The Timing of Education Inequality: When and How Gender Gaps in Maths Skills Emerge and Evolve

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March 28, 2025

What is this study about?

The core focus is to explore the development of gender gaps in Maths achievement at age 15 by examining:

- How early cognitive skills and socioemotional traits (ages 9 and 13) predict later Maths performance
- Whether boys and girls receive different returns from the same skills
- How family structure, particularly paternal involvement, shapes these gaps
- How the absence of fathers differentially affects Maths achievement outcomes by gender

How do I do this? - Methods I

- **Regression analysis:**
  - Identify key predictors of Maths achievement at age 15
  - Separate models for age 9 and age 13 predictors
  - Models with and without father's education to assess selection bias
- **Oaxaca-Blinder decomposition:**
  - Separate gender gap into components: endowments, coefficients, interaction
  - Identify which factors contribute most to observed gaps
  - Compare decomposition across gender and family structure

How do I do this? - Variables

Event	Date	Age (in years)	Variables of interest
Study-child is born	Nov/97 - Oct/98	0	-
Wave 1 data collection	Aug/07 - May/08	9	2 Cognitive variables (Reading and Maths logit scores), 4 SDQ scales, Parental Education (mother and father's), Income quintiles, 1 School Indicator (CoEd)
Wave 2 data collection	Aug/11 - Mar/12	13	3 Cognitive variables (Verbal and Numerical logit scores, BAS Matrices), 4 SDQ scales, Parental Education (mother and father's), Income quintiles, 4 School Indicators (DEIS, CoEd, Fee-paying, Religious Ethos)
Study-child sits the Junior Cert	Jun/13 - Jun/15	15-16	-
Wave 3 data collection	Apr/15 - Aug/16	17-18	Junior Cert scores in Maths (OPS scale), Male dummy

Table: Timeline of Events - Growing Up in Ireland '98 Cohort

Why does this matter for us?

- Cognitive and noncognitive skills developed in childhood are key inputs in the human capital production function.
- I examine how the same skills are differentially rewarded — across gender and family structure — a central question in the economics of education and labour markets.
- Identifying when gaps emerge allows for more efficient timing of interventions, targeting resources where and when they matter most.
- Parental education and absence shape children's academic trajectories. Understanding these mechanisms informs debates on inequality and social mobility.
- Schools have not changed that much. Boys have long underachieved in school compared to girls, but it mattered less when they could get good blue-collar jobs without a college degree. Changing labour market opportunities without time for the labour force to adjust $\rightarrow$ men get left behind.

What does the literature tell us?

- Gender Gaps in achievement: gender disparities in Maths and English emerge early and widen during adolescence. Boys often underperform in behavior-regulated settings (Bertrand and Pan, 2013; Autor et al., 2019).
- Skills as predictors of achievement: both cognitive and socioemotional traits predict academic performance. Traits like self-regulation and attention are especially important for boys (Heckman et al., 2006; Duckworth and Seligman, 2005).
- Family structure and SES: paternal absence and lower socioeconomic status are linked to poorer academic outcomes, often through reduced time investments and weaker behavioural support (McLanahan et al., 2013; Sarkadi et al., 2008).

Literature I Literature II Literature III Literature IV Literature V

What does the literature tell us?

- Developmental timing: skill gaps established early in life can widen over time. Middle childhood and early adolescence are key inflection points in academic divergence (Duncan et al., 2007; Eccles and Roeser, 2011).
- Methodological advances: decomposition methods such as Oaxaca-Blinder are increasingly used to isolate explained and unexplained sources of gender gaps in achievement (Gevrek, Gevrek, and Neumeier, 2020).

Literature VI

How does this study contribute?

- I track how early traits (cognitive, socioemotional, SES) influence Maths achievement from childhood through adolescence using longitudinal data from Ireland.
- I compare predictors measured at ages 9 and 13 to assess when gender and family-based inequalities begin to shape achievement outcomes.
- I go beyond binary presence/absence to analyze consistent paternal disengagement and how its effects differ by gender.
- I apply Oaxaca-Blinder decompositions to disentangle how much of the gender gap is due to endowments vs. differential returns.
- I contribute to a growing international literature by using a nationally representative cohort study in a policy-relevant context.

Question 1

How do early (9, 13) cognitive, socioemotional, socioeconomic factors, and school characterists affect Maths achievement at age 15?

$$\text{Maths Points}_{i,w} = \sum_k B_{k,i,w} \cdot \text{Cog}_{k,i,w} + \sum_l B_{l,i,w} \cdot \text{SocioEmotional}_{l,i,w} + \sum_n B_{n,i,w} \cdot \text{SES}_{n,i,w} + \sum_x B_{x,i,w} \cdot \text{School}_{x,i,w} + \epsilon_{i,w} \quad (1)$$

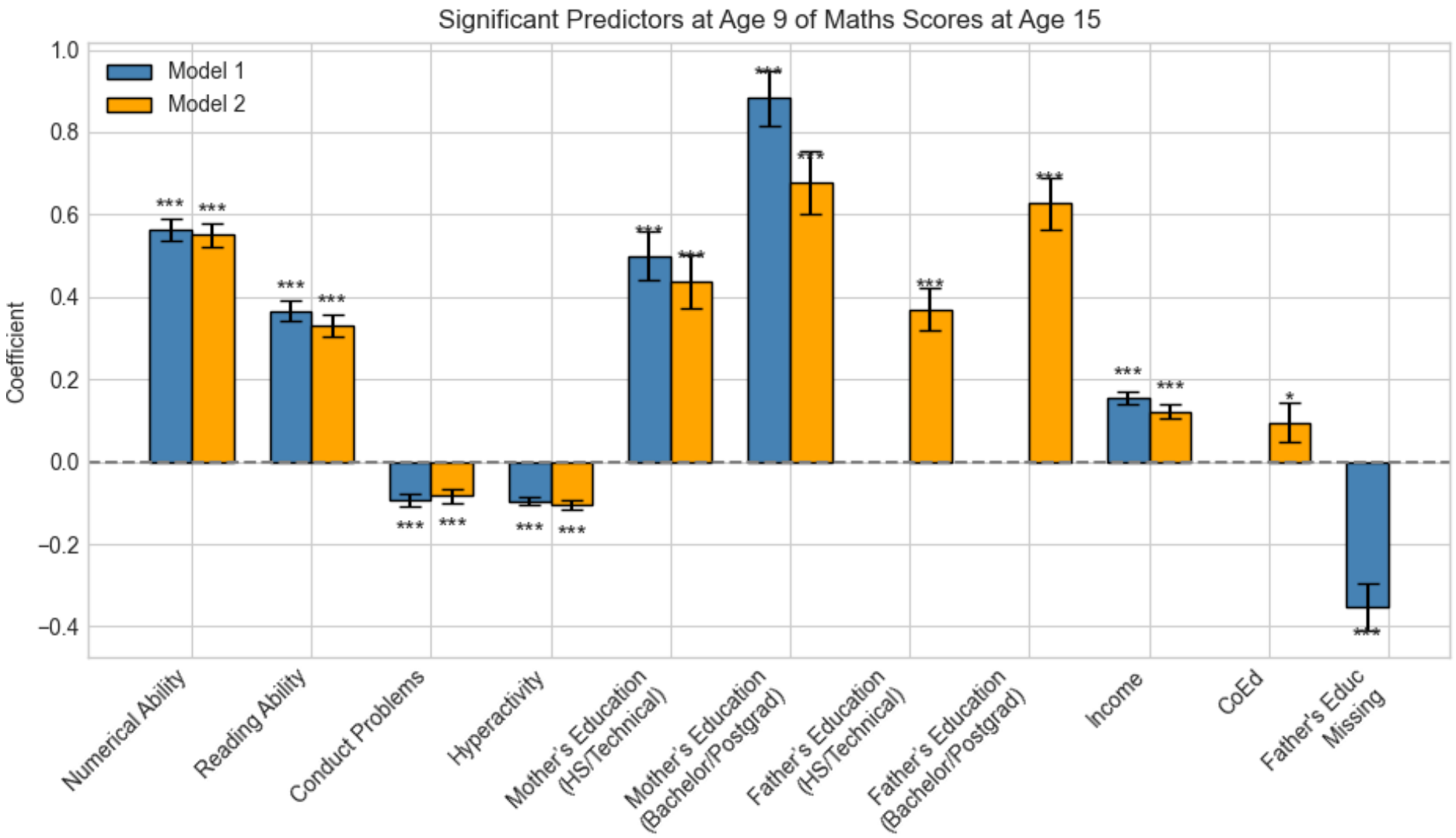
Estimated using four models with predictors from age 9 (Wave 1) and age 13 (Wave 2)

OLS Models

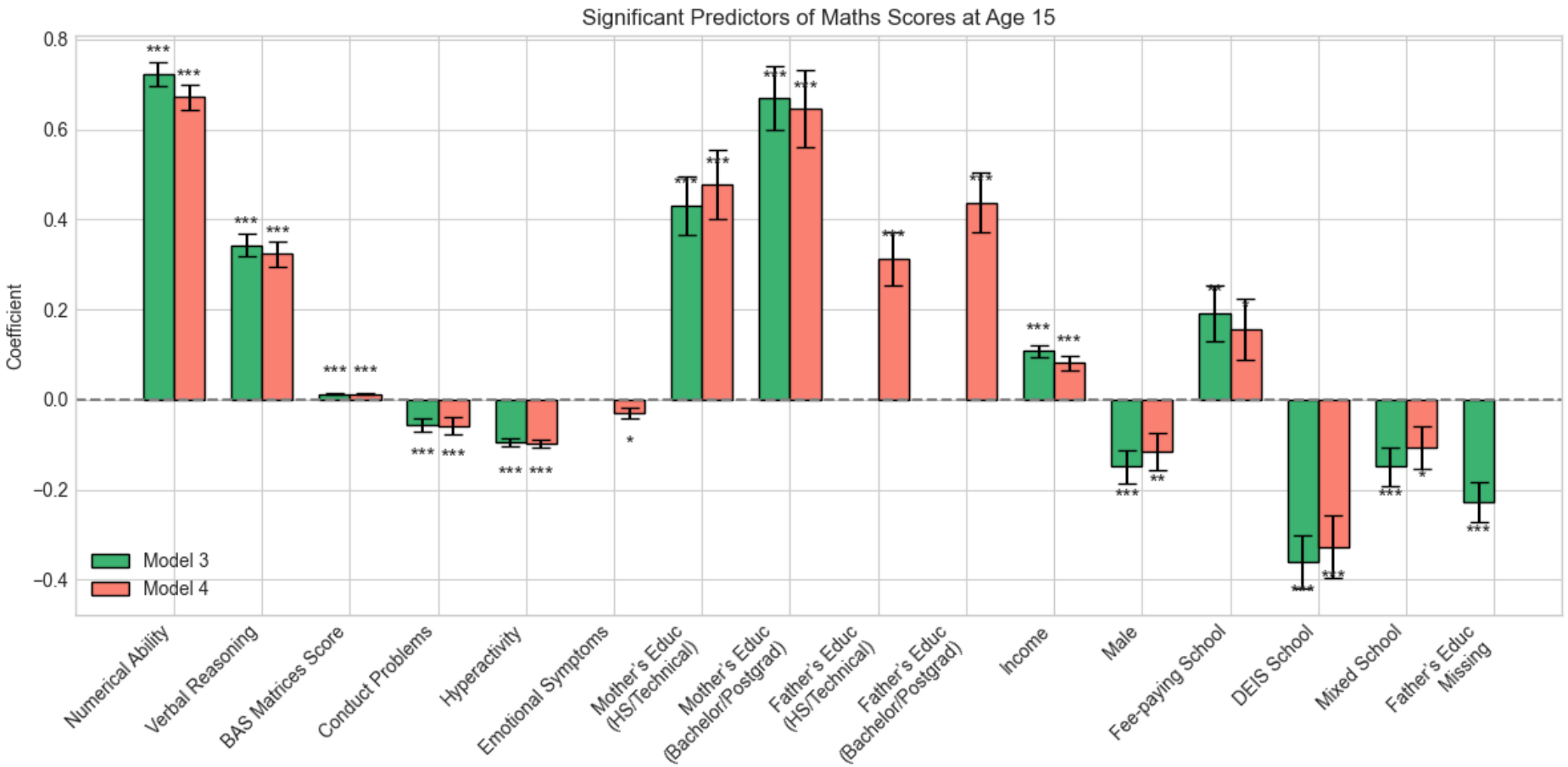
	Model 1	Model 2	Model 3	Model 4
Cognitive	Numerical, Reading	Numerical, Reading	Numerical, Verbal, Matrices	Numerical, Verbal, Matrices
Socio-Emotional	Emotional, Conduct, Hyperactivity, Peer	Emotional, Conduct, Hyperactivity, Peer	Emotional, Conduct, Hyperactivity, Peer	Emotional, Conduct, Hyperactivity, Peer
SES	Mother's Educ, Income, Father Missing	Mother's & Father's Educ, Income	Mother's Educ, Income, Father Missing	Mother's & Father's Educ, Income
School	CoEd	CoEd	CoEd, DEIS, Religious, Fee-paying	CoEd, DEIS, Religious, Fee-paying

Summary stats - I | Summary stats - II | OPS Scale | SDQ | Variables - I | Variables - II

OLS Models with/without father's education, age 9



OLS Models with/without father's education, age 13



What have we learned from the OLS models?

- Cognitive skills are the strongest and most consistent predictors of Maths scores across both ages 9 and 13.
- Socioemotional traits, particularly Hyperactivity and Conduct Problems, are negatively associated with achievement—especially Hyperactivity, which remains significant across time.
- Parental education, especially maternal, is strongly linked to performance. Including father's education clarifies and refines these effects.
- Income matters, but its effect diminishes when school characteristics are included (school stratification plays a role).

What have we learned from the OLS models?

- Boys have a $\uparrow$ average Maths score at age 15 compared to girls (raw gap). However, regression models show that after controlling for skills, SES, and school factors, the Male coefficient becomes < 0 and significant by age 13 $\rightarrow$ girls achieve $\uparrow$ scores than expected, given their characteristics. Boys receive $\downarrow$ returns to the same cognitive and socioemotional traits $\rightarrow$ raw gender gap masks important differences in how characteristics are rewarded.
- Missing father's education data is not random and is associated with lower achievement, even after controlling for income, maternal education, and school type. The dummy for "father's education missing" remains strongly < 0 across waves, which suggests that students whose father's didn't answer the questionnaire receive lower returns to their characteristics, and the gap is not fully explained by socioeconomic status alone.

