P-value for joint test of equality between RWE and OLS	0.345	0.790	0.165	0.518	0.262
10th grade – Upper secondary schools					
Treatment	-0.004 (0.076)	-0.004 (0.086)	-0.006 (0.109)	-0.029 (0.061)	0.051 (0.053)
Percentage difference between RWE and OLS	-59.928	-74.784	-62.107	10.203	0.484
P-value for joint test of equality between RWE and OLS	0.256	0.063	0.195	0.557	0.962

Notes: *Significant at 10%. **Significant at 5%. ***Significant at 1%. Unit of observation: student. All estimates are RWE as in ? . Standard errors clustered at the school level in parentheses.

Table C5: Impact on Student Learning – School Level Regressions

	(1) Average	(2) Math	(3) Portuguese	(4) Human Sciences	(5) Natural Sciences
All schools					
Treatment	0.007 (0.047)	0.012 (0.053)	-0.007 (0.056)	-0.012 (0.045)	0.023 (0.043)
Number of observations	263	263	263	263	263
Mean dep. var. control group	174.729	165.605	182.673	177.650	177.633
SD dep. var. control group	28.554	25.473	27.435	36.662	32.436
5th grade – Primary schools					
Treatment	-0.073 (0.088)	-0.070 (0.098)	-0.095 (0.093)	-0.070 (0.088)	-0.068 (0.086)
Number of observations	92	92	92	92	92
Mean dep. var. control group	155.323	154.385	169.916	152.488	147.769
SD dep. var. control group	17.048	19.485	25.530	15.121	12.779
6th grade – Lower secondary schools					
Treatment	0.152** (0.063)	0.177** (0.076)	0.170** (0.079)	0.112** (0.056)	0.135** (0.064)
Number of observations	99	99	99	99	99
Mean dep. var. control group	162.781	152.310	171.844	159.607	170.514
SD dep. var. control group	12.395	14.902	17.670	9.929	12.829
10th grade – Upper secondary schools					
Treatment	-0.019 (0.076)	-0.027 (0.086)	-0.050 (0.108)	-0.046 (0.065)	0.043 (0.053)
Number of observations	72	72	72	72	72
Mean dep. var. control group	215.228	197.963	213.461	233.734	224.181
SD dep. var. control group	8.703	11.379	13.835	7.299	5.995

Notes: *Significant at 10%. **Significant at 5%. ***Significant at 1%. Unit of observation: school. All regressions are OLS with strata (i.e., region and grade) fixed effects and analytic weights for number of students enrolled in the grade of interest. Robust standard errors in parentheses. The coefficient are expressed in terms of standard deviations from the control group, while mean and standard deviation of the dependent variable refer to the raw values in the control group.

Table C6: Impact on Student Learning – Standardized Test Scores Rescaled to SAEB

	(1) 5th	(2) 6th	(3) 9th	(4) 10th	(5) 12th
Math					
Treatment	-0.081 (0.094)	0.153** (0.073)	0.117 (0.092)	-0.002 (0.085)	-0.078 (0.114)
Number of observations	3065	4226	2118	4744	3257
Number of clusters	96	104	93	78	77
Mean dep. var. control group	164.623	173.851	211.814	220.419	234.287
SD dep. var. control group	46.278	44.655	45.455	37.330	42.500
Portuguese					
Treatment	-0.092 (0.087)	0.133* (0.076)	0.115 (0.085)	-0.014 (0.107)	-0.029 (0.112)
Number of observations	3065	4225	2119	4744	3260
Number of clusters	96	104	93	78	77
Mean dep. var. control group	178.878	179.134	218.859	223.413	231.668
SD dep. var. control group	64.768	51.032	49.923	44.412	46.331

Notes: *Significant at 10%. **Significant at 5%. ***Significant at 1%. Unit of observation: student. All regressions are OLS with strata (i.e., region and grade) fixed effects. Standard errors clustered at the school level.

