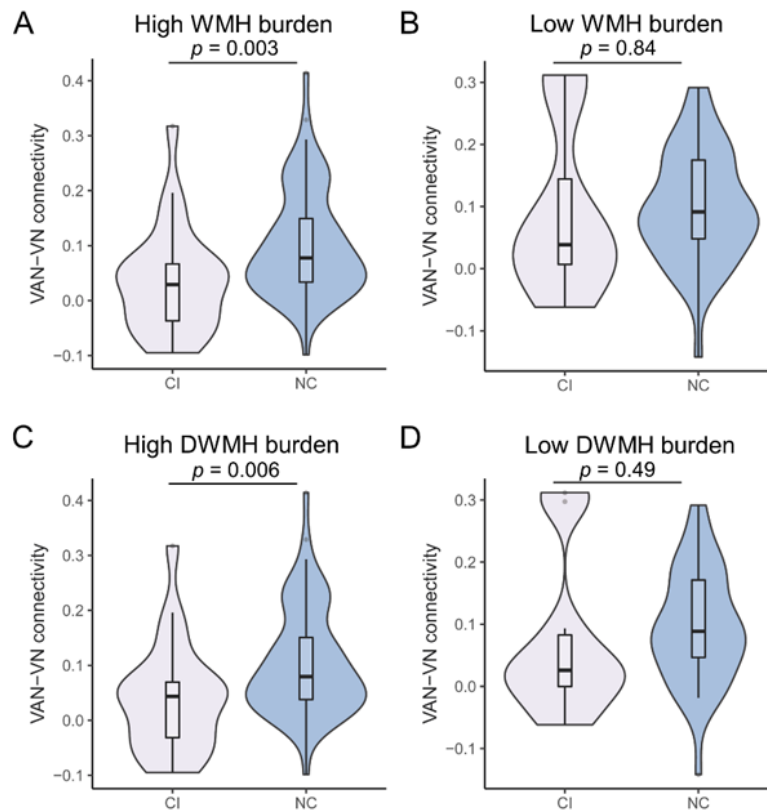SUPPLEMENTARY DATA

Higher Functional Connectivity of Ventral Attention and Visual Network to Maintain Cognitive Performance in White Matter Hyperintensity

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SUPPLEMENTARY DATA

Supplementary Figure 1. Comparison of ventral attention network (VAN)-visual network (VN) connectivity between cognitive-impairment (CI) and normal-cognition (NC) groups in different subgroups. A) Violin plot of high WMH burden subgroup analysis in CI (n = 25, $M = 0.035$ ($SE = 0.019$)) and NC (n = 67, $M = 0.103$ ($SE = 0.012$)) groups. B) Violin plot of low WMH burden subgroup analysis in CI (n = 8, $M = 0.090$ ($SE = 0.049$)) and NC (n = 39, $M = 0.098$ ($SE = 0.014$)) groups. C) Violin plot of high DWMH burden subgroup analysis in CI (n = 23, $M = 0.038$ ($SE = 0.020$)) and NC (n = 66, $M = 0.104$ ($SE = 0.012$)) groups. D) Violin plot of low DWMH burden subgroup analysis in CI (n = 10, $M = 0.071$ ($SE = 0.041$)) and NC (n = 40, $M = 0.095$ ($SE = 0.014$)) groups. Violins show the data distribution. Boxes represent the interquartile range, vertical lines show the maximum and minimum values, and horizontal lines indicate the median.

Supplementary Table 1. Comparison of VAN-related between-network connectivity between CI and NC groups.

	CI group (n=33) *	NC group (n=106) *	p	FDR p
VAN-AN	0.179 (0.020)	0.190 (0.012)	0.66	0.72
VAN-CO	0.102 (0.016)	0.105 (0.009)	0.85	0.85
VAN-CP	0.016 (0.016)	0.063 (0.012)	0.05	0.10
VAN-DMN	**0.070 (0.017)**	**0.185 (0.011)**	**< 0.001**	**< 0.001**
VAN-DAN	0.042 (0.012)	0.056 (0.009)	0.42	0.52
VAN-FPCN	**0.068 (0.013)**	**0.151 (0.010)**	**< 0.001**	**< 0.001**
VAN-RN	**0.010 (0.023)**	**0.096 (0.012)**	**0.001**	**0.004**
VAN-vSM	0.001 (0.013)	0.018 (0.011)	0.43	0.52
VAN-dSM	0.048 (0.019)	0.095 (0.014)	0.05	0.10
VAN-SN	0.128 (0.020)	0.149 (0.011)	0.36	0.52
VAN-VN	**0.048 (0.019)**	**0.101 (0.009)**	**0.008**	**0.02**

Note. CI, cognitive-impairment; NC, normal-cognition; AN, auditory network; CO, cingulo-opercular network; CP, cingulo-parietal network; DMN, default mode network; DAN, dorsal attention network; FPCN, fronto-parietal control network; RN, retrosplenial-temporal network; vSM, ventral somatomotor network; dSM, dorsal somatomotor network; SN, salience network; VAN, ventral attention network; VN, visual network.
* Data in paratheses are SE.

