Supplemental Material

The associations of socioeconomic position with structural brain damage and connectivity and cognitioning: The Maastricht Study

Supplementary methods

Education

Educational attainment included nine nationally relevant categories, ranging from no education to university education, i.e., 1) no education, 2) uncompleted primary education, 3) primary education, 4) lower vocational education, 5) intermediate general secondary education, 6) intermediate vocational education, 7) higher general secondary education, 8) higher vocational education, 9) university, 10) other, and 11) I don't know.

Magnetic resonance imaging

Protocol

The MRI protocol included a three-dimensional T1-weighted magnetization prepared rapid acquisition gradient echo (MPRAGE) sequence (repetition time/inversion time/echo time (TR/TI/TE) 2300/900/2.98 ms, 176 slices, 256×240 matrix size, 1.0 mm cubic reconstructed voxel size), a T2-weighted fluid-attenuated inversion recovery (FLAIR) sequence (TR/TI/TE 5000/1800/394 ms, 176 slices, 512×512 matrix size, 0.49×0.49×1.0 mm reconstructed voxel size), and a diffusion MRI (dMRI) sequence (TR/TE 6100/57 ms, 65 slices, 100×100 matrix size, 64 diffusion sensitizing gradient directions [b=1200 s/mm2], 2.0 mm cubic reconstructed voxel size, with three additional minimally diffusion-weighted images [b=0 s/mm2]).

Image pre-processing

The 94 defined automatic anatomical labelling 2 (AAL2) atlas (Tzourio-Mazoyer et al., 2002) volumes of interest were transformed to diffusion space for each individual subject. First, affine registrations of the dMRI image to the T1 image and of the T1 image to T1 MNI-152 standard space were performed (Fonov et al., 2011). These two transformations were combined, and the inverse transformation matrix was applied to the AAL2 template. dMRI data analysis was performed with the diffusion MR Toolbox Explore DTI version 4.8.6. The main pre-processing steps were eddy current–induced geometric distortions and hea (Leemans et al., 2009)d motion correction, and estimation of the diffusion tensor. After preprocessing, fiber orientation distributions (FODs) were estimated using constrained spherical deconvolution with a maximum harmonic degree of 8 (Tournier et al., 2013), which allows fiber tracking through regions with crossing fibers. Whole-brain deterministic tractography was performed using FOD sampling (Jeurissen et al., 2011) with a seed point resolution of 2 mm3, a step size of 1 mm, and an FOD and maximum deflection angle threshold of 0.1 and 30°, respectively. The next step was performing connectivity analysis to obtain white matter tracts from and-to-all the segmented regions. A previous study of our group confirmed the robustness of tract volume as a measure for the edge weighting (Vaessen et al., 2012). Therefore, for each connection, the tract volume was calculated as the number of voxels visited by at least one tract between concerned areas multiplied by the voxel volume (in mm3). The obtained connectivity matrix with tract volumes was normalized to intracranial volume to reduce inter-subject variation (Whitwell et al., 2001). When regions were connected by only one or two streamlines, the corresponding tract volumes were removed from the connectivity matrix, as an additional noise filter.

Supplementary tables

eTable 1. Associations of socioeconomic position with composite cognitive score stratified by sex/gender and interactions with sex/gender

	Interaction SEP with sex [a] (n=4,839) B (95% CI)	*p*-value	**Women (n=2,408) B (95% CI)**	*p*-value	**Men (n=2,431) B (95% CI)**	*p*-value
Early-life SEP						
Composite score early-life SEP						
=Low	Reference		Reference		Reference	
=Medium	-0.09 (-0.20;0.02)	0.110	**0.12 (0.04;0.20)**	**0.003**	**0.22 (0.14;0.29)**	**<0.001**
=High	-0.04 (-0.16;0.07)	0.459	**0.23 (0.15;0.31)**	**<0.001**	**0.28 (0.20;0.36)**	**<0.001**
Later-life SEP						
Composite score later-life SEP						
=Low	Reference		Reference		Reference	
=Medium	**0.12 (0.01;0.22)**	**0.030**	**0.53 (0.45;0.60)**	**<0.001**	**0.40 (0.32;0.48)**	**<0.001**
=High	0.00 (-0.10;0.11)	0.949	**0.72 (0.65;0.80)**	**<0.001**	**0.71 (0.64;0.79)**	**<0.001**

B indicates unstandardized regression coefficient; CI, confidence interval; SEP, socioeconomic position. Analyses are adjusted for age and type 2 diabetes mellitus. [a] Reference category is men.

eTable 2. Associations of socioeconomic position with composite cognitive score stratified by type 2 diabetes and interactions with type 2 diabetes

	Interaction SEP with T2DM [a] **(n=4,839) B (95% CI)**	*p*-value	**No T2DM (n=3,893) B (95% CI)**	*p*-value	**T2DM (n=946) B (95% CI)**	*p*-value
Early-life SEP						
Composite score early-life SEP	Reference		Reference		Reference	
=Low	0.03 (-0.11;0.16)	0.690	**0.17 (0.11;0.23)**	**<0.001**	**0.19 (0.06;0.32)**	**0.004**
=Medium	-0.02 (-0.16;0.13)	0.797	**0.26 (0.20;0.32)**	**<0.001**	**0.24 (0.10;0.38)**	**0.001**
=High						
Later-life SEP						
Composite score later-life SEP						
=Low	Reference		Reference		Reference	
=Medium	0.11 (-0.02;0.24)	0.097	**0.44 (0.38;0.50)**	**<0.001**	**0.40 (0.32;0.48)**	**<0.001**
=High	0.05 (-0.09;0.18)	0.513	**0.71 (0.65;0.77)**	**<0.001**	**0.71 (0.64;0.79)**	**<0.001**

B indicates unstandardized regression coefficient; CI, confidence interval; SEP, socioeconomic position; T2DM, type 2 diabetes mellitus. Analyses are adjusted for age and sex. [a] Reference category is no T2DM.

eTable 3. Interactions of socioeconomic position with sex/gender on markers of structural brain damage and connectivity

Interactions	WMH volume [a] (per 1SD) B (95% CI)	*p*-value	Grey matter volume (per 1 SD) B (95% CI)	*p*-value	White matter volume (per 1 SD) B (95% CI)	*p*-value	CSF volume (per 1 SD) B (95% CI)	*p*-value	Node degree (per 1 SD) B (95% CI)	*p*-value
Early-life SEP * sex [b]										
Composite score later-life SEP										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	0.08 (-0.03;0.20)	0.160	-0.02 (-0.08;0.05)	0.605	-0.01 (-0.07;0.05)	0.742	0.03 (-0.06;0.11)	0.530	-0.03 (-0.15;0.10)	0.673
=High	**0.13 (0.01;0.25)**	**0.037**	0.00 (-0.06;0.07)	0.884	0.01 (-0.05;0.08)	0.733	-0.03 (-0.12;0.06)	0.490	0.07 (-0.06;0.21)	0.278
Later-life SEP * sex [b]										
Composite score later-life SEP										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	-0.08 (-0.20;0.04)	0.177	-0.04 (-0.10;0.03)	0.268	-0.00 (-0.07;0.06)	0.951	0.05 (-0.04;0.14)	0.289	0.03 (-0.10;0.16)	0.651
=High	-0.05 (-0.17;0.07)	0.443	-0.01 (-0.07;0.05)	0.741	-0.01 (-0.07;0.06)	0.845	0.03 (-0.06;0.11)	0.575	-0.05 (-0.18;0.08)	0.468

