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Maternal weight gain between pregnancies and childhood body mass index - using sibling analysis to address confounding by shared lifestyle

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Objective

Maternal obesity during pregnancy is a risk factor for increased childhood body mass index (BMI) and the mechanism may be causal or confounded by lifestyle common to mother and child. We studied BMI in siblings and their mothers to test the hypothesis that siblings born after maternal weight gain will have increased BMI compared to older siblings.

Approach

This was a whole population data linkage study using data from North East Scotland, UK. Databases containing details from pregnant mothers and their five-year-old children born between 1997 and 2005 were linked using the community health index number. Childhood BMI and the difference between siblings BMI were related to maternal weight gain between pregnancies. Covariates included maternal obesity, smoking, socioeconomic status and the child's birth weight.

Result

Maternal weight gain between pregnancies was determined for 5,863 mothers in whom 718 had >2 pregnancies. Childhood BMI z score was increased in association with maternal obesity (mean increase 0.47 [95% CI 0.39, 0.56]) and with $\geq 10\%$ maternal weight gain between pregnancies (mean increase 0.14 [95% CI 0.06, 0.21]), independent of covariates. In contrast, increased BMI z score for younger siblings, compared to older siblings, was not associated with maternal obesity in the earlier pregnancy or maternal weight gain between pregnancies. BMI z score was higher in younger compared to older siblings in association with deprivation (mean difference between most and least affluent categories 0.29 [0.08, 0.37]), persistent or new onset maternal smoking (increased by mean of 0.10 [0.00, 0.19] for always smokers and 0.20 [0.03, 0.38] for those starting compared

to never smoked) and increased birth weight (BMI z score increased by 0.11 for each increase in birth weight z score [0.07, 0.14]).

Conclusion

When within-family confounding is considered, poverty, persistent and new onset maternal smoking during pregnancy and increased birth weight, but not maternal obesity or weight gain, are independent predictors of increased BMI in young children.

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