

When bootstraps aren't enough: aspirations, learning,
and educational supply in low-income contexts
formerly

*Do Higher Aspirations Lead to Greater Learning?
Evidence from West Africa and a Cautionary Tale About
the Standard Deviation*

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Motivation: low learning in pockets of extreme poverty

- Many children born today in these contexts will **grow up unable to read, complete basic arithmetic tasks**
- Crucial policy issue for human welfare, **inequality**

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- Many children born today in these contexts will **grow up unable to read, complete basic arithmetic tasks**
- Crucial policy issue for human welfare, **inequality**
- Existing work on **possible reasons / constraints to relax:**
 - ▷ Supply side: inputs, contracts, compensation, ...
 - ▷ Demand side: incentives, beliefs, customs, ...

Our paper focuses on understanding a key nexus:

{thoughts → actions → outcomes}

- **Research questions:**

- ▷ If caregivers in low-income contexts want to raise their children's learning levels, **how much learning can they bring about on their own?**
- ▷ Does the answer to this question **vary with the tool we use?**
- ▷ **Does providing more resources on the supply side change this relationship?**

Brief overview of study design

- **Setting:** small communities (villages) in rural Gambia
 - ▷ Learning levels are **very low**
 - ▷ People are **extremely income poor**
- Focus on **children entering primary school** and their caregivers
- **Large supply side intervention** randomly assigned to 50% of villages
 - ▷ Data collected as part of RCT reported in Eble et al., JDE 2021

Data from \sim 4,000 children, caregivers in 169 villages

- **Aspirations**, measured at baseline
 - ▷ **Educational**: that your child will go to college (0/1; mean 0.61)
 - ▷ **Career**: that child will work in urban area (0/1; mean 0.65)
- **Educational investment**:
 - ▷ Caregiver expenditure on child's schooling in year 3 (in Gambian Dalasis)
 - ▷ Enrollment in school in years 1, 2, 3 (0/1 variable for having been enrolled)
- **Learning**:
 - ▷ Raw test score on composite reading and learning tests (scale 0-100)
 - ▷ Literacy (0/1, see Fazio (r) Eble, et al. JPubE 2021)
 - ▷ Numeracy (0/1, see Fazio (r) Eble, et al. JPubE 2021)
 - ▷ Test scores on "subtasks" – measurement of individual skills (scale 0-100)

Answering research question 1

Research question: How do aspirations map onto educational investment and learning?

Estimating equation: $y_{ic} = \alpha_0 + \alpha_1 A_{t=0,ic} + \alpha_2 X_{t=0,ic} + \eta_r + \varepsilon_{ic}$

- y_{ic} – investment (expenditure, enrollment) and endline learning for child i
- $A_{t=0,ic}$ – baseline aspirations of caregiver for child i
- $X_{t=0,ic}$ – baseline demographic characteristics for child i
- η_r – region fixed effect (Lower River or North Bank)
- ε_{ic} – standard error clustered at “cluster of contiguous villages” level

Sample: control group only

Answering research question 2

Research question: How does the mapping of aspirations to learning change with a large increase in resources on the supply side?

Estimating equation:

$$y_{ic} = \beta_0 + \beta_1 T_c + \beta_2 A_{0ic} + \beta_3 T_i * A_{0ic} + \beta_4 X_{t=0,ic} + \eta_r + \varepsilon_{ic}$$

- y_{ic} – endline learning for child i
- $A_{t=0,ic}$ – baseline aspirations of caregiver for child i
- T_c – treatment status (assigned at the cluster level)
- $X_{t=0,ic}$ – baseline demographic characteristics for child i
- η_r – region fixed effect (Lower River or North Bank)
- ε_{ic} – standard error clustered at “cluster of contiguous villages” level

Sample: control and intervention groups

How baseline educational aspirations map onto subsequent educational investment

	(1) Educational expenditure	(2) Enrolled in school, year 1	(3) Enrolled in school, year 2	(4) Enrolled in school, year 3
Aspiration: child will go to college	72.72** (26.18)	0.051* (0.030)	0.059** (0.027)	0.006 (0.008)
Comparison group mean	609.42	0.804	0.780	0.966
Number of observations	1,915	2,164	2,053	1,968

Dependent variable in column heading

Mapping from baseline aspirations to endline test scores

	<i>Aspiration:</i>	
	(1)	(2)
	Child will attend university	Child will work in urban area
High caregiver aspirations at baseline	3.278*** (0.910)	3.792*** (0.658)
Comparison group mean	14.964	14.604
Number of observations	1,971	1,971

Dependent variable: endline test score (scale 0-100)

How does this compare to other studies?

- Similar or greater than all but three interventions highlighted in Kremer and Holla, Annual Review of Economics 2009
- Above the 90th percentile of the studies covered in Evans and Yuan, CGD WP 2020
- Similarly placed in other meta-analyses (McEwan 2014; Ganimian and Murnane 2016; Glewwe and Muralidharan 2016; ...)

What does this mean for learning?

