

# The Effect of Parental Education on Childrens' Cognitive and Non-Cognitive Abilities

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# Motivation

- Strong economic relationship between parents and children

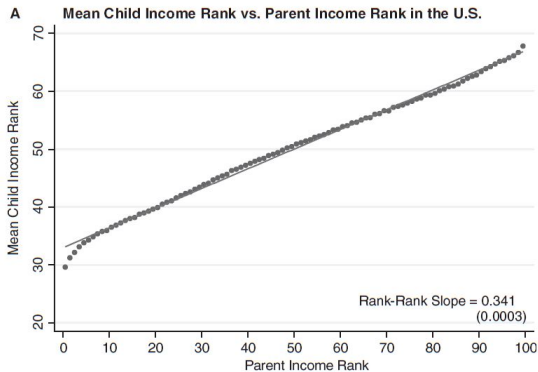


Figure 1: Chetty et al. (2014, Figure II)

# Motivation

- parental education identified to be the most promising/important factor [Haveman and Wolfe (1995) and Holmlund et al. (2011)]
- previous studies on intergenerational transmission did not control for parental ability
- "formal" education (e.g. year of schooling) might not capture the total effect of parental education (e.g. some parents might not been allowed to attend formal higher education but are smart)

# This Paper in a Nutshell

- **Question:** How does parental education affect childrens' cognitive and non-cognitive abilities? What is the role of parental ability?
- **Data:** 1970 British Cohort Study
- **Method:**
  - ▶ Ordinary Least Squares with county Fixed Effects (FE)
- **Results:**
  - ▶ After controlling for parental ability the effect of parental education on cognitive and non-cognitive abilities of children diminishes, particularly for the preschool children

# Literature

- literature on intergenerational transmission of parental education
  - ▶ positive correlation, but mixed causal results
  - ▶ potential confounding channels: assortative mating, role models
- previous studies did not control for parental ability measures (exemption: Amin et al. (2015))
  - ▶ adoption and twin design approaches implicitly control for ability, assuming that it is purely genetically

→ this paper is able to control for ability, measured at age 10

- literature on intergenerational transmission of parental abilities
  - ▶ mixed results on effects of parental education on childrens' cognitive and non-cognitive abilities

→ first paper to include parental ability into the analysis

# Data Set

- 1970 British Cohort Study (BCS70)
    - ▶ ~ 16,500 individuals born in April 1970 in England, Scotland and Wales
  - uniqueness of data set: longitudinal survey with questions on various topics, e.g. parenting behaviour and child characteristics
- data set gathers information on three generations
- information used are gathered in 1970-1986 (parents and grand-parents) and in 2004 (parents and children)
- final sample: 1,940 children (725 preschool, 1,215 school children)

Summary Statistics

Sample Selection

Sample Size

## Cognitive and Non-Cognitive Ability Measurement for Children

- British Ability Scale Second Edition (BASII)
  - assessment questions vary with child age (take education and cognitive development into account)
  - cognitive abilities
    - ▶ children 3-5 years: BASII Early Years Battery
    - ▶ children 6 years and older: BASII School Years Battery (takes formal education into account)
  - non-cognitive abilities
    - ▶ children 3 years and older: Strengths and Difficulties questionnaire

Example NV

Example WR

Example Non-Cog.

## Ability Measurement for Parents

- British Ability Scale (BAS)
- measured at age 10
- 4 different tests, capturing literacy and numeracy skills

Item		Group Example	Group Name
1	Red, blue, brown	I3575	I3576
2	Milk, lemonade, coffee	I3577	I3578
3	Skirt, hat, trousers	I3579	I3580
4	Loon, mouse, cow	I3581	I3582
5	Daisy, rose, dandelion	I3583	I3584
6	Rectangle, hexagon, circle	I3585	I3586
7	Cod, shark, pichard	I3587	I3588
8	Peas, cabbage, carrots	I3589	I3590
9	Cupboard, table, bed	I3591	I3592
10	Sandal, slipper, boot	I3593	I3594
11	Measles, chickenpox, mumps	I3595	I3596
12	Steel, silver, copper	I3597	I3598
13	Mosque, chapel, synagogue	I3599	I3600
14	Water, oil, blood	I3601	I3602
15	Sad, worried, happy	I3603	I3604
16	Ice, steam, snow	I3605	I3606
17	Book, telephone, newspaper	I3607	I3608
18	Sun, wood, oil	I3609	I3610
19	Poem, song, statue	I3611	I3612
20	Hotter, fatter, cleverer	I3613	I3614
21	Democracy, justice, equality	I3615	I3616

