

# A Appendix

Table A1: Sample Inclusion and Tracking

	If Adult Surveyed <sup>†</sup> , is Parent of Eligible Child				If Parent of Eligible Child, Child Surveyed			Adult and Child Surveyed
	Adult Surveyed <sup>†</sup>	Any Child	Younger Child	Older Child	Any Child	Younger Child	Older Child	
<i>Panel A: Waves 1 and 2</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PSDP Treatment	-0.004 (0.027)	0.007 (0.021)	0.029 (0.018)	-0.032 (0.021)	0.007 (0.018)	0.003 (0.028)	-0.016 (0.026)	0.007 (0.028)
Control mean	0.86	0.69	0.41	0.50	0.88	0.76	0.85	0.43
Observations	4753	4305	4305	4305	3088	1930	2042	6176
<i>Panel B: Assigned to Wave 1</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PSDP Treatment	-0.038* (0.023)	0.022 (0.029)	0.019 (0.032)	-0.018 (0.034)	0.028 (0.025)	0.032 (0.050)	-0.005 (0.036)	0.005 (0.031)
Control mean	0.89	0.68	0.37	0.54	0.87	0.77	0.82	0.44
Observations	2314	2089	2089	2089	1512	822	1146	2994
<i>Panel C: Assigned to Wave 2</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PSDP Treatment	0.033 (0.040)	-0.009 (0.033)	0.028 (0.033)	-0.035 (0.027)	-0.016 (0.024)	-0.017 (0.030)	-0.037 (0.036)	0.010 (0.037)
Control mean	0.82	0.71	0.46	0.45	0.90	0.74	0.90	0.42
Observations	2439	2216	2216	2216	1576	1108	896	3182
<i>P-Value: Assigned Wave 1</i>	0.01	0.53	0.05	0.02	0.23	0.56	0.09	0.53
<i>P-Value: PSDP Treat × Assigned Wave 1</i>	0.04	0.49	0.87	0.70	0.17	0.40	0.55	0.90

Adult surveyed in column (1) indicates whether the I Module survey was completed for KLPS respondents in the PSDP sample, among those who were found during the regular tracking phase or were selected to the intensive tracking phase. Excludes deceased respondents who were not tracked during the KLPS-4 I Module, but includes deceased respondents who were tracked during the KLPS-4 I Module for the purposes of identifying eligible children. Whether the KLPS adult is the parent of at least one eligible child in columns (2)-(4) restricts to KLPS respondents who were surveyed in the I Module (or who were tracked for the purposes of identifying eligible children). Child survey completion in columns (5)-(7) restricts to KLPS respondents who were identified as having an eligible child. Adult and child survey completion in column (8) is within the full PSDP sample (excluding deceased respondents who were not tracked during the KLPS-4 I Module, but including deceased respondents who were tracked during the KLPS-4 I Module for the purposes of identifying eligible children). Regressions include appropriate weights to maintain baseline sample representativeness (these weights account for inclusion of those randomly assigned to the control group, but not those randomly assigned to the treatment group of cross-cutting interventions (VocEd and SCY) and for the two-stage intensive tracking strategy). Standard errors are clustered at the 1998 school level.

Table A2: Summary Statistics: Household and Parent Characteristics by Wave

	Wave 1		Wave 2		Wave 2 - Wave 1		
	Mean	SD	Mean	SD	Diff	P-Value	N
<i>Panel A: Full Sample</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Household Characteristics</i>	<i>2017-2018 (Pre-Covid)</i>		<i>2018-2019 (Pre-Covid)</i>				
Urban status	0.58	0.49	0.56	0.50	-0.02	(0.07)	4121
Household size	4.27	2.37	4.18	2.25	-0.09	(0.82)	4135
Children in household	2.14	1.75	2.16	1.79	0.02	(0.31)	4135
Per capita earnings	1359	2184	1389	2199	30	(0.91)	4074
Per capita consumption	2201	2028	2058	1898	-143	(0.01)	4066
Any agricultural empl in HH	0.61	0.49	0.61	0.49	-0.00	(0.50)	4124
<i>KLPS Respondent Characteristics</i>	<i>2017-2018 (Pre-Covid)</i>		<i>2018-2019 (Pre-Covid)</i>				
Female (from baseline)	0.48	0.50	0.48	0.50	-0.00	(0.46)	5789
Age (from E module)	31.64	2.48	32.77	2.44	1.13	(0.00)	4124
<i>KLPS Respondent Characteristics</i>	<i>2018-2019 (Pre-Covid)</i>		<i>2020-2021 (Post-Covid)</i>				
Age (from I module)	33.15	2.56	34.76	2.47	1.60	(0.00)	4268
Years education (from I module)	9.30	3.13	9.51	2.99	0.21	(0.29)	5747
<i>Panel B: Intergenerational Sample</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Household Characteristics</i>	<i>2017-2018 (Pre-Covid)</i>		<i>2018-2019 (Pre-Covid)</i>				
Urban status	0.37	0.48	0.44	0.50	0.06	(0.05)	2740
Household size	4.67	2.17	4.67	2.08	-0.00	(0.88)	2377
Children in household	2.55	1.70	2.60	1.71	0.04	(0.18)	2377
Per capita earnings	921	1562	1072	1648	152	(0.23)	2356
Per capita consumption	1775	1618	1725	1635	-50	(0.02)	2355
Any agricultural empl in HH	0.67	0.47	0.68	0.47	0.01	(0.37)	2372
<i>KLPS Parent Characteristics</i>	<i>2018-2019 (Pre-Covid)</i>		<i>2020-2021 (Post-Covid)</i>				
Female	0.53	0.50	0.51	0.50	-0.02	(0.15)	2808
Age	33.54	2.46	35.22	2.38	1.68	(0.00)	2785
Years education	8.84	2.95	9.37	2.94	0.52	(0.01)	2802
<i>Primary Caregiver Characteristics</i>	<i>2018-2019 (Pre-Covid)</i>		<i>2021 (Post-Covid)</i>				
Primary caregiver is KLPS parent	0.56	0.50	0.59	0.49	0.03	(0.53)	3552
Mother	0.65	0.48	0.65	0.48	-0.00	(0.32)	3527
Father	0.15	0.36	0.18	0.39	0.03	(0.19)	3527
Grandparent	0.11	0.32	0.11	0.31	-0.01	(0.28)	3527

This table summarizes household, parent, and primary caregiver characteristics separately for households assigned to tracking wave 1 or tracking wave 2. Panel A characterizes households in the full sample (all PSDP adults) and Panel B characterizes households in the intergenerational sample (all PSDP adults with at least one child included in the sample for intergenerational impacts analysis). Household characteristics (urban status, household size, children in household, per capita earnings, per capita consumption, and any agricultural employment in the household) were collected in a separate E+ module which took place in 2017-2019, prior to Covid (for both waves 1 and 2). Whether the KLPS respondent is female is as per the PSDP baseline. Age of the KLPS respondent is constructed using year of birth relative to the year of the relevant survey (the E+ module or I-module for Panel A, as noted, and the PC module, for Panel B). Completed years of education is based on the most recent round of data collection, up to and including the I-Module from KLPS-4 (collected in 2018-2021). The I-Module took place in a similar timeframe as the child data. (Wave 1 from in 2018-2021, prior to Covid; Wave 2 between Oct 2020 and Oct 2021, during and after Covid.) However, much of the sample had reached their highest educational attainment prior to Wave 1. Caregiver characteristics were collected in a similar timeframe as the child data. Household and KLPS parent characteristics are at the household/adult level (one observation per household, including those households with two children in the sample) while primary caregiver characteristics are at the child level.

Table A3: Summary Statistics: Cognitive Development

		Younger Children			Older Children		
		Mean	SD	N	Mean	SD	N
		(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A: Language</i>		<i>Scoring Notes</i>					
PPVT Raw Score Sections 1-6	Number correct out of 64	35.8	8.9	1563	.	.	0
PPVT Raw Score Sections 3-10	Number correct out of 91	.	.	0	53.5	11.5	1967
MDAT Raw Score	Number correct out of 66	38.1	10.0	1562	.	.	0
EGRA Swahili Section 1 Raw Score	Number correct out of 100	.	.	0	18.2	18.9	1967
EGRA Swahili Section 2 Raw Score	Number correct out of 100	.	.	0	16.0	22.4	1967
EGRA Swahili Section 3 Raw Score	Number correct out of 50	.	.	0	6.7	11.4	1967
EGRA Swahili Section 4 Raw Score	Number correct out of 20	.	.	0	3.5	6.0	1966
EGRA Swahili Section 5a Raw Score	Number correct out of 60	.	.	0	9.6	16.2	1967
EGRA Swahili Section 5b Raw Score	Number correct out of 5	.	.	0	0.8	1.4	1967
EGRA Swahili Section 6 Raw Score	Number correct out of 5	.	.	0	2.8	1.6	1966
EGRA English Section 5a Raw Score	Number correct out of 66	.	.	0	16.9	23.8	1420
EGRA English Section 5b Raw Score	Number correct out of 5	.	.	0	1.0	1.6	1420
<i>Panel B: Math and Spatial</i>							
Mental Transformation Raw Score	Number correct out of 5	1.6	1.1	1562	.	.	0
EGMA Section 1 Raw Score	Number correct out of 20	.	.	0	10.4	6.8	1967
EGMA Section 2 Raw Score	Number correct out of 10	.	.	0	4.2	3.5	1965
EGMA Section 3 Raw Score	Number correct out of 10	.	.	0	2.6	2.5	1965
EGMA Section 4 L1 Raw Score	Number correct out of 20	.	.	0	4.5	4.5	1967
EGMA Section 4 L2 Raw Score	Number correct out of 5	.	.	0	0.8	1.5	1965
EGMA Section 5 L1 Raw Score	Number correct out of 20	.	.	0	2.8	3.4	1967
EGMA Section 5 L2 Raw Score	Number correct out of 5	.	.	0	0.4	1.0	1965
EGMA Section 6 Raw Score	Number correct out of 5	.	.	0	1.5	1.4	1965
<i>Panel C: Executive Function</i>							
Forward Digit Span Raw Score	Number correct out of 4	1.8	1.1	1563	2.8	0.9	1967
DCCS Pass Color Sort	0 or 1	0.6	0.5	1551	.	.	0
DCCS Pass Shape Sort, if Passed Color Sort	0 or 1	0.3	0.5	1553	.	.	0
PLUS-EF MSIT Congruent Raw Accuracy Score	0 to 1	.	.	0	0.8	0.3	1916
PLUS-EF MSIT Incongruent Raw Accuracy Score	0 to 1	.	.	0	0.5	0.3	1905

This table summarizes raw cognitive performance for younger and older children.

Table A4: Summary Statistics: Child Health, Non-cognitive Development, Home Environment, and Schooling Investments

	Full Sample			Younger Children			Older Childer		
	Mean (1)	SD (2)	N (3)	Mean (4)	SD (5)	N (6)	Mean (7)	SD (8)	N (9)
<i>Panel A: Child Health</i>									
No Sickness in Past 7 Days	0.30	0.46	3528	0.25	0.43	1562	0.35	0.48	1966
Overall Child Health (0[-] to 5[+])	4.06	0.76	3530	4.08	0.76	1563	4.07	0.77	1967
No Serious Health Problems Since Birth	0.79	0.41	3530	0.81	0.39	1563	0.78	0.41	1967
No Disability	0.76	0.42	3523	0.81	0.40	1560	0.74	0.44	1963
Subjective Health Index	0.11	1.01	3521	0.13	0.98	1559	0.13	1.03	1962
Heigh for Age Z-Score	-0.50	1.32	3520	-0.54	1.53	1557	-0.50	1.19	1963
Height (cm)	115.00	12.05	3520	104.23	8.52	1557	122.58	7.95	1963
<i>Panel B: Non-Cognitive Development</i>									
Emotional Symptoms Scale (0[-] to 10[+])	6.63	2.47	3529	6.67	2.35	1563	6.59	2.55	1966
Conduct Problems Scale (0[-] to 10[+])	8.14	1.78	3527	8.03	1.79	1561	8.21	1.77	1966
Hyperactive Scale (0[-] to 10[+])	5.61	2.11	3530	5.30	2.03	1563	5.96	2.13	1967
Peer Problems Scale (0[-] to 10[+])	7.53	1.67	3530	7.53	1.61	1563	7.48	1.73	1967
Prosocial Scale (0[-] to 10[+])	7.69	2.12	3527	7.44	2.21	1560	7.92	2.08	1967
Total Difficulties Score (0[-] to 40[+])	27.91	5.54	3527	27.54	5.24	1561	28.23	5.76	1966
Strengths and Difficulties Index	0.12	1.18	3526	0.04	1.32	1560	0.18	1.07	1966
<i>Panel C: Early Life Health Investments</i>									
Vaccination Index (0 to 5)	4.37	0.52	3525	4.35	0.50	1560	4.37	0.54	1965
Parasitic Prevention Index (0 to 2)	1.55	0.59	3527	1.56	0.58	1561	1.55	0.59	1966
Early Life Health Investment Index	-0.17	1.06	3522	-0.19	0.99	1558	-0.17	1.09	1964
<i>Panel D: Home Environment</i>									
Number of Household Books	4.00	9.55	2790	4.13	10.85	1564	3.56	6.65	1968
Magazines, Newspapers, Pictures, Posters at Home	0.93	0.67	2792	0.93	0.67	1563	0.93	0.69	1967
Source of Play Materials Index	1.47	0.55	2792	1.45	0.57	1563	1.43	0.60	1967
Variety of Play Materials Index	3.51	1.22	2790	3.35	1.29	1562	3.59	1.23	1966
Play Activities	4.07	2.99	2792	3.72	3.05	1563	4.01	3.08	1967
Modified Family Care Indicator (FCI) Index	0.09	0.95	2790	-0.00	0.94	1562	0.08	1.00	1966
Number of Children's Books	1.77	5.26	2790	1.88	6.01	1564	1.60	2.46	1968
<i>Panel E: Schooling and Educational Investments</i>									
Child Currently Enrolled in School	0.87	0.34	3528	0.69	0.46	1561	0.99	0.11	1967
Child Ever Enrolled in School	0.88	0.33	3498	0.71	0.46	1531	0.99	0.10	1967
Child Attended School Last Week	0.82	0.38	3528	0.65	0.48	1561	0.93	0.25	1967
Number of Days School Attended Last Week	3.78	1.95	3528	2.93	2.30	1561	4.37	1.40	1967
Cost of Schooling Last Month	611.72	1486.04	3528	546.15	1228.99	1561	648.12	1625.66	1967
School Enrollment and Educational Investments Index	0.01	1.01	3552	-0.47	1.33	1572	0.33	0.50	1980

This table summarizes measures of the home environment, child health, and child non-cognitive development, the home environment and schooling and educational investments for the full sample, and separately for younger and older children. Variables characterizing the home environment for the full sample (Panel D, columns (1)-(3)) are at the household level.

