Genetic study clarifies the link between birth weight and adult morbidity

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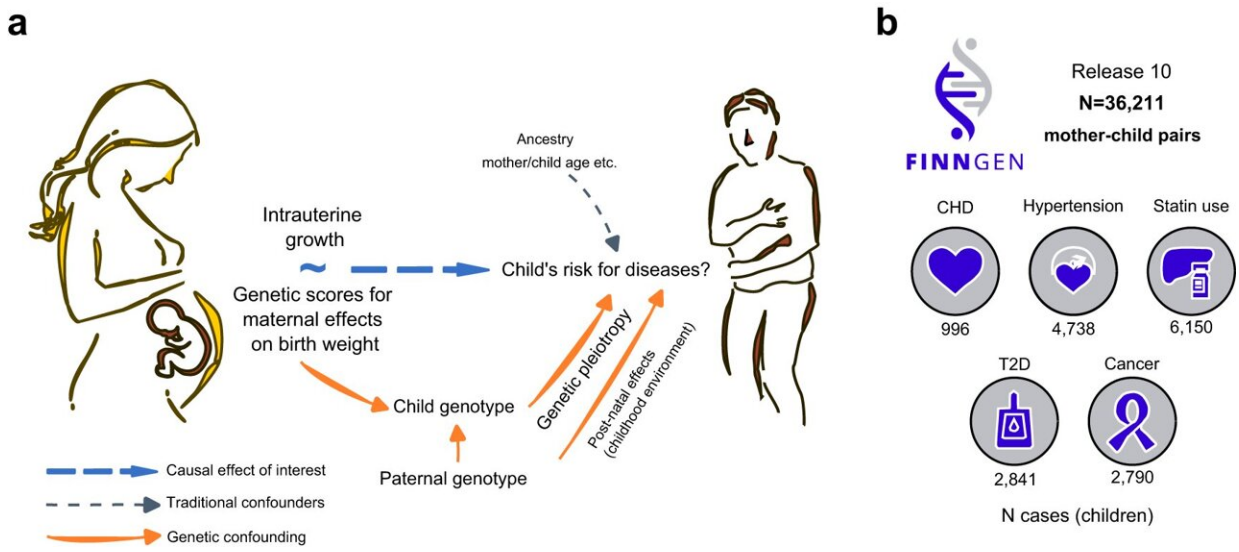

Illustration of the Mendelian Randomization framework applied in mother-child pairs with a summary of the FinnGen dataset. Credit: *Communications Biology* (2024). DOI: 10.1038/s42003-024-05872-9

A unique Finnish study has investigated the link between growth conditions in the womb and cardiovascular disease in adulthood. The results highlight the importance of shared genetic factors between mother and child.

The relationship between birth weight and adult disease has been widely studied. Most studies show that people born small are at increased risk of

developing hypertension and heart disease in adulthood.

The biological cause of this phenomenon has been debated for decades, but there is no definitive research evidence. One popular theory is that inadequate nutritional intake during pregnancy affects the developing fetus's metabolism, predisposing it to cardiovascular disease during periods of over-nutrition.

Recent findings from a team led by Academy Research Fellow Taru Tukiainen suggest that the link between birth weight and disease is instead partly due to risk genes shared by mothers and their children. The findings are published in the journal *Communications Biology*.

The researchers found that maternal genetic factors that influence the growth of the developing fetus have a birth weight-independent effect on the child's subsequent risk of heart disease. However, it appears that these genes only play a role in disease risk when they are passed on to the child.

"Certain maternal genes influence the growth conditions of the child in the womb and consequently the birth weight of the child. The child in turn inherits a copy of these genes from the mother," says Jaakko Leinonen, a Postdoctoral Researcher at the Institute for Molecular Medicine Finland (FIMM) at the University of Helsinki.

"When we studied the impact of these birth weight genes on children's morbidity later in life, we found that small changes in the baby's growth before birth due to the mother are unlikely to have a major impact on the child's risk of developing the disease as an adult. Instead, it seems that a child's own genes play a much more important role in determining his or her future health risks."

Utilizing genetic data from both mothers and children

The new research results were obtained by looking at the genetic data of both mothers and their grown-up children. The results are based on more than 36,000 such mother-child pairs, all included in the large Finnish genomics study FinnGen.

According to the research team, previous genetic studies have produced partly different results because they have not been able to distinguish between the genetic effects of mother and child.

"Our research method, which uses genetic data from both mothers and their children at the same time, has proven to be a very effective way to find out how maternal health and the conditions of the baby in the womb can affect the health of the child," says Dr. Taru Tukiainen, who led the study.

The study in question is the largest study to date on the subject. More research is needed to find out how being born significantly underweight or other significant changes in birth weight affect the risk of disease in adulthood.

"We can be proud that here in Finland we have been able to produce a globally unique research dataset like FinnGen, which allows us to find solutions to research questions that have been challenging to address before," Taru Tukiainen says.

More information: Jaakko T. Leinonen et al, Disentangling the link between maternal influences on birth weight and disease risk in 36,211 genotyped mother–child pairs, *Communications Biology* (2024). DOI: 10.1038/s42003-024-05872-9

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