- Does this large SD difference mean that aspirations are the key to greater learning in this context?
 - ▷ Not necessarily!
- It's hard to compare SDs across contexts (see Abhijeet Singh's excellent blog post)
- Instead, compare skills or some transformation thereof (e.g., LAYS)

The skills we study

<i>Reading</i>		<i>Math</i>	
<u>Subtask</u>	<u>Skill</u>	<u>Subtask</u>	<u>Skill</u>
1	Read a letter's sound (e.g., "eh" for e)*	1	Read a number (e.g., 1, 5, 22)
2	Differentiate sounds (e.g., which word starts with a different sound: book, dog, or boy)*	2	Choose the larger number (e.g., 7 or 5)
3	Read a made-up word (e.g., tob)	3	Complete a sequence (e.g., 2 4 6 __)
4	Read a familiar word (e.g., but)	4a	Simple addition (e.g., 3+2)
5a	Read a short passage	4b	Two- and three-digit addition (e.g., 38+26)
5b	Answer questions on the passage's content	5a	Simple subtraction (e.g., 5-3)
6	Listen to a different short passage, answer questions on the passage's content	5b	Two- and three-digit subtraction (e.g., 59-37)
		6	Solve a simple word problem read aloud

Transforming subtasks into literacy and numeracy measures

- Use measures of **key skills**
 - ▷ **Literacy**: the ability to read and understand written material
 - ▷ **Numeracy**: the ability to understand and manipulate groups of numbers
- **Measuring them with EGRA and EGMA tests**
 - ▷ Literacy: read “with good fluency” (45 words per minute) and can correctly answer 80% of reading comprehension questions
 - ▷ Numeracy: successfully identify numbers in sequence (e.g., 2, 4, __, 8) and correctly answer 80% of word problems

Mapping from baseline aspirations to endline **skill levels**

	<i>Aspires child will attend university</i>		<i>Aspires child will work in urban area</i>	
	(1)	(2)	(3)	(4)
	Literacy	Numeracy	Literacy	Numeracy
High caregiver aspirations at baseline	-0.001 (0.002)	0.002 (0.001)	-0.001 (0.004)	0.003 (0.004)
Comparison group mean	0.001	0.000	0.006	0.004
Number of observations	1,971	1,971	1,970	1,970

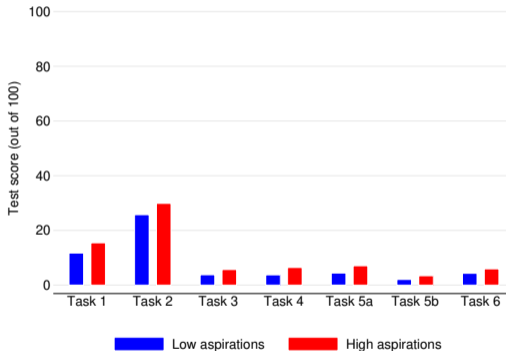
Dependent variable in column heading

Why we should use skill-based measures instead of the SD

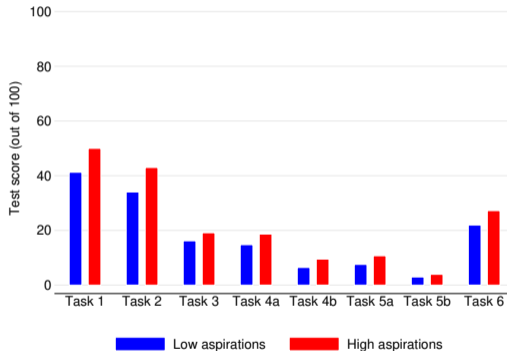
- **Natural inclination** to compare across contexts
- **Two big problems** with using the SD to make these comparisons:
 - ▷ At low learning, **small absolute gains are large relative gains**
 - ▷ **Skill gain** from a learning increment **varies by starting point**

How endline skills vary by baseline educational aspirations

Reading skills

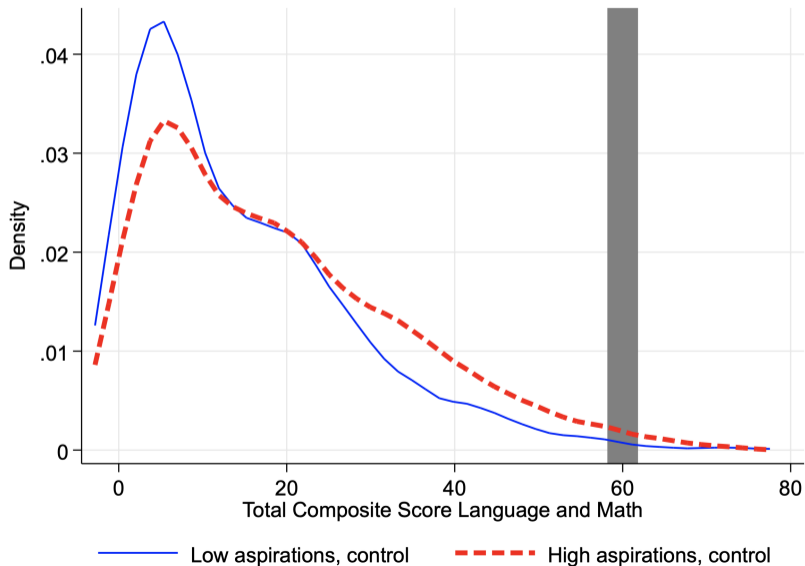


Math skills



Heterogeneity

Learning levels relative to literacy and numeracy



How adequate educational supply changes the aspirations–learning relationship

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- Children in intervention villages offered a bundled intervention providing after-school classes in grades 1-3
 - ▷ **Para-teachers** delivering **scripted lessons**
 - ▷ **Frequent monitoring** of teachers with **emphasis on teacher training, student learning**
 - ▷ **Highly-resourced**: more than \$200 per child per year
- **Highly impactful** - 3.2 SD gain in test scores after 3 years

