

Title: Sex-Specific Network Architecture and Behavioral Modulation of Brain Aging Revealed by Connectome-Based Predictive Modeling

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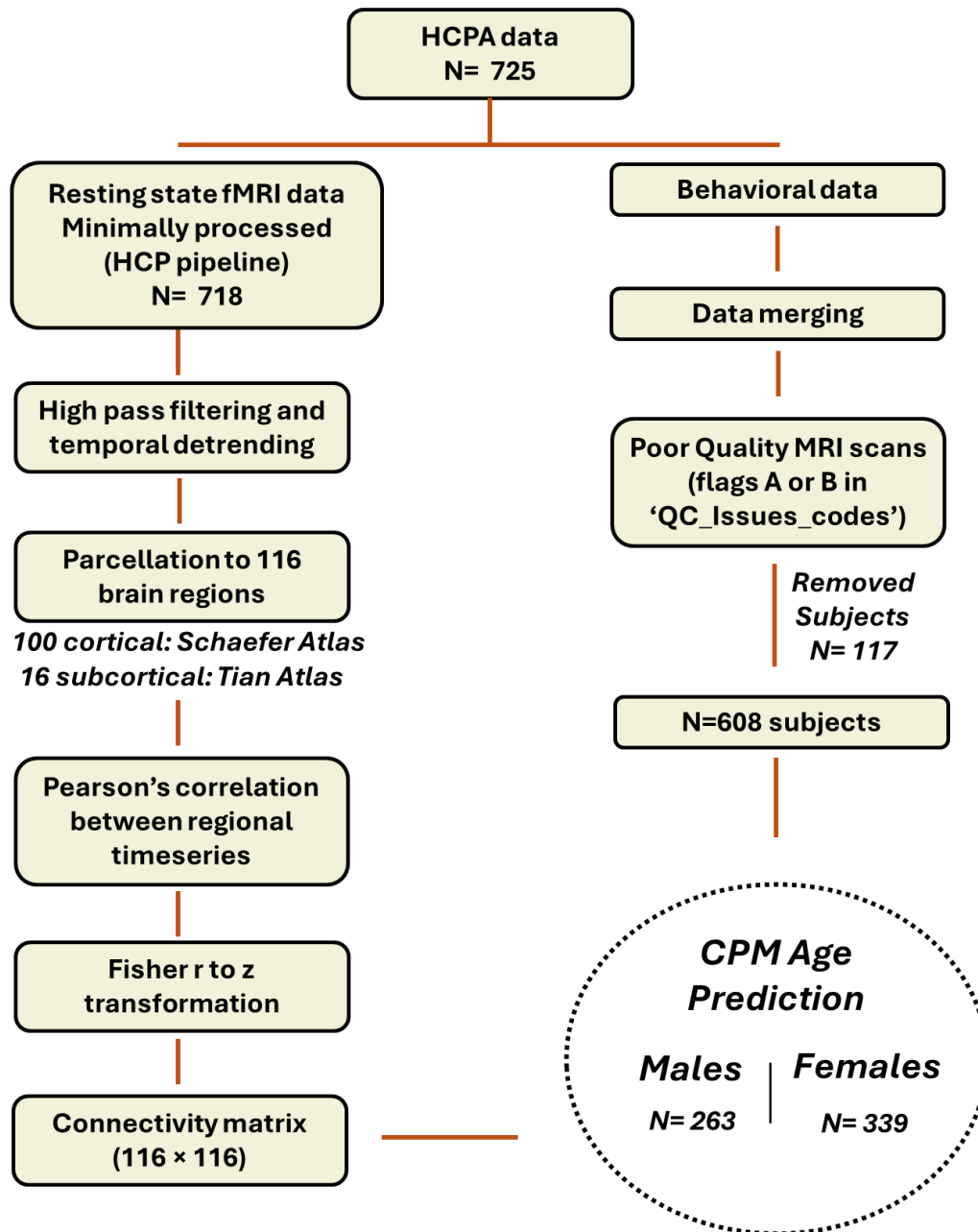
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Supplementary Figure 1. Data processing and sample selection pipeline. Resting-state fMRI and behavioral data from the Human Connectome Project-Aging (HCP-A) dataset were processed in parallel. Minimally processed resting-state fMRI data underwent temporal detrending, parcellation into 116 brain regions, and pairwise Pearson's correlation between regional time series, followed by Fisher r-to-z transformation to generate subject-level functional connectivity matrices (116 ×

116). Behavioral data were merged with imaging data, and subjects with poor-quality MRI scans (QC flags A or B) were excluded, yielding a final analytic sample of 602 subjects.

Supplementary Table 1. Hemispheric distribution on consensus CPM edges (degree=1) in males and females

	LL	RR	LR
	(proportion (total counts))		
<i>Males</i>			
POS edges (total counts= 819)	0.24 (193)	0.31 (250)	0.46 (376)
NEG edges (total counts= 825)	0.24 (195)	0.26 (216)	0.50 (414)
<i>Females</i>			
POS edges (total counts= 979)	0.21 (206)	0.21 (209)	0.58 (564)
NEG edges (total counts= 1004)	0.24 (239)	0.28 (278)	0.49 (487)

Supplementary Table 2. Spatial distribution of edges in positive and negative CPM networks

Network type	n edges	Mean Distance (mm)	Median Distance (mm)	Q1 Short	Q2 Mid-short	Q3 Mid-long	Q4 Long
<i>Males</i>							
POS	819	86.97	87.48	0.15	0.22	0.26	0.37
NEG	825	61.92	60.07	0.44	0.27	0.19	0.10
<i>Females</i>							
POS	979	87.26	88.41	0.13	0.23	0.28	0.37
NEG	1004	61.46	59.40	0.45	0.25	0.20	0.09

Note: distances represent Euclidean distances between node centroids. Quartiles (Q1–Q4) were defined using pooled distance cutoffs across networks (Quartile boundaries were $Q1 \leq 55.9$ mm, $Q2 = 55.9–76.8$ mm, $Q3 = 76.8–97.9$ mm, and $Q4 > 97.9$ mm).

