

The relevance of tracking and social segregation for growing achievement gaps by parental education in lower secondary school.

A longitudinal analysis in France, Germany, the United States, and England

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Motivation

- Substantial cross-country variation in SES-achievement gaps
- Importance of student assignment to schools and classes and school resources
 - Early between-school tracking associated with larger SES-achievement gaps
(van de Werfhorst & Mijs 2010; Le Donne, 2014; Marks et al., 2006)
 - Course-by-course tracking too, but less strong (Chmielewski 2014, Schnabel et al. 2002)
 - Social segregation of schools associated with larger SES-achievement gaps
(Holzberger et al., 2020; van Ewijk & Sleegers, 2010)
- Main limitation of existing research: cross sectional data

Research Questions

1. How much does achievement progress in lower secondary school depend on SES?

To what extent can SES gaps in achievement progress be attributed

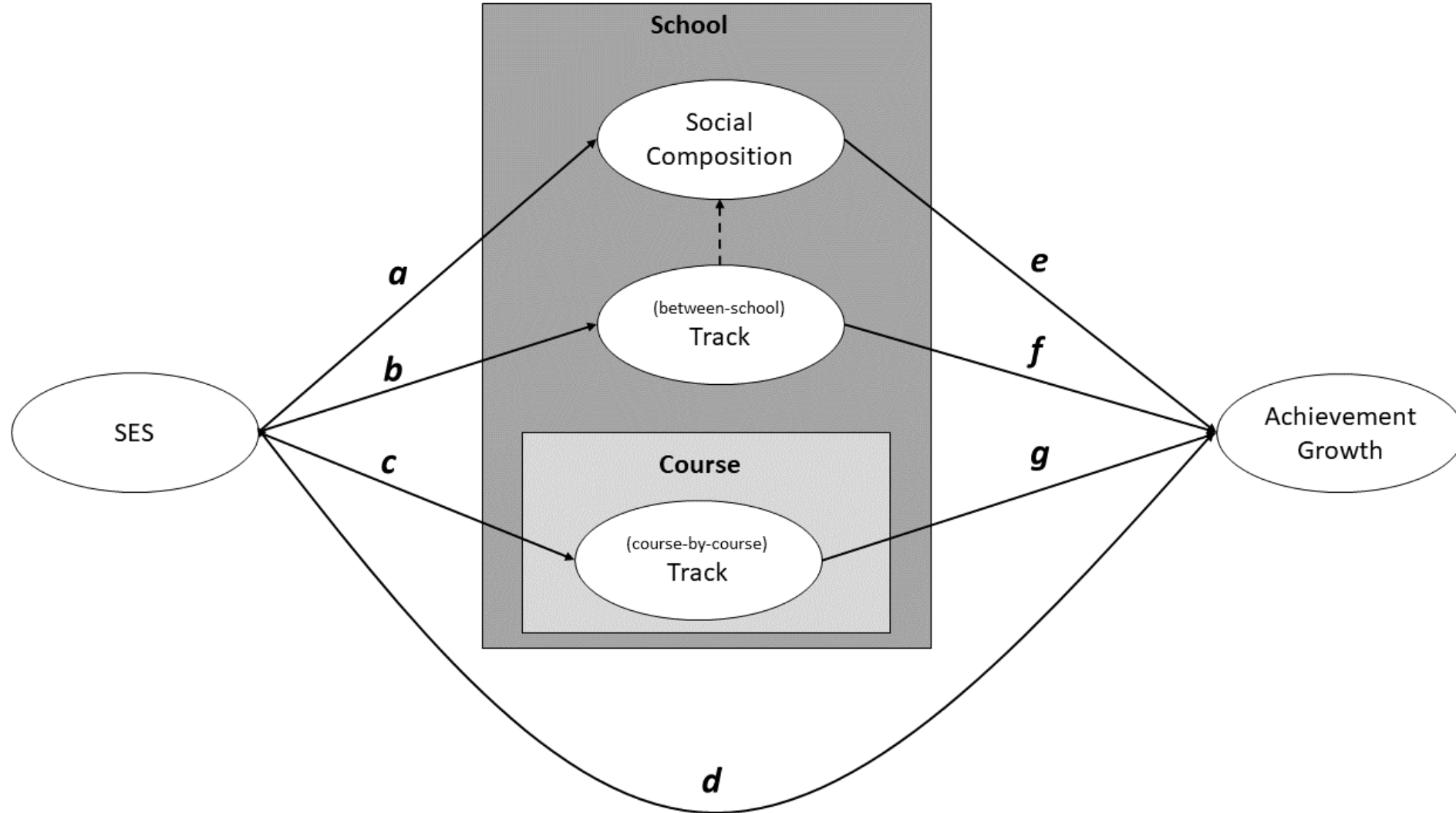
2. to (any) difference between schools?

3. to schools' social composition?

4. to tracking?

