

# How our genes and environment influence BMI and height

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Environmental conditions influence our body mass index (BMI) by increasing or decreasing the effect of inherited genetic variations, University of Queensland researchers have discovered.

A team led by Huanwei Wang and Professor Jian Yang from UQ's Institute for Molecular Bioscience found the opposite for human [height](#)

—that the genetic effects that influence it are very stable from one environment to another.

The discovery could help determine whether, for any particular traits, the effect of a genetic variation is influenced by environmental factors.

"Most human traits, such as height or BMI, are complex because they are influenced by many genetic factors, as well as environmental factors," Professor Yang said.

"But whether the genetic controls of these traits depend on [environmental conditions](#) has been elusive—a DNA difference could affect a trait, but is the effect stable across [different environments](#)?

"For example, there is a genetic variation known to influence lung function, and the function of this genetic variation is altered significantly by smoking.

"But while the link between smoking and lung function is well-known, how do you discover if a gene [variation](#) is affected by an environmental condition if you don't know what that environmental condition is?"

In human populations, it's very difficult to measure all possible environmental factors to which a person has been exposed, so the researchers decided to take a different approach.

Using data from more than 300,000 individuals with a known height and BMI among many other complex traits, the researchers searched for genetic variations associated with the variability of each of those traits.

They found that BMI could differ significantly even for individuals with the same [genetic variation](#), but this wasn't the case for genetic variations associated with height.

"We found a large number of [genetic factors](#) for height but their effects do not seem to be sensitive to environmental conditions, while genetic effects on BMI and a few other obesity-related traits seem to be much more sensitive," said Professor Yang.

"Height can be affected by environment for sure, and height can also be affected by genes, but these things seem to be independent."

"It's important to know this because it can enable us to search for elusive [environmental factors](#) that might be interfering with the function of a gene."

"It is also informative to design further research to understand why a genetic effect at a particular gene locus is sensitive to environment—knowing the underlying mechanism will be highly important in terms of biology and medical research."

The findings shed new light on the interaction between genomes and [environment](#) when it comes to BMI and height, but Professor Yang said the approach could be used much more widely.

The study was published in *Science Advances*.

**More information:** Huanwei Wang et al, Genotype-by-environment interactions inferred from genetic effects on phenotypic variability in the UK Biobank, *Science Advances* (2019). [DOI: 10.1126/sciadv.aaw3538](#)

Provided by University of Queensland

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