

**CHILD HEIGHT AND INTERGENERATIONAL
TRANSMISSION OF HEALTH:
EVIDENCE FROM INDIAN MIGRANTS IN ENGLAND**

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BACKGROUND

- Strong correlation between living standards and body size in several countries
 - Fogel 1994, Steckel 1995
 - Hatton and Bray 2010, 1cm per decade among young European men 1870s to 1970s
- Well-documented economic returns to height
 - Strauss and Thomas 1998, 2008
 - Persico et al 2005, Case and Paxson 2008
- Widespread poor growth performance among children in India
 - NFHS 2005-06 data:
 - ~45% stunted
 - >40% underweight
 - >25% wasted
 - India does poorly even relative to a number of SSA countries that are poorer/have worse public health infrastructure/have higher IMR
 - “South Asian Enigma” (Ramalingaswami et al 1996)

MALNUTRITION REMAINS WIDESPREAD

	NFHS-3, 2005-06	NFHS-4, 2015-16
Children U5		
Stunted (HAZ < -2)	48	38.4
Wasted (WHZ < -2)	19.8	21
Severely Wasted (< -3)	6.4	7.5
Anemic (6-59m, Hb<11)	69.4	58.4
Women 15-49		
BMI < 18.5	35.5	22.9
Non-pregnant Anemic (Hb < 12)	55.2	53.1
PW Anemia (Hb < 11)	57.9	50.3

ONGOING WORK

- with Aprajit Mahajan, Rey Martorell and Grant Miller
- Can **mandated food fortification** help to reduce anemia?
- Ongoing project in collaboration with Gov. of Tamil Nadu, India
- Large-scale RCT in ~200 villages in Cuddalore District
- Baseline survey likely this year
- Work through the Public Distribution System
 - 20-35 Kgs of *free* rice per household per month
 - Fortified rice distributed through existing system
 - No need to change downstream supply chain or to behavioral change
- Funded by GoTN, GIF and Tata Trusts

BACK TO THE ORIGIN OF THE HIGH PREVALENCE OF STUNTING IN INDIA: ONGOING DEBATE

1. Women status (Coffey et al. 2013, Coffey 2015)
2. Son preference (Jayachandran and Pande 2015)
3. Eating habits (Bhalotra et al. 2010, Atkin 2013, 2014)
4. Sanitation (Spears 2012)
5. **Gradual Catch-up** (Deaton and Drèze 2009)
 1. Small mothers less likely to give birth to “big” healthy babies
6. **Genes** (Panagariya 2013)

Our work: Look at 5 & 6, looking at height across generations among ethnic Indians in UK

- Will not make strong causal claims because migrants are obviously not a random sample of the Indian population!

DATA

- **India**

- National Family Health Survey-3 (2005-06)

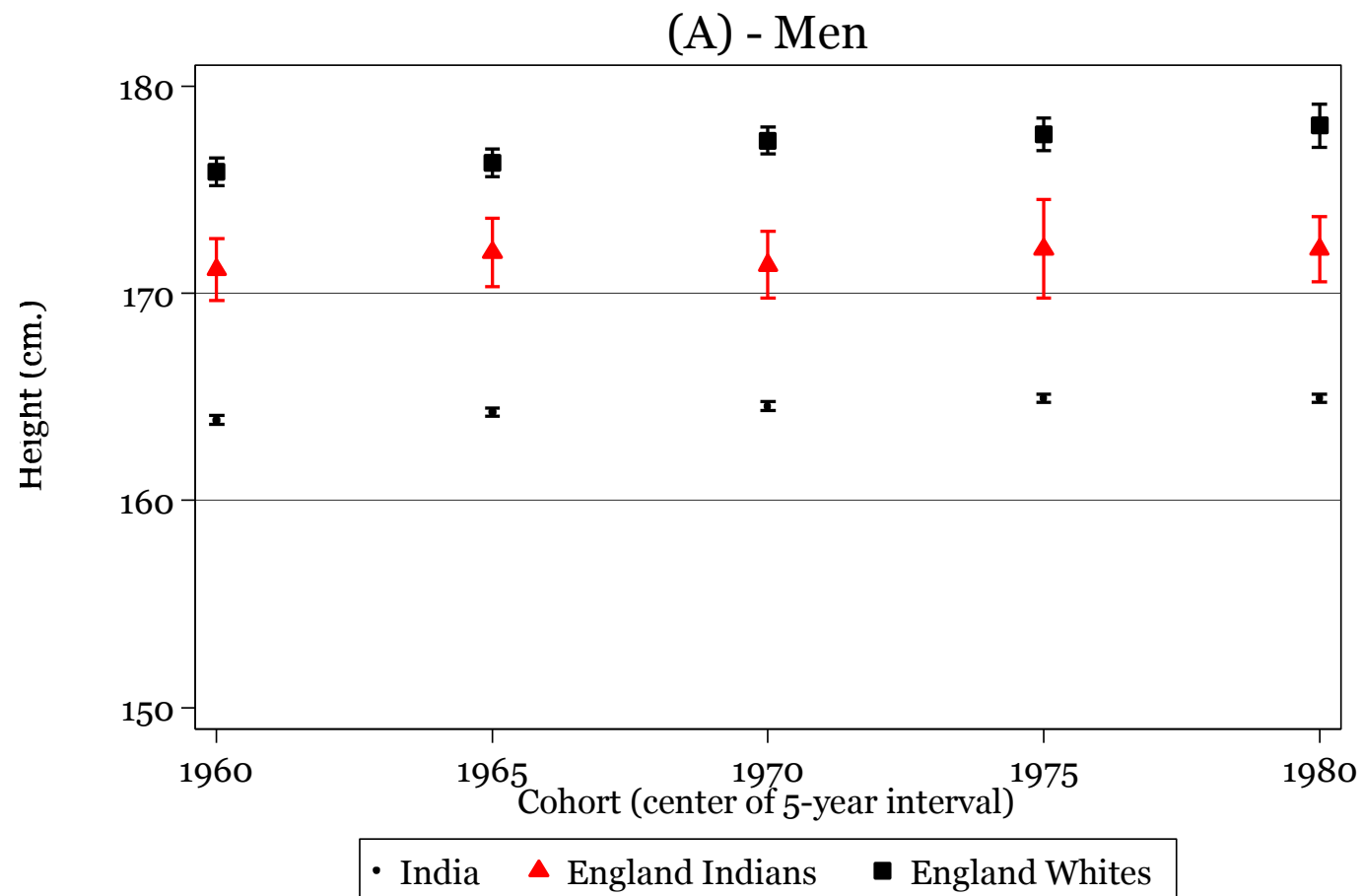
- n=109,041 households, nationally representative
 - Biomarkers (height, weight, hemoglobin): women aged 15-49, men 15-54, **U5**

