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 0.30 $\sigma$ - both in Maths and Reading.
"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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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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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.
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 "lo uso o lo pierdo".

Una sección de la corteza cerebral © Picharsco

Dentro de la corteza cerebral hay miles de millones de pequeñas células nerviosas llamadas neuronas. Estas células nerviosas tienen ramos 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.

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.

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, cualquier persona 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.

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

¿Qué puedes hacer para volverte más inteligente?

Tal como un levantador de pesas o un futbolista, para ser un atleta del cerebro, tienes que ejercitarlo y practicarlo. Al practicar haces que tu cerebro sea más fuerte. Además puedes aprender habilidades que te permitan 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 pienses que te has hecho mejor y más fuerte, todo el trabajo valdá la pena!
Ejercita tu Mente – Mejora Tu Inteligencia

¡¡Con Práctica y Esfuerzo Tu Puedes!!

1. Meta. Proponte una nueva meta. Motivate. ¡¡Con esfuerzo tu puedes !!
2. Piensa, fijate y habla con otros sobre tu meta. Relacionala con lo que ya sabes.
3. Practica duro una y otra vez. Fijate en tus errores y céntrate en las partes más difíciles.
5. Tu cerebro está creciendo. Cada vez las cosas resultan más fáciles. Pero te sigues esforzando en aplicar tus nuevas habilidades a nuevas situaciones.

Recuerda “La práctica hace al maestro”
Intervention: ‘Grow Your Mind’ Sessions

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.

<table>
<thead>
<tr>
<th></th>
<th>ANCASH</th>
<th>JUNIN</th>
<th>LIMA</th>
<th>All Regions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Schools</td>
<td>104</td>
<td>101</td>
<td>195</td>
<td>400</td>
</tr>
<tr>
<td>Eligible Schools</td>
<td>102</td>
<td>102</td>
<td>196</td>
<td>400</td>
</tr>
<tr>
<td>Total Nr Schools</td>
<td>206</td>
<td>203</td>
<td>391</td>
<td>800</td>
</tr>
</tbody>
</table>
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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.

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

\[ y = \alpha + \beta \cdot \text{GYM} + \text{strata} + X \cdot \gamma + \epsilon \]

- \( y \) captures standardised Mathematics and Reading test scores.
- \( \text{GYM} \) denotes eligibility status of schools.
- We include a set of 12 stratas, \( \text{strata} \), to capture assignment probabilities.
- Balancing tests are passed except for a couple of schools variables, \( X \), which are added to the specification.
- We apply IV/LATE estimates to correct for imperfect compliance.
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\[ y_{is} = \alpha + \beta * GYM_s + strata_v + X_s \gamma + \epsilon_s \]

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Evidence

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.

(BSG, Oxford)
Heterogeneity: Maths and Spanish Scores, by Lima and Non-Lima Regions

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Lima schools are larger, more chaotic, but have higher levels of achievement.

Intervention might not be as salient in that context.
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.

<table>
<thead>
<tr>
<th></th>
<th>Individual Pupil Score</th>
<th>School-Average Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maths</td>
<td>Reading</td>
</tr>
<tr>
<td><strong>ITT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Regions</td>
<td>0.050*</td>
<td>0.039</td>
</tr>
<tr>
<td>Non-Lima</td>
<td>0.119**</td>
<td>0.082**</td>
</tr>
<tr>
<td><strong>LATE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Regions</td>
<td>0.145*</td>
<td>0.113</td>
</tr>
<tr>
<td>Non-Lima</td>
<td>0.316**</td>
<td>0.217**</td>
</tr>
</tbody>
</table>

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
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:

<table>
<thead>
<tr>
<th>Pupil Beliefs</th>
<th>Teacher Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Encourage-</td>
</tr>
<tr>
<td>Education</td>
<td>Encouragement</td>
</tr>
<tr>
<td>Expectations</td>
<td></td>
</tr>
<tr>
<td>ITT All Regions</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td>[0.017]</td>
</tr>
<tr>
<td>Non-Lima</td>
<td>0.053 *</td>
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<tr>
<td></td>
<td>[0.029]</td>
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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.

<table>
<thead>
<tr>
<th></th>
<th>Mathematics</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2-months</td>
<td>14-months</td>
</tr>
<tr>
<td>ITT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GYM 2015</td>
<td>0.119**</td>
<td>0.101***</td>
</tr>
<tr>
<td></td>
<td>[0.014]</td>
<td>[0.049]</td>
</tr>
<tr>
<td>Re-inforced with GYM-2016</td>
<td>0.013</td>
<td>[0.074]</td>
</tr>
<tr>
<td>LATE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GYM 2015</td>
<td>0.316**</td>
<td>0.271**</td>
</tr>
<tr>
<td></td>
<td>[0.020]</td>
<td>[0.140]</td>
</tr>
<tr>
<td>Re-inforced with GYM-2016</td>
<td>0.060</td>
<td>[0.204]</td>
</tr>
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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 0.30 $\sigma$
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.