N=4,839. WMH indicates white matter hyperintensities; SD, standard deviation; B, unstandardized regression coefficient; CI, confidence interval; CSF, cerebrospinal fluid; T2DM, type 2 diabetes mellitus; SEP, socioeconomic position; MRI, magnetic resonance imaging. [a] White matter hyperintensity volumes were log transformed. [b] Reference category is men. Analyses are adjusted for MRI time lag, intracranial volume (for brain volumes only), age, and type 2 diabetes mellitus.

eTable 4. Associations of socioeconomic position with markers of structural brain damage and connectivity stratified by sex/gender

	WMH volume [a] (per 1SD) B (95% CI)	*p*-value	**Grey matter volume (per 1 SD) B (95% CI)**	*p*-value	**White matter volume (per 1 SD) B (95% CI)**	*p*-value	**CSF volume (per 1 SD) B (95% CI)**	*p*-value	**Node degree (per 1 SD) B (95% CI)**	*p*-value
Women (n=2,408)										
Early-life SEP										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	0.01 (-0.07;0.10)	0.768	0.03 (-0.01;0.07)	0.115	-0.03 (-0.07;0.02)	0.232	-0.01 (-0.06;0.05)	0.792	0.07 (-0.01;0.16)	0.089
=High	0.04 (-0.04;0.13)	0.342	0.02 (-0.02;0.05)	0.456	-0.04 (-0.08;0.01)	0.116	0.02 (-0.04;0.08)	0.512	**0.13 (0.04;0.21)**	**0.003**
Later-life SEP										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	-0.07 (-0.16;0.01)	0.080	0.03 (-0.01;0.06)	0.186	-0.01 (-0.05;0.03)	0.600	-0.01 (-0.07;0.04)	0.665	**0.13 (0.05;0.22)**	**0.001**
=High	-0.07 (-0.16;0.02)	0.106	0.07 (0.03;0.12)	<0.001	-0.02 (-0.07;0.02)	0.312	-0.06 (-0.12;0.00)	0.058	**0.12 (0.04;0.21)**	**0.006**
Men (n=2,431)										
Early-life SEP										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	-0.07 (-0.16;0.01)	0.074	0.02 (-0.03;0.07)	0.364	-0.03 (-0.08;0.02)	0.203	0.02 (-0.05;0.08)	0.632	0.07 (-0.03;0.16)	0.157
=High	**-0.10 (-0.18; -0.01)**	**0.036**	-0.02 (-0.07;0.03)	0.416	**-0.07 (-0.12; -0.02)**	**0.008**	**0.12 (0.05;0.18)**	**0.001**	0.01 (-0.09;0.12)	0.785
Later-life SEP										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	0.01 (-0.08;0.10)	0.814	0.02 (-0.03;0.07)	0.505	-0.04 (-0.09;0.01)	0.160	0.03 (-0.04;0.10)	0.418	0.05 (-0.06;0.15)	0.397
=High	-0.02 (-0.11;0.07)	0.598	0.05 (-0.00;0.10)	0.073	-0.05 (-0.10;0.00)	0.061	0.00 (-0.06;0.07)	0.906	**0.11 (0.01;0.21)**	**0.031**

WMH indicates white matter hyperintensities; SD, standard deviation; B, unstandardized regression coefficient; CI, confidence interval; CSF, cerebrospinal fluid; T2DM, type 2 diabetes mellitus; SEP, socioeconomic position; MRI, magnetic resonance imaging. [a] White matter hyperintensity volumes were log transformed. Analyses are adjusted for MRI time lag, intracranial volume (for brain volumes only), age, and type 2 diabetes mellitus.

eTable 5. Interactions of socioeconomic position with type 2 diabetes mellitus on markers of structural brain damage and connectivity

Interactions	WMH volume [a] (per 1SD) B (95% CI)	*p*-value	Grey matter volume (per 1 SD) B (95% CI)	*p*-value	White matter volume (per 1 SD) B (95% CI)	*p*-value	CSF volume (per 1 SD) B (95% CI)	*p*-value	Node degree (per 1 SD) B (95% CI)	*p*-value
Early-life SEP * T2DM [b]										
Composite score early-life SEP										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	-0.01 (-0.15;0.14)	0.928	0.03 (-0.04;0.11)	0.364	0.01 (-0.07;0.08)	0.860	-0.05 (-0.16;0.05)	0.315	0.02 (-0.13;0.18)	0.780
=High	**0.17 (0.01;0.32)**	**0.033**	0.05 (-0.03;0.13)	0.206	-0.06 (-0.14;0.03)	0.192	-0.00 (-0.11;0.11)	0.966	-0.03 (-0.19;0.14)	0.756
Later-life SEP * T2DM [b]										
Composite score later-life SEP										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	**0.19 (0.04;0.33)**	**0.010**	0.05 (-0.02;0.13)	0.168	-0.01 (-0.09;0.07)	0.815	-0.06 (-0.16;0.05)	0.301	-0.03 (-0.19;0.12)	0.672
=High	**0.18 (0.02;0.33)**	**0.024**	**0.10 (0.02;0.18)**	**0.018**	-0.06 (-0.14;0.03)	0.181	-0.06 (-0.17;0.05)	0.317	0.09 (-0.08;0.25)	0.305

N=4,839. WMH indicates white matter hyperintensities; SD, standard deviation; B, unstandardized regression coefficient; CI, confidence interval; CSF, cerebrospinal fluid; T2DM, type 2 diabetes mellitus; SEP, socioeconomic position; MRI, magnetic resonance imaging. [a] White matter hyperintensity volumes were log transformed. [b] Reference category is no T2DM. Analyses are adjusted for MRI time lag, intracranial volume (for brain volumes only), age, and sex.

eTable 6. Associations of socioeconomic position with markers of structural brain damage and connectivity stratified by type 2 diabetes mellitus status

	WMH volume [a] (per 1SD) B (95% CI)	*p*-value	**Grey matter volume (per 1 SD) B (95% CI)**	*p*-value	**White matter volume (per 1 SD) B (95% CI)**	*p*-value	**CSF volume (per 1 SD) B (95% CI)**	*p*-value	**Node degree (per 1 SD) B (95% CI)**	*p*-value
Participants without T2DM (n=3,893)										
Early-life SEP										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	-0.04 (-0.10;0.03)	0.264	0.02 (-0.01;0.05)	0.254	-0.03 (-0.06;0.01)	0.133	0.01 (-0.04;0.06)	0.624	**0.07 (0.00;0.14)**	**0.043**
=High	-0.06 (-0.13;0.01)	0.087	-0.01 (-0.05;0.02)	0.516	**-0.04 (-0.08; -0.00)**	**0.033**	**0.07 (0.02;0.12)**	**0.009**	**0.09 (0.01;0.16)**	**0.018**
Later-life SEP										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	**-0.08 (-0.15; -0.01)**	**0.023**	0.00 (-0.03;0.04)	0.915	-0.02 (-0.06;0.01)	0.220	0.03 (-0.02;0.08)	0.203	**0.10 (0.02;0.17)**	**0.009**
=High	**-0.09 (-0.16; -0.02)**	**0.009**	0.03 (-0.00;0.07)	0.089	-0.03 (-0.07;0.01)	0.119	0.00 (-0.05;0.05)	0.882	**0.10 (0.03;0.17)**	**0.007**
Participants with T2DM (n=946)										
Early-life SEP										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	-0.04 (-0.17;0.09)	0.521	0.05 (-0.02;0.12)	0.189	-0.02 (-0.10;0.05)	0.495	-0.03 (-0.13;0.07)	0.541	0.06 (-0.09;0.22)	0.416
=High	0.11 (-0.03;0.25)	0.131	0.03 (-0.05;0.11)	0.430	**-0.10 (-0.18; -0.02)**	**0.011**	0.08 (-0.02;0.19)	0.144	0.04 (-0.13;0.21)	0.684
Later-life SEP										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	0.11 (-0.02;0.24)	0.097	0.05 (-0.02;0.13)	0.146	-0.03 (-0.11;0.04)	0.336	-0.02 (-0.12;0.08)	0.684	0.04 (-0.11;0.20)	0.582
=High	0.09 (-0.05;0.23)	0.224	**0.14 (0.06;0.22)**	**0.001**	-0.08 (-0.16; -0.00)	0.050	-0.08 (-0.19;0.03)	0.140	**0.21 (0.04;0.38)**	**0.015**