- **England**

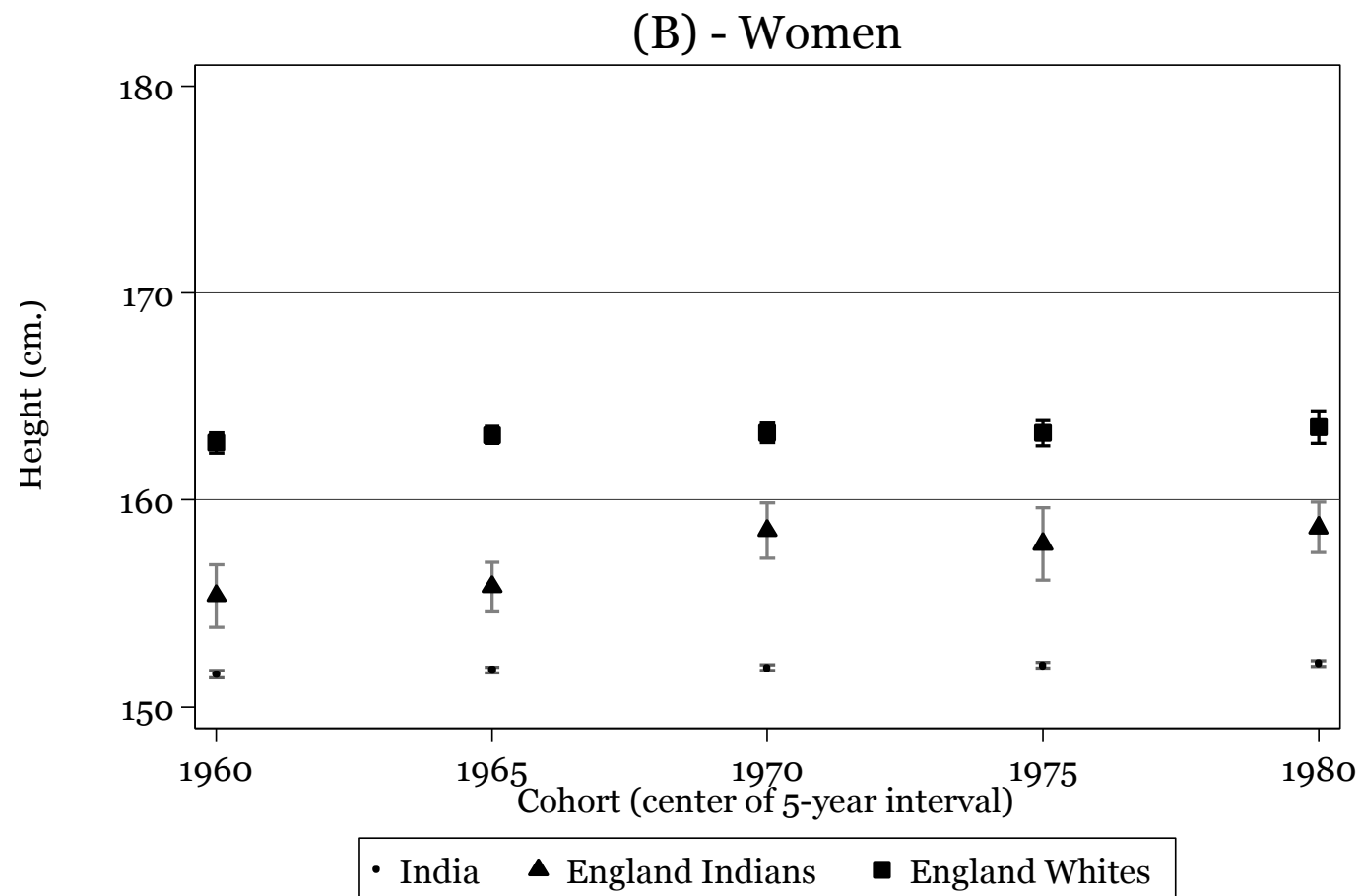
- Health Survey for England (1999 and 2004)

