

The wider consequences of obesity: estimated social and economic costs from Mendelian Randomization

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Background:

Obesity is a key public health issue worldwide. Accurate estimates of its full impacts on health, social, and economic outcomes are required, but are difficult to obtain due to bias from confounding and reverse causality (the impact of social and economic factors on obesity).

Methods:

Using data from the UK Biobank and ALSPAC, we applied a genetic causal inference approach (Mendelian Randomization, MR) to estimate the impact of body mass index (BMI) on key social and economic outcomes. Because genetic variants are assigned before birth and cannot change, estimates from MR studies are less liable to confounding and reverse causation.

Results:

Effects of higher BMI were often larger in MR than conventional (non-genetic) models, suggesting previous studies may have underestimated the impact of BMI. For example, in adolescents, MR models implied a standard deviation increase in BMI led to exam scores around 1/3 of a grade lower in all subjects at age 16, and 8.7% (CI: 1.8% to 16.1%) more school absence. In adults a 5kg/m² increase in BMI corresponded, among other negative outcomes, to £2,778 less annual household income (CI: £1,864 to £3,693), less chance of owning one's home (-1.6%, CI: -2.4% to -0.8%), and higher chance of being lonely (2.4%, CI: 1.4% to 3.5%). At

£21.22 (CI: £14.35 to £28.07) per person per marginal kg/m² per year, MR estimates for inpatient hospital costs were around 40% higher than conventional estimates.

Conclusions:

Findings from causal inference based on genetic variation indicate that high BMI has negative impacts on social and economic outcomes that may be larger than previously

estimated. This evidence highlights the potential social and economic value of preventing high BMI across the life course.

Key messages:

- High BMI has considerable negative impacts not only for health, but for individuals' education and socioeconomic outcomes, and overall health care costs.
- Previous attempts to quantify these effects may have underestimated BMI's full impact.