Supplementary Table 3. Prediction accuracy (r) and change from baseline (Δr) following network virtual lesioning.

Lesioned network	N edges dropped	r	Δr
<i>Males</i>			
Baseline (no lesion) $r=0.68$ (NET)			
DAN	1620	0.66	0.016
DMN	2484	0.64	0.034
FPN	1417	0.67	0.008
LIM	565	0.68	-0.005
SCN	1720	0.68	-0.001
SMN	1519	0.65	0.029
VAN	1314	0.68	-0.003
VIS	1819	0.66	0.012

<i>Females</i>			
Baseline (no lesion) $r = 0.59$ (NET)			
DAN	1620	0.57	0.022
DMN	2484	0.55	0.046
FPN	1417	0.58	0.012
LIM	565	0.59	-0.001
SCN	1720	0.63	-0.033
SMN	1519	0.61	-0.014
VAN	1314	0.57	0.026
VIS	1819	0.61	-0.009

Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network.

Supplementary Table 4. CPM network-pair densities in males and females

Network pair	CPM Positive edges		CPM Negative edges	
	Males	Females	Males	Females
DAN-DAN	0.02	0.10	0.26	0.28
DAN-DMN	0.17	0.12	0.11	0.15
DAN-FPN	0.13	0.23	0.11	0.11
DAN-LIM	0.15	0.19	0.07	0.13
DAN-SCN	0.00	0.00	0.00	0.00
DAN-SMN	0.13	0.19	0.06	0.11
DAN-VAN	0.16	0.21	0.17	0.16
DAN-VIS	0.19	0.20	0.13	0.17
DMN-DMN	0.05	0.09	0.22	0.24
DMN-FPN	0.22	0.16	0.02	0.15
DMN-LIM	0.00	0.04	0.35	0.15
DMN-SCN	0.00	0.00	0.00	0.00
DMN-SMN	0.01	0.25	0.19	0.02
DMN-VAN	0.29	0.72	0.00	0.02
DMN-VIS	0.58	0.38	0.08	0.08
FPN-FPN	0.04	0.05	0.28	0.29
FPN-LIM	0.00	0.38	0.13	0.00
FPN-SCN	0.00	0.00	0.00	0.00
FPN-SMN	0.09	0.47	0.09	0.00
FPN-VAN	0.00	0.60	0.05	0.00
FPN-VIS	0.31	0.34	0.06	0.03
LIM-LIM	0.00	0.00	0.90	0.70
LIM-SCN	0.00	0.00	0.00	0.00
LIM-SMN	0.08	0.33	0.04	0.00

LIM-VAN	0.27	0.80	0.00	0.00
LIM-VIS	0.67	0.63	0.08	0.13
SCN-SCN	0.04	0.07	0.54	0.67
SCN-SMN	0.42	0.53	0.04	0.06
SCN-VAN	0.10	0.08	0.20	0.35
SCN-VIS	0.13	0.28	0.15	0.14
SMN-SMN	0.00	0.00	0.78	0.96
SMN-VAN	0.21	0.24	0.10	0.15
SMN-VIS	0.02	0.00	0.17	0.21
VAN-VAN	0.00	0.02	0.41	0.44
VAN-VIS	0.50	0.54	0.04	0.00
VIS-VIS	0.03	0.02	0.60	0.48

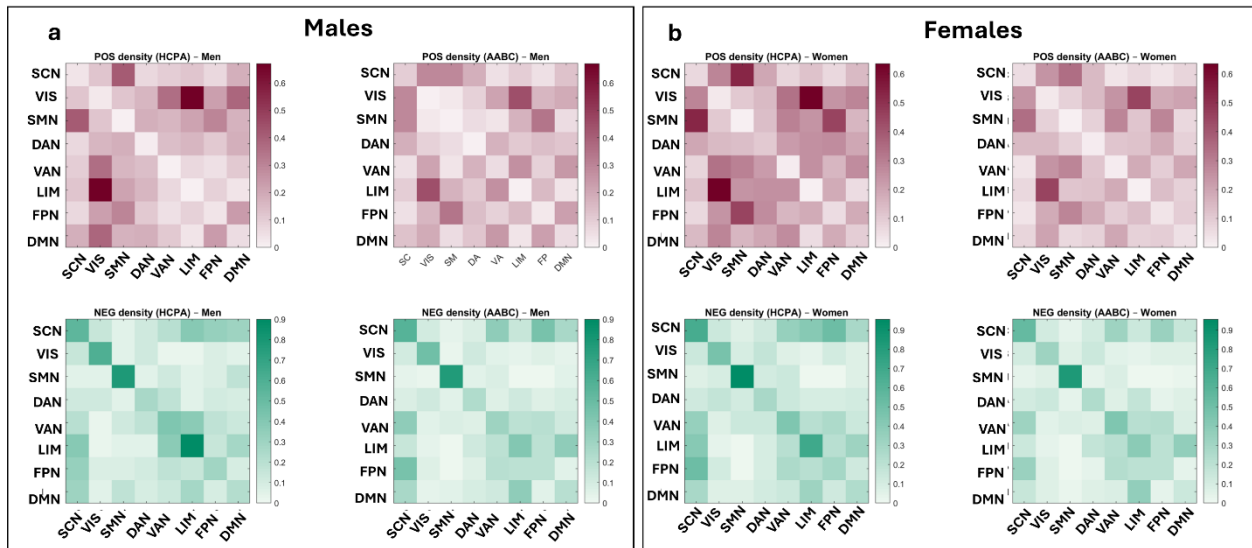
Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network.