Figure 2: Example: Word Similarities



## Ordinary Least Squares (OLS) regression

$$y_c = \beta_1 S_p + \beta_2 A_p + \gamma \mathbf{X}_p + \delta_1 ChildAge_c + \delta_2 ChildAge_c^2 + \delta_4 (county\ FE) + u_c \quad (1)$$

# Descriptives: Parental Ability - Parental Education

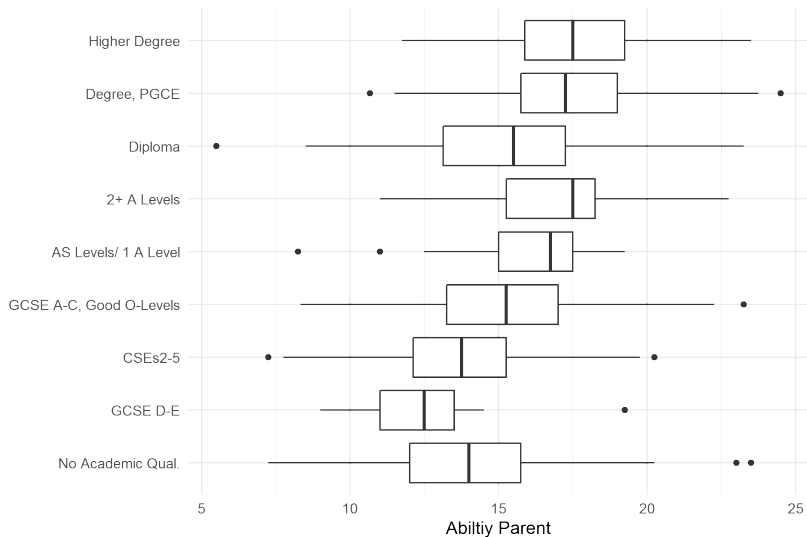


Figure 3: Correlation Parental Ability - Highest Academic Qualification

# Results: Ability - Cognitive Ability

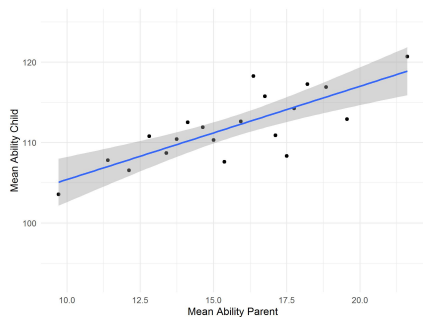


Figure 4: Preschool Children

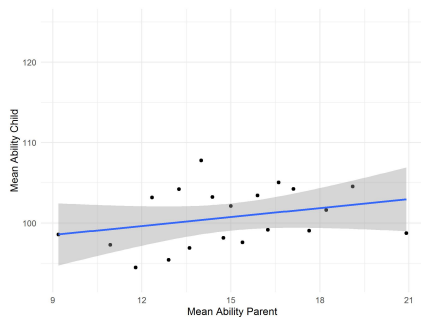


Figure 5: School-Age Children

# Results: Education - Cognitive Ability

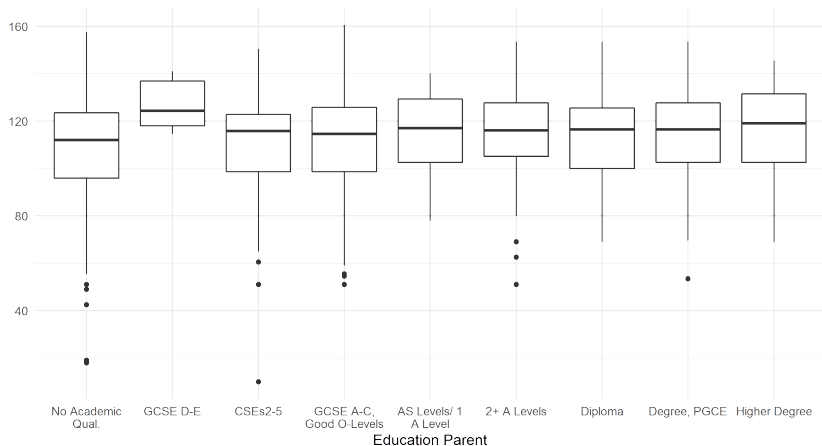


Figure 6: Preschool Children

# Results: Education - Non-Cognitive Ability

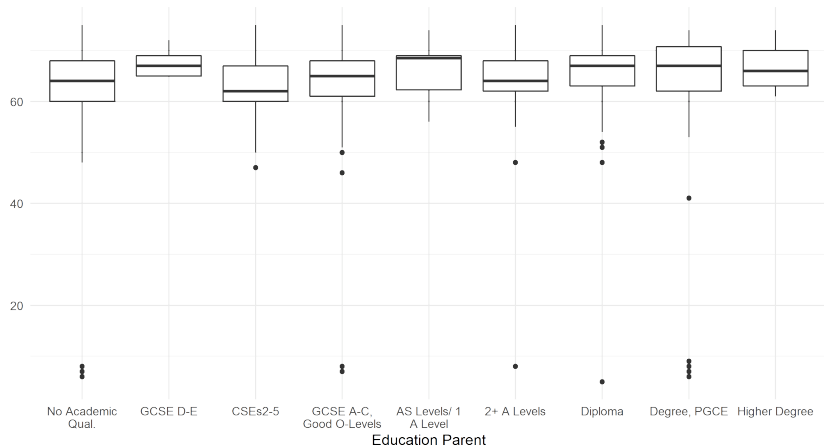


Figure 7: Preschool Children

# Results - Parental Education

Table 1: Effects of parental education

	Cognitive Ability		Non-Cognitive Ability	
	Preschool	School	Preschool	School
Years of Schooling	0.69*** (0.20)	0.26 (0.22)	0.30* (0.14)	0.06 (0.04)
Child Gender (female)	1.53 (1.01)	2.48* (1.13)	0.72 (0.83)	0.46 (0.24)
Child Age (Month)	4.09*** (0.63)	1.88*** (0.14)	0.61 (0.51)	0.01 (0.03)
Child Age (Month, Squared)	-0.02*** (0.01)	-0.01*** (0.00)	-0.00 (0.00)	-0.00 (0.00)
