The Role of Mindset in Education: a Large-Scale Field Experiment in Disadvantaged Schools

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Plan

1. Introduction
2. The program
3. Experimental Design
4. Data and empirical strategy
5. Results
6. Conclusions

Motivation

Why do students perform so differently?

- Important literature on *external* factors
  - School inputs: class size, teacher salary, teacher experience
  - Peer effects within the class, school, and neighborhood
  - Family: inherited intelligence, parental involvement
- More recent interest in *internal* factors, i.e. students' psychology (or mindset)
- How adolescents think about their chance of success and returns to effort may be just as important for schoolwork and learning as external factors

Motivation

- The US and UK governments have launched programs to develop student character
- The French blind spot? PISA 2012:
  - Self-esteem: France 62 / 65
  - Anxiety: France 62 / 65
  - Internal locus of control: France 58 / 65
  - Perseverance: France 63 / 65
  - Self-discipline: France 60 / 65
  - Growth mindset (2018): 46% of french students think that intelligence can change, 60% in the US

Motivation

Mindset issues may be more pronounced in disadvantaged students

- In France, students overestimate the influence of SES on future success in high school (Guyon and Huillery 2021)
- Low-SES students have a 0.15 SD lower academic self-esteem than their high-SES equally-achieving classmates
- The same patterns are found in 6 OECD countries using PISA 2018 (Barone et al. 2020)
- Behavioral poverty trap: low aspirations => low effort => low school outcomes

This paper

- Uses a large-scale field experiment to test a light-touch intervention in middle school to increase the perceived return to effort:
  - Internal locus of control
  - Growth mindset
- Research questions:
  - Is it possible to train character skills in adolescents?
  - Is it sufficient to induce changes in behavior and school outcomes?

Preview of the results

- We find positive and significant impacts on:
  - Students' mindset and perceived return to effort
  - Behavior in class
  - GPA and aspirations
- These impacts are driven by girls and by well-behaved students
- Small effect sizes, but fantastic returns

Contributions to the literature

- Correlation between non-cognitive skills and educational or professional outcomes: Heckman et al. 2006, Almlund et al., 2011; Dohmen et al., 2011; Golsteyn et al., 2014
- Cocktails of actions including non-cognitive skills: Heckman et al. 2010 and 2013, Chetty et al. 2011, Durlak et al. 2011
- Only a few experimental papers on students' mindset: Paunesku et al. 2015, Alan et al. 2018, Alan et al. 2019, Yeager et al. 2020
  - We provide rich and precise channels of causality
  - Longer term impacts on real-life educational outcomes
  - Ecological setting, large number of schools and facilitators

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The Program "Energie Jeunes"

- Objective: prevent school drop-out in disadvantaged schools by developing students' motivation and engagement
- Consists of three 55-minute class interventions per year, from Grade 6 to Grade 9
- Led by the association's volunteers and speakers from the professional world
- The interventions are built around videos, activities and personal stories

The Program "Energie Jeunes"

The Program "Energie Jeunes"

How does the program aims to develop motivation and engagement?

1. Internal *versus* external locus of control
   - Downplaying the importance of external constraints
   - Making the role of effort stand out
2. Growth versus fixed mindset
   - The brain is highly plastic and grows stronger when it experiences dedicated schoolwork
   - Failures are temporary and signal a learning opportunity

=> Increases the perceived return to effort

The Program "Energie Jeunes"

- Each year during the second session, students are asked to make a commitment that they record in an individual engagement journal
- Examples of such commitment include: work more, be attentive in class, homework comes before video games, etc
- During the third session, students assess whether they were able to honor their commitment

Plan

Experimental Design

Sampling strategy

- 97 middle schools from 7 academic districts
  - Eligibility: disadvantaged schools (80% Priority Education)
  - School staff is volonteer
- Sampled schools are in fact representative of Priority Education schools
  - 78% blue collar family (63% at the national level)
  - 49% receive need-based financial aid (25% at the national level)
  - 26% lower performance in maths at the Grade 9 national exam wrt national av.

Experimental Design

- We randomized two cohorts within schools:
  - In half of the schools, 2014 Grade 6 are treated for four years, while 2015 Grade 6 are not
  - In the other half, 2015 Grade 6 are treated for four years, while 2014 Grade 6 are not

Experimental Design

		School A	School B
1st year (2014/2015)	Grade 6	Energie jeunes	Control
	Grade 7		
	Grade 8		
	Grade 9		
2nd year (2015/2016)	Grade 6	Control	Energie jeunes
	Grade 7	Energie jeunes	Control
	Grade 8		
	Grade 9		
3rd year (2016/2017)	Grade 6		
	Grade 7	Control	Energie jeunes
	Grade 8	Energie jeunes	Control
	Grade 9		
4th year (2017/2018)	Grade 6		
	Grade 7		
	Grade 8	Control	Energie jeunes
	Grade 9	Energie jeunes	Control
5th year (2018/2019)	Grade 6		
	Grade 7		
	Grade 8		
	Grade 9	Control	Energie jeunes

Experimental Design

Student samples

	Grade 6	Grade 7	Grade 8	Grade 9
Full	24,142	23,095	24,349	24,532
Treatment	11,914	11,330	12,070	11,999
Control	12,228	11,765	12,279	12,533

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Data Sources

1. Administrative data from school registers (full sample)
   - GPA
   - School behavior: absences, lateness, sanctions, disciplinary actions
   - Socio-economic status, gender
2. Student survey (random sub-sample of seven students per class)
3. Teacher survey (same student sub-sample):
   - KIPP Character Report Card for each surveyed student

Outcomes of interest

(1) Perceived return to effort

- Growth mindset
  - Intelligence is something that can't be changed (Claro et al 2016)
  - I prefer problems that I'll learn a lot from (Li and Bates 2017)
  - Prob. of success if gifted but does not study hard / if study regularly (Guyon and Huillery 2020)
- Locus of control
  - Prob. of success if from advantaged / disadvantaged neighborhood (idem)
  - Prob. of success if parents with / without college degree (idem)

Outcomes of interest

(2) Behavior

- Self-reported diligence
  - Orderliness (Goldberg et al. 1990)
  - Grit (Duckworth and Quinn 2009)
  - Schoolwork impulsivity (Tsukayama 2013)
  - Work discipline (Goldberg 2006)
  - Homework management (Xu 2013)
  - Time spent doing homework (the authors)

Outcomes of interest

(2) Behavior

- Teacher-reported character (Park et al. 2017)
  - Social character: peer conflicts and popularity
  - Intellectual character: participation in class, curiosity
  - Achievement character: grit, optimism, self-control
- School-reported behavior
  - Absences
  - Lateness
  - Sanctions (e.g. detention)
  - Disciplinary actions (e.g. expulsion)

Outcomes of interest

(3) Academic outcomes and life choices

- Aspirations
  - Educational aspirations: academic, technical or vocational high school
  - Career aspiration: preferred job => hand-coded into low, medium, or high-skilled job
- GPA

