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PRESS RELEASE

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Deciphering the genetics behind eating disorders

By studying the genomes of more than 20,000 individuals, an international team is shedding light on the genetic links between eating disorders, mental illnesses and body weight regulation.

Anorexia nervosa, bulimia nervosa and binge-eating disorder are the three main eating disorders that 4 out of 10 individuals living in Western Europe will experience at some point in their lives. In recent years, studies on the genetic basis of anorexia nervosa have highlighted the existence of predisposing genetic markers, which are shared with other psychiatric disorders. By analysing the genome of tens of thousands of British people, a team from the University of Geneva (UNIGE), the University Hospitals of Geneva (HUG), King's College London, the University College London, the University of North Carolina (UNC) and The Icahn School of Medicine at Mount Sinai have built on these initial results by discovering similarities between the genetic bases of these various eating disorders, and those of other psychiatric disorders. Eating disorders differ in their genetic association with anthropometric traits, like weight, waist circumference or body mass index. Thus, genetic predisposition to certain weight traits may be a distinctive feature of anorexia nervosa, bulimia nervosa or binge-eating disorder. The study is published in the *International Journal of Eating Disorders*.



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“Previous studies, which highlighted a genetic association between a high risk of anorexia nervosa and a low risk of obesity, have begun to lift the veil on certain aspects of how eating disorders develop that had been mostly neglected until then”, explains Nadia Micali, Professor at the Department of Psychiatry at UNIGE Faculty of Medicine and Head of the Division of child and adolescent psychiatry at the HUG, who directed this work.

She continues, “However, the same work has not been done for the two other major eating disorders: bulimia nervosa and binge-eating disorder. The goal of our study was to understand similarities and differences amongst all eating disorders in the role of genes governing body weight.”

The genome of more than 20,000 people examined

To understand the similarities and differences between the genetic patterns of anorexia nervosa, bulimia nervosa and binge-eating disorder, the research team analysed the genomes of more than 20,000 people. These were taken from two large population-based studies conducted in the UK: the UK Biobank and the Avon Longitudinal Study of Parents and Children.

First author, Dr Christopher Hübel, from King's College London said: “We were able to access volunteer's DNA, their basic health data (weight, age, etc.) and responses to health questionnaires, including possible psychiatric disorders and their eating disorder history. We are grateful for this access as we were able to conduct multifactorial analyses and calculate more than 250 polygenic scores for each person. Each polygenic score sums the risk genes involved in a specific trait, such as depression, for example. We calculated polygenic scores for psychiatric disorders, such as schizophrenia and obsessive-compulsive disorder, and metabolic and physical traits, including insulin sensitivity, obesity and high BMI.” Thus,



Nadia Micali, Professor at the Department of Psychiatry at UNIGE Faculty of Medicine and Head of the Division of child and adolescent psychiatry at the HUG.



Dr Christopher Hübel, from King's College London.

High resolution pictures

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the higher the score, the greater the genetic risk, whether it is blue eyes or the development of a given disease.

The research team then examined the associations between the polygenic scores of these volunteers (representing genetic liability to psychiatric disorders, metabolic and physical traits) and eating disorders.

A combination of psychiatric and body weight regulation genetic risk

The study shows that while there are great genetic similarities between anorexia nervosa, bulimia nervosa and binge-eating disorder, there are also notable differences.

Nadia Micali details these results: “The similarities lie in the association with psychiatric risks: anorexia nervosa, bulimia nervosa and binge-eating disorder share genetic risk with certain psychiatric disorders, in particular for schizophrenia and depression, thus confirming the strong psychiatric component of these diseases. However, the big difference concerns the associated genetics of body weight regulation, which are opposite between anorexia on the one hand, and bulimia nervosa and binge-eating disorder on the other, the latter being linked to a high genetic risk of obesity, and high BMI.”

A genetic predisposition to a heavy weight versus a light weight may constitute a determining factor that pushes individuals with similar psychiatric genetic risk to different eating disorders.

“The metabolic and physical component would therefore direct the individual either towards anorexia nervosa or towards bulimia nervosa or binge-eating disorder”, analyses Nadia Micali. “Moreover, this study confirms a clear genetic relationship between binge-eating disorder and attention deficit hyperactivity disorder (ADHD), that was already clinically observed, which might be linked to greater impulsivity, which is shared by these disorders.”

The role of genetic patterns in body weight regulation identified in this study provides a better understanding of the genetic basis of eating disorders, and of how they differ in their genetic marking despite their similarities. This work could lead to better understand the development of eating disorders.

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