Question 2

How do gender and family background contribute to the Maths achievement gap at age 15, and how do these contributions change between age 9 and age 13?

The Oaxaca-Blinder Decomposition allows us to answer/asses:
a) whether gender gaps stem primarily from different skill levels or from differential rewards for the same skills,
b) how father absence affects boys vs. girls through different pathways,
c) whether the mechanisms driving gender gaps evolve from age 9 to age 13, and
d) if maternal education might compensate differently for father absence by gender.
"Two parents in a household mean more resources — financial, emotional, and time — for children. The absence of this structure doesn't just affect individual families; it perpetuates societal divides."

OBD - General

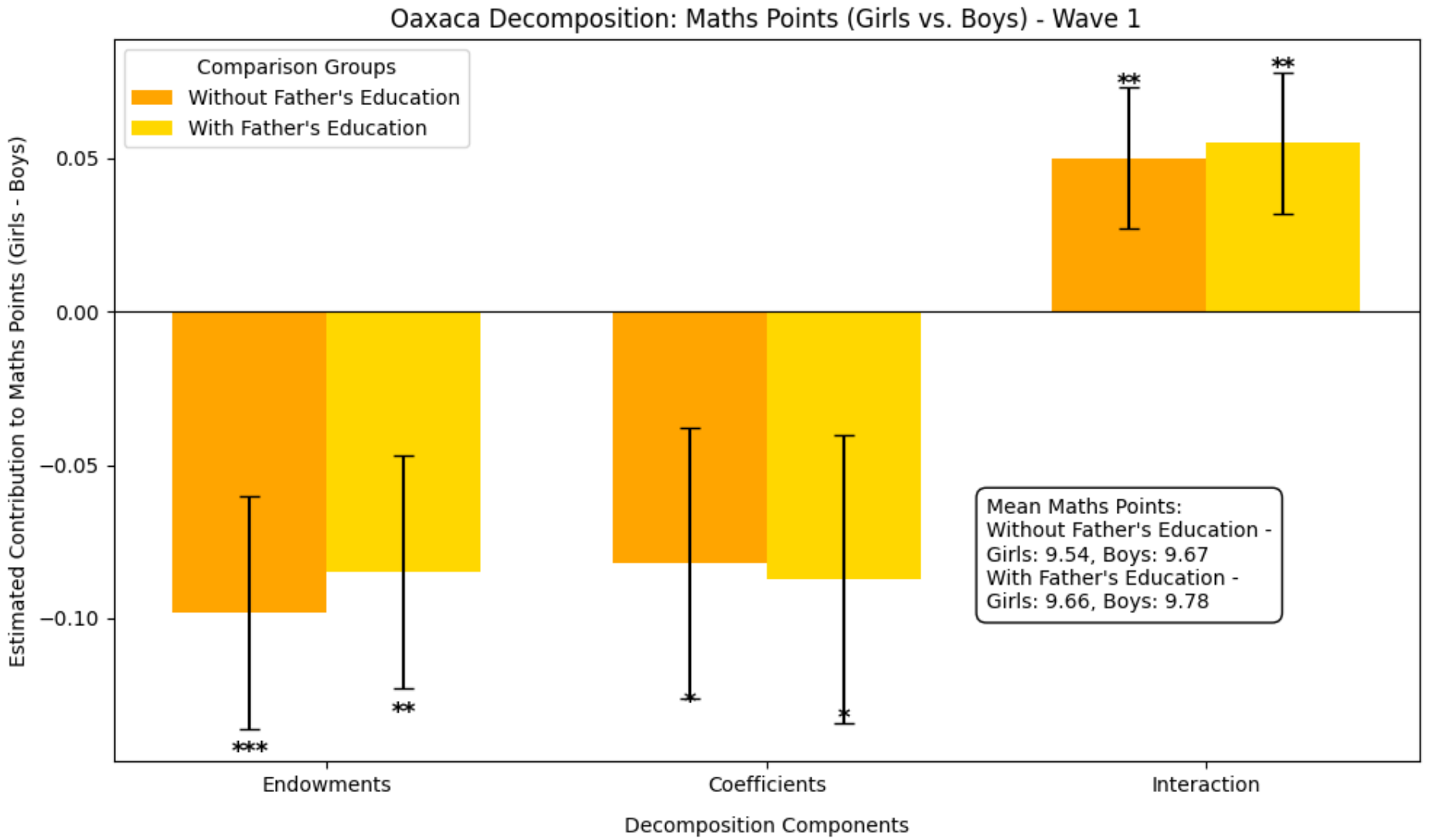
$$\bar{Y}_A - \bar{Y}_B = \underbrace{(\bar{\mathbf{X}}_A - \bar{\mathbf{X}}_B) \cdot \beta_B}_{\text{Endowments}} + \underbrace{\bar{\mathbf{X}}_B \cdot (\beta_A - \beta_B)}_{\text{Coefficients}} + \underbrace{(\bar{\mathbf{X}}_A - \bar{\mathbf{X}}_B) \cdot (\beta_A - \beta_B)}_{\text{Interaction}} \tag{2}$$

Endowments $\rightarrow$ differences in "what" each group has (skills, SES, etc.), holding returns constant.
Coefficients $\rightarrow$ differences in "how" each group is rewarded for those same characteristics (aka "returns", or "unexplained part" $\rightarrow$ disparities that cannot be explained by differences in observable characteristics).
Interaction $\rightarrow$ the "synergy" between having different characteristics and getting different returns.

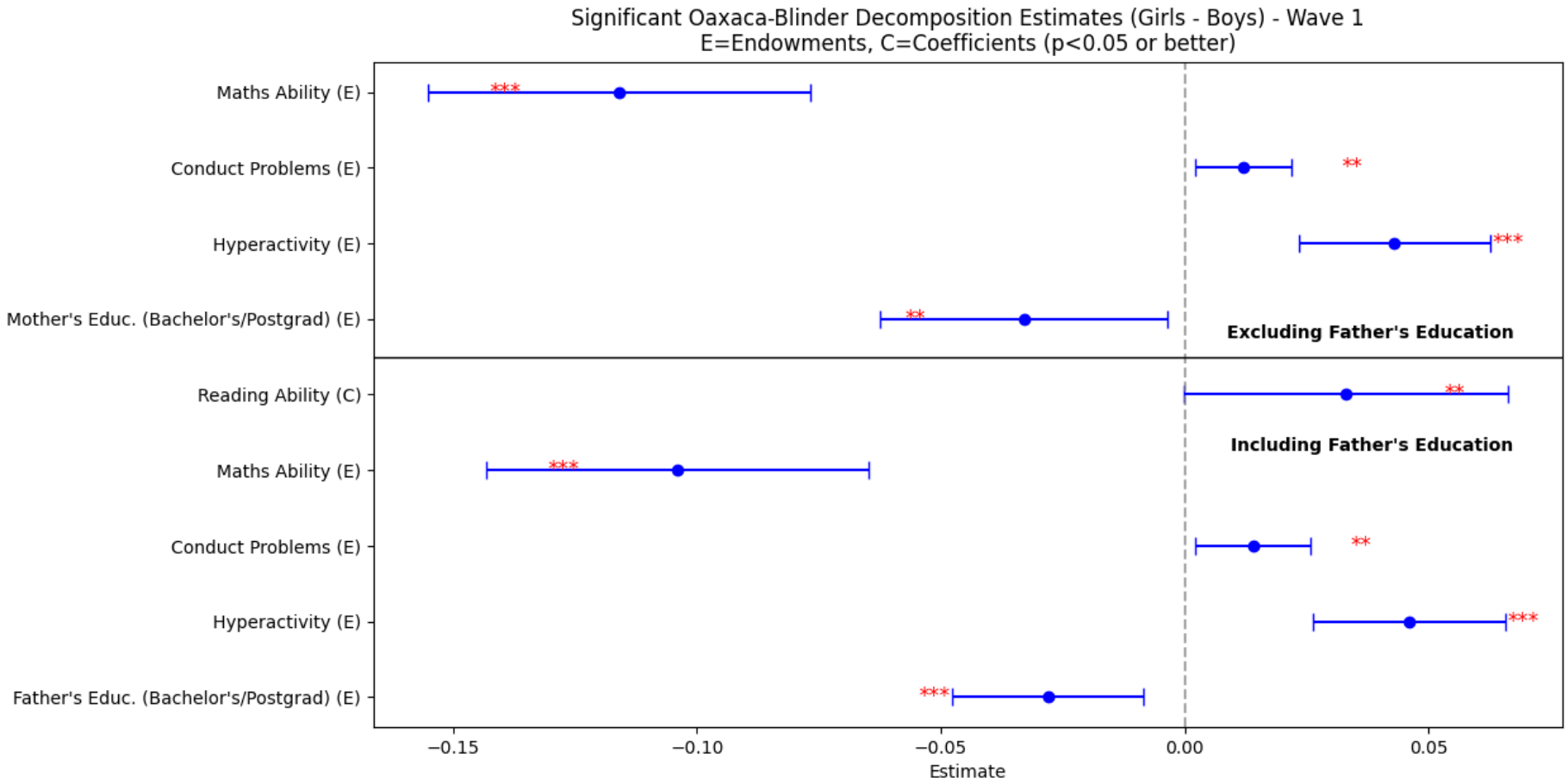
OBD - Context, Boys vs Girls

Symbol	Meaning	Context
$\bar{Y}_A$	Expected average Maths score for girls	Expected Maths scores for girls
$\bar{Y}_B$	Expected average Maths score for boys	Expected Maths scores for boys
$\bar{X}_A$	Girls' average characteristics (e.g., skills, income, etc.)	Girls' average characteristics (e.g. skills, income, etc.)
$\bar{X}_B$	Boys' average characteristics	Boys' average characteristics
β_A	Effect of each characteristic on girls' Maths scores	How each characteristic affects girls' Maths scores
β_B	Effect of each characteristic on boys' Maths scores	How each characteristic affects boys' Maths scores

