

Excessive body fat around the middle linked to smaller brain size

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Carrying extra body fat, especially around the middle, may be linked to brain shrinkage, according to a study published in the January 9, 2019, online issue of *Neurology*, the medical journal of the American

Academy of Neurology. For the study, researchers determined obesity by measuring body mass index (BMI) and waist-to-hip ratio in study participants and found those with higher ratios of both measures had the lowest brain volume.

BMI is a weight-to-height ratio. It is determined by dividing a person's weight by the square of their height. People with a BMI above 30.0 are considered obese. Waist-to-hip ratio is determined by dividing waist circumference by hip circumference. People with bigger bellies compared to their hips have higher ratios. Men above 0.90 and women above 0.85 are considered to be centrally obese.

"Existing research has linked [brain](#) shrinkage to memory decline and a higher risk of dementia, but research on whether extra body fat is protective or detrimental to brain size has been inconclusive," said study author Mark Hamer, Ph.D., of Loughborough University in Leicestershire, England. "Our research looked at a large group of people and found obesity, specifically around the middle, may be linked with [brain shrinkage](#)."

The study looked at 9,652 people with an average age of 55. Of that group, 19 percent were determined to be obese. Researchers measured BMI, waist-to-hip ratio and overall body fat and surveyed participants about their health. Researchers then used magnetic resonance imaging to determine brain volumes for white and gray brain matter and volumes in the various regions of the brain.

Gray matter contains most of the brain's nerve cells and includes brain regions involved in self-control, muscle control and sensory perception. White matter contains nerve fiber bundles that connect various regions of the brain.

After adjusting for other factors that may affect brain volume, such as

age, [physical activity](#), smoking and [high blood pressure](#), researchers found that while a high BMI alone was linked to slightly lower brain volumes, those with high BMI and waist-to-hip ratios had lower gray matter brain volumes than participants who did not have a high waist-to-hip ratio. Specifically, researchers found that 1,291 people who had a high BMI and a high waist-to-hip ratio had the lowest average gray matter brain volume of 786 cubic centimeters, compared to 3,025 people of healthy weight who had an average gray matter brain volume of 798 cubic centimeters and 514 people with a high BMI but without high waist-to-hip ratio who had an average gray matter brain volume of 793 cubic centimeters. They found no significant differences in [white matter](#) brain volume.

"While our study found obesity, especially around the middle, was associated with lower [gray matter](#) brain volumes, it's unclear if abnormalities in brain structure lead to obesity or if obesity leads to these changes in the brain," said Hamer. "We also found links between [obesity](#) and shrinkage in specific regions of the brain. This will need further research but it may be possible that someday regularly measuring BMI and waist-to-hip ratio may help determine brain health."

A limitation of the study was that only 5 percent of those invited to participate in the study took part, and those who participated tended to be healthier than those who did not, so the results may not reflect the population as a whole.

Provided by American Academy of Neurology

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