CLOSER Conference

Education 2

Chair: **Alice Sullivan**

- Maternal and paternal involvement in educational activities and early child development
  Isabelle Fischer
- "Universal" early education and care: who benefits for longest? Tracking take-up through the National Pupil Database
  Tammy Campbell
- Do early life "non-cognitive skills" matter? A systematic review of early life effects on academic achievement, psychosocial, language and cognitive, and health outcomes
  Neil Davies
- An analysis into the genetic similarity of educational attainment, cognitive ability and socioeconomic position
  Tim Morris

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LEAD Graduate School & Research Network

Maternal & paternal involvement in educational activities and early child development

UCL CLOSER conference

Inequalities: a longitudinal perspective

09.11.2017, Isabelle Fischer

LEAD
Graduate School & Research Network

Outline

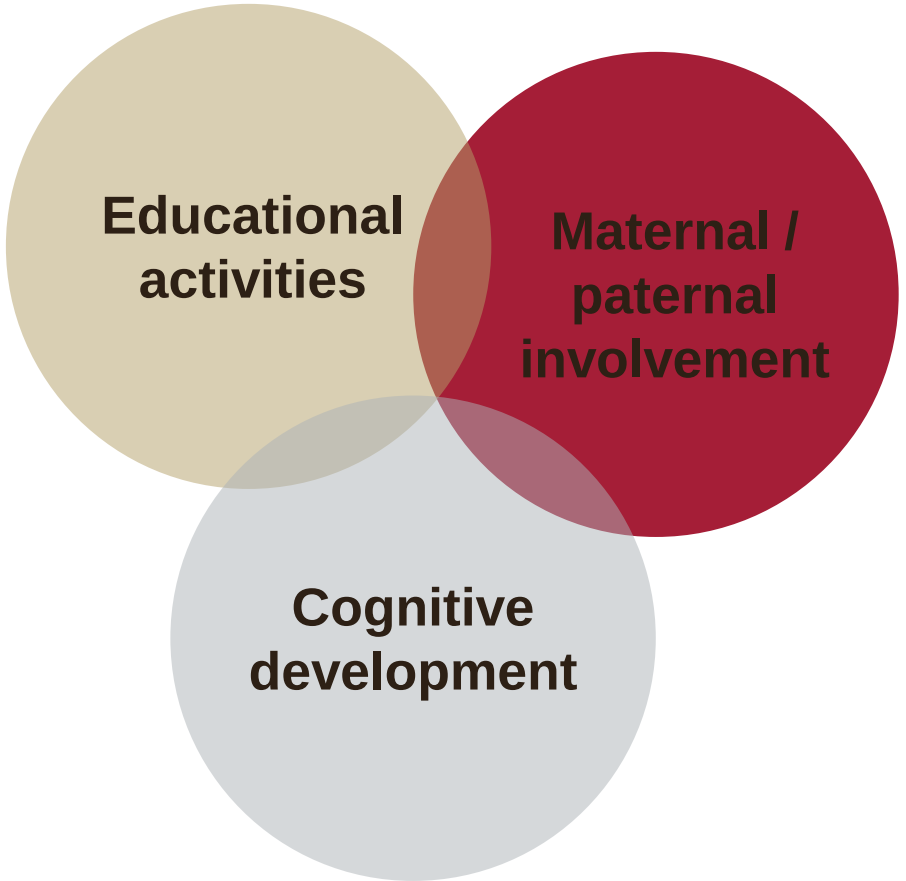
I	Motivation
II	Theoretical background & research questions
III	Working model
IV	Data & methodological approach
V	Preliminary results
VI	First conclusions
VII	Outlook

Motivation

Combine various branches of literature

♂♀ Gender theories

Child development theories



Theoretical background

Father involvement in two-parent families

+ ?

positive social, behavioral, psychological, or cognitive outcomes

- Gender often neglected
- Influences child's experiences:
  - Gendered interactions
  - Expectations
  - Activities

Amato & Gilbreth 1999; Lewis & Lamb 2003 Tenenbaum & Leaper 2003; Else-Quest et al. 2006; Emolu 2014

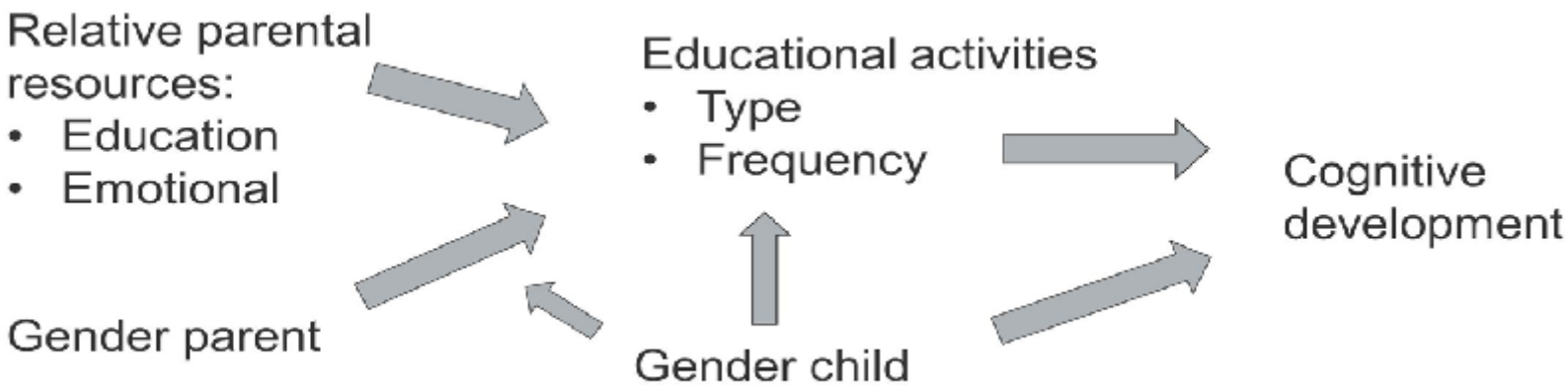
Research questions

Frequency mother and father activities: child gender?

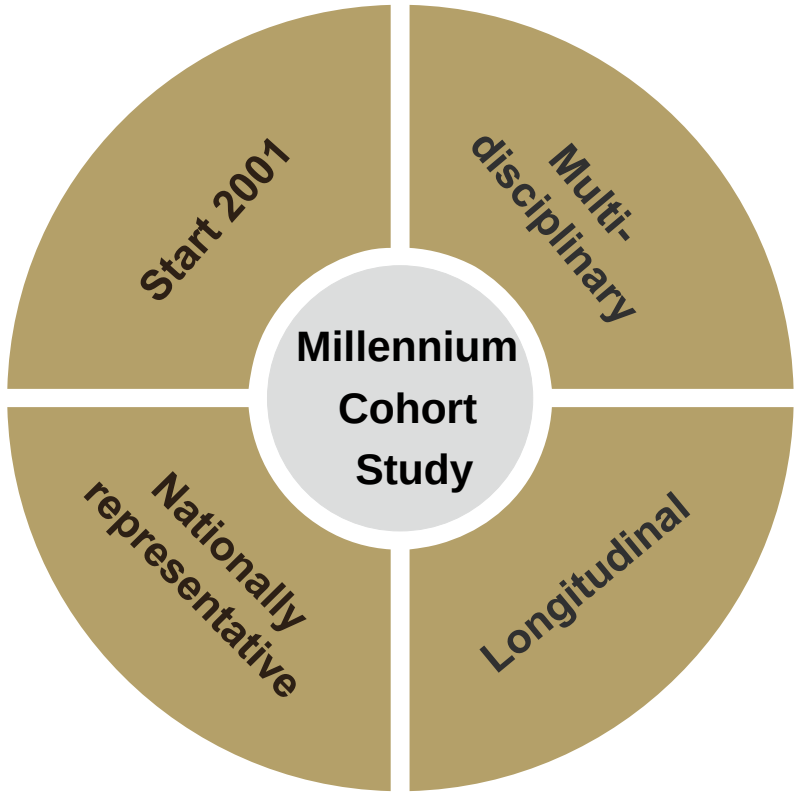
Mother / father involvement qualitatively different?

Source of stimulation vs. overall amount?

Working model



Data & methodological approach



Participants
Waves 1-4: 6,228

Methods
- Face-to-face interviews
- Direct testing
- Questionnaires

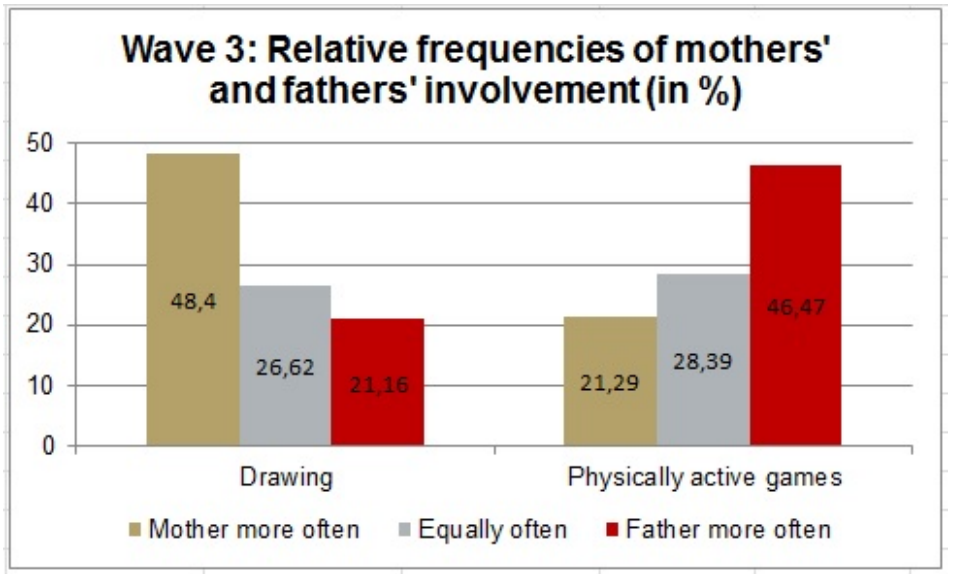
Cognitive development
British Ability Scales

Analyses
- Polychoric correlations
- Ordered logistic regressions
- Linear regressions

Preliminary results

Fathers' NVQ

Frequency of activities



Preliminary results:

	Score wave 4
Score wave 3	0.519***
	(40.09)
Std. mother activity score	-0.00202
	(-0.14)
Std. father activity score	0.00480
	(0.31)
Constant	-1.526***
	(-3.60)
N	4461

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Pattern Construction Wave 4:
Standardized ability scores

Control variables include:

- *Previous test results*
- *Mother reading frequency*
- *Father reading frequency*
- *Parents' relative NVQ*
- *Child gender*
- *Child age in months,*
- *Number of siblings*
- *Grandparent in HH*
- *Mother work hours*
- *Father work hours*
- *Poverty*

First conclusions

- Reading = most important?
- Gender-specific activity groups
- ~~More frequent mother-daughter or father-son interactions~~
- No linear relationship between parents' activity factor scores and test scores.

