

Small and large birth weight linked to genetics of mother and baby—except in tiniest babies

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Genetics of mother and baby contribute to most cases where babies are born very large or very small, according to new research.

A large scale study, led by the University of Exeter and Cardiff University, has found the strongest evidence to date that genetics play a major role in most cases when babies born at full term are in the top or bottom 10 percent of the [weight](#) spectrum.

However, in the three percent of babies with the smallest [birth](#) weights, genetics seemed to play a less important role. This indicated that other factors may be contributing to the babies' [small size](#). The research looked at 190 common [genetic](#) variations that are known to affect birth weight, yet it is possible that rare genetic changes in the baby reduce growth in the smallest three percent. Other [important factors](#) could include the health of the mother or fetus or of the placenta, which transfers nutrients and oxygen to the baby.

The study was a collaboration also involving the University of Bristol's Children of the 90s, Imperial College London, and the University of Oulu in Finland. The research was supported by Wellcome Trust and the H2020 program of the European Commission.

The weight of babies at birth is important, as those born at the extreme ends are at higher risk of complications. Smaller babies are more likely to be admitted to neonatal units and at higher risk of death, while larger babies are at higher risk of complications during birth.

To examine the extent to which birth weight was linked to the genetics of mothers and babies, the team created a genetic score for higher birth weight. Published today in *PLOS Genetics*, the study tested whether the genetic score was higher or lower in babies who were born very large or very small in a sample of nearly 12,000 babies and more than 5,000 mothers of European ancestry. The mothers and babies were from Children of the 90s, a health study based at the University of Bristol, the Exeter Family Study of Childhood Health and the Northern Finland Birth Cohorts 1966 and 1986.

Dr. Robin Beaumont, of the University of Exeter Medical School, was lead author of the study. He said: "This research casts new light on why some babies are born very large or small. This knowledge will help both parents and clinicians understand where they need to focus medical attention. Genetics played a lesser role in the three percent of babies with the lowest weight, suggesting that other factors such as the health of the placenta, may have influenced their weight."

Co-lead author and clinician, Professor Sailesh Kotecha, of Cardiff University, added: "It's important to identify reasons why babies are born with low birth weight as they are at risk of increased health problems in later life including diabetes and high blood pressure. Our work shows that genetics are a key part of the reason why some babies are born small, and raises the possibility that genetics could be used alongside maternal and placental factors to identify those most likely to have fallen short of their growth potential."

Professor Rachel Freathy, of the University of Exeter, who oversaw of the study said: "Our study gives the greatest insight to date into how common genetic variations between people influence the extremes of [birth weight](#). We now need to understand better whether the genetics or environmental factors are more important in the later life health risks."

The paper is entitled "Common maternal and fetal genetic variants show expected polygenic effects on risk of small- or large-for-gestational-age (SGA or LGA), except in the smallest 3% of [babies](#)," and is published in *PLOS Genetics*.

Provided by University of Exeter

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