Supplementary Table 5. Sex differences in CPM network-pair densities

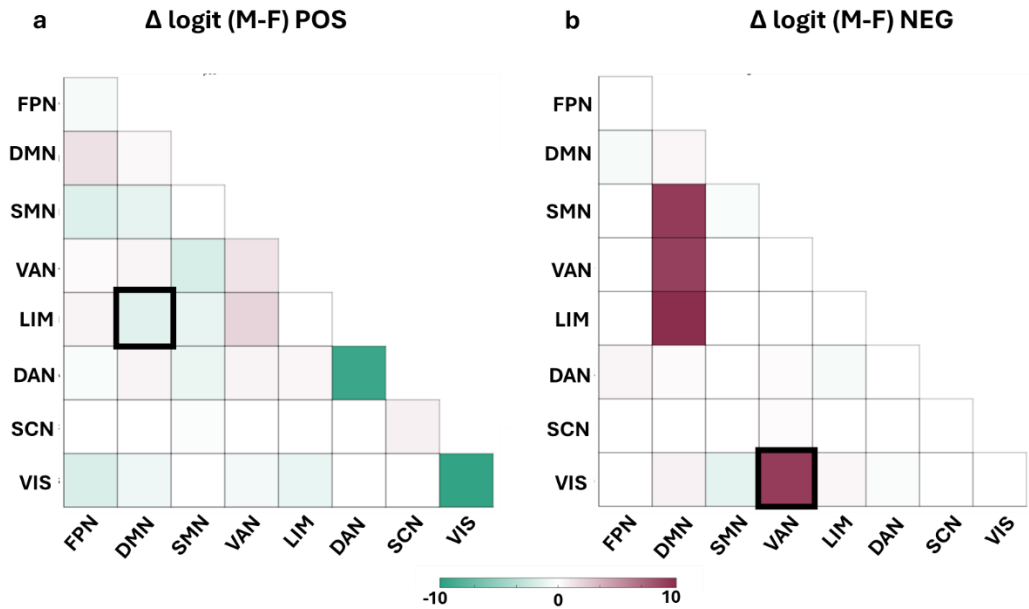
Network pair	CPM Positive edges			CPM Negative edges		
	Δ logit (Males–Females)	p-value	q-value	Δ logit (Males–Females)	p-value	q-value
DAN-DAN	-1.80	<0.001	<0.001	-0.10	<0.001	<0.001
DAN-DMN	0.39	<0.001	<0.001	-0.37	0.31	0.35
DAN-FPN	-0.75	<0.001	<0.001	0.06	<0.001	<0.001
DAN-LIM	-0.27	<0.001	<0.001	-0.62	<0.001	<0.001
DAN-SMN	-0.48	<0.001	<0.001	-0.61	0.82	0.85
DAN-VA	-0.31	<0.001	<0.001	0.06	<0.001	<0.001
DAN-VIS	-0.10	<0.001	<0.001	-0.37	<0.001	<0.001
DMN-DMN	-0.59	<0.001	<0.001	-0.08	<0.001	<0.001
DMN-FPN	0.39	<0.001	<0.001	-2.28	<0.001	<0.001
DMN-LIM	-10.60	<0.001	<0.001	1.07	<0.001	<0.001
DMN-SMN	-3.54	<0.001	<0.001	2.50	<0.001	<0.001
DMN-VAN	-1.84	<0.001	<0.001	-9.66	<0.001	<0.001
DMN-VIS	0.78	<0.001	<0.001	0.00	1.00	1.00
FPN-FPN	-0.30	<0.001	<0.001	-0.06	<0.001	<0.001
FPN-LIM	-13.30	<0.001	<0.001	11.87	<0.001	<0.001
FPN-SMN	-2.14	<0.001	<0.001	11.55	<0.001	<0.001
FPN-VAN	-14.22	<0.001	<0.001	10.87	<0.001	<0.001
FPN-VIS	-0.14	0.29	0.31	0.73	<0.001	<0.001
LIM-LIM	0.00	1.00	1.00	1.35	<0.001	<0.001

LIM-SMN	-1.70	0.16	0.18	10.68	<0.001	<0.001
LIM-VAN	-2.40	<0.001	<0.001	0.00	1.00	1.00
LIM-VIS	0.18	<0.001	<0.001	-0.45	<0.001	<0.001
SCN-SCN	-0.50	<0.001	<0.001	-0.53	<0.001	<0.001
SCN-SMN	-0.45	<0.001	<0.001	-0.36	<0.001	<0.001
SCN-VAN	0.32	<0.001	<0.001	-0.77	<0.001	<0.001
SCN-VIS	-1.02	<0.001	<0.001	0.09	<0.001	<0.001
SMN-SMN	0.00	1.00	1.00	-1.81	<0.001	<0.001
SMN-VAN	-0.21	<0.001	<0.001	-0.50	0.09	0.10
SMN-VIS	9.97	<0.001	<0.001	-0.27	<0.001	<0.001
VAN-VAN	-9.64	<0.001	<0.001	-0.12	0.80	0.85
VAN-VIS	-0.14	0.06	0.07	10.52	<0.001	<0.001
VIS-VIS	0.30	<0.001	<0.001	0.48	<0.001	<0.001

Note: shaded cells indicate network pairs with statistically significant differences.; DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network.



Supplementary Figure 2. CPM network heatmaps in HCP-A (left) and AABC (right) datasets in (a) males and (b) females.



Supplementary Figure 3. Heatmaps showing differences in CPM network dominance in males (M) versus females (F) for (a) positive and (b) negative edges. Abbreviation: subcortical network (SCN), visual network (VIS), somatomotor network (SMN), dorsal attention network (DAN), ventral attention network (VAN), limbic network (LIM), frontoparietal network (FPN), and default mode network (DMN). Note: the highlighted network pairs represent networks where sex differences indicated in the HCP-A findings were replicated in the AABC dataset.