Parent Gender (female)	0.59 (1.36)	-2.16 (1.43)	1.04 (0.81)	0.44 (0.28)
Num. obs.	725	1215	701	1142
R <sup>2</sup> (full model)	0.59	0.58	0.17	0.09
R <sup>2</sup> (proj model)	0.54	0.54	0.03	0.01
Adj. R <sup>2</sup> (full model)	0.55	0.55	0.07	0.02
Adj. R <sup>2</sup> (proj model)	0.49	0.50	-0.09	-0.07

\*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$

# Results - Parental Education

Table 2: Effects of parental education and ability

	Cognitive Ability		Non-Cognitive Ability	
	Preschool	School	Preschool	School
Years of Schooling	0.37 (0.20)	-0.01 (0.22)	0.20 (0.15)	0.03 (0.04)
Child Gender (female)	1.75 (1.01)	2.26* (1.11)	0.76 (0.84)	0.43 (0.23)
Child Age (Month)	4.03*** (0.59)	1.90*** (0.14)	0.60 (0.52)	0.01 (0.03)
Child Age (Month, Squared)	-0.02*** (0.01)	-0.01*** (0.00)	-0.00 (0.00)	-0.00 (0.00)
Parent Gender (female)	0.77 (1.37)	-1.77 (1.36)	1.09 (0.80)	0.48 (0.29)
Ability Parents	0.95*** (0.25)	1.33*** (0.24)	0.29* (0.12)	0.16** (0.05)
Num. obs.	725	1215	701	1142
R <sup>2</sup> (full model)	0.61	0.60	0.17	0.10
R <sup>2</sup> (proj model)	0.56	0.56	0.04	0.02
Adj. R <sup>2</sup> (full model)	0.56	0.57	0.07	0.03
Adj. R <sup>2</sup> (proj model)	0.51	0.52	-0.08	-0.06