WMH indicates white matter hyperintensities; SD, standard deviation; B, unstandardized regression coefficient; CI, confidence interval; CSF, cerebrospinal fluid; T2DM, type 2 diabetes mellitus; SEP, socioeconomic position; MRI, magnetic resonance imaging. [a] White matter hyperintensity volumes were log transformed. Analyses are adjusted for MRI time lag, intracranial volume (for brain volumes only), age, and sex.

eTable 7. Association of individual socioeconomic indicators with composite cognitive score

	Model 1 B (95% CI)	*p*-value	Model 2 B (95% CI)	*p*-value	Model 3 B (95% CI)	*p*-value
Early-life SEP						
Childhood poverty (n=4,592)						
=High	Reference		Reference		Reference	
=Medium	**0.12 (0.00;0.25)**	**0.048**	0.12 (-0.00;0.24)	0.051	0.06 (-0.05;0.18)	0.299
=Low	**0.23 (0.11;0.34)**	**<0.001**	**0.22 (0.10;0.33)**	**<0.001**	0.09 (-0.01;0.20)	0.090
Educational attainment mother (n=4,369)						
=Low	Reference		Reference		Reference	
=Medium	**0.14 (0.09;0.20)**	**<0.001**	**0.14 (0.08;0.19)**	**<0.001**	0.01 (-0.04;0.06)	0.671
=High	**0.36 (0.24;0.49)**	**<0.001**	**0.36 (0.24;0.48)**	**<0.001**	**0.12 (0.00;0.24)**	**0.047**
Educational attainment father (n=4,307)						
=Low	Reference		Reference		Reference	
=Medium	**0.19 (0.14;0.25)**	**<0.001**	**0.19 (0.14;0.24)**	**<0.001**	**0.07 (0.02;0.12)**	**0.008**
=High	**0.37 (0.30;0.44)**	**<0.001**	**0.36 (0.29;0.43)**	**<0.001**	**0.14 (0.07;0.21)**	**<0.001**
Later-life SEP						
Educational attainment (n=4,795)						
=Low	Reference		Reference		Reference	
=Medium	**0.54 (0.47;0.60)**	**<0.001**	**0.53 (0.46;0.59)**	**<0.001**	**0.52 (0.45;0.58)**	**<0.001**
=High	**0.92 (0.85;0.98)**	**<0.001**	**0.90 (0.83;0.96)**	**<0.001**	**0.88 (0.81;0.95)**	**<0.001**
Occupational attainment (n=1,829)						
=Low	Reference		Reference		Reference	
=Intermediate	**0.44 (0.35;0.52)**	**<0.001**	**0.42 (0.33;0.50)**	**<0.001**	**0.39 (0.31;0.48)**	**<0.001**
=High	**0.59 (0.50;0.67)**	**<0.001**	**0.56 (0.47;0.64)**	**<0.001**	**0.52 (0.43;0.61)**	**<0.001**
Household income (n=3,806)						
=Low	Reference		Reference		Reference	
=Medium	**0.29 (0.23;0.35)**	**<0.001**	**0.28 (0.22;0.34)**	**<0.001**	**0.26 (0.20;0.32)**	**<0.001**
=High	**0.43 (0.37;0.50)**	**<0.001**	**0.42 (0.36;0.48)**	**<0.001**	**0.39 (0.33;0.45)**	**<0.001**

B indicates unstandardized regression coefficient; CI, confidence interval; SEP, socioeconomic position.
Model 1: adjusted for age and sex.
Model 2: additionally adjusted for type 2 diabetes (because of oversampling).
Model 3: model 2 including both early-life and later-life SEP.

eTable 8. Associations of continuous composite and individual socioeconomic scores with composite cognitive score

	B (95% CI)	*p*-value
Early-life SEP		
Composite score childhood SEP (n=4,839)	**0.18 (0.15;0.21)**	**<0.001**
Childhood poverty score (n=4,592)	**0.06 (0.03;0.08)**	**<0.001**
Educational attainment mother score (n=4,369)	**0.12 (0.09;0.14)**	**<0.001**
Educational attainment father score (n=4,307)	**0.14 (0.12;0.17)**	**<0.001**
Later-life SEP		
Composite score adulthood SEP (n=4,839)	**0.36 (0.34;0.39)**	**<0.001**
Educational attainment score (n=4,795)	**0.33 (0.31;0.35)**	**<0.001**
Occupational attainment score (n=1,829)	**0.26 (0.22;0.29)**	**<0.001**
Household income score (n=3,806)	**0.17 (0.14;0.19)**	**<0.001**

B indicates unstandardized regression coefficient; CI, confidence interval; SEP, socioeconomic position. Analyses are adjusted for age, sex, and type 2 diabetes mellitus.

eTable 9. Association of individual socioeconomic indicators with markers of structural brain damage and connectivity

