

Perseverance in the classroom: results from a randomised educational intervention in primary schools in England

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Motivations

- Individuals with higher non-cognitive skills, such as self-control and perseverance, are more likely to graduate from high school, have higher rates of college attendance and completion, higher wages and better employment (Heckman et al. 2006, Carneiro et al. 2007, Gutman and Schoon, 2013).
- Research in economics and psychology shows that non cognitive skills are malleable in children and adolescents (Kautz et al, 2014; Alan et al, 2015; Alan et al, 2019).
- Can schools foster and improve non-cognitive skills of pupils?
Can they do it with young pupils?

Growth Mindset theory

- A student's belief in their abilities to learn is referred to as their academic mindset (Dweck, 2006).
- Students with a “fixed mindset” believe their intelligence is a fixed trait.
- Students with a “growth mindset” believe their intelligence can grow with effort and better strategies; challenges are not seen as obstacles but opportunities.
- Families and teachers can shape a young person's mindset through everyday verbal feedback (Mueller and Dweck, 1998).
- Interventions based on a precise psychological theory of mindset can shape young people beliefs about their abilities and raise school attainment (Paunesku et al., 2015; Yeager et al., 2016)

This study

- *What we do*

- * We study the effect of a randomised educational intervention based on the growth mindset theory.
- * The trial involved 100 primary schools in England
- * The subjects of the intervention are Year 6 pupils who are introduced to the idea of resilience, perseverance and incremental intelligence by their teachers over several sessions.

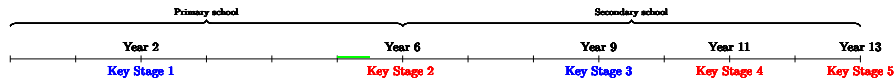
- *Findings*

- * Positive effect on the measure of pupil mindset.
- * No impact on numeracy and literacy.
- * No impact on non-cognitive skills.

Contribution

- Our work contributes to the economic literature on non-cognitive skills showing new results on whether schools can raise attainment by fostering resilience and perseverance in the classroom (Bettinger et al., 2018; Alan et al., 2019).
- Our results contributes to the growing literature on low-cost interventions in education that help students better perform in their school environment (Bonesrønning et al., 2021; Bettinger et al., 2012)
- Our work builds on the numerous growth mindset trials that exist in the psychology literature (Dweck, 2006; Yeager and Dweck, 2012) by studying how younger children exposed to a growth mindset intervention perform in a real-world task.

Institutional settings and timing of the intervention



National tests, externally marked

Teachers' evaluations

Intervention

Intervention I

- Year 6 teachers in schools in the intervention group attended a training in Sep/Oct 2016.
- The training introduced teachers to mindset theory and evidence and provided them tips for how to embed the approach in their classrooms.
- Teachers were given the material and training to run an 8 week programme (up 2.5 hours a week) of weekly lessons and activities with their pupils.
- Finally teachers were granted free access to online videos supplied by the Positive Edge Foundation; these videos were referenced in the lesson plans and teachers were encouraged to use the videos to explain or emphasize particular concepts such as resilience and learning from mistakes.

Intervention II



Changing Mindsets Project

Autumn Group:
September 2016

positive edge
education



Overview

1. Background

- Theories of intelligence
- Exploring the evidence (US and UK)

Refreshments (Marion Clist article)

2. How to promote a Growth Mindset

- Everyday practice

Lunch

3. How to promote a Growth Mindset

- Language and Praise

4. Growing Learners Mindset Intervention

- Evaluation tool
- Positive Edge Education
- 8-week pupil programme

Refreshments (scenarios)

5. Supporting Change and Next Steps

End and opportunity for questions

Evaluation Design

- The design of this study is a two-arm cluster randomised trial, with schools participating in the trial randomly assigned to either the intervention group or the control group.
- School level randomisation was chosen over class or pupil level to minimise the chance of contamination of control by treatment.
- The trial had a wait-list design with the aim of keeping the control schools engaged in the programme.
- All schools paid £500 and received the full training. Schools in the intervention group received their training in September/October 2016, while wait-list control schools received the training two academic terms later.
- Randomisation was carried out using block randomisation techniques, controlling for prior attainment at the school level and geographical area.

Recruitment

- The study was advertised on the Education Endowment Foundation website, on social media and by contacting schools via emails from National College of Teachers
- Schools were eligible if they had not used a systematic Growth Mindset approach with their future year 6 cohort and if they were able to attend the training dates.
- Interested and eligible schools were emailed a welcome pack.
- Schools entered the randomisation when they returned the headteacher consent and were revealed their allocation after sending confirmation that letters were sent to parents and the completed pre-treatment non-cognitive measures.
- All schools had to return non-cognitive measures collected a year later.