\*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$

# Results by Child Age

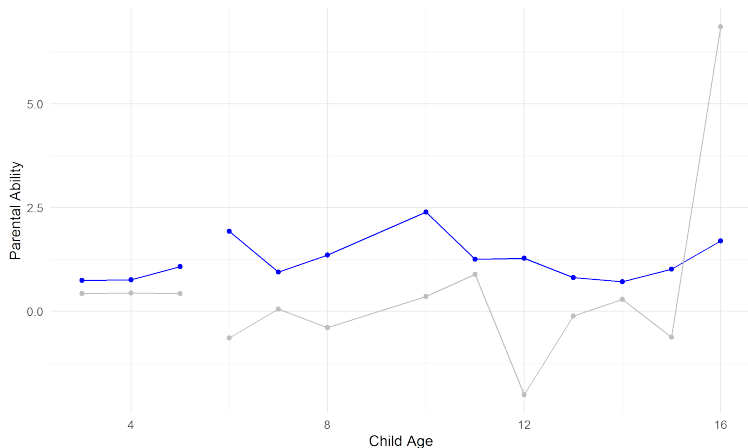
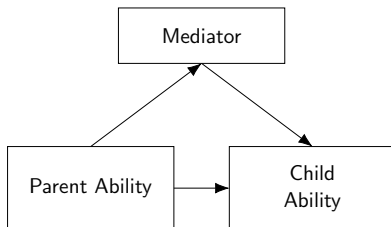


Figure 8: Effect by Child Age

Note: blue depicts ability, grey depicts education



# Mediation Analysis



- potential mediators:
  - ▶ environmental factors (number of books, private lessons)
  - ▶ parenting factors
- preliminary results:
  - ▶ private lessons: 7 %
  - ▶ number of books: 10 %

# Conclusion

- study the effect of parents' education on childrens' cognitive and non-cognitive skills in Great Britain using the 1970 British Cohort Study and an OLS with FE
- effects are positive and significant (esp. for preschool children) without controlling for parental ability
- after controlling: effect of parental education diminishes
- mediation analysis suggests that abilities are partly transmitted via environment provided to children (e.g. number of books, private lessons, etc.)

# APPENDIX

# Summary Statics Children and Cohort Members

Table 3: Summary Statistics

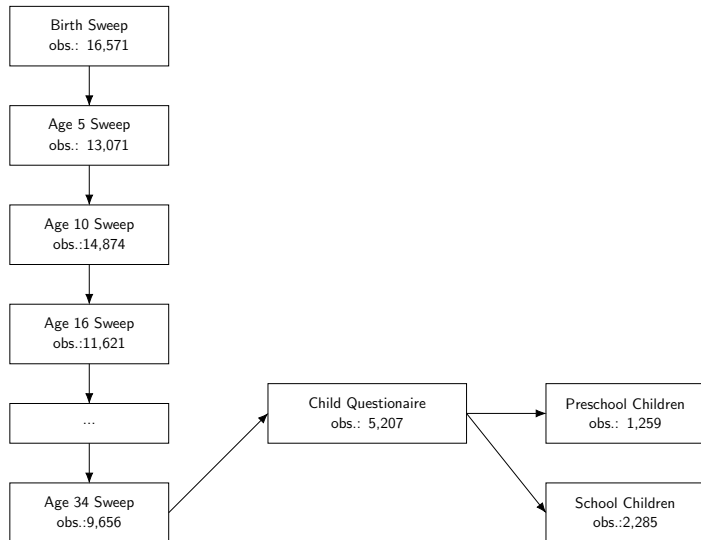
	N	Mean	St. Dev.	Min	Max
<i>Panel A: Child Characteristics</i>					
Child Age	2,174	7.313		3	16
Child Gender	2174	0.503		0	1
Child has longlasting illness or disability	2174	0.155		0	1
<i>Panel B: Cohort Member Characteristics</i>					
Years of Schooling grandfather	1382	11.06		0	25
Years of Schooling grandmother	1382	10.73		0	19
Years of Schooling	1382	12.98		10	29
Gender	1382	0.652		0	1