**Does this change the mapping
from baseline aspirations to endline learning?**

The intervention greatly increases the ability of high aspirations families to help their children to literacy

	(1) Endline test score	(2) Child is literate	(3) Child is numerate
Baseline aspirations x intervention	0.39 (1.58)	0.06*** (0.02)	0.04* (0.02)
Aspirations	3.65*** (0.92)	-0.00 (0.00)	-0.00 (0.01)
Intervention	45.52*** (1.74)	0.23*** (0.02)	0.17*** (0.02)
Comparison group mean	14.96	0.00	0.01
Number of observations	3,814	3,814	3,813

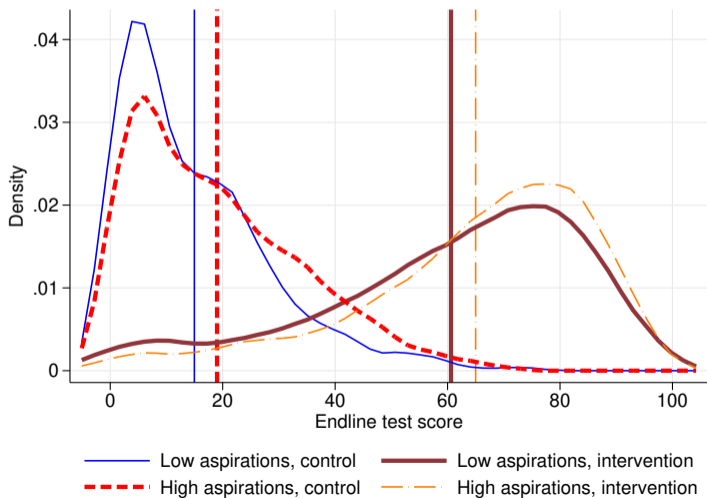
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Distribution of test scores, by educational aspirations and receipt of intervention



How educational aspirations and the intervention combine to change reading performance, by skill difficulty

	Subtask 1	Subtask 2	Subtask 3	Subtask 4	Subtask 5a	Subtask 5b	Subtask 6
Baseline aspirations x intervention	-1.745 (1.936)	-1.044 (2.057)	2.322 (1.885)	3.418 (2.223)	3.191 (2.122)	4.264** (2.075)	-0.651 (2.273)
Baseline aspirations	3.349** (1.276)	4.095*** (1.272)	1.648* (0.841)	2.421*** (0.841)	2.400*** (0.866)	1.226** (0.543)	1.052 (0.872)
Intervention	55.737*** (2.143)	24.628*** (2.082)	45.475*** (1.874)	57.575*** (2.227)	54.428*** (2.251)	42.227*** (2.075)	56.889*** (2.436)
Comparison group mean	37.820	37.261	25.238	30.705	29.915	21.682	31.135
Number of observations	3,683	3,683	3,683	3,683	3,683	3,683	3,683

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How educational aspirations and the intervention combine to change math performance, by skill difficulty

	Subtask 1	Subtask 2	Subtask 3	Subtask 4a	Subtask 4b	Subtask 5a	Subtask 5b	Subtask 6
Baseline aspirations x intervention	-5.304** (2.273)	-4.032* (2.242)	3.385* (1.729)	0.660 (1.955)	2.873 (2.194)	1.619 (1.880)	7.364*** (2.474)	-0.193 (2.031)
Baseline aspirations	7.462*** (1.983)	7.650*** (1.827)	2.276** (0.894)	3.431*** (1.070)	2.859*** (0.788)	3.070*** (0.811)	1.046 (0.681)	5.416*** (1.131)
Intervention	49.649*** (2.866)	49.716*** (2.786)	41.106*** (1.773)	46.540*** (2.128)	56.763*** (2.169)	39.007*** (1.611)	47.004*** (2.260)	26.923*** (1.972)
Comparison group mean	64.822	57.450	35.478	36.491	32.851	25.710	24.955	34.343
Number of observations	3,682	3,682	3,682	3,682	3,682	3,682	3,682	3,682

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Conclusion - two key messages

- **Message 1:** higher aspirations map onto greater investment ***but*** only generate greater learning when complementary inputs are also present
 - ▷ Families want and try to help their children on to better lives
 - ▷ ***Much*** higher returns to investment with adequate supply
- **Message 2:** when (not) to use the SD measure
 - ▷ It's tempting to compare SDs across contexts
 - ▷ If low baseline learning levels, large SD results don't necessarily mean meaningful skill gains
 - ▷ For cross-context comparisons, use skill-based measures