Balance checks

	G6 sample		G7 sample		G8 sample		G9 sample	
	C	Impact	C	Impact	C	Impact	C	Impact
Panel A: Full Sample								
Date of Birth	2003.30	-0.000	2003.29	0.004	2003.27	0.006	2003.26	-0.004
	[0.664]	(0.005)	[0.667]	(0.005)	[0.690]	(0.005)	[0.716]	(0.006)
Female	0.489	0.004	0.492	0.005	0.489	0.008	0.489	0.007
	[0.500]	(0.005)	[0.500]	(0.006)	[0.500]	(0.005)	[0.500]	(0.006)
Was held back	0.185	-0.001	0.188	-0.005	0.203	-0.004	0.217	-0.000
	[0.389]	(0.004)	[0.391]	(0.004)	[0.402]	(0.004)	[0.412]	(0.005)
Financial aid	0.504	0.013	0.520	-0.028***	0.476	0.012	0.444	-0.002
	[0.500]	(0.008)	[0.500]	(0.008)	[0.499]	(0.008)	[0.497]	(0.005)
Single parent family	0.178	-0.007	0.173	-0.007	0.182	-0.008**	0.195	-0.011
	[0.382]	(0.005)	[0.378]	(0.004)	[0.386]	(0.004)	[0.396]	(0.008)
Blue collar family	0.766	-0.013***	0.761	-0.009**	0.758	-0.012***	0.743	-0.012***
	[0.424]	(0.005)	[0.426]	(0.004)	[0.429]	(0.004)	[0.437]	(0.004)
Foreigner	0.125	0.003	0.134	-0.002	0.150	-0.003	0.141	0.002
	[0.331]	(0.004)	[0.341]	(0.003)	[0.357]	(0.003)	[0.348]	(0.005)
Top half baseline GPA	0.498	0.003	0.497	0.005	0.497	0.005	0.516	0.007
	[0.500]	(0.006)	[0.500]	(0.006)	[0.500]	(0.006)	[0.500]	(0.006)
Baseline GPA	13.176	0.020	13.310	0.024	13.346	0.028	13.474	0.047
	[2.676]	(0.039)	[2.589]	(0.040)	[2.571]	(0.038)	[2.527]	(0.039)
Top half baseline behavior	0.525	-0.028***	0.516	-0.031***	0.528	-0.024**	0.533	-0.018*
	[0.499]	(0.009)	[0.500]	(0.010)	[0.499]	(0.010)	[0.499]	(0.010)
Baseline behavior (-)	-0.011	0.022*	-0.009	0.021	-0.008	0.010	0.001	0.002
	[0.637]	(0.012)	[0.614]	(0.013)	[0.622]	(0.013)	[0.618]	(0.013)

Attrition

- Minimal attrition in the administrative data (0-4%)
- 6% to 21% attrition rates in the student survey sample
- 23% to 39% attrition rates in the teacher survey sample
- All balanced across T and C, and final samples are identical to original ones

Estimation strategy

- Intention-to-treat estimates

$$Y_{iscj} = \alpha_j + \beta_j T_{sc} + \theta_s + \theta_c + \epsilon_{iscj}$$

- Y: outcome of student i in school s, cohort c, grade j
- School and cohort fixed effects
- Standard errors clustered at the school*cohort level

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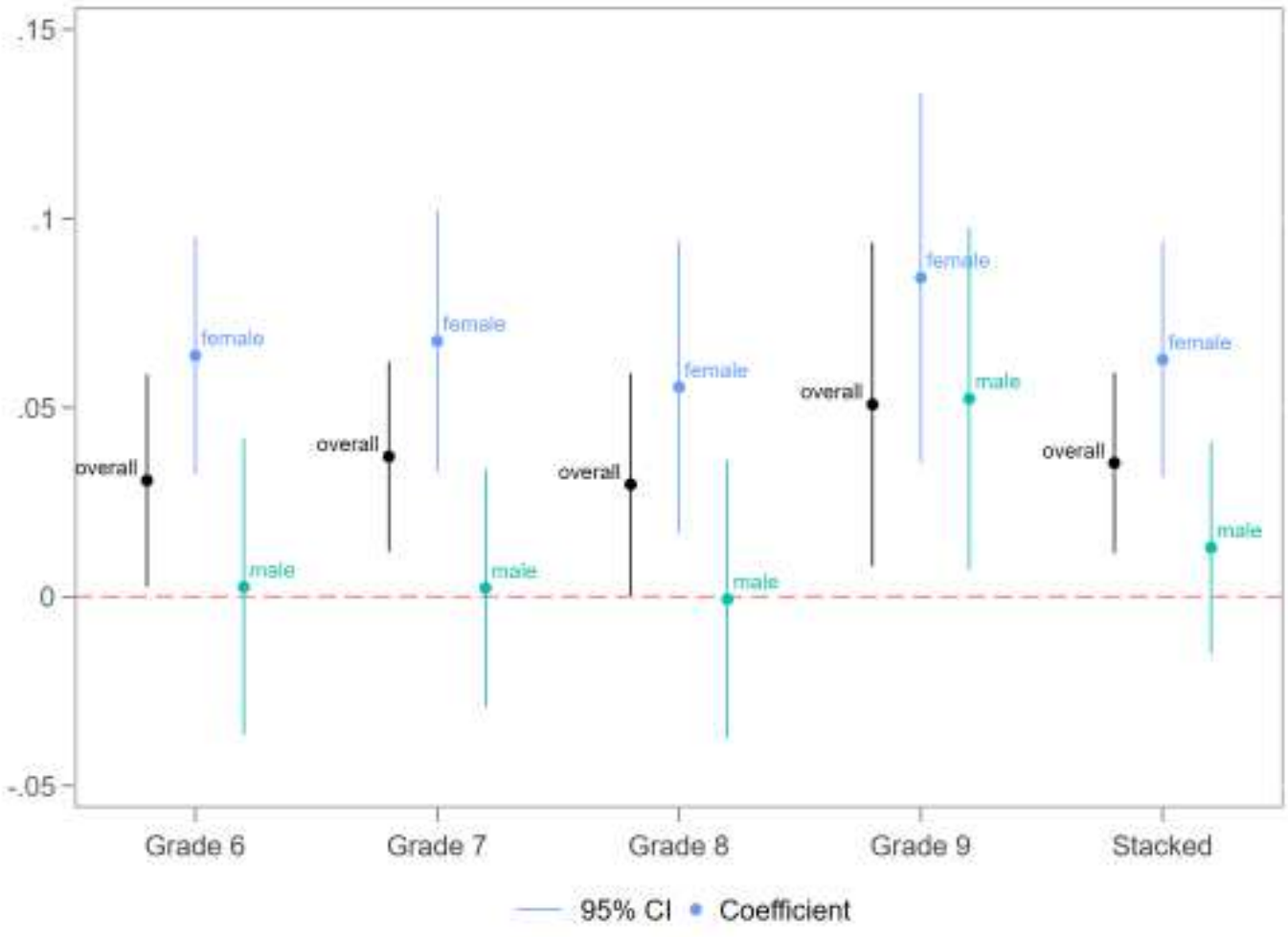
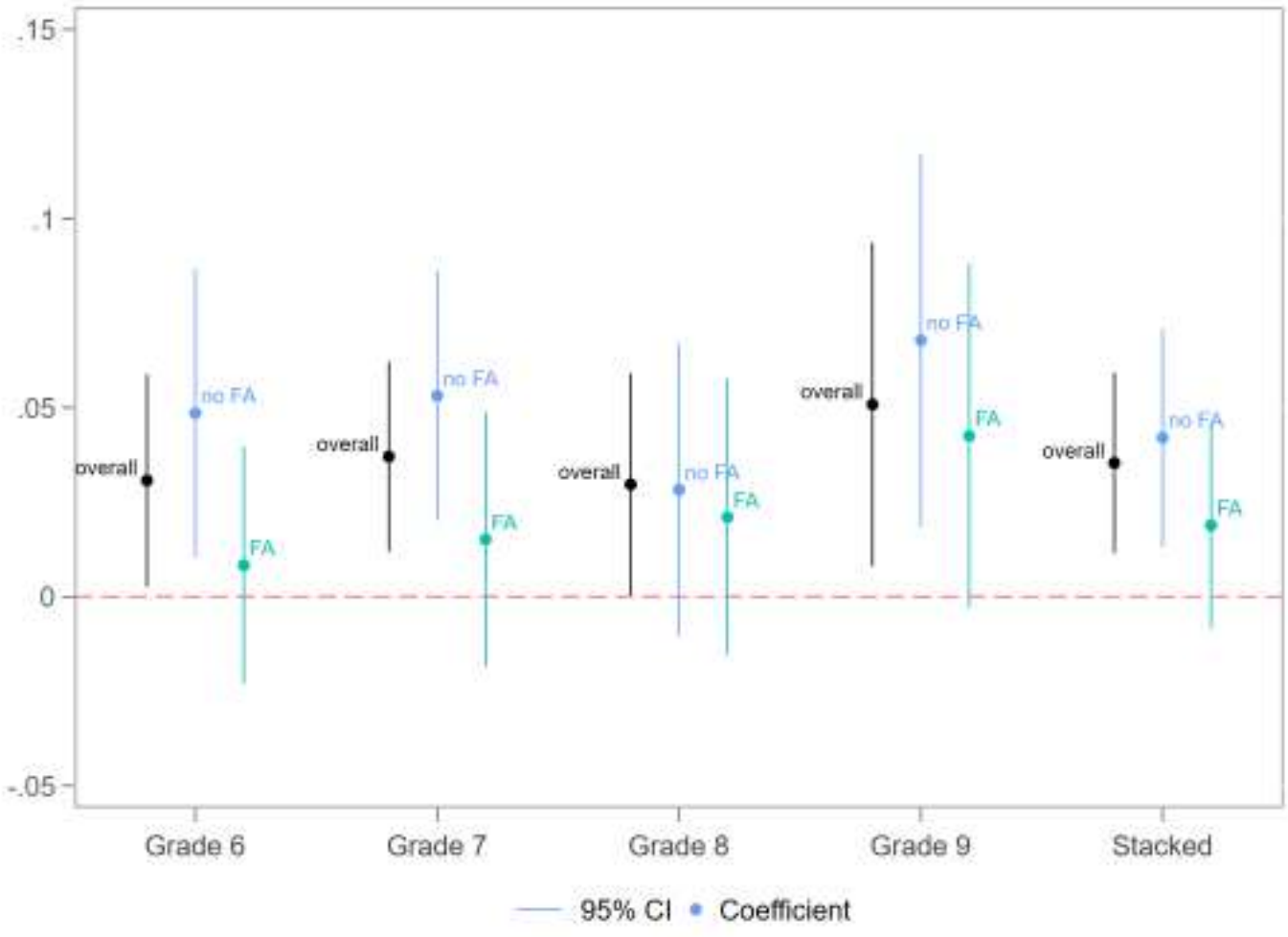
Results: impact on GPA