Supplementary Table 6. Eigenvalues and percent variance explained by cognitive Principal Components (PC)

PC	Eigenvalue	Percent Variance Explained
1	5.95	37.54
2	2.47	15.58
3	1.52	9.58
4	1.26	7.97
5	0.84	5.31
6	0.65	4.08
7	0.62	3.91
8	0.56	3.52
9	0.47	2.93
10	0.39	2.46
11	0.35	2.21
12	0.29	1.84
13	0.28	1.73

14	0.21	1.33
15	0.00	0.01
16	0.00	0.01
17	0.00	0.00

Supplementary Table 7. Principal component (PC) loadings for cognitive variables

Cognitive variable	PC1_loading	PC2_loading	PC3_loading
MoCA	0.27	0.05	-0.03
NIH total cognition	0.38	0.01	-0.08
NIH Fluid cognition	0.33	-0.29	0.09
NIH_Crystal cognition	0.27	0.41	-0.27
NIH DCCS	0.24	-0.23	0.05
NIH Flanker	0.25	-0.23	0.07
NIH LSWMT	0.26	0.00	0.03
RAVLT Short Delay Total Correct	0.27	-0.11	-0.02
PSM	0.24	-0.21	0.10
ORRT	0.24	0.36	-0.26
TPVT	0.25	0.38	-0.24
DELDISK AUC 200	0.09	0.34	0.60
DELDISK AUC 40000	0.12	0.30	0.61
PCPS	0.21	-0.31	0.06
TRAIL A	0.18	-0.11	0.04
TRAIL B	0.24	-0.02	-0.01
RAVLT Short Delay Completion time (seconds)	0.01	0.03	0.16

Note: MoCA: Montreal Cognitive Assessment, DCCS: Dimensional Change Card Sort Test, LSWMT: List Sorting Working Memory Test, RAVLT: Rey Auditory Verbal Learning Test, PSM: Picture Sequence Memory, ORRT: Oral Reading Recognition Test, TPVT1: NIH Toolbox Picture Vocabulary Test, DELDISK AUC 200/40000: Delay Discounting Task Area Under the Curve for Delay Amount \$200/\$40000, PCPS: Pattern Completion Processing Speed, TRAIL A: Trail Making Test A, TRAIL B: Trail Making Test B

Explanation: Principal component analysis of cognitive measures identified a first component (PC1) characterized by uniformly positive loadings across memory, executive function, attention, and global cognition measures, reflecting a general cognitive performance factor. The second component (PC2) showed opposing loadings between crystallized and knowledge-based tasks versus speeded executive and fluid cognition measures, capturing individual differences in cognitive profile rather than overall ability. A third component (PC3) was dominated by delayed discounting task metrics and reflected task-specific variance. Based on interpretability and relevance to large-scale brain-behavior relationships, PC1 and PC2 were carried forward for moderation analyses, whereas PC3 was excluded.

Supplementary Table 8. Eigenvalues and percent variance explained by positive emotion Principal Components (PC)

PC	Eigenvalue	Percent Variance Explained
1	4.58	56.94
2	0.96	11.90
3	0.65	8.11
4	0.57	7.11
5	0.47	5.89
6	0.38	4.76
7	0.35	4.34
8	0.08	0.95

Supplementary Table 9. Principal component (PC) loadings for positive emotion variables

Positive Emotion Variable	PC1_loading	PC2_loading	PC3_loading
PROMISG	0.43	-0.28	-0.13
NIH Self efficacy	0.27	0.56	-0.46
NIH Psychological Well-Being, Positive Affect	0.35	0.35	0.21
NIH Psychological Well-Being, Life Satisfaction	0.36	0.20	0.49
NIH psychological Well-Being, Meaning and Purpose	0.34	0.30	0.23
EMSUP1	0.37	-0.28	-0.38
EMSUP2	0.31	-0.49	0.40
TLBX_FRIEND	0.38	-0.18	-0.36

Note: PROMISG: PROMIS General Life Satisfaction, EMSUP1: Emotional Support Survey, EMSUP2: Instrumental Support Survey, TLBX_FRIEND: Friendship survey.

Explanation: Principal component analysis of positive emotion measures identified a first component (PC1) characterized by uniformly positive loadings across global mental health, psychological well-being, life satisfaction, meaning and purpose, and social support measures, reflecting a general positive emotional well-being factor. The second component (PC2) showed opposite loadings between self-efficacy and internally oriented well-being measures versus social and emotional support variables, capturing individual differences in reliance on internal versus external emotional resources rather than overall positivity. A third component (PC3) reflected residual variance primarily related to specific aspects of life satisfaction and social support and lacked a coherent global emotional construct. Based on interpretability and relevance to brain-behavior relationships, PC1 and PC2 were carried forward for moderation analyses, whereas PC3 was excluded.

Supplementary Table 10. Eigenvalues and percent variance explained by negative emotion Principal Components (PC)

PC	Eigenvalue	Percent Variance Explained
1	5.03	50.05
2	1.65	16.40
3	0.99	9.82
4	0.80	7.96
5	0.57	5.66
6	0.42	4.19
7	0.34	3.35
8	0.24	2.37
9	0.02	0.19
10	0.00	0.01

Supplementary Table 11. Principal component (PC) loadings for negative emotion variables

Negative Emotion Variable	PC1_loading	PC2_loading	PC3_loading
PSS	0.38	-0.10	-0.13
GALES Event Count	0.22	0.67	0.02
GALES Stress Sum	0.23	0.66	0.02
PRANG1_T_Score	0.32	-0.13	0.11
PRANG2_T_Score	0.43	-0.15	-0.12
PRANG3_T_Score	0.15	-0.10	0.80
PRANG4_T_Score	0.34	-0.21	-0.06
PREDA1_T_Score	0.37	-0.10	-0.21
PREDA2_T_Score	0.20	-0.02	0.50
PREDD_T_Score	0.38	-0.07	-0.17

Note: PSS: Perceived Stress Scale, GALES: Geriatric Adverse Life Events Scale, PRANG1: Anger hostility, PRANG2: Negative affect summary, PRANG3: Physical Aggression, PRANG4: Negative affect anger, PREDA1: Fear-Affect, PREDA2: Fear-Somatic Arousal, PREDD: Negative affect Sadness.