5. To what extent do these contributions differ by country?

Theoretical background



Theoretical background

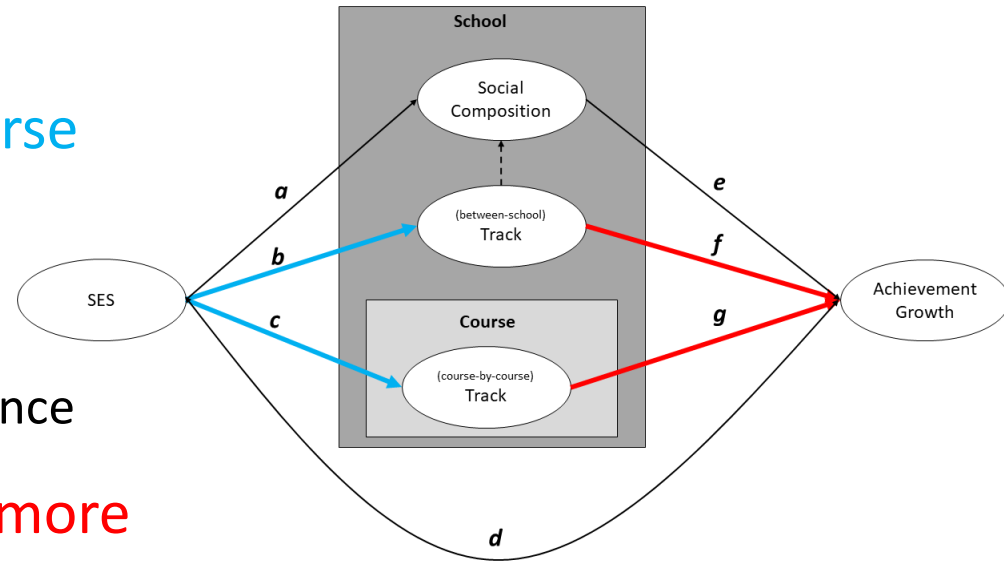
Is attendance of between-school tracks or course-by-course tracking more socially stratified?

- Between-school tracking more obviously related to tertiary education
- More mobility between courses than between schools
- Between-schools more socially stratified than course attendance (Chmielewski 2014, 2017; Dupriez et al. 2008; Schnabel 2002)

Is between-school tracking or course-by-course tracking more consequential for achievement progress?

- Between-schools: students who attend high-track schools are surrounded by students with similar skills, motivation, and expectations *all the time*
- Course-by-course: more homogenous courses with respect to skills in the specific subject
- Between school tracking and course-by-course tracking have a similar impact on achievement gains (Dupriez et al. 2008; Huang 2009)

Overall, between-school tracking will likely lead to larger SES-achievement gaps than course-by-course tracking



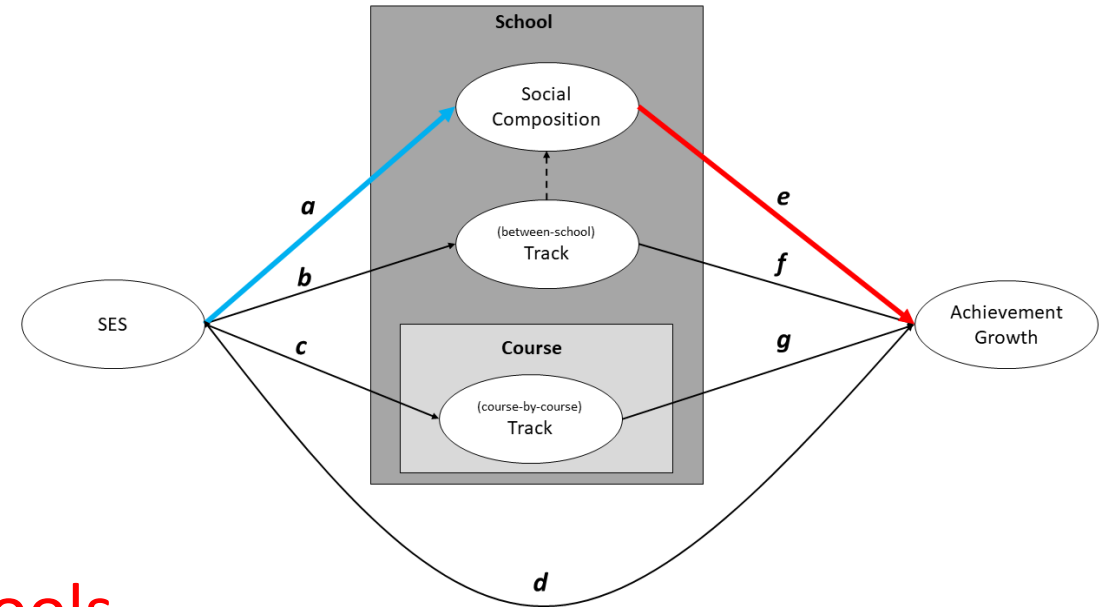
Theoretical background

How socially segregated are schools?

- Residential segregation
- Costs of schools
- School choice restrictions
- Between-school tracking

How consequential is it to attend a schools with many low SES children?

