

Telementoring and homeschooling during school closures

A randomized experiment in rural Bangladesh

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Motivation

- Educational disruptions in low- and middle-income countries are common
- Millions of children are affected yearly due to natural disasters, war, epidemics, political unrests, teacher absenteeism, etc.
- Most primary school children in rural areas are several years behind
- This pre-existing problem has been aggravated by Covid-19 school closures
- Also, heterogeneity in learning → some has remote access to learning but many do not, esp. in rural areas (Banerjee & Banerji, 2021)
- Already-behind children in rural areas are now even further behind
- If we do not address this learning heterogeneity, millions of children in low- and middle-income countries might not return to schools at all (Banerjee & Banerji, 2021)

Research question

- Can we leverage the wider mobile phone coverage in rural areas to address this learning inequality?
- That is, can weekly educational support via phone calls improve learning outcomes of children?
- We implement an RCT in 200 Bangladesh villages to evaluate its impact.
- A potential solution to learning disruptions caused by Covid-19 + other shocks

Education during Covid-19 in Bangladesh

- Institutions closed since 17 March 2020.
- 38 million students, 18.6 million in primary (most in rural).
- Low internet penetration → asynchronous TV/Radio based learning
- 44% households in rural area own a television
- 1 in 2 mothers reported difficulty in homeschooling (Biswas et al., 2020).
- Pre-Covid, school dropout at primary was 47% (80% in rural)
- Pre-Covid, 57% could not read and understand simple texts → 76% due to Covid
- LA-Years of Schooling expected to fall from 6y in 2019 to 5.3y in 2021

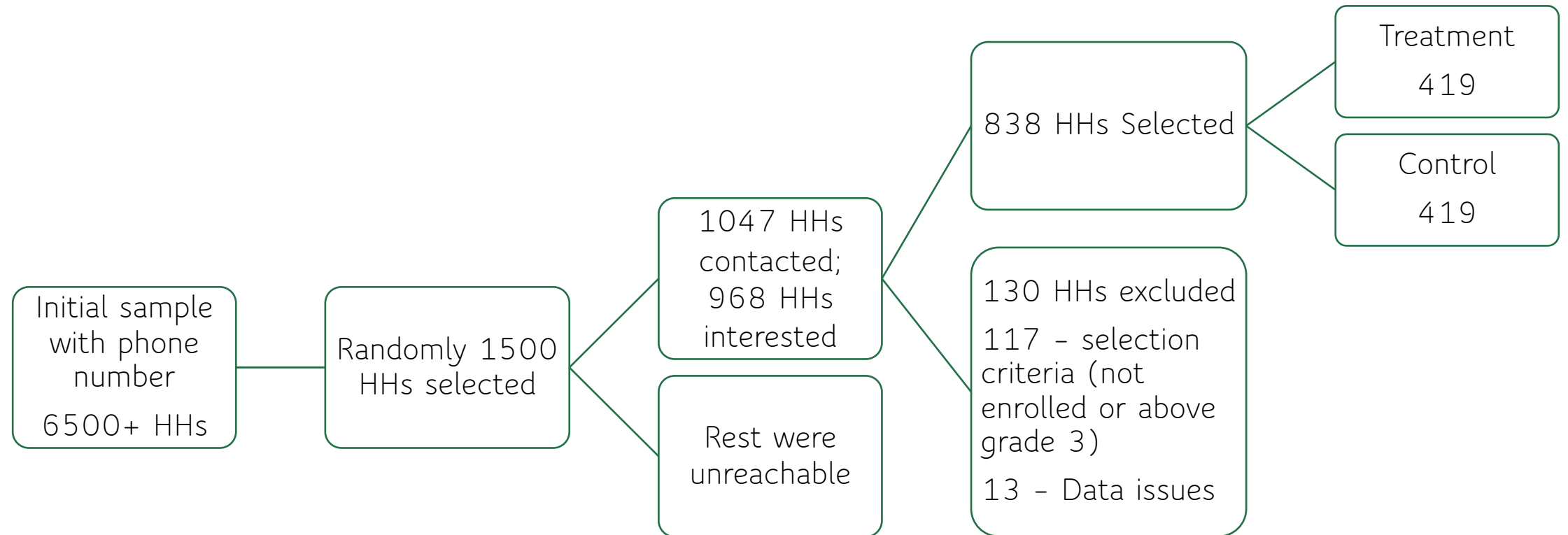
What we do?