- Ethnic Boost in both rounds, records ethnicity, including Indian
 - Height for children 2 and above and for all adults
 - Drawbacks
 - Small sample conditional on ethnicity (~200 children age 2-4 years)
 - 2004 does not report age in months for children
 - » We will focus on height in cm. not on measures of “stunting”

ADULTS: NFHS-3 vs HS(ENGLAND)

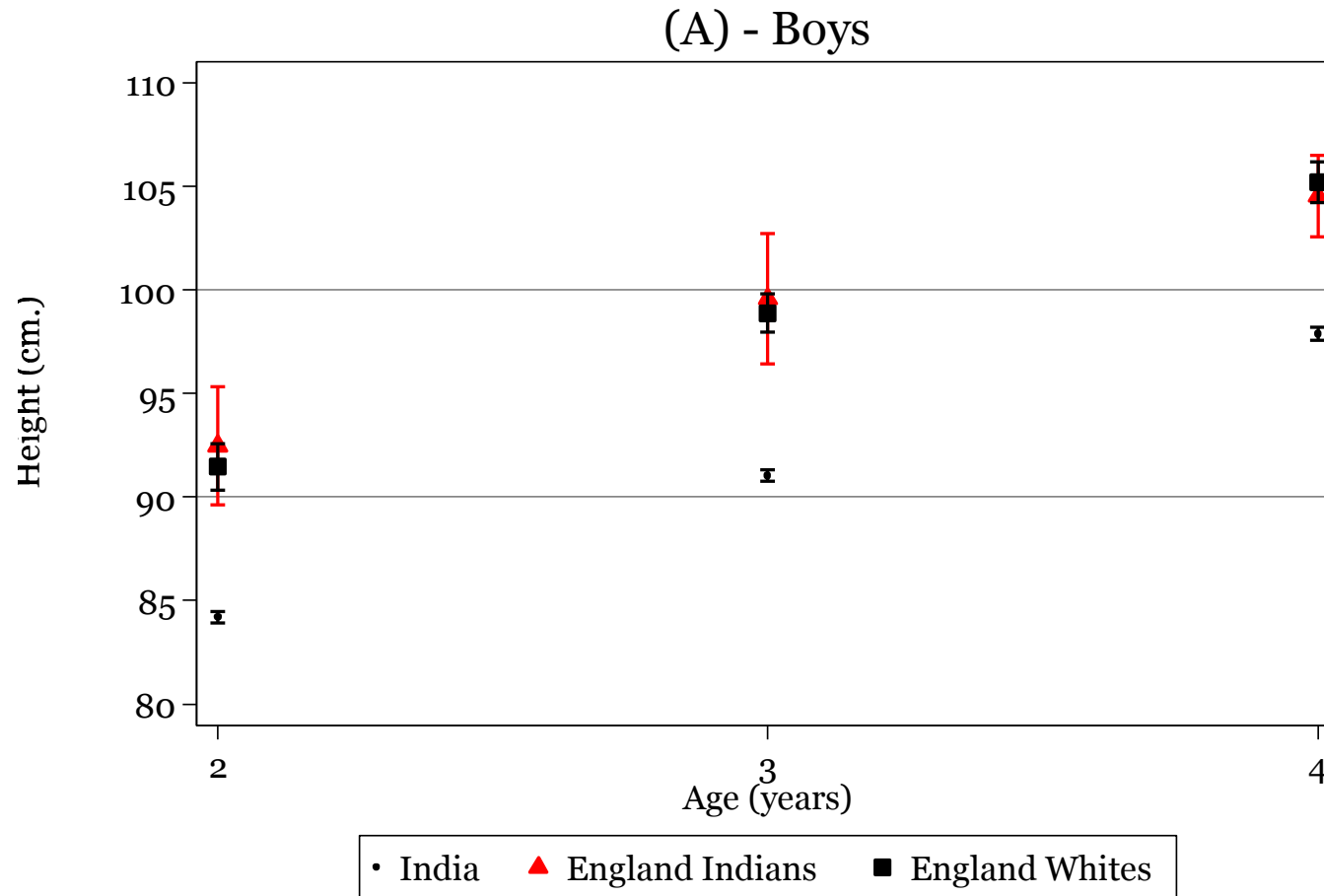


ADULTS: NFHS-3 vs HS(ENGLAND)