Table C7: Impact on Student Progression Rates in 6th Grade Treated Schools – Spillover to Other Grades

	<i>Grade level</i>				<i>Student level</i>			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	6th	7th	8th	9th	6th	7th	8th	9th
Passing								
Treatment	8.46**	-0.16	-1.60	-4.62	7.00**	1.41	-0.46	0.95
	(3.30)	(2.93)	(2.64)	(3.23)	(3.10)	(3.18)	(2.88)	(3.61)
Number of observations	104	103	99	93	5490	4465	3294	2883
Number of clusters					104	103	99	93
Mean dep. var. control group	63.56	72.63	86.08	86.24	58.73	66.93	80.92	77.79
SD dep. var. control group	17.05	13.46	12.32	10.94	49.24	47.06	39.30	41.58
Dropout								
Treatment	-1.61	-0.31	0.05	4.15	-4.35**	-2.88	-1.32	-3.78*
	(1.27)	(1.38)	(1.42)	(2.76)	(1.82)	(1.78)	(1.75)	(2.25)
Number of observations	104	103	99	93	5494	4473	3303	2889
Number of clusters					104	103	99	93
Mean dep. var. control group	6.84	5.67	4.73	5.69	13.55	13.57	11.37	15.10
SD dep. var. control group	7.15	6.57	7.16	7.23	34.23	34.25	31.75	35.82
Retention								
Treatment	-6.85**	0.48	1.55	0.47	-2.65	1.46	1.84	2.84
	(2.91)	(2.89)	(2.13)	(2.08)	(2.81)	(2.74)	(1.74)	(2.08)
Number of observations	104	103	99	93	5490	4465	3294	2883
Number of clusters					104	103	99	93
Mean dep. var. control group	29.59	21.70	9.19	8.07	27.72	19.48	7.65	7.08
SD dep. var. control group	14.91	12.37	10.02	9.51	44.77	39.61	26.60	25.66

Notes: *Significant at 10%. **Significant at 5%. ***Significant at 1%. School-level data are from *Sistema Integrado de Gestão da Educação* (SIGEduc) and student-level data are from Rio Grande do Norte census. Unit of observation: school and student. Sample: schools treated at 6th grade. All regressions are OLS with strata (i.e., region) fixed effects. Robust standard errors for school-level regressions and standard errors clustered at the school level for student-level regressions in parentheses.

Table C8: Impact on Socio-Emotional Skills – Controlling for Students’ Characteristics

	(1)	(2)	(3)	(4)	(5)
	Agreeableness	Conscientiousness	Extraversion	Neuroticism	Openness
All schools					
Treatment	0.059 (0.063)	0.118* (0.061)	0.099* (0.059)	0.098 (0.061)	0.042 (0.061)
Number of observations	2141	2141	2141	2141	2141
Number of clusters	213	213	213	213	213
Mean dep. var. control group	4.419	4.347	4.206	3.993	4.122
SD dep. var. control group	0.983	1.060	0.788	0.741	0.964
5th grade – Primary schools					
Treatment	-0.058 (0.087)	-0.001 (0.096)	-0.017 (0.092)	-0.023 (0.083)	-0.102 (0.091)
Number of observations	778	778	778	778	778
Number of clusters	82	82	82	82	82
Mean dep. var. control group	4.552	4.436	4.347	4.099	4.262
SD dep. var. control group	1.034	1.124	0.834	0.754	0.987
6th grade – Lower secondary schools					
Treatment	0.076 (0.119)	0.139 (0.109)	0.163 (0.104)	0.145 (0.119)	0.070 (0.108)
Number of observations	796	796	796	796	796
Number of clusters	82	82	82	82	82
Mean dep. var. control group	4.356	4.281	4.125	3.917	3.962
SD dep. var. control group	1.077	1.152	0.860	0.752	1.054
10th grade – Upper secondary schools					
Treatment	0.182 (0.110)	0.235** (0.097)	0.148* (0.086)	0.187* (0.101)	0.194* (0.105)
Number of observations	567	567	567	567	567
Number of clusters	49	49	49	49	49
Mean dep. var. control group	4.324	4.325	4.130	3.965	4.180
SD dep. var. control group	0.674	0.752	0.519	0.687	0.700

Notes: *Significant at 10%. **Significant at 5%. ***Significant at 1%. Unit of observation: student. All regressions are OLS with strata (i.e., region and grade) fixed effects and control for students’ characteristics, such as age, gender and race dummies (white, indigenous, black, or *pardo*), whether they receive *Bolsa Família*, and whether they use school transportation. Standard errors clustered at the school level in parentheses.