- We provide telementoring to primary school children and their mothers → RCT in 200 Bangladeshi villages
- Telementoring → a mentor guides a mentee over telephone to help grow their skills and knowledge.
- Use GDRI directory to randomly select roughly 840 mother-child dyads
- We hired over 200 student volunteers as mentors from various Bangladeshi universities
- Randomly assigned mentors to child-mother dyads
- Mentors provided weekly education support for 13 consecutive weeks
- Tuition on two core subjects: mathematics and English
- 30 minutes phone calls, SMS + study plans for the week to mothers
- Half received telementoring, half did not.

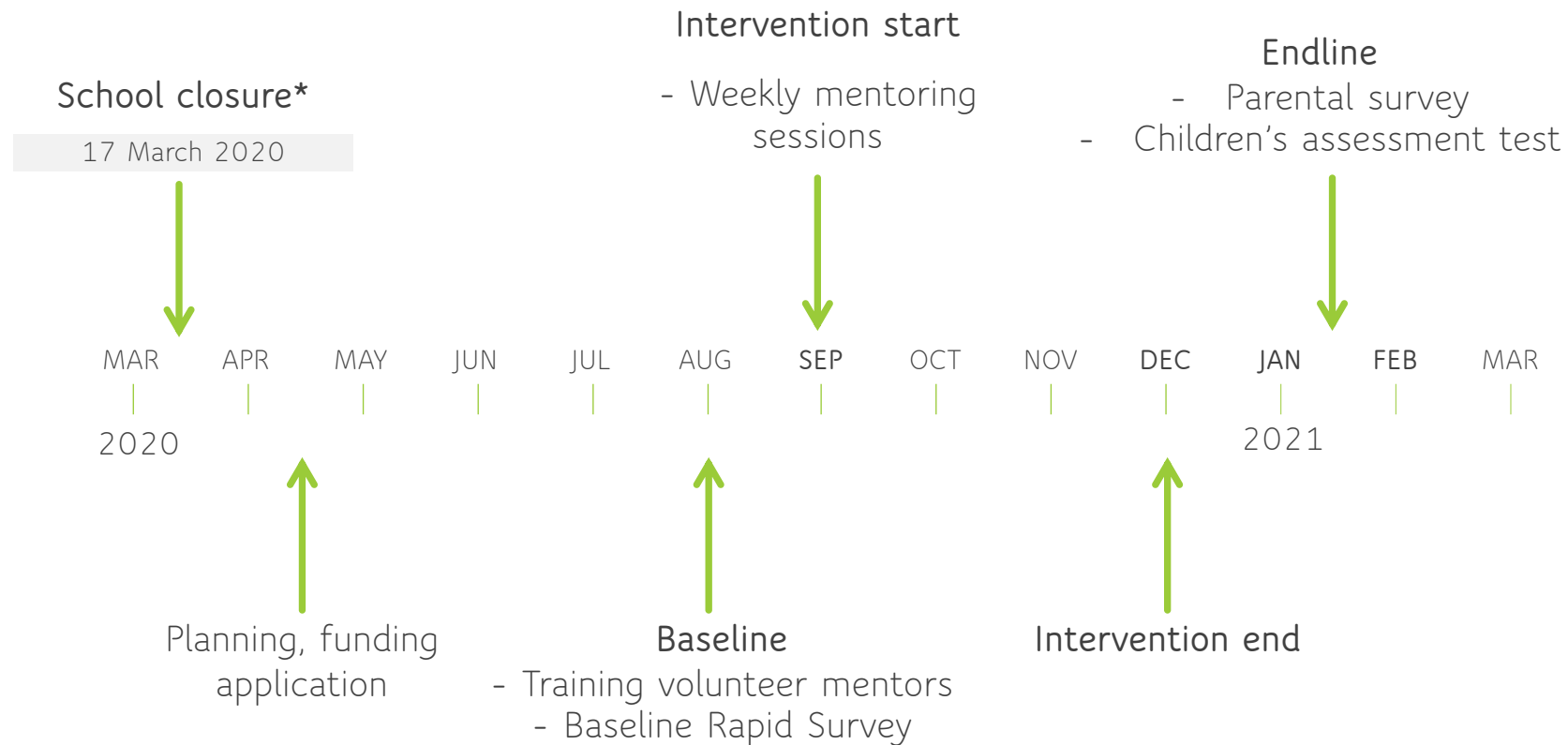
Mentoring session



Sampling



Timeline



* Educational institutions are yet to open as of 31 August 2021.