- Funding of schools
- Autonomy of schools



Institutional context

	France	Germany	United States	England
Tracking regime (Dupriez et al 2008)	Uniform integration	Separate	Á la carte integration	Á la carte integration
Between-school tracking	-	2-4 tracks depending on federal state	-	Comprehensive schools vs. Grammar schools
Within-school tracking	<ul style="list-style-type: none"> • Comprehensive track • International track • Remedial track 	Different course levels in comprehensive schools	Courses on different levels	Courses on different levels

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Tracking will contribute most in Germany and least in France

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Between-school social segregation (Gutierrez et al 2020)	43%	42%	39%	36%
Correlation between schools' SES and schools' resources	==	—	—	—

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Schools' social composition will contribute most in the United States

Data & Variables

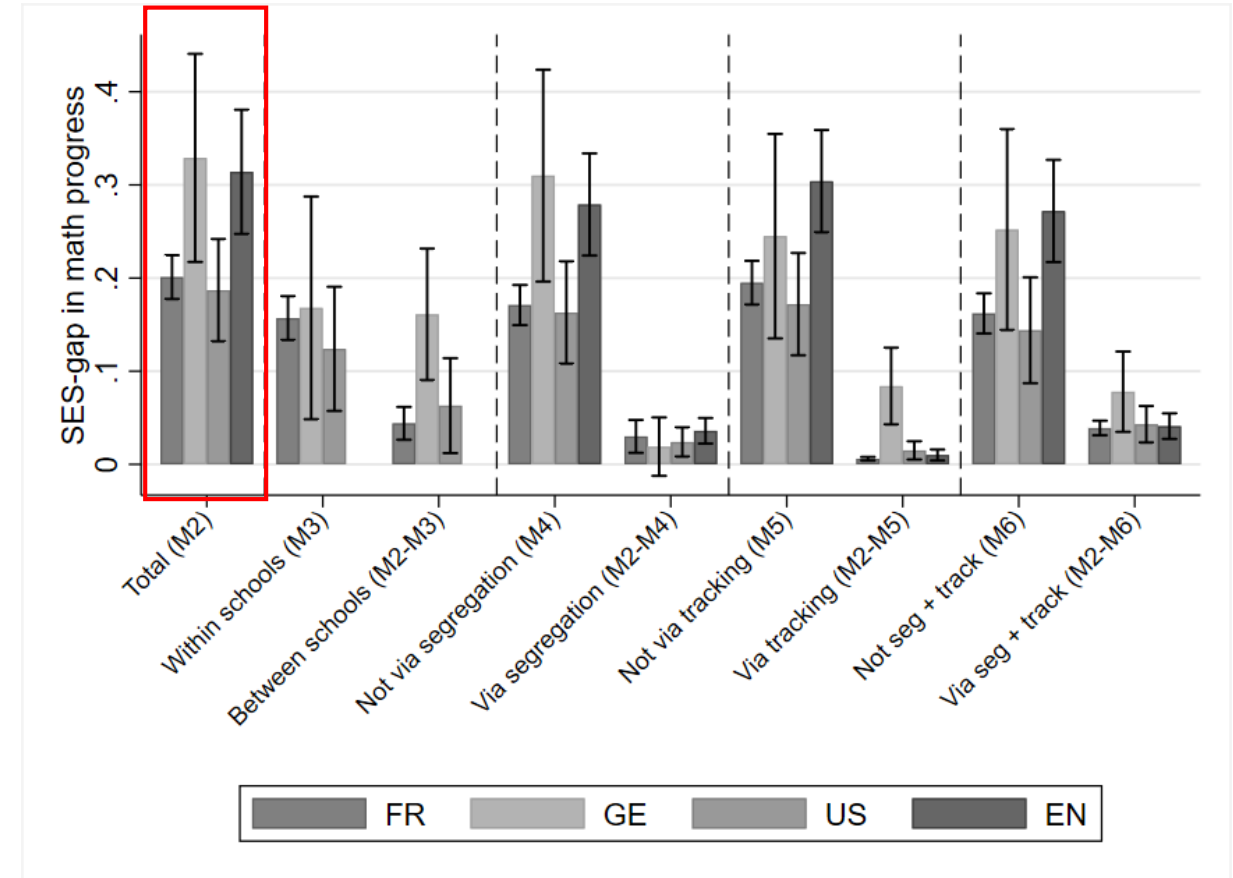
	England	France	Germany	United States
Data	MCS	DEPP panel	NEPS-SC3	ELCS-K 1998
Birth cohorts	2000-02	1996	1998-2000	1992-93
Analysis Sample	6,217	22,921	2,071	3,060
Outcome: Math Achievement at the end of lower secondary school	Math test scores (9th grade)			
SES	Highest parental education (3 categories, low: no qualification beyond socially expected minimum; high: at least a bachelor's degree; Bradbury et al. 2015)			
Achievement at the beginning of lower secondary school	Achievement at the beginning of lower secondary school (5th or 6th grade); math & reading			
Between-school track	Comprehensive vs. Grammar schools	-	Upper track vs. Lower tracks vs. Comprehensive schools	-
Course Level	<i>Not measured</i>	Comprehensive vs. International vs. Remedial	<i>Uncommon - not measured</i>	Remedial vs. General vs. advanced math course
Schools' social composition	Proportion students eligible for free lunch	Proportion blue collar / not working parents	Proportion parents with low social status	Proportion of students eligible for free / price-reduced lunch
Control variables	immigration status, family status, child's gender, child's age, number of siblings, family lives in rural area			

