

Growth Mindset at Scale

Increasing school attainment by affecting the mindset of secondary students in Peru

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Overview

- We evaluate the impact of a psychosocial stimulation intervention - '**Grow Your Mind**' **Programme**- aimed at increasing the growth-mindset of students in Peru.
- The 'Grow Your Mind' intervention is highly **cost-effective and scalable**:
 - ▶ 'Grow Your Mind' consists of a single 1.5 hour session and requires no school visit or ad-hoc teacher training.
 - ▶ In 2015, we treated over 25,000 pupils in urban Peru at a cost of just \$0.2 per pupil.
- **Evidence**
 - ▶ We find significant improvements in Maths and Reading Comprehension, 2-months after the intervention.
 - ▶ Benefits are sustained over time - 14-months after intervention, there is no sign of dissipation.
 - ▶ Impact on individual tests scores are large - up to 0.30σ - both in Maths and Reading.

Literature

- "Self-theories of intelligence" (Dweck et. al, 1995; Dweck, 2006) classify students regarding their view over their own abilities:
 - ▶ Fixed Mindset - their abilities can not be changed - or a Growth Mindset - abilities are malleable.
- Students' self-theories affect the way student's respond to personal and academic challenges (Dweck et. al, 1995; Dweck, 2006).
 - ▶ Students with a growth mindset have been shown to be better motivated, work harder, use more effective learning strategies and overall have higher educational attainment.
 - ▶ More importantly, they respond with resilience and perseverance in the face of failure.

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 - ▶ More importantly, they respond with resilience and perseverance in the face of failure.
- Experimental studies have shown growth-mindsets can be changed (Blackwell et. al. (2007)), and can result in higher motivation, effort and ultimately increased educational attainment (Paunesku et. al. (2012); Yeager et. al. (2012))
- Moreover, returns to growth-mindset interventions have been found to be largest among vulnerable groups, such as ethnic minorities or low socio-economic groups (Aronson et. al., 2002, Good et. al., 2003).

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- Moreover, returns to growth-mindset interventions have been found to be largest among vulnerable groups, such as ethnic minorities or low socio-economic groups (Aronson et. al., 2002, Good et. al., 2003).
- However, most of the growth-mindset evidence is from the US, and from small samples.
- The present study is the first of its kind in a developing country and the first globally at such a scale.

Intervention: 'Grow Your Mind' Sessions

- The GYM sessions explain the science of the brain and the fact 'the brain works like a muscle - the more is exercised the stronger it grows'.
- **Two key components of the 'Grow Your Mind' intervention:**
 - 1 **The 'Grow Your Mind' teaching sessions** - lasting 1.5 hours and included the '**Grow Your Mind**' hand-out text.
 - 2 '**Grow Your Mind**' poster to be hanged in the classroom wall.

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- The session were structured as follows:
 - 1 Students read the '**Grow Your Mind**' hand-out text on the science of the brain.
 - 2 In groups they discussed the text and a number of discussion points.
 - 3 Finally, students were asked to write a short mentoring letter to a friend or family member explaining what they learned in the session.
- All sessions were led by local school teachers. The intervention did not require a school visit or ad-hoc teacher training.

'Grow Your Mind' Text

Puedes hacer crecer tu inteligencia

Nuevos estudios demuestran que el cerebro se desarrolla como un músculo

Mucha gente piensa en el cerebro como algo misterioso. No saben mucho sobre inteligencia ni sobre cómo funciona. Creen que las personas nacen con una inteligencia alta, regular o baja y que así se quedarán por el resto de su vida.

Pero las nuevas investigaciones demuestran que el cerebro funciona más bien como un músculo: Cambia y se hace más fuerte cuando lo usas. Los científicos han sido capaces de demostrar cómo exactamente es que el cerebro crece y se hace más fuerte cuando aprendes.

Todo el mundo sabe que, cuando levantas pesas, los músculos se hacen más grandes y se vuelven más fuertes. Una persona que cuando empieza a ejercitarse no puede levantar ni 10 kilos, puede terminar cargando 50 kilos después de haber entrenado por algún tiempo. Y cuando deja de ejercitarse, sus músculos se encogen y se vuelven débiles. Por eso la gente dice "o lo usas o lo pierdes".



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Pero lo que la mayoría de gente no sabe es que cuando uno practica y aprende cosas nuevas, partes de su cerebro cambian y se hacen más grandes, de forma similar a lo que sucede con los músculos cuando se hace ejercicio.