Outcome variables

1. Children's learning outcomes

- 100 marks one-on-one test; English, mathematics, Bengali, & general knowledge.

2. Parental involvement

- Homeschooling involvement in daily minutes
- Leisure activity involvement in daily minutes

3. Parenting style and perception

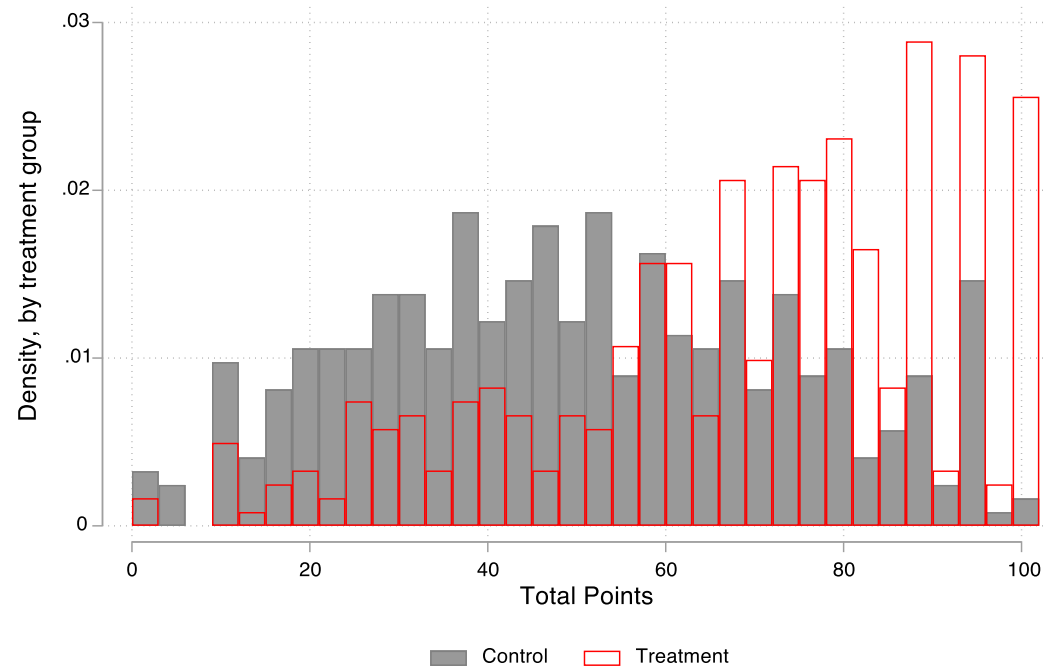
- All outcomes have been control group standardized: control mean 0 and SD 1.

