

Despite common obesity gene variants, obese children lose weight after lifestyle changes

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Children who are genetically predisposed to overweight by common gene variants can still lose weight by changing their diet and exercise habits. Around 750 overweight or obese children and adolescents undergoing lifestyle interventions participated in the study conducted by researchers from the University of Copenhagen and Holbæk Hospital.

Overweight and [obesity](#) constitute an increasing global problem that may lead to serious sequelae such as heart attacks, diabetes and cancer. In 2016, 124 million [children](#) and adolescents worldwide suffered from obesity. Now, researchers from the University of Copenhagen and the Children's Obesity Clinic at Holbæk Hospital have examined how genetics affect children and young people's ability to lose excess weight.

"We are trying to understand the genetic driving force behind overweight and whether this force also makes it impossible for some to lose weight.

We show that a high [genetic predisposition](#) to overweight during childhood in fact had no influence on whether the children reacted to [lifestyle](#) intervention compared to children with low genetic predisposition to overweight. The 15 genetic variants we have studied are common in the population and are the ones that in general increase a child's risk of becoming overweight," says Postdoc at the Novo Nordisk Foundation Center for Basic Metabolic Research at UCPH Theresia Maria Schnurr, who is one of the authors of the study.

The new research results have just been published in the scientific journal *Obesity*. The researchers' aim was to determine the influence of specific gene variants on children and adolescents' ability to lose weight. Therefore, they studied the 15 specific gene variants implicated in childhood obesity and which are common in the population. In the study, the researchers demonstrate that these genetic variants did not predict whether children and adolescents were able to lose weight when they changed their lifestyle. Only children with a rare genetic mutation in the MC4R gene do not seem to lose weight during the lifestyle intervention.

Lifestyle Intervention Led to Weight Loss

The researchers examined 754 children and adolescents with overweight and obesity. The median age was 11.6 years. The genetic profile of all participants was mapped, and the researchers then calculated a genetic risk score for childhood overweight for each participant based on the 15 genetic variants. They all carried one or more of the 15 genetic variants associated with increased risk for obesity and overweight during childhood. To determine whether a genetic predisposition for overweight affected the children and adolescents' ability to lose weight the children had to implement

a series of lifestyle changes.

They followed a [treatment protocol](#) developed at Holbæk Hospital. The protocol centres around the family with behavioural lifestyle changes. For example, the children and adolescents had to change their diet, means of transportation, physical activity, sedentary activity, amount of sleep, consumption of snacks and sweet things and social activities. The intervention lasted six to 24 months. Subsequently, the researchers followed up on the treatment and found that the lifestyle changes had affected the weight of the participants, despite their genetic disposition for overweight and obesity.

"Large parts of the population believes that when you have problematic genes it is game over. That is why it is very important we send a clear message that even though you have a genetic sensitivity this treatment can help people. We have discovered that it does not matter whether the children and adolescents have an increased genetic risk score or not. They can respond to treatment just as well. This means our treatment is efficient despite carrying common obesity risk genes. It gives hope to people with obesity and obesity related complications such as high blood pressure, cholesterol and fatty liver that we can in fact help them," says one of the study's authors Jens-Christian Holm, doctor and head of the Children's Obesity Clinic, Holbæk Hospital.

Genetic Markers

The genetic variants the researchers have examined are common in the population and turned out not to have an effect on the ability to lose weight during the intervention. So far, the researchers did not find any biological markers for a poor response on lifestyle intervention except for the rare gene MC4R associated with poor response in terms of [weight loss](#) following a [lifestyle intervention](#).

"MC4R is a rare genetic mutation and thus the question remains why around 75 percent of children in a group of children receiving the exact same treatment react more positively to the treatment compared to the remaining 25 percent of children not responding to [lifestyle treatment](#).

Identifying additional common [genetic markers](#) would help us understand the biological pathways that affect obesity and a person's reaction to lifestyle changes—and thus in the long term help us provide even better treatments," says Professor at the Novo Nordisk Foundation Center for Basic Metabolic Research Torben Hansen, last author of the study.

More information: Mette Hollensted et al, Genetic Susceptibility for Childhood BMI has no Impact on Weight Loss Following Lifestyle Intervention in Danish Children, *Obesity* (2018). [DOI: 10.1002/oby.22308](https://doi.org/10.1002/oby.22308)

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