Trading social status for genetics in marriage markets: Evidence from UK Biobank




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Goals of this paper

In increasing order of ambition:

- Explain a puzzle about the **intergenerational persistence of inequality**.
- Provide a new explanation of the **genes-SES (socio-economic status) gradient**.
- Rethink the **nature of inequality** in historical human societies.
- Change how we think about **genetic variation**.

Many genetic measures, including polygenic scores for education and health outcomes, differ between low and high Socio-Economic Status (SES) people.

The leading explanation for this **genes-SES gradient** is meritocracy: genetic variants that cause success in *labour markets* lead to upward mobility.

An alternative explanation: both some genetic variants, and high SES, are desirable qualities in **marriage markets**.

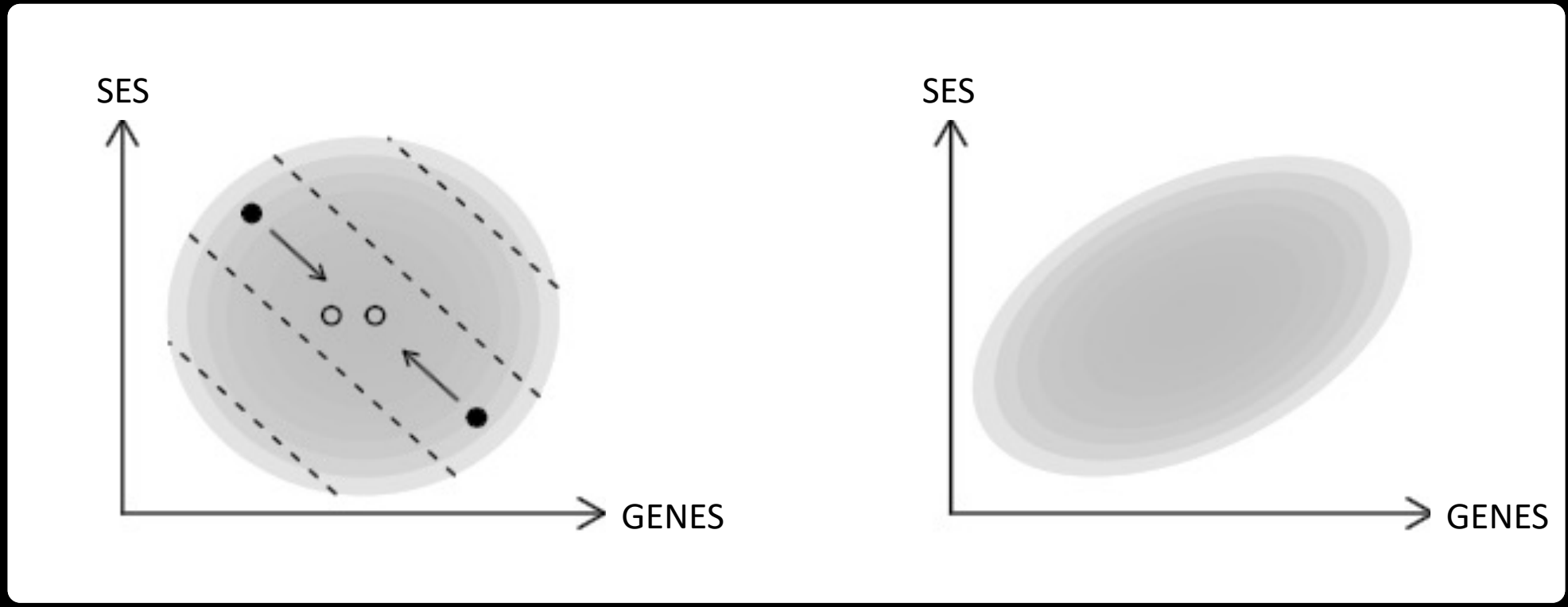
If you are rich or privileged, you may marry someone intelligent or good-looking.

Both SES and genetics are then inherited by the next generation.

Under **Social-Genetic Assortative Mating**:

- Shocks to SES are reflected in the DNA of subsequent generations.
- The genes-SES gradient depends on social structure, e.g. on persistence of inherited wealth.
- The genes-SES gradient is likely historically widespread, beyond modern meritocracies.