Outlook

- Subsample analyses
  - Level of educational attainment
  - Ethnicities
- Examine influence of gender ideologies
- Structural equation models / change models
- Robustness checks
  - Include single parents

Thank you.

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“Universal” early education and care: who benefits for longest? Tracking take-up through the National Pupil Database

Tammy Campbell,* Ludovica Gambaro,^ Kitty Stewart*

*CASE, LSE ^DIW, Berlin

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

CASE

Nuffield Foundation

Background and context: Early Childhood Education and Care (ECEC) in England

- Children in England are educated within school-year cohorts, corresponding to the structure of the academic year (September-August)

- All* English children start primary school in the academic year (September-August) in which they turn five

- All English children are entitled to 15 hours free ECEC from the term after they turn three

*Though increasingly there are challenges to this, with a little more variation being introduced, this is negligible for our years of interest

…ECEC in England

- So autumn-born children are entitled to five terms of free ECEC, spring-borns to four terms, and summer-borns to three terms
- The vast majority of children attend in the penultimate year before primary school (estimated 95-98% in 2011)
- But, among autumn-borns, who are entitled to the most free ECEC, who benefits from this entitlement?

Why are patterns in take-up of interest?

- Spending on young children is increasingly dedicated to ECEC as the key early intervention (15 hours for low-income two-year-olds; 30 hours for ‘working parents’)
- Some evidence that high-quality ECEC can be beneficial to children’s development / school readiness – particularly low-income children
- But children can only benefit if they attend

Key research questions

Among autumn-borns, who are entitled to five terms' free ECEC:

- How does take-up vary by income-level?
- What other factors relate to differences in take up?
- Do other factors account for variation by income-level?

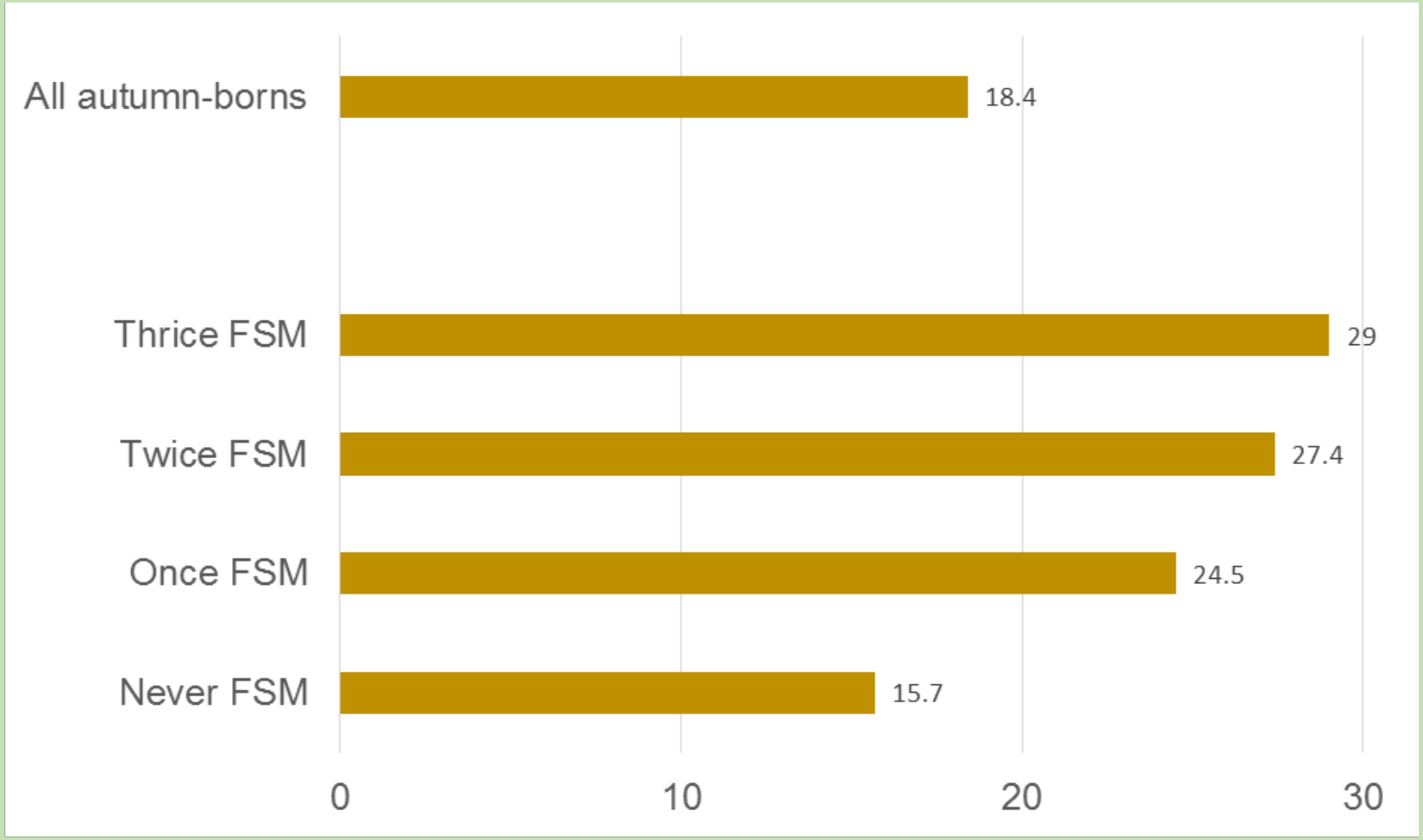
Data and sample

- National Pupil Database (NPD): census of all children in funded state education in England
- 2011 data: 205,865 autumn-borns attended ECEC
- 2010 data: linked to establish whether they also attended in January of the previous year, taking up their full five terms
- NPD also provides measures of low-income (FSM), ethnicity, EAL, locality of child

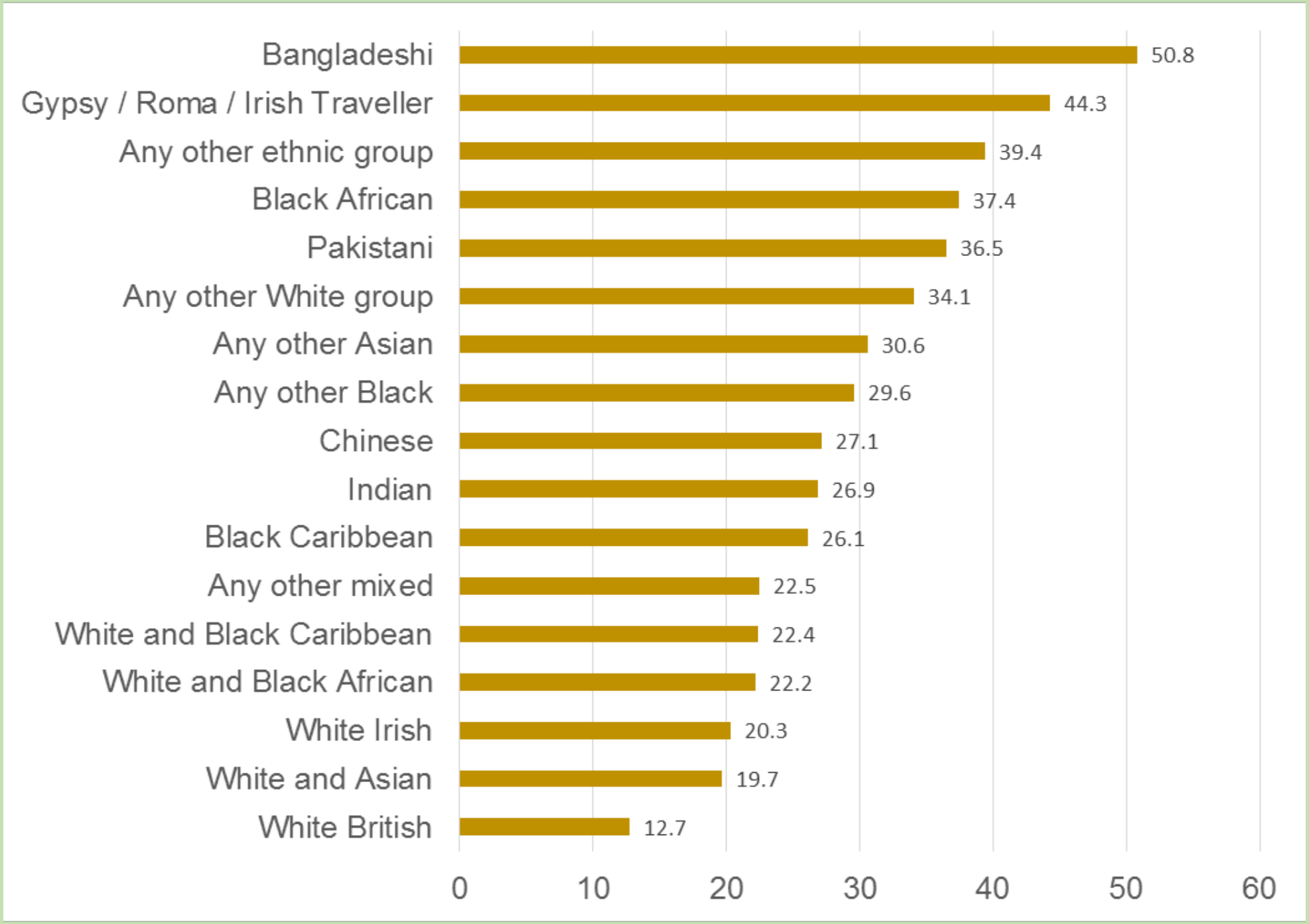
Low-income measure: future FSM

- No measure of family income-level at ECEC stage
- Link data forward to primary school – receipt of free school meals (FSM) recorded: low-income proxy
- Times FSM in the first three years of primary school:
  - Never (77%)
  - Once (5.5%)
  - Twice (5.9%)
  - Thrice (11.7%)

