

# Bariatric Surgery Tied to Long-Term Cognitive Benefits

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## — Surgical weight loss linked with improved cognitive function, mood, and brain parameters on MRI

by [Kate Kneisel](#), February 12, 2024

Gastric bypass surgery in people with severe obesity was associated with sustained improvements in cognitive function, inflammation, and comorbidities, according to results of a cohort study in the Netherlands.

At 2 years post-surgery, neuropsychological tests showed improvements of 20% or higher in global cognition (43% of patients), ability to shift attention (40%), episodic memory (32%), verbal fluency (24%), and working memory (11%), reported Amanda J. Kiliaan, PhD, of Radboud University Medical Center in Nijmegen, the Netherlands, and colleagues.

"Lower inflammation and adipokine secretion, remission of comorbidities, higher physical activity, and better mood" may have played a role in the sustained improvement in global cognition for that subset of patients, the researchers suggested in [JAMA Network Openopens in a new tab or window](#).

Compared with baseline, improvements at 2 years post-surgery were noted for inflammation, as indicated by decreases in high-sensitivity C-reactive protein (4.77 vs 0.80 µg/mL,  $P < 0.001$ ).

Furthermore, patients were less likely to use antihypertensives at this point (36.1% vs 16.7% at baseline), had a reduction in depressive symptoms (Beck Depression Inventory scores of 9.0 vs 3.0,  $P < 0.001$ ), and increased their physical activity (mean Baecke score of 7.64 to 8.19,  $P < 0.001$ ).

Previous studies have linked bariatric surgery-induced weight loss with improved brain function and structure, Kiliaan and co-authors noted in their study introduction.

"However, results are contradictory, underlying mechanisms remain largely unknown, and it is uncertain whether outcomes are long-lasting," they wrote. "Imbalance of adipokines and proinflammatory cytokines may be involved, as they impair CBF [cerebral blood flow] and therewith cause [neurodegenerationopens in a new tab or window](#), which may be reversible after bariatric surgery."

The researchers considered the stabilization of cerebral structures and functions the most noteworthy finding of their study.

"Despite the lower CBF in several regions, volumes of hippocampus, nucleus accumbens, frontal cortex, white matter, and white matter hyperintensities remained stable after surgery," they wrote.

"Notably, the temporal cortex exhibited not only higher cortical thickness but also higher vascular efficiency after surgery, as indicated by a lower sCOV [spatial coefficient of variation]. These results highlight beneficial vascular responses occurring in conjunction with bariatric surgery. Accordingly, nucleus accumbens and parietal cortex demonstrated stable CBF and cerebrovascular efficiency."

Using data from the Bariatric Surgery Rijnstate and Radboudumc Neuroimaging and Cognition in Obesity study, Kiliaan and colleagues analyzed outcomes of 133 patients [eligible opens in a new tab or window](#) for Roux-en-Y gastric bypass from September 2018 to December 2020.

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Patients were ages 35 to 55 years (mean 47), with a body mass index (BMI) over 40, or a BMI over 35 with comorbidities. Most patients in the cohort (84%) were women.

Endpoints were assessed at baseline (before bariatric surgery), and at 6 months and 2 years after surgery. Kiliaan and co-authors calculated the 20% change index -- an indication of clinically meaningful and significant cognitive improvement -- at 2 years after surgery to exclude practice effects.

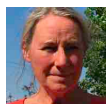
Patients' body weight, BMI, waist circumference, and blood pressure were all significantly lower both at 6 months and 2 years after bariatric surgery. Meanwhile, the percentage of total body weight-loss increased from a mean 27% at 6 months to 34% at 2 years ( $P < 0.001$ ).

At 2 years after surgery, the proportion of patients with Beck Depression Inventory scores showing mild or moderate depressive symptoms at baseline declined from 42.3% to 9.4%, and from 3.1% to 1.6%, respectively.

The group noted that the high mean baseline score of 27 on the Montreal Cognitive Assessment (MoCA) and other neuropsychological assessments suggested that "obesity did not impair cognitive performance in clinical sense."

Regarding the mechanism behind the observed cognitive improvements during the study, "stabilization of volume, CBF, and sCOV in brain regions, together with larger cortical thickness and higher vascular efficiency in the temporal cortex, might be involved," Kiliaan and colleagues suggested.

Limitations acknowledged by the authors included the lack of a control group, an unequal sex distribution (although representative of the general bariatric surgery population), and failure to include cortical surface and curvature parameters, which they noted "could improve our understanding of change in cortical volume and thickness after bariatric surgery."



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