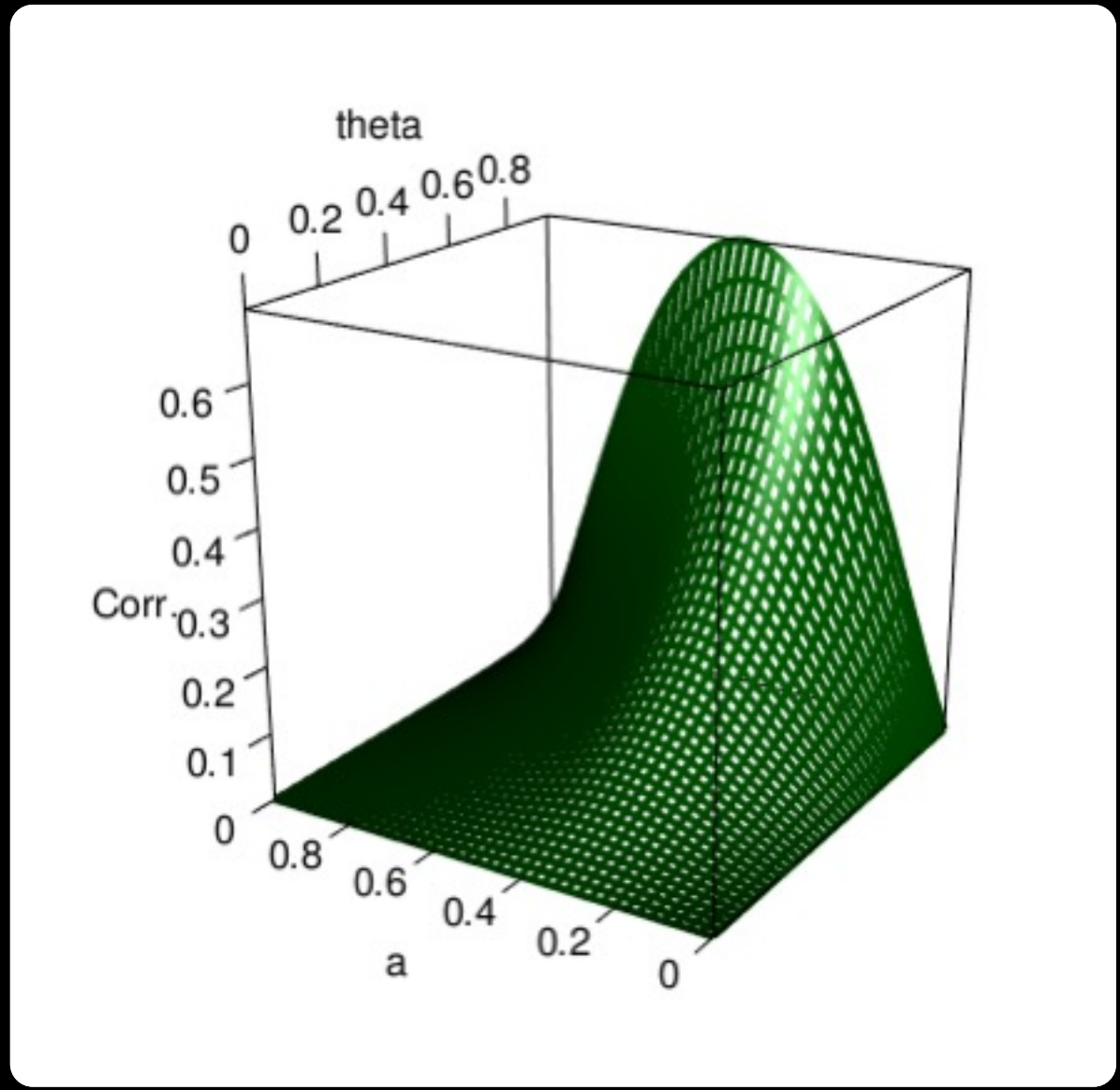
Intuition



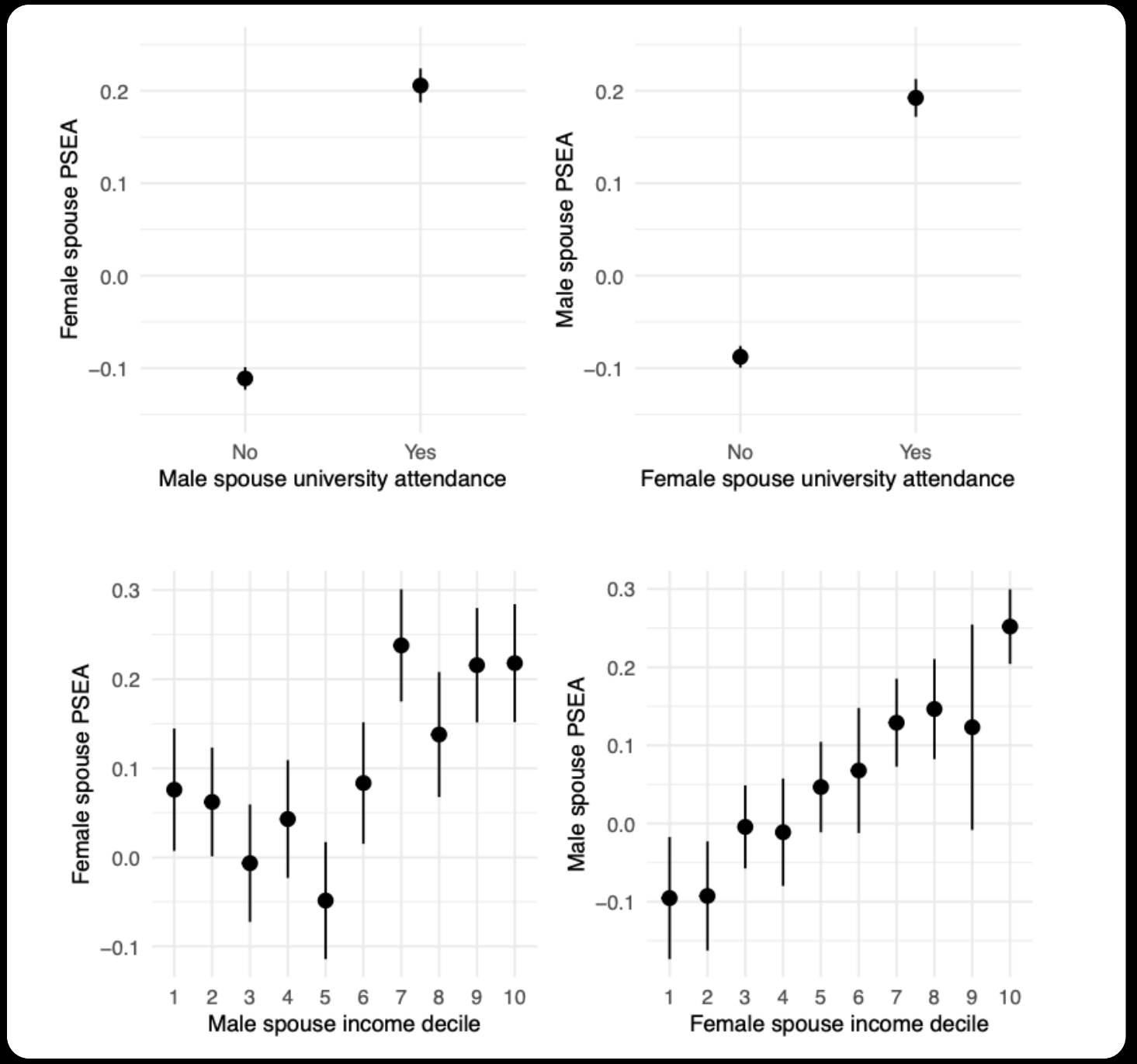
Parents (●) mate along iso-attractiveness curves (- - - - -).
Their children (○) are between them in expectation.
As a result, the children's distribution is squashed along the attractiveness gradient.

In our model, the correlation between genes and SES (Corr.) depends on

- the relative importance of genes compared to SES in marriage markets (a);
- intergenerational persistence of SES (theta).



35,682 UK Biobank spouse pairs



These results could just be due to genetic assortative mating (GAM).

We need a “shock” to SES which is not correlated with genetics.

We use **birth order**.

- Siblings have the same expected polygenic scores, by the “lottery of meiosis”.
- Early-born siblings receive more parental care and have better life outcomes, including SES.