Una sección de la corteza cerebral. © Pearson

Dentro de la corteza cerebral hay miles de millones de pequeñas células nerviosas llamadas neuronas. Estas células nerviosas tienen ramas que las conectan con otras células, formando una complicada cadena. La comunicación entre estas células del cerebro es lo que nos ayuda a pensar y solucionar problemas.

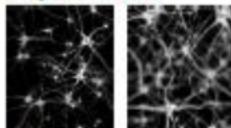


Una típica célula nerviosa. © Pearson

Cuando aprendes cosas nuevas, estas pequeñas conexiones en el cerebro literalmente se multiplican y se hacen más fuertes. Mientras más esfuerzos tu mente para aprender, más crecen tus células cerebrales. Luego, las cosas que tú en algún momento pensabas que eran muy difíciles o incluso imposibles de hacer (como hablar otro idioma o hacer álgebra) se vuelven sencillas. El resultado es un cerebro más fuerte e inteligente.

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Desarrollo de una conexión neuronal en un niño desde que nació hasta los 6 años



Al nacer

A los 6 años

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La verdad acerca de ser "tonto" y ser inteligente

Nadie piensa que los bebés son tontos sólo porque no pueden hablar. Simplemente no han aprendido cómo hacerlo hasta ahora. Pero algunas personas llaman a otras "tontas" si no pueden resolver problemas matemáticos, o deletrear una palabra correctamente, o leer rápido, incluso cuando estas cosas se aprenden con la práctica.

En un principio, nadie puede leer o resolver ecuaciones. Pero con la práctica, cualquiera puede aprender a hacerlo. Y mientras más aprende una persona, más fácil se le hace aprender cosas nuevas, porque sus "músculos" del cerebro se han vuelto más fuertes.

Los estudiantes que todo el mundo cree que son los "más inteligentes" puede que no hayan nacido distintos a cualquier otro. Pero antes de empezar al colegio, puede que hayan empezado a leer. Ya habían empezado a entrenar sus "músculos de lectura". Luego, en la clase, todos dijeron "ese es el estudiante más inteligente del salón".

Las personas no se dan cuenta que cualquiera de los otros estudiantes podría aprender a hacer las cosas tan bien si se ejercitaran y practicarán leyendo lo igual. Recuerda, todos esos otros estudiantes ya han aprendido cómo hablar al menos un idioma, algo que los adultos encuentran bastante difícil de lograr. Sólo tienen que entrenar sus "músculos de lectura".

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¿Qué puedes hacer para volverte más inteligente?

Tal como un levantador de pesas o un futbolista, para ser un atleta del cerebro, debes que ejercitarte y practicar. Al practicar haces que tu cerebro sea más fuerte. Además aprendes habilidades que te permiten usar tu cerebro de una forma más inteligente, de la misma forma que un futbolista aprende nuevas técnicas.

Pero mucha gente se pierde la oportunidad de hacer que su cerebro crezca y se haga fuerte porque creen que no lo pueden lograr o que es muy difícil. Por supuesto que toma trabajo, así como volverse más fuerte físicamente o volverse un mejor deportista toma trabajo. Muchas veces incluso puede ser doloroso. ¡Pero cuando sientes que te haces mejor y más fuerte, todo el trabajo valdrá la pena!

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'Grow Your Mind' Poster

Ejercita tu Mente – Mejora Tu Inteligencia

¡¡ Con Práctica y Esfuerzo Tu Puedes !!



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¡¡Expande tu Mente! Poster IV 2.