by gender



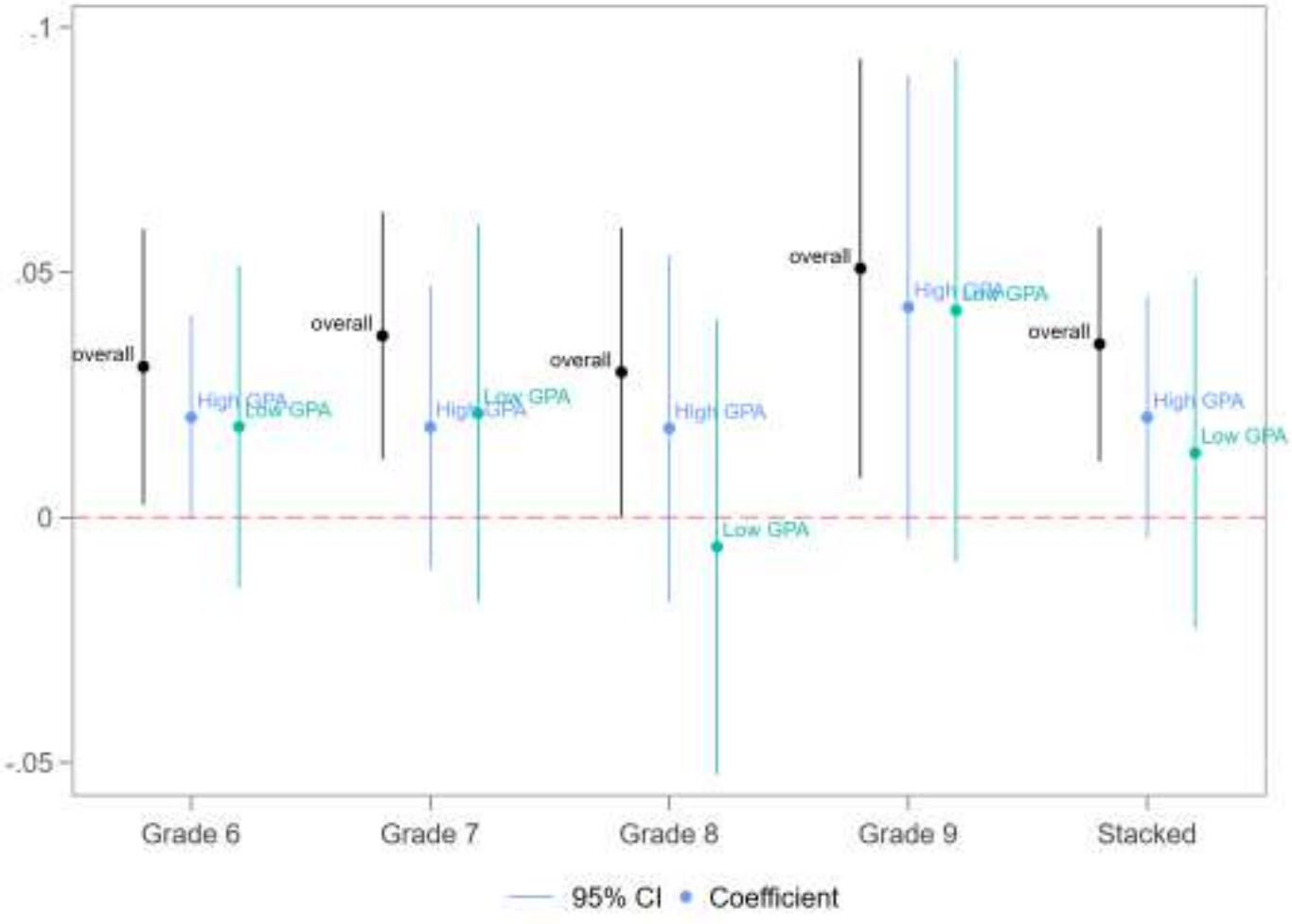
Results: impact on GPA

by socioeconomic background



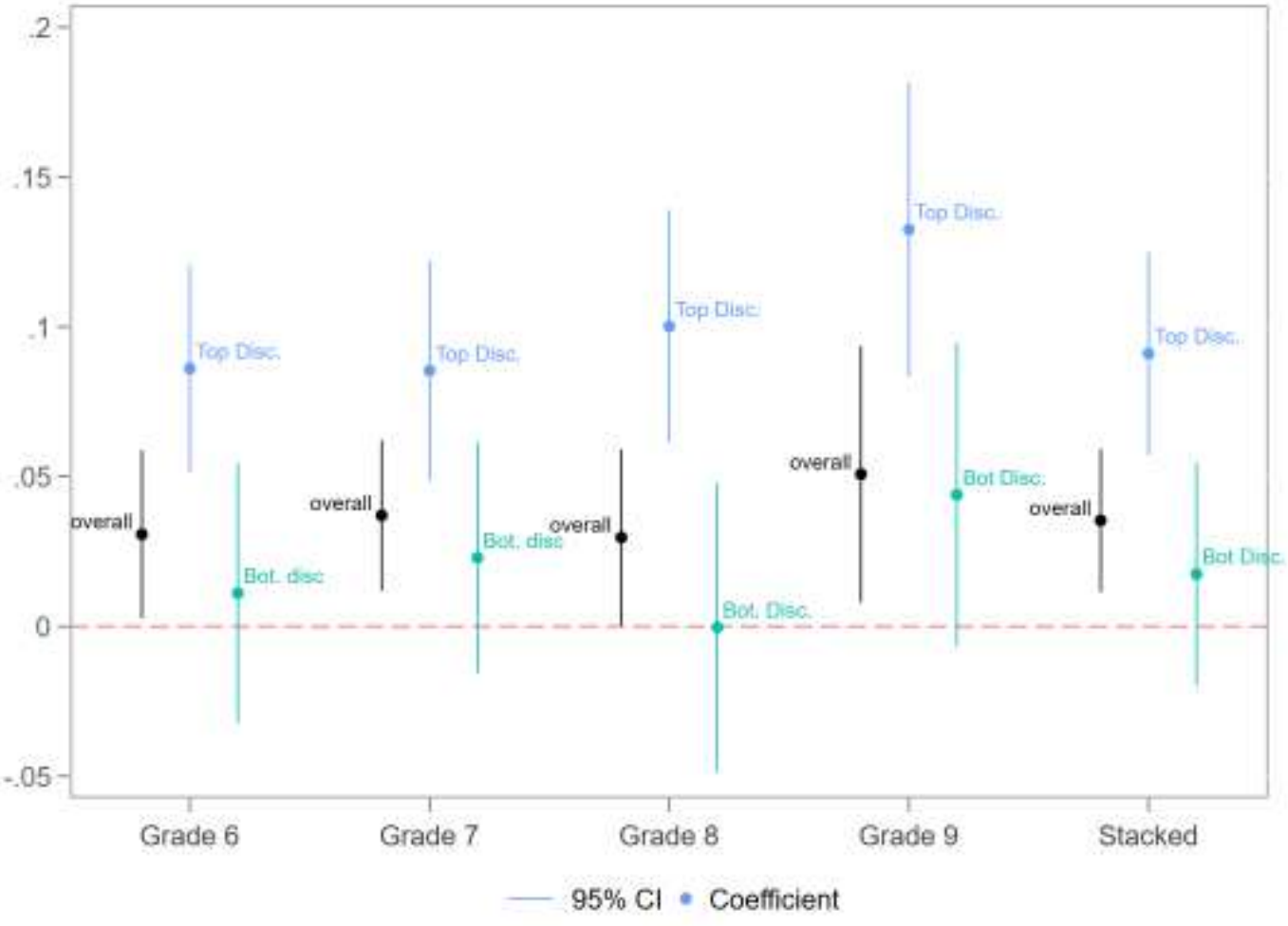
Results: impact on GPA

by baseline academic performance



Results: impact on GPA

by baseline school behavior



Summary of the impacts on GPA

- Positive and significant impact on GPA, +7% of a standard deviation
- Driven by girls +9% sd) and well-behaved students (+13% sd)
- The impact increases over time +5%, +5%, +3% resp. in Grade 6, 7 and 8
  - Even boys and bad-behaved' GPA improved in Grade 9

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=> **Is the program worth the risk?**

Cost-effectiveness

	Cost per student	Impact (% sd)	Cost for a 1pp sd impact
