People whose genotype supports physical activity found to have lower risk of developing cardiovascular disease

November 6 2023

Credit: University of Jyväskylä

In a study conducted at the University of Jyväskylä's Faculty of Sport and Health Sciences, it was found that individuals with a genetic

predisposition for higher levels of physical activity have fewer risk factors for cardiovascular diseases and a reduced risk of developing hypertension, cerebrovascular diseases, and type 2 diabetes. The study was conducted as an international collaboration and was published in the *European Journal of Epidemiology*.

The research investigated the role of genetics in physical activity, aerobic fitness, as well as risk factors and diseases related to cardiovascular health in a large Norwegian cohort study. The study revealed that the genetic inheritance predisposing to higher physical activity levels was associated with higher amount of self-reported physical activity.

This same genetic predisposition was also linked to more favorable cardiovascular risk factors, such as higher HDL cholesterol levels, smaller waist circumference, and lower body mass index. Additionally, this genetic predisposition for physical activity was associated with a reduced risk of developing hypertension, stroke, and type 2 diabetes.

"Genetic predisposition favoring physical activity was associated with healthier profile in cardiovascular risk factors and lower disease risk, even after accounting for self-reported physical activity levels," said Niko Tynkkynen, a doctoral researcher at the Faculty of Sport and Health Sciences. "It seems that the same genetic variation partially regulates both the amount of physical activity and the development of diseases."

Novel method to determine genetic predisposition

Physical activity, aerobic performance, and the risk of developing diseases have complex genetic components. Studying the relationship between genetics and complex traits has been challenging because these traits are influenced by the interaction of thousands of genetic variants.

Polygenic risk score summarizes the combined effects of millions of genetic variants in a heritable trait.

Polygenic risk score for physical activity was estimated based on a large UK Biobank dataset including 400,000 Europeans. The data contained information on both genetic variation and individuals' physical activity. Using this information, an individualized polygenic risk score for physical activity was calculated for approximately 47,000 Norwegians who were part of an independent research cohort from the original dataset.

"This study was the first to investigate the genetic predisposition for physical activity in relation to maximal oxygen uptake and cardiometabolic risk factors. Polygenic risk scores provide new opportunities to study the role of genetics in health behaviors and disease susceptibility," explains Tynkkynen.

The study participants were individuals aged 19 to 100 from the Trøndelag Health Study in Norway. This health cohort study created a unique database over 35 years, containing information on lifestyle and environmental factors, clinical measurements, and biological samples.

More information: Niko Paavo Tynkkynen et al, Associations of polygenic inheritance of physical activity with aerobic fitness, cardiometabolic risk factors and diseases: the HUNT study, *European Journal of Epidemiology* (2023). DOI: 10.1007/s10654-023-01029-w

Provided by University of Jyväskylä