Photos of Sessions

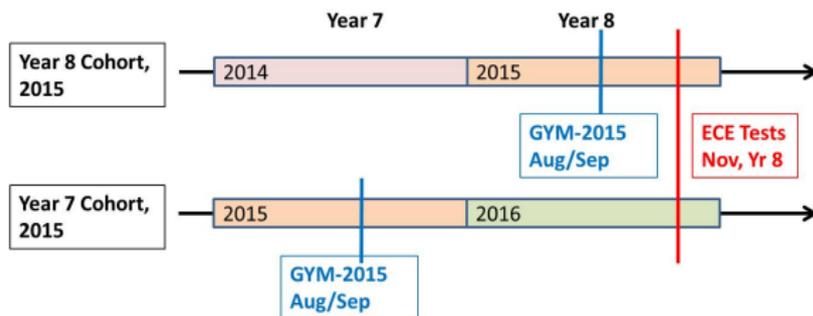


Study Design

- 800 Schools were randomly assigned to receive the Grow Your Mind Package: 400 treated and 400 control.
- Schools were instructed to implement the sessions **in all classrooms in Grades 7 and 8**. . There are two separate cohorts exposed to GYM in 2015:
 - ▶ Cohort 1: Year 8 in 2015
 - ▶ Cohort 2: Year 7 in 2015
- **Sampling and Assignment to Treatment:**
 - ▶ Schools were sampled in three adjacent regions: Lima, Ancash and Junin.
 - ▶ Lima versus Non-Lima regions were roughly equally powered.
 - ▶ Sampling frame was restricted to schools in the bottom-four quintiles of wealth.
 - ▶ Treatment was randomly assigned within 12 strata, identified by region and wealth quintile of the district.

	ANCASH	JUNIN	LIMA	All Regions
Control Schools	104	101	195	400
Eligible Schools	102	102	196	400
Total Nr Schools	206	203	391	800

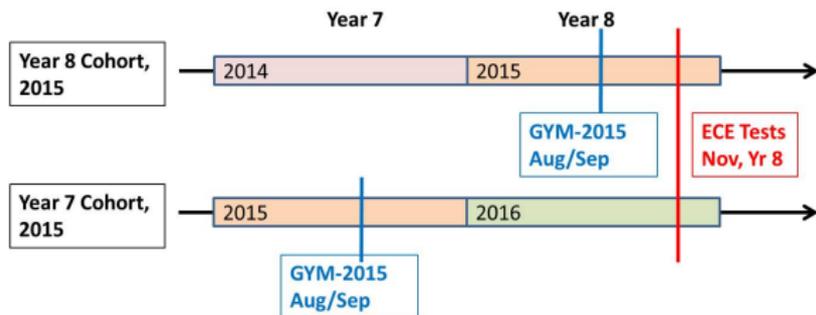
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- **Timing.**

- ▶ Schools were asked to implement sessions during August/September 2015.
- ▶ Every October, national test scores are administered to all Year 8 students.

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● Verification and Compliance.

- ▶ To ensure sessions took place, teachers were asked to take pictures and send them to a specifically created email address.
- ▶ Schools were also called via phone to remind and verify implementation.
- ▶ However, compliance was less than perfect:
 - ★ Of the 400 Eligible schools, only 340 received a parcel. Delivery service could not find remaining schools.
 - ★ 227 schools confirmed over the phone, and only 174 sent pictures for all classes !!!

Analysis

- Data:

- ▶ We rely exclusively on the National Census Evaluation (ECE) from Peru.
- ▶ The ECE is administered annually to all Year 8 students in the country.
- ▶ ECE collects Mathematics and Reading Test-scores, as well as some background information on students and teachers.

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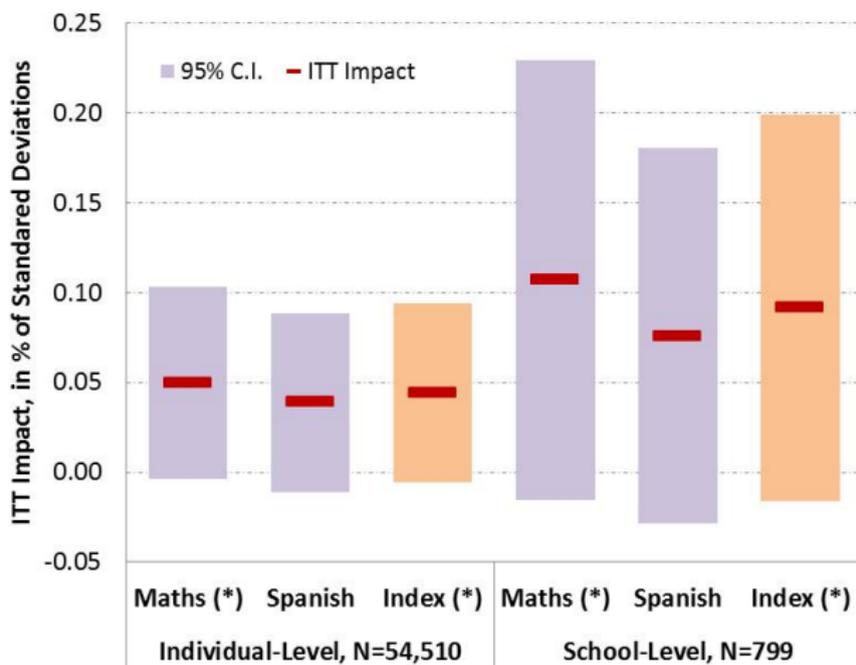
- We estimate the following equation to obtain ITT estimates for GYM impact:

