

A methodological approach to study why some individuals are prone to weight gain while others aren't

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Even though it's known that people who have a higher genetic risk for obesity generally have a higher body mass index (BMI), researchers have

unveiled a new methodological approach to find out why some individuals are more susceptible to weight gain than others for reasons not related to their genetic liability to obesity, according to a study published in *Obesity*.

The study is the first of its kind to determine in a pair of twins with large intrapair BMI differences which of the co-twins had acquired a BMI that deviated from their genetically-informed BMI.

"This novel approach opens doors to uncover the protective and detrimental factors that precede [weight gain](#), offering valuable insights into how people can maintain a healthy [weight](#)," said Bram J. Berntzen, Ph.D., Institute for Molecular Medicine Finland, University of Helsinki, Finland. Berntzen is the corresponding and first author of the study.

In previous research, scientists have studied adult monozygotic and dizygotic twin pairs with large within-twin-pair differences in BMI. However, these studies were cross-sectional and did not consider the genetic predisposition to obesity. Earlier studies on twin pairs with large intrapair BMI differences have also not established whether the co-twin with higher or lower BMI is the one who deviates more from genetic predisposition.

In the current research, the study's authors investigated 36-year BMI trajectories in twins whose BMI in young adulthood was below, within, or above their genetically predicted BMI. Below prediction means resilience against weight gain, while above indicates susceptibility to weight gain prior to study inclusion.

Researchers selected the twin pairs from the Older Finnish Twin Cohort, a group consisting of twins born before 1958 and alive in 1974 in Finland. Surveys conducted in 1975 and 1981 targeted all twins in the cohort, whereas a 1990 survey was restricted to twins born between 1930

and 1957.

Genotype data were collected mainly from the late 1990s onwards. Based on twins participating in 1975, 3,227 complete same-sex twin pairs (34% monozygotic) around their 30's had genotype data. The 2011 data collection targeted twins born between 1945 and 1957, with 943 of them (44% monozygotic) having genotype data.

Zygoty or twin characteristics were confirmed through genotyping information derived from blood samples. Personal characteristics were self-reported through a questionnaire. BMI was also self-reported through weight and height measurements. BMI was categorized as underweight, [normal weight](#), overweight, and obesity. The polygenic risk score for BMI was based on 996,919 common single nucleotide polymorphisms.

In monozygotic and dizygotic twin pairs with large intrapair BMI differences, two-thirds of co-twins with a higher observed BMI in 1975 deviated above the predicted BMI compared to one-third of co-twins with a lower BMI who deviated below the prediction. Each deviating individual had a twin sibling who followed their genetic predisposition to obesity. Individuals below, within, and above prediction in 1975 reached, respectively, normal weight, overweight, and [obesity](#) by 2011, with a mean BMI increase of 4.5.

Additionally, Berntzen noted the BMI of twins when they were young adults played an important role in whether they reached a healthy body weight after 36 years since everyone generally gained weight with aging. Berntzen added, "For this reason, it's vital to study the reasons for weight gain already during childhood before they become young adults." Future studies may examine characteristics of children over time, calculating their genetically-informed BMI as they reach young adulthood to understand the factors affecting their weight gain trajectories, he said.

The study's authors noted that the determinants and health implications of regular BMI trajectories instead of PRS-enriched BMI trajectories require further research.

Other authors of the study include Teemu Palviainen and Jaakko Kaprio, Institute for Molecular Medicine Finland, University of Helsinki, Finland; Karri Silventoinen, Faculty of Social Sciences, Population Research Unit, University of Helsinki; and Kirsi H. Pietiläinen, Obesity Research Unit, Research Program for Clinical and Molecular Metabolism, Faculty of Medicine, University of Helsinki and HealthyWeightHub, Endocrinology, Abdominal Center, Helsinki University Hospital, University of Helsinki.

The authors declared no conflict of interest.

The study, titled "[Polygenic Risk of Obesity and BMI Trajectories over 36 Years: A Longitudinal Study of Adult Finnish Twins](#)," will be published in the print issue of *Obesity* in December 2023.

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