	WMH volume [a] (per 1SD) B (95% CI)	*p*-value	**Grey matter volume (per 1 SD) B (95% CI)**	*p*-value	**White matter volume (per 1 SD) B (95% CI)**	*p*-value	**CSF volume (per 1 SD) B (95% CI)**	*p*-value	**Node degree (per SD) B (95% CI)**	*p*-value
Early-life SEP										
Childhood poverty (n=4,592)										
=High	Reference		Reference		Reference		Reference		Reference	
=Medium	-0.08 (-0.21;0.05)	0.249	0.01 (-0.06;0.08)	0.762	-0.05 (-0.12;0.02)	0.169	0.05 (-0.05;0.14)	0.337	0.03 (-0.11;0.18)	0.655
=Low	-0.05 (-0.17;0.07)	0.404	0.03 (-0.04;0.09)	0.385	**-0.09 (-0.16; -0.02**)	**0.007**	0.07 (-0.02;0.16)	0.118	0.05 (-0.08;0.19)	0.414
Educational attainment mother (n=4,369)										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	**-0.07 (-0.12; -0.01)**	**0.021**	0.00 (-0.03;0.03)	0.784	-0.03 (-0.06;0.00)	0.052	0.03 (-0.01;0.08)	0.107	0.04 (-0.02;0.10)	0.239
=High	-0.05 (-0.18;0.08)	0.417	-0.03 (-0.10;0.04)	0.438	-0.05 (-0.12;0.02)	0.151	**0.10 (0.00;0.19)**	**0.041**	-0.00 (-0.14;0.14)	0.962
Educational attainment father (n=4,307)										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	**-0.06 (-0.11; -0.00)**	**0.047**	-0.03 (-0.05;0.00)	0.091	-0.02 (-0.05;0.01)	0.218	**0.06 (0.02;0.10)**	**0.004**	-0.01 (-0.08;0.05)	0.631
=High	-0.03 (-0.11;0.05)	0.405	-0.01 (-0.05;0.03)	0.563	**-0.05 (-0.09; -0.01)**	**0.024**	**0.07 (0.02;0.13)**	**0.010**	-0.05 (-0.13;0.03)	0.238
Later-life SEP										
Educational attainment (n=4,795)										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	-0.00 (-0.07;0.07)	0.980	0.02 (-0.02;0.06)	0.298	-0.03 (-0.07;0.01)	0.176	0.01 (-0.05;0.06)	0.751	0.06 (-0.02;0.14)	0.177
=High	-0.03 (-0.11;0.04)	0.408	0.04 (-0.00;0.08)	0.056	-0.03 (-0.07;0.01)	0.125	-0.01 (-0.06;0.05)	0.807	**0.10 (0.01;0.18)**	**0.021**
Occupational attainment (n=1,829)										
=Low	Reference		Reference		Reference		Reference		Reference	
=Intermediate	-0.02 (-0.11;0.08)	0.748	-0.00 (-0.05;0.05)	0.936	-0.01 (-0.06;0.04)	0.725	0.02 (-0.05;0.10)	0.548	0.06 (-0.04;0.17)	0.249
=High	0.04 (-0.06;0.13)	0.457	0.01 (-0.05;0.06)	0.793	-0.04 (-0.09;0.02)	0.190	0.04 (-0.04;0.11)	0.346	0.08 (-0.03;0.19)	0.161
Household income (n=3,806)										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	-0.04 (-0.11;0.02)	0.181	0.01 (-0.02;0.05)	0.498	-0.02 (-0.05;0.02)	0.307	0.01 (-0.04;0.06)	0.686	-0.00 (-0.08;0.07)	0.919
=High	-0.05 (-0.12;0.02)	0.156	0.03 (-0.01;0.06)	0.114	0.00 (-0.03;0.04)	0.844	-0.04 (-0.09;0.01)	0.164	**0.12 (0.05;0.20)**	**0.001**

WMH indicates white matter hyperintensities; SD, standard deviation; B, unstandardized regression coefficient; CI, confidence interval; CSF, cerebrospinal fluid; SEP, socioeconomic position; MRI, magnetic resonance imaging. Analyses are adjusted for MRI time lag, intracranial volume (for brain volumes only), age, sex, and type 2 diabetes (because of oversampling). [a] White matter hyperintensity volumes were log transformed.

eTable 10. Associations of continuous composite and individual socioeconomic scores with markers of structural brain damage and connectivity

	WMH volume [a] (per 1SD) B (95% CI)	*p*-value	Grey matter volume (per 1 SD) B (95% CI)	*p*-value	White matter volume (per 1 SD) B (95% CI)	*p*-value	CSF volume (per 1 SD) B (95% CI)	*p*-value	Node degree (per SD) B (95% CI)	*p*-value
Early-life SEP										
Composite score early-life SEP (n=4,839)	-0.02 (-0.05;0.01)	0.176	-0.00 (-0.02;0.01)	0.623	**-0.03 (-0.04; -0.01)**	**0.002**	**0.04 (0.02;0.06)**	**0.001**	0.03 (-0.01;0.06)	0.125
Childhood poverty score (n=4,592)	-0.00 (-0.03;0.02)	0.962	0.01 (-0.01;0.02)	0.327	**-0.02 (-0.04; -0.01)**	**0.002**	0.02 (-0.00;0.04)	0.071	0.01 (-0.01;0.04)	0.331
Educational attainment mother score (n=4,369)	**-0.03 (-0.06; -0.01)**	**0.015**	-0.00 (-0.02;0.01)	0.807	**-0.02 (-0.03; -0.00)**	**0.026**	**0.02 (0.00;0.04)**	**0.015**	0.02 (-0.01;0.05)	0.147
Educational attainment father score (n=4,307)	-0.02 (-0.04;0.01)	0.205	-0.01 (-0.02;0.01)	0.344	**-0.02 (-0.03; -0.00)**	**0.029**	**0.03 (0.01; 0.05)**	**0.003**	0.00 (-0.02;0.03)	0.799
Later-life SEP										
Composite score later-life SEP (n=4,839)	-0.02 (-0.05;0.01)	0.129	**0.02 (0.01;0.04)**	**0.003**	**-0.02 (-0.04; -0.00)**	**0.013**	-0.00 (-0.02;0.02)	0.815	**0.05 (0.02;0.09)**	**0.001**
Educational attainment score (n=4,795)	-0.02 (-0.05;0.00)	0.065	**0.02 (0.00;0.03)**	**0.010**	**-0.02 (-0.03; -0.00)**	**0.033**	-0.00 (-0.02;0.02)	0.799	**0.03 (0.01;0.06)**	**0.018**
Occupational attainment score (n=1,829)	0.01 (-0.03;0.05)	0.739	0.00 (-0.02;0.03)	0.714	-0.02 (-0.04;0.01)	0.158	0.02 (-0.02;0.05)	0.334	0.04 (-0.00;0.09)	0.060
Household income score (n=3,806)	-0.02 (-0.05;0.01)	0.192	**0.02 (0.00;0.03)**	**0.024**	-0.01 (-0.03;0.00)	0.140	-0.01 (-0.03;0.01)	0.590	**0.04 (0.01;0.07)**	**0.009**

WMH indicates white matter hyperintensities; SD, standard deviation; B, unstandardized regression coefficient; CI, confidence interval; CSF, cerebrospinal fluid; SEP, socioeconomic position; MRI, magnetic resonance imaging. Analyses are adjusted for MRI time lag, intracranial volume (for brain volumes only), age, sex, and type 2 diabetes (because of oversampling). [a] White matter hyperintensity volumes were log transformed.

eTable 11. Sensitivity analyses for the associations of socioeconomic position with composite cognitive score