$$y_{is} = \alpha + \beta * GYM_s + strata_v + X_s\gamma + \epsilon_s$$

- 1 y_{is} captures standardised Mathematics and Reading test scores.
- 2 GYM_s denotes eligibility status of school s
- 3 We include a set of 12 stratas, $strata_v$, to capture assignment probabilities.
- 4 Balancing tests are passed except for a couple of schools variables, X_s , which are added to the specification

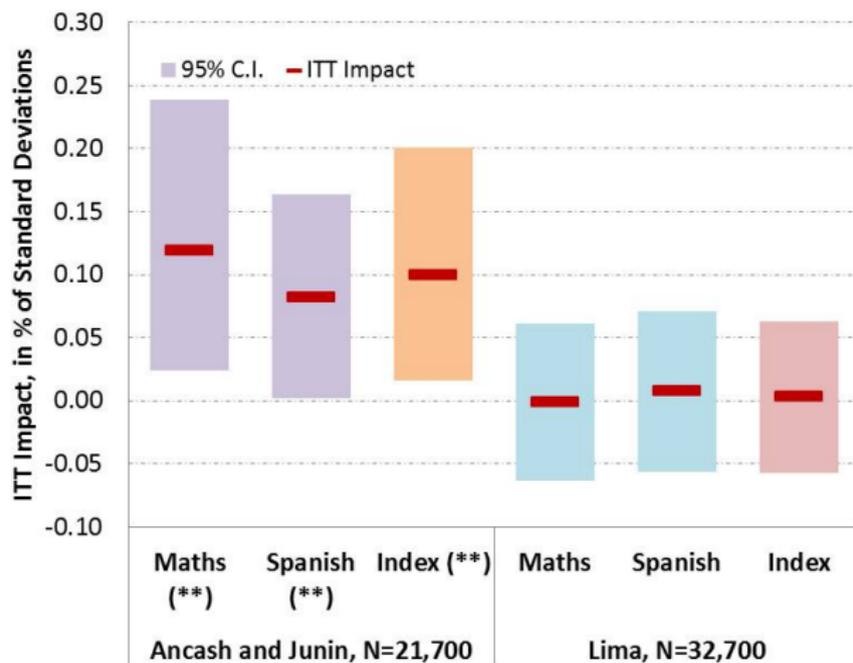
- 5 We apply IV/LATE estimates to correct for imperfect compliance.

ITT Impacts: Maths and Spanish Scores, in Standard Deviations



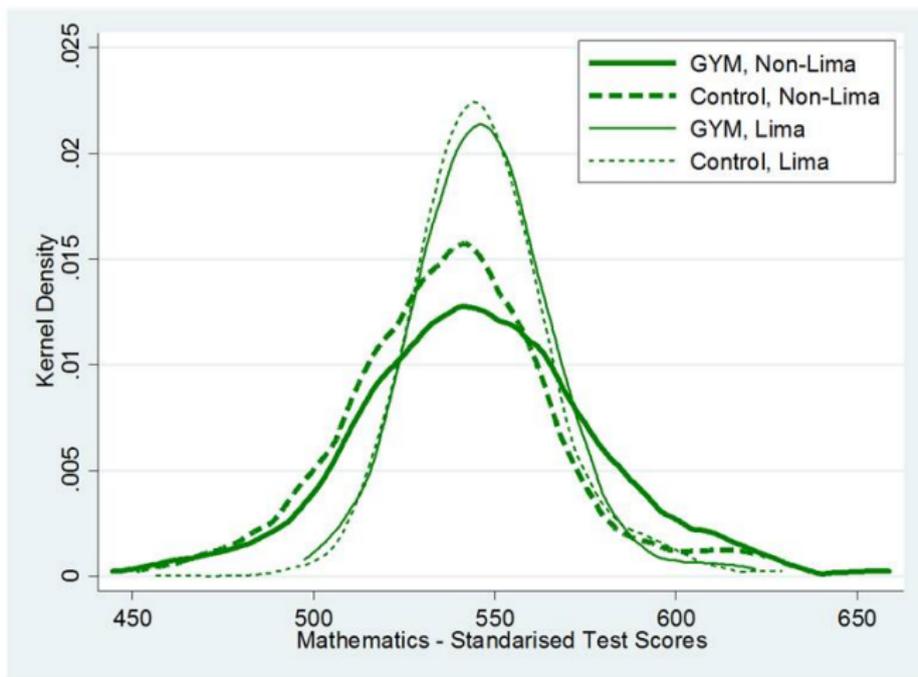
Notes: ITT impacts are in standard deviations of the control group. Index is the weighted sum of the Standardised Math and Spanish scores. 95% Confidence Intervals (CI) constructed using clustered standard errors at the school level. (*), (**), (***) denote significance at 10%, 5% and 1% levels.