Timeline of the trial

Date	Activity
Jan 2016 -	Schools approached
Jan - May 2016	Schools recruited and agree to participate
May/July 2016	Pre-trial Mindset and MSLQ questionnaires
Jun-16	Schools randomly allocated to treatment/control group
Sep-16	Intervention group attended 1-day training event
Sept-Dec 2016	Intervention delivered in schools by intervention group
Sept 2016 – Feb 2017	Fidelity survey to treatment schools
Dec 2016 – Feb 2017	Fieldwork visits to 6 treatment schools
Jan-Feb 2017	End of project survey to treatment schools
Jun-17	Control group survey
May-17	Pupils sit Key stage 2 Exams
March/July 2017	Post-trial Mindset and MSLQ questionnaires
Jun-17	Control group attended 1-day training event
Autumn term 2017	Intervention delivered by control schools

Outcomes: test scores

- Scaled point scores (range 80 to 120) in Key Stage 2 National Assessment tests:
 - * Reading
 - * Grammar, Punctuation and Spelling
 - * Maths

Outcomes: mindset measure

- Mean score given to the following statements by pupils on 6-points scale (where 1 is "strongly disagree" and 6 "strongly agree"):
 - * "You have a certain amount of intelligence, and you really can't do much to change it."
 - * "Your intelligence is something about you that you can't change very much."
 - * "You can learn new things, but you can't really change your basic intelligence."

Outcomes: measures of learning strategies and academic motivation (Duncan and McKeachie, 2005)

- Mean score given to the 31 items in the following sub-scales by pupils on 7-points scale (where 1 is "strongly disagree" and 7 "strongly agree")
 - * Intrinsic Value: how the academic task is an aim;
 - * Self-efficacy: how a pupil judges the ability to accomplish an academic task;
 - * Test anxiety
 - * Self regulation: ability to plan their cognitive strategies to succeed in academic tasks.

- Administrative records on KS1 (Year 2) and KS2 (Year 6) test scores from the National Pupil Database.
- Non-cognitive measures collected by all schools before and after the intervention.

Internal Validity I

Baseline comparison at analysis - schools

	Intervention	Control	difference	(p-value)
Religious school	0.255	0.229	0.026	0.769
Academy	0.191	0.292	-0.100	0.259
Community school	0.532	0.438	0.094	0.363
Foundation school	0.064	0.146	-0.082	0.197
Voluntary aided	0.191	0.125	0.066	0.380
Ofsted: Outstanding	0.170	0.146	0.024	0.748
Ofsted: Good	0.723	0.750	-0.027	0.771
Ofsted: Satisfactory	0.085	0.083	0.002	0.976
Ofsted: Inadequate	0.021	0.021	0.000	0.988
Number of pupils	340.574	361.958	-21.384	0.474
% of Free School Meal	16.598	14.867	1.731	0.462
% SEN with support	12.593	13.061	-0.467	0.716
% SEN with statement	1.506	1.223	0.283	0.218
% English Additional Language	15.577	17.513	-1.936	0.675
<i>N</i>	<i>47</i>	<i>48</i>		

Internal Validity II

Baseline comparison at analysis - individuals

	Intervention	Control	difference	(p-value)
Female	0.480	0.493	-0.013	0.389
Ever FSM	0.367	0.346	0.021	0.142
Black	0.072	0.040	0.033	0
White	0.687	0.731	-0.044	0.001
Reading points (std)	-0.032	0.004	-0.036	0.236
Writing points (std)	0.007	-0.026	0.033	0.280
Maths points (std)	-0.013	0.002	-0.015	0.626
<i>N</i>	<i>2,122</i>	<i>2,209</i>		
Mindset measure	-0.014	0.009	-0.023	0.476
Intrinsic value	0.052	-0.032	0.084	0.010
Self-efficacy	0.047	-0.034	0.080	0.013
Anxiety	-0.022	0.022	-0.045	0.168
Self-regulation	0.048	-0.037	0.085	0.009
<i>N</i>	<i>1,759</i>	<i>2,034</i>		

Empirical strategy

- To test the null hypothesis that the programme had no impact on the outcome y , we estimate the average treatment effect by conditioning on baseline outcome measures and individual characteristics:

$$y_{is,t} = \beta_0 + \beta_1 T_s + \gamma y_{is,t-1} + X_i' \delta + \epsilon_{is,t}$$

Standard errors are clustered at the school level.