Energie Jeunes (4 years)	**60 EURO**	**7%**	**12 EURO**
Energie Jeunes, including volunteer wage (4 years)	260 EURO	7%	52 EURO
50% class size reduction, French 2017 reform (DEPP report, 2019)	4,000 EURO	10%	400 EURO
50% class size reduction, international lit review (Bouguen et al. 2017)	4,000 EURO	30%	133 EURO
Boarding schools for disadvantaged stud. (2 years, maths) (Behaghel et al. 2013)	20,000 EURO	41%	488 EURO

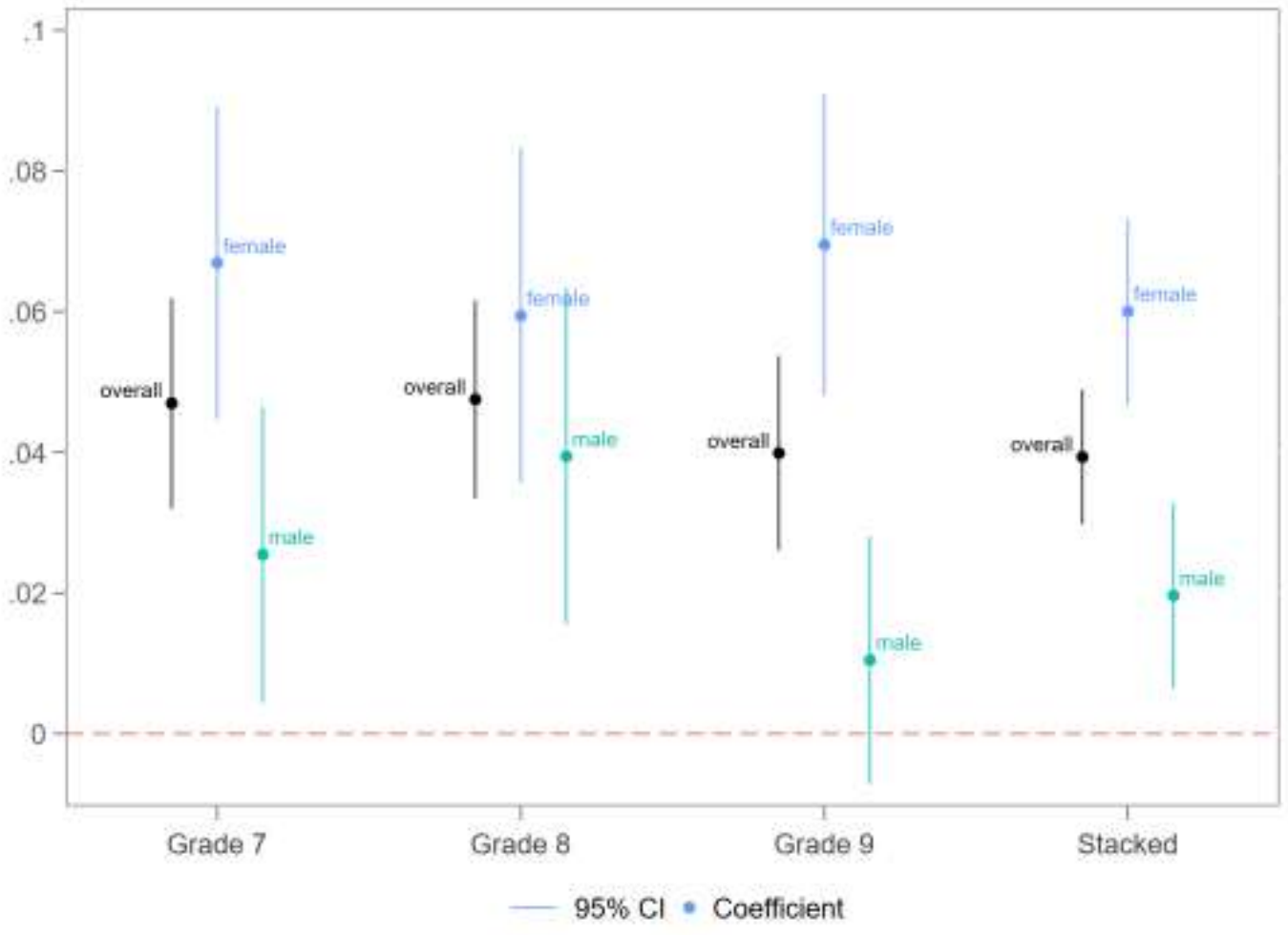
Mechanisms

What happened in girls and well-behaved that did not happen in boys and bad-behaved?

- Changes in perceived return to effort?
- Changes in behavior?
  - Self-reported
  - Teacher-reported
  - School-reported
- Changes in aspirations?