Survey and assessment sessions

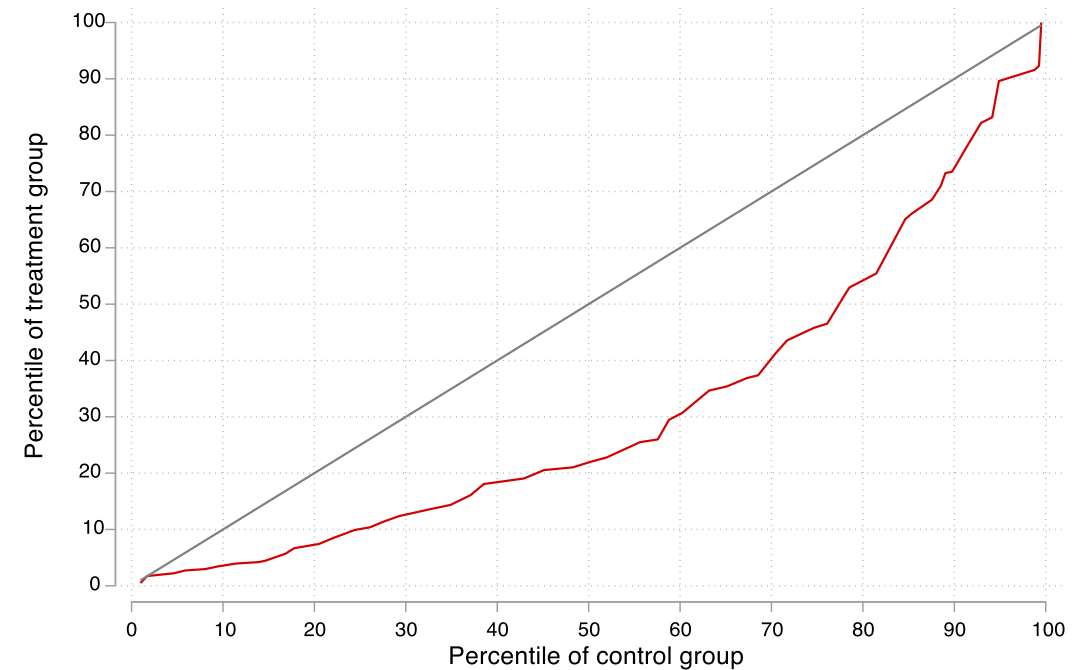


Treatment effect – distribution of test score

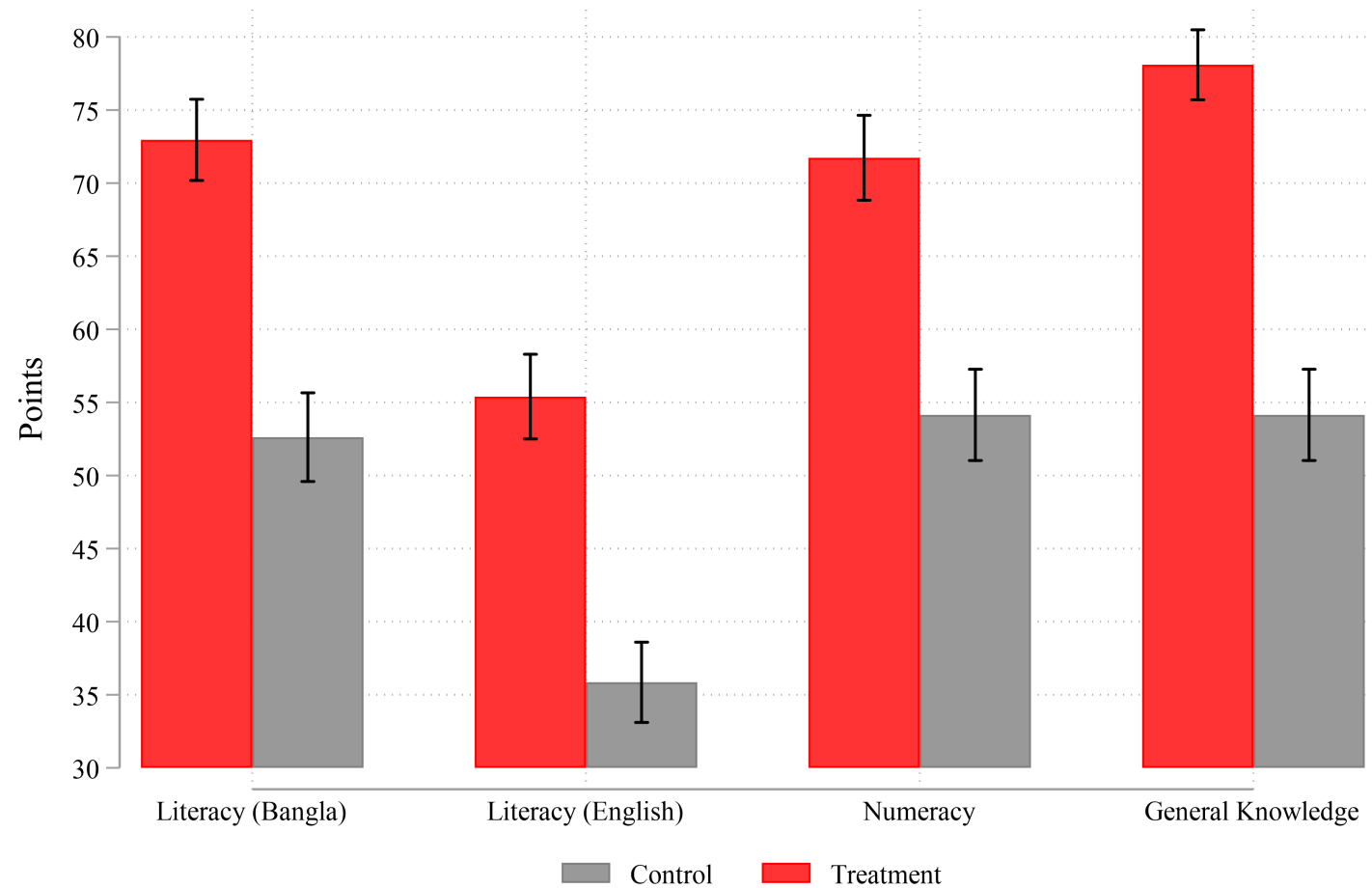
Panel A: Distribution of total score, by treatment group