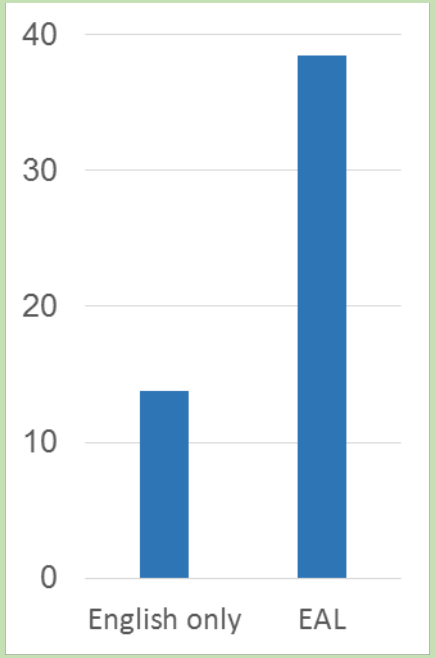
How does take-up vary by income-level?



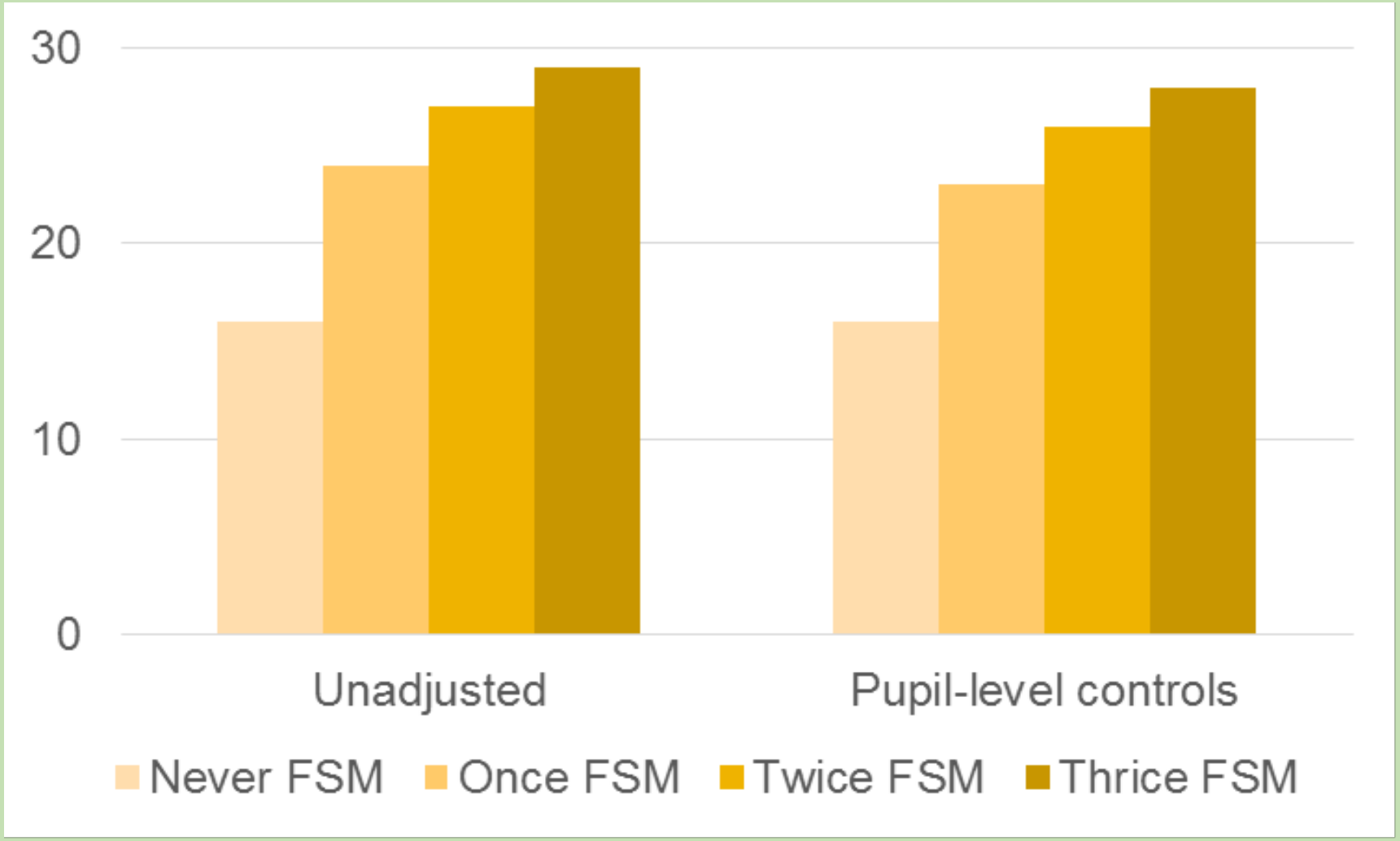
Children who claim FSM for each of the first three years of primary school are least likely to have attended free ECEC for the full duration



Wide variation in non-take-up by ethnicity and home language



Do other pupil-level factors account for variation by income-level?