Table A5: Deworming and Household Living Standards

	Years Education	Urban Status	Per Capita Consumption	Per Capita Earnings
<i>Panel A: Full Sample</i>	(1)	(2)	(3)	(4)
PSDP Treatment	0.28 (0.19)	0.04** (0.02)	305* (159)	239* (129)
KLPS round	2,3, or 4	2,3, or 4	3 and 4	4
Unit of observation	Adult	Adult	HH	HH
Control mean	9.33	0.45	2156.46	1296.35
Observations	5506	13793	4794	4074
<i>Panel B: Intergenerational Sample</i>	(1)	(2)	(3)	(4)
PSDP Treatment	0.21 (0.23)	0.04 (0.03)	183* (110)	-114 (103)
KLPS round	2,3, or 4	2,3, or 4	3 and 4	4
Unit of observation	Adult	Adult	HH	HH
Control mean	9.02	0.43	1708.12	1014.83
Observations	2785	6644	2693	2342

Panel A replicates results from previously published work in the full sample (including those KLPS respondents who participated in the Primary School Deworming Program (PSDP), but who were not assigned to the treatment group of cross-cutting interventions (VocEd or SCY).) Panel B restricts to the sample of KLPS respondents (and households) with children in the intergenerational impacts sample used for this study. Results in column (1) of replicate and extend those in Baird et al., (2016). Years of educational attainment for each respondent is based on the most recent round of data available from KLPS round 2, 3, or 4. Results in columns (2)-(4) replicate those in Hamory et al., (2021). Urban status in column (2) draws on the most recent round of data available for each respondent from KLPS round 2, 3, or 4. Consumption in column (3) is collected in KLPS-4 and for a subset of respondents in KLPS-3, while earnings as per column (4) are collected only in KLPS-4. Measures of each are constructed as detailed in Hamory et al., (2021). Per capita consumption as per column (3) captures the monetary value of goods consumed through purchase, gift, barter, or home production over the last year, divided by the number of household members. Annual per capita household earnings as per column (4) sums over wage employment earnings, self-employment profits, and agricultural profits across all household members, divided by the number of household members. Measures of per capita consumption and earnings are expressed in PPP-adjusted 2017 USD, trimming the top 1% of observations. PSDP treatment is an indicator for assignment to a 1998 primary school randomly assigned to early receipt of Primary School Deworming Program (group 1 or group 2 schools). Controls include the proportion of students in schools assigned to deworming treatment within 6km of the KLPS respondent's 1998 PSDP school, an indicator for attending a school assigned to the cost-sharing treatment in 2001, density of children in 6km radius of 1998 PSDP school, indicators for 1998 PSDP school zone, population of 1998 PSDP school, average test score of 1996 school, an indicator for inclusion in the VocEd or SCY sample, grade in 1998, and gender. Regressions include survey wave and month of interview fixed effects. Regressions in columns (1), (2), and (3) additionally include survey year fixed effects. Regressions include appropriate weights to maintain baseline sample representativeness (these weights account for inclusion of those randomly assigned to the control group, but not those randomly assigned to the treatment group of cross-cutting interventions (VocEd and SCY) and for the two-stage intensive tracking strategy). Standard errors are clustered at the 1998 school level. \* denotes significance at 10%, \*\* denotes significance at 5%, and \*\*\* denotes significance at 1%.

Table A6: Early Life Health Investments

	Summary Index	Index Components	
	Early Life Health Investments Index	Parasitic Prevention Index	Vaccination Index
<i>Panel A: Older Children (Ages 6-8)</i>	(1)	(2)	(3)
PSDP Treatment	-0.01 (0.07)	-0.00 (0.04)	-0.02 (0.04)
Unit of observation	Child	Child	Child
Control mean	-0.16	4.36	1.57
Control SD	(1.06)	(0.50)	(0.59)
Observations	1964	1965	1966
<i>Panel B: Younger Children (Ages 3-5)</i>	(1)	(2)	(3)
PSDP Treatment	0.07 (0.09)	0.09* (0.05)	-0.04 (0.05)
Unit of observation	Child	Child	Child
Control mean	-0.14	4.32	1.63
Control SD	(0.89)	(0.49)	(0.54)
Observations	1558	1560	1561

Sample includes children of KLPS respondents who participated in the Primary School Deworming Program (PSDP), but who were not assigned to the treatment group of cross-cutting interventions (VocEd or SCY). The Early Life Health Investments Index (column (1)) is constructed by creating normalized averages over each of the sub-indices in columns (2) and (3) (where each of the components are averaged and normalized to be mean zero with unit variance relative to the control group in wave 1 but not within gender-age bands), summing across components, then renormalizing in the same way. PSDP treatment is an indicator for biological parent assignment to a 1998 primary school randomly assigned to early receipt of Primary School Deworming Program (group 1 or group 2 schools). Controls include child gender and age, the proportion of students in schools assigned to deworming treatment within 6km of the KLPS parent's 1998 PSDP school, an indicator for parent attending a school assigned to the cost-sharing treatment in 2001, density of children in 6km radius of parent's 1998 PSDP school, indicators for parent's 1998 PSDP school zone, population of parent's 1998 PSDP school, average test score of parent's 1996 school, an indicator for parent inclusion in the VocEd or SCY sample, parent grade in 1998, parent gender, an indicator for interviewer gender, and months elapsed since the start of the survey wave. Regressions include appropriate weights to maintain representativeness of the next population (these weights account for inclusion of those parents randomly assigned to the control group, but not those randomly assigned to the treatment group of cross-cutting interventions (VocEd and SCY), for the two-stage intensive tracking strategy, and for total fertility). Standard errors are clustered at the 1998 school level. \* denotes significance at 10%, \*\* denotes significance at 5%, and \*\*\* denotes significance at 1%.

Table A7: Home Environment

	Summary Index	Index Components					Other
	Modified FCI Index (1)	Household Books (2)	Magazines and Newspapers (3)	Sources of Play Materials Index (4)	Varieties of Play Materials Index (5)	Play Activities (6)	Number Story or Picture Books (7)
PSDP Treatment	0.06 (0.08)	-0.29 (0.69)	0.09* (0.05)	0.01 (0.04)	0.02 (0.08)	0.01 (0.18)	0.41 (0.31)
Unit of observation	HH	HH	HH	HH	HH	HH	HH
Control mean	0.05	3.84	0.92	1.46	3.48	3.97	1.56
Control SD	(0.96)	(11.89)	(0.67)	(0.54)	(1.23)	(3.03)	(2.21)
Observations (HH)	2790	2790	2792	2792	2790	2792	2790
Observations (Child)	3532	3532	3534	3534	3532	3534	3532

Sample includes KLPS respondents who participated in the Primary School Deworming Program (PSDP), but who were not assigned to the treatment group of cross-cutting interventions (VocEd or SCY). All outcomes are expressed at the household level. In cases where there are two biological children of the same KLPS parent, play activities averages in column (6) averages over the two children. All other outcomes are collected at the household level. The Modified Family Care Indicators (FCI) Index in column (1) is created by summing all indices in columns (2)-(6) (where household books in column (2) excludes picture books and story books, and where having any of picture books or story books is included as an element of the Varieties of Play component in column (5)), then normalizing after summing to be mean zero with unit variance relative to the control group in wave 1. Outcomes are as described in [Table A15](#). Table rows include p-values associated with estimated coefficients from assignment to the pre-Covid tracking wave and the interaction between PSDP treatment and assignment to the pre-Covid tracking wave (regressions not reported). PSDP treatment is an indicator for biological parent assignment to a 1998 primary school randomly assigned to early receipt of Primary School Deworming Program (group 1 or group 2 schools). Controls include the proportion of students in schools assigned to deworming treatment within 6km of the KLPS parent's 1998 PSDP school, an indicator for parent attending a school assigned to the cost-sharing treatment in 2001, density of children in 6km radius of parent's 1998 PSDP school, indicators for parent's 1998 PSDP school zone, population of parent's 1998 PSDP school, average test score of parent's 1996 school, an indicator for parent inclusion in the VocEd or SCY sample, parent grade in 1998, parent gender, an indicator for interviewer gender, and months elapsed since the start of the survey wave. Regressions include appropriate weights to maintain representativeness of the next population (these weights account for inclusion of those parents randomly assigned to the control group, but not those randomly assigned to the treatment group of cross-cutting interventions (VocEd and SCY), for the two-stage intensive tracking strategy, and for total fertility). Standard errors are clustered at the 1998 school level. \* denotes significance at 10%, \*\* denotes significance at 5%, and \*\*\* denotes significance at 1%.

Table A8: Schooling and Educational Investments

	Summary Index	Index Components				
	School Enrollment and Edu Investments Index	Child Enrolled	Ever Enrolled	Attended School Last Week	Days Attended Last Week	Schooling Cost Last Month
<i>Panel A: Older Children (Ages 6-8)</i>	(1)	(2)	(3)	(4)	(5)	(6)
PSDP Treatment	0.01 (0.04)	-0.00 (0.01)	-0.00 (0.01)	-0.01 (0.02)	-0.06 (0.09)	-28.59 (106.65)
Unit of observation	Child	Child	Child	Child	Child	Child
Control mean	0.34	0.99	0.99	0.95	4.45	670.90
Control SD	(0.49)	(0.12)	(0.11)	(0.23)	(1.29)	(2184.26)
Observations	1980	1967	1967	1967	1967	1967
<i>Panel B: Younger Children (Ages 3-5)</i>	(1)	(2)	(3)	(4)	(5)	(6)
PSDP Treatment	0.03 (0.09)	-0.01 (0.03)	0.02 (0.03)	0.01 (0.04)	-0.00 (0.18)	44.56 (82.64)
Unit of observation	Child	Child	Child	Child	Child	Child
Control mean	-0.59	0.65	0.66	0.61	2.76	479.74
Control SD	(1.36)	(0.48)	(0.47)	(0.49)	(2.34)	(1067.03)
Observations	1572	1561	1531	1561	1561	1561

Sample includes children of KLPS respondents who participated in the Primary School Deworming Program (PSDP), but who were not assigned to the treatment group of cross-cutting interventions (VocEd or SCY). The School Enrollment and Educational Investments Index (as per column (1)) is constructed by creating normalized averages over each of the components in columns (2)-(6) (where each of the components are averaged and normalized to be mean zero with unit variance relative to the control group in wave 1 but not within gender-age bands), summing across components, then renormalizing in the same way. Note that the School Enrollment and Educational Investments Index is constructed using any available components (even if some are missing) with the exception of imposing that Child Currently Enrolled is non-missing. PSDP treatment is an indicator for biological parent assignment to a 1998 primary school randomly assigned to early receipt of Primary School Deworming Program (group 1 or group 2 schools). Controls include child gender and age, the proportion of students in schools assigned to deworming treatment within 6km of the KLPS parent's 1998 PSDP school, an indicator for parent attending a school assigned to the cost-sharing treatment in 2001, density of children in 6km radius of parent's 1998 PSDP school, indicators for parent's 1998 PSDP school zone, population of parent's 1998 PSDP school, average test score of parent's 1996 school, an indicator for parent inclusion in the VocEd or SCY sample, parent grade in 1998, parent gender, an indicator for interviewer gender, and months elapsed since the start of the survey wave. Regressions include appropriate weights to maintain representativeness of the next population (these weights account for inclusion of those parents randomly assigned to the control group, but not those randomly assigned to the treatment group of cross-cutting interventions (VocEd and SCY), for the two-stage intensive tracking strategy, and for total fertility). Standard errors are clustered at the 1998 school level. \* denotes significance at 10%, \*\* denotes significance at 5%, and \*\*\* denotes significance at 1%.

