Obesity epidemic is not caused by genes or lifestyle

Neither genes nor lifestyle are responsible for widespread obesity. Instead, it may be entirely down to our environment during childhood.

Scientists have long agreed that obesity is not only a result of eating too much or sitting down for too long. Some of us have unfortunate gene variants that increase our risk of becoming obese.

However, a new study shows that it is not all in our genes, suggesting that researchers must find the underlying causes of the obesity epidemic that has gradually spread across the entire world elsewhere.

"We thought that those who were most strongly genetically predisposed to becoming obese would have had a greater risk of becoming obese during the obesity epidemic that began in the early 1970s. However, we see that the obesity epidemic hasn't only been affecting those with the most fragile genes," says Teresa Adeltoft Ajslev from the Department of Preventive Medicine, Frederiksberg and Bispebjerg Hospital in Copenhagen, Denmark.

"In fact, the risk of obesity has increased equally for all," she says. Ajslev is behind the new study recently published in the journal Obesity.

She explains that it is not only our genes that can explain the obesity epidemic, but that there are other environmental factors at play—and that this goes beyond the fact that we have become less active while eating more.

The first signs of increasing prevalence of obesity were observed among children born in the 1940s and continued to rise over the next 10 years. For a while, incidences of obesity became stable, shortly before an even sharper rise in the number of obesity cases was observed among children born in the 1970s.

Back then we were still not accustomed to our modern day sedentary lifestyle where we sit still for large portions of the day and over consume burgers and sugary drinks. So why were we getting fatter and how did the present epidemic get started?

Genes are important but did not cause the epidemic

Previous studies have shown that the prevalence of obesity in children increased in two phases: one after 1942 and one after 1972.

In the new study, the scientists examined whether specific environmental factors may have activated obesity-related gene variants in some children. This may explain why children born after 1971 were more likely to be obese than previous generations.

The scientists first assessed the likelihood of inheriting obesity in children born before and after the early 1970s. Using body mass index (BMI) as an indicator, they identified specific obesity gene variants in
children born between 1952 and 1989. They did this by calculating the childhood BMI of the children’s parents in the 1930s and 1940s and looking at the obesity-related gene variants in the top 10 per cent of the most obese parents.

The scientists discovered that the children of the top ten per cent most overweight parents were also in the top ten per cent of most overweight in their own age group.

Ajslev used about 400,000 school nurse records and data from the Danish National Health Service Register. Her findings are based on more than 20,000 families where both generations have been living in Copenhagen and had had their weight and height measured by a school nurse.

**Obesity-gene variations present but unable to explain the epidemic**

Obesity risk was up to nine times higher in children when both parents had also been overweight in their childhood. The risk was three times higher if only one parent had been obese as a child.

The data seems to confirm previous studies of adopted children and twins which conclude that obesity can be inherited.

However, when Ajslev compared BMI figures with the international standards of child obesity (IOTF) it turned out that since the early 1970s, childhood risk of obesity had increased equally across the board for all children studied irrespective of their parents’ childhood weight.

It seems that a shared genetic history cannot fully explain the fierce obesity epidemic that began in the 1970s.

**Scientists look to our first years for alternative explanations**

Scientists are still discussing what may explain the epidemic and are considering environmental factors from our first few years of childhood.

“Whilst I have no explanation for what environmental factors may have caused the epidemic we can hypothesise,” says Ajslev.

It could be due to factors that occur early in life.

“We believe this to be the case because the obesity epidemic seems to hit specific generations in early childhood. There are many options, but of particular interest to me is the importance of bacterial composition of the gut which may have changed over time,” she says, noting that use of antibiotics early in life or caesarean births are known to affect intestinal bacterial composition—which may lead to obesity.

Changing habits in relation to stress, smoking, diet, and exercise during pregnancy, breastfeeding and bottle-feeding, transition diet, endocrine disruptors, are all possible factors according to the scientists.

**Assessment: Solid study**

Ph.D. and systems biologist Tune Pers is a postdoctoral researcher at Boston Children's Hospital and the Broad Institute of Harvard University and Massachusetts Institute of Technology, USA. He says the new study is a solid piece of research which confirms previous hypothesises shared among scientists in the field.

"It seems to be a very elegant study with especially strong data behind it. Conceptually, their work is very well thought out and solid," says Pers.
He does note, however, that the results are not altogether surprising because scientists have long known that normal obesity in the population is not only due to genes or environmental factors—but most probably caused by a complex interaction between the two.

Pers says the study does offer a strong basis for understanding the complexity of obesity epidemics.

"The study makes it clear that we have to understand how the environment interacts with genetics and, for example, affects the unpacking and packing of genes that occur in the body. There’s not a single gene variant or other disruptions in the body that can explain all obesity cases," says Pers.

Read the original story in Danish on Videnskab.dk [6]

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