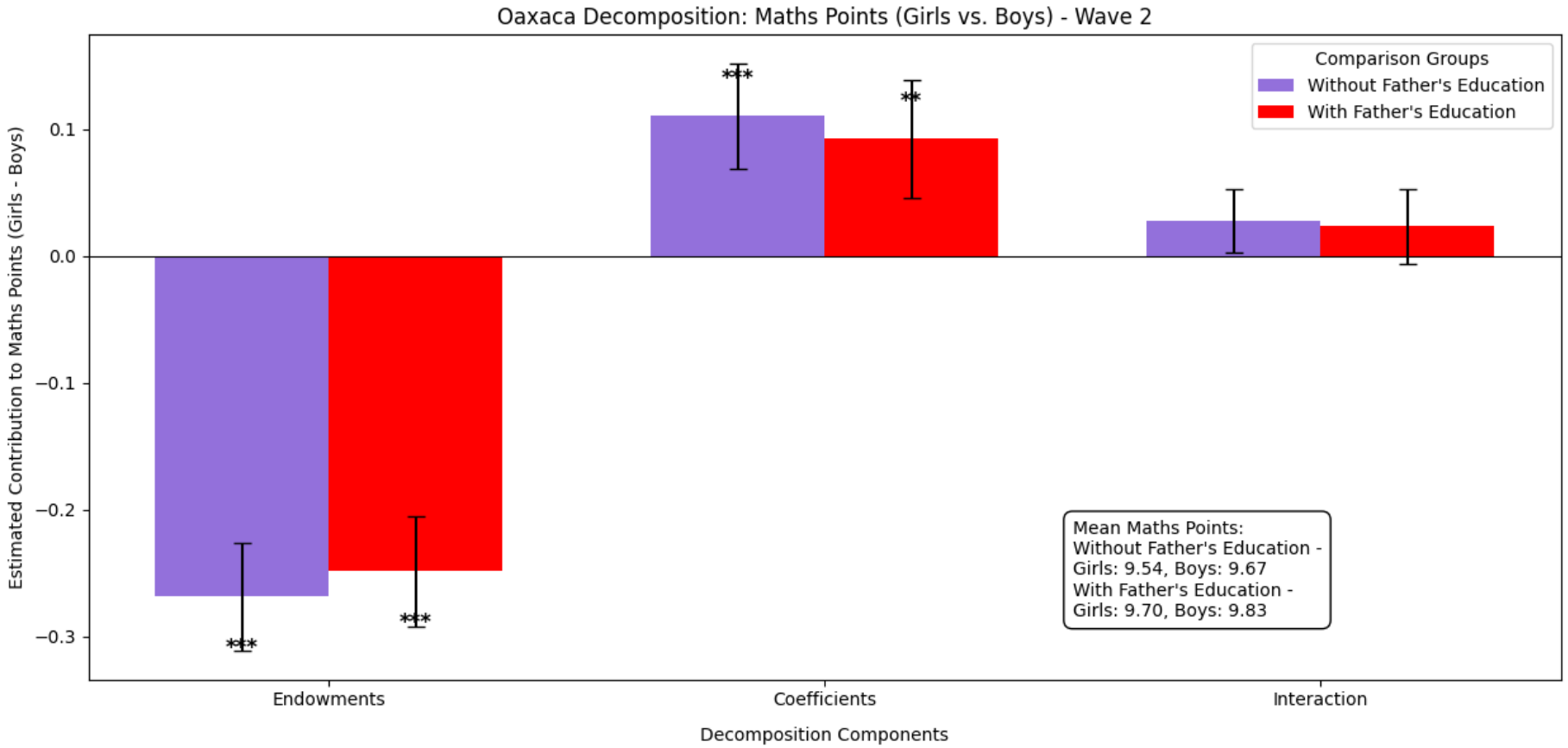
OBD Results - Girls vs Boys, age 9



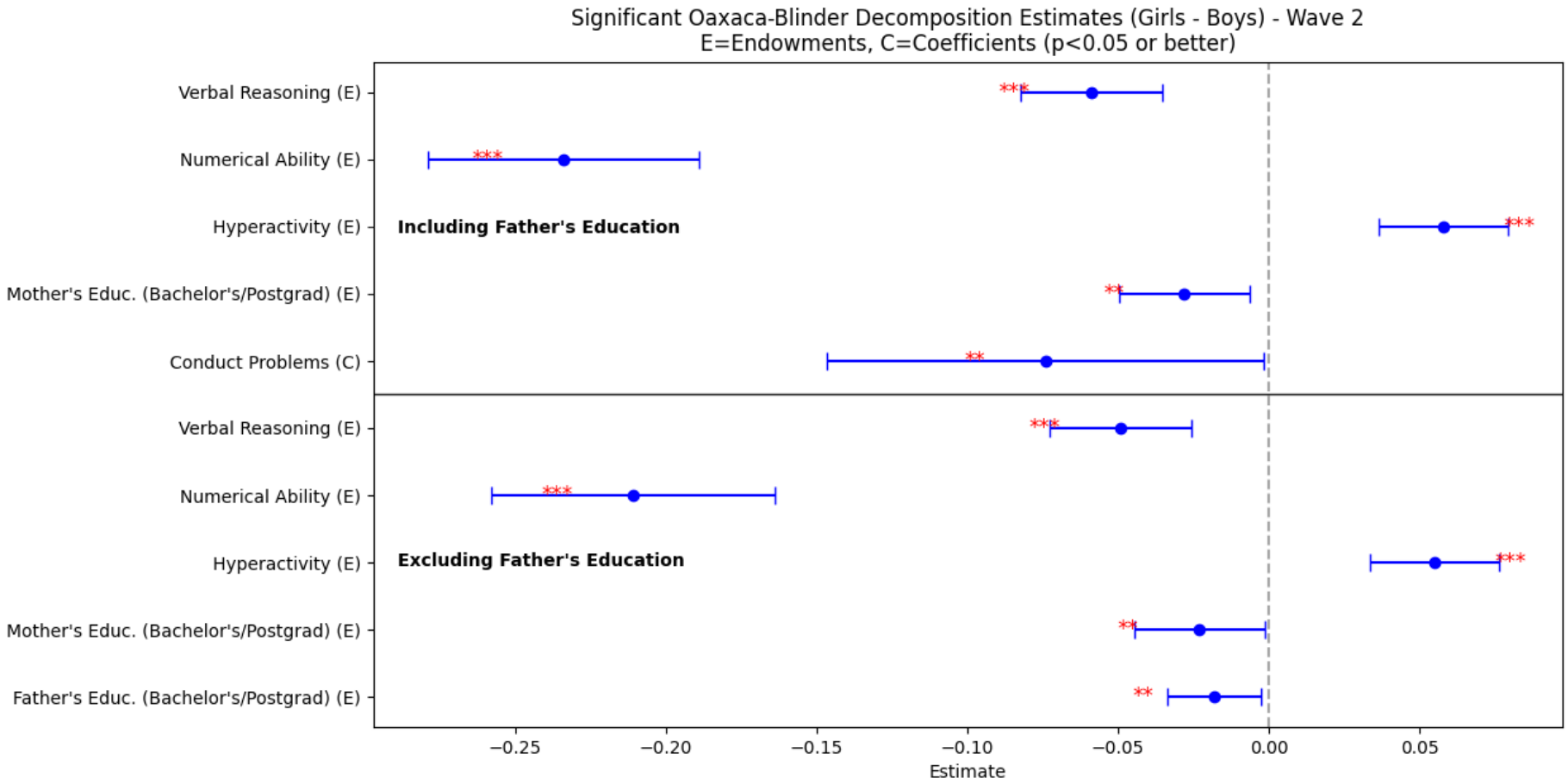
OBD Results - Girls vs Boys, age 9, significant estimates



OBD Resuts - Girls vs Boys, age 13



OBD Results - Girls vs Boys, age 13, significant estimates



What have we learned from the OBD by gender?

- Early skill gaps are measurable and predictive $\rightarrow$ cognitive and socioemotional traits at ages 9 and 13 have lasting effects on achievement at age 15. This supports the economic theory of dynamic skill formation (Cunha & Heckman, 2007).
- By age 13, girls receive $\uparrow$ returns to observed traits despite having slightly $\downarrow$ raw scores. This points to gendered production functions in education and is consistent with models of differential treatment or behavior-reward structures in schools.
- Including or excluding paternal education (often missing for lower-SES boys) significantly shifts the estimates (it's important to account for endogenous sample selection in applied micro work in general).
- Gender achievement gaps are not fully explained by observable traits $\rightarrow$ a substantial part of the gender gap is unexplained (consistent with theories of differential treatment, peer effects, or latent noncognitive factors not captured in standard data).

Defining father absence

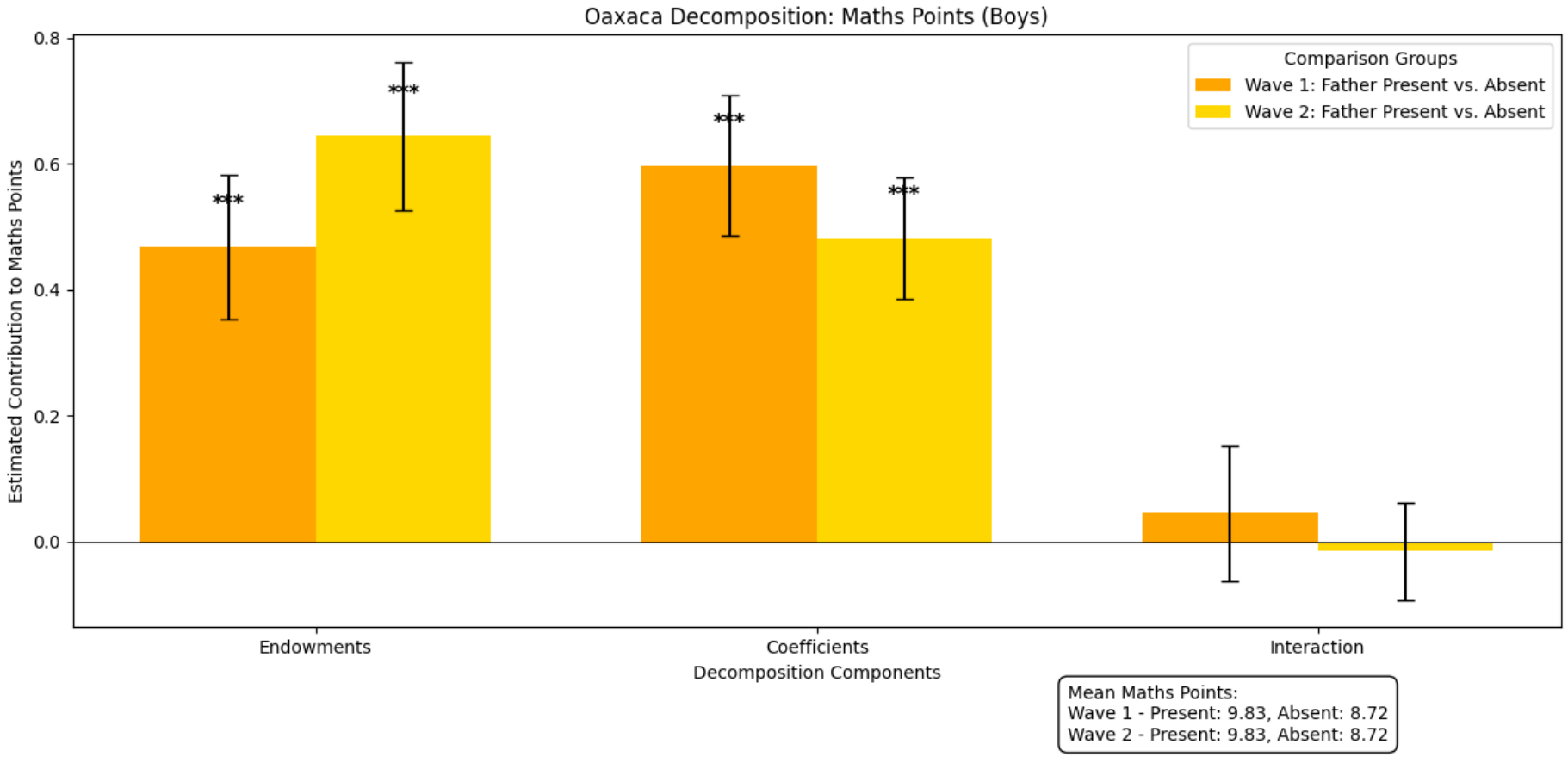
- Father absence is defined as non-response to the father questionnaire in both Waves 1 and 2.
- Captures consistent paternal disengagement, not just physical absence.
- 80% of these cases are single-mother households; 20% are fathers present but disengaged $\rightarrow$ from emotional disengagement to physical absence.
- This distinction is useful, as it reflects both structural and behavioural disengagement $\rightarrow$ important for understanding returns.
- In the following decompositions I examine how father absence affects Maths achievement and whether effects differ by gender and developmental stage.

OBD - Context, Present vs Absent Father

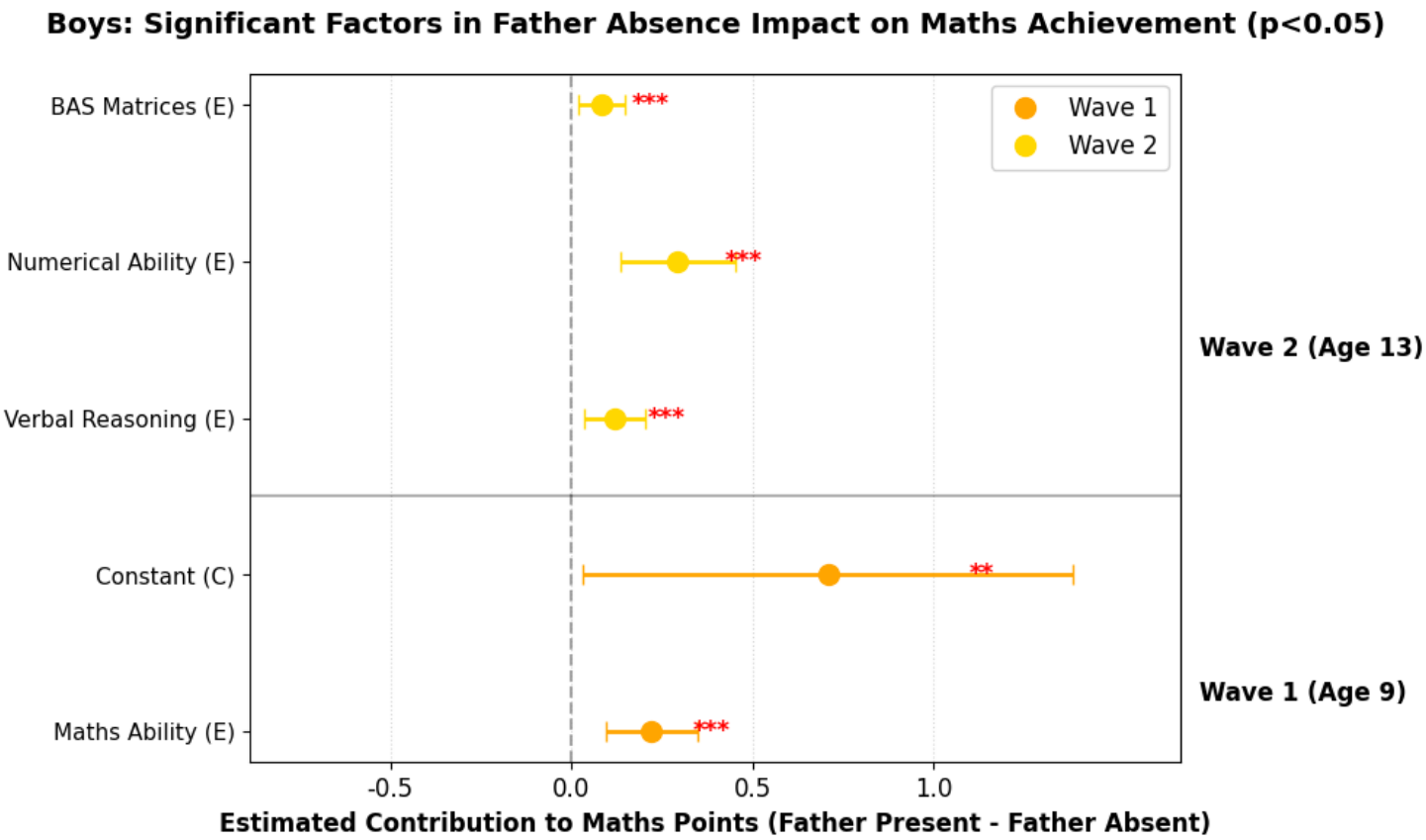
Do children with absent fathers perform worse in Maths? If yes, is it because they have fewer skills or because they receive lower returns to their skills?