	Model 1 B (95% CI)	*p*-value	Model 2 B (95% CI)	*p*-value	Model 3 B (95% CI)	*p*-value
Early-life SEP						
Childhood poverty + educational attainment (n=4,551)						
=High	Reference		Reference		-	-
=Medium	0.04 (-0.07;0.16)	0.452	0.04 (-0.07;0.16)	0.453		
=Low	0.08 (-0.02;0.19)	0.128	0.08 (-0.03;0.18)	0.153		
Childhood poverty * high educational attainment (n=4,551)						
=High	Reference		Reference		-	-
=Medium	-0.18 (-0.45;0.09)	0.192	-0.17 (-0.44;0.10)	0.218		
=Low	-0.18 (-0.43;0.08)	0.176	-0.16 (-0.42;0.09)	0.205		
Composite score early-life SEP + verbal intelligence (n=4,782)						
=Low	Reference		Reference		Reference	
=Medium	**0.07 (0.02;0.12)**	**0.006**	**0.06 (0.01;0.11)**	**0.015**	0.02 (-0.03;0.07)	0.496
=High	**0.10 (0.04;0.15)**	**<0.001**	**0.09 (0.03;0.14)**	**0.001**	0.01 (-0.04;0.07)	0.609
Later-life SEP						
Household income + educational attainment (n=3,769)						
=Low	Reference		Reference		Reference	
=Medium	**0.15 (0.09;0.20)**	**<0.001**	**0.14 (0.08;0.20)**	**<0.001**	**0.13 (0.08;0.20)**	**<0.001**
=High	**0.18 (0.11;0.24)**	**<0.001**	**0.17 (0.10;0.23)**	**<0.001**	**0.17 (0.10;0.23)**	**<0.001**
Household income * high educational attainment (n=3,769)						
=Low	Reference		Reference		Reference	
=Medium	-0.09 (-0.22;0.04)	0.160	-0.08 (-0.21;0.05)	0.213	-0.08 (-0.21;0.05)	0.239
=High	-0.08 (-0.21;0.05)	0.238	-0.08 (-0.21;0.06)	0.253	-0.07 (-0.20;0.06)	0.296
Composite score later-life SEP + verbal intelligence (n=4,782)						
=Low	Reference		Reference		Reference	
=Medium	**0.27 (0.22;0.33)**	**<0.001**	**0.27 (0.21;0.32)**	**<0.001**	**0.26 (0.21;0.32)**	**<0.001**
=High	**0.42 (0.36;0.48)**	**<0.001**	**0.41 (0.35;0.47)**	**<0.001**	**0.40 (0.34;0.46)**	**<0.001**

B indicates unstandardized regression coefficient; CI, confidence interval; SEP, socioeconomic position.
Model 1: adjusted for age and sex.
Model 2: additionally adjusted for type 2 diabetes (because of oversampling).
Model 3: model 2 including both early-life and later-life SEP.

eTable 12. Sensitivity analyses for the associations of socioeconomic position with markers of structural brain damage and connectivity

	WMH volume [a] (per 1SD) B (95% CI)	*p*-value	**Grey matter volume (per 1 SD) B (95% CI)**	*p*-value	**White matter volume (per 1 SD) B (95% CI)**	*p*-value	**CSF volume (per 1 SD) B (95% CI)**	*p*-value	**Node degree (per SD) B (95% CI)**	*p*-value
Early-life SEP										
Childhood poverty + educational attainment (n=4,551)										
=High	Reference		Reference		Reference		Reference		Reference	
=Medium	-0.08 (-0.21;0.05)	0.217	0.00 (-0.07;0.07)	0.925	-0.04 (-0.11;0.03)	0.236	0.05 (-0.05;0.14)	0.332	0.03 (-0.11;0.17)	0.645
=Low	-0.06 (-0.18;0.07)	0.368	0.02 (-0.04;0.08)	0.539	**-0.08 (-0.15; -0.02)**	**0.016**	0.07 (-0.02;0.16)	0.120	0.05 (-0.08;0.18)	0.453
Childhood poverty * high educational attainment (n=4,551)										
=High	Reference		Reference		Reference		Reference		Reference	
=Medium	-0.21 (-0.51;0.10)	0.183	-0.10 (-0.26;0.06)	0.229	-0.08 (-0.25;0.09)	0.345	**0.23 (0.00;0.45)**	**0.045**	-0.20 (-0.53;0.14)	0.244
=Low	-0.23 (-0.52;0.05)	0.107	-0.08 (-0.23;0.07)	0.302	-0.01 (-0.16;0.15)	0.917	0.11 (-0.10;0.32)	0.303	-0.26 (-0.58;0.05)	0.096
Composite score early-life SEP + verbal intelligence (n=4,782)										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	-0.03 (-0.09;0.03)	0.389	0.02 (-0.01;0.06)	0.129	**-0.03 (-0.06; -0.00)**	**0.049**	0.01 (-0.03;0.05)	0.605	0.05 (-0.01;0.12)	0.110
=High	-0.02 (-0.08;0.05)	0.602	-0.01 (-0.04;0.03)	0.679	**-0.05 (-0.09; -0.02)**	**0.002**	**0.08 (0.03;0.12)**	**0.001**	0.05 (-0.02;0.12)	0.152
Later-life SEP										
Household income + educational attainment (n=4,551)										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	-0.05 (-0.12;0.02)	0.135	0.01 (-0.03;0.04)	0.704	-0.01 (-0.05;0.03)	0.533	0.01 (-0.04;0.06)	0.774	-0.01 (-0.08;0.06)	0.792
=High	-0.05 (-0.12;0.03)	0.202	0.02 (-0.02;0.06)	0.352	0.01 (-0.03;0.05)	0.531	-0.03 (-0.09;0.02)	0.216	**0.12 (0.04;0.20)**	**0.004**
Household income * high educational attainment (n=3,769)										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	0.11 (-0.04;0.26)	0.138	-0.03 (-0.11;0.04)	0.387	0.08 (-0.00;0.16)	0.056	-0.05 (-0.16;0.05)	0.329	-0.02 (-0.18;0.14)	0.796
=High	-0.01 (-0.16;0.14)	0.931	-0.07 (-0.15;0.01)	0.078	0.04 (-0.05;0.12)	0.384	0.05 (-0.07;0.16)	0.425	-0.14 (-0.30;0.03)	0.101
Composite score later-life SEP + verbal intelligence (n=4,782)										
=Low	Reference		Reference		Reference		Reference		Reference	
=Medium	-0.01 (-0.07;0.06)	0.785	0.02 (-0.02;0.05)	0.350	-0.03 (-0.07;0.01)	0.095	0.02 (-0.03;0.07)	0.376	0.06 (-0.01;0.13)	0.098
=High	-0.02 (-0.09;0.05)	0.601	**0.05 (0.02;0.09)**	**0.004**	**-0.04 (-0.08; -0.01)**	**0.023**	-0.01 (-0.06;0.04)	0.697	0.07 (-0.01;0.15)	0.075

WMH indicates white matter hyperintensities; SD, standard deviation; B, unstandardized regression coefficient; CI, confidence interval; CSF, cerebrospinal fluid; SEP, socioeconomic position; MRI, magnetic resonance imaging. Analyses are adjusted for MRI time lag, intracranial volume (for brain volumes only), age, sex, and type 2 diabetes (because of oversampling). [a] White matter hyperintensity volumes were log transformed.

eTable 13. Associations of socioeconomic position with composite cognitive score with additional adjustments