Table A9: Child Cognitive Development: Common Cohort Sample

	Wave 1 (Pre-Covid)					Wave 2 (Post-Covid)				
	Summary Index	Components			Other	Summary Index	Components			Other
	Academic Cognitive Index	Language Index	Math and Spatial Abilities Index	Executive Function Index	Cognitive Abilities Index	Academic Cognitive Index	Language Index	Math and Spatial Abilities Index	Executive Function Index	Cognitive Abilities Index
<i>Panel A: Older Children (Ages 6-8)</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
PSDP Treatment	0.56** (0.22)	0.42** (0.20)	0.62*** (0.23)	0.13 (0.18)	0.51** (0.21)	-0.01 (0.15)	0.00 (0.14)	-0.02 (0.16)	0.07 (0.11)	0.02 (0.13)
Control mean	-0.01	0.01	-0.03	0.05	0.01	-0.15	-0.17	-0.11	0.27	-0.01
Control SD	(0.95)	(0.97)	(0.91)	(0.96)	(0.96)	(0.96)	(0.91)	(1.06)	(0.99)	(0.94)
Observations	351	351	351	351	351	466	466	466	466	466
<i>P-Value: PSDP Treat × pre-Covid</i>						0.03	0.07	0.03	0.78	0.07
<i>Panel B: Younger Children (Ages 3-5)</i>										
PSDP Treatment	0.08 (0.21)	0.29 (0.18)	-0.11 (0.20)	-0.31 (0.24)	-0.02 (0.22)	0.11 (0.19)	0.28 (0.26)	-0.08 (0.21)	0.28 (0.24)	0.20 (0.20)
Control mean	-0.04	-0.02	-0.04	-0.11	-0.06	0.06	-0.07	0.14	-0.35	-0.11
Control SD	(1.00)	(1.00)	(0.99)	(0.94)	(1.01)	(1.17)	(1.32)	(1.16)	(1.44)	(1.28)
Observations	380	380	380	192	380	260	260	260	260	260
<i>P-Value: PSDP Treat × pre-Covid</i>						0.90	0.99	0.90	0.12	0.50

Sample includes children of KLPS respondents who participated in the Primary School Deworming Program (PSDP), but who were not assigned to the treatment group of cross-cutting interventions (VocEd or SCY). Uses the common cohort sample, restricting to children born in the same cohort across waves (as described in the text). All indices are constructed by summing across normalized components (each normalized to be mean zero with unit variance within gender and 6-month age bands relative to the control group in wave 1), then renormalizing in the same way, and winsorizing the top and bottom 1%. The Academic Cognitive Index (not pre-specified) is composed of the Language and Math and Spatial Abilities Indices. The Language Index is composed of the PPVT and MDAT assessments (for younger children) or the PPVT, EGRA Swahili, and EGRA English assessments (for older children). The Math and Spatial Abilities Index is composed of the Mental Transformation assessment (for younger children) or the EGMA assessment (for older children). The Executive Function Index is composed of Forward Digit Span and Dimensional Change Card Sort (DCCS) (for younger children) or Forward Digit Span and PLUS-EF (for older children). For younger children, the Executive Function index excludes those aged 3. The Cognitive Abilities Index is composed of the Language, Math and Spatial Abilities, and Executive Function Indices. PSDP treatment is an indicator for biological parent assignment to a 1998 primary school randomly assigned to early receipt of Primary School Deworming Program (group 1 or group 2 schools). Columns (1)-(5) restrict to children assigned to the pre-Covid wave (wave 1) of data collection, while columns (6)-(10) restrict to children assigned to the post-Covid wave (wave 2) of data collection. Table rows include p-values associated with estimated coefficients from assignment to the pre-Covid tracking wave and the interaction between PSDP treatment and assignment to the pre-Covid tracking wave (regressions not reported). Controls include the proportion of students in schools assigned to deworming treatment within 6km of the KLPS parent's 1998 PSDP school, an indicator for parent attending a school assigned to the cost-sharing treatment in 2001, density of children in 6km radius of parent's 1998 PSDP school, indicators for parent's 1998 PSDP school zone, population of parent's 1998 PSDP school, average test score of parent's 1996 school, an indicator for parent inclusion in the VocEd or SCY sample, parent grade in 1998, parent gender, an indicator for interviewer gender, and months elapsed since the start of the survey wave. Regressions include appropriate weights to maintain representativeness of the next population (these weights account for inclusion of those parents randomly assigned to the control group, but not those randomly assigned to the treatment group of cross-cutting interventions (VocEd and SCY), for the two-stage intensive tracking strategy, and for total fertility). Standard errors are clustered at the 1998 school level. \* denotes significance at 10%, \*\* denotes significance at 5%, and \*\*\* denotes significance at 1%.

Table A10: Deworming and Household Living Standards by Wave Assignment

	Assigned to Wave 1				Assigned to Wave 2			
	Years Education	Urban Status	Per Capita Consumption	Per Capita Earnings	Years Education	Urban Status	Per Capita Consumption	Per Capita Earnings
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PSDP Treatment	0.19 (0.25)	0.02 (0.03)	246 (203)	332** (161)	0.39* (0.22)	0.06*** (0.02)	354* (186)	98 (139)
KLPS round	2,3, or 4	2,3, or 4	3 and 4	4	2,3, or 4	2,3, or 4	3 and 4	4
Unit of observation	Adult	Adult	HH	HH	Adult	Adult	HH	HH
Control mean	9.24	0.46	2224.82	1260.13	9.43	0.44	2082.73	1335.05
Observations	2710	6684	2268	1919	2796	7109	2526	2155
<i>P-Value: Assigned Wave 1</i>					0.00	0.13	0.00	0.06
<i>P-Value: PSDP Treat × Assigned Wave 1</i>					0.48	0.14	0.66	0.24

This table replicates the results presented in [Table A5](#), separately for KLPS respondents assigned to wave 1 or wave 2.

Table A11: Household Economic Circumstances during Covid by Wave

	Per capita consumption	HH members went to bed hungry (0 or 1)	Agricultural employment (0 or 1)	Closed business (0 or 1)	Lost job (0 or 1)	Sold assets (0 or 1)
<i>Panel A: Waves 1 and 2</i>	(1)	(2)	(3)	(4)	(5)	(6)
PSDP Treatment	2.162 (1.922)	0.001 (0.012)	-0.018 (0.022)	0.022 (0.013)	-0.023* (0.013)	0.009 (0.011)
Control Mean	22.06	0.13	0.51	0.24	0.21	0.11
Observations	2359	4812	4812	4812	4812	4812
<i>Panel B: Assigned to Wave 1</i>	(1)	(2)	(3)	(4)	(5)	(6)
PSDP Treatment	0.993 (2.409)	-0.002 (0.020)	-0.022 (0.030)	0.028 (0.019)	-0.017 (0.021)	0.021 (0.015)
Control mean	23.03	0.12	0.51	0.22	0.21	0.09
Observations	1143	2332	2332	2332	2332	2332
<i>Panel C: Assigned to Wave 2</i>	(1)	(2)	(3)	(4)	(5)	(6)
PSDP Treatment	3.626* (2.173)	0.006 (0.017)	-0.019 (0.026)	0.018 (0.023)	-0.035* (0.020)	-0.005 (0.015)
Control mean	21.04	0.14	0.51	0.26	0.22	0.12
Observations	1216	2480	2480	2480	2480	2480
<i>P-Value: Assigned Wave 1</i>	0.34	0.08	0.59	0.84	0.22	0.76
<i>P-Value: PSDP Treat × Assigned Wave 1</i>	0.34	0.78	0.94	0.74	0.56	0.20

Data are from 2020 Covid phone survey. Per capita consumption (column (1)) is a measure of per capita household consumption (in 2021 USD PPP) over the last 7 days. This measure was only collected for a randomly chosen 50% of respondents. Column (2) presents estimates for whether anyone in the household went to bed hungry at any point over the last seven days. Agricultural employment (column (3)) is an indicator for whether any member of the household engaged in agriculture or pastoralist activities over the last 14 days. Columns (4), (5), and (6) present indicators for whether the respondent or any member of their household closed a business, lost their job, or sold assets since March 2020. Controls include the proportion of students in schools assigned to deworming treatment within 6km of the KLPS respondent's 1998 PSDP school, an indicator for respondent attending a school assigned to the cost-sharing treatment in 2001, density of children in 6km radius of respondent's 1998 PSDP school, indicators for respondent's 1998 PSDP school zone, population of respondent's 1998 PSDP school, average test score of respondent's 1996 school, an indicator for respondent inclusion in the VocEd or SCY sample, respondent grade in 1998, respondent gender, an indicator for interviewer gender, an indicator for tracking wave assignment, and month of survey fixed effects. Estimated with KLPS population weights. Standard errors clustered by PSDP school. \* denotes significance at 10%, \*\* denotes significance at 5%, and \*\*\* denotes significance at 1%.

Table A12: Non-Economic Household Circumstances during Covid by Wave

	Change in HH members (#) (1)	Mental health score (0(-) to 15(+)) (2)	Any learning activities (0 or 1) (3)	Number learning activities (#) (4)	Currently doing homework (0 or 1) (5)
<i>Panel A: Waves 1 and 2</i>					
PSDP Treatment	0.029 (0.051)	0.153 (0.117)	0.011 (0.014)	-0.017 (0.018)	-0.040 (0.031)
Control Mean	0.53	-9.78	0.11	0.70	0.80
Observations	4814	4796	3363	3457	4814
<i>Panel B: Assigned to Wave 1</i>					
PSDP Treatment	0.022 (0.073)	0.099 (0.174)	0.039* (0.020)	-0.043 (0.029)	-0.081* (0.045)
Control mean	0.55	-9.82	0.10	0.72	0.79
Observations	2333	2324	1588	1630	2333
<i>Panel C: Assigned to Wave 2</i>					
PSDP Treatment	0.041 (0.057)	0.211* (0.124)	-0.013 (0.020)	0.007 (0.025)	0.006 (0.040)
Control mean	0.50	-9.73	0.11	0.69	0.80
Observations	2481	2472	1775	1827	2481
<i>P-Value: Assigned Wave 1</i>	0.07	0.83	0.90	0.22	0.04
<i>P-Value: PSDP Treat × Assigned Wave 1</i>	0.82	0.55	0.06	0.22	0.14

Data are from 2020 Covid phone survey. Change in household members (column (1)) totals the number of members who joined or left the household since March 2020. Mental health score (column (2)) ranges from 0 to 15, accounting for the frequency that respondents felt depressed, nervous, lonely, hopeful, or had a physical reaction, each signed so that positive values indicate better mental health. Any learning activities (column (3)) is an indicator for whether a randomly-selected child in the household (not necessarily the child selected for inclusion in the present study) engaged in any of seven different home learning activities over the past 24 hours. Count of learning activities (column (4)) counts the total number of such activities the child engaged in. Currently doing homework (column (5)) is an indicator for whether the respondent lists reading, doing homework, or doing schoolwork as the child's main activity over the past 15 minutes. Controls include the proportion of students in schools assigned to deworming treatment within 6km of the KLPS respondent's 1998 PSDP school, an indicator for respondent attending a school assigned to the cost-sharing treatment in 2001, density of children in 6km radius of respondent's 1998 PSDP school, indicators for respondent's 1998 PSDP school zone, population of respondent's 1998 PSDP school, average test score of respondent's 1996 school, an indicator for respondent inclusion in the VocEd or SCY sample, respondent grade in 1998, respondent gender, an indicator for interviewer gender, an indicator for tracking wave assignment, and month of survey fixed effects. Estimated with KLPS population weights. Standard errors clustered by PSDP school. \* denotes significance at 10%, \*\* denotes significance at 5%, and \*\*\* denotes significance at 1%.

Table A13: Heterogeneity by School Quality and Expenditure

	Academic Cognitive Index (Older Children)					
	Wave 1 (Pre-Covid)			Wave 2 (Post-Covid)		
	(1)	(2)	(3)	(4)	(5)	(6)
PSDP Treatment	0.26** (0.12)	0.16 (0.11)	0.21* (0.12)	-0.09 (0.12)	-0.10 (0.13)	-0.13 (0.12)
PSDP Treatment × Enrolled private		0.14 (0.29)			0.12 (0.22)	
PSDP Treatment × School fees (100 KSH)			0.00 (0.01)			0.01 (0.01)
Control mean	0.00	0.00	0.00	-0.14	-0.14	-0.14
Observations	1005	1005	1005	962	962	962

Table replicates regressions presented in columns (1) and (5) of [Table 4](#), in columns (1) and (4), interacting treatment status with measures of school investment, including private school enrollment (in columns (2) and (5)) and spending on education (in columns (3) and (6)). Controls, clustering of standard errors, and weights are as per regressions in [Table 4](#).

Table A14: Adult Psychological Well-Being (Full Sample)

	(-1)* Depressive Symptoms (CESD Score, 0 to 30) (1)	Happiness (1 to 3) (2)	Life satisfaction (0 to 10) (3)
PSDP Treatment	0.88** (0.36)	-0.01 (0.02)	0.20 (0.13)
Control mean	-9.81	2.70	5.56
Control SD	(6.16)	(0.51)	(3.14)
Observations	4244	4247	4195

Estimated treatment effects on outcomes capturing adult psychological well-being are collected for the primary KLPS respondent in the I-module; these results are for the full sample, not only those KLPS respondents with a child in the main sample for this study. Depressive symptoms reported in column (1) of Panel A are measured using the Center for Epidemiologic Studies Depression Scale, which ranges from 0 to 30. Scores are multiplied by (-1) so that positive coefficients indicate a reduction in depressive symptoms. Happiness in column (2) is measured on a three-point scale (1 = not happy, 2 = somewhat happy, and 3 = very happy). Life satisfaction in column (3) is measured on a scale from 0 to 10. PSDP treatment is an indicator for assignment to a 1998 primary school randomly assigned to early receipt of Primary School Deworming Program (group 1 or group 2 schools). Controls include the proportion of students in schools assigned to deworming treatment within 6km of the KLPS respondent's 1998 PSDP school, an indicator for attending a school assigned to the cost-sharing treatment in 2001, density of children in 6km radius of 1998 PSDP school, indicators for 1998 PSDP school zone, population of 1998 PSDP school, average test score of 1996 school, an indicator for inclusion in the VocEd or SCY sample, grade in 1998, gender, and indicators for survey wave and month of interview. Regressions include appropriate weights to maintain baseline sample representativeness (these weights account for inclusion of those randomly assigned to the control group, but not those randomly assigned to the treatment group of cross-cutting interventions (VocEd and SCY) and for the two-stage intensive tracking strategy). Standard errors are clustered at the 1998 school level. \* denotes significance at 10%, \*\* denotes significance at 5%, and \*\*\* denotes significance at 1%.