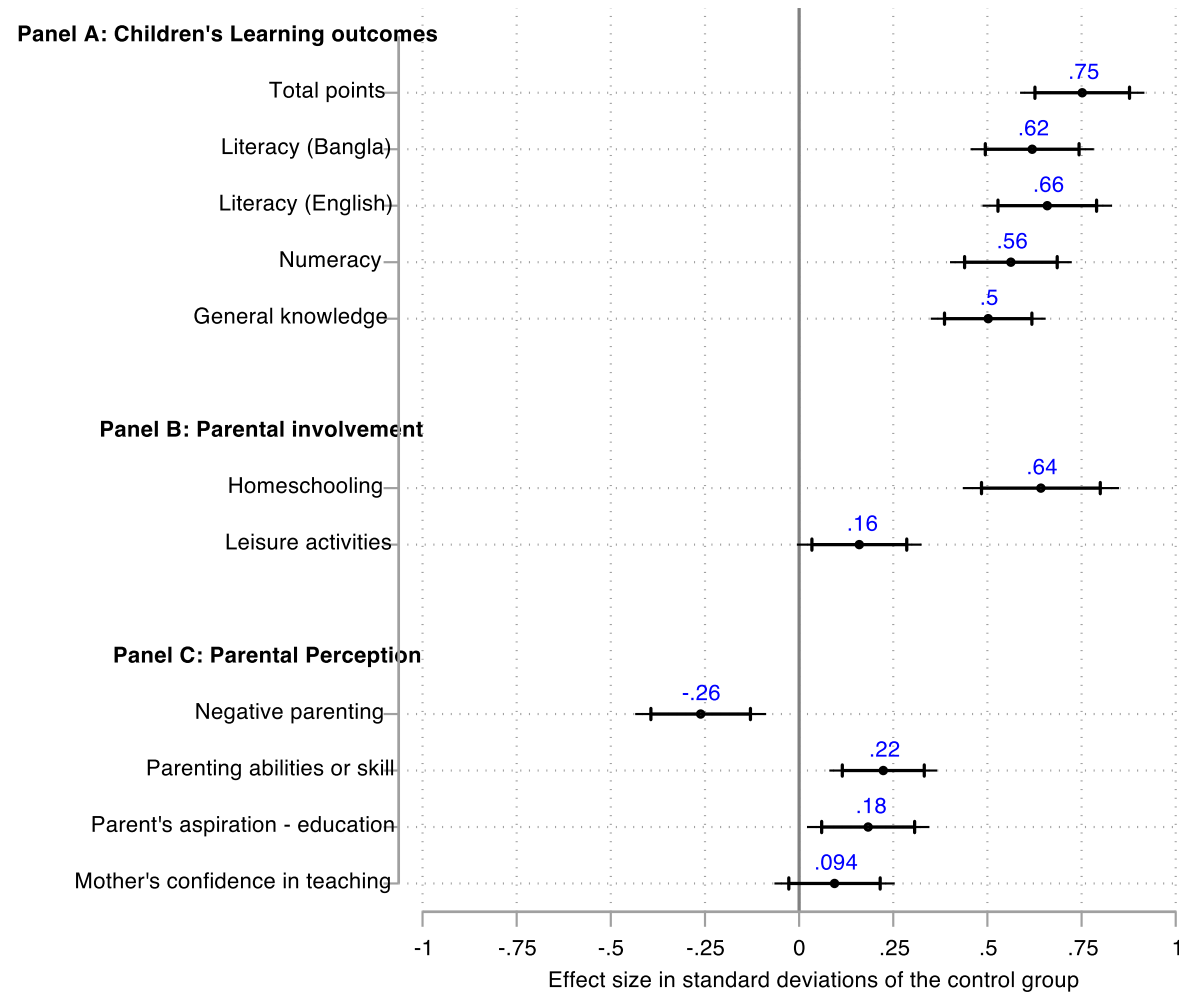
Panel B: Percentile-to-percentile plot of test score



Treatment effects on test scores



Treatment effects in SD units



Mediation analysis (Imai et al., 2010)

