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## New research indicates visceral fat has a profoundly negative effect on cognitive abilities

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Being overweight or having excess body fat is a strong predictor of reduced cognitive function, according to new research published in *The Lancet*. The findings highlight the importance of maintaining a healthy weight to protect cognitive function.

The authors of the new study were motivated by the increasing prevalence of obesity and metabolic diseases in Asia and their potential impact on cognitive health in the region. The researchers aimed to investigate the relationship between adiposity (body fat) and metabolic risk factors with cognitive function in Asian populations.

"I am interested in this topic because I am passionate about understanding the relationship of our brain and body in maintaining health," explained study author Theresia Handayani Mina, a Dean's Postdoctoral Research Fellow within the Population and Global Health Research Group at Nanyang Technological University in Singapore.

"We know from observational studies that obesity may be bad for our cognitive function, so in theory managing obesity may maintain or improve cognitive function. However, the findings from other trials of obesity risk management have been inconsistent, so the causal relationship between obesity, and other metabolic risk factors, and cognitive function was still unclear."

"I am also keen to explore this research question using data derived from a multi-ethnic Asian population, because most evidence came from non-Asian population, but there is a higher obesity burden in Asia-Pacific."

The methodology of the study involved two main components: an epidemiological analysis and a two-sample Mendelian Randomization analysis.

For the epidemiological analysis, the researchers used data from the Health for Life in Singapore Study, a population-based cohort comprising 10,004 Asian men and women living in Singapore. The participants were around 51 years old on average, with more than half of them being female. The majority were of Chinese ethnicity, followed by Malay and South Asian backgrounds.

The participants underwent extensive physiological assessments, biological sample collections, and completed comprehensive health and lifestyle questionnaires. Cognitive function was evaluated using a computerized test adopted from the UK Biobank, which covered four major cognitive domains. Body fat composition was quantified using DEXA whole-body scans.

The two-sample Mendelian Randomization analysis was conducted to assess causal relationships between metabolic disturbances and cognitive function. MR is an analytical method that uses genetic variants associated with the exposure (metabolic disturbances) as instrumental variables to evaluate their causal effects on the outcome (cognitive function).

“The genetic approach that we used in the study, called Mendelian Randomization, is a very powerful approach if applied well. It is powerful because genetic variation is assigned at birth in random and is less affected by environmental factors. Therefore, it is akin to nature’s randomised controlled trial and can be used to provide causal link.”

The researchers found that obesity was prevalent, with about 23% of the participants classified as obese. Various metabolic conditions, such as hypertension and diabetes, were also present in the population. General cognition was influenced by factors like age and education. Higher levels of education were associated with better cognitive performance, while older age was linked to lower cognitive function.

When examining the factors that could predict general cognition, the study found that measures of adiposity (such as body mass index and visceral fat) and metabolic health markers (like HDL cholesterol) were significantly associated with cognitive function. In particular, metabolic syndrome, high levels of visceral fat, and low HDL cholesterol were related to poorer cognitive performance.

“I think that we were all surprised by the impact of visceral fat,” Mina told PsyPost. “In terms of weight, visceral fat is only a small proportion of our body composition. Visceral fat is also anatomically far from the brain. And yet it has such profound, systemic effect, and we learnt through other studies that visceral fat can have systemic effect through various biological mechanisms. This is why visceral fat is very fascinating: it is small but mighty.”

The results from the Mendelian Randomization analysis suggested a causal relationship between certain factors and cognitive function. Specifically, higher levels of visceral fat, body mass index, and waist-to-hip ratio were found to have a causal effect on reduced cognitive function. However, other metabolic factors like blood pressure, cholesterol, and blood sugar did not show a direct causal relationship with cognition.

These findings indicate that maintaining a healthy weight and metabolic health may be important for preserving cognitive function. Excess body weight, especially visceral fat, could have a detrimental effect on cognitive abilities.

“A healthy brain needs a healthy body,” Mina said. “This includes not having excess visceral fat. Visceral fat is excess body fat stored in the abdomen and not very visible, but over time this may make individuals more prone to developing diabetes, hypertension, and high cholesterol. We all should take steps to manage visceral fat through exercise or healthy eating.”

The study, like all research, includes some caveats. The associations observed could be influenced by underlying metabolic diseases and the cross-sectional nature of the study limits the ability to assess cognitive decline over time.

“Our assessment of cognitive function is cross-sectional,” Mina explained. “This means we can only estimate the effect of fat on ‘cognitive ageing,’ which refers to the equivalent age for specific level of cognitive function if other health factors are held constant, and cannot comment on true cognitive decline.”

“Future studies need to determine if maintaining visceral fat and overall metabolic health can reduce the risk of cognitive decline, and this can only be performed by following up on patients over a longer period of time.”

Nevertheless, the combination of epidemiological and genetic evidence provides strong evidence that excess body weight and

"This study was made possible with the support of study volunteers, my colleagues and supervisors, and our funders," Mina added. "I would like to express my sincere gratitude to all study volunteers and colleagues for enabling the study. We hope to share further public health discovery in the near future."



The study, "[Adiposity impacts cognitive function in Asian populations: an epidemiological and Mendelian Randomization study](#)00028-7/fulltext)", was authored by Theresia Mina, Yik Weng Yew, Hong Kiat Ng, Nilanjana Sadhu, Gervais Wansaicheong, Rinkoo Dalan, Dorrain Yan Wen Low, Benjamin Chih Chiang Lam, Elio Riboli, Eng Sing Lee, Joanne Ngeow, Paul Elliott, Konstadina Griva, Marie Loh, Jimmy Lee, and John Chambers.