Table C9: Impact on Socio-Emotional Skills – Blocked Difference-in-Means

	(1)	(2)	(3)	(4)	(5)
	Agreeableness	Conscientiousness	Extraversion	Neuroticism	Openness
All schools					
Treatment	0.013 (0.059)	0.085 (0.061)	0.107* (0.063)	0.013 (0.050)	0.019 (0.059)
Number of observations	3560	3560	3560	3558	3560
Number of clusters	235	235	235	235	235
Mean dep. var. control group	4.413	4.331	4.199	4.007	4.105
SD dep. var. control group	0.975	1.053	0.777	0.738	0.970
5th grade – Primary schools					
Treatment	-0.025 (0.102)	0.072 (0.104)	0.053 (0.112)	0.004 (0.079)	-0.085 (0.103)
Number of observations	1296	1296	1296	1294	1296
Number of clusters	85	85	85	85	85
Mean dep. var. control group	4.468	4.359	4.287	4.040	4.193
SD dep. var. control group	1.049	1.108	0.851	0.738	0.997
6th grade – Lower secondary schools					
Treatment	0.068 (0.095)	0.170* (0.100)	0.203** (0.099)	0.009 (0.084)	0.120 (0.095)
Number of observations	1270	1270	1270	1270	1270
Number of clusters	87	87	87	87	87
Mean dep. var. control group	4.390	4.265	4.156	3.971	3.950
SD dep. var. control group	1.090	1.176	0.858	0.770	1.089
10th grade – Upper secondary schools					
Treatment	0.011 (0.098)	-0.006 (0.086)	0.075 (0.091)	0.036 (0.091)	0.072 (0.083)
Number of observations	994	994	994	994	994
Number of clusters	63	63	63	63	63
Mean dep. var. control group	4.378	4.387	4.152	4.017	4.212
SD dep. var. control group	0.663	0.761	0.514	0.692	0.701

Notes: *Significant at 10%. **Significant at 5%. ***Significant at 1%. Unit of observation: student. Coefficients are sample-weighted average treatment effects of the within-block difference-in-means (Blocked DIM). Standard errors clustered at the school level in parentheses.

Table C10: Impact on Socio-Emotional Skills – Interaction-Weighted Estimator (IWE)

	(1)	(2)	(3)	(4)	(5)
	Agreeableness	Conscientiousness	Extraversion	Neuroticism	Openness
All schools					
Treatment	0.046 (0.054)	0.113** (0.052)	0.113** (0.053)	0.036 (0.046)	0.055 (0.052)
Percentage difference between IWE and OLS	-4.587	-1.692	-2.212	-1.581	-5.082
P-value for joint test of equality between IWE and OLS	0.221	0.002	0.101	0.211	0.059
P-value for joint Wald Test for interactions	0.462	0.122	0.483	0.680	0.303
5th grade – Primary schools					
Treatment	0.023 (0.095)	0.093 (0.094)	0.048 (0.096)	-0.020 (0.073)	-0.062 (0.092)
Percentage difference between IWE and OLS	-0.984	-0.341	-1.650	2.051	1.703
P-value for joint test of equality between IWE and OLS	0.745	0.890	0.467	0.868	0.861
P-value for joint Wald Test for interactions	0.945	0.989	0.815	0.984	0.980
6th grade – Lower secondary schools					
Treatment	0.078 (0.097)	0.173* (0.096)	0.206** (0.096)	0.060 (0.091)	0.138 (0.096)
Percentage difference between IWE and OLS	-0.020	-0.147	-0.561	2.750	-0.233
P-value for joint test of equality between IWE and OLS	0.211	0.487	0.377	0.621	0.308
P-value for joint Wald Test for interactions	0.517	0.795	0.703	0.886	0.625
10th grade – Upper secondary schools					
Treatment	0.035 (0.083)	0.063 (0.068)	0.080 (0.074)	0.079 (0.070)	0.103 (0.071)
Percentage difference between IWE and OLS	-16.644	-7.669	-5.785	-3.637	-6.341
P-value for joint test of equality between IWE and OLS	0.051	0.000	0.075	0.019	0.007
P-value for joint Wald Test for interactions	0.223	0.007	0.384	0.172	0.134

Notes: *Significant at 10%. **Significant at 5%. ***Significant at 1%. Unit of observation: student. All estimates are IWE as in ?. Standard errors clustered at the school level in parentheses.