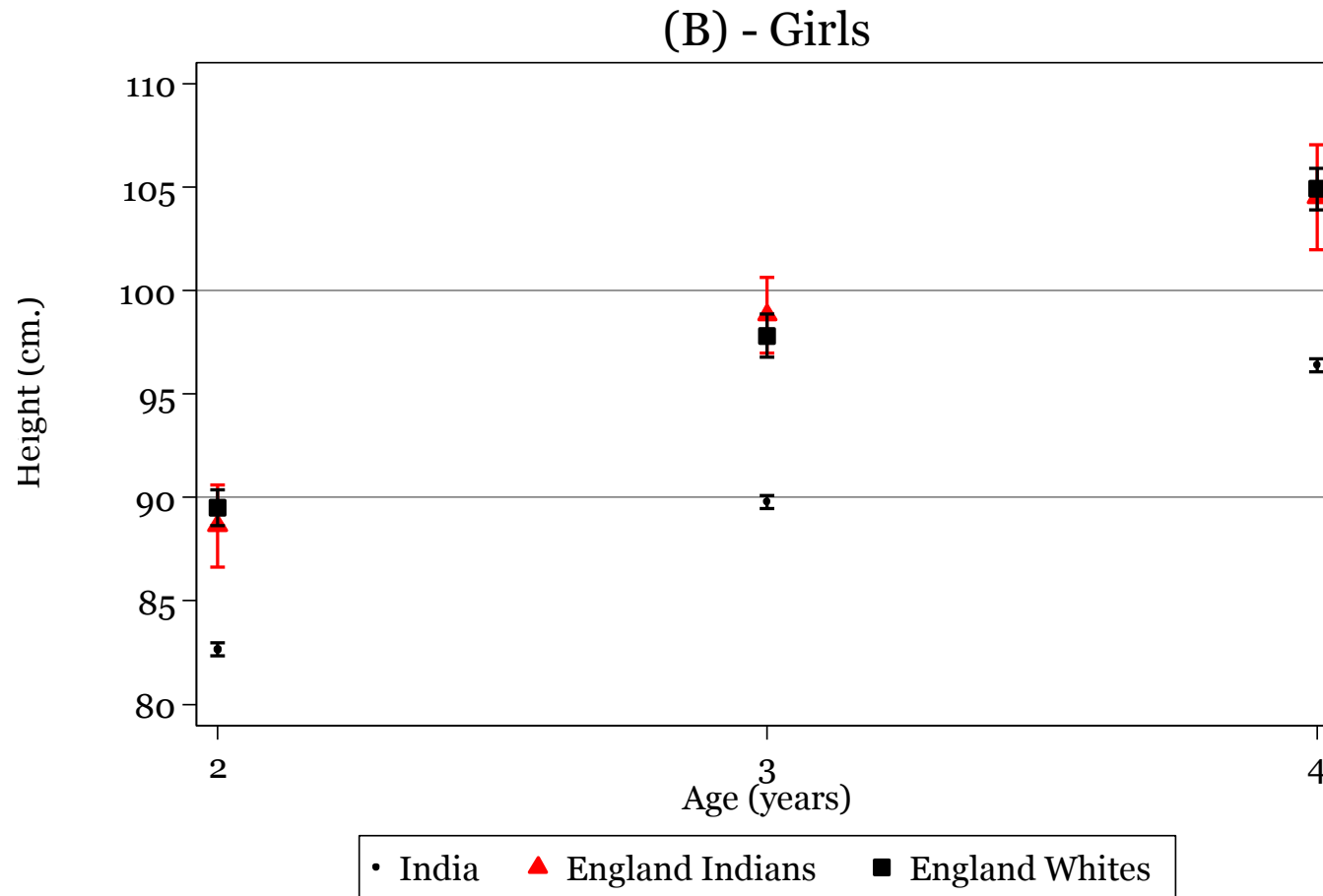
BOYS 2-4: NFHS-3 vs HSE

- Can only compare for $2 \leq \text{Age} < 5$



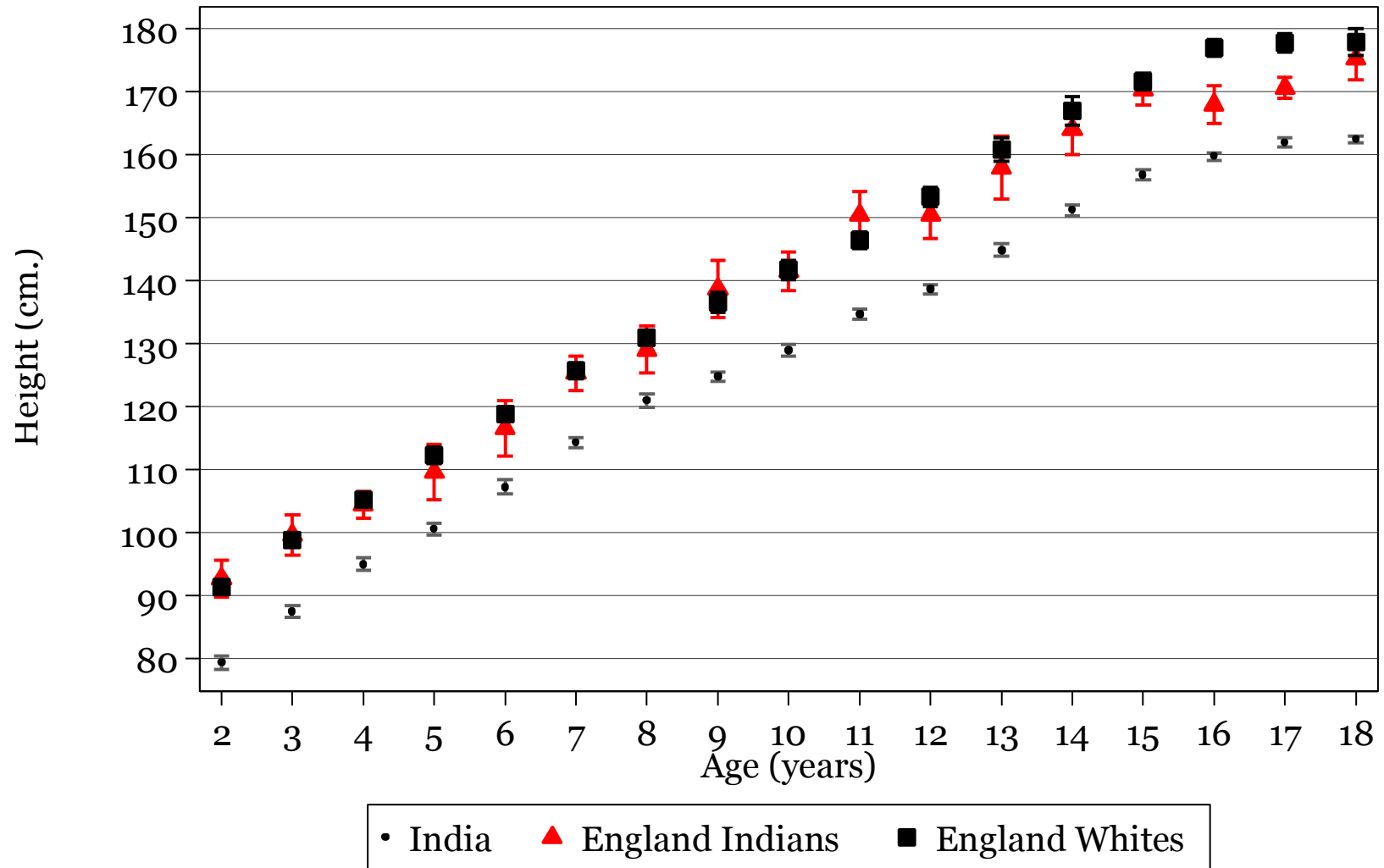
GIRLS 2-4: NFHS-3 vs HSE

- Can only compare for $2 \leq \text{Age} < 5$



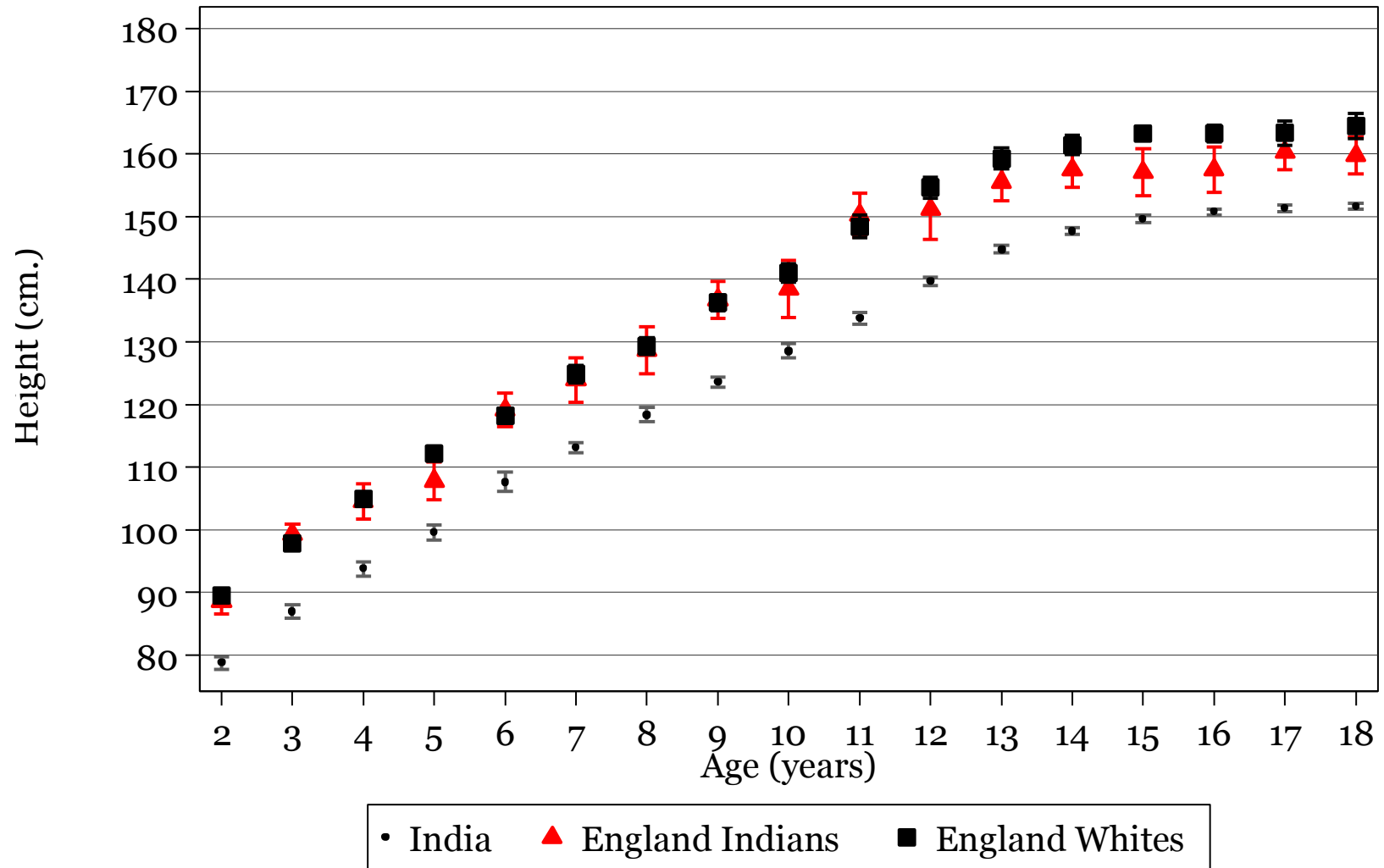
LOOKING AT OLDER CHILDREN

(A) - Boys



SYSTEMATIC GAP ONLY APPEARS AFTER 11

(B) - Girls



BUT BIRTHWEIGHT MUCH LOWER AMONG ETHNIC INDIANS!

	Birth weight (Kg)
Constant (White, males)	3.5*** (0.02)
White, girl	-0.14*** (0.02)
Ethnic Indian, boy	-0.41*** (0.03)
Ethnic Indian, girl	-0.45*** (0.04)
Observations	4,037
R-squared	0.0692

- Source: HSE 1999 and 2004

INTER-GENERATIONAL TRANSMISSION

$2 \leq \text{AGE} < 5$, NFHS-3 vs HSE(ENGLAND)

- Pooled regressions, including only Indians in NFHS and ethnic Indians in England
- Also large differences when comparing ethnic Indian children in England with children in India from parents that are at least as tall

	(1) Boys	(2) Girls