Results: Gaps in achievement

	M1	M2	M3	M4	M5	M6
France (N=23,026)						
High vs. low gap	0.816***	0.201***	0.157***	0.171***	0.195***	0.162***
SE	0.016	0.012	0.012	0.011	0.012	0.011
Reduction compared to M2	-	-	0.044***	0.030***	0.006***	0.039***
SE of reduction	-	-	0.009	0.009	0.001	0.004
Reduction in percent	-	-	22%	15%	3%	19%
Germany (N=2,071)						
High vs. low gap	0.969***	0.329***	0.168**	0.310***	0.245***	0.252***
SE	0.089	0.057	0.061	0.058	0.056	0.055
Reduction compared to M2	-	-	0.161***	0.019	0.084***	0.078***
SE of reduction	-	-	0.036	0.016	0.021	0.022
Reduction in percent	-	-	49%	6%	26%	24%
US (N=3,060)						
High vs. low gap	0.908***	0.187***	0.124***	0.163***	0.172***	0.144***
SE	0.045	0.028	0.034	0.028	0.028	0.029
Reduction compared to M2	-	-	0.063**	0.024**	0.015**	0.043***
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Reduction compared to M2	-	-	-	0.036***	0.010***	0.041***
SE of reduction	-	-	-	0.007	0.003	0.007
Reduction in percent	-	-	-	11%	3%	13%
Basic controls	X	X	X	X	X	X
Initial achievement	-	X	X	X	X	X
School fixed-effects	-	-	X	-	-	-
Schools' SES composition	-	-	-	X	-	X
Track/course	-	-	-	-	X	X