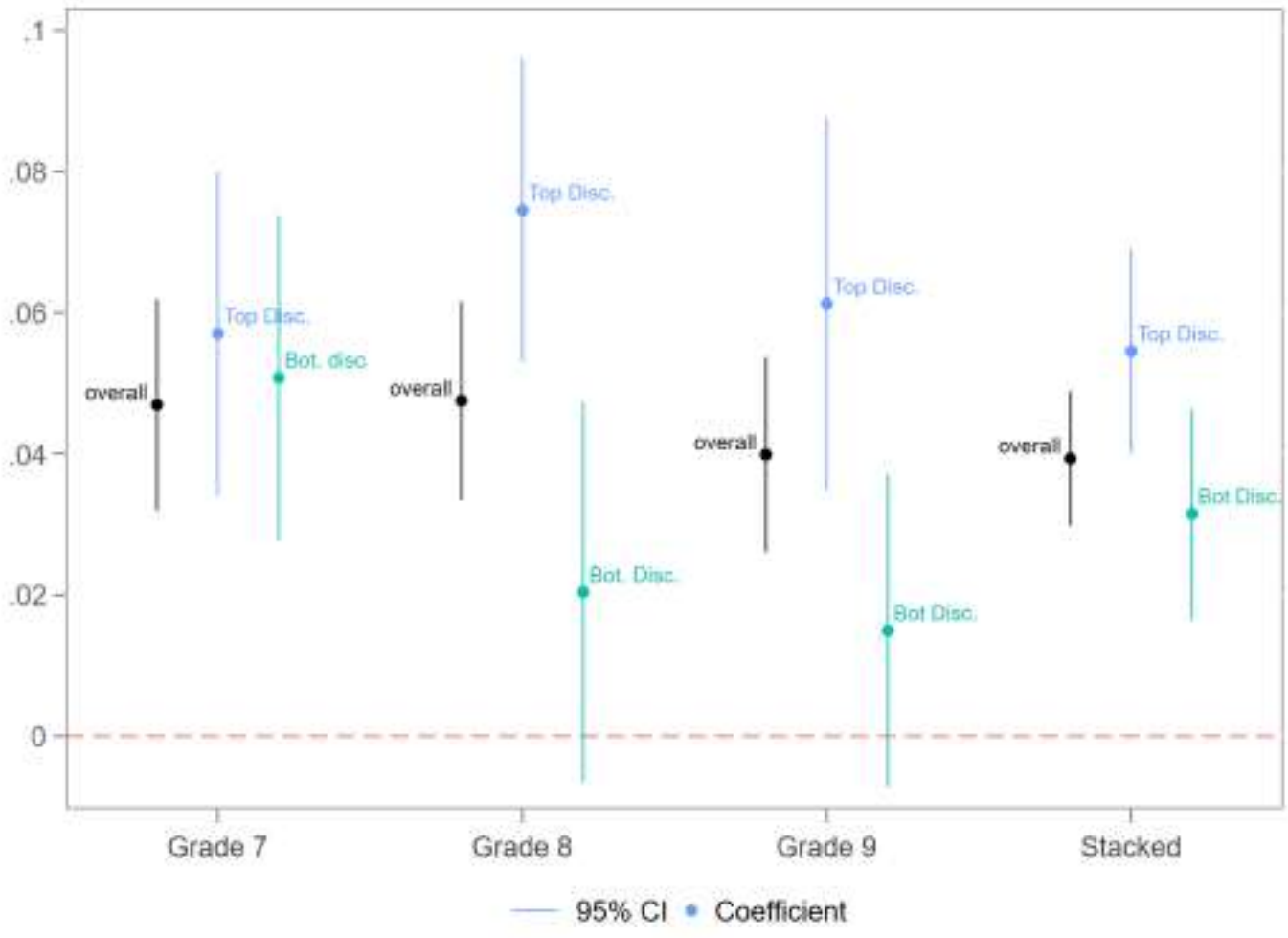
Perceived return to effort

by gender



Perceived return to effort

by baseline school behavior



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What happened in girls and well-behaved that did not happen in boys and bad-behaved?

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- Changes in behavior?
  - Self-reported
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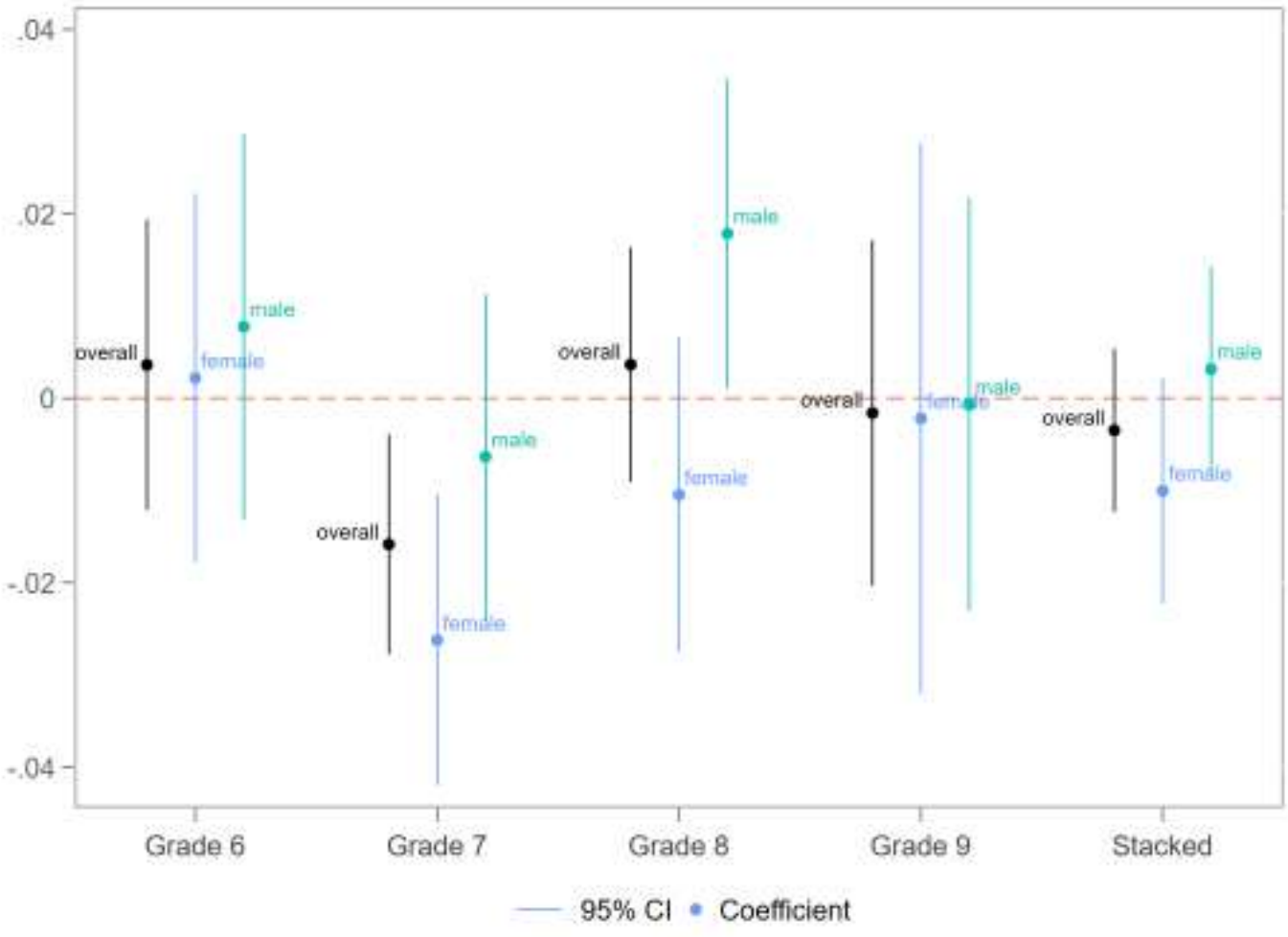
- Changes in aspirations?

