

Description of Additional Supplementary Files:

Supplementary Data 1: Full regression model outputs for the cross-sectional interaction analyses between VAT and brain volumes in relation to MoCA scores (Figure 2A).

Supplementary Data 2: Regression model outputs for parallel BMI-based interaction models examining associations between BMI and brain volumes in relation to cognitive performance.

Supplementary Data 3: Sensitivity analyses of VAT–brain volume interactions adjusted for incretin-based anti-obesity medication (GLP-1) use.

Supplementary Data 4: Full model outputs for associations between cumulative VAT exposure (VAT AUC) and cognitive outcomes (MoCA and MoCA-MIS) at follow-up (Figure 2B).

Supplementary Data 5: Regression results for cumulative BMI exposure (BMI AUC) in relation to cognitive performance at follow-up.

Supplementary Data 6: Regression model outputs for associations between VAT change during the 18-month intervention and brain structural outcomes at follow-up (Figure 3).

Supplementary Data 7: Model outputs for analyses of relative BMI change during the intervention in relation to brain structural outcomes at follow-up.

Supplementary Data 8: Sex-by-intervention interaction results from the models examining the association between VAT change during the 18-month intervention and brain structural outcomes at follow-up.

Supplementary Data 9: Linear mixed-effects model outputs for interactions between VAT AUC and time predicting longitudinal brain structural change trajectories (Figure 4).

Supplementary Data 10: Linear mixed-effects model results for BMI AUC × time interactions in longitudinal brain structure models.

Supplementary Data 11: Sensitivity analyses examining metabolic biomarker × time interactions in longitudinal brain change models.