Symbol	Meaning	Context
$\bar{Y}_P$	Expected average Maths score for boys/girls with present fathers	Expected Maths scores for boys/girls with present fathers
$\bar{Y}_A$	Expected average Maths score for boys/girls with absent fathers	Expected Maths scores for boys/girls with absent fathers
$\bar{X}_P$	Average characteristics for boys/girls with present fathers	Average characteristics for present-father boys/girls
$\bar{X}_A$	Average characteristics for boys/girls with absent fathers	Average characteristics for absent-father boys/girls
β_P	Effect of characteristics on Maths scores for boys/girls with present fathers	How characteristics affect Maths scores for boys/girls with present fathers
β_A	Effect of characteristics on Maths scores for boys/girls with absent fathers	How characteristics affect Maths scores for boys/girls with absent fathers

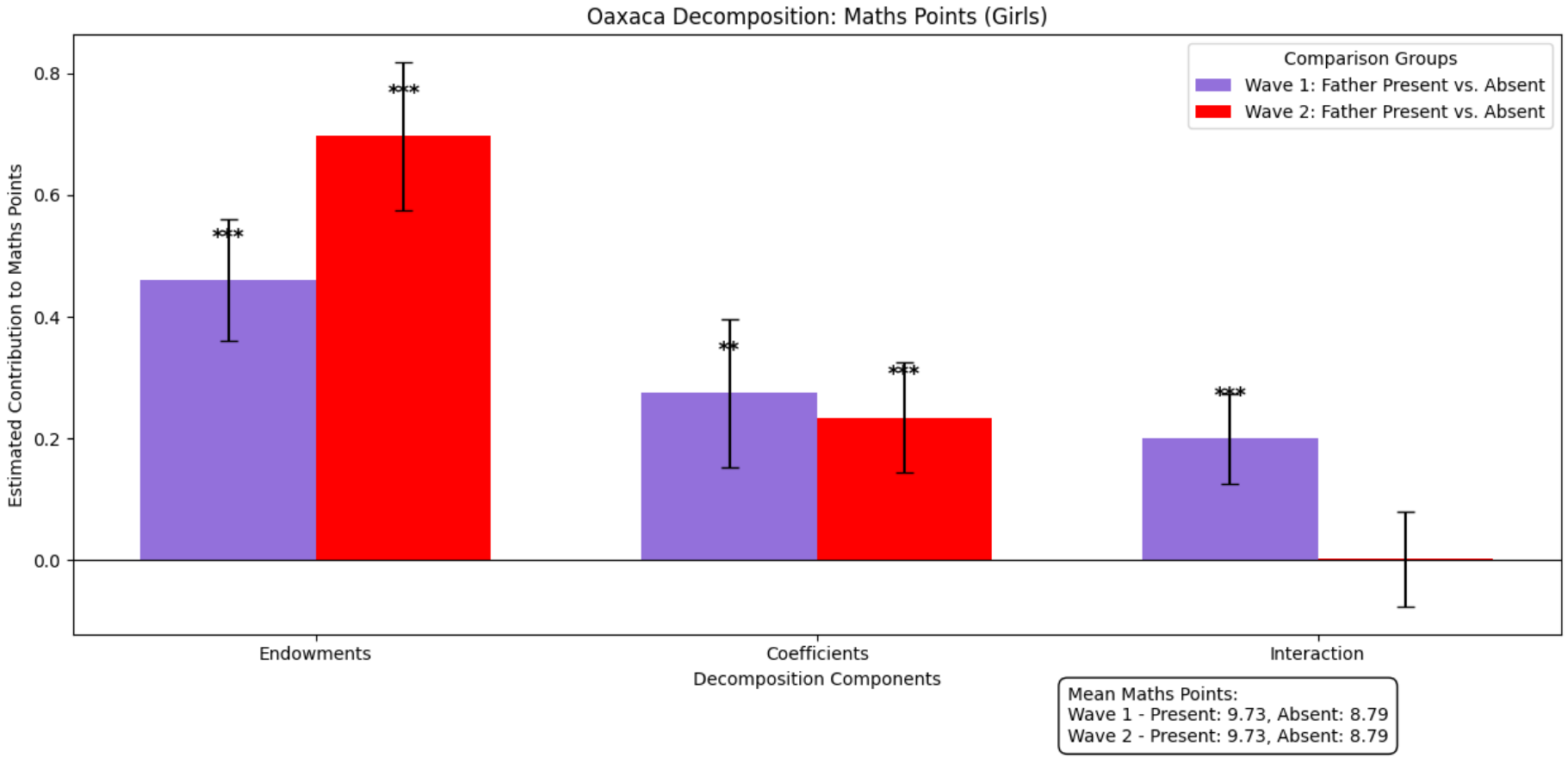
OBD - Present x Absent Fathers (Boys, W1W2)



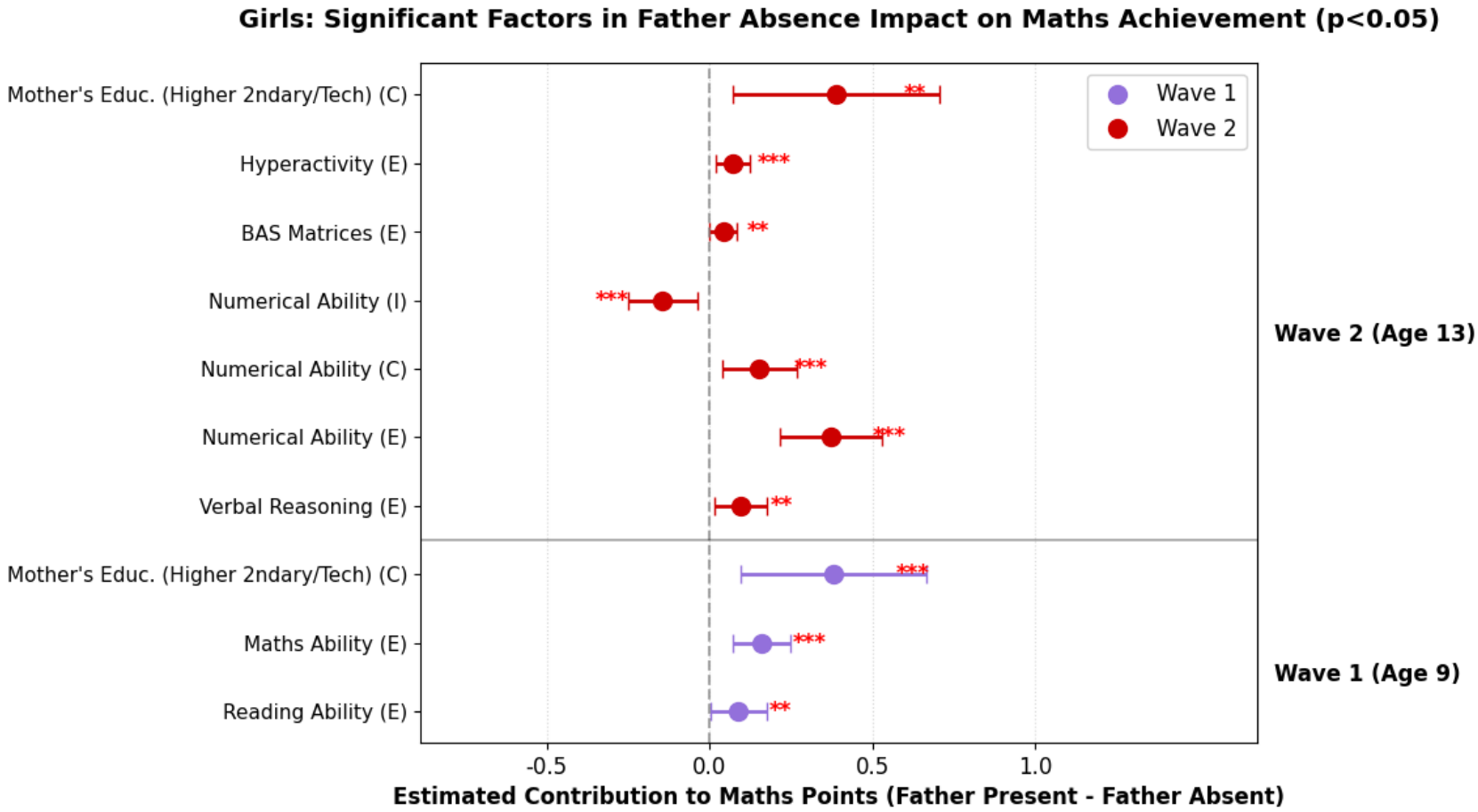
OBD - Present x Absent Fathers (Boys, W1W2), estimates



OBD - Present x Absent Fathers (Girls, W1W2)



OBD - Present x Absent Fathers (Boys, W1W2), estimates



Potential mechanisms behind the gaps

- For boys: larger coefficients effects in both waves $\rightarrow$ lower returns to skills when father is absent; especially strong for Maths ability and unobserved factors (constant term).
- For girls: $\uparrow$ endowments effects by age 13 $\rightarrow$ stronger skills base; significant maternal education coefficients $\rightarrow$ mother may compensate; girls show significant return to numerical ability when fathers are present.
- It suggests that father absence influences **how** boys' skills are rewarded, and **which** skills girls are able to develop.

What drives the gap?

- Numerical Ability is the dominant contributor to the gap in both waves.
- Mother's education plays a compensatory role, especially for girls
- School characteristics (e.g., mixed schools) gain importance by Wave 2 $\rightarrow$ OVB?
- Male coefficient becomes significant in Wave 2 $\rightarrow$ father presence reinforces gendered advantages.
- Interaction effects decrease $\rightarrow$ a clearer distinction between skills and returns.

Why this matters?

- Gaps of 1 point on the OPS scale matter, this is grade-level performance $\rightarrow$ may affect subject choice for Leaving Cert, with long-term implications.
- Differences reflect human capital formation pathways $\rightarrow$ Endowments = skill acquisition + Coefficients = productivity of those skills.
- Gender-differentiated effects suggest different strategies needed for boys and girls. For boys: early skill-building, behavioural supports, male mentorship may help (boys, specifically, do better when they have male teachers, and this is especially true in English where boys struggle most, while girls don't do worse when they have male teachers). For girls: support cognitive development and parental engagement (esp. maternal)
- We should consider school-level interventions in adolescence when institutional environment matters more.

Final takeaways

1. Observable traits do not explain the entire gap — returns differ by gender and family context.
2. Father absence, when consistent across time, is associated with lower Maths returns, especially for boys.
3. Cognition and behavioural traits play different roles in predicting outcomes by gender.
4. Gender gaps in Maths are not static — they emerge and evolve, particularly at early adolescence.
5. Interventions should target behavioural development, especially hyperactivity, and support single-parent households early.

Summary stats - I

Variable	Obs	Mean	Std. Dev.	Min	Max
Maths points (Junior Cert)	5,926	9.57	1.76	2	12
English points (Junior Cert)	5,906	10.13	1.35	5	12
Reading Ability (Logit, W1)	5,917	0.23	0.98	-3.36	2.87
Maths Ability (Logit, W1)	5,977	-0.57	0.91	-3.62	1.90
Verbal Reasoning (Logit, W2)	5,785	0.03	0.89	-2.55	1.78
Numerical Ability (Logit, W2)	5,757	0.02	0.89	-2.36	2.11
BAS Matrices (W2)	5,537	117.00	18.30	10	161
Emotional Symptoms (W1)	6,034	1.99	1.96	0	10
Conduct Problems (W1)	6,030	1.21	1.41	0	10
Hyperactivity (W1)	6,028	2.92	2.41	0	10
Peer Problems (W1)	6,024	1.12	1.43	0	10
Emotional Symptoms (W2)	6,038	1.75	1.90	0	10
Conduct Problems (W2)	6,038	1.05	1.35	0	10
Hyperactivity (W2)	6,038	2.50	2.31	0	10
Peer Problems (W2)	6,038	1.07	1.45	0	10

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Summary stats - II

Variable	Obs	Mean	Std. Dev.	Min	Max
Male	6,039	0.49	0.50	0	1
PCG Education (W1)	6,039	3.77	1.26	1	6
SCG Education (W1)	5,197	3.61	1.42	1	6
PCG Education (W2)	6,039	3.94	1.24	1	6
SCG Education (W2)	4,704	3.84	1.37	1	6
PCG Education (3-4) (W1)	6,039	0.56	0.50	0	1
PCG Education (5-6) (W1)	6,039	0.29	0.45	0	1
SCG Education (3-4) (W1)	5,197	0.46	0.50	0	1
SCG Education (5-6) (W1)	5,197	0.29	0.46	0	1
Income Quintile (W1)	5,613	3.41	1.34	1	5
PCG Education (3-4) (W2)	6,039	0.57	0.50	0	1
PCG Education (5-6) (W2)	6,039	0.33	0.47	0	1
SCG Education (3-4) (W2)	4,704	0.49	0.50	0	1
SCG Education (5-6) (W2)	4,704	0.34	0.47	0	1
Income Quintile (W2)	5,610	3.31	1.40	1	5
Fee-Paying (W2)	5,811	0.10	0.30	0	1
DEIS (W2)	5,811	0.13	0.33	0	1
Religious School (W2)	6,039	0.66	0.47	0	1
Mixed School (W1)	5,652	0.76	0.43	0	1
Mixed School (W2)	5,663	0.54	0.50	0	1

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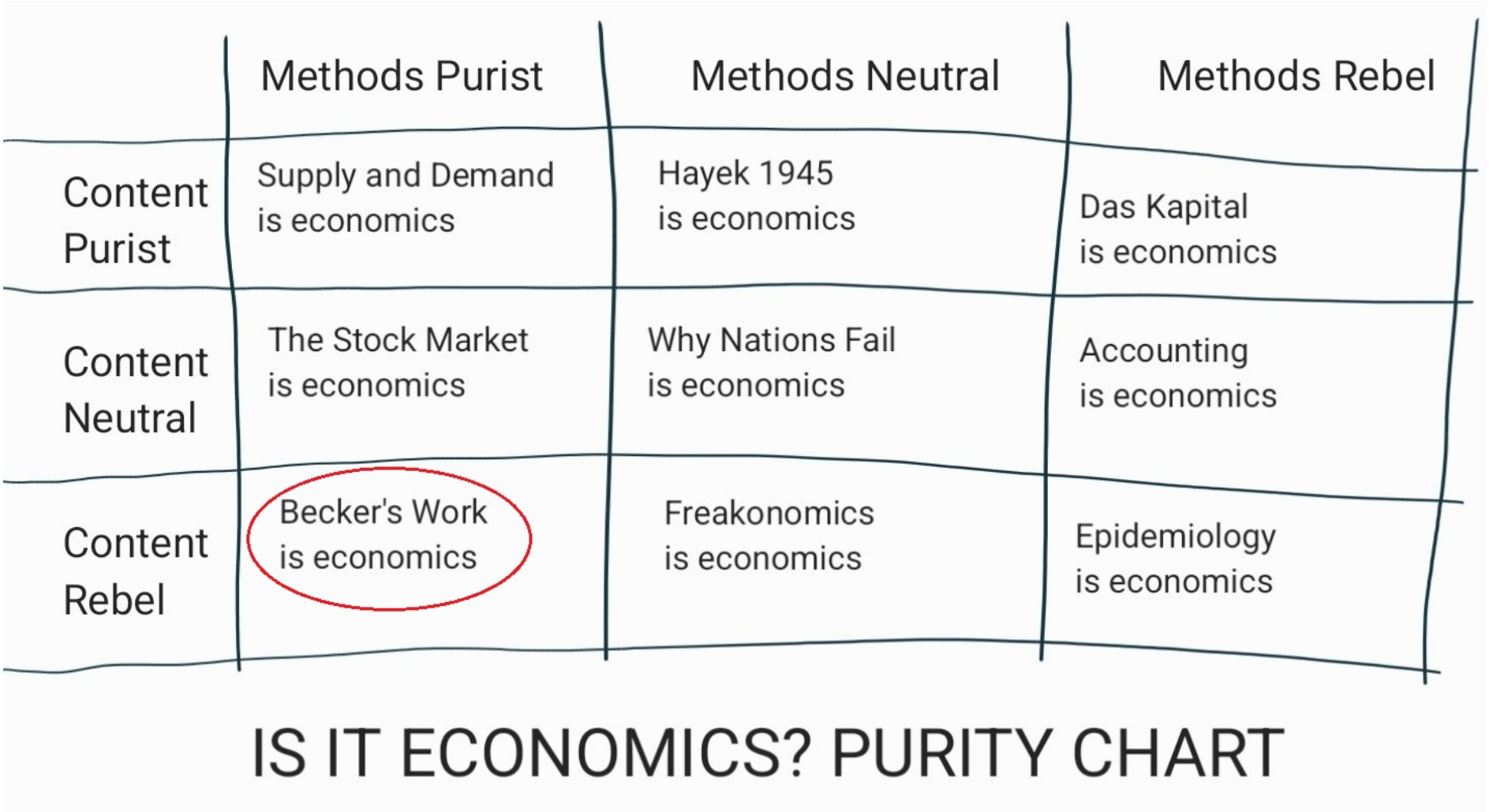
How is this Economics



Questions you might ask

1) Why focus on Maths and not other subjects? Maths is a key STEM gateway subject, with implications for long-term earnings and gender representation in high-paying fields.
2) Why focus on father absence rather than broader family instability? It's about selection and disengagement specifically through survey non-response, which provides a measurable proxy for disengagement over time.
3) Should we interpret father absence as causal? Absolutely not :) I am not claiming causality but rather exploring patterns of association, especially as selection into non-response is likely non-random.
4) Why is the gender gap not significant at age 9 but is at age 13? Likely due to the school transition and growing behavioural issues among boys (like hyperactivity) likely play a role, consistent with adolescence literature. More on the last slide.