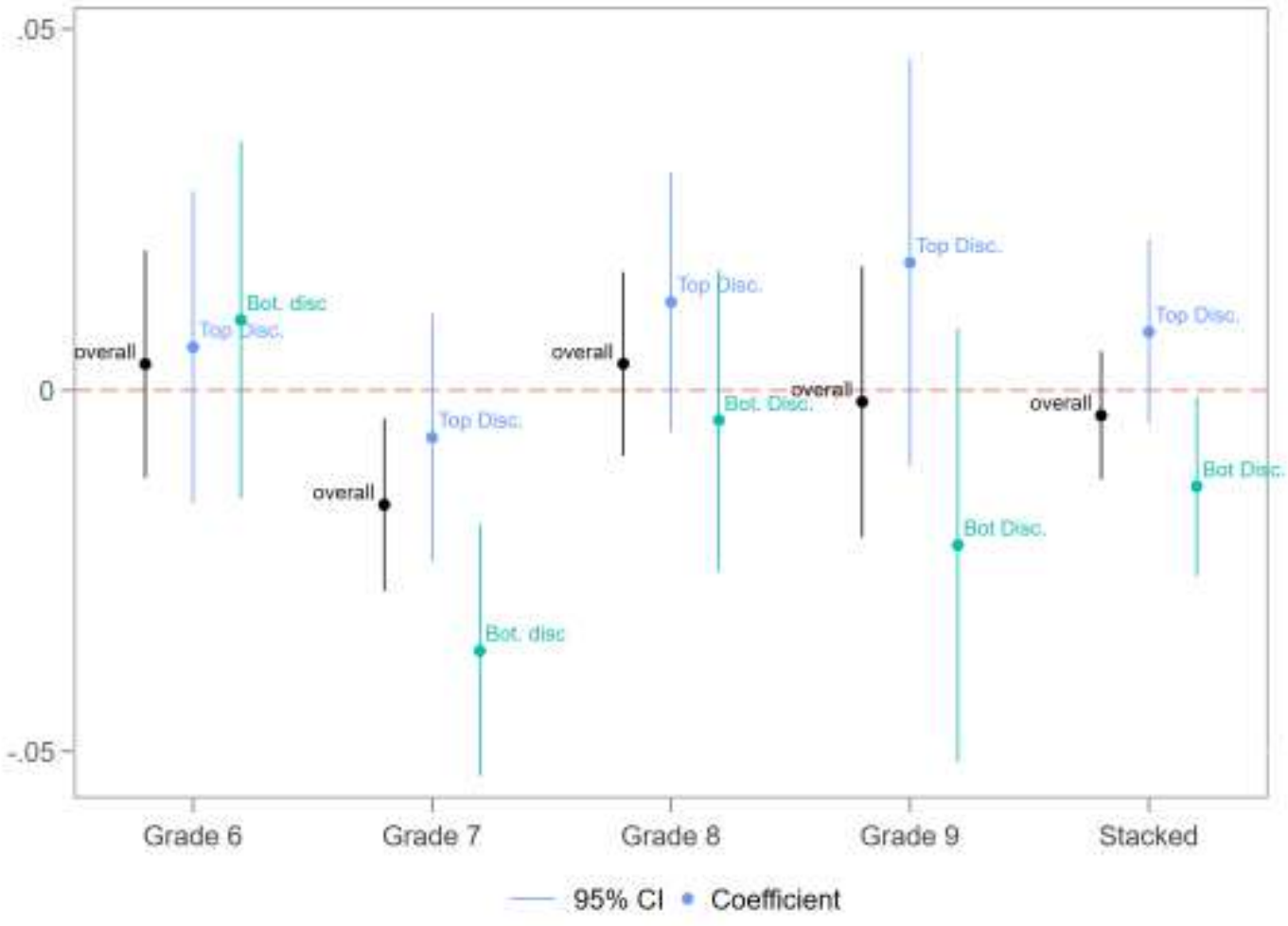
Changes in behavior: self-reported diligence

by gender



Changes in behavior: self-reported diligence

by baseline school behavior



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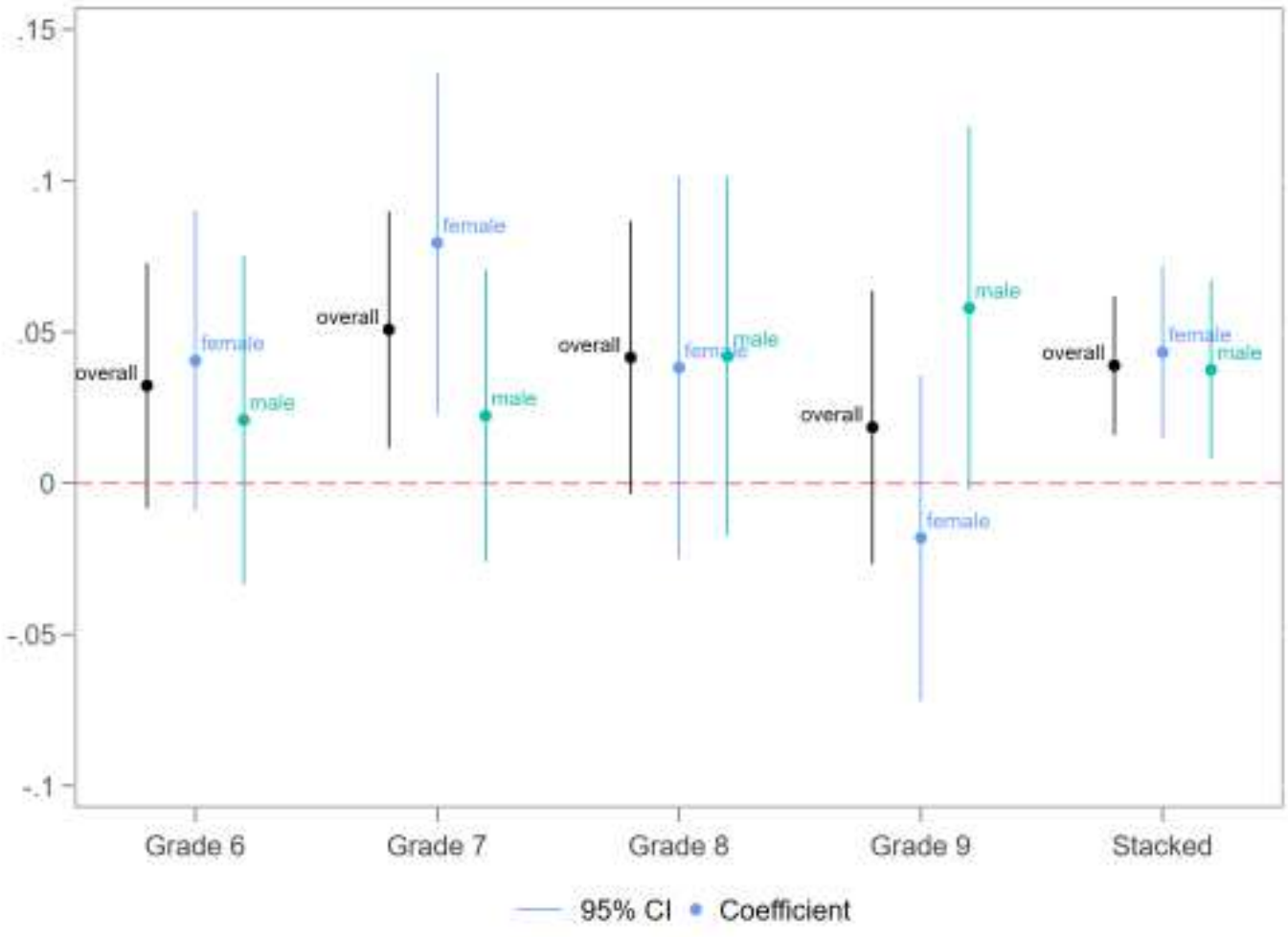
  - Teacher-reported
  - School-reported
- Changes in aspirations?