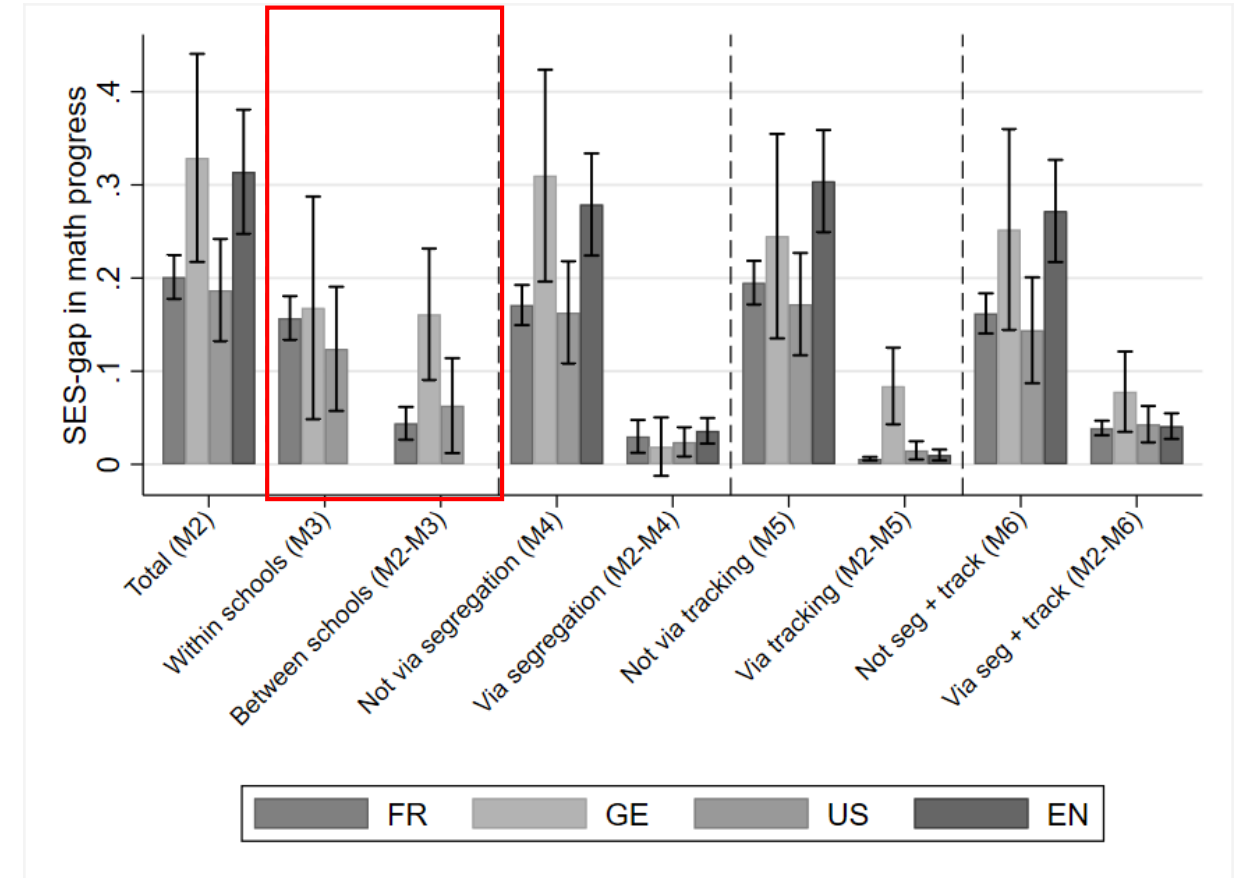
Results: Gaps in achievement progress

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Track/course	-	-	-	-	X	X



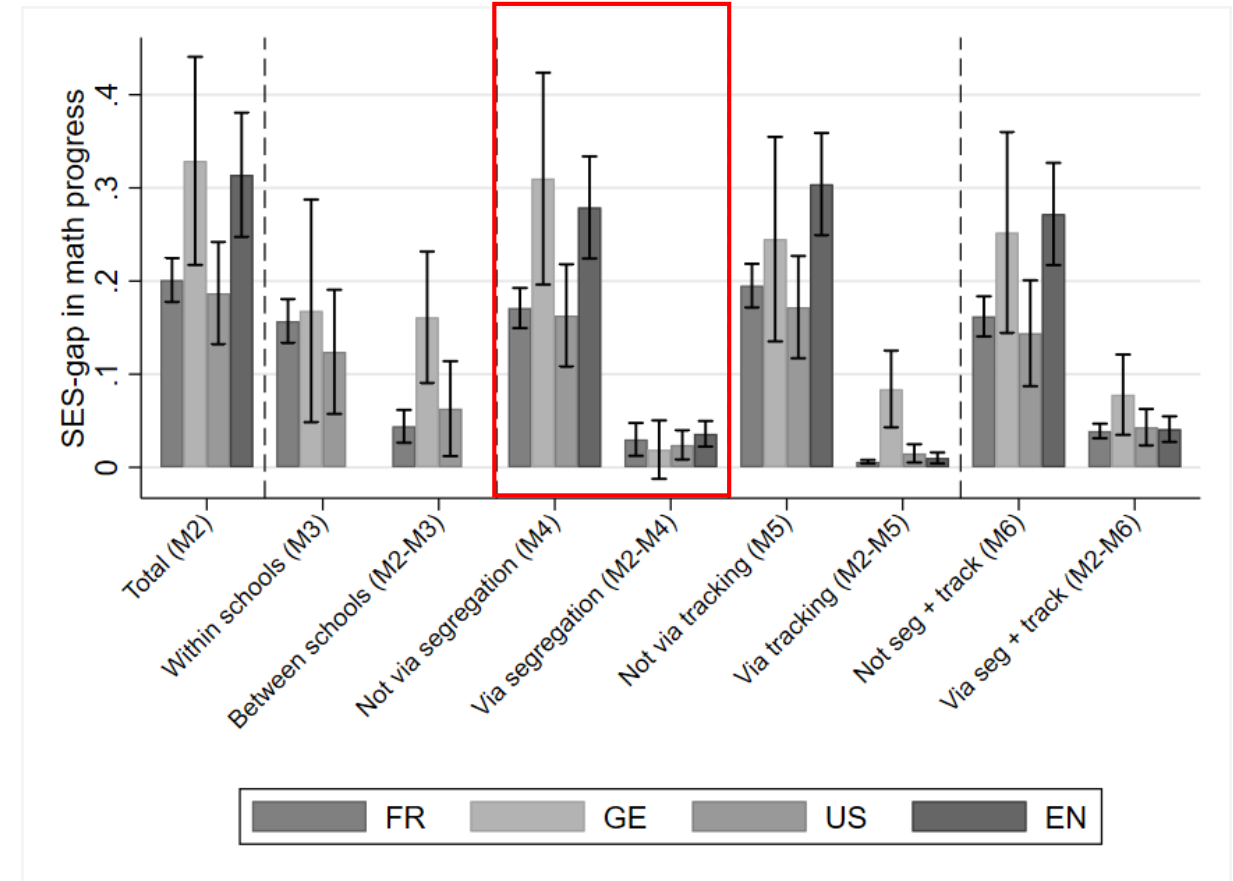
Results: between vs. within schools

