

## **Supplementary Materials for:**

### **Cognitive ability and physical health: a Mendelian randomization study**

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Supplementary Figure 1: Educational attainment and verbal-numerical reasoning in UK

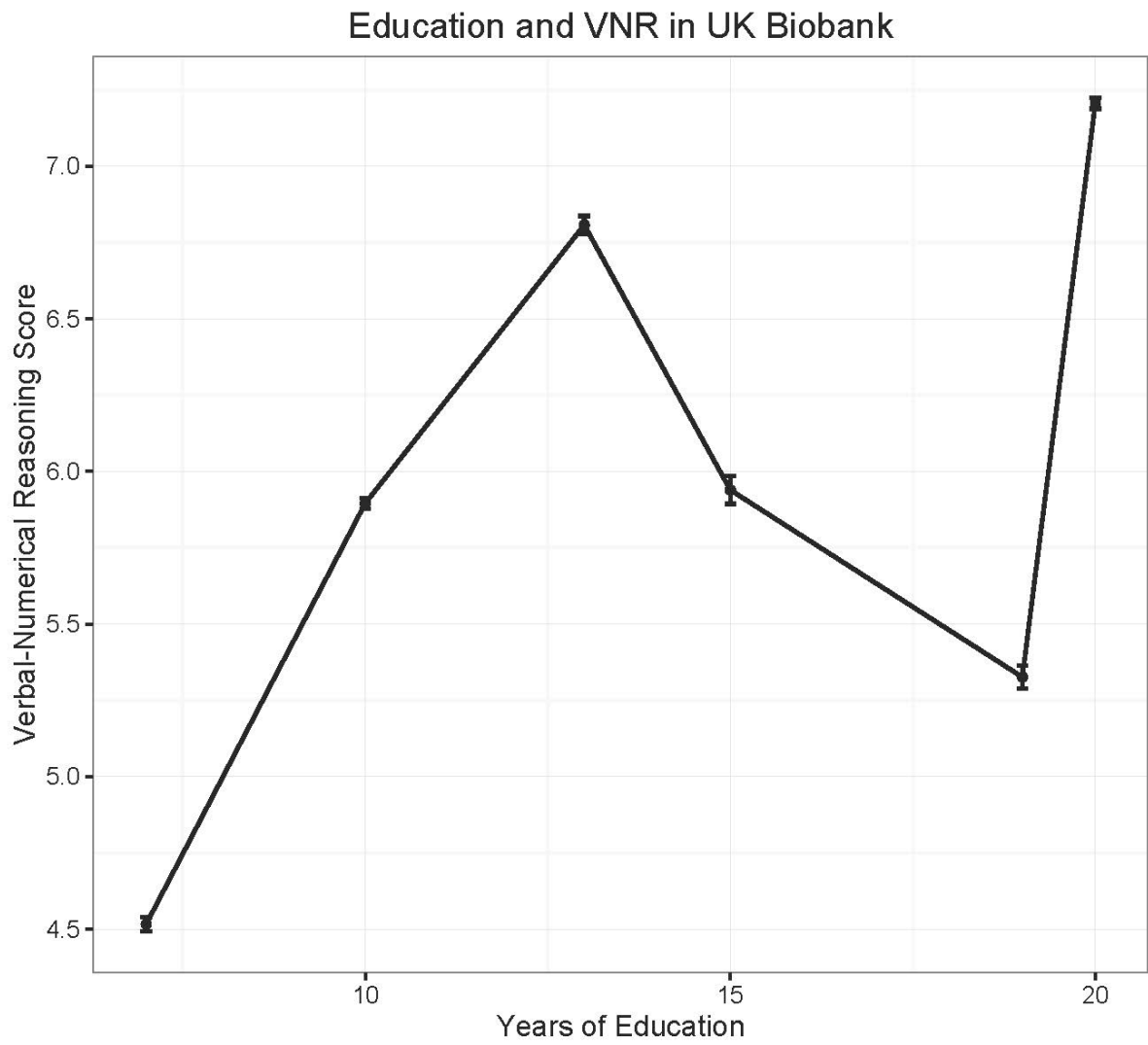
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Supplementary Table 1: Power calculations

Supplementary Table 2: Observational associations between educational attainment and health outcomes.

Supplementary Table 3a-f: Summary of the SNPs used for instrumental variants previously identified as associated with exposure at genome wide significance

**Supplementary figure 1.** Educational attainment categories and mean scores for verbal-numerical reasoning per group. Error bars represent standard errors.



**Supplementary Table 1.** Power for bidirectional Mendelian randomization analysis (two-sided  $\alpha = 0.05$ ). Power calculations are based on the method developed by Brion, et al. <sup>1</sup>.

Exposure/instrumental variable	Outcome	R-squared (of variance in exposure)	Actual N (outcome)	Proportion of cases (outcome)	Observational Effect size	N required for 80% power	Power at actual N
Educational attainment	BMI	0.015	111712	NA	-0.37	3299	1
Educational attainment	Height	0.015	111959	NA	0.31	4922	1
Educational attainment	Systolic blood pressure	0.015	106759	NA	-0.2	12559	1
Educational attainment	Coronary artery disease	0.015	110,072	0.048	OR 0.4	42,832	1
Educational attainment	Type 2 diabetes	0.015	111,779	0.034	OR 0.6	86,084	0.89
BMI	Verbal-numerical reasoning	0.027	36,035	NA	-0.05	115990	0.35
Height	Verbal-numerical reasoning	0.15	36,035	NA	0.18	1563	1
Systolic blood pressure	Verbal-numerical reasoning	0.009	36,035	NA	-0.05	347968	0.15
Coronary artery disease	Verbal-numerical reasoning	0.1	36,035	NA	-0.27	999	1
Type 2 diabetes	Verbal-numerical reasoning	0.057	36,035	NA	-0.06	36207	0.8

**Supplementary Table 2.** Observational associations between educational attainment and health outcomes.

	Educational attainment – health outcomes (7 vs 10 years)			Educational attainment – health outcomes (7 vs 13 years)		
	Beta	95% CI	p	Beta	95% CI	p
BMI	-0.1287	-0.146 – (-0.111)	<b>7.25×10<sup>-44</sup></b>	-0.2350	-0.257 – (-0.213)	<b>8.15×10<sup>-93</sup></b>
Height	0.1667	0.155 – 0.178	<b>2.25×10<sup>-151</sup></b>	0.2590	0.243 – 0.275	<b>1.94×10<sup>-235</sup></b>
Systolic blood pressure	-0.0775	-0.095 – (-0.060)	<b>6.89×10<sup>-18</sup></b>	-0.1273	-0.149 – (-0.106)	<b>1.71×10<sup>-30</sup></b>
Type 2 diabetes	OR: 0.815	0.742 – 0.895	<b>1.74×10<sup>-05</sup></b>	OR: 0.800	0.706 – 0.905	<b>4.27×10<sup>-04</sup></b>
Coronary artery disease	OR: 0.631	0.583 – 0.683	<b>2.79×10<sup>-30</sup></b>	OR: 0.555	0.496 – 0.620	<b>2.98×10<sup>-25</sup></b>

**Supplementary Table 3a-f.** Summary of the SNPs used for instrumental variants previously identified as associated with exposure at genome wide significance.

See attached Excel spreadsheet

## References

- 1 Brion, M.-J. A., Shakhbazov, K. & Visscher, P. M. Calculating statistical power in Mendelian randomization studies. *International Journal of Epidemiology* **42**, 1497-1501, doi:10.1093/ije/dyt179 (2013).