Note: Summary statistics are calculated based on the total sample. Statistics within subsamples might be different.

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# Sample Selection

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# Sample Selection

subsample: 5,207 children

## Selection Criteria

- Geographic Identifier available (-396 obs.)
- Ability and Education variable available (-1,173 obs.)
- At least 2 obs (with and without university education) per county (-111 obs.)
- Outcome variable children and child age available (-1,353 obs.)

→ Final sample: 1,940 children (725 preschool, 1,215 school children)

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# Example BAS II Naming Vocabulary

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Fig. 1 - BAS II Naming Vocabulary Image and CAPI Screen7

SHOW P  
INTERV  
SAY: VE

1. CORRECT Shoe  
 2. ACCEPTABLE Name of any type of shoe (eg. trainer, boot)  
 3. INCORRECT Thing you can wear (PROBE)  
 4. INCORRECT Put on your foot (PROBE)  
 5. INCORRECT Leather (PROBE)  
 6. INCORRECT Other

INT	<input type="checkbox"/>	Continue	IVC03
IVW02	<input type="checkbox"/>	Continue	IVC4
IV1	<input type="checkbox"/>		IVC04
IVQB1	<input type="checkbox"/>		IV5
IV2	<input type="checkbox"/>		IVQB5
IVQB2	<input type="checkbox"/>		IV6
IV3	<input type="checkbox"/>		IVQB6

3134 QAB(2) 1 0645(2) QAB(2) 06-04-2004 14:03:47

Figure 9: Example Naming Vocabulary Exercise

# Example BAS II Word Reading

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<b>Word Reading Card</b>						
A	the	up	he	you	box	
	at	said	out	jump	fish	
	one	cup	wood	bird	clock	
	ring	water	window	men	light	
B	▶	oil	ship	running	dig	money
		paper	gate	knock	heel	skin
		coat	carpet	brick	thin	building
		tail	travel	babies	writing	climb
C	▶	collect	early	piece	piano	whistle
		invite	guest	electric	enormous	shoulder
D	▶	wreck	favour	supplies	encounter	universal
		ceiling	generation	environment	cough	character
		avenue	experience	radiant	statue	audience
		curiosity	obscure	diameter	chaos	boisterous
		tentative	trauma	jeopardy	silhouette	desultory
		reminiscent	divulge	diplomacy	rheumatism	tyrannical
		catastrophe	regurgitate	meticulous	initiate	tertiary
		criterion	archaic	monosyllabic	mnemonic	facetious

Figure 10: Example Word Reading Exercise



# Example Strength and Difficulties Questionnaire

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**Table 6: Strengths and Difficulties questions**

	<b>Green (age 3 – 5yrs 11 mths)</b>	<b>Lilac (age 6 – 16yrs 11 mths)</b>
Considerate of other people's feelings	<b>Q1a</b>	<b>Q1a</b>
Restless, overactive and not able to sit still for long	<b>Q1b</b>	<b>Q1b</b>
Often complaining of headaches, stomach-aches or sickness	<b>Q1c</b>	<b>Q1c</b>
Sharing readily with other children (treats, toys, pencils etc.)	<b>Q1d</b>	<b>Q1d</b>
Has often had temper tantrums or hot tempers	<b>Q1e</b>	<b>Q1e</b>
Rather solitary, tending to play alone	<b>Q1f</b>	<b>Q1f</b>
Generally obedient, usually doing what adults requested	<b>Q1g</b>	<b>Q1g</b>
Many worries, often seeming worried	<b>Q1h</b>	<b>Q1h</b>
Helpful if someone was hurt, upset or feeling ill	<b>Q1i</b>	<b>Q1i</b>
Constantly fidgeting and squirming	<b>Q1j</b>	<b>Q1j</b>
Has had at least one good friend	<b>Q1k</b>	<b>Q1k</b>
Has often had fights with other children or bullied them	<b>Q1l</b>	<b>Q1l</b>
Often unhappy, downhearted or tearful	<b>Q1m</b>	<b>Q1m</b>
Generally liked by other children	<b>Q1n</b>	<b>Q1n</b>
Easily distracted, concentration wandered	<b>Q1o</b>	<b>Q1o</b>