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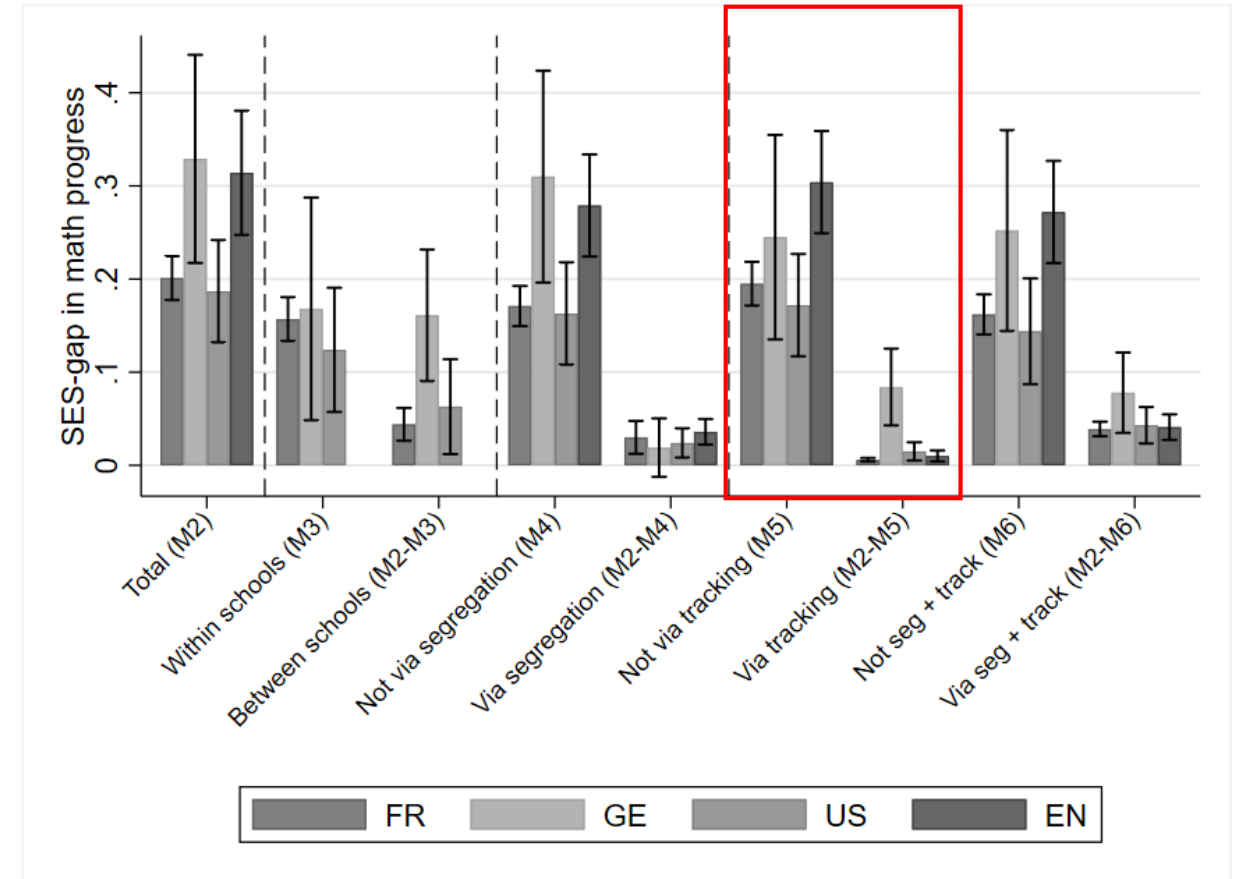
Results: Mediation via SES composition

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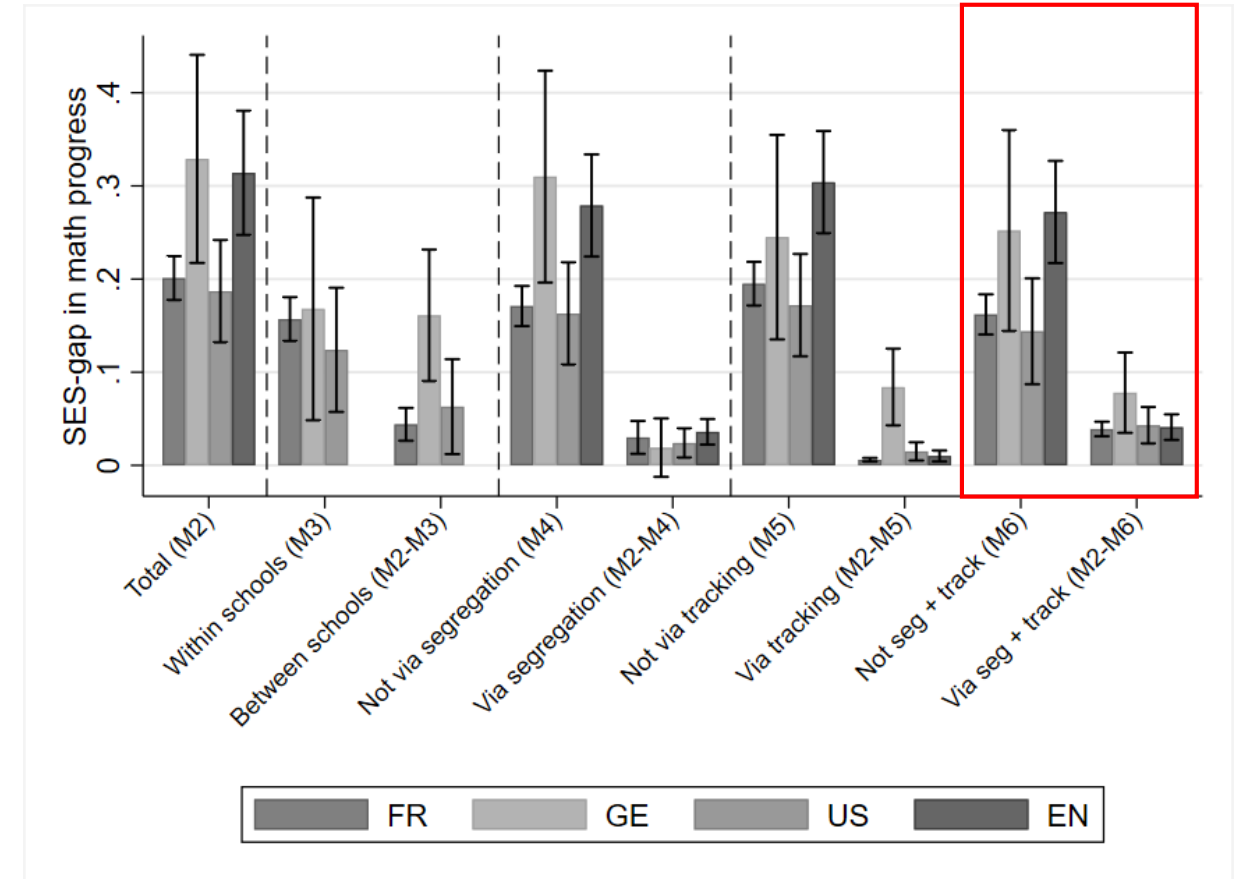
Results: Mediation via tracking