Parental involvement

$$M_{ijk} = \alpha + \beta T_{ijk} + \mathbf{\Gamma}' \mathbf{X}_{ijk} + g_j + c_k + \varepsilon_{ijk}$$

Treatment effect and mediation

$$Y_{ijk} = \rho + \pi T_{ijk} + \delta M_{ijk} + \mathbf{\Gamma}' \mathbf{X}_{ijk} + g_j + c_k + \omega_{ijk}$$

- M_{ijk} is a mediator that captures parental involvement.
- If parental involvement is an important channel through which the intervention leads to an improvement in the child's learning, then $\beta\delta \neq 0$
- We construct a parental involvement index that captures both the quantitative and qualitative aspects of parental involvement.

Mediation results

	Total points	Literacy (Bangla)	Literacy (English)	Numeracy	General Knowledge
Direct effect	0.649***	0.533***	0.572***	0.486***	0.430***
	(0.064)	(0.063)	(0.066)	(0.063)	(0.061)
Indirect effect (ACME)	0.101***	0.086***	0.092***	0.070***	0.070***
	(0.020)	(0.019)	(0.019)	(0.016)	(0.017)
Total effect	0.750***	0.619***	0.664***	0.556***	0.501***
	(0.063)	(0.062)	(0.065)	(0.061)	(0.060)
Percentage of total effect mediated via parental index	13.50%***	13.84%***	13.84%***	12.56%***	14.11%***
	(0.012)	(0.014)	(0.014)	(0.014)	(0.018)

Heterogeneous treatment effects

- We use Causal Forest algorithm by following Athey and Imbens (2016) & Wager and Athey (2018) to estimate heterogeneous treatment effect
- We find that the groups most benefitted in terms of learning outcomes
 - Children that were academically weaker at baseline
 - Children with less-educated parents, coming from a low-income family, and with fewer siblings.
 - No heterogeneity by children's gender and grade.
- We find that the groups most benefitted in terms of parental involvement:
 - Academically weaker, more educated parents, high income family, children without private tutors.
 - Gender bias in homeschooling + leisure time involvement.

Concluding remarks

- Over-the-phone learning support is very effective → ↑ *learning outcomes*, ↑ *homeschooling involvement*
- Did not crowd out of their leisure and employment time.
- Cost per child was less than USD 20 → 0.038 SD improvement in learning outcomes per dollar spent.
- Given high mobile phone penetration in rural areas, telementoring can be a scalable and effective solution
- Can also be utilized in non-epidemic contexts, such as school closures during flood, political unrests and protests (such as *hartals*), etc.
- Now working with BRAC to scale it up and plan to continue beyond the current school closures.

An aerial photograph of a coastal area. On the left, there is a sandy beach with a parking lot containing several cars. A road runs along the beach. To the right, the water is a deep green color, and a large pile of rocks is visible on the shoreline. The text "Thank You" is overlaid in the center of the image.

Thank You

Appendix

Weekly Themes

Week no	Theme no	Weekly Theme
1	-	None
2	-	None
3	1	Promoting Social Responsibility
4	2	Maintaining daily routine
5	3	Restraining abusive parenting
6	4	Encouraging gender equality in home schooling
7	5	Teach your child to share
8	6	Encourage to read books (story)
9	7	Promoting parents' aspiration about offspring's education
10	8	Stimulating parents' confidence in providing educational support to the kids
11	9	Believing in the kids and letting them know
12	10	Broadening the educational planning horizon of the parents i.e., shifting their concentration from a role model
13	-	None

Sample characteristics and balance (1)

Variables	(1) Treatment n=419	(2) Control n=419	(3) Total n=838	(4) P-Value (F-test)
Panel A: Demography				
Child age (1/1/2020)	7.387 (0.0226)	7.396 (0.0218)	-0.009 (0.031)	0.769
Child gender (Boy=1)	0.494 (0.024)	0.494 (0.024)	-0.000 (0.035)	1
Father's education in years	6.010 (0.208)	6.007 (0.210)	0.002 (0.295)	0.994
Mother's education in years	6.983 (0.157)	6.726 (0.166)	0.258 (0.229)	0.261
Family's monthly income	11,409.3 (278.7)	11,342.0 (226.5)	67.3 (359.1)	0.851
Number of sibling(s) under 15 years	0.640 (0.033)	0.635 (0.030)	0.005 (0.045)	0.915
Religion (Islam = 1)	0.771 (0.021)	0.778 (0.020)	-0.007 (0.029)	0.804
Homestead land size in decimal	8.401 (0.483)	9.033 (0.541)	-0.632 (0.725)	0.383
Value of total asset	822,675 (152,098)	723,045 (88,489)	99,630 (175,966)	0.571