Heterogeneity: Maths and Spanish Scores, by Lima and Non-Lima Regions



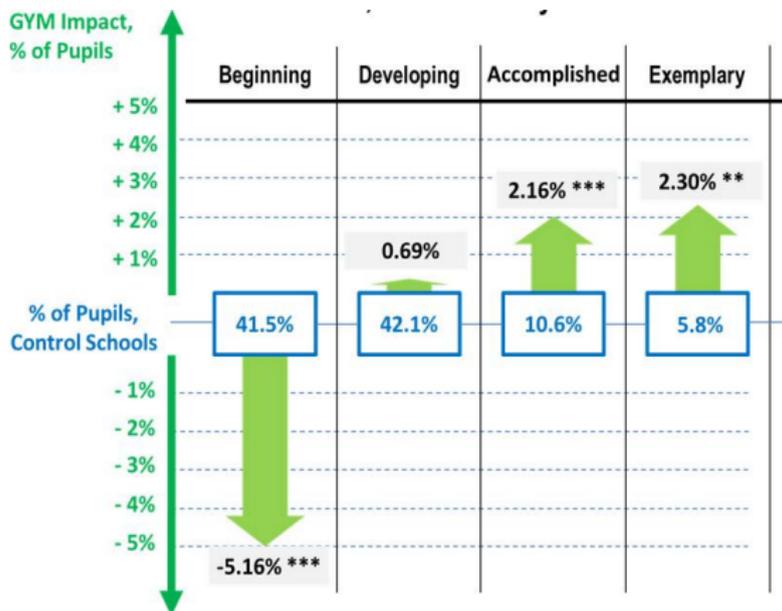
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Heterogeneity: Kernel Densities, School-Level data



- Lima schools are larger, more chaotic, but have higher levels of achievement.
- Intervention might not be as salient in that context.

Impact on Grade Prevalence, Non-Lima



- GYM also achieves grade progression both at top and bottom of distribution.
- Largest benefits are achieved among lower grades.

ITT and LATE: Full Results

- ITT estimates underestimate impact, due to imperfect compliance.
- We apply IV/LATE estimates to correct for incompliance.

		Individual Pupil Score				School-Average Score			
		Maths	Reading	Index	Nr Pupils	Maths	Reading	Index	Nr Schools
ITT	All Regions	0.050* [0.069]	0.039 [0.129]	0.044* [0.082]	54,510	0.107* [0.086]	0.076 [0.154]	0.092* [0.095]	799
	Non-Lima	0.119** [0.014]	0.082** [0.044]	0.100** [0.020]	21,700	0.204** [0.045]	0.115 [0.170]	0.159* [0.072]	408
LATE	All Regions	0.145* [0.074]	0.113 [0.134]	0.129* [0.087]	54,510	0.247* [0.086]	0.176 [0.154]	0.212* [0.095]	799
	Non-Lima	0.316** [0.020]	0.217** [0.050]	0.266** [0.026]	21,700	0.423** [0.044]	0.239 [0.170]	0.331* [0.071]	408

Notes: Impacts are in standard deviations of the control group. Index is the weighted sum of the Standardised Math and Spanish scores. Clustered standard errors at the school level reported in brackets. (*), (**), (***) denote significance at 10%, 5% and 1% levels.

Robustness and Further Evidence

- **Robustness Tests:**

- ① No evidence of increased selection of children in Exam Taking (ECE).
- ② No evidence of increased preparation to the test.
- ③ Compliance: As expected, the higher the level of compliance the higher the LATE impact effects.