	Model 1 B (95% CI)	*p*-value	Model 2 B (95% CI)	*p*-value
Early-life SEP				
Composite score early-life SEP + waist circumference (n=4,837)				
=Low	Reference		Reference	
=Medium	**0.17 (0.11;0.22)**	**<0.001**	**0.05 (0.00;0.11)**	**0.049**
=High	**0.25 (0.19;0.31)**	**<0.001**	**0.06 (0.01;0.12)**	**0.025**
Composite score early-life SEP + total cholesterol-to-HDL ratio + lipid-modifying medication (n=4,834)				
=Low	Reference		Reference	
=Medium	**0.17 (0.12;0.23)**	**<0.001**	**0.05 (0.00;0.11)**	**0.042**
=High	**0.25 (0.20;0.31)**	**<0.001**	**0.07 (0.01;0.12)**	**0.022**
Composite score early-life SEP + systolic blood pressure + antihypertensive medication (n=4,836)				
=Low	Reference		Reference	
=Medium	**0.17 (0.12;0.23)**	**<0.001**	**0.05 (0.00;0.11)**	**0.042**
=High	**0.25 (0.20;0.31)**	**<0.001**	**0.07 (0.01;0.12)**	**0.020**
Composite score early-life SEP + cardiovascular risk factors [a] (n=4,830)				
=Low	Reference		Reference	
=Medium	**0.17 (0.11;0.22)**	**<0.001**	**0.05 (0.00;0.11)**	**0.043**
=High	**0.25 (0.19;0.31)**	**<0.001**	**0.06 (0.01;0.12)**	**0.026**
Composite score early-life SEP + smoking (n=4,815)				
=Low	Reference		Reference	
=Medium	**0.17 (0.11;0.22)**	**<0.001**	0.05 (-0.00;0.10)	0.052
=High	**0.25 (0.20;0.31)**	**<0.001**	**0.07 (0.01;0.12)**	**0.020**
Composite score early-life SEP + alcohol consumption (n=4,839)				
=Low	Reference		Reference	
=Medium	**0.17 (0.12;0.23)**	**<0.001**	**0.05 (0.00;0.11)**	**0.043**
=High	**0.26 (0.20;0.32)**	**<0.001**	**0.07 (0.01;0.13)**	**0.017**
Composite score early-life SEP + major depressive disorder + antidepressant medication (n=4,814)				
=Low	Reference		Reference	
=Medium	**0.16 (0.11;0.22)**	**<0.001**	0.05 (-0.00;0.10)	0.052
=High	**0.25 (0.19;0.31)**	**<0.001**	**0.07 (0.01;0.12)**	**0.022**
Composite score early-life SEP + physical activity (n=4,392)				
=Low	Reference		Reference	
=Medium	**0.16 (0.10;0.21)**	**<0.001**	0.04 (-0.01;0.10)	0.122
=High	**0.24 (0.18;0.30)**	**<0.001**	0.05 (-0.01;0.11)	0.077
Composite score early-life SEP + healthy diet (n=4,682)				
=Low	Reference		Reference	
=Medium	**0.18 (0.12;0.23)**	**<0.001**	**0.06 (0.01;0.11)**	**0.023**
=High	**0.26 (0.21;0.32)**	**<0.001**	**0.08 (0.02;0.13)**	**0.009**

Composite score early-life SEP + behavioral risk factors [b] (n=4,238)				
=Low	Reference		Reference	
=Medium	**0.15 (0.09;0.21)**	**<0.001**	0.05 (-0.01;0.10)	0.116
=High	**0.23 (0.17;0.28)**	**<0.001**	0.05 (-0.00;0.11)	0.072
Composite score early-life SEP + cardiovascular risk factors [a] + behavioral risk factors [b] (n=4,229)				
=Low	Reference		Reference	
=Medium	**0.14 (0.09;0.20)**	**<0.001**	0.05 (-0.01;0.10)	0.098
=High	**0.21 (0.15;0.27)**	**<0.001**	0.05 (-0.01;0.11)	0.093
Later-life SEP				
Composite score later-life SEP + waist circumference (n=4,837)				
=Low	Reference			
=Medium	**0.46 (0.41;0.52)**	**<0.001**	**0.45 (0.40;0.51)**	**<0.001**
=High	**0.72 (0.66;0.77)**	**<0.001**	**0.70 (0.64;0.76)**	**<0.001**
Composite score later-life SEP + total cholesterol-to-HDL ratio + lipid-modifying medication (n=4,834)				
=Low	Reference		Reference	
=Medium	**0.46 (0.41;0.52)**	**<0.001**	**0.45 (0.39;0.50)**	**<0.001**
=High	**0.72 (0.66;0.77)**	**<0.001**	**0.70 (0.64;0.75)**	**<0.001**
Composite score later-life SEP + systolic blood pressure + antihypertensive medication (n=4,836)				
=Low	Reference		Reference	
=Medium	**0.46 (0.41;0.51)**	**<0.001**	**0.45 (0.39;0.50)**	**<0.001**
=High	**0.71 (0.66;0.77)**	**<0.001**	**0.70 (0.64;0.75)**	**<0.001**
Composite score later-life SEP + cardiovascular risk factors [a] (n=4,830)				
=Low	Reference		Reference	
=Medium	**0.46 (0.40;0.51)**	**<0.001**	**0.45 (0.39;0.50)**	**<0.001**
=High	**0.71 (0.66;0.77)**	**<0.001**	**0.69 (0.64;0.75)**	**<0.001**
Composite score later-life SEP + smoking (n=4,815)				
=Low	Reference		Reference	
=Medium	**0.45 (0.40;0.50)**	**<0.001**	**0.44 (0.38;0.49)**	**<0.001**
=High	**0.71 (0.65;0.76)**	**<0.001**	**0.69 (0.63;0.74)**	**<0.001**
Composite score later-life SEP + alcohol consumption (n=4,839)				
=Low	Reference		Reference	
=Medium	**0.46 (0.41;0.51)**	**<0.001**	**0.45 (0.39;0.50)**	**<0.001**
=High	**0.72 (0.66;0.77)**	**<0.001**	**0.70 (0.64;0.76)**	**<0.001**
Composite score later-life SEP + major depressive disorder + antidepressant medication (n=4,814)				
=Low	Reference		Reference	
=Medium	**0.45 (0.39;0.50)**	**<0.001**	**0.43 (0.38;0.49)**	**<0.001**
=High	**0.70 (0.65;0.76)**	**<0.001**	**0.69 (0.63;0.74)**	**<0.001**
Composite score later-life SEP + physical activity (n=4,392)				
=Low	Reference		Reference	
=Medium	**0.46 (0.41;0.52)**	**<0.001**	**0.45 (0.40;0.51)**	**<0.001**
=High	**0.71 (0.66;0.77)**	**<0.001**	**0.70 (0.64;0.76)**	**<0.001**

Composite score later-life SEP + healthy diet (n=4,682)				
=Low	Reference		Reference	
=Medium	**0.45 (0.40;0.51)**	**<0.001**	**0.44 (0.38;0.49)**	**<0.001**
=High	**0.71 (0.66;0.77)**	**<0.001**	**0.69 (0.63;0.75)**	**<0.001**
Composite score later-life SEP + behavioral risk factors [b] (n=4,238)				
=Low	Reference		Reference	
=Medium	**0.42 (0.37;0.48)**	**<0.001**	**0.41 (0.36;0.47)**	**<0.001**
=High	**0.68 (0.62;0.74)**	**<0.001**	**0.67 (0.61;0.73)**	**<0.001**
Composite score later-life SEP + cardiovascular risk factors [a] + behavioral risk factors [b] (n=4,229)				
=Low	Reference		Reference	
=Medium	**0.41 (0.36;0.47)**	**<0.001**	**0.40 (0.35;0.46)**	**<0.001**
=High	**0.66 (0.60;0.72)**	**<0.001**	**0.65 (0.59;0.71)**	**<0.001**