Questions you might ask

5) Why does income become less significant when school indicators are added? School indicators capture institutional effects correlated with income (like DEIS targeting disadvantaged schools), the income coefficient absorbs less variance.
6) How should we interpret the 'unexplained' component in OBD results? Unexplained $\neq$ discrimination necessarily. It means the same traits produce different outcomes, which could reflect treatment differences, measurement issues, or omitted variables.
7) Have you considered endogeneity in the predictors? E.g., what if cognitive ability and income are simultaneously determined? While the study is not designed to identify causal effects, I control for observable characteristics. Future work could explore IV approaches (e.g., shocks to income or school quality) if suitable instruments exist.

Econometric considerations

- **Clustering**: School identifiers are not available in the AMF. Standard errors are robust, but not clustered.
- **Endogeneity**: Predictors are observational and not instrumented. No causal claims are made — results describe associations only.
- **Model Choice**: OLS is used to enable interpretability and decomposition. Nonlinear is a possible extension.
- **Fixed Effects**: Not applicable here. Most predictors (e.g., cognition, SDQ, SES) are measured at a single time point and would drop out.
- **Multicollinearity**: Variance inflation factors (VIFs) are within acceptable range; no evidence of problematic multicollinearity.

OPS Scale

Table: Junior Certificate Overall Performance Scale (OPS)

Higher Level	Ordinary Level	Foundation Level	OPS Score
A			12
B			11
C			10
D	A		9
E	B		8
F	C		7
	D	A	6
	E	B	5
	F	C	4
		D	3
		E	2
		F	1

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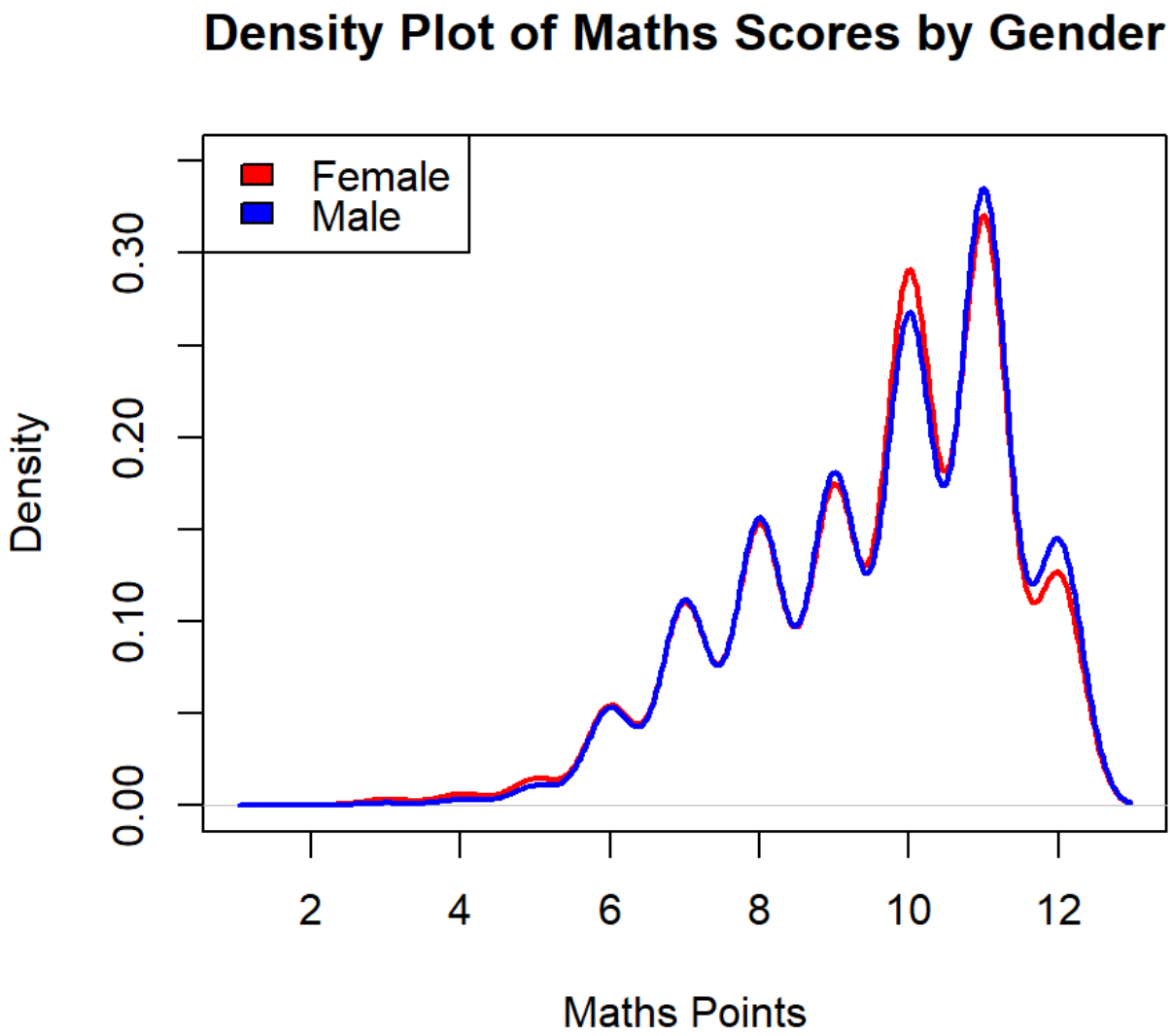
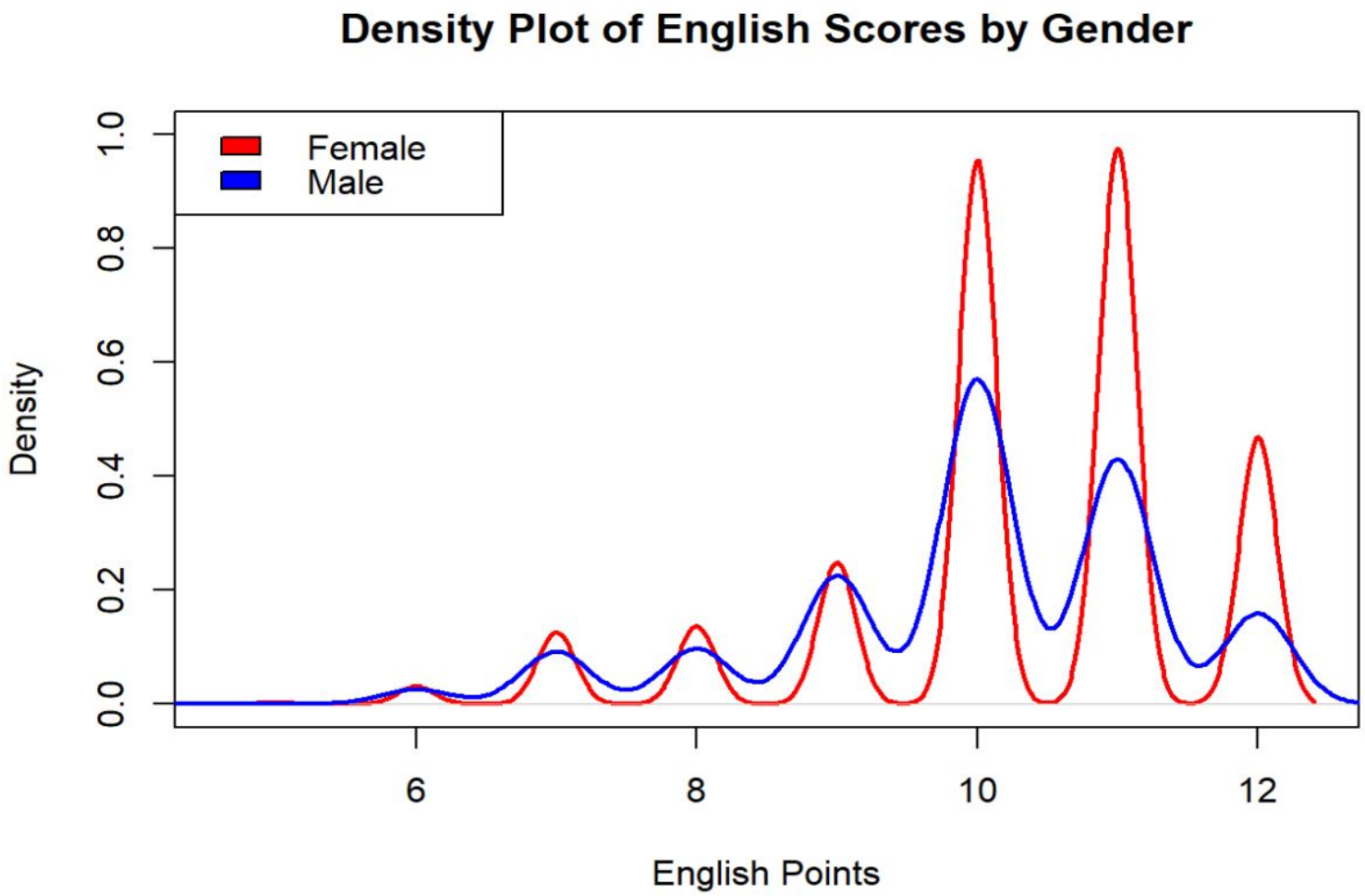
Points distribution - Maths



Points distribution - English



The Strengths and Difficulties Questionnaire (SDQ)

- A widely-used behavioural screening tool for ages 3–16
- Measures both difficulties and strengths
- Contains 25 items across five subscales:
  - Emotional Symptoms
  - Conduct Problems
  - Hyperactivity/Inattention
  - Peer Problems
  - Prosocial Behaviour
- Completed by parents, teachers, or the child (age-dependent)
- 3-point Likert scale: *Not True*, *Somewhat True*, *Certainly True*

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Use of the SDQ in this Study

- SDQ completed by:
  - **Wave 1 (Age 9)**: Primary caregiver and teacher
  - **Wave 2 (Age 13)**: Primary caregiver only
- Focused on 4 subscales:
  - Emotional Symptoms
  - Conduct Problems
  - Hyperactivity
  - Peer Problems
- *Note: Prosocial Behaviour scale was excluded due to how the score was calculated in AMF files.*
- Each scale contains 5 items; some are reverse-scored
- Higher scores indicate more behavioural difficulties

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SDQ Sample Items by Subscale

Emotional Symptoms

- Complains of headaches or sickness
- Many worries
- Often unhappy or tearful

Conduct Problems

- Temper tantrums
- Disobedience (rev.)
- Lies or cheats

Hyperactivity

- Overactive or restless
- Easily distracted
- Fidgeting

Peer Problems

- Rather solitary
- Picked on by peers
- Gets on better with adults

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Variables I

Cognitive ability is measured using standardized assessments that capture both verbal and numerical reasoning. At age 9, children completed the Drumcondra Primary Reading and Maths Tests, while at age 13 they were assessed on Verbal and Numerical Reasoning as well as non-verbal ability using the BAS Matrices test. To ensure comparability across different test versions and school levels, logit scores are used rather than raw percentages, providing a more reliable estimate of underlying ability. Socioemotional development is captured through four subscales of the Strengths and Difficulties Questionnaire (SDQ): Emotional Symptoms, Conduct Problems, Hyperactivity/Inattention, and Peer-relationship Problems. These traits reflect important dimensions of self-regulation and behavior that are known to influence academic performance, particularly through their effects on classroom engagement and attentional control.

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Variables II

Socioeconomic status is captured primarily through parental education and household income. Maternal and paternal education are recorded as the highest level of completed schooling and recoded into two dummy variables for each parent: one for higher secondary/technical education and one for third-level degrees. Income is equivalised to account for household composition and then converted into quintiles. These measures allow for consistent comparisons across households with different structures and resources. School-level characteristics include whether the child attended a mixed-gender (CoEd), fee-paying, DEIS (disadvantaged), or religious school. However, except for CoEd, these school indicators are only available at age 13, reflecting the fact that Wave 2 captures the transition to post-primary education when institutional context becomes more relevant for student outcomes.