England	0.0636*** (0.008)	0.0626*** (0.008)
Log(Father's height)	0.26*** (0.04)	0.27*** (0.04)
Log(Mother's height)	0.35*** (0.04)	0.39*** (0.04)
Age FE	Yes	Yes
Observations	6,380	5,884
R-squared	0.408	0.346

CONCLUSIONS & LIMITATIONS

- Adult ethnic Indians migrants to England **1.** positively selected on height, but **2.** still much smaller than Whites
- Their children have already caught up, at least up to age 10-12
 - Fast catch up
 - Adds evidence against genes being important for small U5 in India, but
 - Cannot rule out selection also in terms of genetic potential
 - Parents taller than the average in India because of selection
 - Do not estimate the “returns to England”
 - Do not observe height of these children as teenagers and adults
 - Studies from genetics suggest that genes matter less among very young children.
 - Much lower birthweight relative to Whites
 - Does it matter for height in adulthood?
 - Does it matter for human capital, e.g. cognitive development?
- Other limitations
 - Do not look at reasons for catch up
 - Comparisons with Whites in England, not international growth standards
 - Small sample, despite ethnic boost in HSE

IN PROGRESS: MILLENNIUM COHORT STUDY

- National longitudinal birth cohort study
- “Year long” cohort of ~ **19,000** babies
- Oversampling of families living in areas with high prevalence of child poverty and ethnic minority
- Several waves: **9 months, then 3, 5, 7, 11 years**
- Information on:
 - Demographics
 - Parenting Activities (Mother and Father)
 - Parental and Child Attitudes
 - Parental and Child Health
 - Employment and Education
 - Anthropometric Measures
 - Child Cognitive Assessments

LOW BIRTHWEIGHT MUCH MORE LIKELY AMONG ETHNIC INDIANS

Weight (Kgs)	Boys	Girls
White	3.43	3.31
Ethnic Indian	3.05	2.95

Low Birthweight (<2.5Kgs)	Boys	Girls
White	0.06	0.08
Ethnic Indian	0.12	0.19

- Also very small average difference in gestational length (2 days)