Table C11: Impact on Socio-Emotional Skills – Regression-Weighted Estimator (RWE)

	(1)	(2)	(3)	(4)	(5)
	Agreeableness	Conscientiousness	Extraversion	Neuroticism	Openness
All schools					
Treatment	0.046 (0.056)	0.113** (0.054)	0.114** (0.054)	0.036 (0.047)	0.055 (0.054)
Percentage difference between RWE and OLS	-4.761	-1.763	-2.109	-1.953	-5.274
P-value for joint test of equality between RWE and OLS	0.248	0.183	0.109	0.587	0.053
5th grade – Primary schools					
Treatment	0.023 (0.096)	0.093 (0.095)	0.048 (0.096)	-0.020 (0.074)	-0.062 (0.093)
Percentage difference between RWE and OLS	-1.707	-0.373	-1.363	1.391	1.820
P-value for joint test of equality between RWE and OLS	0.889	0.895	0.796	0.907	0.650
6th grade – Lower secondary schools					
Treatment	0.078 (0.099)	0.173* (0.098)	0.207** (0.097)	0.060 (0.092)	0.138 (0.098)
Percentage difference between RWE and OLS	0.026	-0.111	-0.505	2.322	-0.220
P-value for joint test of equality between RWE and OLS	0.992	0.925	0.636	0.546	0.874
10th grade – Upper secondary schools					
Treatment	0.035 (0.092)	0.063 (0.079)	0.080 (0.078)	0.079 (0.074)	0.102 (0.080)
Percentage difference between RWE and OLS	-16.960	-8.219	-5.698	-3.997	-6.596
P-value for joint test of equality between RWE and OLS	0.175	0.058	0.123	0.177	0.080

Notes: *Significant at 10%. **Significant at 5%. ***Significant at 1%. Unit of observation: student. All estimates are RWE as in ?. Standard errors clustered at the school level in parentheses.

Table C12: Impact on Socio-Emotional Skills – School Level Regressions

	(1)	(2)	(3)	(4)	(5)
	Agreeableness	Conscientiousness	Extraversion	Neuroticism	Openness
All schools					
Treatment	0.075	0.142**	0.103	0.087	0.078
	(0.076)	(0.069)	(0.069)	(0.062)	(0.069)
Number of observations	235	235	235	235	235
Mean dep. var. control group	4.379	4.293	4.162	3.966	4.049
SD dep. var. control group	0.566	0.612	0.468	0.355	0.582
5th grade – Primary schools					
Treatment	0.086	0.157	0.050	0.092	-0.010
	(0.125)	(0.120)	(0.118)	(0.102)	(0.121)
Number of observations	85	85	85	85	85
Mean dep. var. control group	4.435	4.323	4.258	3.984	4.162
SD dep. var. control group	0.689	0.651	0.484	0.347	0.562
6th grade – Lower secondary schools					
Treatment	0.098	0.204*	0.274**	0.096	0.182
	(0.120)	(0.111)	(0.124)	(0.096)	(0.124)
Number of observations	87	87	87	87	87
Mean dep. var. control group	4.359	4.211	4.080	3.938	3.853
SD dep. var. control group	0.595	0.718	0.573	0.406	0.702
10th grade – Upper secondary schools					
Treatment	0.039	0.064	0.022	0.071	0.107
	(0.145)	(0.122)	(0.109)	(0.124)	(0.106)
Number of observations	63	63	63	63	63
Mean dep. var. control group	4.330	4.372	4.149	3.984	4.182
SD dep. var. control group	0.262	0.315	0.161	0.285	0.258

Notes: *Significant at 10%. **Significant at 5%. ***Significant at 1%. Unit of observation: school. All regressions are OLS with strata (i.e., region and grade) fixed effects and analytic weights for number of students enrolled in the grade of interest. Robust standard errors in parentheses. The coefficient are expressed in terms of standard deviations from the control group, while mean and standard deviation of the dependent variable refer to the raw values in the control group.