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Family dynamics - W1W2

Table 11: Summary of Family Dynamics Transitions Between Wave 1 and Wave 2

Transition Type	Count	Percentage
Partner Status Transitions		
No partner → No partner	360	85.1% of initially without partner
No partner → Partner	63	14.9% of initially without partner
Partner → Partner	4,141	96.2% of initially with partner
Partner → No partner	165	3.8% of initially with partner
Primary Caregiver Marital Status Transitions		
Married → Married	3,868	95.9% of initially married
Married → Separated	101	2.5% of initially married
Married → Divorced	33	0.8% of initially married
Separated → Separated	118	60.5% of initially separated
Separated → Married	16	8.2% of initially separated
Separated → Divorced	53	27.2% of initially separated
Never married → Never married	291	81.1% of initially never married
Never married → Married	60	16.7% of initially never married
Secondary Caregiver Participation Transitions		
No SCG → No SCG	360	85.1% of initially without SCG
No SCG → SCG (completed)	38	9.0% of initially without SCG
No SCG → SCG (non-completed)	25	5.9% of initially without SCG
SCG (completed) → SCG (completed)	3,619	87.8% of initial SCG completers
SCG (completed) → SCG (non-completed)	359	8.7% of initial SCG completers
SCG (completed) → No SCG	146	3.5% of initial SCG completers
Key Net Changes		
Net partner loss	102	2.4% of initial partnered households
Net increase in separation/divorce	171	4.2% of initial married households
Net decrease in SCG questionnaire completion	223	5.4% of initial SCG completers

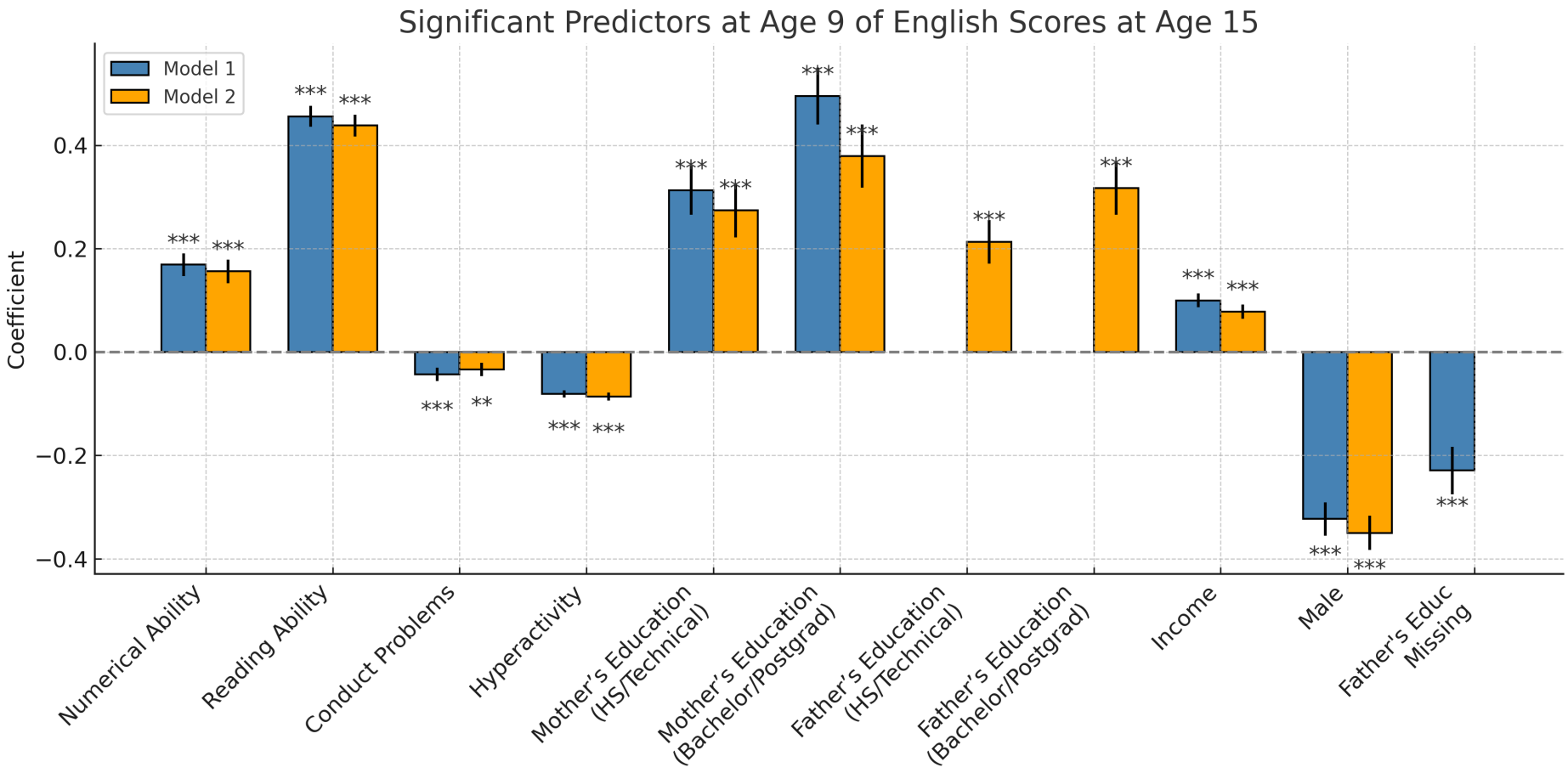
Family dynamics - W2W3

Table 12: Summary of Family Dynamics Transitions Between Wave 2 and Wave 3

Transition Type	Count	Percentage
Partner Status Transitions		
No partner → No partner	480	91.6% of initially without partner
No partner → Partner	44	8.4% of initially without partner
Partner → Partner	3,996	95.5% of initially with partner
Partner → No partner	186	4.5% of initially with partner
Primary Caregiver Marital Status Transitions		
Married → Married	3,771	95.1% of initially married
Married → Separated	114	2.9% of initially married
Married → Divorced	11	0.3% of initially married
Separated → Separated	159	65.1% of initially separated
Separated → Married	9	3.7% of initially separated
Separated → Divorced	55	22.5% of initially separated
Divorced → Divorced	85	56.7% of initially divorced
Divorced → Widowed	53	35.3% of initially divorced
Never married → Never married	267	89.0% of initially never married
Never married → Married	32	10.7% of initially never married
Secondary Caregiver Participation Transitions		
No SCG → No SCG	480	91.6% of initially without SCG
No SCG → SCG (completed)	17	3.2% of initially without SCG
No SCG → SCG (non-completed)	27	5.2% of initially without SCG
SCG (completed) → SCG (completed)	3,009	81.4% of initial SCG completers
SCG (completed) → SCG (non-completed)	584	15.8% of initial SCG completers
SCG (completed) → No SCG	149	4.0% of initial SCG completers
Key Net Changes		
Net partner loss	142	3.4% of initial partnered households
Net increase in separation/divorce	170	4.3% of initial married households
Net decrease in SCG questionnaire completion	436	11.8% of initial SCG completers