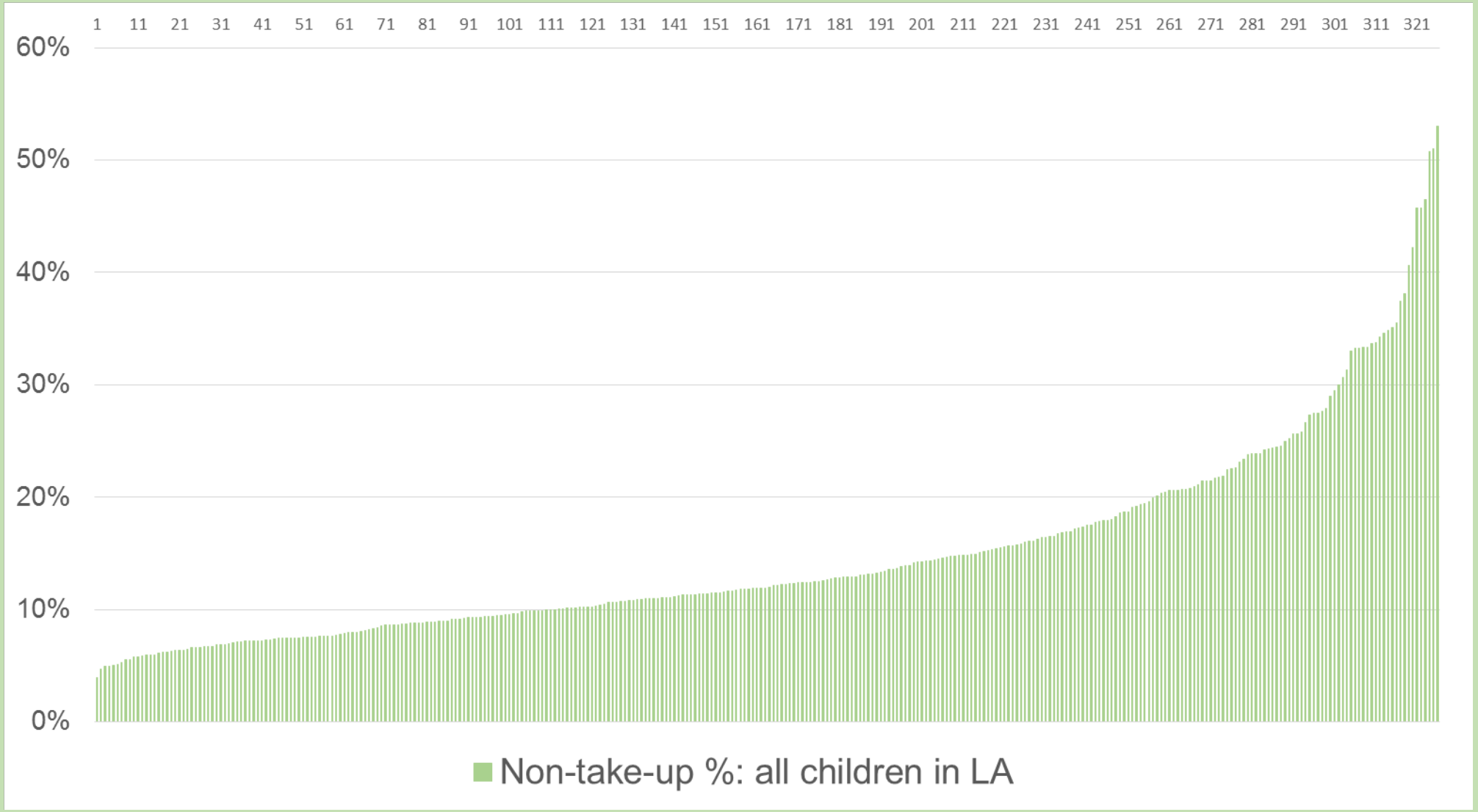


No: never-thrice gap = 13pp vs 12 pp

Predicted probability of non-take-up; logistic regression

Controls = ethnicity, EAL, month of birth, gender

Wide variation by local authority

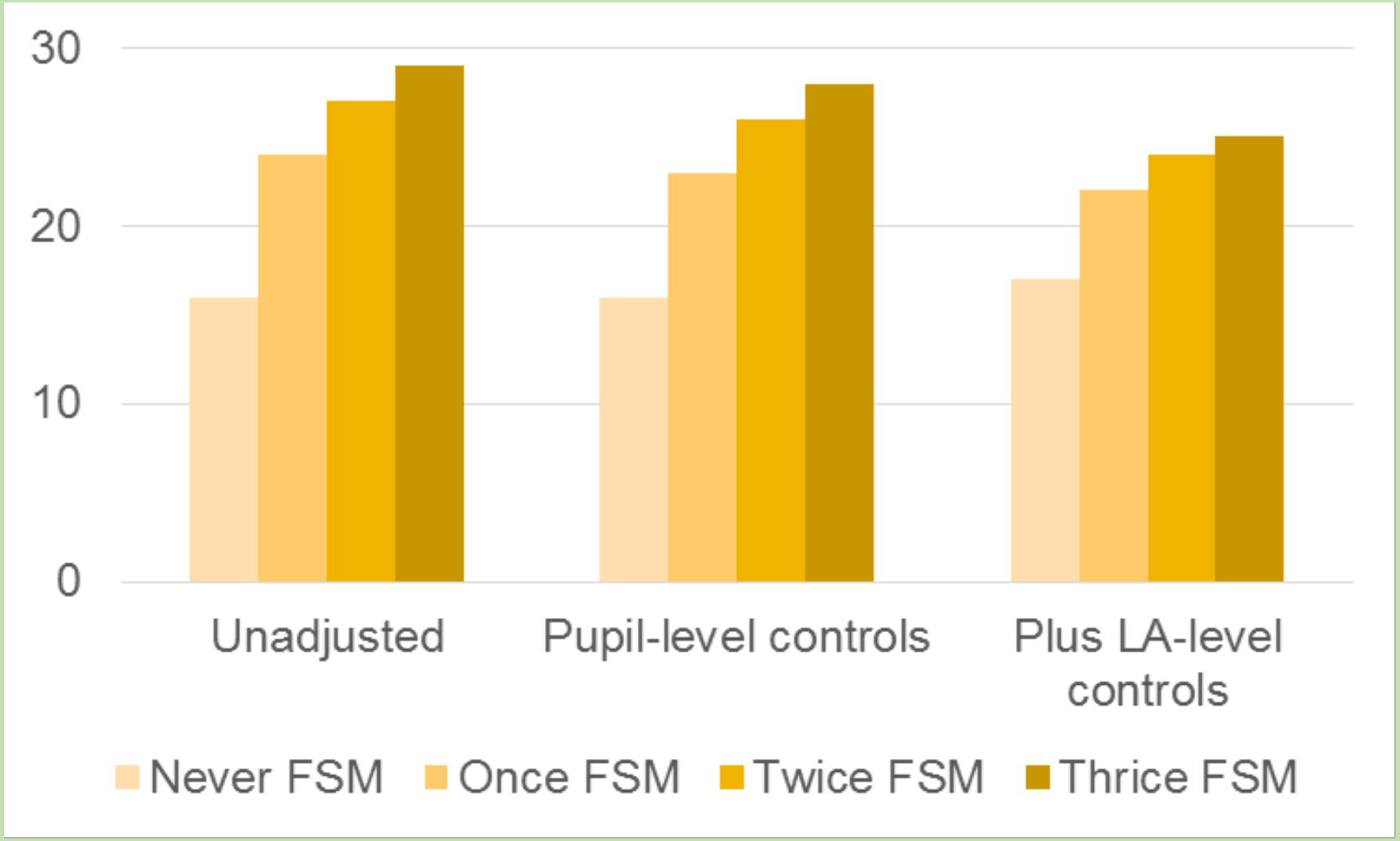


Ranges from 4% non-take-up to 53%

Variation in local factors

	Min	Max	Mean	Standard Deviation
IDACI	0	99.4	22.7	17.0
Local authority provision:				
Maintained	0.2	97.8	46.6	25.5
Voluntary	0	52.6	14.7	12.6
Private	2.2	94.3	32.6	16.7
All other provision	0	79.7	6.1	8.5

Do local factors account for variation in take-up by income-level?



Partly: never-thrice gap = 13pp vs 8pp

Predicted probability of non-take-up; logistic regression

Pupil-level controls + IDACI and local provision make-up

Main findings

- Low-income children are less likely to take up the full duration of their free ECEC
- This is not explained by co-existing family-level factors
- It is partly but not fully explained by local factors such as provision make-up

Implications

- If providing for low-income families and closing developmental gaps is truly a concern, policy on ECEC needs to move beyond simply providing ‘entitlements’ of which there is uneven take-up
- Provision type / local availability and suitability for different families is one potential lever
- Further investigation of barriers to take-up would be useful…
- …alongside critical discussion and analysis of the merits of increasing free ECEC entitlements, when it is the more affluent families / children who disproportionately benefit

Thanks for listening

Questions, comments…?

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CASE

Nuffield Foundation

Do early life “non-cognitive skills” matter? A systematic review of early life effects on academic achievement, psychosocial, language and cognitive, and health outcomes

CLOSER Conference UCL 2nd November 2017

Lisa Smithers[1], Alyssa Sawyer[1], Catherine Chittleborough[1], Neil Davies [2], George Davey Smith [2], and John Lynch[1,2]

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[2]MRC Integrative Epidemiology Unit, University of Bristol

MRC Integrative Epidemiology Unit

University of BRISTOL

What are non-cognitive skills?

- Psychological traits which are not intelligence as measured by IQ tests
- Including, but not limited to:
  - Perseverance
  - Emotional intelligence
  - Grit
  - Attention
  - Time discounting/delayed gratification

- In reality – what ever was measured

  in the cohort study currently being analyzed

Motivation

- Non-cog skills:
  - Associate with long term outcomes
  - Thought to be
    - less heritable than IQ
    - More malleable
- A suitable target for interventions?
  - Psychologists think so

Science according to Heathrow airport…….

Motivation

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Science according to the Journal of Labor economics…….

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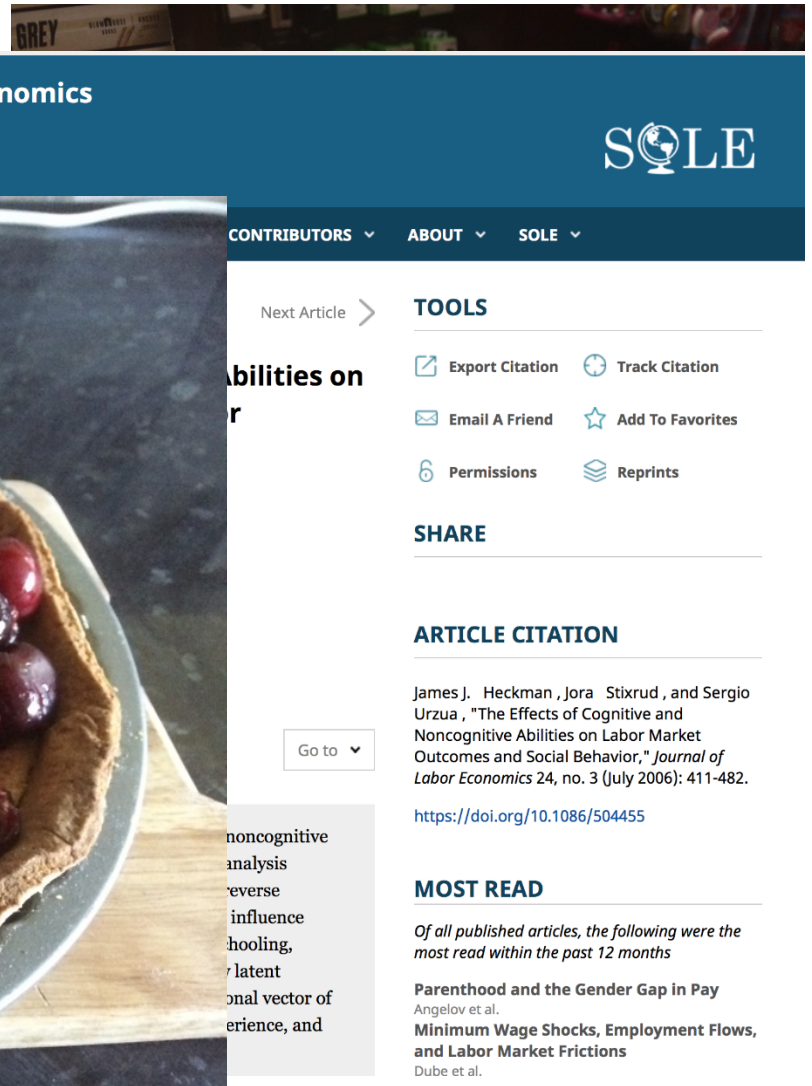


Science according to the Journal of Labor economics…….

Objectives

- Big claims about non-cognitive skills
- Are they supported by scientific evidence?
- We conducted a systematic review of non-cognitive skills

Science according to Heathrow airport…….