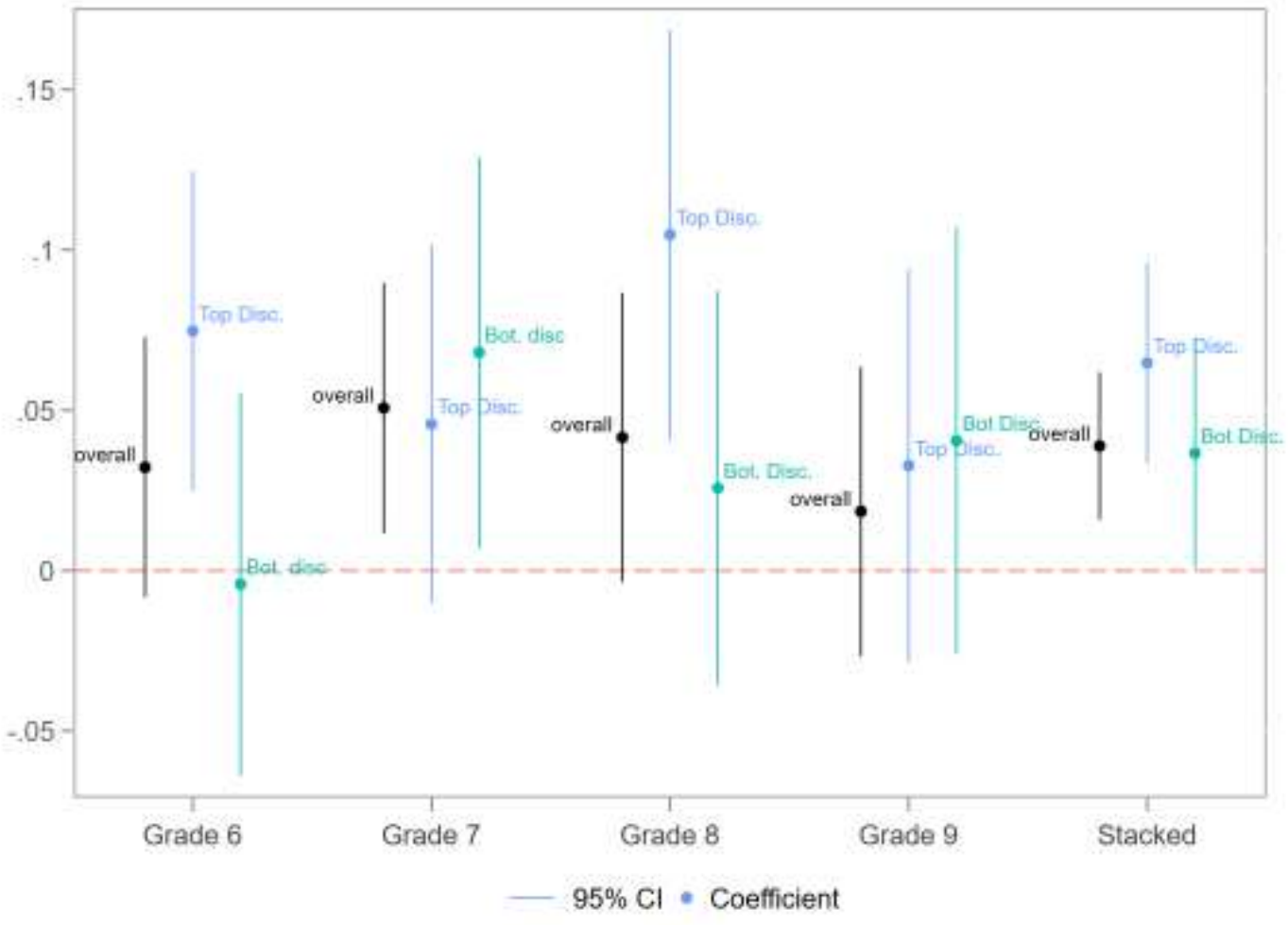
Changes in behavior: teacher-reported character

by gender



Changes in behavior: teacher-reported character

by baseline school behavior



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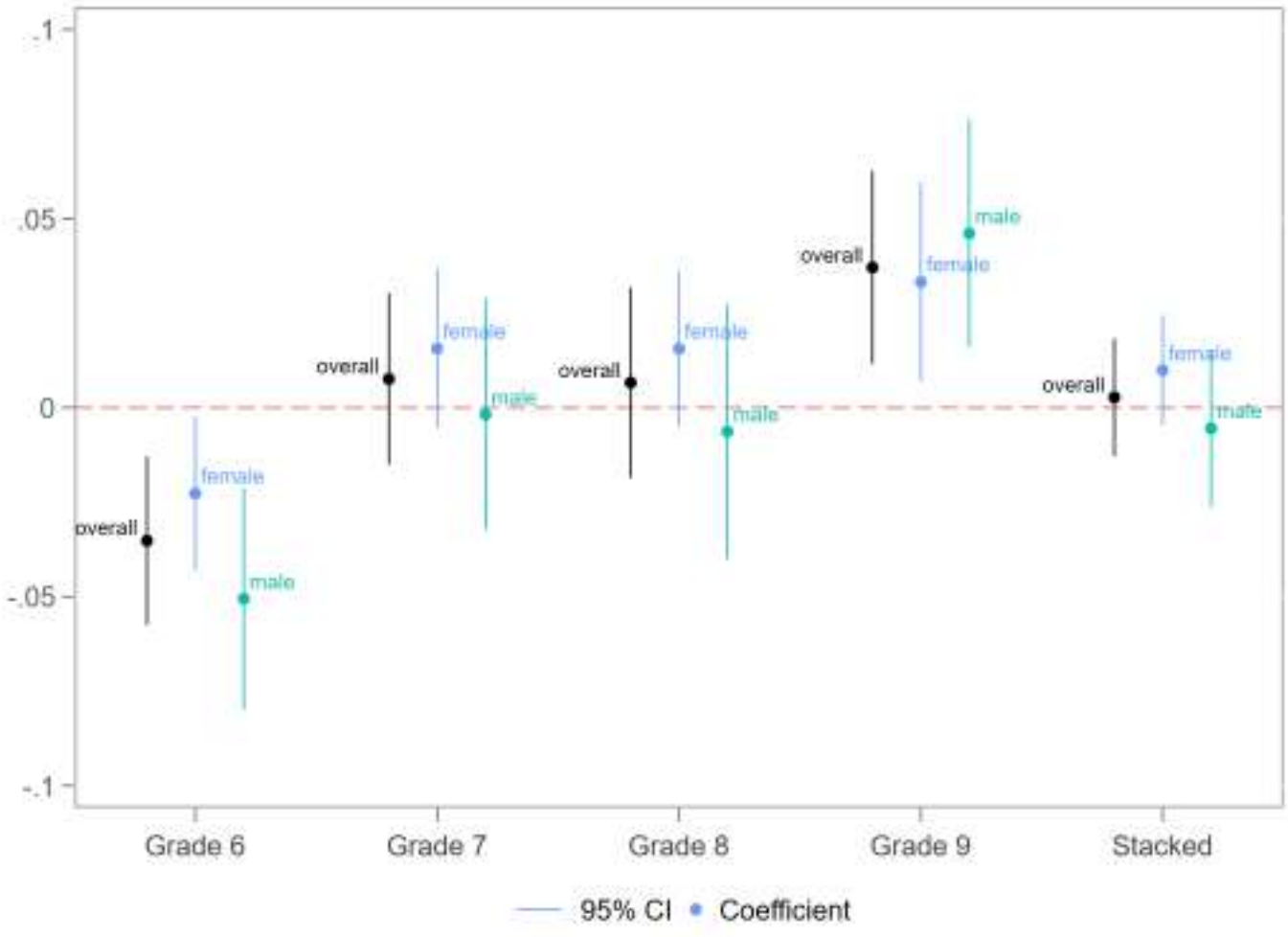
  - Teacher-reported: YES 4% sd overall, $\times 2$ in well-behaved (although the diff is not significant)
  - School-reported:
- Changes in aspirations?