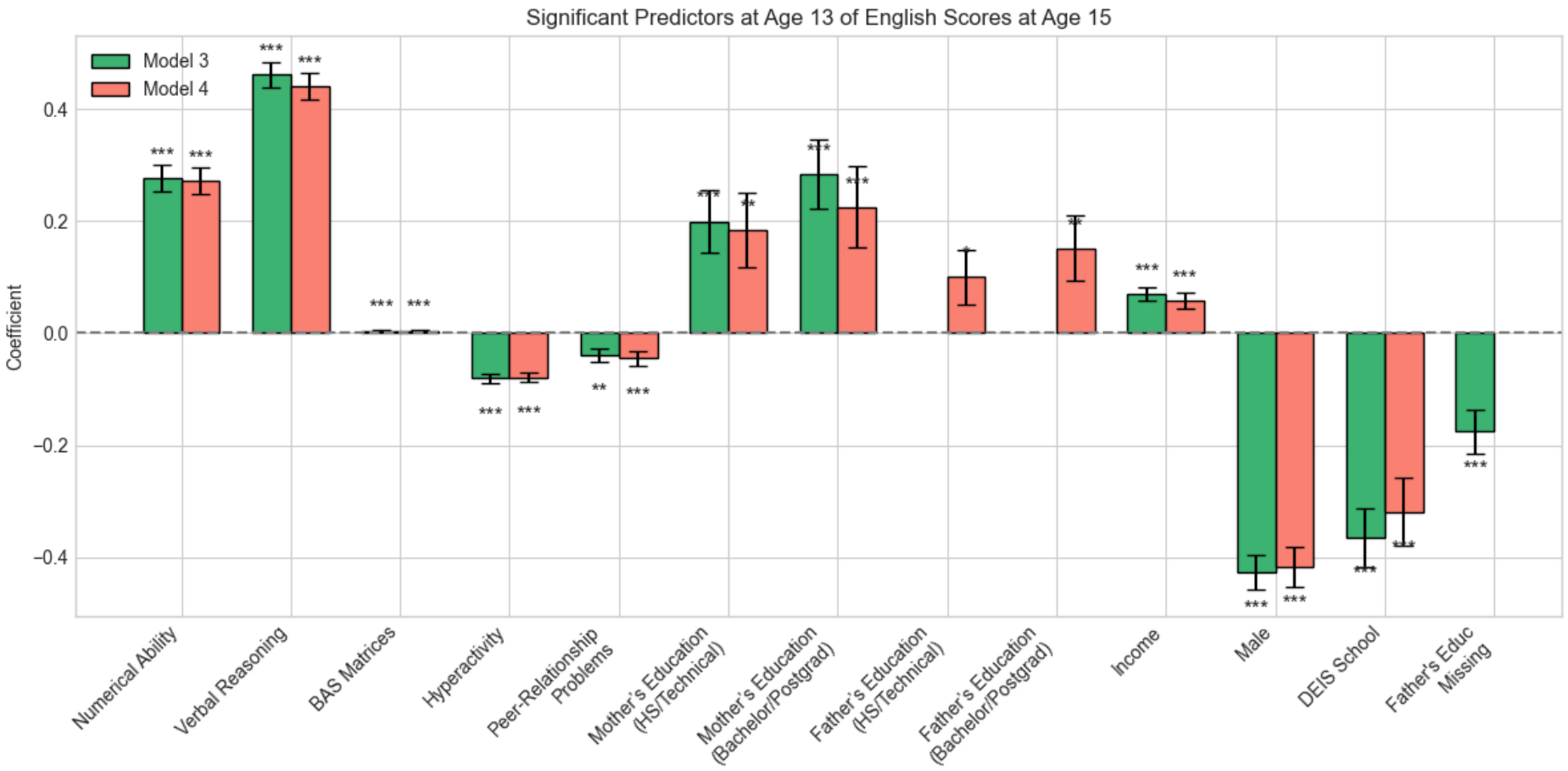
English

OLS Models with/without father's education, age 9



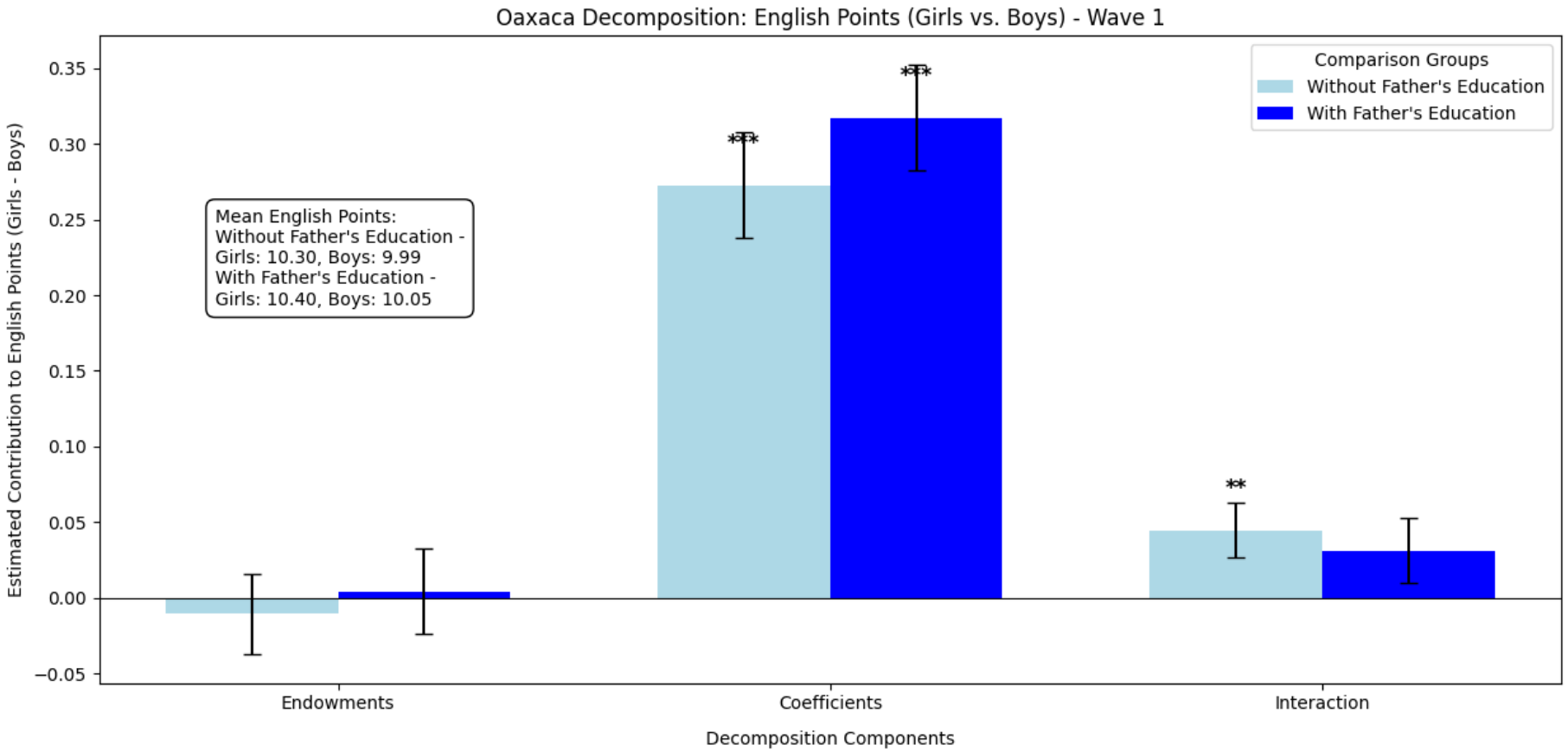
English

OLS Models with/without father's education, age 13



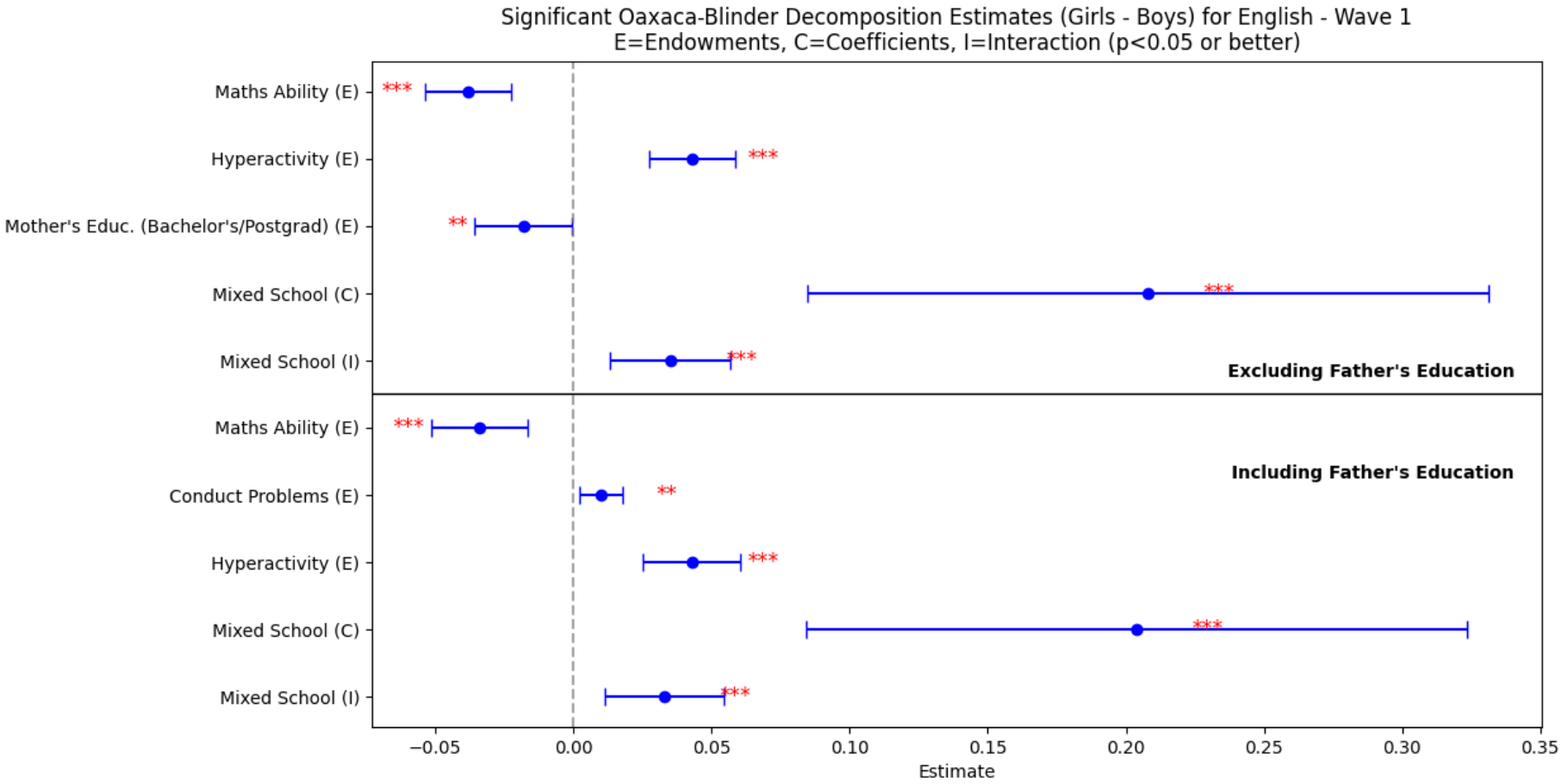
English

OBD Results - Girls vs Boys, age 9



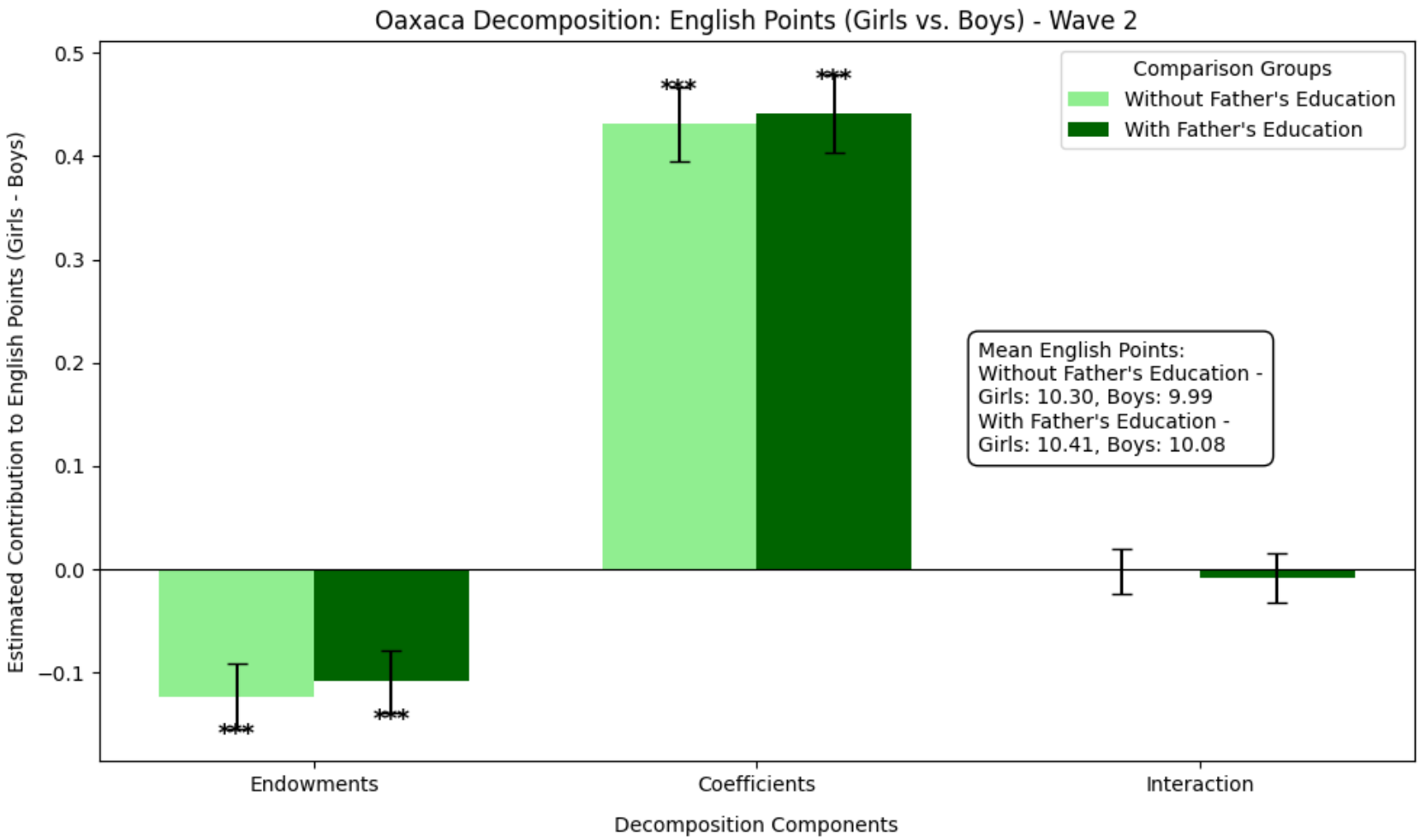
English

OBD Results - Girls vs Boys, age 9, significant estimates



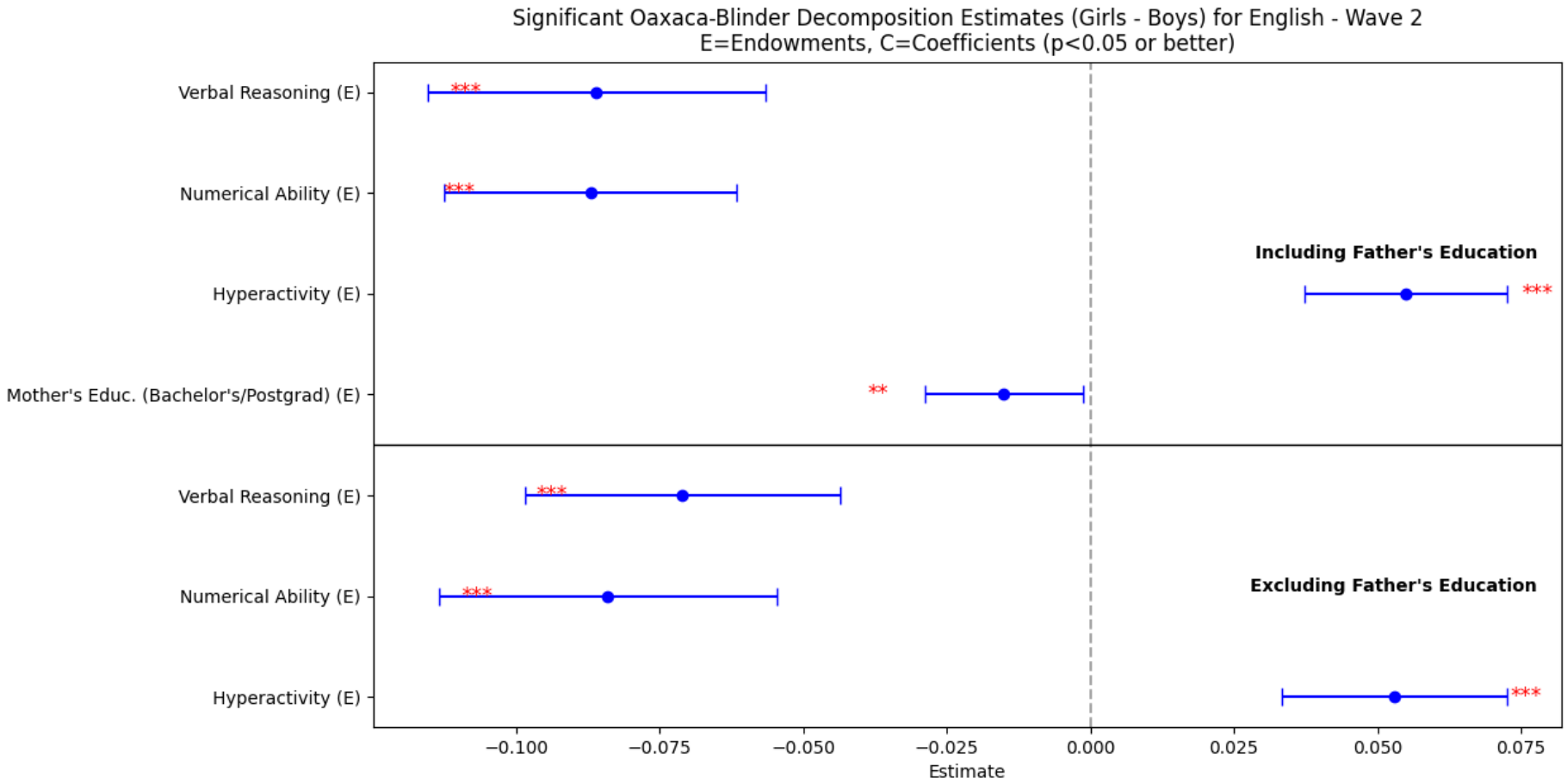
English

OBD Results - Girls vs Boys, age 13



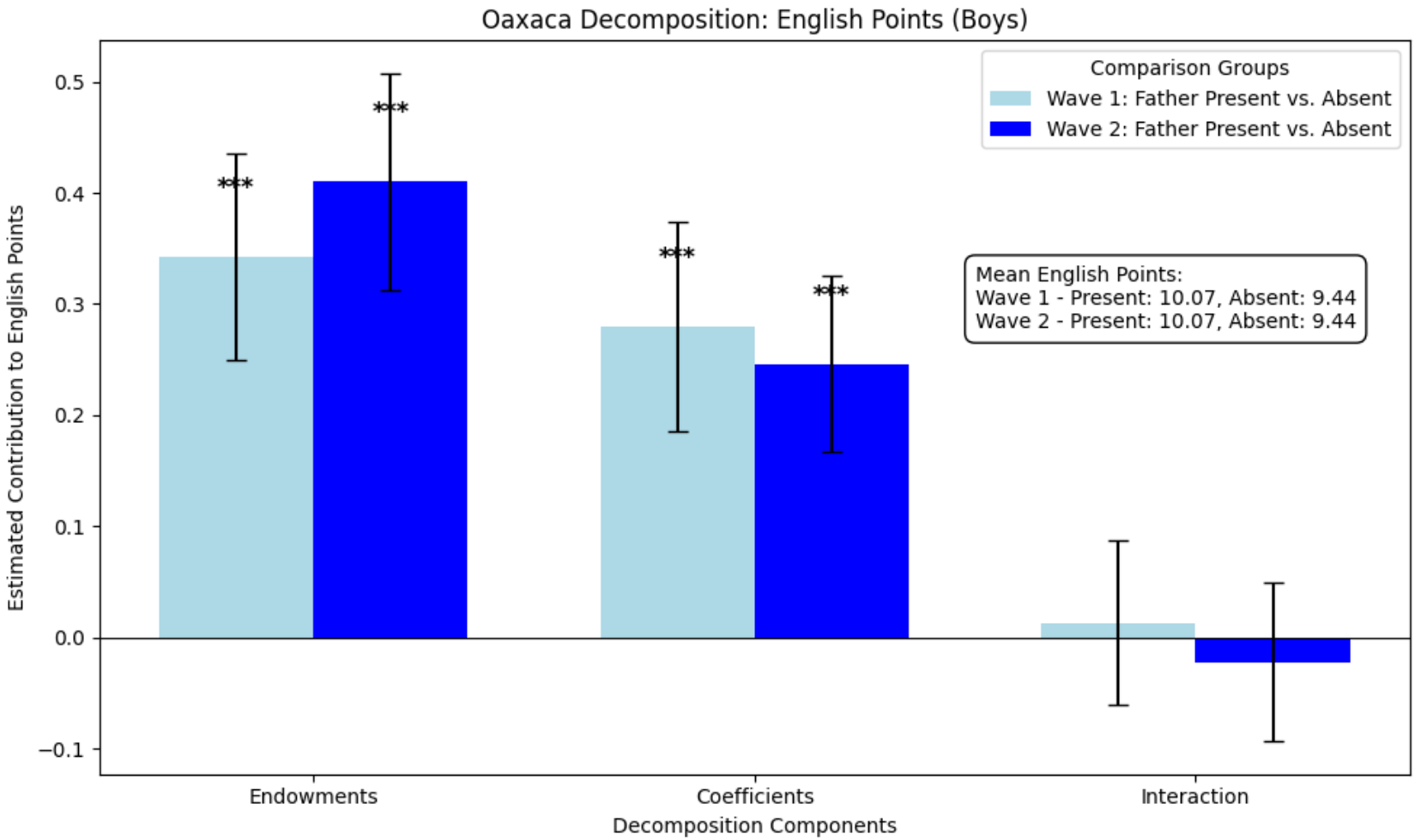
English

OBD Results - Girls vs Boys, age 13, significant estimates



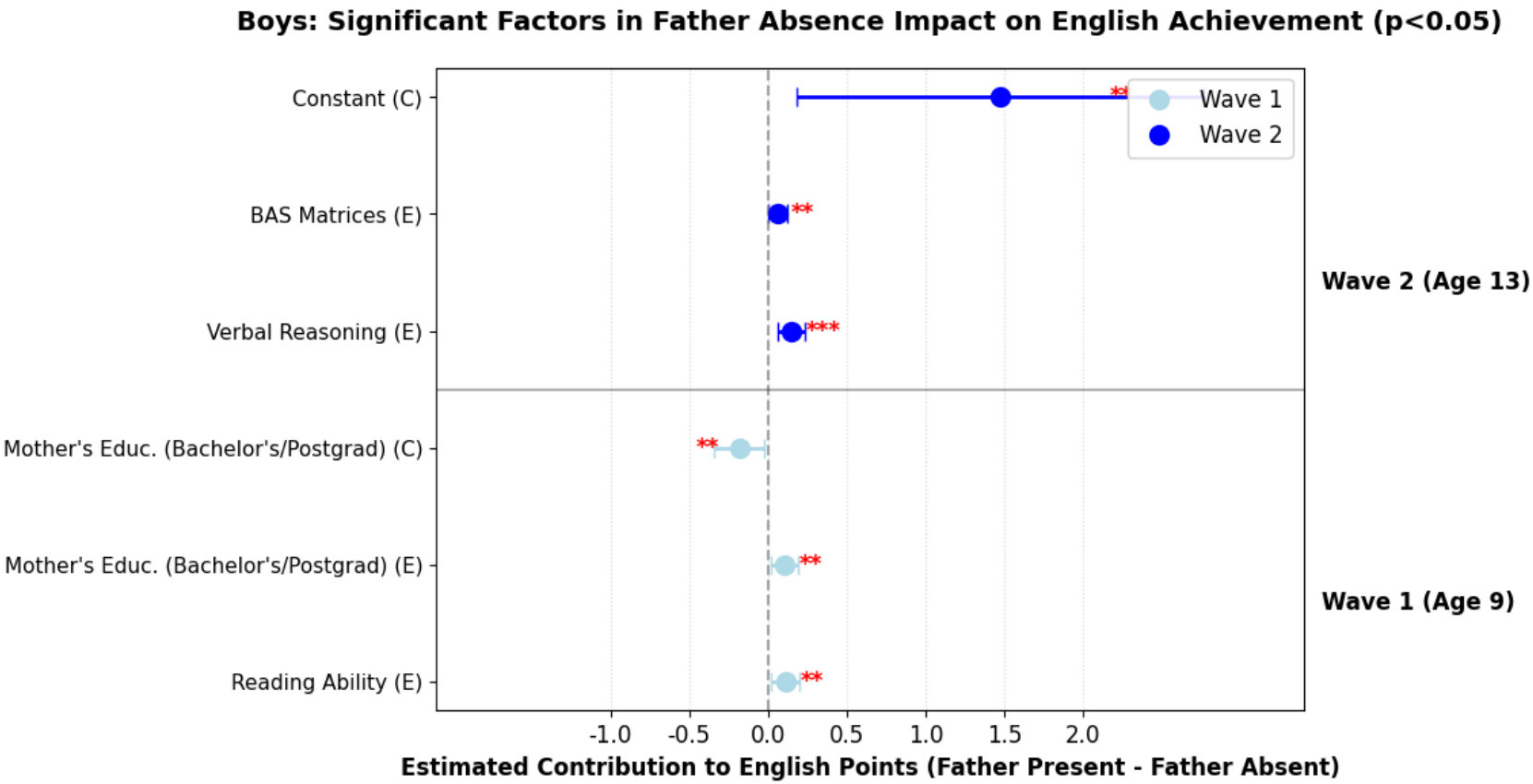
English

OBD - Present x Absent Fathers (Boys, W1W2)



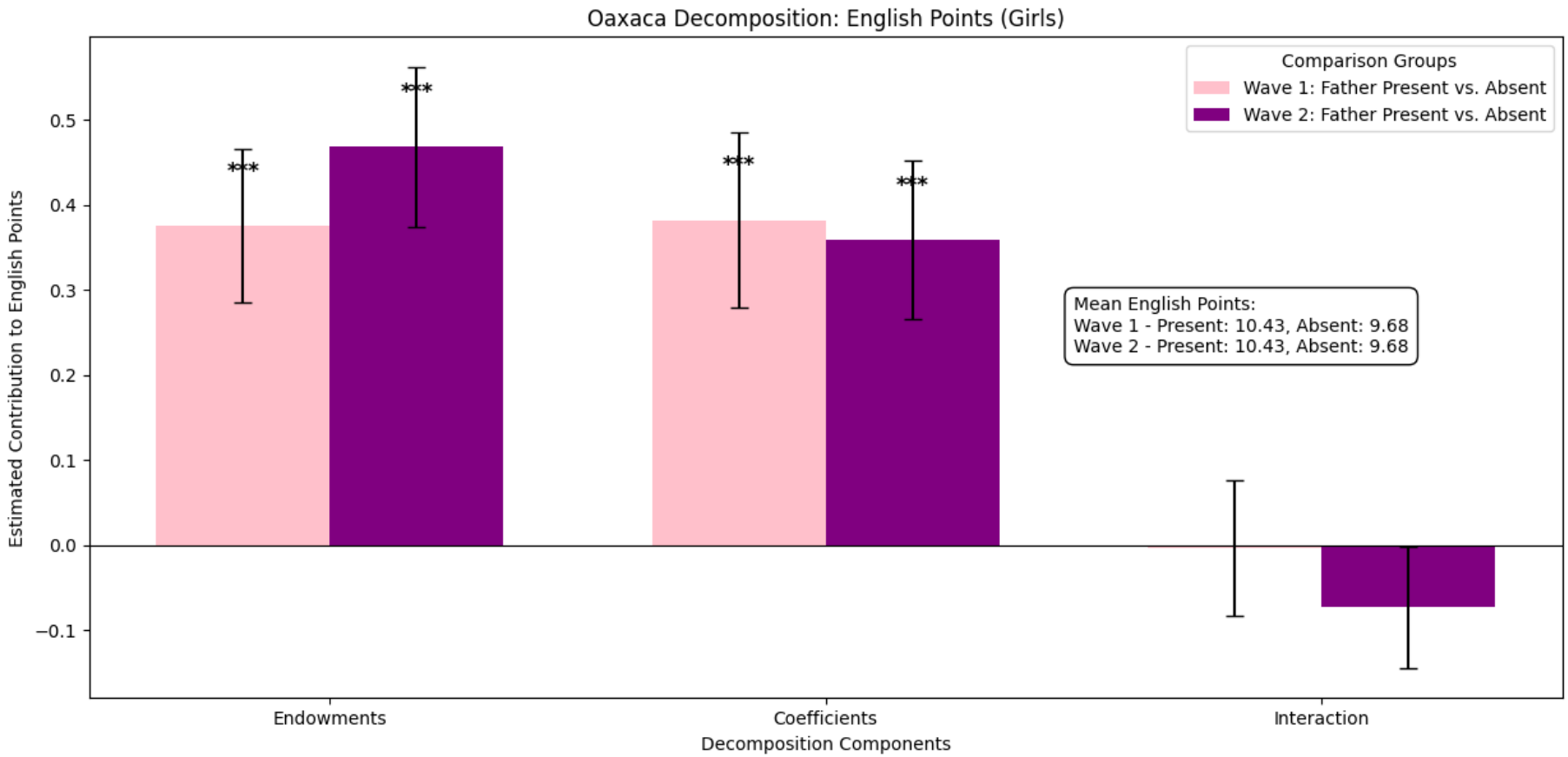
English

OBD - Present x Absent Fathers (Boys, W1W2), significant estimates



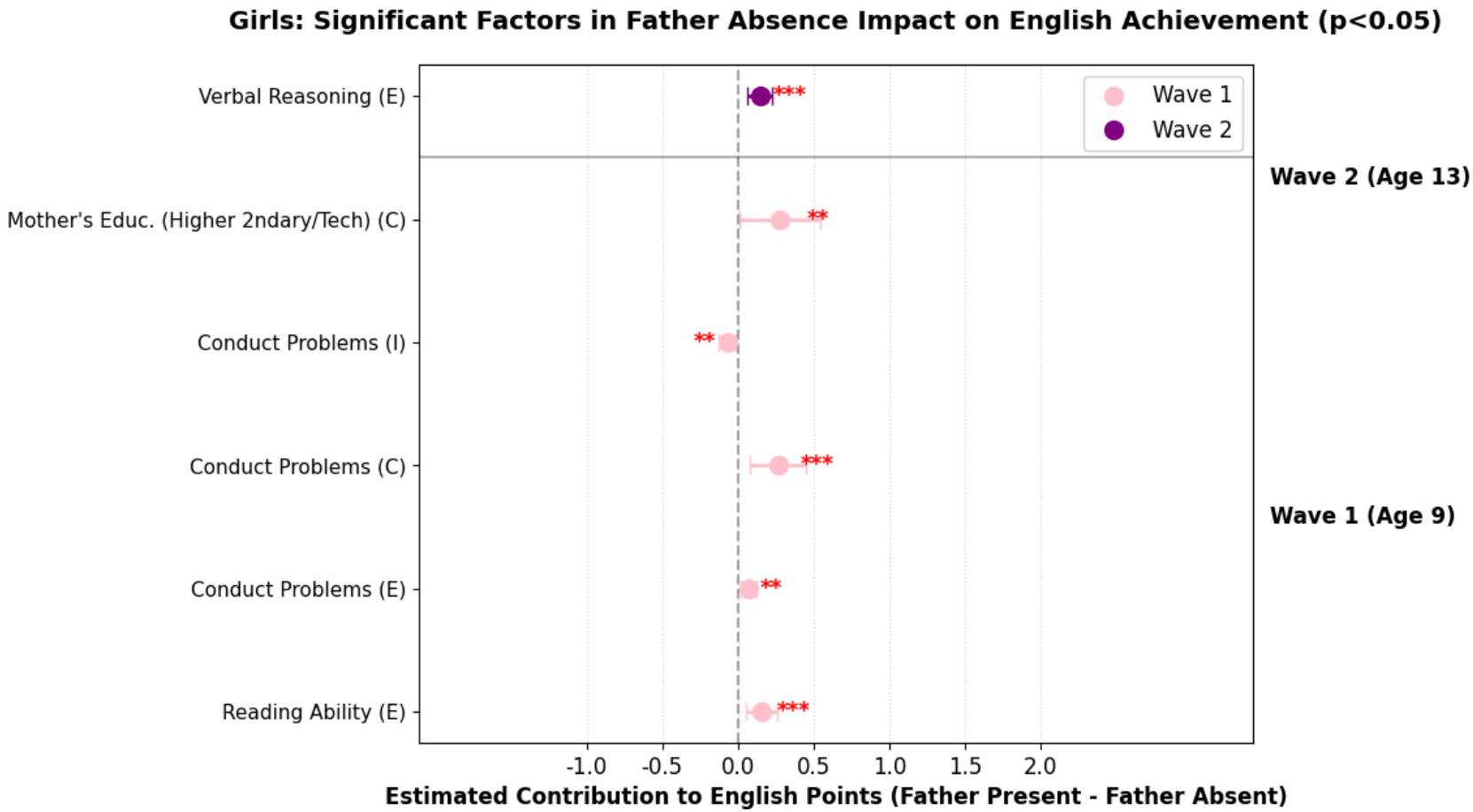
English

OBD - Present x Absent Fathers (Girls, W1W2)



English

OBD - Present x Absent Fathers (Girls, W1W2), significant estimates



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Developmental changes between primary/2ndary school - I

- Around age 9, most children are still in the concrete operational stage (Piaget), meaning they can think logically but mostly about tangible concepts.
- By age 13, many are transitioning into the formal operational stage, developing abstract thinking, reasoning, and metacognition — this can lead to divergence in academic engagement, especially in subjects like Maths and Science.
- Girls tend to mature earlier cognitively, and often outperform boys in school settings that reward organization, verbal fluency, and sustained attention.
- Girls typically enter puberty earlier than boys (often starting around 10–11 for girls vs. 11–12 for boys).

Developmental changes between primary/2ndary school - II

- This earlier maturation affects emotional regulation, self-concept, and motivation — and it often results in girls becoming more goal-oriented and compliant with school expectations.
- Boys, on the other hand, may still be in a more immature behavioural phase, with issues like inattention, impulsivity, and lower emotional regulation more prominent — especially in less structured settings.
- Hyperactivity and externalising behaviours (e.g., conduct issues) are more prevalent in boys and become more noticeable in early adolescence.
- Internalising behaviours (e.g., anxiety, perfectionism) rise more in girls but are often less disruptive to academic performance.

School transition

- The move to secondary school is a major environmental shock, often around age 12 in many systems.
- It tends to reward executive functioning skills (planning, time management), which girls often develop earlier.
- Boys — especially those with higher hyperactivity/inattention — may struggle more with the demands of self-regulation, leading to emerging gender gaps in academic performance.