Methods

- Review registration: PROSPERO, CRD42013006566
- Inclusion criteria
  - Original studies
  - Non-clinical samples
  - Experimental and observational studies
- Outcomes
  - academic achievement
  - language and cognitive development
  - psychosocial well-being
  - health
- Published until September 2015 (update pending)
- Searched Pubmed, PsycINFO, Embase, and Business Source Complete.

Eligible non-cognitive skills

- executive function
- effortful control
- emotional regulation
- persistence
- conscientiousness
- attention
- self-control
- impulsivity
- delay of gratification

- Measured in children aged up to eight years

Figure 1: Frequency of papers by year

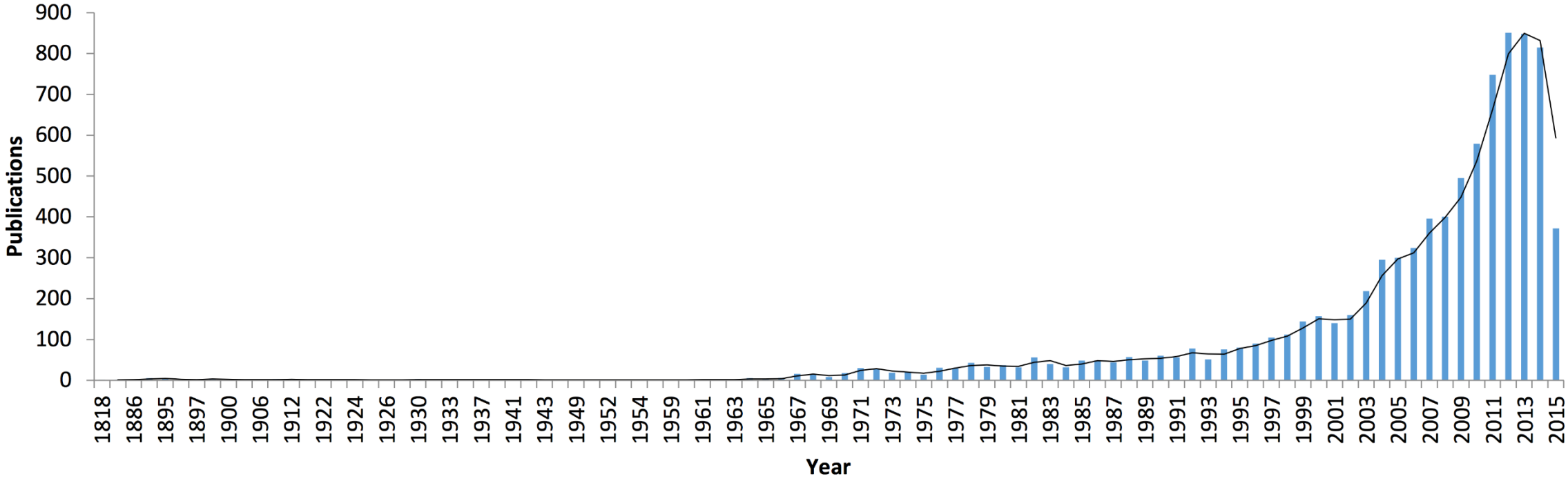
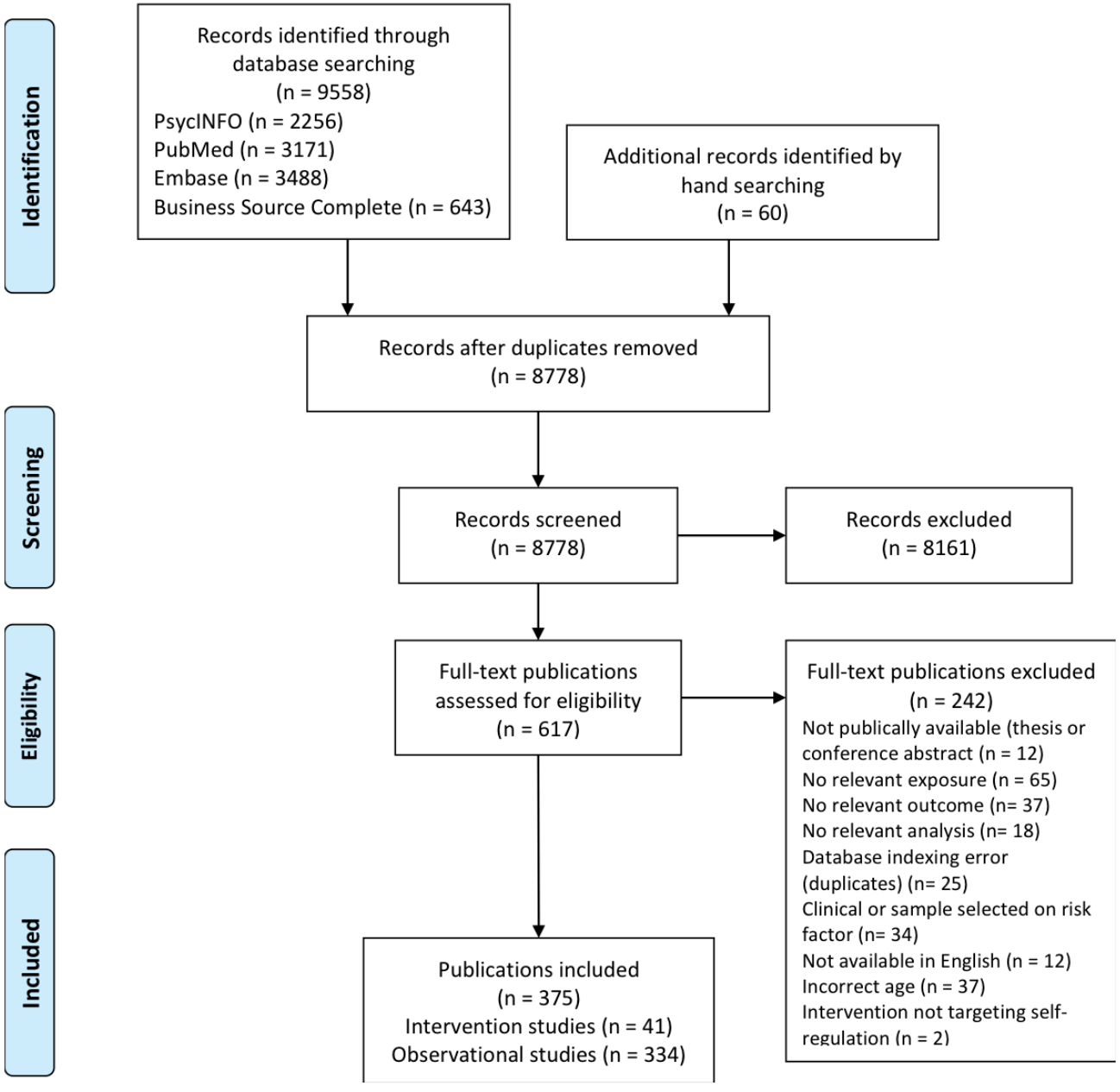


Figure 2. Flow chart of publications identified through electronic (n=9558) and hand searches (n=60) resulting in 8778 unique publications.