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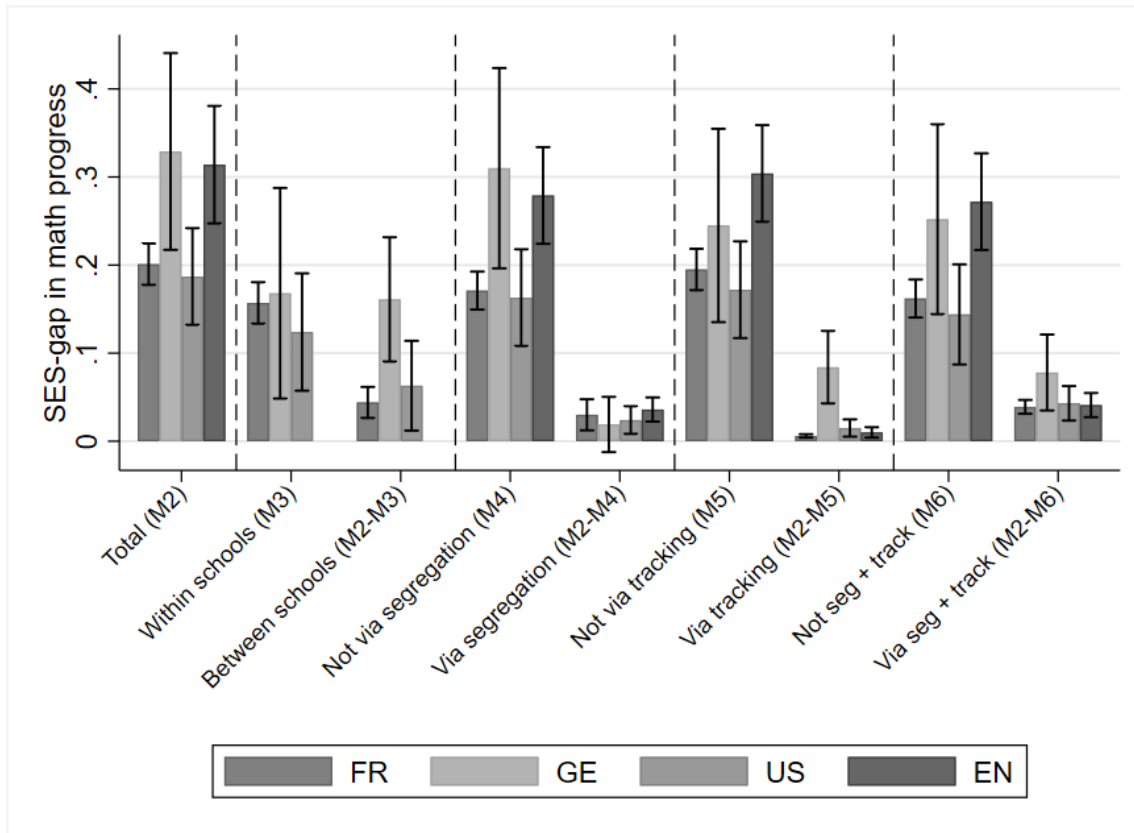
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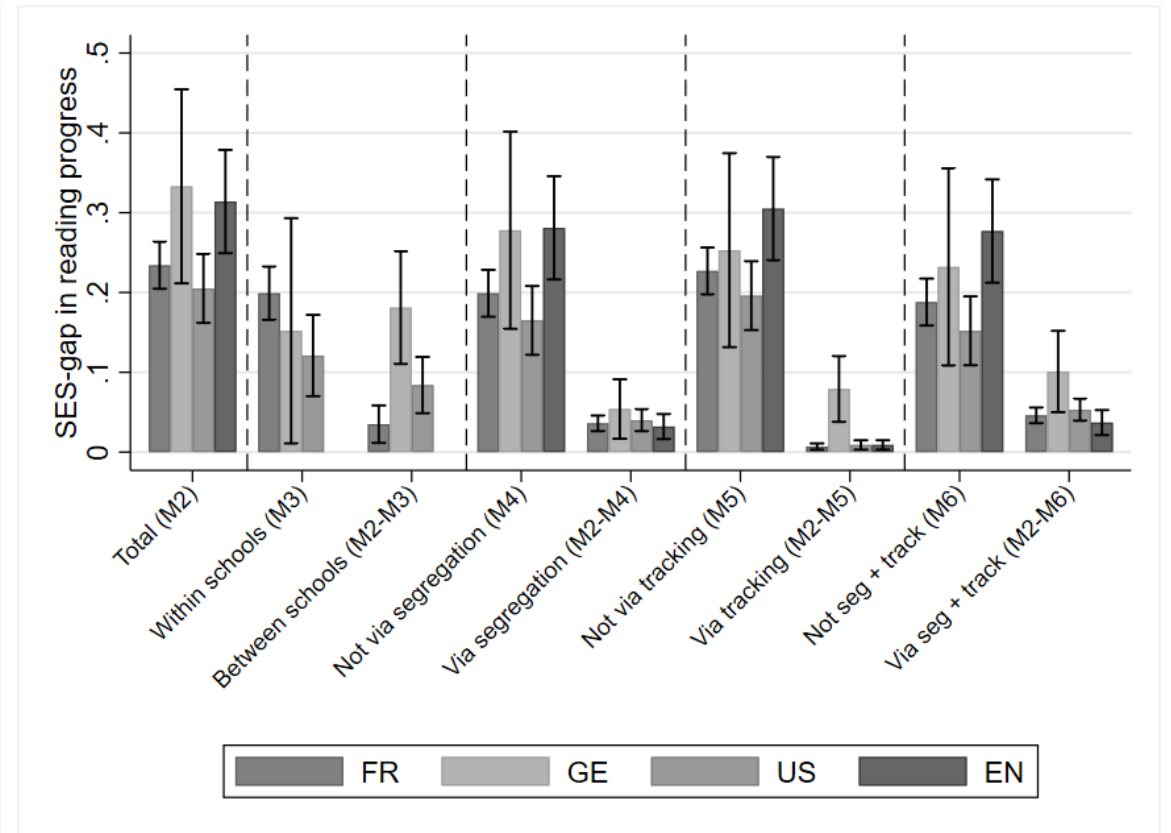