Table A15: Construction of Outcomes and Measures

Outcome or Measure	Description
<i>Panel A: Child Health</i>	
(1) No sickness over past 7 days	0 or 1
(2) Overall child health	Self-reported on scale from 1 (very poor) to 5 (very good)
(3) No serious health problem	0 or 1
(4) No disability indicator	0 or 1 (out of 10 possible disabilities listed)
(5) Subjective health index <sup>†</sup>	(1)-(4) are normalized, summed, and renormalized
(6) Height for Age*	Z-scores constructed using WHO child growth standards
(7) Height (in cm)	Height in centimeters
<i>Panel B: Non-Cognitive (Socioemotional) Development</i>	
(1) Emotional symptoms scale	Score of 0 [-] to 10 [+] across 5 items
(2) Conduct problems scale	Score of 0 [-] to 10 [+] across 5 items
(3) Hyperactive scale	Score of 0 [-] to 10 [+] across 5 items
(4) Peer problems scale	Score of 0 [-] to 10 [+] across 5 items
(5) Prosocial scale	Score of 0 [-] to 10 [+] across 5 items
(6) Total difficulties score	Sum of (1)-(4)
(7) Strengths and difficulties index*	(1)-(5) are normalized, summed, and renormalized
<i>Panel C: Cognitive Development</i>	
(1) Language Index*	Components (listed below) are normalized, summed, and renormalized Young (ages 3-5): (i) PPVT (sections 1-6) and (ii) MDAT Old (ages 6-8): (i) PPVT (sections 3-10), (ii) EGRA-Swahili, and (iii) EGRA-English (ages 7-8 only)
(2) Math and Spatial Abilities Index*	Components (listed below) are normalized, summed, and renormalized Young (ages 3-5): (i) Mental transformation Old (ages 6-8): (i) EGMA
(3) Executive Function Index*	Components (listed below) are normalized, summed, and renormalized Young (ages 3-5): (i) Forward digit span and (ii) DCCS Old (ages 6-8): (i) Forward digit span and (ii) PLUS-EF
(4) Cognitive Abilities Index*	(1)-(3) are summed and renormalized
(5) Academic Cognitive Index*	(1) and (2) are summed and renormalized
<i>Panel D: Early Life Health Investments</i>	
(1) Vaccination Index	Sum of indicators for: (i) BCG, (ii) polio, (iii) DPT, (iv) measles, and (v) yellow fever vaccinations
(2) Parasitic Prevention Index	Sum of indicators for: (i) child slept under a bed net previous night and (ii) child received deworming medication in last 12 months
(3) Early Life Health Investments Index <sup>†</sup>	(1) and (2) are normalized, summed, and renormalized
<i>Panel E: Home Environment</i>	
(1) Household books	Number of books at home (excluding story or picture books)
(2) Magazines and newspapers	Sum of two indicators: (i) newspapers, magazines, pamphlets, or brochures at home and (ii) pictures, posters, etc. at home
(3) Sources of play materials index	Sum of two indicators: (i) plays with homemade toys and (ii) plays with toys from a shop or manufactured toys
(4) Varieties of play materials index	Sum of six indicators: (i) music player or radio at home, (ii) musical instruments at home, (iii) paper and pen or art supplies at home, (iv) any story books or picture books at home, (v) whether the child plays games of strategy, and (vi) whether the child makes toys
(5) Play activities	Sum of twelve indicators: (i) caregiver reads books to or looks at books2 with child, (ii) tells stories to child, (iii) sings songs or plays instruments, (iv) plays with child, (v) constructs objects or art with child, (vi) names, counts, or draw things with child, (vii) helps child with homework, (viii) talks with child about what they're learning at school, (ix) teaches vocabulary words in English or Swahili, (x) teaches vocabulary words in local language, (xi) plays sports or other physical activities with child, (xii) takes child on a fun outing
(6) Modified FCI Index <sup>†</sup>	(1)-(5) are normalized, summed, and renormalized
(7) Number of story or picture books	Number of story or picture books at home
<i>Panel F: Schooling and Educational Investments</i>	
(1) Enrolled in school	0 or 1
(2) Ever enrolled in school	0 or 1
(3) Attended last week	0 or 1
(4) Number of days attended last week	Number
(5) Cost of schooling last month	Amount paid in Kenyan Shillings
(6) School enrollment and educational investments index <sup>†</sup>	(1)-(5) are normalized, summed, and renormalized

\* Normalization is within gender and 6-month age bands relative to control in wave 1, where applicable

<sup>†</sup> Normalization is relative to control in wave 1, where applicable

Table A16: Child Health, Non-Cognitive, and Cognitive Development by Wave

	Older Children (Ages 6-8)			Younger Children (Ages 3-5)		
	Subjective Health Index	Strengths & Difficulties Index	Academic Cognitive Index	Strengths & Difficulties Index	Subjective Health Index	Academic Cognitive Index
	(1)	(2)	(3)	(4)	(5)	(6)
PSDP Treatment × Wave 1	-0.03 (0.12)	-0.08 (0.12)	0.35** (0.16)	-0.25 (0.18)	-0.22 (0.19)	0.01 (0.19)
PSDP Treatment	0.18** (0.09)	0.24** (0.12)	-0.09 (0.12)	0.23* (0.13)	0.17 (0.16)	-0.01 (0.11)
Wave 1	-0.18 (0.45)	-0.03 (0.28)	0.40 (0.28)	0.43 (0.29)	0.44 (0.45)	0.17 (0.34)
Control mean	0.02	0.08	-0.06	0.06	0.01	0.09
Control SD	(1.04)	(1.02)	(1.02)	(0.99)	(1.15)	(1.08)
Observations	1962	1966	1967	1559	1560	1562

Sample includes children of KLPS respondents who participated in the Primary School Deworming Program (PSDP), but who were not assigned to the treatment group of cross-cutting interventions (VocEd or SCY). PSDP treatment is an indicator for biological parent assignment to a 1998 primary school randomly assigned to early receipt of Primary School Deworming Program (group 1 or group 2 schools). Columns (1)-(3) presents results for older children, while columns (4)-(6) presents results for younger children. Treatment status and all controls are interacted with an indicator for assignment to tracking wave 1. Controls include the proportion of students in schools assigned to deworming treatment within 6km of the KLPS parent's 1998 PSDP school, an indicator for parent attending a school assigned to the cost-sharing treatment in 2001, density of children in 6km radius of parent's 1998 PSDP school, indicators for parent's 1998 PSDP school zone, population of parent's 1998 PSDP school, average test score of parent's 1996 school, an indicator for parent inclusion in the VocEd or SCY sample, parent grade in 1998, parent gender, an indicator for interviewer gender, and months elapsed since the start of the survey wave. Regressions include appropriate weights to maintain representativeness of the next population (these weights account for inclusion of those parents randomly assigned to the control group, but not those randomly assigned to the treatment group of cross-cutting interventions (VocEd and SCY), for the two-stage intensive tracking strategy, and for total fertility). Standard errors are clustered at the 1998 school level. \* denotes significance at 10%, \*\* denotes significance at 5%, and \*\*\* denotes significance at 1%.

Table A17: Treatment Effects on All Pre-Specified Summary Outcomes

	Primary Child Outcomes				Home Environment and Investments			
	Cognitive Abilities Index (1)	Strength and Difficulties Index (2)	Subjective Health Index (3)	Height (4)	Early Life Health Investments Index (5)	Modified FCI Index (6)	School Enrollment and Edu Investments Index (7)	Child Discipline Strategies Index (8)
<i>Panel A: All Children</i>								
PSDP Treatment	0.02 (0.08)	0.15* (0.08)	0.14** (0.07)	-0.01 (0.07)	0.03 (0.07)	0.04 (0.08)	0.04 (0.05)	0.05 (0.06)
P-Value	0.74	0.07	0.04	0.91	0.69	0.62	0.45	0.39
Q-Value: Outcomes in (1)-(8)	1.00	0.37	0.37	1.00	1.00	1.00	1.00	1.00
Q-Value: Outcomes in (1)-(4)	0.83	0.16	0.16	0.83				
Observations	3529	3526	3521	3520	3522	3528	3552	3527
<i>Panel B: Younger Children (Ages 3-5)</i>								
PSDP Treatment	-0.12 (0.09)	0.07 (0.10)	0.13 (0.09)	0.04 (0.08)	0.07 (0.09)	-0.03 (0.09)	0.03 (0.09)	-0.00 (0.10)
P-Value	0.20	0.46	0.13	0.61	0.42	0.76	0.72	0.99
Q-Value: Outcomes in (1)-(8)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Q-Value: Outcomes in (1)-(4)	0.65	0.65	0.65	0.65				
Observations	1562	1560	1559	1557	1558	1562	1572	1563
<i>Panel C: Older Children (Ages 6-8)</i>								
PSDP Treatment	0.11 (0.09)	0.20** (0.09)	0.15* (0.08)	-0.03 (0.08)	-0.01 (0.07)	0.08 (0.09)	0.01 (0.04)	0.08 (0.05)
P-Value	0.24	0.03	0.06	0.69	0.87	0.37	0.88	0.15
Q-Value: Outcomes in (1)-(8)	0.58	0.33	0.33	0.95	0.95	0.65	0.95	0.42
Q-Value: Outcomes in (1)-(4)	0.19	0.14	0.14	0.48				
Observations	1967	1966	1962	1963	1964	1966	1980	1964
<i>Panel D: Older Children, Wave 1 (Pre-Covid)</i>								
PSDP Treatment	0.29** (0.13)	0.16 (0.10)	0.15 (0.10)	-0.07 (0.12)	-0.05 (0.10)	0.12 (0.12)	0.01 (0.04)	0.03 (0.10)
P-Value	0.03	0.12	0.15	0.57	0.61	0.33	0.78	0.74
Q-Value: Outcomes in (1)-(8)	0.32	0.55	0.55	0.95	0.95	0.69	0.95	0.95
Q-Value: Outcomes in (1)-(4)	0.14	0.18	0.18	0.25				
Observations	1005	1004	1001	1002	1002	1005	1005	1003

This table presents estimated treatment effects on all pre-specified summary outcomes. As pre-specified, the Cognitive Abilities Index in column (1) is not winsorized. The Child Discipline Strategies Index in column (8) combines positive and negative discipline strategies as described in the pre-analysis plan. All other outcomes as in the main text. Sample includes children of KLPS respondents who participated in the Primary School Deworming Program (PSDP), but who were not assigned to the treatment group of cross-cutting interventions (VocEd or SCY). Table rows include p-values indicating the level of significance of the estimated treatment effect, along with sharpened Q-values (Anderson, 2008) to adjust for multiple hypothesis testing across all outcomes in columns (1) to (8), or across the primary child outcomes in columns (1) to (4). Controls include the proportion of students in schools assigned to deworming treatment within 6km of the KLPS parent's 1998 PSDP school, an indicator for parent attending a school assigned to the cost-sharing treatment in 2001, density of children in 6km radius of parent's 1998 PSDP school, indicators for parent's 1998 PSDP school zone, population of parent's 1998 PSDP school, average test score of parent's 1996 school, an indicator for parent inclusion in the VocEd or SCY sample, parent grade in 1998, parent gender, an indicator for interviewer gender, and months elapsed since the start of the survey wave. Regressions include appropriate weights to maintain representativeness of the next population (these weights account for inclusion of those parents randomly assigned to the control group, but not those randomly assigned to the treatment group of cross-cutting interventions (VocEd and SCY), for the two-stage intensive tracking strategy, and for total fertility). Standard errors are clustered at the 1998 school level. \* denotes significance at 10%, \*\* denotes significance at 5%, and \*\*\* denotes significance at 1%.