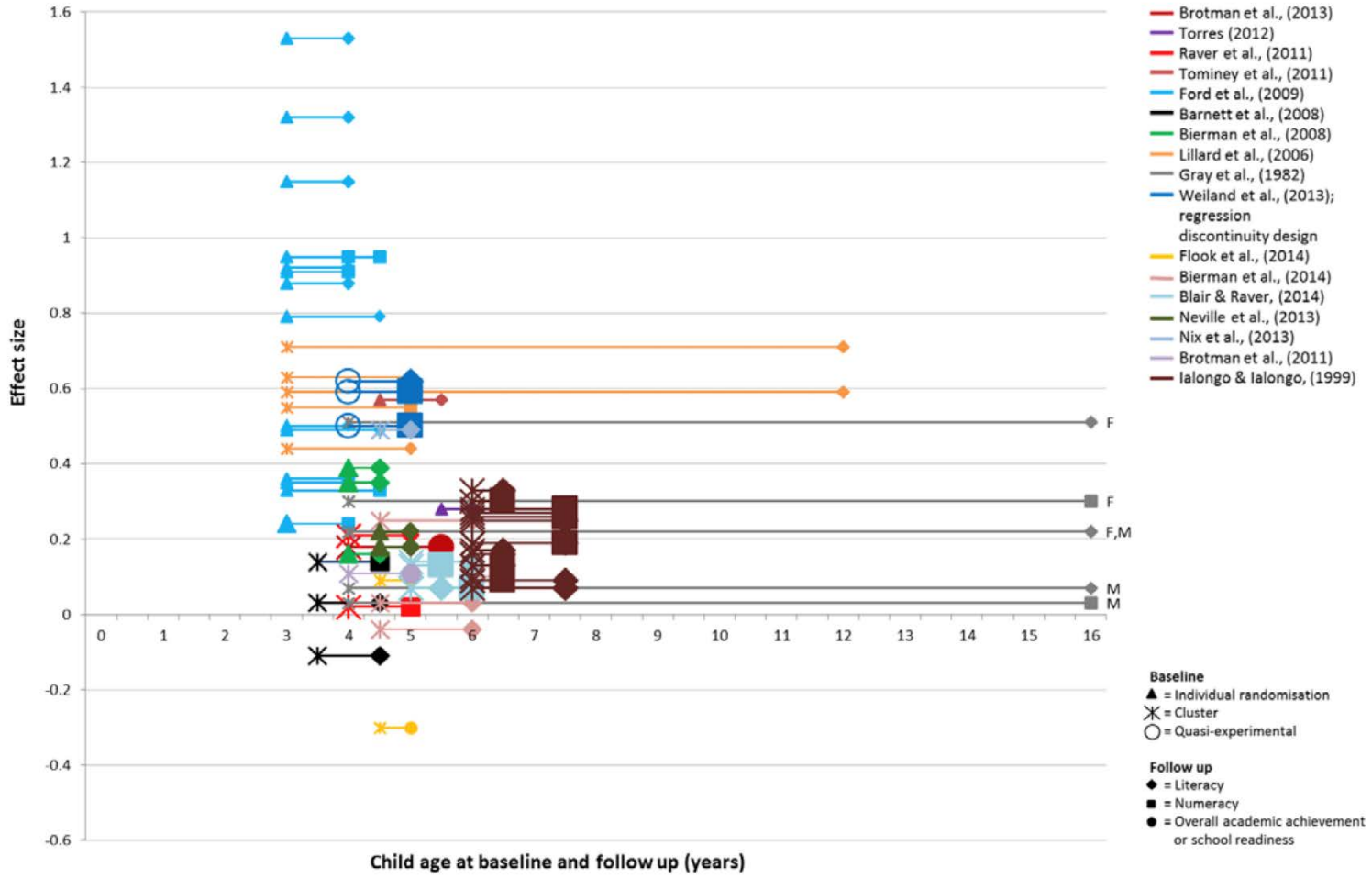


Summary of results

- *Academic achievement outcomes:*
  - *Experimental* 0.2-0.5 SD 1 yr effects
  - Observational 0-0.2 SD 5 yr effects
- *Psychosocial outcomes*
  - Inconsistent estimates – even from the same data source
- *Language and cognitive outcomes*
  - small effects of ~0.1-0.2 SD
- *Physical health outcomes*
  - Highly diverse outcomes, null to small effects

(Inadequate) Follow-up

Figure 3. Effect sizes, study size and follow up for RCTs and quasi-experimental interventions with academic achievement outcomes.



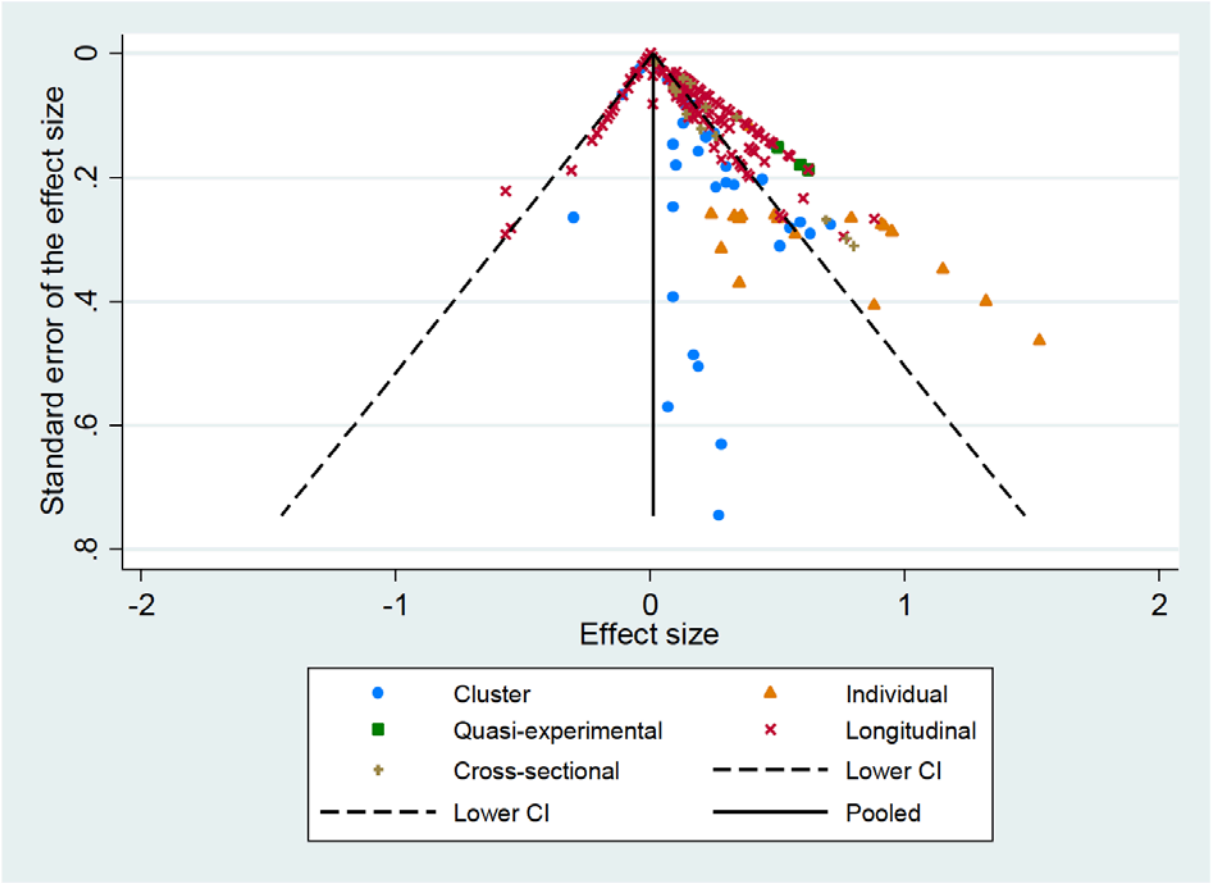
Publication/small study bias (funnel plots)

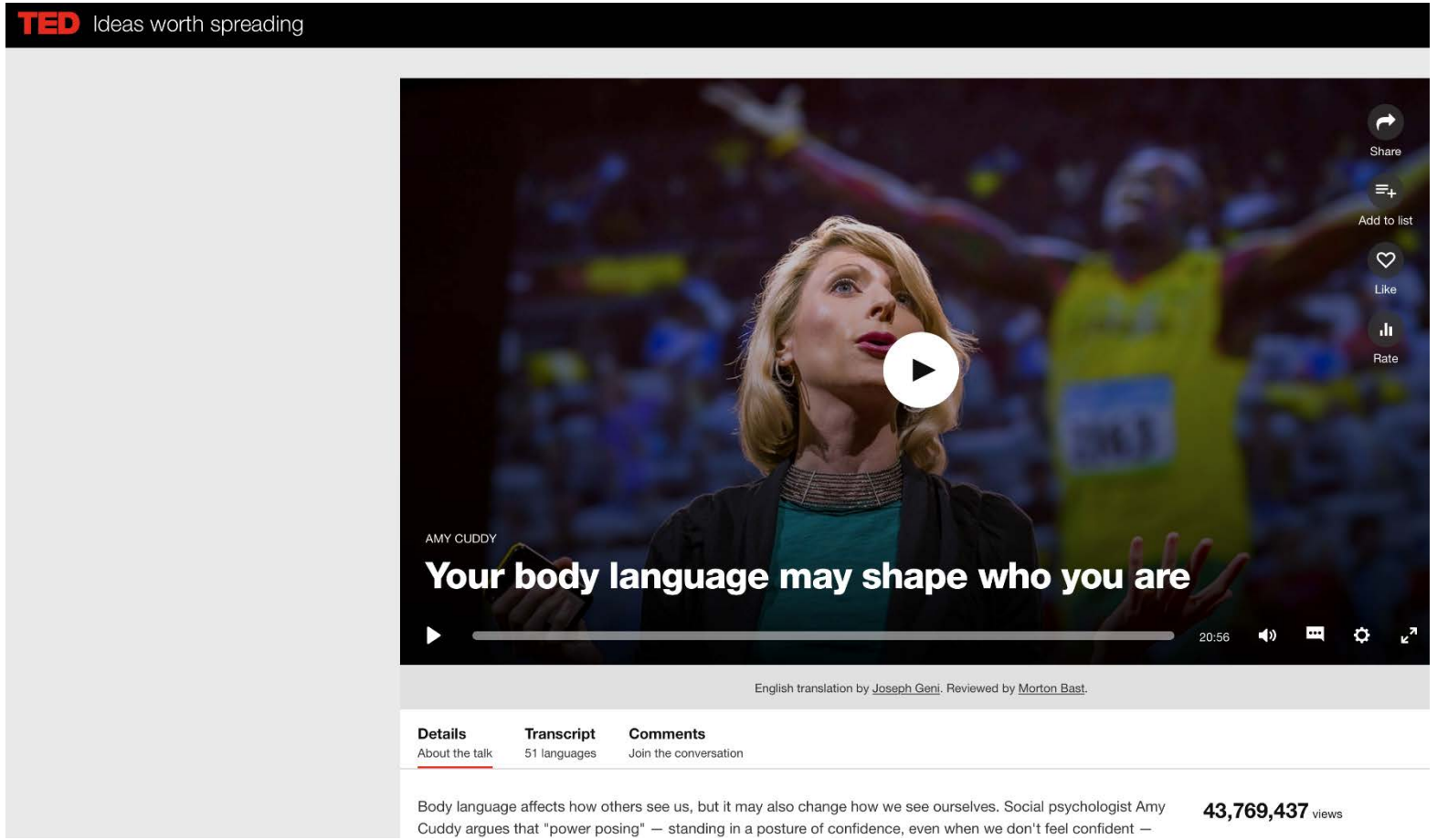
- Funnel plots can be used to detect publication bias
- Asymmetric funnel plot suggests bias

Publication/small study bias (funnel plots)