Sample characteristics and balance (2)

Variables	(1) Treatment n=419	(2) Control n=419	(3) Total n=838	(4) P-Value (F-test)
Panel B: Children's Assessments				
ASQ Score	261.95 (1.960)	258.52 (2.264)	3.437 (2.995)	0.251
Literacy Score	16.122 (0.192)	16.243 (0.202)	-0.122 (0.279)	0.663
Numeracy Score	14.778 (0.144)	14.747 (0.145)	0.031 (0.205)	0.880
Panel C: Parental Involvement & perception				
Parenting - negative actions	0.372 (0.029)	0.394 (0.030)	-0.021 (0.042)	0.606
Parenting time - education	2.310 (0.051)	2.267 (0.049)	0.043 (0.070)	0.542
Parenting abilities or skill (15-item scale)	4.334 (0.022)	4.306 (0.023)	0.028 (0.032)	0.380

Sample characteristics and balance (3)

Variables	(1) Treatment n=419	(2) Control n=419	(3) Total n=838	(4) P-Value (F-test)
Panel D: COVID-19				
Extent of economic loss	1.909 (0.045)	1.919 (0.043)	-0.010 (0.063)	0.879
Television in the household	0.525 (0.030)	0.518 (0.030)	0.007 (0.043)	0.868
Child's regularity in home education	1.496 (0.034)	1.496 (0.036)	-0.000 (0.049)	1
Hours given to the child in studying English	2.587 (0.061)	2.583 (0.061)	0.005 (0.086)	0.956
Hours given to the child in studying Mathematics	2.546 (0.068)	2.486 (0.061)	0.061 (0.092)	0.507
Private tutor - at present	0.623 (0.024)	0.585 (0.024)	0.038 (0.034)	0.259

Treatment Effects on Unstandardized Outcomes

Outcome Variables	Treatment n=404	Control n=410	Difference n=814	FWER P- value	RI P- value
Panel A: Learning outcomes of children					
Total points [100 marks test]	68.349	50.110	17.702***	0.000	0.001
Literacy (Bangla) [20 marks]	14.592	10.524	3.867***	0.000	0.001
Literacy (English) [30 marks]	16.619	10.756	5.590***	0.000	0.001
Numeracy [30 marks]	21.520	16.244	5.424***	0.000	0.001
General Knowledge [20 marks]	15.619	12.585	2.821***	0.000	0.001
Panel B: Parental involvement					
In Homeschooling (in minutes/ day)	106.757	84.407	21.813***	0.000	0.001
In Homeschooling – dummy (Probit est.)	0.332	0.144	0.691***	0.000	0.001
In leisure activities (in minutes/day)	91.978	79.127	12.032***	0.026	0.013
In leisure activities – dummy (Probit est.)	0.151	0.093	0.336***	0.019	0.009
Panel C: Parenting perception					
Negative parenting [0 to 5 scale]	1.027	1.310	-0.284***	0.001	0.001
Parenting abilities or skill [11 to 55 scale]	50.042	48.698	1.469***	0.001	0.000
Parent's aspiration about child's future edu.	5.173	4.868	0.246***	0.013	0.003
Mother's confidence in educational involvement	22.411	21.415	0.650	0.128	0.144

Heterogeneous treatment effect: ML Approach (1)