Table A18: Academic Outcomes: Robustness to Different Measures of Math and Language

<i>Panel A: Older Children (Ages 6-8), Wave 1 (Pre-Covid)</i>												
	Language Index				Math and Spatial Abilities Index				Academic Cognitive Index			
	PAP version (1)	Not winsorized (2)	Equal section weighting (3)	Equal domain weighting (4)	PAP version (5)	Not winsorized (6)	Equal section weighting (7)	Equal domain weighting (8)	PAP version (9)	Not winsorized (10)	Equal section weighting (11)	Equal domain weighting (12)
PSDP Treatment	0.52** (0.21)	0.28** (0.12)	0.21* (0.12)	0.21* (0.11)	0.33** (0.13)	0.34** (0.14)	0.29** (0.12)	0.27** (0.12)	0.45*** (0.17)	0.33** (0.13)	0.26** (0.12)	0.25** (0.12)
Control mean	0.07	0.00	-0.00	-0.00	0.04	0.00	-0.00	-0.00	0.06	0.00	-0.00	-0.00
Observations	1005	1005	1005	1005	1005	1005	1005	1005	1005	1005	1005	1005

<i>Panel B: Older Children (Ages 6-8), Wave 2 (Post-Covid)</i>												
	Language Index				Math and Spatial Abilities Index				Academic Cognitive Index			
	PAP version (1)	Not winsorized (2)	Equal section weighting (3)	Equal domain weighting (4)	PAP version (5)	Not winsorized (6)	Equal section weighting (7)	Equal domain weighting (8)	PAP version (9)	Not winsorized (10)	Equal section weighting (11)	Equal domain weighting (12)
PSDP Treatment	-0.04 (0.11)	-0.05 (0.11)	-0.06 (0.11)	-0.06 (0.11)	-0.06 (0.12)	-0.07 (0.13)	-0.11 (0.13)	-0.16 (0.13)	-0.05 (0.12)	-0.07 (0.12)	-0.09 (0.12)	-0.11 (0.12)
Control mean	-0.09	-0.17	-0.17	-0.18	-0.05	-0.09	-0.12	-0.16	-0.08	-0.14	-0.15	-0.18
Observations	962	962	962	962	962	962	962	962	962	962	962	962

<i>Panel C: Younger Children (Ages 3-5), Wave 1 (Pre-Covid)</i>									
	Language Index			Math and Spatial Abilities Index			Academic Cognitive Index		
	PAP version (1)	Not winsorized (2)		PAP version (5)	Not winsorized (6)		PAP version (9)	Not winsorized (10)	
PSDP Treatment	-0.01 (0.09)	0.00 (0.10)		0.01 (0.11)	0.00 (0.13)		0.01 (0.11)	-0.01 (0.13)	
Control mean	-0.15	0.00		0.02	-0.00		-0.08	-0.00	
Observations	735	735		734	734		734	734	

<i>Panel D: Younger Children (Ages 3-5), Wave 2 (Post-Covid)</i>									
	Language Index			Math and Spatial Abilities Index			Academic Cognitive Index		
	PAP version (1)	Not winsorized (2)		PAP version (5)	Not winsorized (6)		PAP version (9)	Not winsorized (10)	
PSDP Treatment	-0.02 (0.12)	-0.03 (0.15)		0.04 (0.10)	-0.00 (0.12)		0.02 (0.09)	-0.01 (0.12)	
Control mean	0.17	0.35		-0.02	-0.04		0.10	0.18	
Observations	828	828		828	828		828	828	

This table presents regression estimates corresponding to different ways of constructing the language index, math and spatial abilities index, and academic cognitive index. Columns (1), (5), and (9) present results estimated using the pre-specified versions of each index (pooling across waves, instead of normalizing relative to wave 1). Columns (2), (6), and (10) present results estimated using versions of each index that are normalized relative to wave 1, but without winsorizing the top 1%. Columns (3), (7), and (11) present results estimated using versions of each index are constructed giving equal weight to sections (rather than subsections) within EGMA, EGRA Swahili, and EGRA English (not applicable for younger children). Columns (4), (8), and (12) present results estimated using versions of each index constructed giving equal weight to domains (rather than subsections) within EGMA, EGRA Swahili, and EGRA English (again, not applicable for younger children).

Table A19: Executive Function: Robustness to Different Measures of Executive Function

<i>Panel A: Wave 1 (Pre-Covid)</i>										
	Executive Function Index Younger Children (Ages 3-5)			Executive Function Index Older Children (Ages 6-8)						
	Primary version (1)	PAP version (2)	Including 3 year olds (3)	Primary version (4)	PAP version (5)	PAP modified: All games (6)	PAP modified: MSIT and flanker (7)	MSIT accuracy score alone (8)	MSIT incongruent score alone (9)	Normalizing within time configuration (10)
PSDP Treatment	-0.32** (0.15)	-0.33** (0.14)	-0.27** (0.13)	0.12 (0.11)	0.17 (0.14)	0.21* (0.13)	0.13 (0.14)	0.09 (0.13)	0.06 (0.12)	0.21 (0.13)
Control mean	-0.002	0.000	-0.000	0.001	0.000	0.000	0.000	-0.000	-0.000	0.000
Observations	545	545	735	1005	1005	1005	1005	1005	1005	1005

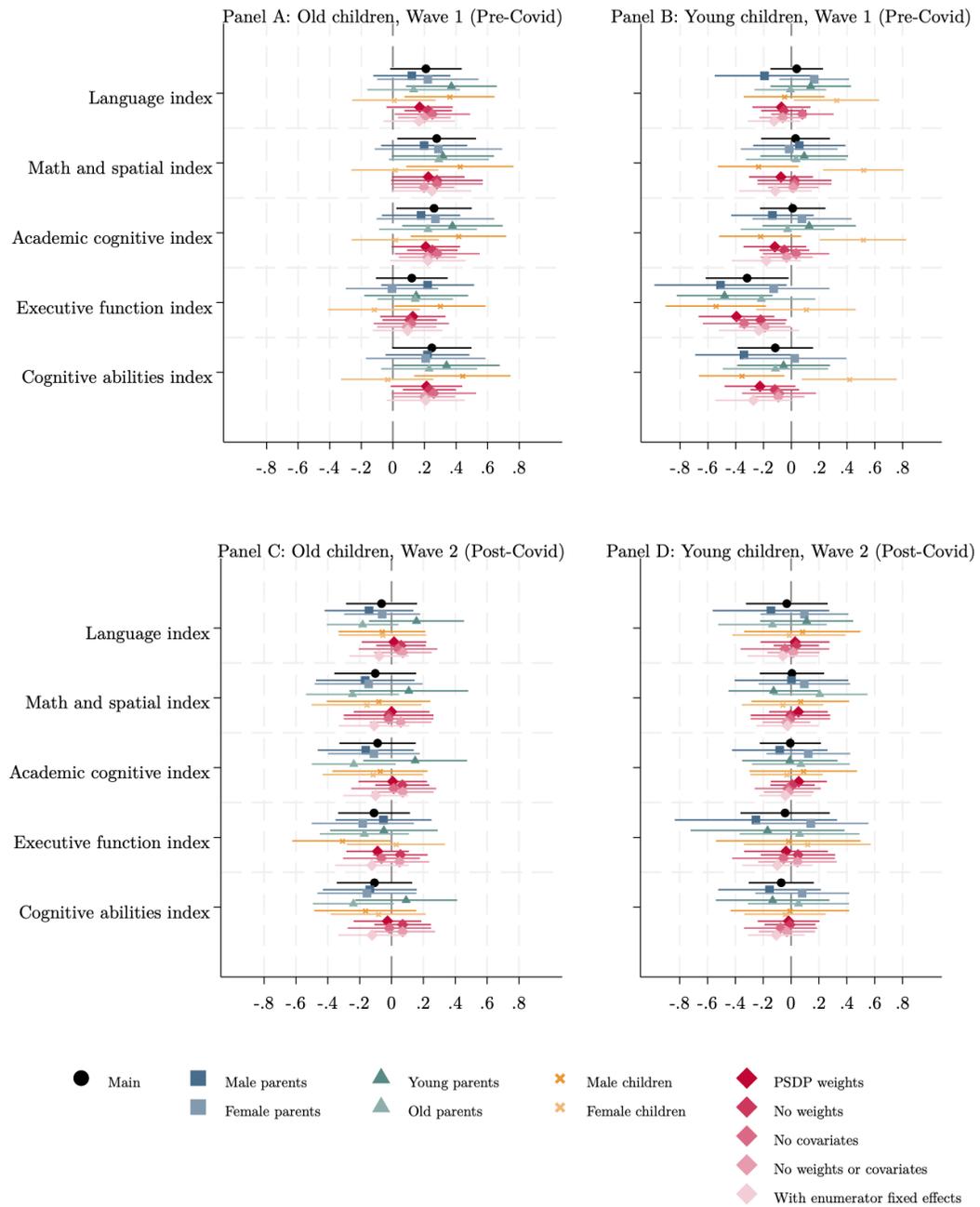
  

<i>Panel B: Wave 2 (Post-Covid)</i>										
	Executive Function Index Younger Children (Ages 3-5)			Executive Function Index Older Children (Ages 6-8)						
	Primary version (1)	PAP version (2)	Including 3 year olds (3)	Primary version (4)	PAP version (5)	PAP modified: All games (6)	PAP modified: MSIT and flanker (7)	MSIT accuracy score alone (8)	MSIT incongruent score alone (9)	Normalizing within time configuration (10)
PSDP Treatment	-0.04 (0.16)	-0.01 (0.16)	-0.27* (0.15)	-0.11 (0.11)	0.06 (0.31)	0.04 (0.16)	-0.05 (0.11)	-0.15 (0.11)	-0.15 (0.10)	-0.04 (0.10)
Control mean	-0.035	-0.059	0.154	0.107	1.831	1.552	0.263	0.067	0.134	0.038
Observations	565	565	828	962	962	962	962	962	962	962

Each of the above are different versions of the executive function index. In all cases, the forward digit span task is score as pre-specified, and combined with different versions of the DCCS components (for younger children) and PLUS-EF components (for older children) as described below.

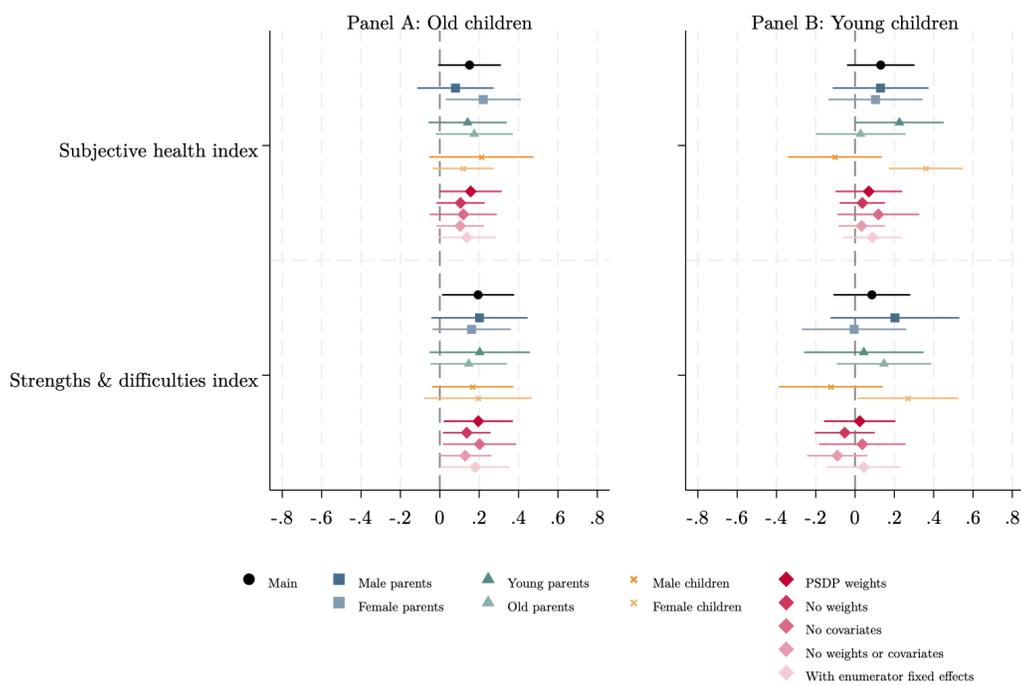
- (1) Primary: DCCS scored as 0, 1, or 2, excluding 3 year olds
- (2) PAP: Pre-specified version (separate indicators for DCCS round 1 and DCCS round 2)
- (3) Including 3 year olds: As in column (1) but including 3 year olds
- (4) Primary: Congruent and incongruent scores from MSIT only, non-response as zero, etc.)
- (5) PAP: Fully pre-specified version (all three games, non-response as invalid, etc.)
- (6) PAP modified: All games: Congruent, incongruent, and mixed scores from all three games, non-response as zero, etc.
- (7) PAP modified: MSIT and flanker: Congruent, incongruent, and mixed scores from MSIT and flanker only non-response as zero, etc.
- (8) MSIT accuracy score alone: MSIT accuracy score alone (instead of separate scores for congruent and incongruent blocks)
- (9) MSIT incongruent score alone: MSIT incongruent score only
- (10) Normalizing within time configuration: As per column (6), but normalizing within time configuration rather than relative to wave 1

Figure A1: Robustness: Cognitive Outcomes by Wave and Age Group



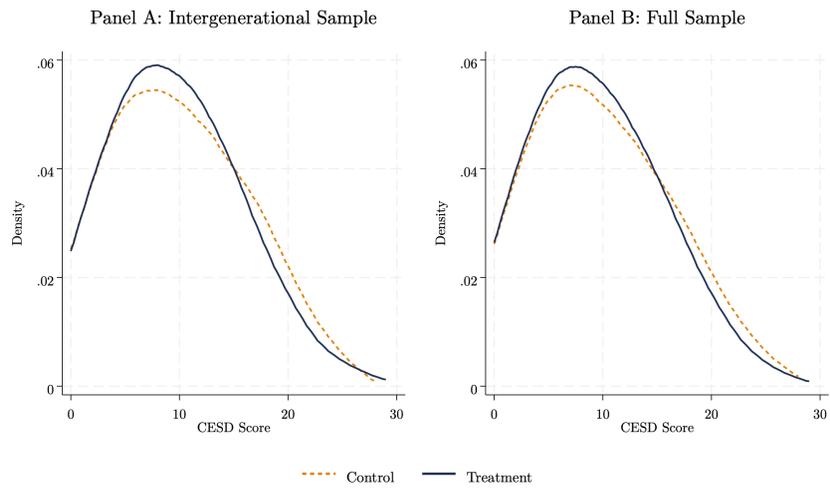
Note: Panels depict PSDP treatment coefficients with 95% confidence intervals for estimation using different subsamples, with different weighting strategies, without weights and/or without covariates, and with enumerator fixed effects, as noted in the legend.

Figure A2: Robustness: Health and Non-Cognitive Development by Age Group



Note: Panels depict PSDP treatment coefficients with 95% confidence intervals for estimation using different subsamples, with different weighting strategies, without weights and/or without covariates, and with enumerator fixed effects, as noted in the legend.