Estimation strategy

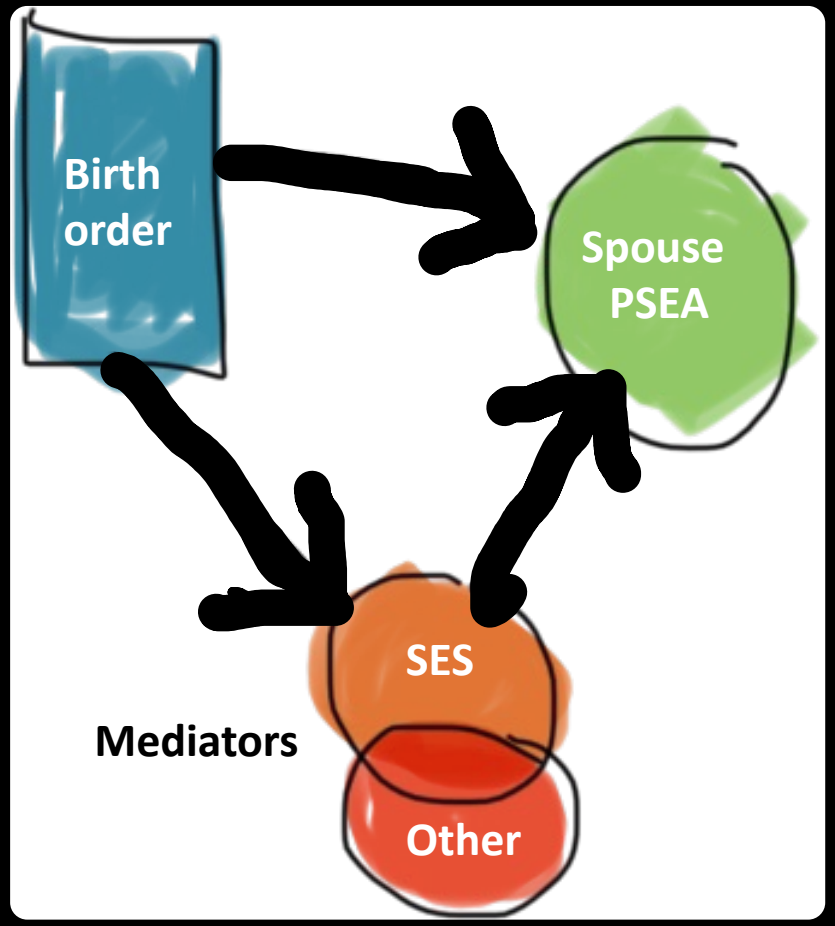


Table 1: Regressions of mediators on birth order

	University	Income	Fluid IQ	Height	BMI	Health
Birth order	−0.0790 ***	−1.0899 *	−0.2733 ***	−0.7012 ***	0.1907 **	−0.0430 ***
	(0.0067)	(0.4264)	(0.0304)	(0.1355)	(0.0662)	(0.0103)
PSEA	0.0889 ***	1.5144 ***	0.3180 ***	0.1970 *	−0.4281 ***	0.0533 ***
	(0.0046)	(0.3307)	(0.0200)	(0.0921)	(0.0456)	(0.0068)
Parents' age at birth	0.0163 ***	0.2623 ***	0.0588 ***	0.1514 ***	−0.0989 ***	0.0110 ***
	(0.0012)	(0.0722)	(0.0053)	(0.0241)	(0.0117)	(0.0018)
Family size dummies	Yes	Yes	Yes	Yes	Yes	Yes
Birth month dummies	Yes	Yes	Yes	Yes	Yes	Yes
Birth year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	10220	3412	10220	10220	10220	10220
R2	0.074	0.026	0.058	0.017	0.023	0.018

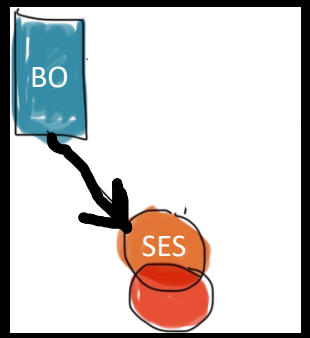
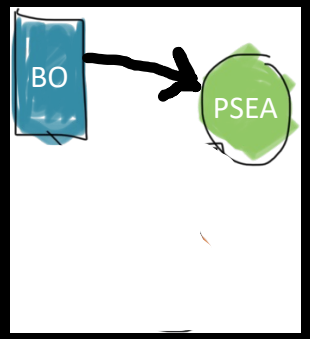