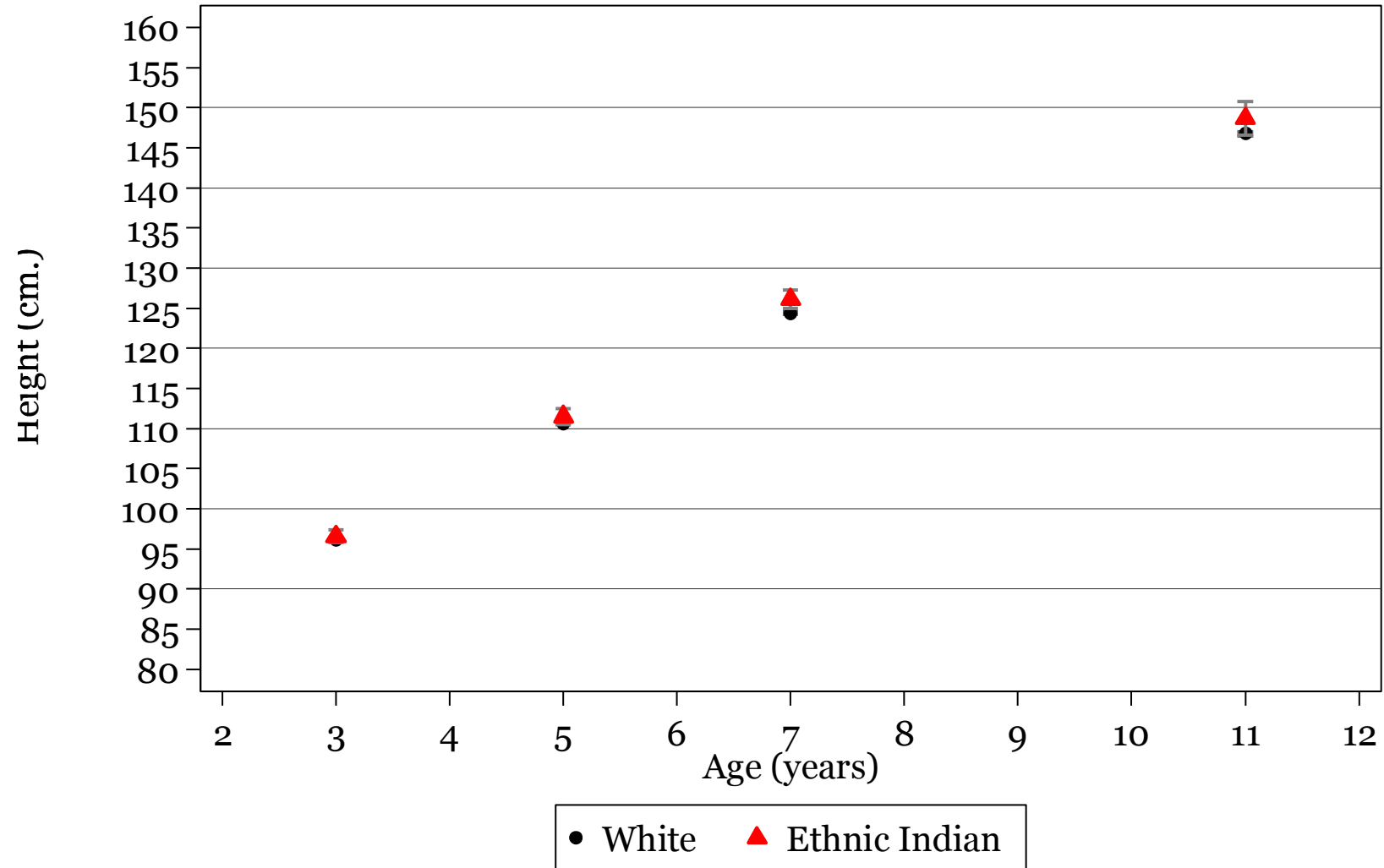
LOW BIRTHWEIGHT NEGATIVELY CORRELATED WITH DEVELOPMENTAL OUTCOMES, AS EXPECTED

Outcome (all boys and girls, pooled)	Low Birthweight (s.e. in par.)	Mean for children with normal BW
Height in wave 2 (age ~3)	-2.01 (0.19)	95.9
Height in wave 3 (age ~5)	-2.52 (0.22)	110.7
Height in wave 4 (age ~7)	-2.51 (0.26)	123.7
Height in wave 5 (age ~11)	-2.82 (0.38)	146.4
Development index age 9 months (0-1 scale)	-0.12 (0.01)	0.63
Bracken School Readiness, Age ~3 (0-100)	-2.69 (0.65)	29.9
NFER Number Skills, Age ~7 (0-15 scale)	-0.86 (0.13)	9.8