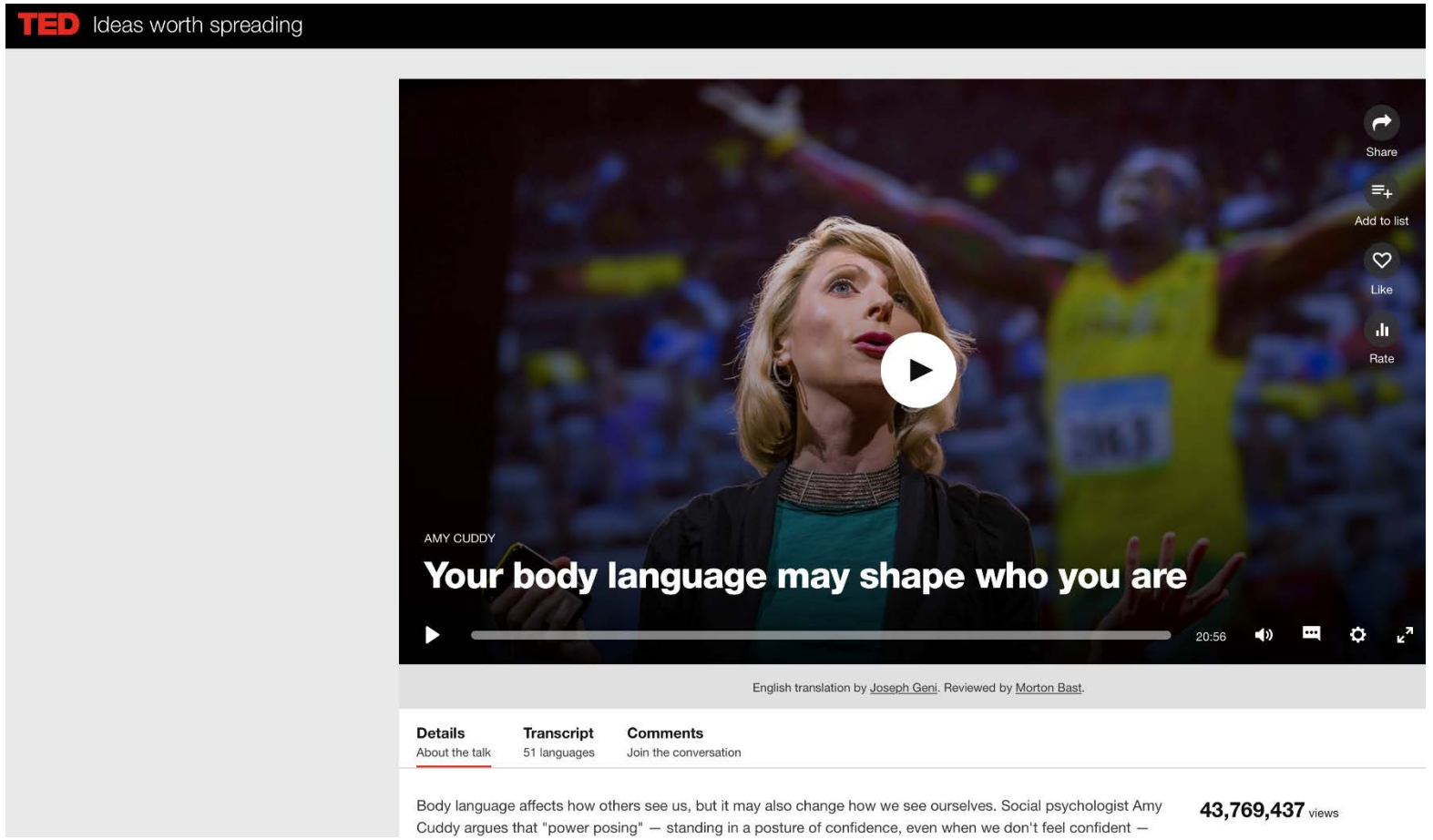
- Funnel plots can be used to detect publication bias
- Asymmetric funnel plot suggests bias

- Funnel plot for academic achievement:
- Egger Regression: Bias = 2.00 (95% CI 1.77, 2.23), $p < 0.005$





A little science can make you look pretty stupid…..



A little science can make you look pretty stupid…..

Conclusions

- Effects are likely to be modest and of the order ~0.2 SD
- Clear evidence of publication/small study bias
- Literature dominated by poor quality studies
  - No control for confounding
  - Short follow-up
  - Small samples
  - Inconsistent definitions of non-cognitive skills
  - Poor quality trials
- Despite a huge volume of research very little reliable evidence of which specific non-cognitive skills matter

Acknowledgements

- The people who did all the work:
  - Lisa Smithers, Alyssa Sawyer, Catherine Chittleborough, George Davey Smith and John Lynch

- Funders
  - MRC
  - ESRC

Thanks for listening, questions, comments?

- Pre-print available here:
- https://www.biorxiv.org/content/early/2017/03/10/115691
- Currently being updated….

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An analysis into the genetic similarity of educational attainment, cognitive ability and socioeconomic position

Tim Morris, Neil Davies, Danny Dorling, George Davey Smith

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Educational attainment

- Research into educational attainment (EA) and inequalities (EI) has focussed heavily on social forces
- In UK, social inequalities now larger than gender or ethnic inequalities (Strand, 2011)
- Children from high socioeconomic families outperform those from low socioeconomic families, regardless of ability (Morris et al, 2016)
- Impact of social factors argued to increase as children grow older (Feinstein, 2003), though this is disputed (Jerrim and Vignoles, 2013)

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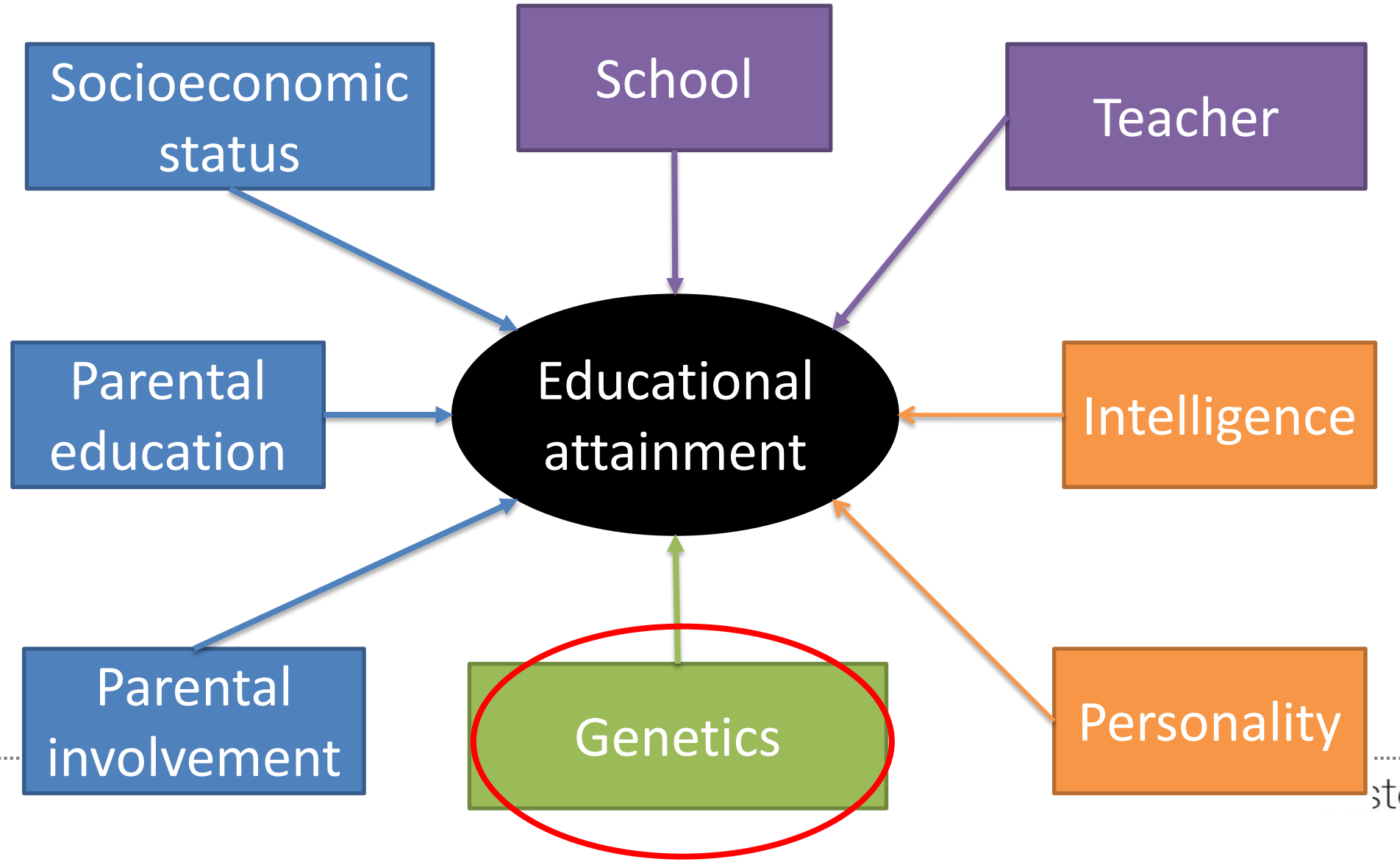
Influences of EA



Genetics of EA

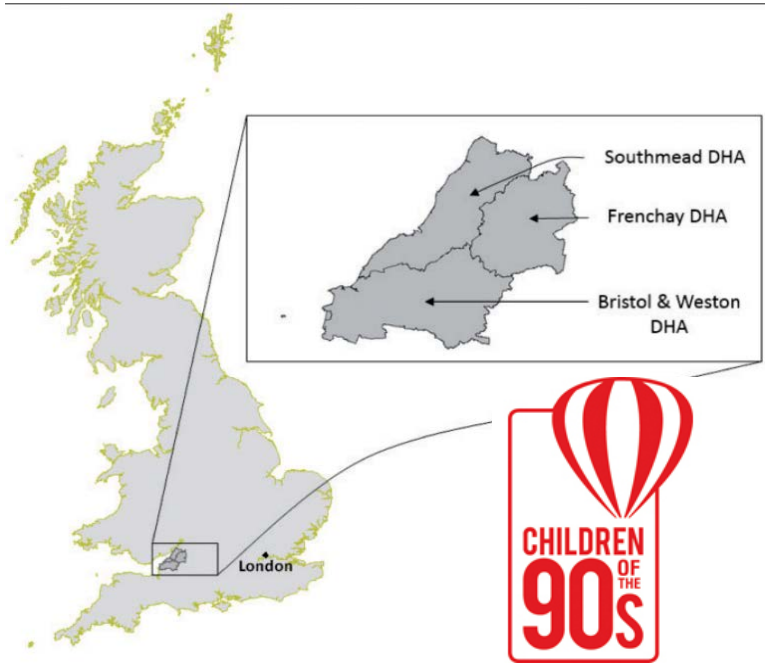
- Increasi avies et al., 2015)
- Heritabi l., 2013)
- Therefo s in EA due to non-ger
- Educati

Why incorporate genetics?