Explanation: Principal component analysis of stress and negative emotion measures identified a first component (PC1) characterized by uniformly positive loadings across perceived stress, anxiety, depressive symptoms, and stress exposure, reflecting a general stress or negative affect burden. The second component (PC2) was driven primarily by stressful life event counts and severity, capturing individual differences in objective stress exposure independent of subjective symptom burden. A third component (PC3) was dominated by a specific anxiety subscale and reflected scale-specific variance. Based on interpretability and relevance to brain–behavior moderation, PC1 and PC2 were included in subsequent analyses.

Supplementary Table 12. Moderation results in males

Network pair	Interaction β	t-value	p-value	q-value
<i>Cognitive PC1</i>				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
SMN-SMN	25.71	2.69	0.006	0.102
LIM-VAN	17.58	1.75	0.086	0.463
FPN-SMN	-17.15	-1.69	0.093	0.463
DMN-VAN	15.53	1.54	0.116	0.463
DAN-DAN	12.13	1.31	0.194	0.621
VAN-VIS	-8.23	-0.85	0.392	0.945
VAN-VAN	-6.06	-0.67	0.498	0.945
DMN-FPN	-5.81	-0.65	0.542	0.945
SCN-VIS	-3.34	-0.39	0.712	0.945
DMN-SMN	3.32	0.34	0.731	0.945
<i>Cognitive PC2</i>				
<i>Network pairs that survived $q < 0.05$</i>				
DMN-LIM	-29.08	-2.86	0.004	0.032
LIM-LIM	-33.12	-3.24	0.001	0.022
<i>Top 10 networks</i>				
LIM-LIM	-33.12	-3.24	0.001	0.022
DMN-LIM	-29.08	-2.86	0.004	0.032
LIM-SMN	21.22	1.98	0.056	0.224
SMN-VIS	-19.77	-1.97	0.051	0.224
LIM-VAN	-13.95	-1.59	0.110	0.272
SMN-SMN	-17.15	-1.58	0.117	0.272
FPN-SMN	17.26	1.56	0.119	0.272
DMN-VAN	-11.05	-1.17	0.253	0.418
FPN-LIM	-11.34	-1.12	0.262	0.418
DMN-SMN	12.37	1.07	0.291	0.418
<i>Positive Emotion PC1</i>				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
SCN-VIS	26.31	2.68	0.009	0.082
LIM-SMN	30.99	2.59	0.010	0.082
DMN-SMN	28.01	2.37	0.024	0.126
SMN-VIS	-15.82	-1.61	0.133	0.370
FPN-SMN	16.41	1.48	0.151	0.370
DAN-DAN	17.42	1.47	0.137	0.370
VAN-VAN	-16.08	-1.30	0.185	0.370
FPN-LIM	-17.10	-1.30	0.185	0.370
DMN-FPN	-16.02	-1.24	0.241	0.428

SMN-SMN	-10.24	-0.93	0.357	0.572
Positive Emotion PC2				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 network pairs</i>				
LIM-LIM	35.27	2.58	0.009	0.147
FPN-LIM	20.87	1.88	0.060	0.409
DMN-LIM	22.34	1.77	0.085	0.409
DMN-VAN	19.21	1.63	0.102	0.409
VAN-VIS	-16.35	-1.37	0.176	0.562
DAN-DAN	13.10	1.24	0.250	0.573
LIM-VAN	15.88	1.22	0.230	0.573
LIM-SMN	-10.05	-0.94	0.358	0.626
DMN-SMN	-8.69	-0.90	0.381	0.626
DMN-FPN	9.62	0.85	0.391	0.626
Negative Emotion PC1				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
SCN-VIS	-25.09	-2.64	0.009	0.103
SMN-VIS	25.22	2.43	0.016	0.103
DMN-SMN	-28.89	-2.41	0.019	0.103
LIM-SMN	-21.01	-1.89	0.068	0.271
VAN-VIS	19.27	1.64	0.112	0.289
DMN-FPN	18.81	1.58	0.116	0.289
VAN-VAN	-18.96	-1.56	0.127	0.289
FPN-SMN	-15.55	-1.45	0.155	0.289
DAN-DAN	-14.94	-1.39	0.163	0.289
LIM-LIM	-15.58	-1.33	0.196	0.313
Negative Emotion PC2				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
DMN-VAN	-26.08	-2.12	0.039	0.396
VAN-VIS	18.32	1.79	0.072	0.396
DMN-LIM	-17.32	-1.53	0.129	0.396
LIM-VAN	-17.72	-1.51	0.142	0.396
LIM-LIM	-15.50	-1.47	0.148	0.396
SMN-SMN	-15.40	-1.44	0.142	0.396
LIM-SMN	14.70	1.27	0.206	0.467
FPN-LIM	-13.95	-1.13	0.246	0.467
SCN-VIS	-11.31	-1.08	0.279	0.467
SMN-VIS	11.19	1.06	0.292	0.467

Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network.