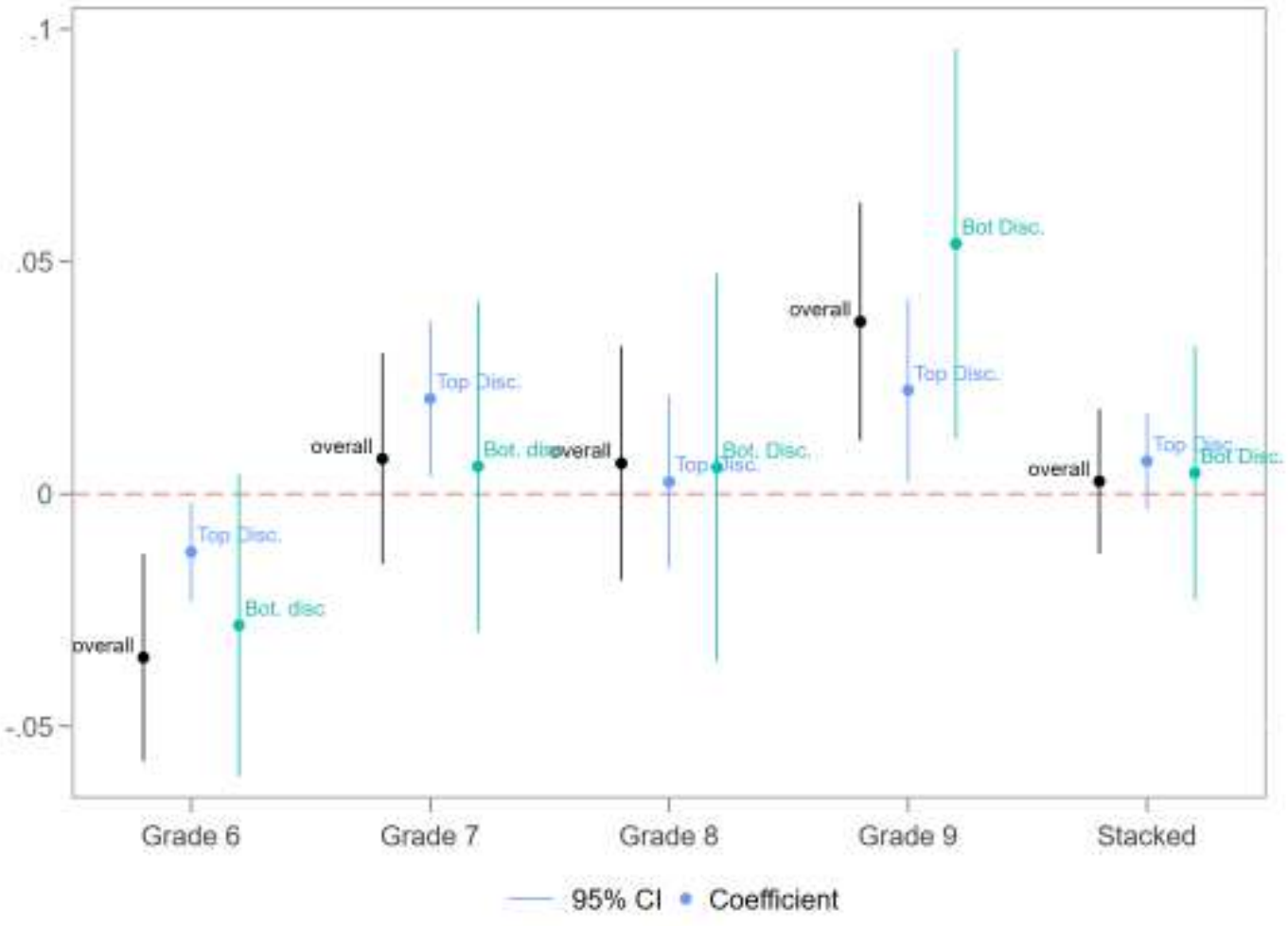
Changes in behavior: school-reported behavior

by gender



Changes in behavior: school-reported behavior

by baseline school behavior



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  - School-reported: YES but only in Grade 9 when absences and sanctions deteriorate the most (more than double btw Grade 6 and Grade 9)
- Changes in aspirations?

Changes in aspirations

by gender

	Full Sample			Gender Heterogeneity		
	Obs.	Control	Impact	EJ	female	Ej* female
Professional Aspirations						
High skill	5,379	0.284	-0.004	-0.019	-0.036**	0.029
		[0.451]	(0.010)	(0.016)	(0.018)	(0.024)
Medium skill	5,379	0.201	0.021***	0.017	0.091***	0.008
		[0.401]	(0.007)	(0.013)	(0.017)	(0.023)
Low skill	5,379	0.337	-0.023*	-0.005	-0.049**	-0.036
		[0.473]	(0.012)	(0.015)	(0.019)	(0.026)
No aspiration	5,379	0.178	0.006	0.006	-0.006	-0.002
		[0.383]	(0.009)	(0.013)	(0.015)	(0.022)
Educational Aspirations						
Academic High School	5,504	0.684	0.019*	0.005	0.084***	0.028
		[0.465]	(0.011)	(0.016)	(0.019)	(0.026)
Technical High School	5,504	0.261	-0.011	0.010	-0.059***	-0.041*
		[0.439]	(0.010)	(0.015)	(0.016)	(0.024)
Vocational High School	5,504	0.050	-0.010**	-0.011	-0.020**	0.002
		[0.218]	(0.004)	(0.008)	(0.009)	(0.012)

Changes in aspirations

by baseline school behavior

	Full Non-missing Sample			Behavior heterogeneity		
	Obs.	Control	Impact	EJ	Well-behaved	EJ*Well-behaved
Professional Aspirations						
High skill	3,984	0.293	-0.006	0.005	0.055**	-0.021
		[0.293]	(0.012)	(0.019)	(0.021)	(0.028)
Medium skill	3,984	0.206	0.028***	0.028*	0.030*	0.012
		[0.206]	(0.008)	(0.015)	(0.016)	(0.025)
Low skill	3,984	0.313	-0.025*	-0.016	-0.074***	-0.031
		[0.313]	(0.014)	(0.020)	(0.022)	(0.029)
No aspiration	3,984	0.188	0.003	-0.017	-0.012	0.040
		[0.188]	(0.011)	(0.016)	(0.020)	(0.026)
Educational Aspirations						
Academic High School	4,047	0.723	0.013	0.003	0.108***	0.044
		[0.723]	(0.013)	(0.019)	(0.022)	(0.028)
Technical High School	4,047	0.232	-0.002	0.006	-0.079***	-0.036
		[0.232]	(0.013)	(0.019)	(0.021)	(0.027)
Vocational High School	4,047	0.042	-0.013**	-0.016*	-0.028***	0.001
		[0.042]	(0.005)	(0.008)	(0.010)	(0.012)

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  - School-reported: YES but for all and only in Grade 9 when absences and sanctions deteriorate the most (more than double btw Grade 6 and Grade 9)
- Changes in aspirations: YES, concerns mostly girls and well-behaved students (although diff are not significant)

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Conclusions

- We find high returns on an intervention that works on students' mindset
  - At least in France where baseline students' mindset is particularly sad
- Shows the causal impact of psychology in the formation of human capital
- Students with better outcomes benefit more
  - Better at updating their beliefs
  - More prone to adjust their aspirations
  - Evidence of behavioral changes, but not always in line with benefits in GPA
- Methodological lesson: be careful with self-reported behavioral measures, reference points may change with treatment

Conclusions

We have to do more than that!

- Make boys and bad-behaved students more responsive
  - School norms regarding work discipline and diligence?
  - Intention-to-action gap?
- Teacher training on the growth mindset and locus of control
  - Ongoing RCT for primary school teachers
- Parent training on growth mindset and locus of control?