Table 2: Regressions of spouse PSEA on birth order

	(1)	(2)	(3)
Birth order	−0.0091	−0.0075	−0.0314 *
	(0.0074)	(0.0074)	(0.0146)
Own PSEA		0.0650 ***	0.0573 ***
		(0.0065)	(0.0100)
Parents' age at birth			0.0116 ***
			(0.0026)
Family size dummies	Yes	Yes	Yes
Birth month dummies	No	Yes	Yes
Birth year dummies	No	Yes	Yes
N	23840	23797	10206
R2	0.003	0.010	0.013



SES mediators

Non-SES mediators

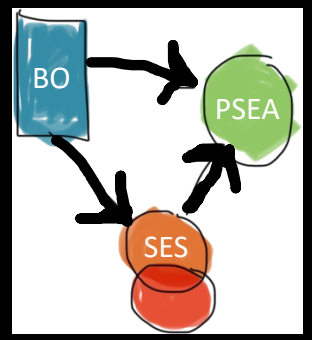
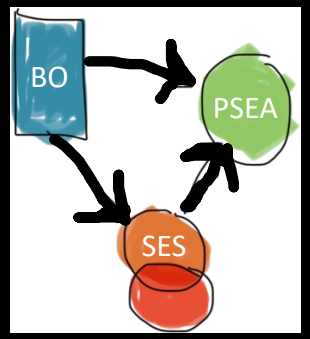


Table 3: Regressions of spouse PSEA on birth order and mediators

	(1)	(2)	(3)	(4)
Birth order	−0.0314 *	−0.0045	−0.0106	−0.0042
	(0.0146)	(0.0146)	(0.0270)	(0.0270)
University		0.2179 ***		0.1538 ***
		(0.0225)		(0.0377)
Income			0.0037 ***	0.0031 **
			(0.0011)	(0.0011)
Fluid IQ		0.0172 **	0.0201 *	0.0112
		(0.0053)	(0.0094)	(0.0097)
Height		0.0029 **	0.0046 *	0.0043 *
		(0.0011)	(0.0020)	(0.0019)
BMI		−0.0109 ***	−0.0114 **	−0.0109 **
		(0.0022)	(0.0040)	(0.0040)
Self-reported health		0.0181	0.0145	0.0077
		(0.0151)	(0.0272)	(0.0271)
Own PSEA	0.0573 ***	0.0263 **	0.0218	0.0118
	(0.0100)	(0.0101)	(0.0184)	(0.0185)
Parents' age at birth	0.0116 ***	0.0053 *	0.0091 +	0.0078 +
	(0.0026)	(0.0026)	(0.0047)	(0.0047)

Table 4: Percent of birth order effects accounted for by mediators, models 2-4

	Model 2 (%)	Model 3 (%)	Model 4 (%)
University	54.9		38.7
Income		13.0	10.6
Fluid IQ	15.0	17.6	9.7
Height	6.6	10.4	9.5
BMI	6.6	7.0	6.6
Self-reported health	2.5	2.0	1.1



Robustness

Socio-Genetic Assortative Mating

Explain a puzzle about the **intergenerational persistence of inequality**.

- Inequality can persist because of unmeasured genetic variation (Clark 2021). Genetics can be a mediator, not just a confound, for transmission of SES over generations.

Provide a new explanation of the **genes-SES gradient**.

- In modern meritocracies, genes affect SES.
- Under SGAM, in all societies, SES can affect genes.
- Shocks to SES are reflected in the DNA of subsequent generations.

Rethink the **nature of inequality** in historical human societies.

- Prediction: a genes-status gradient should be visible in ancient DNA.
- SGAM plus differential reproduction could induce differences in e.g. appearance between groups.

Change how we think about **genetic variation**.

- Yes, genes are “biological”…
- But across generations, **genetic variation is a social outcome**.
- The size of the genes-SES gradient is affected by socio-economic institutions.

Thank you!

Society Genetics

Spouse pairs

Some respondents in the Biobank sample have a genetic child who is also in the sample.

Among our spouse pairs, 511 have a genetic child of at least one partner in the sample.

For 86% (441) of these, the child is the genetic child of both partners.

Comparison: 11% of families with dependent children included a stepchild in England and Wales in 2011 (National Statistics 2014).

Robustness

Extra mediators: BMI, self-reported health.

Birth order is independent of 33 different polygenic scores.

Results are qualitatively robust…

- … if we use birth order dummies: strongest effect for first child versus subsequent children.
- … using age left full-time education as the key mediator
- … for males and females only (initial birth order coefficient is not significant)
- … for couples with children

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