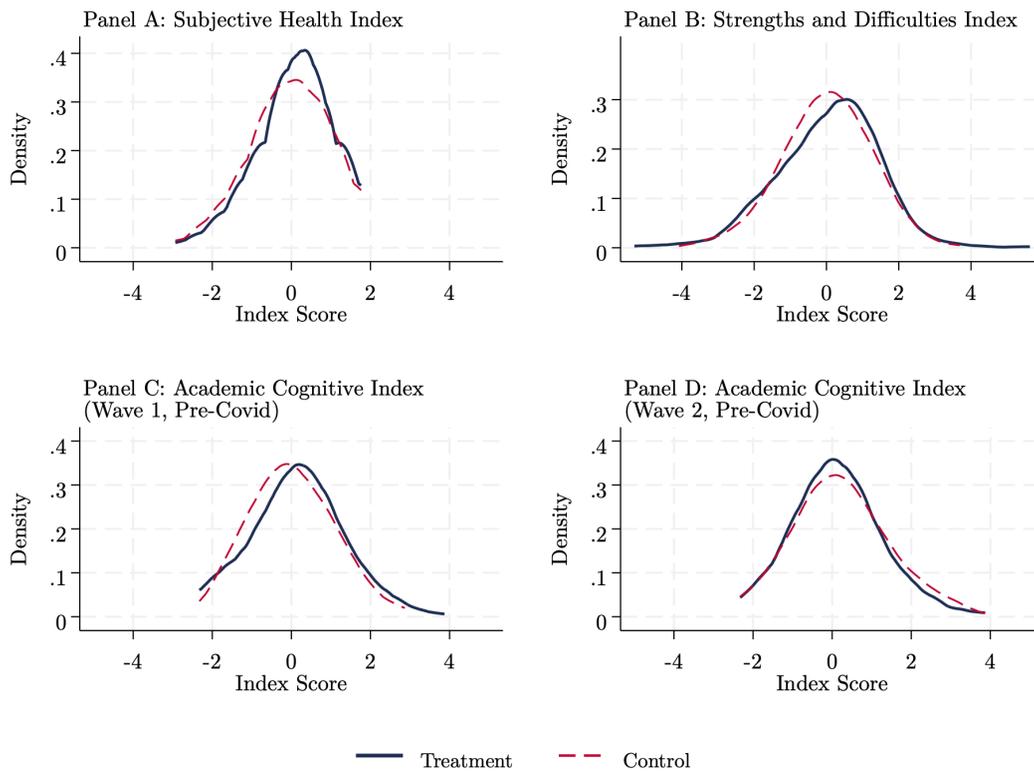
Figure A3: Depressive Symptoms among KLPS Adults by Treatment Status



Notes: This figure plots the density of Center for Epidemiological Studies Depression (CESD) scores separately for KLPS respondents in the treatment and control groups, within the full sample (Panel A) and the intergenerational impacts sample (Panel B).

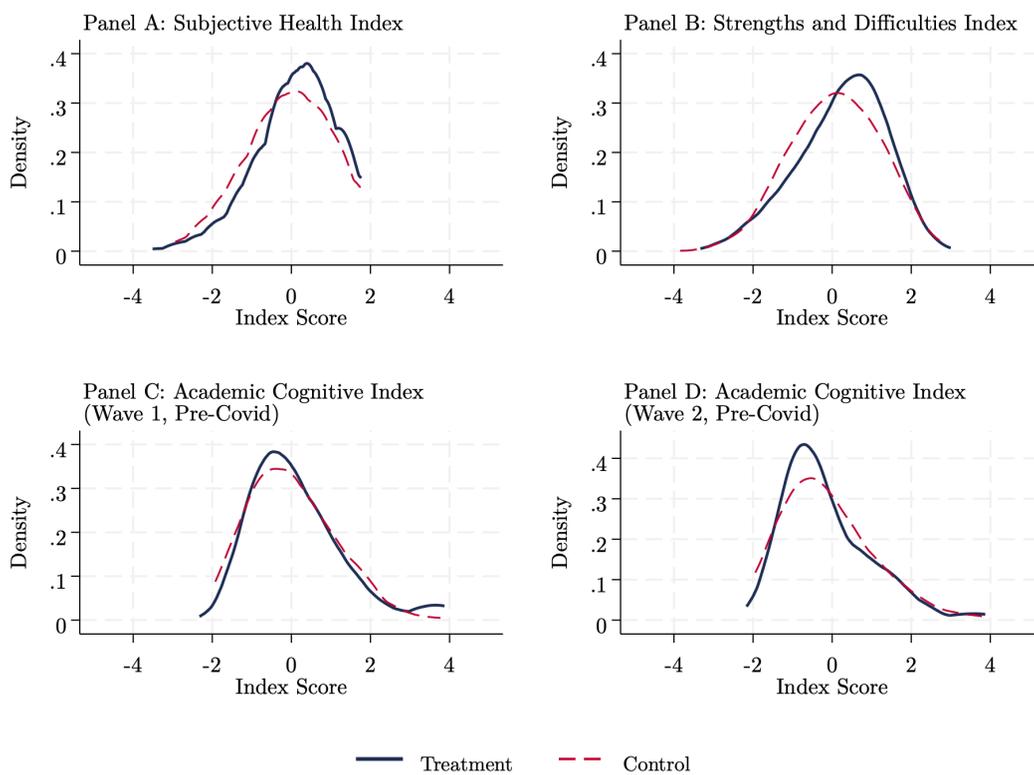
## B Appendix B: Additional Results

Figure B1: Distribution of Primary Indices: Younger Children



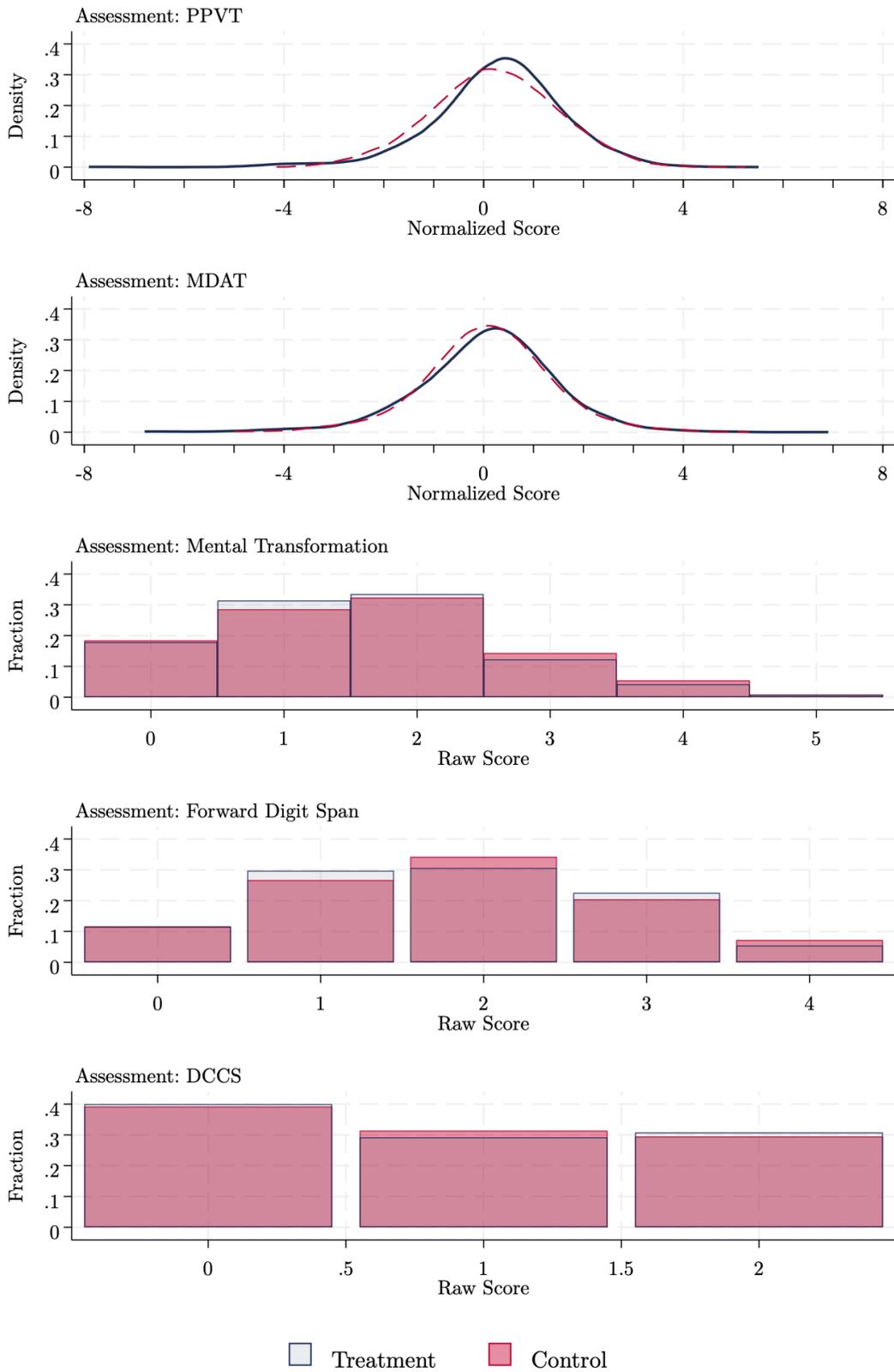
Note: This figure presents densities of index scores for younger children (ages 3-5) for each of the main indices (Panel A: The Subjective Health index; Panel B: Strengths and Difficulties Index; Panel C: Academic Cognitive Index, Wave 1; Panel D: Academic Cognitive Index, Wave 2), separately for treatment (solid blue line) and control (dotted red line).

Figure B2: Distribution of Primary Indices: Older Children



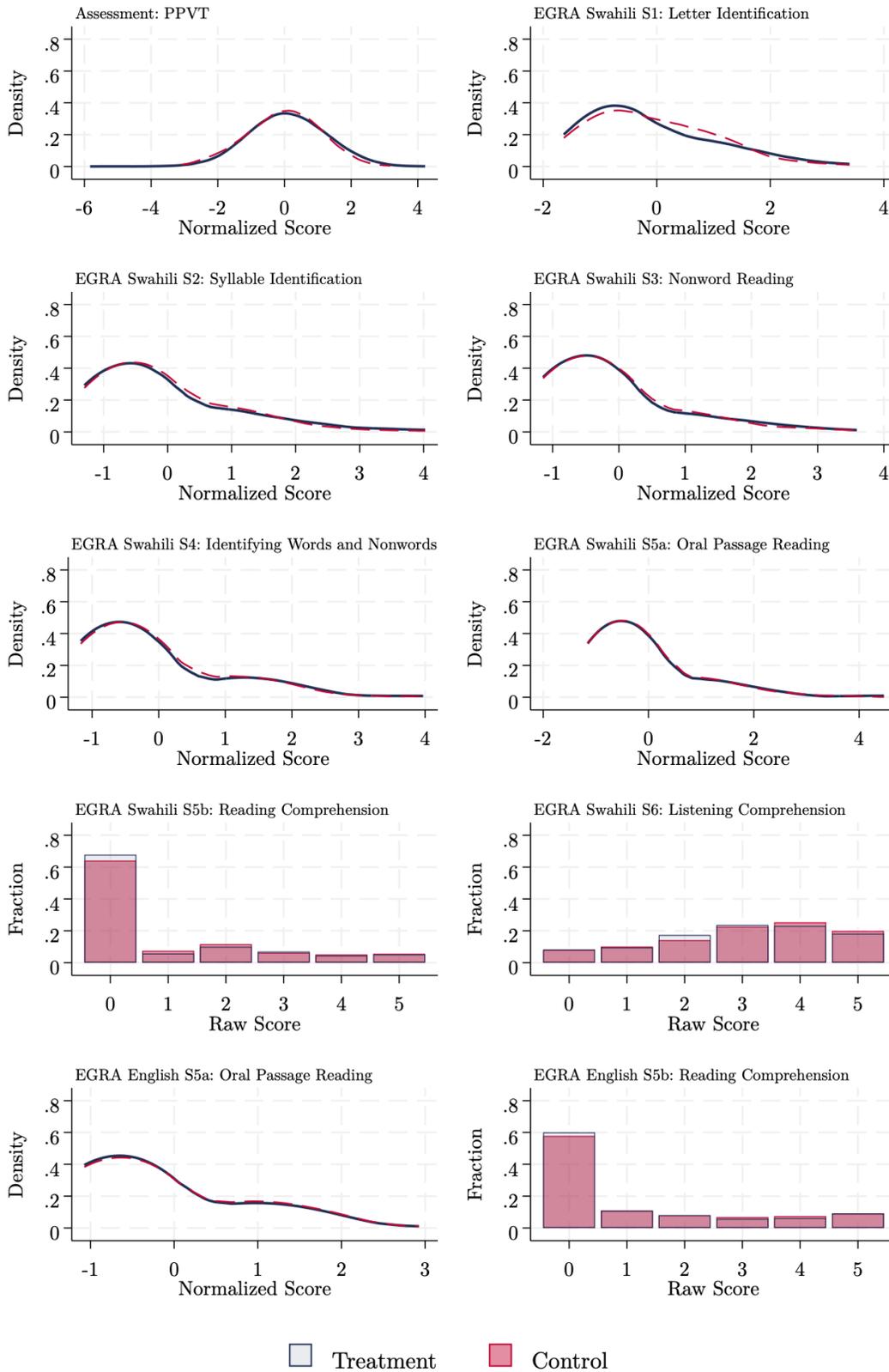
Note: This figure presents densities of index scores for older children (ages 6-8) for each of the main indices (Panel A: The Subjective Health index; Panel B: Strengths and Difficulties Index; Panel C: Academic Cognitive Index, Wave 1; Panel D: Academic Cognitive Index, Wave 2), separately for treatment (solid blue line) and control (dotted red line).