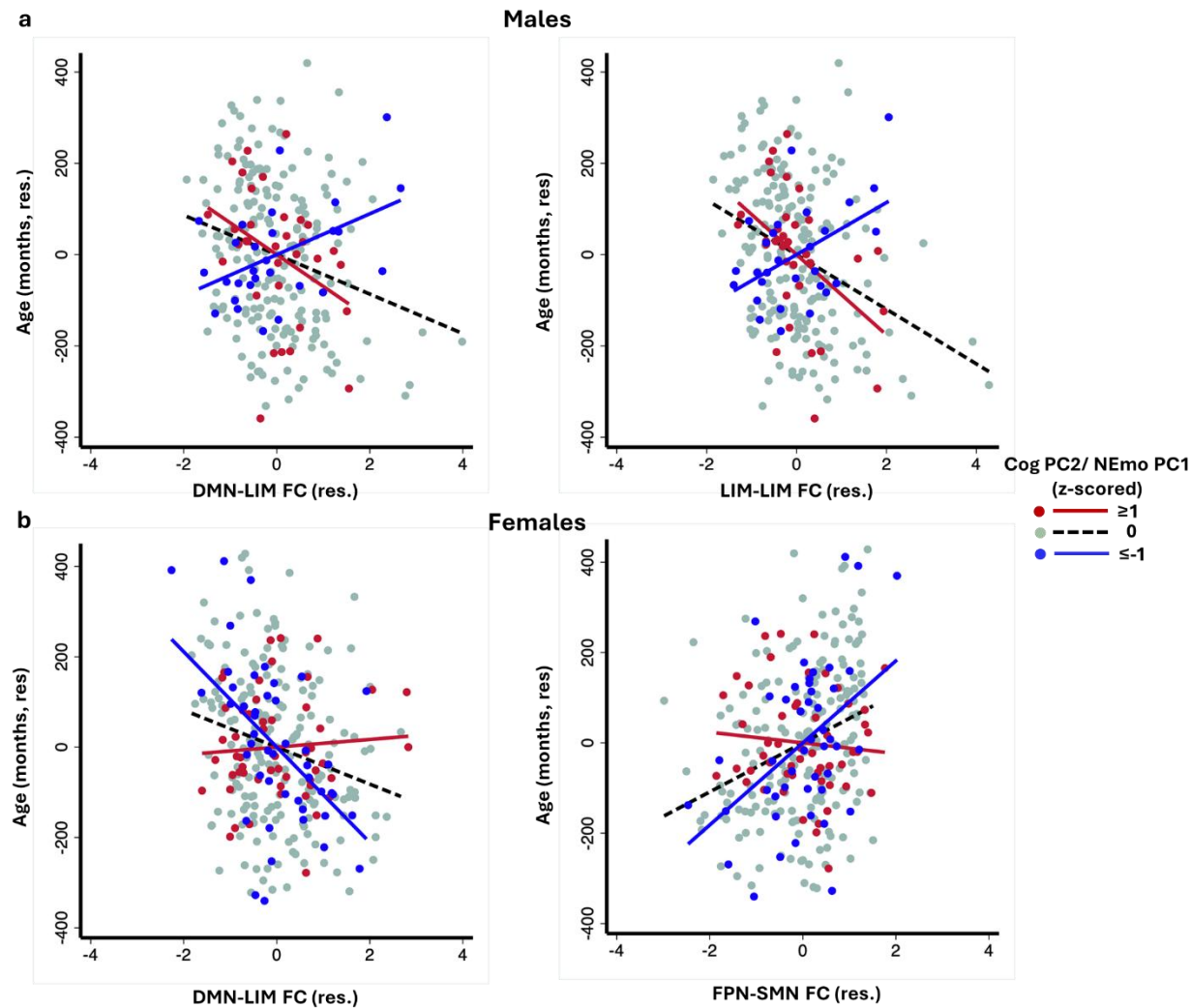
Supplementary Table 13. Moderation results in females

Network pair	Interaction β	t-value	p-value	q-value
<i>Cognitive PC1</i>				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
SMN-SMN	19.27	2.34	0.022	0.176
DMN-FPN	-18.88	-2.33	0.021	0.176
LIM-LIM	18.07	1.94	0.048	0.258
FPN-SMN	-16.73	-1.85	0.073	0.294
LIM-SMN	-11.09	-1.25	0.215	0.585
VAN-VAN	10.08	1.24	0.219	0.585
DMN-VAN	-9.28	-1.06	0.283	0.627
DMN-LIM	8.79	0.99	0.313	0.627
SMN-VIS	6.93	0.81	0.428	0.642
LIM-VAN	-7.04	-0.77	0.442	0.642
<i>Cognitive PC2</i>				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
LIM-LIM	-15.73	-2.35	0.018	0.285
SMN-SMN	-15.10	-1.74	0.078	0.629
LIM-VAN	11.27	1.40	0.166	0.644
DMN-VAN	10.24	1.31	0.189	0.644
DMN-LIM	-8.63	-1.24	0.220	0.644
VAN-VIS	-9.04	-0.99	0.324	0.644
DAN-DAN	-8.56	-0.91	0.378	0.644
SCN-VIS	7.83	0.91	0.353	0.644
VAN-VAN	-7.72	-0.87	0.387	0.644
LIM-SMN	6.24	0.82	0.402	0.644
<i>Positive Emotion PC1</i>				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
DAN-DAN	-22.74	-2.45	0.015	0.246
DMN-FPN	14.42	1.46	0.169	0.562
SMN-SMN	-13.78	-1.42	0.166	0.562
FPN-VAN	-13.57	-1.39	0.189	0.562
FPN-SMN	13.66	1.34	0.195	0.562
SMN-VIS	-12.32	-1.24	0.211	0.562
LIM-SMN	9.90	0.98	0.304	0.657

VAN-VIS	-7.77	-0.84	0.412	0.657
DMN-VAN	6.97	0.77	0.461	0.657
LIM-VAN	7.37	0.72	0.476	0.657
Positive Emotion PC2				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
DMN-VAN	21.40	2.03	0.053	0.596
LIM-LIM	18.04	1.66	0.106	0.596
DMN-LIM	17.82	1.62	0.112	0.596
VAN-VAN	-12.46	-1.42	0.159	0.637
DMN-FPN	12.81	1.11	0.273	0.697
SMN-SMN	10.72	1.09	0.290	0.697
LIM-VAN	10.79	1.045	0.305	0.697
SCN-VIS	-10.29	-0.84	0.409	0.817
LIM-SMN	-6.12	-0.49	0.616	0.943
FPN-SMN	-4.79	-0.48	0.635	0.943
Negative Emotion PC1				
<i>Network pairs that survived $q < 0.05$</i>				
DMN-LIM	27.89	3.07	0.002	0.019
FPN-SMN	-30.77	-3.09	0.002	0.019
<i>Top 10 networks</i>				
FPN-SMN	-30.77	-3.09	0.002	0.019
DMN-LIM	27.89	3.07	0.002	0.019
SMN-VIS	27.18	2.70	0.010	0.056
DAN-DAN	20.76	2.23	0.026	0.094
SCN-VIS	-21.18	-2.17	0.039	0.105
LIM-SMN	-19.32	-2.13	0.029	0.094
LIM-LIM	16.62	1.84	0.062	0.135
DMN-SMN	-16.30	-1.79	0.067	0.135
FPN-VAN	15.56	1.61	0.118	0.210
SMN-SMN	14.90	1.47	0.146	0.234
Negative Emotion PC2				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
LIM-LIM	-18.81	-2.09	0.039	0.639
FPN-SMN	12.74	1.32	0.196	0.865
SMN-SMN	-9.91	-1.12	0.265	0.865
LIM-VAN	-9.71	-0.98	0.333	0.865
SCN-VIS	-7.29	-0.73	0.474	0.865
DMN-FPN	-7.07	-0.72	0.499	0.865
DMN-LIM	-6.09	-0.67	0.521	0.865
FPN-VAN	5.53	0.56	0.582	0.865
DMN-VAN	-5.04	-0.52	0.605	0.865