Results: cognitive outcomes

	(1)	(2)	(3)
	KS2 maths	KS2 reading	KS2 GPS
T	-0.028 (0.048)	-0.005 (0.040)	0.018 (0.046)
N	4,454	4,437	4,448
R^2	0.416	0.413	0.483

Results: cognitive outcomes - FSM

	(1)	(2)	(3)
	KS2 maths	KS2 reading	KS2 GPS
T	-0.030 (0.067)	0.021 (0.057)	-0.009 (0.068)
N	1,579	1,574	1,576
R^2	0.367	0.366	0.451

Results: cognitive outcomes - Fixed mindset

	(1)	(2)	(3)
	KS2 maths	KS2 reading	KS2 GPS
T	-0.017 (0.062)	0.033 (0.050)	0.022 (0.058)
N	2,525	2,510	2,522
R^2	0.355	0.387	0.444

Results: non cognitive outcomes

	(1)	(2)	(3)	(4)	(5)
	Mindset	Intrinsic	Self-efficacy	Anxiety	Self-regulation
T	-0.417*** (0.074)	0.100 (0.067)	-0.025 (0.058)	-0.016 (0.053)	0.077 (0.054)
N	2,902	2,917	2,916	2,916	2,899
R^2	0.139	0.273	0.275	0.235	0.231

Results: non cognitive outcomes - FSM

VARIABLES	(1) Mindset	(2) Intrinsic	(3) Self-efficacy	(4) Anxiety	(5) Self-regulation
T	-0.477*** (0.108)	0.136 (0.096)	-0.077 (0.085)	0.043 (0.073)	0.074 (0.084)
N	953	955	955	955	948
R^2	0.140	0.254	0.219	0.153	0.214

Qualitative Analysis

- Fieldwork visits to a small number of treatment schools that included: interviews with teachers, focus groups with pupils and observation of three lessons.
- End of project survey administered to treatment and control schools.
- Findings:
 - * Good fidelity with limited deviations from the expected delivery. Good buy-in from teachers.
 - * The programme was well received by teachers and pupils.
 - * Interviews and focus groups with children revealed a good level of understanding of the main messages.
 - * Ubiquitous nature of growth mindset messages.

Discussion

- We consider three possible explanations for the lack of impact of the intervention:
 - * The programme was not delivered as intended.
 - * Control and treatment schools were already using growth mindset messages to some degree.
 - * Pupils were too young to embed the main messages and self direct their learning in and out of school.

Conclusions

- In this paper we study the effect of a Growth Mindset intervention carried out in primary schools in England.
- This intervention partly differs from previous studies: the subjects here are younger pupils who are introduced to the idea of incremental intelligence by their teachers over several sessions.
- We find no impact on literacy and numeracy overall.
- We find no impact on non-cognitive outcomes.

Thank you very much!

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References

- Alan, S., Boneva, T., and Ertac, S. (2019). Ever failed, try again, succeed better: Results from a randomized educational intervention on grit. *The Quarterly Journal of Economics*, 134(3):1121–1162.
- Bettinger, E., Ludvigsen, S., Rege, M., Solli, I. F., and Yeager, D. (2018). Increasing perseverance in math: Evidence from a field experiment in norway. *Journal of Economic Behavior & Organization*, 146:1–15.
- Bettinger, E. P., Long, B. T., Oreopoulos, P., and Sanbonmatsu, L. (2012). The role of application assistance and information in college decisions: Results from the h&r block fafsa experiment. *The Quarterly Journal of Economics*, 127(3):1205–1242.
- Bonesrønning, H., Finseraas, H., Hardoy, I., Iversen, J. M. V., Nyhus, O. H., Opheim, V., Salvanes, K. V., Jorde, A. M., and Sandsør, P. S. (2021). Small group instruction to improve student performance in mathematics in early grades: Results from a randomized field experiment.
- Duncan, T. G. and McKeachie, W. J. (2005). The making of the motivated strategies for learning questionnaire. *Educational psychologist*, 40(2):117–128.
- Dweck, C. (2006). *Mindset: The New Psychology of Success*. Random House, New York.
- Mueller, C. M. and Dweck, C. S. (1998). Praise for intelligence can undermine children’s motivation and performance. *Journal of personality and social psychology*, 75(1):33.
- Paunesku, D., Walton, G. M., Romero, C., Smith, E. N., Yeager, D. S., and Dweck, C. S. (2015). Mind-set interventions are a scalable treatment for academic underachievement. *Psychological science*, 26(6):784–793.
- Yeager, D. S. and Dweck, C. S. (2012). Mindsets that promote resilience: When students believe that personal characteristics can be developed. *Educational psychologist*, 47(4):302–314.
- Yeager, D. S., Romero, C., Paunesku, D., Hulleman, C. S., Schneider, B., Hinojosa, C., Lee, H. Y., O’Brien, J., Flint, K., Roberts, A., et al. (2016). Using design thinking to improve psychological interventions: The case of the growth mindset during the transition to high school. *Journal of educational psychology*, 108(3):374.