Covariates	Total test score			Homeschooling			Leisure activities		
	25% most (δ_4)	25% least (δ_1)	Diff. ($\delta_4 - \delta_1$)	25% most (δ_4)	25% least (δ_1)	Diff. ($\delta_4 - \delta_1$)	25% most (δ_4)	25% least (δ_1)	Diff. ($\delta_4 - \delta_1$)
Girl	0.49	0.46	0.03	0.40	0.52	-0.12**	0.44	0.58	-0.14***
	(0.43, 0.56)	(0.39, 0.53)	(-0.06, 0.13)	(0.33, 0.47)	(0.45, 0.59)	(-0.21, -0.02)	(0.38, 0.51)	(0.51, 0.65)	(-0.23, -0.04)
Age	7.41	7.21	0.20***	7.28	7.44	-0.16***	7.31	7.31	-0.01
	(7.35, 7.47)	(7.17, 7.26)	(0.12, 0.27)	(7.23, 7.33)	(7.36, 7.52)	(-0.25, -0.07)	(7.24, 7.37)	(7.25, 7.38)	(-0.09, 0.09)
Birth order	0.77	1.10	-0.34***	0.90	0.99	-0.08	1.05	0.89	0.16*
	(0.64, 0.89)	(0.96, 1.25)	(-0.52, -0.15)	(0.77, 1.04)	(0.86, 1.11)	(-0.26, 0.10)	(0.91, 1.19)	(0.76, 1.02)	(-0.03, 0.35)
Grade of Study	1.49	1.52	-0.03	1.49	1.54	-0.05	1.47	1.56	-0.01
	(1.39, 1.59)	(1.42, 1.61)	(-0.16, 0.11)	(1.40, 1.58)	(1.44, 1.63)	(-0.18, 0.08)	(1.37, 1.57)	(1.48, 1.65)	(-0.22, 0.03)
Baseline literacy	13.20	18.58	-5.38***	13.09	19.03	-5.95***	15.02	17.91	-2.90***
	(12.62, 13.79)	(18.12, 19.05)	(-6.13, -4.64)	(12.62, 13.55)	(18.62, 19.44)	(-6.56, -5.33)	(14.39, 15.64)	(17.46, 18.36)	(-3.66, -2.13)
Baseline numeracy	12.50	16.31	-3.81***	14.01	15.72	-1.62***	14.15	15.60	-1.45***
	(11.98, 13.02)	(16.12, 16.50)	(-4.37, -3.26)	(13.66, 14.53)	(15.41, 16.02)	(-2.14, -1.09)	(13.70, 14.60)	(15.26, 15.93)	(-2.00, -0.89)

Heterogeneous treatment effect: ML Approach (2)

Covariates	Total test score			Homeschooling			Leisure activities		
	25% most (δ_4)	25% least (δ_1)	Diff. ($\delta_4 - \delta_1$)	25% most (δ_4)	25% least (δ_1)	Diff. ($\delta_4 - \delta_1$)	25% most (δ_4)	25% least (δ_1)	Diff. ($\delta_4 - \delta_1$)
Access to private tutor	0.59	0.62	-0.03	0.47	0.66	-0.19***	0.50	0.70	-0.20***
	(0.53, 0.66)	(0.56, 0.69)	(-0.13, 0.07)	(0.40, 0.54)	(0.60, 0.73)	(-0.28, -0.01)	(0.43, 0.57)	(0.64, 0.76)	(-0.29, -0.11)
Father's education	4.48	7.40	-2.92***	8.27	4.90	3.37***	8.83	5.20	3.64***
	(3.96, 4.50)	(6.76, 8.03)	(-3.74, -2.10)	(7.60, 8.94)	(4.46, 5.34)	(2.57, 4.17)	(8.16, 9.51)	(4.73, 5.67)	(2.82, 4.46)
Mother's education	5.42	7.73	-2.31***	7.75	6.57	1.18***	8.21	7.03	1.18***
	(4.98, 5.86)	(7.27, 8.18)	(-2.94, -1.68)	(7.24, 8.26)	(6.18, 6.95)	(0.54, 1.83)	(7.70, 8.72)	(6.66, 7.40)	(0.55, 1.81)
Total family income	10,347	12,890	-2,543***	13,485	9,232	4,252***	15,036	9,953	5,085***
	(9,831, 10,862)	(12,093, 13,687)	(-3,492, -1,5935)	(12,566, 14,403)	(8,864, 9,599)	(3,263, 5,242)	(13,991, 16,082)	(9,509, 10,395)	(3,948, 6,220)
No of children	1.48	1.75	-0.27***	1.58	1.70	-0.11*	1.70	1.59	0.11*
	(1.40, 1.56)	(1.65, 1.85)	(-0.40, -0.14)	(1.49, 1.67)	(1.61, 1.78)	(-0.23, 0.01)	(1.60, 1.81)	(1.51, 1.68)	(-0.02, 0.24)
Religion (1=Islam)	0.85	0.74	0.11***	0.81	0.82	-0.01	0.84	0.76	0.08**
	(0.80, 0.90)	(0.68, 0.80)	(0.04, 0.19)	(0.76, 0.87)	(0.76, 0.87)	(-0.08, 0.07)	(0.79, 0.89)	(0.701, 0.82)	(0.01, 0.16)