B indicates unstandardized regression coefficient; CI, confidence interval; SEP, socioeconomic position; HDL, high-density lipoprotein. [a] Includes waist circumference, total cholesterol to high-density lipoprotein ratio, lipid-modifying medication use, systolic blood pressure, and antihypertension medication use. [b] Includes smoking, alcohol consumption, major depressive disorder, antidepressant medication, physical activity, and healthy diet.
Model 1: adjusted for age, sex, and type 2 diabetes (because of oversampling).
Model 2: additionally adjusted for adulthood SEP (childhood SEP) or childhood SEP (adulthood SEP).

eTable 14. Associations of socioeconomic position with markers of structural brain damage and connectivity with additional adjustments

	WMH volume [a] (per 1SD) B (95% CI)	Grey matter volume (per 1 SD) B (95% CI)	White matter volume (per 1 SD) B (95% CI)	CSF volume (per 1 SD) B (95% CI)	Node degree (per 1 SD) B (95% CI)
Early-life SEP					
Composite score early-life SEP + waist circumference (n=4,837)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.02)	0.02 (-0.01;0.06)	-0.03 (-0.06;0.00)	0.01 (-0.04;0.05)	**0.07 (0.01;0.13)**
=High	-0.03 (-0.09;0.03)	-0.01 (-0.04;0.03)	**-0.05 (-0.08; -0.02)**	**0.07 (0.03;0.12)**	**0.07 (0.00;0.14)**
Composite score early-life SEP + total cholesterol-to-HDL ratio + lipid-modifying medication (n=4,834)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.02)	0.03 (-0.00;0.06)	-0.03 (-0.06;0.00)	0.00 (-0.04;0.05)	**0.07 (0.01;0.13)**
=High	-0.03 (-0.09;0.03)	-0.00 (-0.03;0.03)	**-0.05 (-0.09; -0.02)**	**0.07 (0.02;0.11)**	**0.08 (0.01;0.14)**
Composite score early-life SEP + systolic blood pressure + antihypertensive medication (n=4,836)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.03)	0.02 (-0.01;0.06)	-0.03 (-0.06;0.00)	0.01 (-0.04;0.05)	**0.07 (0.00;0.13)**
=High	-0.02 (-0.08;0.04)	-0.01 (-0.04;0.02)	**-0.05 (-0.08; -0.02)**	**0.07 (0.03;0.12)**	**0.07 (0.00;0.14)**
Composite score early-life SEP + cardiovascular risk factors [b] (n=4,830)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.02)	0.03 (-0.00;0.06)	-0.03 (-0.06;0.00)	0.00 (-0.04;0.05)	**0.07 (0.00;0.13)**
=High	-0.02 (-0.08;0.04)	-0.01 (-0.04;0.03)	**-0.05 (-0.08; -0.02)**	**0.07 (0.03;0.12)**	**0.07 (0.01;0.14)**
Composite score early-life SEP + smoking (n=4,815)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.03)	0.02 (-0.01;0.05)	-0.03 (-0.06;0.00)	0.01 (-0.04;0.05)	**0.07 (0.00;0.13)**
=High	-0.03 (-0.09;0.04)	-0.01 (-0.04;0.03)	**-0.05 (-0.09; -0.02)**	**0.07 (0.03;0.12)**	**0.07 (0.01;0.14)**
Composite score early-life SEP + alcohol consumption (n=4,839)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.02)	0.03 (-0.00;0.06)	-0.03 (-0.06;0.00)	0.00 (-0.04;0.05)	**0.07 (0.01;0.13)**
=High	-0.03 (-0.09;0.03)	-0.00 (-0.04;0.03)	**-0.05 (-0.09; -0.02)**	**0.07 (0.03;0.11)**	**0.07 (0.01;0.14)**
Composite score early-life SEP + major depressive disorder + antidepressant medication (n=4,814)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.02)	0.03 (-0.00;0.06)	-0.03 (-0.06;0.00)	0.00 (-0.04;0.05)	**0.07 (0.00;0.13)**
=High	-0.03 (-0.09;0.04)	-0.00 (-0.03;0.03)	**-0.05 (-0.09; -0.02)**	**0.07 (0.03;0.12)**	**0.07 (0.00;0.13)**
Composite score early-life SEP + physical activity (n=4,392)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.04)	0.03 (-0.00;0.06)	-0.03 (-0.06;0.00)	0.00 (-0.04;0.05)	**0.07 (0.00;0.14)**
=High	-0.02 (-0.09;0.04)	0.00 (-0.03;0.04)	**-0.06 (-0.09; -0.02)**	**0.07 (0.02;0.12)**	**0.09 (0.02;0.16)**

Composite score early-life SEP + healthy diet (n=4,682)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.04 (-0.10;0.02)	0.03 (-0.00;0.06)	-0.03 (-0.06;0.00)	0.00 (-0.04;0.05)	**0.07 (0.00;0.13)**
=High	-0.03 (-0.10;0.03)	-0.00 (-0.04;0.03)	**-0.05 (-0.09; -0.02)**	**0.07 (0.02;0.12)**	**0.07 (0.00;0.14)**
Composite score early-life SEP + behavioral risk factors [b] (n=4,238)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.03)	0.03 (-0.01;0.06)	-0.03 (-0.06;0.01)	0.01 (-0.04;0.05)	0.06 (-0.00;0.13)
=High	-0.02 (-0.09;0.04)	0.00 (-0.03;0.04)	**-0.05 (-0.09; -0.02)**	**0.06 (0.02;0.11)**	**0.08 (0.01;0.16)**
Composite score early-life SEP + cardiovascular risk factors [b] + behavioral risk factors [c] (n=4,229)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.02 (-0.09;0.04)	0.03 (-0.01;0.06)	-0.03 (-0.06;0.01)	0.00 (-0.04;0.05)	0.06 (-0.00;0.13)
=High	-0.01 (-0.08;0.05)	0.00 (-0.03;0.04)	**-0.05 (-0.09; -0.02)**	**0.06 (0.02;0.11)**	**0.09 (0.02;0.16)**
Composite score early-life SEP excl. participants with MRI lag time > year (n=3,159)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.00 (-0.08;0.07)	0.03 (-0.01;0.07)	-0.03 (-0.07;0.00)	0.00 (-0.05;0.06)	0.04 (-0.04;0.11)
=High	0.04 (-0.04;0.11)	-0.00 (-0.04;0.04)	**-0.05 (-0.09; -0.01)**	**0.05 (0.00;0.11)**	**0.01 (-0.07;0.10)**
Later-life SEP					
Composite score later-life SEP + waist circumference (n=4,837)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.03)	0.01 (-0.02;0.04)	-0.03 (-0.06;0.01)	0.02 (-0.02;0.07)	**0.08 (0.02;0.15)**
=High	-0.05 (-0.11;0.01)	**0.05 (0.01;0.08)**	**-0.04 (-0.07; -0.00)**	-0.01 (-0.05;0.04)	**0.11 (0.04;0.18)**
Composite score later-life SEP + total cholesterol-to-HDL ratio + lipid-modifying medication (n=4,834)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.03)	0.01 (-0.02;0.05)	-0.03 (-0.06;0.01)	0.02 (-0.02;0.07)	**0.08 (0.02;0.15)**
=High	-0.05 (-0.11;0.02)	**0.05 (0.02;0.08)**	**-0.04 (-0.07; -0.01)**	-0.01 (-0.06;0.03)	**0.12 (0.05;0.18)**
Composite score later-life SEP + systolic blood pressure + antihypertensive medication (n=4,836)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.03)	0.01 (-0.02;0.04)	-0.03 (-0.06;0.00)	0.03 (-0.02;0.07)	**0.08 (0.01;0.15)**
=High	-0.03 (-0.09;0.03)	**0.04 (0.01;0.08)**	**-0.04 (-0.07; -0.01)**	-0.00 (-0.05;0.04)	**0.11 (0.04;0.18)**
Composite score later-life SEP + cardiovascular risk factors [b] (n=4,830)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.03)	0.01 (-0.02;0.04)	-0.03 (-0.06;0.01)	0.03 (-0.02;0.07)	**0.08 (0.02;0.15)**
=High	-0.04 (-0.10;0.02)	**0.04 (0.01;0.08)**	**-0.04 (-0.07; -0.00)**	-0.01 (-0.05;0.04)	**0.11 (0.05;0.18)**
Composite score later-life SEP + smoking (n=4,815)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.03)	0.01 (-0.02;0.04)	-0.03 (-0.06;0.01)	0.03 (-0.02;0.07)	**0.08 (0.01;0.14)**
=High	-0.04 (-0.11;0.02)	**0.04 (0.01;0.08)**	**-0.04 (-0.07; -0.01)**	-0.00 (-0.05;0.04)	**0.10 (0.03;0.17)**

