Is It How Tall You Are as a Child or How Tall You End Up That Influences Socio-Economic Outcomes? A Life-Course Mendelian Randomization Analysis

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Abstract

Objectives: Prior studies have estimated either the effect of adult or childhood height on socioeconomic outcomes, but these exposures are highly correlated — genetically and phenotypically — making it difficult to disentangle their independent contributions. Using a life-course Mendelian Randomization (MR) framework, we ask whether childhood height causally affects educational attainment (EA), cognitive performance, income, and neighbourhood deprivation independent of adult height.

Methods: We apply univariable MR (UVMR) to estimate total effects and multivariable MR (MVMR) to estimate direct effects of genetically predicted height at age 10 and in adulthood. Robustness is assessed through complementary MR estimators, MR-Clust, MR-Corge, a PheWAS-based clustering analysis, and reverse-direction UVMR.

Results: In UVMR, both exposures were positively associated with all outcomes. In MVMR, adult height showed robust direct effects ($\beta \approx 0.26$–0.32 for EA, cognitive performance, and income; $\beta = -0.171$ for neighbourhood deprivation). The childhood height conditional estimate was not robust under any sensitivity specification. Reverse-direction UVMR found no evidence that deprivation causally influences height.

Discussion: Childhood height appears to affect socioeconomic outcomes largely indirectly through adult stature, with no robust evidence of an independent early-life effect. Limitations include retrospective self-report of childhood height, coarse exposure categorisation, and substantial heterogeneity in instrument-specific estimates.