LIM-SMN	-4.72	-0.49	0.620	0.865
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Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network.



Supplementary Figure 4. Scatterplots of age versus network-pair functional connectivity stratified by standardized cognitive and emotional PC levels (≤ -1 SD, mean, $\geq +1$ SD) in (a) males and (b) females; Cog: cognitive, Nemo: negative emotion, DMN: default mode network, LIM: limbic, FPN: frontoparietal network, SMN: somatomotor network, FC: functional connectivity, PC: principle component.

Supplementary Table 14. Moderation results in males (psychotropic drug use as an additional covariate)

Network pair	Interaction β	t-value	p-value	q-value
Positive Emotion PC1				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
LIM-SMN	31.49	2.63	0.015	0.117
SCN-VIS	25.30	2.59	0.010	0.117
DMN-SMN	28.40	2.40	0.025	0.133
FPN-SMN	17.26	1.56	0.123	0.350
SMN-VIS	-15.00	-1.53	0.145	0.350
VAN-VAN	-17.02	-1.38	0.161	0.350
FPN-LIM	-17.84	-1.35	0.175	0.350
DAN-DAN	15.66	1.34	0.174	0.350
DMN-FPN	-16.27	-1.25	0.230	0.408
SMN-SMN	-10.62	-0.97	0.348	0.557
Positive Emotion PC2				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 network pairs</i>				
LIM-LIM	40.02	2.95	0.003	0.054
FPN-LIM	24.10	2.17	0.034	0.230
DMN-LIM	25.51	2.03	0.043	0.230
DMN-VAN	20.36	1.73	0.083	0.331
VAN-VIS	-18.21	-1.52	0.131	0.401
DAN-DAN	15.85	1.50	0.150	0.401
LIM-VAN	17.85	1.37	0.176	0.403
LIM-SMN	-11.85	-1.11	0.290	0.524
DMN-SMN	-9.54	-0.99	0.345	0.524
DMN-FPN	10.80	0.96	0.330	0.524
Negative Emotion PC1				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
SCN-VIS	-26.50	-2.82	0.007	0.081
SMN-VIS	25.85	2.51	0.012	0.081
DMN-SMN	-29.70	-2.48	0.015	0.081
LIM-SMN	-21.82	-1.96	0.058	0.231
VAN-VIS	19.88	1.69	0.097	0.232
VAN-VAN	-19.66	-1.61	0.111	0.232
DMN-FPN	19.16	1.61	0.109	0.232
DAN-DAN	-16.30	-1.55	0.116	0.232
FPN-SMN	-14.97	-1.40	0.166	0.290
LIM-LIM	-15.91	-1.37	0.181	0.290

Negative Emotion PC2				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
DMN-VAN	-26.76	-2.17	0.038	0.339
VAN-VIS	19.04	1.86	0.068	0.339
DMN-LIM	-18.53	-1.64	0.092	0.339
LIM-LIM	-17.17	-1.63	0.104	0.339
LIM-VAN	-18.57	-1.59	0.118	0.339
SMN-SMN	-15.97	-1.50	0.132	0.339
SCN-VIS	-14.87	-1.41	0.156	0.339
SMN-VIS	14.80	1.40	0.170	0.339
LIM-SMN	13.73	1.18	0.237	0.381
FPN-LIM	-14.20	-1.15	0.238	0.381

Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network.

Supplementary Table S15. Moderation results in females (psychotropic drug use as an additional covariate)

Network pair	Interaction β	t-value	p-value	q-value
Positive Emotion PC1				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
DAN-DAN	-22.11	-2.40	0.018	0.294
SMN-SMN	-15.28	-1.57	0.121	0.632
FPN-VAN	-13.34	-1.37	0.185	0.632
FPN-SMN	13.99	1.37	0.174	0.632
LIM-SMN	11.77	1.18	0.229	0.632
DMN-FPN	11.39	1.16	0.276	0.632
SMN-VIS	-11.08	-1.12	0.266	0.632
DMN-LIM	-7.04	-0.82	0.413	0.766
VAN-VIS	-6.52	-0.71	0.494	0.766
DMN-SMN	7.08	0.70	0.499	0.766
Positive Emotion PC2				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 network pairs</i>				
DMN-VAN	21.79	2.09	0.041	0.651
LIM-LIM	17.20	1.59	0.115	0.651
DMN-LIM	16.53	1.52	0.138	0.651