Robustness checks: achievement domain

Math



Reading



Conclusion

- SES gaps in achievement progress in all four countries
- Within-school SES gaps in achievement progress rather similar across countries
 - Country differences largely driven by different allocation of students and resources to schools/classes
- Longitudinal evidence that between-school tracking is associated with larger SES gaps in achievement progress
- Social composition of schools partially substitutes for between-school tracking

Thank you for your attention!

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Development of Inequalities in Child Educational Achievement: A Six Country Study

<https://dice.site.ined.fr>

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Appendix

	FR		GE		US		EN	
	Mean/ Percent	SD	Mean/ Percent	SD	Mean/ Percent	SD	Mean/ Percent	SD
Parental Education								
High	19%		33%		31%		37%	
Medium	31%		54%		27%		36%	
Low	50%		12%		42%		28%	
Tracking								
<i>Comprehensive school / general course</i>	No tracking 83%		Comprehensive 10%		General course 61%		Comprehensive 95%	
<i>Lower school track / remedial course</i>	Tracking down 2%		Other tracks 34%		Remedial Course 12%			
<i>Upper school track / advanced course</i>	Tracking up 15%		Gymnasium 56%		Honors Course 27%		Grammar school 5%	
Schools' social segregation								
% low SES in school	36.16	18.47	20.39	14.84	41.53	25.53	8.58	10.16
Control variables								
At least one parent born abroad	12%		16%		21%		22%	
Family status: two bio parents	79%		76%		68%		66%	
Family status: single parent	14%		11%		22%		21%	
Family status: step family	7%		6%		10%		11%	
Family status: other	1%		7%		0%		2%	
Child gender: female	51%		50%		51%		50%	
No siblings	13%		25%		15%		14%	
One sibling	45%		51%		45%		42%	
Two siblings	29%		18%		25%		29%	
Three or more siblings	13%		6%		15%		15%	
Rural status	30%		10%		16%		28%	
Urban status	70%		90%		82%		72%	
Rural/urban status is missing	-		-		2%		-	
Child repeated a class during lower secondary school	12%		2%		2%		-	
Childage (in months)	181.79	6.58	178.46	5.49	171.39	4.38	195.53	3.45
N Students		22,921		2,071		3,060		6,217
N Schools		6,288		157		1,160		1,729

County differences

Table A1. Differences between countries and statistical significance of country differences

	FR vs. GE		FR vs. US		FR vs. EN		GE vs. US		GE vs. EN		US vs. EN	
	Diff	p-value	Diff	p-value	Diff	p-value	Diff	p-value	Diff	p-value	Diff	p-value
M1	-.153	.091	-.092	.054	.063	.303	.061	.541	.216*	.043	.155*	.037
M2	-.128*	.028	.014	.646	-.113**	.002	.142*	.026	.015	.821	-.127**	.004
M3	-.011	.860	.033	.360	-	-	.044	.529	-	-	-	-
M2-M3	-.117**	.002	-.019	.490	-	-	.098*	.028	-	-	-	-
M4	-.139*	.019	.008	.790	-.108***	.000	.147*	.023	.031	.630	-.116**	.003
M2-M4	.011	.549	.006	.618	-.006	.599	-.005	.780	-.017	.331	-.012	.259
M5	-.050	.383	.023	.450	-.109***	.000	.073	.244	-.059	.346	-.132**	.001
M2-M5	-.078***	.000	-.009	.078	-.004	.206	.069**	.001	.074**	.001	.005	.391
M6	-.090	.109	.018	.562	-.110***	.000	.108	.083	-.020	.746	-.128**	.002
M6-M2	-.039	.081	-.004	.710	-.002	.804	.035	.148	.037	.109	.002	.870

Own calculations. Significance Levels: *** = $p\text{-value} < 0.001$; ** = $p\text{-value} < 0.01$; * = $p\text{-value} < 0.05$.