Figure B3: Distribution of Assessment Scores: Young Children



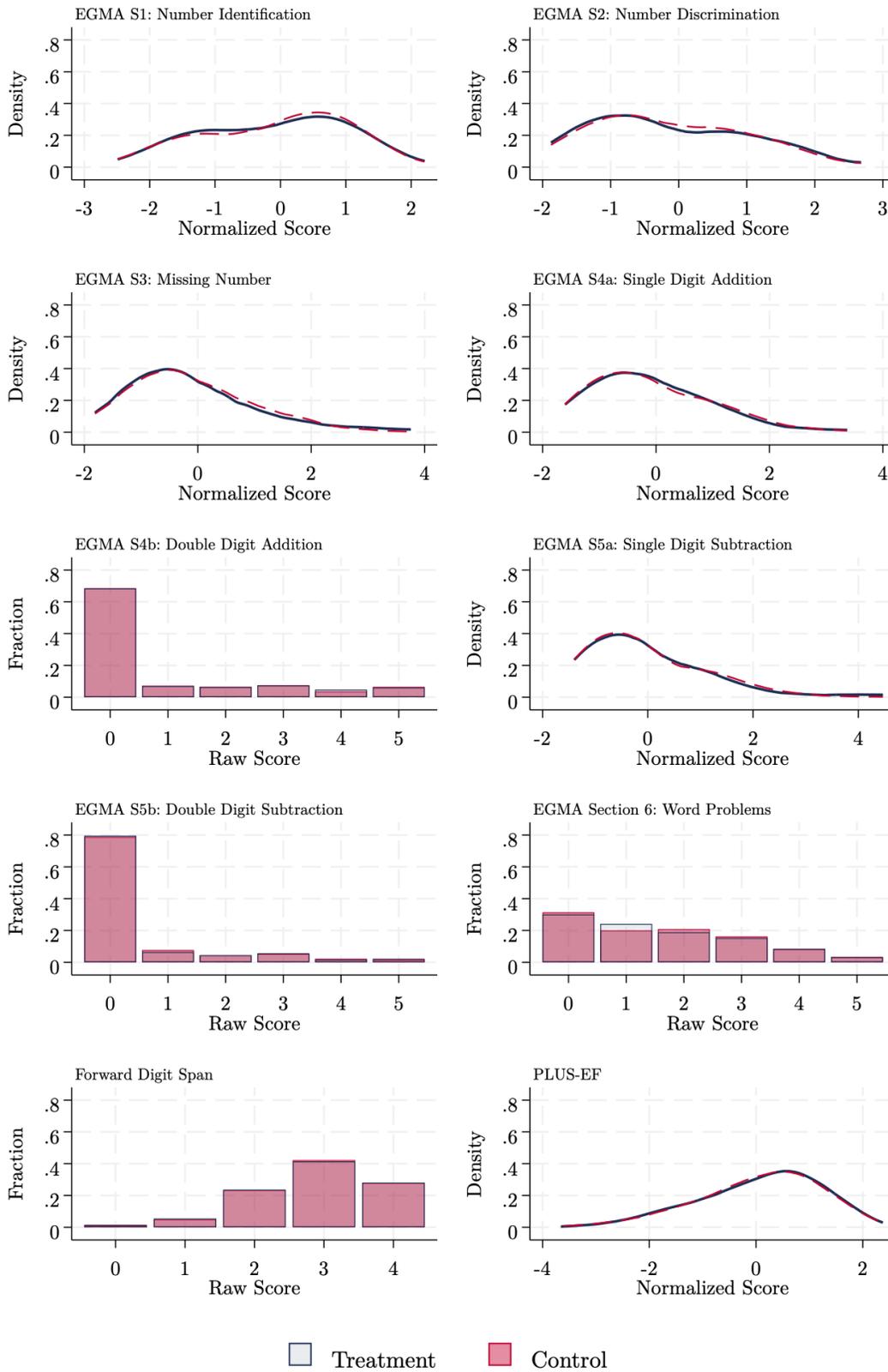
Note: This figure presents the distribution of individual assessments for younger children, separately for treatment (solid blue) and control (dotted red). Densities of normalized scores are presented for those assessments with at least five possible scores (PPVT; MDAT), while histograms are presented for those assessments with five or fewer possible scores (Mental Transformation; Forward Digit Span; DCCS).

Figure B4: Distribution of Assessment Scores: Old Children (1 of 2)



Note: This figure presents the distribution of individual assessments/sections for older children, separately for treatment (solid blue) and control (dotted red). Densities of normalized scores are presented for those assessments or sections with at least five possible scores (PPVT; EGRA-Swahili Sections 1-5a; EGRA-English Section 5a), while histograms are presented for those assessments with five or fewer possible scores (EGRA-Swahili Sections 5b and 6; EGRA English Section 5b).

Figure B5: Distribution of Assessment Scores: Old Children (2 of 2)



Note: This figure presents the distribution of individual assessments/sections for older children, separately for treatment (solid blue) and control (dotted red). Densities of normalized scores are presented for those assessments or sections with at least five possible scores (EGMA Sections 1-4a and 5a; PLUS-EF), while histograms are presented for those assessments with five or fewer possible scores (EGMA Section 4b, 5b, and 6; Forward Digit Span).

Table B1: Cognitive Performance by Assessment (Younger)

	Language		Math and Spatial	Executive Function (Age 4 & 5)	
	PPVT	MDAT	Mental Transformation	Forward Digit Span	DCCS Score
<i>Wave 1 (Pre-Covid)</i>	(1)	(2)	(3)	(4)	(5)
PSDP Treatment	0.20 (0.12)	-0.09 (0.10)	0.03 (0.13)	-0.13 (0.14)	-0.08 (0.10)
Control mean	0.00	0.00	-0.00	-0.00	0.00
Observations	735	734	734	735	729
<i>Wave 2 (Post-Covid)</i>	(1)	(2)	(3)	(4)	(5)
PSDP Treatment	0.06 (0.13)	0.01 (0.15)	0.01 (0.12)	-0.21 (0.14)	-0.13 (0.14)
Control mean	0.44	0.17	-0.04	0.07	0.13
Observations	828	828	828	828	825

This table presents treatment effect estimates for individual (normalized) assessment scores. Controls include the proportion of students in schools assigned to deworming treatment within 6km of the KLPS parent's 1998 PSDP school, an indicator for parent attending a school assigned to the cost-sharing treatment in 2001, density of children in 6km radius of parent's 1998 PSDP school, indicators for parent's 1998 PSDP school zone, population of parent's 1998 PSDP school, average test score of parent's 1996 school, an indicator for parent inclusion in the VocEd or SCY sample, parent grade in 1998, parent gender, an indicator for interviewer gender, and months elapsed since the start of the survey wave. Regressions include appropriate weights to maintain representativeness of the next population (these weights account for inclusion of those parents randomly assigned to the control group, but not those randomly assigned to the treatment group of cross-cutting interventions (VocEd and SCY), for the two-stage intensive tracking strategy, and for total fertility). Standard errors are clustered at the 1998 school level. \* denotes significance at 10%, \*\* denotes significance at 5%, and \*\*\* denotes significance at 1%.

Table B2: Cognitive Performance by Assessment (Older)

	Language										Math and Spatial						Executive Function			
	EGRA Swahili					EGRA English					EGMA						Forward Digit Span	Plus-EF MSIT		
	PPVT	S1	S2	S3	S4	S5a	S5b	S6	S5a	S5b	S1	S2	S3	S4a	S4b	S5a			S5b	S6
<i>Wave 1 (Pre-Covid)</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
PSDP Treatment	0.19*	-0.08	0.35**	0.12	0.26**	0.73**	0.12	0.22**	0.08	0.15	0.25**	0.31**	0.22*	0.22**	0.23	0.41**	0.17	0.28***	0.09	0.10
	(0.11)	(0.13)	(0.14)	(0.12)	(0.12)	(0.31)	(0.10)	(0.10)	(0.13)	(0.13)	(0.11)	(0.13)	(0.13)	(0.10)	(0.14)	(0.19)	(0.12)	(0.10)	(0.12)	(0.09)
Control mean	-0.00	-0.00	0.00	-0.00	0.00	0.00	-0.00	0.00	0.00	0.00	-0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00
Observations	1005	1005	1005	936	1004	1005	936	1004	730	730	1005	1003	1003	1005	1003	1005	858	1003	1005	972
<i>Wave 2 (Post-Covid)</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
PSDP Treatment	0.11	-0.13	-0.17	-0.12	-0.10	-0.09	-0.16	-0.13	-0.16	-0.19	-0.16	-0.16	-0.12	-0.12	-0.01	-0.12	-0.05	0.08	-0.19*	-0.05
	(0.11)	(0.12)	(0.11)	(0.11)	(0.09)	(0.10)	(0.11)	(0.09)	(0.12)	(0.13)	(0.12)	(0.14)	(0.13)	(0.10)	(0.14)	(0.12)	(0.13)	(0.13)	(0.11)	(0.12)
Control mean	-0.06	-0.17	-0.17	-0.19	-0.21	-0.23	-0.18	0.12	-0.25	-0.10	-0.11	-0.22	-0.21	-0.17	0.10	-0.06	0.14	0.05	0.01	0.11
Observations	962	962	962	899	962	962	899	962	690	690	962	962	962	962	962	962	827	962	962	928

This table presents treatment effect estimates for individual (normalized) assessment scores. Treatment effect estimates are presented separately for individual sections of the EGRA and EGMA assessments. EGRA Swahili consists of a letter identification task (Section 1), a syllable identification task (Section 2), a nonword reading task (Section 3), a word/nonword identification task (Section 4), an oral passage reading task (Section 5a), a reading comprehension task (Section 5b), and a listening comprehension task. EGRA English consists of an oral passage reading task (Section 5a) and a reading comprehension task (Section 5b). EGMA consists of a number identification task (Section 1), a number discrimination task (Section 2), a missing number task (Section 3), single digit addition (Section 4a), double digit addition (Section 4b), single digit subtraction (Section 5a), double digit subtraction (Section 5b), and word problems (Section 6). Controls include the proportion of students in schools assigned to deworming treatment within 6km of the KLPS parent's 1998 PSDP school, an indicator for parent attending a school assigned to the cost-sharing treatment in 2001, density of children in 6km radius of parent's 1998 PSDP school, indicators for parent's 1998 PSDP school zone, population of parent's 1998 PSDP school, average test score of parent's 1996 school, an indicator for parent inclusion in the VocEd or SCY sample, parent grade in 1998, parent gender, an indicator for interviewer gender, and months elapsed since the start of the survey wave. Regressions include appropriate weights to maintain representativeness of the next population (these weights account for inclusion of those parents randomly assigned to the control group, but not those randomly assigned to the treatment group of cross-cutting interventions (VocEd and SCY), for the two-stage intensive tracking strategy, and for total fertility). Standard errors are clustered at the 1998 school level. \* denotes significance at 10%, \*\* denotes significance at 5%, and \*\*\* denotes significance at 1%.

# C Appendix C: Data Collection and Data Quality

## C.1 Instrument Development and Enumerator Training

### C.1.1 NIH-Funded Pilot (2015-2016)

With funding from the National Institutes on Health (NIH), a pilot study took place in 2015 to 2016, serving as a precursor to the present study. During the pilot, measures of cognitive and non-cognitive development (“Primary Child Outcomes”) along with measures of investments in health, education, and the home environment (“Child Investment Outcomes”) were collected for a sample of just over 850 3 to 5 year old children of KLPS respondents. (See [Hamory et al. \(2021a\)](#) for an application of these data.)

Lessons from this pilot study informed the present study, particularly in terms of adapting and refining the measures to be context-appropriate and age-appropriate. This process took place in collaboration with and using input from child development specialists with extensive experience developing and adapting assessments in multiple Sub-Saharan African countries.

In the pilot study, child cognitive development was assessed using six assessments, including (1) the Kaufman Assessment Battery for Children (K-ABC; [Kaufman and Kaufman \(2004\)](#)) Face Recognition Task, which measures short-term visual memory and processing (2) the Kaufman Assessment Battery for Children (K-ABC; [Kaufman and Kaufman \(2004\)](#)) Triangle Task, which measures spatial abilities, (3) the Peabody Picture Vocabulary Test (PPVT; [Dunn and Dunn \(2007\)](#)), which measures receptive vocabulary, (4) the Leiter-R Attention Sustained Task ([Roid and Miller, 1997](#)), which measures executive function, (5) the Malawi Development Assessment Tool (MDAT) Fine Motor Skills ([Gladstone et al., 2010](#)), which measures motor skills, and (6) the Malawi Development Assessment Tool (MDAT) Language and Hearing ([Gladstone et al., 2010](#)) which measures general verbal abilities. As in the present study, child non-cognitive development (socioemotional development) was assessed using the Strengths and Difficulties Questionnaire (SDQ; [Goodman \(1997\)](#)). Finally, as per the present study, child health was assessed using a Subjective Health Index (with recent sickness, overall child health, incidence of serious health problems, and disability ([Durkin et al., 1995](#)) as components), and height served as the primary anthropometric outcome. Prenatal and early life health investments was measured using a Prenatal and Early Life Health Investments Index (with a breastfeeding, vaccination, parasitic prevention, and medical care prior to birth as components). The richness of the home environment was measured using a Home Environment Investments Index (capturing the presence of music, reading materials, creative outlets, and toys in the home, along with engagement in activities to support child development) ([Hamadani et al., 2010](#); [Kariger et al., 2012](#); [UNICEF, 2015](#)). Child discipline behaviors were measured using a Child Discipline Strategies Index ([Sadowski et al., 2004](#); [UNICEF, 2010, 2015](#)), with positive and negative discipline strategies as components. More information on data collection and the measures used in the pilot can be found in the Social Sciences Registry ([AEARCTR-0000728](#)) and pre-analysis plan ([Fernald et al., 2015](#)).