Figure 11: Example Strengths and Difficulties Questions

# Data

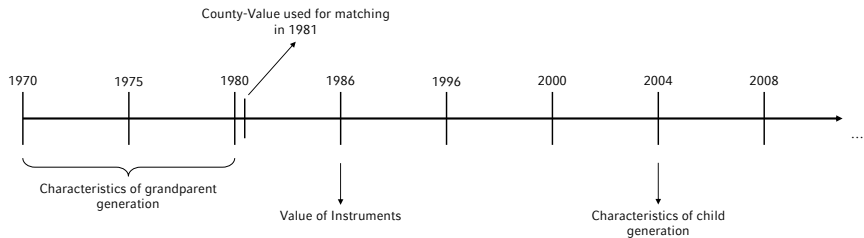


Figure 12: Timeline

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# Results: Education - Cognitive Ability

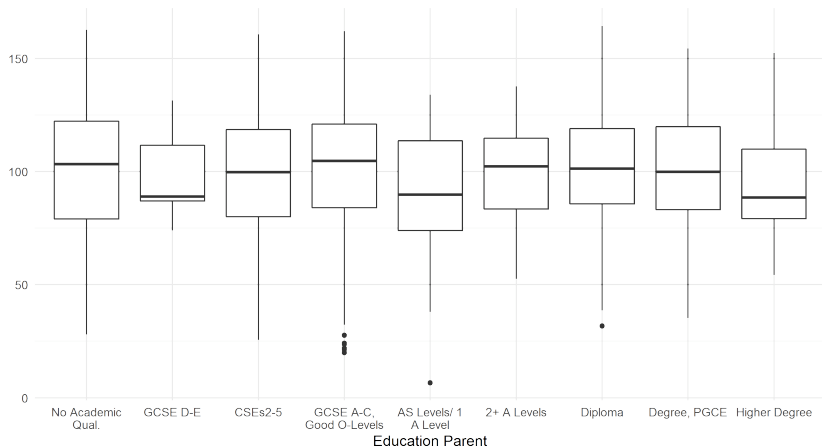


Figure 13: School Children

# Results: Education - Non-Cognitive Ability

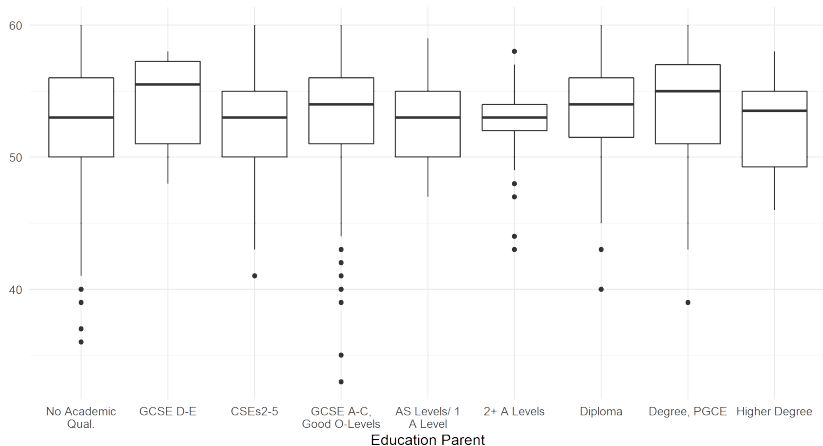


Figure 14: School Children