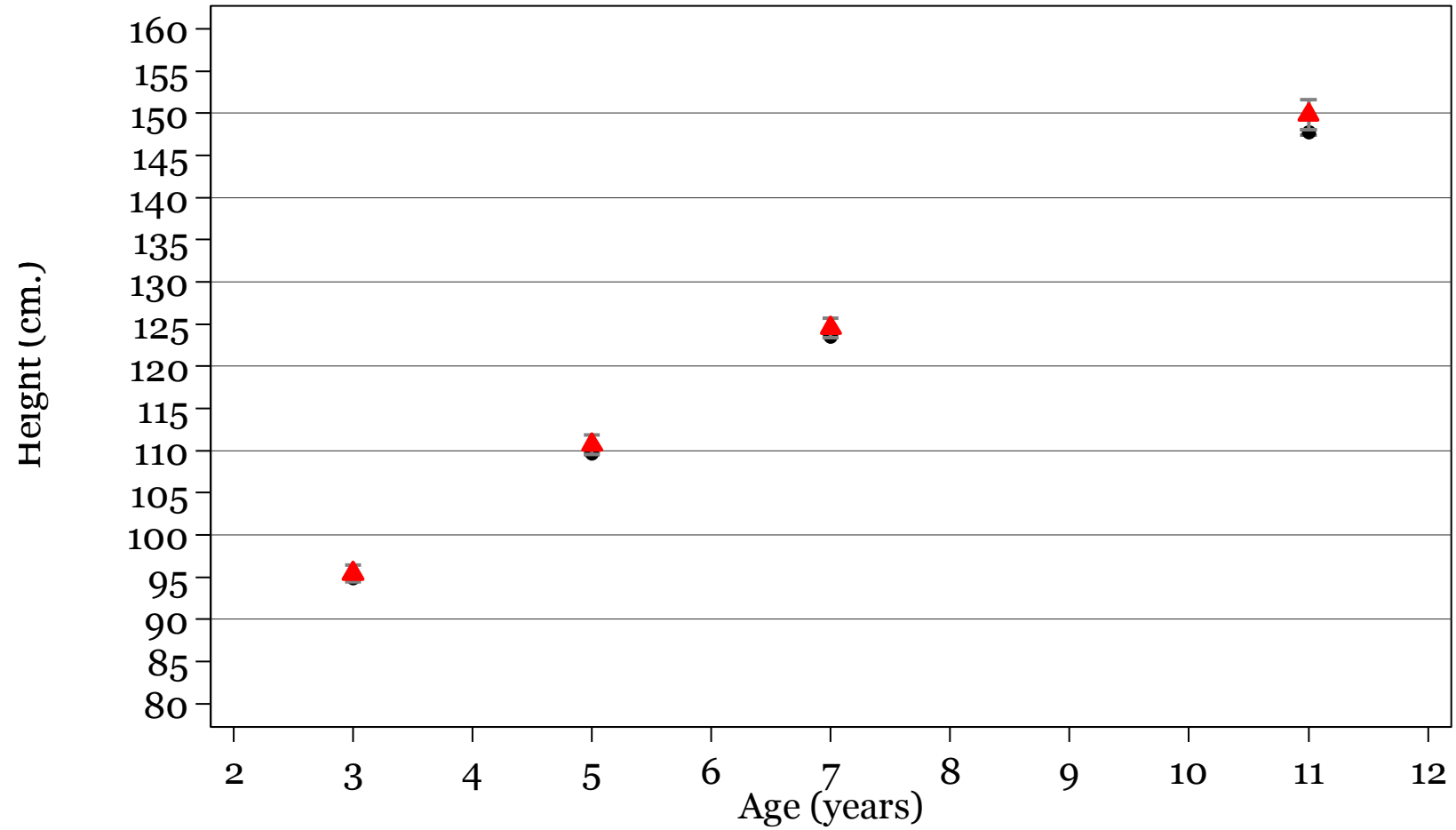
- Note: All slopes significant at 1% level

HEIGHT AMONG WHITES AND ETHNIC INDIANS

(A) - Boys



(B) - Girls



• White ▲ Ethnic Indian

COGNITIVE INDEXES

Outcome (all boys and girls, pooled)	Ethnic Indian (s.e. in par.)	Mean for White children
Development index, age 9 months (0-1)	0.04 (0.009)***	0.62
BAS Naming Vocabulary, Age ~3 (0-30)	-3.9 (0.31)***	17.4
Bracken School Readiness, Age ~3 (0-100)	-3.4 (1.13)***	29.8
BAS Picture similarity, Age ~5	0.09 (0.26)	15.8
BAS Naming Vocabulary, Age ~5	-1.7 (0.25)***	14.8
BAS Pattern Construction, Age ~5	-0.46 (0.49)	19.1
BAS Pattern Construction, Age ~7 (0-100)	-1.25 (0.46)***	19.3
BAS Word Reading, Age ~7 (0-100)	7.2 (1.24)***	44.4
NFER Number Skills, Age ~7 (0-15 scale)	0.19 (0.24)	9.7