### **C.1.2 Assessment Piloting and Adaptation**

Assessments were piloted out of sample for several months in the summer of 2018 to refine the cognitive and non-cognitive instruments, ensure all instruments were context- and age-appropriate, and make any adaptations necessary. This process took place in collaboration between child development specialists and development economists, field-based research staff, and full-time and graduate student research assistants.

In pre-pilot activities, a small group of children local to the Innovations for Poverty Action (IPA) office in Busia, Kenya would complete assessments under close observation. In the main pilot activities, the team would visit a school in a representative village and pilot assessments with groups of 10 to 20 children, sharing feedback and refining instruments day-to-day in an iterative process.

In addition to translating the assessments from English into Swahili, Luo, or Luhya, various adaptations were made to adapt the assessments to the context. For example, in the Promoting Learning, Understanding, Self-Regulation Change Card Sort (PLUS-EF, described below), the usual “Heart and Flowers” subtask was exchanged for a “Stars and Flowers” subtask, using the more familiar star shape than the heart shape. In the Peabody Picture Vocabulary Test (PPVT, described below), unfamiliar items were exchanged for more familiar items (for example, exchanging an image of an uncommon fruit such as a pear for a common fruit such as a mango).

### **C.1.3 Enumerator Training**

A team of 17 enumerators was carefully selected and trained to administer the child assessments. Training took place over the course of three weeks (one week of classroom training, demonstration, and practice followed by one week of standardization and team testing) under the observation of local field staff and child development specialists (in person, and by sharing videos of recorded assessments). Refresher training on particular items or assessments were conducted as necessary.

### **C.1.4 Data Quality**

Data quality checks were completed on an approximately weekly basis. These checks involved describing and analyzing survey time and completed assessments across enumerators and over time. Raw data were also analyzed descriptively to check for and quickly resolve any irregularities.

## **C.2 Cognitive Assessments**

Each of the assessments are described briefly below. More detail can be found in the pre-analysis plan ([Fernald et al., 2019](#)) and the data user guide. Data are available on the KLPS Harvard Dataverse ([Miguel et al., 2014](#)).

### **C.2.1 Peabody Picture Vocabulary Test (PPVT)**

The Peabody Picture Vocabulary Test (PPVT) ([Dunn and Dunn, 2007](#)) assesses receptive vocabulary and was administered to children 3 to 8 years old. For each item, children are

presented with four images and asked to point to the image corresponding to the word the enumerator says out loud. As an example, children might be presented with an image of a lemon, an orange, a banana, and an avocado, and asked to identify the avocado. Younger children completed 64 items over the course of 6 sections (sections 1 to 6), progressing in difficulty. Older children completed 91 items over the course of 8 sections (sections 3 to 10), again progressing in difficulty. No stopping rules were enforced (children completed the full assessment). However, if children failed to correctly answer at least four of eight practice items, the remainder of the test was not administered. (Such cases were uncommon). Certain items that were not context-appropriate were skipped, and in other cases, the usual images were replaced with more context-appropriate images (for example, using an image of an avocado, instead of a pear).

### **C.2.2 Malawi Development Assessment Tool (MDAT)**

The Malawi Development Assessment Tool (MDAT) (Gladstone et al., 2010) assesses general language skills, and was administered to children 3 to 5 years old. The MDAT consists of a series of diverse subtasks. These are designed to assess whether children could name objects, identify objects, describe the use of objects, understand the use of prepositions, among understand the concept of opposites, among other general language skills. For example, in one subtask, each child was presented with various items (thread, a cup, scissors, a fork, a wick, a nail, a pencil, and a flashlight), and asked to identify which one is for writing, sewing, drinking, etc. In another subtask, each child was presented with fourteen common items (a candle, a safety pin, thread, a mirror, a comb, scissors, etc.) and asked to identify each by name. In another subtask, each child was asked to point to these items when identified by name, and in another, to describe the use of a subset of items. In another subtask, each child was asked to fill in the blank in a sentence using the concept of opposites, for example, “If you cry when you are sad, you smile when you are \_\_\_\_.”

### **C.2.3 Early Grade Reading Assessment Swahili (EGRA-Swahili)**

The Early Grade Reading Assessment Swahili (EGRA-Swahili) (Dubeck and Gove, 2015; Gove and Wetterberg, 2011) measures literacy in Swahili, and was administered to children 6 to 8 years old. The EGRA-Swahili consists of 6 sections (7 subsections):

- *Section 1: Letter sound identification:* In this timed subtask, the child was presented with a piece of paper with 100 letters and asked to point to and say as many letters as they were able to in 60 seconds.
- *Section 2: Syllable identification:* In this timed subtask, the child was presented with a piece of paper with 100 syllables and asked to point to and say as many syllables as they were able to in 60 seconds.
- *Section 3: Invented/non-word reading:* In this timed subtask, the child was presented with a piece of paper with 50 invented/non-words and asked to read and pronounce as many invented/non-words as they were able to in 60 seconds.

- *Section 4: Word/non-word identification:* In this untimed subtask, the child was presented with a piece of paper with 20 real and invented/non-words and asked to identify whether each word was real or invented.
- *Section 5a: Oral passage reading:* In this timed subtask, the child was presented with a short (60-word) story and asked to read as much as they were able to in 60 seconds.
- *Section 5b: Reading comprehension:* In this untimed subtask, the child was asked 5 comprehension questions about the short story.
- *Section 6: Listening comprehension:* In this untimed subtask, the enumerator read out loud a short story, then asked the child 5 comprehension questions about the story.

#### C.2.4 Early Grade Reading Assessment English (EGRA-English)

The Early Grade Reading Assessment English (EGRA-English) (Dubeck and Gove, 2015; Gove and Wetterberg, 2011) measures literacy in English. A subset of the full task was administered to children 7 to 8 years old, including two sub-sections:

- *Section 5a: Oral passage reading:* In this timed subtask, the child was presented with a short (66-word) story and asked to read as much as they were able to in 60 seconds.
- *Section 5b: Reading comprehension:* In this untimed subtask, the child was asked 5 comprehension questions about the short story.

#### C.2.5 Mental Transformation (MT)

The Mental Transformation (MT) task (UNICEF, 2017) measures spatial abilities and was administered to children 3 to 5 years old. The Mental Transformation used as part of the child assessments is a subtask of the Measuring Early Learning Quality and Outcomes Direct Assessment (MELQO). The MT consisted of five items. In each item, the child was presented with two disjoint pieces of a shape, and asked to select what complete shape the two pieces would make when combined, out of four possible response options.

#### C.2.6 EGMA

The Early Grade Math Assessment (EGMA) (Platas et al., 2014) assesses numeracy and was administered to children ages 6 to 8. The EGMA consists of 6 sections (8 subsections):

- *Section 1: Number identification:* In this timed subtask, the child was presented with a piece of paper with 20 numbers and asked to point to and identify as many as they were able to in 60 seconds.
- *Section 2: Number discrimination:* In this untimed subtask, the child was presented with pairs of numbers and asked to identify which of the numbers was larger. This task included ten items (pairs of numbers).
- *Section 3: Number pattern completion:* In this untimed subtask, the child was presented with a series of four numbers forming a pattern (one of which was missing) and asked to identify which number should fit in the blank space. There were ten items (series of four numbers).

- *Section 4a: Single digit addition:* In this timed subtask, the child was presented with 20 single-digit addition exercises and asked to solve as many as they were able to (without pencil and paper) in 60 seconds.
- *Section 4b: Double digit addition:* In this untimed subtask, the child was presented with 5 double-digit addition exercises to solve, with the option to use pencil and paper.
- *Section 5a: Single digit subtraction:* In this timed subtask, the child was presented with 20 single-digit subtraction exercises and asked to solve as many as they were able to (without pencil and paper) in 60 seconds.
- *Section 5b: Double digit subtraction:* In this untimed subtask, the child was presented with 5 double-digit subtraction exercises to solve, with the option to use pencil and paper.
- *Section 6: Word problems:* In this untimed subtask, the enumerator read out a series of 5 word problems for the child to solve.

### **C.2.7 Forward Digit Span (FD)**

The Forward Digit Span (FD) task (UNICEF, 2017) measures executive function, primarily working memory, and was administered to children 3 to 8 years old. The Forward Digit Span used as part of the child assessments is a subtask of the Measuring Early Learning Quality and Outcomes Direct Assessment (MELQO). In the FD, the enumerator would clearly list a sequence of digits out loud, and the child was asked to repeat back the sequence. There were four items, ranging from a two-digit sequence to a five-digit sequence.

### **C.2.8 Dimensional Change Card Sort (DCCS)**

The Dimensional Change Card Sort (DCCS) (Zelazo, 2006) task measures executive function, primarily cognitive flexibility, and was administered to children 3 to 5 years old. The DCCS consists of two rounds, the “color game” and the “shape game.” In each round, each child was presented with six cards one at a time (where each card had either a green truck or a red star) and was asked to place the cards into one of two boxes (displaying either a red truck or a green star) according to the game’s rules. In the first round (the color game), the rule was to place the cards according to color (placing a card with a green truck into the box displaying a green star, or placing a card with a red star into the box displaying a red truck). In the second round (the shape game), the rule was now to place the cards according to shape (placing a card with a green truck into the box displaying the red truck, or placing a card with a red star into the box displaying the green star).

### **C.2.9 Promoting Learning, Understanding, Self-Regulation Change Card Sort (PLUS-EF)**

The Promoting Learning, Understanding, Self-Regulation Change Card Sort (PLUS-EF) (Obradović et al., 2018) measures executive function, including cognitive flexibility and inhibitory control, and was administered to children 6 to 8 years old. In contrast to all other assessments, the PLUS-EF was administered entirely on the tablet, using a custom software

built in collaboration between the research team and a software engineer participating on a consultant basis. The PLUS-EF included three subtasks:

- *Multi-Source Interference Task (MSIT)*: The MSIT subtask consists of 24 “congruent” and 24 “incongruent” items. For each item, three digits would appear on the screen for a short amount of time, and the child was tasked with press the digit that did not belong with the others before the three digits disappeared and the next set appeared. For the congruent items, two of the digits were always zeros, and the third was always a one, two, or three. For the incongruent items, there were no zeros, and the two matching digits could be ones, twos, or threes, as could the third non-matching digit.
- *Stars and Flowers*: The Stars and Flowers subtask consisted of three blocks of items: a congruent block (12 items), an incongruent block (12 items), and a mixed block (33 congruent or incongruent items). For each item, an image of a stars or a flowers would appear on either side of the screen for a short amount of time, and the child was tasked with pressing a button on the same side of the image if it was a star (a congruent item) or the button on the opposite side of the image if it was a flower (an incongruent item).
- *Flanker*: The Flanker subtask consisted of three blocks of items. In the first block (22 items), an image of five blue fish lined up would appear on the screen for a short amount of time, and the child was tasked with pressing a button on the left or right side of the screen depending on which direction the middle fish was facing (the outside fish could all be facing in the same or the opposite direction). In the second block (12 items), an image of five pink fish lined up would appear on the screen for a short amount of time. Now the child was tasked with pressing a button on the left or right side of the screen depending on which direction the outside fist was face (the middle fish could be facing in the same or the opposite direction as the outside fish). In the third block (45 items), images of blue fish or pink fish appeared on the screen, and the child was tasked with pressing the right a button on the left or right side of the screen according to the rules of the previous two rounds.

### C.3 Non-Cognitive Development

Measures of non-cognitive development were collected using the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997). The SDQ is a 25-item questionnaire with five items corresponding to each of five subscales capturing emotional problems, conduct problems, hyperactivity, peer problems, and prosociality. For each item, caregivers were asked how true a statement was of the child’s behavior over the past six months, selecting from “not true,” “somewhat true,” or “certainly true.” As examples, parents were asked to indicate how true it is that the child is “often unhappy, depressed, or tearful, ” or is “easily distracted, concentration wanders,” or is “kind to younger children.”

## C.4 Other Data Sources

### C.4.1 Integrated (I) Module

The Integrated (I) Module surveys took place from September 2018 to Jan 2020 (for KLPS respondents assigned to wave 1) and October 2020 to November 2021 (for KLPS respondents assigned to wave 2). The I module was usually administered to the KLPS respondent several weeks before the primary caregiver module and child assessments were completed. The present study primarily makes use of measures of psychological well-being (for new analyses) and educational attainment (to extend analyses in [Baird et al. \(2016\)](#)) from in the I module. This survey module was also used to collect information ranging from schooling, fertility, and migration histories, religious affiliation and political attitudes, and risk and time preferences.

### C.4.2 Earnings Plus (E+) Module

The Earnings Plus (E+) Module survey took place from July 2017 to May 2018 (wave 1) and July 2018 to July 2019 (wave 2), and collected detailed economic measures such as labor supply, earnings, and consumption. The present study primarily makes use of measures of earnings, consumption, and urban status in replications and extensions of results from [Hamory et al. \(2021b\)](#).

### C.4.3 Covid Phone Survey

A phone survey was conducted with from April to August 2020 by phone. Just under 80% of the non-deceased PSDP sample completed the phone survey, including some respondents who did not complete an I module survey nor the child-related surveys. Nearly 95% of households included in the intergenerational sample (those with children eligible for the presents study) completed a phone survey. The phone survey collected information on household composition (new members joining the household or former members leaving), travel patterns and interactions, child learning activity, household consumption (only administered to a random half of the sample), economic activity and food security, earnings, mental health, health, Covid-19 knowledge, and household and social relations. The present study primarily makes use of measures of household consumption, food security, experience of economic shocks, household composition, respondent mental health, and child learning activities from this Covid phone survey. (Measures of child learning activities correspond to a randomly-selected child in the household, not necessarily one of the children included in the present study.)