- A full understanding of EA requires better knowledge of how genetics may contribute to social inequalities
- Improve power and precision of models
- Educational policy should be based upon scientific evidence, and account for all factors which influence EA
- *Our aim*: to explore if genetics may contribute towards social inequalities in EA

Data source

- Data from the Avon Longitudinal Study of Parents and Children (ALSPAC)
- Recruited in 1991 & 1992
- Representative of UK population
- 14 775 children in full sample

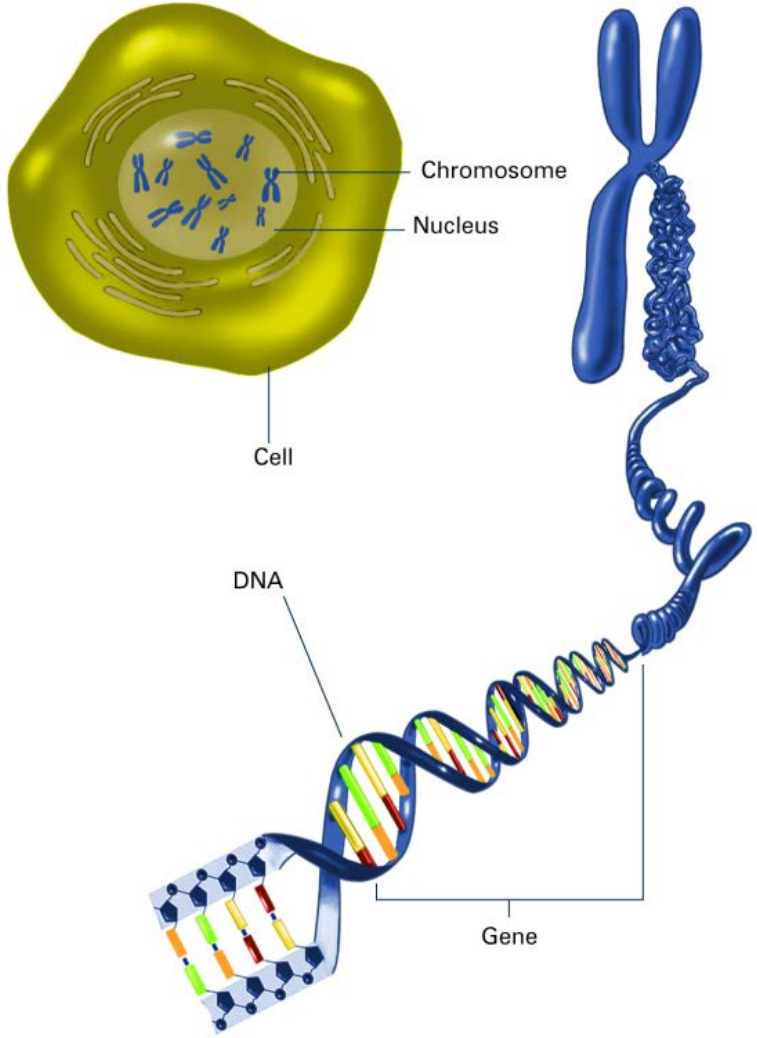


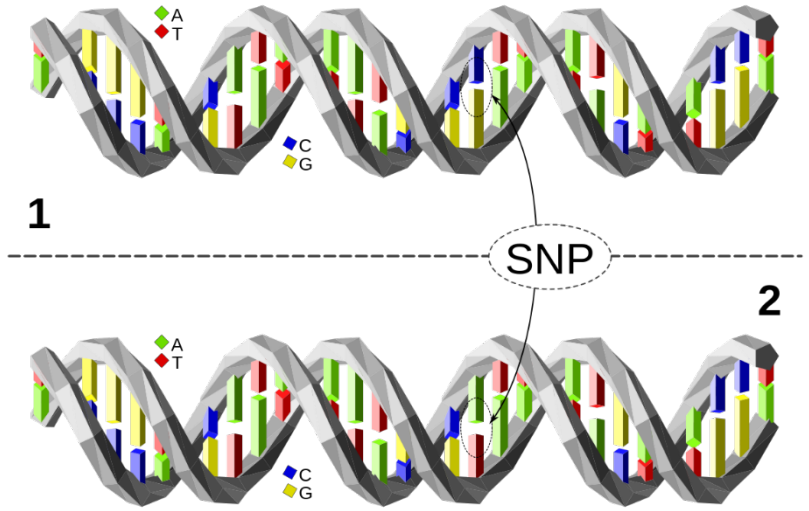
- 6 061 children with data on education/outcome and genetic data
- Data linked to the UK National Pupil Database (NPD)

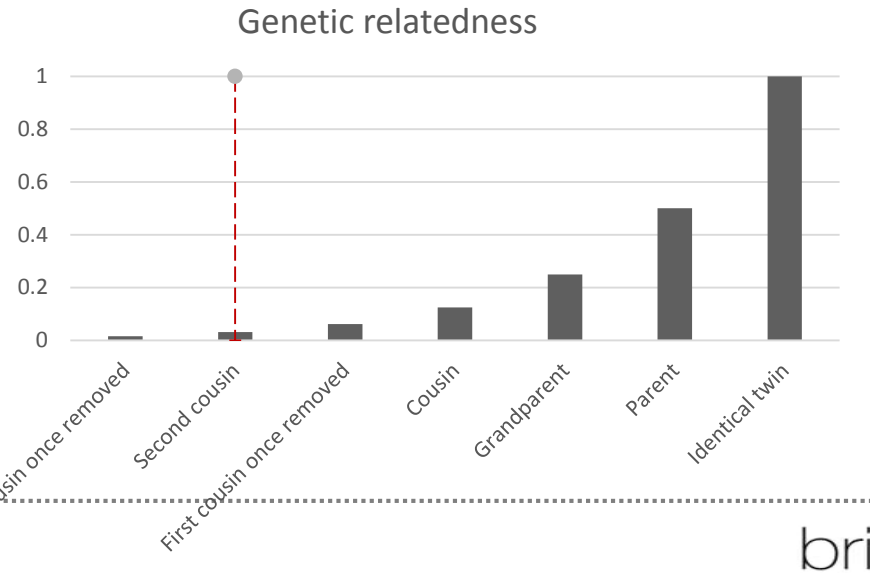
Outcomes

- Educational attainment at 11, 14 and 16
- Cognitive ability measured at age 8
- Two measures of socioeconomic position:
  - Binary classification of “high” vs “low” based on RGSC
  - Continuous classification using the Cambridge Social Stratification Score (CAMSIS)

How do we measure genetics?







Analyses

- We estimate the genetic correlations between educational attainment, SEP and cognitive ability
- Genetic and phenotypic similarity between pairs of unrelated individuals are compared
- Where genetically similar pairs are more phenotypically similar than genetically dissimilar pairs, heritability estimates are higher
- Analyses restricted to unrelated participants (less related than 2nd cousins)

Analyses

- We use genome-wide complex trait analysis (GCTA) to estimate the genetic correlations between educational attainment, SEP and CA:

$$r_g = \frac{cov_g(t_1, t_2)}{\sqrt{var_g(t_1) var_g(t_2)}}$$

- Where r_g is the genetic correlation between two traits, $var_g(t_i)$ is the genetic variance of trait i and $cov_g(t_1, t_2)$ is the genetic covariance between the two traits.
- Genetic correlations say nothing about the *proportion* of outcome correlation that can be attributed to genetic correlation.

Results: genetic correlations

	KS2	KS3	KS4
Cognitive ability	0.985 (0.039)	0.967 (0.047)	0.989 (0.051)
Linear SEP			
Binary SEP			

- Genetic correlations consistent throughout schooling
- Majority of SNPs that associate with EA also associate with CA
- Unsurprising given that ability tests and exam papers are similar experiences that are likely to require similar skills
- Does not imply that EA is based solely on cognitive ability

Results: genetic correlations

	KS2	KS3	KS4
Cognitive ability	0.985 (0.039)	0.967 (0.047)	0.989 (0.051)
Linear SEP	0.861 (0.069)	0.872 (0.069)	0.936 (0.055)
Binary SEP	0.768 (0.098)	0.760 (0.097)	0.784 (0.085)

- Many SNPs that associate with EA also associate with SEP
- Correlations higher for linear than binary measure
- Higher correlation at age 16 suggests SNPs associated with SEP are more strongly associated with EA at later ages in childhood, where performance is more likely to impact SEP in adulthood
- Does not imply that SEP is genetically determined

Conclusions

- Genetic variants that associate with high academic performance also associate with high SEP and performance on cognitive tests
- Results suggest genetics may be involved with social inequalities in EA
- However, does not imply that socio-economic gradients in EA are caused by genetics
- Results may be influenced by unobserved differences between individuals (residual population structure)
- Demonstrates the use of genetic data to social scientists and social science research questions

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Thank you for your attention

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Sample sizes

- Study numbers

	n	Mean	SD
KS4 points	6518	39.89	9.48
KS3 points	4960	35.97	6.19
KS2 points	6132	28.04	3.85
Cognitive ability	5295	105.07	16.36
Binary SEP	n	%	
High	3,990	59.53	
Low	2,713	40.47	