

On Brain Volume and Cognitive Function Study Reveals Metabolic Syndrome's Impact

Researchers examined associations between [metabolic syndrome](#) (MetS) and cognitive and neuroimaging outcomes in dementia-free adults.



Study

The present study examined associations between MetS and cognitive and [neuroimaging](#) outcomes. They used data from the United Kingdom Biobank.

During 2006-10 (baseline), subjects underwent physical examinations and provided data on sociodemographic, environmental, health, and lifestyle factors via questionnaires. Blood samples were also collected at baseline to measure [biomarkers](#).

Participants were invited for follow-up [imaging](#) assessments. Cognitive tests were performed, and baseline measures, except for biomarker data, were repeated during the follow-up.

[Cognitive tests](#) included fluid intelligence tests, trail-making tests A and B, backward digit span tasks, symbol-digit substitution tests, matrix pattern completion tests, and paired associate learning tasks. Participants were classified into MetS and reference (no MetS) groups.

MetS was defined as the presence of at least three components: abdominal obesity, elevated blood pressure, elevated triglycerides, reduced [HDL cholesterol](#), and elevated fasting blood glucose.

The team excluded people with dementia, chronic neurodegenerative conditions, aneurysms, traumatic brain injury, encephalitis, nervous system infection, stroke, cerebral palsy, brain hemorrhage, brain cancer, brain abscess, or [Parkinson's disease](#).

Imaging-derived phenotypes were selected based on their relevance to brain [health markers](#). Multivariable linear regression models examined associations between MetS and outcomes and adjusted for covariates.

Covariates included age, sex, Townsend deprivation index, ethnicity, education, household income, alcohol consumption, smoking status, [physical activity](#), and apolipoprotein E (APOE)-ε4 carrier status.

Results

Overall, 37,395 participants were included; of these, 7,945 had MetS. The MetS group was more likely to be male, older, White, former smokers, less physically active, APOE-ε4 carriers, have less education and lower [household income](#), and live in socioeconomically deprived areas.

Overall, 65.7% of MetS subjects had three MetS components; 6.9% had all five components. Elevated [blood pressure](#) was the most prevalent component.

MetS was associated with lower gray matter, total brain, and (right and left) hippocampal volumes and increased [white matter](#) hyperintensity (WMH) volume compared to no MetS. There was no significant association between white matter volume and MetS.

Further, the team found a dose-response relationship between the number of MetS components present and several [neuroimaging measures](#).

Among individual components, increased glycated [hemoglobin](#) (HbA1c) and larger waist circumference were significantly associated with lower gray matter and total brain volumes. By contrast, elevated blood pressure is strongly associated with higher WMH volume.

A significant interaction of age with MetS and [WMH volume](#) was observed, with the stronger association among younger people.

Likewise, there was a significant interaction of sex with MetS and white matter, gray matter, and total [brain](#) volumes, with a particularly strong association in males. MetS subjects had significantly poor performance on cognitive tests. A dose-response relationship was observed between the number of MetS components present and cognitive performance.

Increased blood pressure was associated with significantly poor cognitive performance among individual components. There was no interaction of age with MetS and cognitive outcomes; however, a significant interaction of sex with MetS and numerical and [verbal reasoning](#) was evident, with a particularly stronger association in males.

Conclusion

MetS was associated with higher vascular pathology, smaller brain volume, and poor cognition. A dose-response relationship emerged between increasing MetS components and poorer cognition, [vascular pathology](#), and less brain volume.

These results suggest an association between MetS and poorer global brain health rather than domain- or region-specific effects. Future research should evaluate whether improvements in MetS could augment [brain health](#).

Source:

<https://www.news-medical.net/news/20240624/Study-reveals-metabolic-syndromes-impact-on-brain-volume-and-cognitive-function.aspx>