Composite score later-life SEP + alcohol consumption (n=4,839)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.03)	0.02 (-0.02;0.05)	-0.03 (-0.06;0.00)	0.02 (-0.02;0.07)	**0.08 (0.01;0.15)**
=High	-0.05 (-0.11;0.01)	**0.05 (0.02;0.08)**	**-0.04 (-0.07; -0.01)**	-0.01 (-0.06;0.04)	**0.11 (0.04;0.18)**
Composite score later-life SEP + major depressive disorder + antidepressant medication (n=4,814)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.03)	0.02 (-0.02;0.05)	**-0.03 (-0.07; -0.00)**	0.03 (-0.02;0.07)	**0.07 (0.01;0.14)**
=High	-0.04 (-0.11;0.02)	**0.05 (0.02;0.09)**	**-0.05 (-0.08; -0.01)**	-0.00 (-0.05;0.04)	**0.10 (0.03;0.17)**
Composite score later-life SEP + physical activity (n=4,392)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.10;0.03)	0.01 (-0.02;0.05)	-0.03 (-0.06;0.01)	0.02 (-0.03;0.07)	**0.07 (0.00;0.14)**
=High	**-0.07 (-0.13; -0.00)**	**0.06 (0.02;0.09)**	**-0.04 (-0.08; -0.01)**	-0.02 (-0.06;0.03)	**0.12 (0.05;0.19)**
Composite score later-life SEP + healthy diet (n=4,682)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.09;0.03)	0.01 (-0.02;0.04)	-0.03 (-0.06;0.01)	0.03 (-0.02;0.07)	**0.08 (0.01;0.14)**
=High	-0.05 (-0.11;0.01)	**0.05 (0.02;0.08)**	**-0.04 (-0.07; -0.01)**	-0.01 (-0.05;0.04)	**0.10 (0.04;0.17)**
Composite score later-life SEP + behavioral risk factors [b] (n=4,238)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.02 (-0.09;0.04)	0.00 (-0.03;0.04)	-0.03 (-0.06;0.01)	0.04 (-0.01;0.09)	0.06 (-0.01;0.13)
=High	-0.06 (-0.13;0.01)	**0.05 (0.01;0.08)**	**-0.04 (-0.08; -0.01)**	0.00 (-0.05;0.05)	**0.10 (0.02;0.17)**
Composite score later-life SEP + cardiovascular risk factors [b] + behavioral risk factors [c] (n=4,229)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.03 (-0.10;0.04)	0.00 (-0.03;0.04)	-0.02 (-0.06;0.02)	0.03 (-0.02;0.08)	0.07 (-0.00;0.14)
=High	-0.06 (-0.13;0.01)	**0.04 (0.01;0.08)**	-0.03 (-0.07;0.01)	-0.01 (-0.07;0.04)	**0.12 (0.05;0.20)**
Composite score later-life SEP excl. participants with MRI lag time > year (n=3,159)					
=Low	Reference	Reference	Reference	Reference	Reference
=Medium	-0.04 (-0.11;0.04)	0.03 (-0.01;0.06)	-0.02 (-0.06;0.02)	0.00 (-0.05;0.06)	**0.11 (0.03;0.19)**
=High	-0.05 (-0.13;0.03)	**0.07 (0.03;0.11)**	**-0.04 (-0.08; -0.00)**	-0.03 (-0.09;0.02)	**0.11 (0.03;0.20)**

WMH indicates white matter hyperintensities; SD, standard deviation; B, unstandardized regression coefficient; CI, confidence interval; CSF, cerebrospinal fluid; SEP, socioeconomic position; HDL, high-density lipoprotein; MRI, magnetic resonance imaging. [a] White matter hyperintensity volumes were log transformed. [b] Includes waist circumference, total cholesterol to high-density lipoprotein ratio, lipid-modifying medication use, systolic blood pressure, and antihypertension medication use. [c] Includes smoking, alcohol consumption, major depressive disorder, antidepressant medication, physical activity, and healthy diet. Analyses are adjusted for MRI time lag, intracranial volume (for brain volumes only), age, sex, and type 2 diabetes (because of oversampling). Statistically significant associations (*p*<0.05) are presented in bold.

eTable 15. Associations of structural brain damage with composite cognitive score excluding participants with MRI lag time > 1 year

	Model 1 **B (95% CI)**	*p*-value
WMH volume[a] (per 1 SD)	**-0.09 (-0.13; -0.06)**	**<0.001**
Grey matter volume (per 1 SD)	**0.10 (0.04;0.16)**	**0.002**
White matter volume (per 1 SD)	**0.08 (0.02;0.14)**	**0.011**
CSF matter volume (per 1 SD)	**-0.10 (-0.15; -0.06)**	**<0.001**
Node degree (per 1 SD)	**0.09 (0.06;0.12)**	**<0.001**

Notes: n=3,159. B indicates unstandardized regression coefficient; CI, confidence interval; WMH, white matter hyperintensities; SD, standard deviation; CSF, cerebrospinal fluid; MRI, magnetic resonance imaging. [a] White matter hyperintensity volumes were log transformed. Analyses are adjusted for MRI time lag, intracranial volume, age, sex, and type 2 diabetes mellitus (because of oversampling).

eTable 16. Associations of node degree with composite cognitive score adjusted for structural brain damage

	Composite cognition score **B (95% CI)**	*p*-value
Node degree (per 1 SD)	**0.08 (0.06;0.11)**	**<0.001**
Node degree + WMH volume[a]	**0.07 (0.05;0.10)**	**<0.001**
Node degree + grey matter volume	**0.07 (0.04;0.09)**	**<0.001**
Node degree + white matter volume	**0.07 (0.04;0.09)**	**<0.001**
Node degree + CSF matter volume	**0.05 (0.03;0.08)**	**<0.001**

Notes: n=4,839. B indicates unstandardized regression coefficient; CI, confidence interval; WMH, white matter hyperintensities; SD, standard deviation; CSF, cerebrospinal fluid; MRI, magnetic resonance imaging. [a]White matter hyperintensity volumes were log transformed. Analyses are adjusted for MRI time lag, intracranial volume, age, sex, and type 2 diabetes mellitus (because of oversampling).

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