- **Further Evidence:**

- ▶ Exploration of Mechanisms and Other Outcomes
- ▶ Short versus Medium-term impact: exploring the Year 7 (2015) cohort.

Mechanisms: Student and Teacher Beliefs

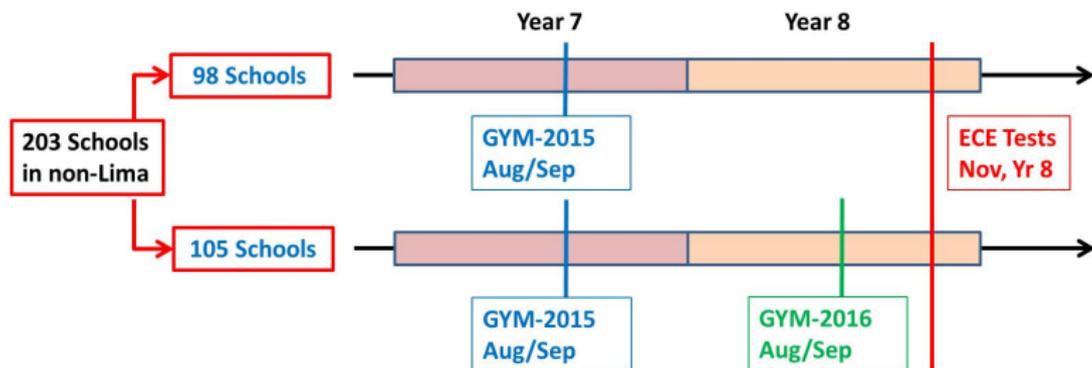
- There are a number of mechanisms through which GYM might be working.
- At least two: (a) changing the beliefs, mindsets and behaviour of students and/or (b) changing the beliefs, mindset and behaviour of teachers.
- ECE collects no information on growth-mindset, but has some measures on teacher and pupils beliefs:

		Pupil Beliefs		Teacher Behaviour		
		Education Expectations	Encouragement	Item: 'Encourages to Study'	Effort	Item: 'Asks for Arguments'
ITT	All Regions	0.025 [0.017]	0.012 [0.020]	0.014 [0.012]	0.029 [0.020]	0.031 ** [0.013]
	Non-Lima	0.053 * [0.029]	0.008 [0.030]	0.041 ** [0.021]	0.020 [0.029]	0.037 * [0.021]

Notes: Clustered standard errors at the school level reported in brackets. (*), (**), (***) denote significance at 10%, 5% and 1% levels.

Medium-Term Impact: Year 7 (2015) Cohort

- The evidence so far uses only Year 8 students in 2015 - and their tests scores 2-months later.
- Using the Cohort 2 - Year 7 students in 2015 - will allow us to test whether results are sustained over time.
- Moreover, in 2016, we implemented a re-enforcement (GYM-2016) in a sub-sample of 2015-treated schools outside Lima



Short and Medium-Term Impacts, Non-Lima regions

- GYM impacts are sustained 14-months after the intervention. There is little dissipation.
- Re-enforcement sessions had little impact.
- Mathematic impacts remain large, but Reading effects after 14-months are larger than the 2-month impacts.

		Mathematics			Reading		
		2-months	14-months	14-months	2-months	14-months	14-months
ITT	GYM 2015	0.119** [0.014]	0.101*** [0.049]	0.108* [0.063]	0.082** [0.044]	0.115*** [0.046]	0.103* [0.059]
	Re-inforced with GYM-2016			0.013 [0.074]			-0.023 [0.071]
LATE	GYM 2015	0.316** [0.020]	0.271** [0.140]	0.242 [0.154]	0.217** [0.050]	0.307*** [0.131]	0.321*** [0.149]
	Re-inforced with GYM-2016			0.060 [0.204]			-0.028 [0.199]

Notes: Results for Ancash and Junin only. ITT impacts are in standard deviations of the control group. Clustered standard errors at the school level reported in brackets. (*), (**), (***) denote significance at 10%, 5% and 1% levels.

Conclusions and Further Research

● Summary of Results

- 1 GYM Sessions can have substantial impacts on Maths and Reading test-scores - up to 0.30σ
- 2 Impacts are sustained over time - even without re-enforcement.
- 3 Biggest improvements in grades take place among less able students.
- 4 Moreover, GYM sessions change expectations of pupils and behaviour of teachers.

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● Psychosocial interventions, such as GYM, might prove to be highly cost-effective educational remediation tools.