

Parental obesity and autism risk in the child

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Several studies have looked at possible links between maternal obesity during pregnancy and the risk of developmental disorders in the child. However, paternal obesity could be a greater risk factor than maternal obesity, according to a new study from the Norwegian Institute of Public Health.

As the first researcher to study the role of paternal obesity in autism, Dr. Pål Surén emphasises that this is still a theory and requires much more research before scientists can discuss possible causal relationships.

"We have a long way to go. We must study genetic factors in the relationship between obesity and autism, as well as environmental factors associated with switching the genes on or off - so-called epigenetic factors," he explains.

Surén and his fellow researchers used data from the Norwegian Mother and Child Cohort Study (MoBa). The researchers studied questionnaire data from over 90,000 Norwegian children at three, five and seven years of age. The mothers had answered detailed questions about their own mental and physical health, and about their children. The fathers completed a questionnaire about their mental and [physical health](#) while their partner was pregnant. The researchers also collected data from the Norwegian Patient Registry and from studies of children who were referred for evaluation and treatment of possible autism or Asperger's syndrome. By the end of the follow-up period, the children were aged 4 to 13 years.

Surprising findings

419 children, approximately 0.45 per cent of the sample, had an autism spectrum diagnosis (ASD). This is slightly lower than in the general population (0.8 per cent) because it is difficult to diagnose autism among the youngest children.

In the sample, 22 per cent of the mothers and 43 per cent of the fathers were overweight, with a body mass index (BMI) of between 25 and 30. Approximately 10 per cent of mothers and fathers were obese, with a BMI of 30 or more.

The researchers found that maternal obesity had little association with the development of autism in the child. However, they found a doubled risk for development of autism and Asperger's syndrome in the child if the father was obese, compared with a normal weight father.

"We were very surprised by these findings because we expected that maternal obesity would be the main risk factor for the development of ASD. It means that we have had too much focus on the mother and too little on the father. This probably reflects the fact that we have given greater focus to conditions in pregnancy, such as the growth environment for the foetus in the womb than both environmental and genetic factors before conception," says Surén.

The researchers adjusted for variables that may also be associated with the development of autism in the child. In addition to adjusting for [maternal obesity](#), they considered education, age, smoking, mental disorders, hormone therapy before pregnancy, use of folic acid, maternal diabetes, pre-eclampsia and the baby's weight at birth.

Risk genes

Surén believes that the finding about paternal obesity is sound. The researchers found that the risk remained unchanged when adjusted for sociodemographic and lifestyle factors.

"Our findings therefore suggest that there may be a genetic link between obesity in the father and the development of ASD in the child," says Surén.

He points out that genetic mutation may play a role in the development of both [extreme obesity](#) and [autism](#). Researchers have shown, for example, that if a section of chromosome 16 is missing this can lead to morbid obesity or developmental disorders in children. Mutations may be a basis for the development of a number of complex syndromes and diseases.

Another explanation may lie in epigenetics. Epigenetic changes do not mean that the gene is altered, but that the gene is activated or inactivated as a result of environmental conditions. Switching a gene on or off at the wrong time and place can lead to adverse consequences for the individual and the epigenetic changes can be passed on to the next generation.

"We still know very little about how [epigenetic changes](#) in germ cells are affected by obesity or other [environmental factors](#) but animal experiments have shown that obese males have offspring with altered gene expression in early growth regulation," says Surén.

Further research

Researchers are still in the early stages of studying possible links between obesity in the father and the development of ASD in the child. The first study was recently published in the *Pediatrics* journal. The research paper is included in Surén's doctoral thesis and it was written

with a large group of [researchers](#) from university and hospital environments in Norway, England and the USA.

"We have begun to sequence all genes to find mutations and we must do more epigenetic analysis. If there is a correlation between [obesity](#) and ASD, this is a risk factor where the incidence is increasing in the population. Further research is therefore of great importance to public health," says Surén.

More information: Suren P, et al "Parental obesity and risk of autism spectrum disorder" *Pediatrics* 2014; [DOI: 10.1542/peds.2013-3664](https://doi.org/10.1542/peds.2013-3664).

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