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Supplementary Table 2. Logistic regression analysis for normal cognition.

	OR (95% Confidence Interval)	*p*
Model 1: adjusting for age, sex, and years of education		
VAN-DMN	1.20e5 (5.97e2-2.41e7)	< 0.001
VAN-FPCN	2.68e4 (1.12e2-6.42e6)	< 0.001
VAN-RN	5.37e2 (9.63-2.99e4)	0.002
VAN-VN	4.23e2 (3.69-4.85e4)	0.01
Model 2: adjusting for age, sex, years of education, and WMH scores		
VAN-DMN	1.16e5 (5.80e2-2.30e7)	< 0.001
VAN-FPCN	2.66e4 (1.12e2-6.32e6)	< 0.001
VAN-RN	5.37e2 (9.53-3.03e4)	0.002
VAN-VN	3.96e2 (3.41-4.58e4)	0.01

Note. VAN, ventral attention network; DMN, default mode network; FPCN, fronto-parietal control network; RN, retrosplenial-temporal network; VN, visual network; WMH, white matter hyperintensity.

Supplementary Table 3. Comparison of VAN-related between-network connectivity between CD and CND groups.

	CD group (n=26) *	CND group (n=113) *	*p*	FDR *p*
VAN-DMN	0.138 (0.020)	0.162 (0.012)	0.36	0.69
VAN-FPCN	0.120 (0.023)	0.134 (0.010)	0.52	0.69
VAN-RN	0.066 (0.022)	0.078 (0.012)	0.69	0.69
VAN-VN	**0.050 (0.013)**	**0.098 (0.010)**	**0.005**	**0.02**

Note. CD, cognitive-decline; CND, cognitive non-decline; VAN, ventral attention network; DMN, default mode network; FPCN, fronto-parietal control network; RN, retrosplenial-temporal network; VN, visual network.
* Data in paratheses are SE.

Supplementary Table 4. Logistic regression analysis for cognitive non-decline.

	OR (95% Confidence Interval)	*p*
Model 1: adjusting for age, sex, and years of education		
VAN-VN	1.640e2 (0.993-2.710e4)	0.05
Model 2: adjusting for age, sex, years of education, and baseline MMSE		
VAN-VN	6.035e2 (2.288-1.592e5)	0.02
Model 3: adjusting for age, sex, years of education, baseline MMSE, and WMH scores		
VAN-VN	6.043e2 (2.288-1.596e5)	0.02

Note. VAN, ventral attention network; VN, visual network; MMSE, Mini-Mental State Examination; WMH, white matter hyperintensity.

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Supplementary Table 5. The number of ROIs for each of the 12 functional networks

Network	AN	CO	CP	DMN	DAN	FPCN	RN	vSM	dSM	SN	VAN	VN
Number	24	40	5	41	32	24	8	8	38	4	23	39

Note. AN, auditory network; CO, cingulo-opercular network; CP, cingulo-parietal network; DMN, default mode network; DAN, dorsal attention network; FPCN, fronto-parietal control network; RN, retrosplenial-temporal network; vSM, ventral somatomotor network; dSM, dorsal somatomotor network; SN, salience network; VAN, ventral attention network; VN, visual network; ROIs, regions of interest.

Supplementary Table 6. The comparison of clinical, demographic, and MRI characteristics between included and excluded participants.

Characteristics	Included (N = 139)	Excluded (N = 1018)	p
Demographic and neuropsychological characteristics			
Age (mean (SD))	62.7 (8.9)	61.4 (8.3)	0.10
Sex (female%)	69 (49.6%)	452 (44.4%)	0.24
Years of education (mean (SD))	8.0 (4.8)	8.3 (4.0)	0.57
MMSE (mean (SD))	26.4 (3.3)	25.5 (4.3)	**0.002**
MRI features			
PWMH scores (mean (SD))	1.9 (0.9)	1.7 (0.9)	**0.001**
DWMH scores (mean (SD))	2.0 (0.9)	1.5 (1.0)	**< 0.001**
Risk factors			
Hypertension (yes%)	80 (57.6%)	672 (66.0%)	**0.05**
Hyperlipidemia (yes%)	30 (21.6%)	327 (32.1%)	**0.01**
Diabetes (yes%)	27 (19.4%)	198 (19.4%)	> 0.99
Smoking (yes%)	39 (28.1%)	363 (35.7%)	0.08
Drinking (yes%)	36 (25.9%)	438 (43.0%)	**< 0.001**

Note. MMSE, Mini-Mental State Examination; PWMH, periventricular white matter hyperintensity; DWMH, deep periventricular white matter hyperintensity.