

ORIGINAL RESEARCH COMMUNICATION

Substantial intergenerational increases in body mass index are not explained by the fetal overnutrition hypothesis: the Cardiovascular Risk in Young Finns Study^{1, 2, 3}

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Background: According to the fetal overnutrition hypothesis, intrauterine influences of maternal obesity increased lifelong obesity risk in the offspring. If the hypothesis is true, then the association between maternal body mass index (BMI; in kg/m²) and offspring BMI should be stronger than the association between paternal BMI and offspring BMI, because only the mother directly influences the fetal environment.

Objectives: We prospectively examined intergenerational change in BMI and tested the fetal overnutrition hypothesis.

Design: Data on offspring weight were obtained from mothers. BMI was assessed from 2980 complete parent-offspring trios when the offspring were 3 to 18 y of age. The assessment of offspring BMI was repeated 21 y later at age 24–39 y.

Results: Adult BMI of the offspring was 1.21 units higher than the BMI of their parents at the same age, which indicates an increase in obesity levels across generations ($P < 0.0001$). Maternal BMI was more strongly associated with offspring birth weight than was paternal BMI ($P = 0.0009$). However, there were no such differences in parent-offspring associations for BMI at later developmental stages when offspring were aged 3–39 y ($P > 0.35$). The results did not materially change in a sensitivity analysis for 1% to 15% nonpaternity.

Conclusions: Because offspring share all genes with their parents, the observed substantially higher adult BMI for offspring than for parents is likely explained by environmental influences. No support was found for any specific influence from fetal environment on this intergenerational increase in adult obesity. The findings were consistent with the fetal overnutrition hypothesis only in relation to birth weight.

Key Words: Body mass index • obesity • fetal overnutrition hypothesis • cardiovascular disease risk • Finns

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