VAN-VAN	-12.41	-1.43	0.163	0.651
LIM-VAN	11.48	1.12	0.290	0.756
SMN-SMN	9.82	1.00	0.331	0.756
DMN-FPN	11.32	0.99	0.328	0.756
SCN-VIS	-8.97	-0.73	0.466	0.933
LIM-SMN	-5.12	-0.42	0.680	0.962
FPN-LIM	4.17	0.38	0.700	0.962
Negative Emotion PC1				
<i>Network pairs that survived $q < 0.05$</i>				
DMN-LIM	28.50	3.16	0.002	0.027
FPN-SMN	-30.27	-3.05	0.003	0.027
<i>Top 10 networks</i>				
DMN-LIM	28.50	3.16	0.002	0.027
FPN-SMN	-30.27	-3.05	0.003	0.027
SMN-VIS	27.02	2.71	0.010	0.055
LIM-SMN	-20.60	-2.30	0.024	0.094
DAN-DAN	19.79	2.14	0.033	0.103
SCN-VIS	-20.56	-2.12	0.039	0.103
LIM-LIM	17.50	1.95	0.056	0.128
DMN-SMN	-16.91	-1.87	0.073	0.146
SMN-SMN	15.58	1.55	0.136	0.242
FPN-VAN	14.40	1.50	0.158	0.253
Negative Emotion PC2				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
LIM-LIM	-19.28	-2.15	0.035	0.560
FPN-SMN	12.91	1.34	0.197	0.829
SMN-SMN	-10.15	-1.15	0.259	0.829
LIM-VAN	-9.24	-0.94	0.349	0.829
DMN-FPN	-7.42	-0.76	0.471	0.829
DMN-LIM	-6.85	-0.76	0.463	0.829
SCN-VIS	-6.75	-0.68	0.500	0.829
DMN-VAN	-4.70	-0.49	0.630	0.829
FPN-LIM	4.48	0.46	0.657	0.829
DAN-DAN	-4.85	-0.46	0.662	0.829

Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network.

Supplementary Table S16. Moderation results (3-way interaction; age ~ FC × M × sex + COV)

Network pair	Interaction β	t-value	p-value	q-value
<i>Cognitive PC2</i>				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
LIM-VAN	27.70	2.01	0.022	0.352
DMN-VAN	22.75	1.57	0.069	0.470
VAN-VIS	-20.77	-1.46	0.111	0.470
DMN-LIM	17.10	1.20	0.159	0.470
FPN-LIM	17.27	1.20	0.159	0.470
SMN-VIS	18.18	1.15	0.186	0.470
LIM-LIM	15.09	1.04	0.206	0.470
LIM-SMN	-14.00	-0.92	0.269	0.538
FPN-SMN	-10.36	-0.62	0.452	0.745
DMN-SMN	-10.09	-0.61	0.466	0.745
<i>Negative Emotion PC1</i>				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 network pairs</i>				
DMN-LIM	37.69	2.31	0.012	0.189
DAN-DAN	32.90	2.00	0.025	0.198
LIM-LIM	29.97	1.76	0.040	0.212
DMN-FPN	-28.53	-1.59	0.069	0.274
FPN-VAN	18.57	1.16	0.192	0.568
VAN-VAN	19.35	1.08	0.213	0.568
VAN-VIS	-16.41	-0.94	0.280	0.640
FPN-SMN	-10.08	-0.59	0.502	0.897
DMN-SMN	8.26	0.47	0.588	0.897
SMN-SMN	6.94	0.38	0.658	0.897

Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network.

Supplementary Table S17. Moderation results across all networks in males

Network pair	Interaction β	t-value	p-value	q-value
<i>Cognitive PC1</i>				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
SCN-SMN	-29.82	-2.90	0.004	0.108
SMN-SMN	25.71	2.69	0.006	0.108
FPN-SCN	21.42	2.36	0.020	0.245

LIM-VAN	17.58	1.75	0.087	0.655
FPN-SMN	-17.16	-1.69	0.091	0.655
DMN-VAN	15.53	1.54	0.120	0.721
DAN-LIM	14.14	1.36	0.195	0.913
DAN-DAN	12.13	1.31	0.203	0.913
FPN-FPN	11.43	1.18	0.233	0.933
DAN-SCN	-9.24	-0.99	0.337	0.955
Cognitive PC2				
<i>Network pairs that survived $q < 0.05$</i>				
LIM-VIS	30.02	3.32	0.001	0.019
LIM-LIM	-33.12	-3.24	0.001	0.019
DMN-VIS	31.10	3.12	0.002	0.019
DMN-LIM	-29.08	-2.86	0.004	0.036
<i>Top 10 networks</i>				
LIM-VIS	30.02	3.32	0.001	0.019
LIM-LIM	-33.12	-3.24	0.001	0.019
DMN-VIS	31.10	3.12	0.002	0.019
DMN-LIM	-29.08	-2.86	0.004	0.036
SCN-SMN	23.52	2.20	0.036	0.185
FPN-SCN	-20.84	-2.17	0.029	0.185
VIS-VIS	-18.62	-2.03	0.038	0.185
LIM-SMN	21.22	1.98	0.050	0.185
SMN-VIS	-19.77	-1.97	0.054	0.185
DAN-DMN	-21.15	-1.96	0.056	0.185
Positive Emotion PC1				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
SCN-VIS	26.31	2.68	0.009	0.167
LIM-SMN	31.00	2.60	0.010	0.167
LIM-SCN	-25.22	-2.43	0.019	0.167
DMN-SMN	28.01	2.37	0.018	0.167
DAN-DMN	-25.83	-2.28	0.023	0.168
SCN-VAN	-22.80	-2.08	0.047	0.280
DMN-DMN	20.82	1.85	0.065	0.334
DMN-SCN	-18.21	-1.72	0.090	0.406
FPN-SCN	-20.54	-1.68	0.105	0.420
SMN-VIS	-15.82	-1.61	0.129	0.422
Positive Emotion PC2				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 network pairs</i>				
LIM-LIM	35.27	2.58	0.009	0.317
FPN-LIM	20.87	1.88	0.054	0.821
DMN-LIM	22.34	1.77	0.087	0.821

DMN-VAN	19.21	1.64	0.104	0.821
DMN-VIS	-18.33	-1.51	0.132	0.821
FPN-VIS	-15.20	-1.39	0.182	0.821
VAN-VIS	-16.35	-1.37	0.179	0.821
DAN-DAN	13.10	1.24	0.228	0.821
LIM-VAN	15.88	1.22	0.229	0.821
LIM-VIS	-15.33	-1.18	0.239	0.821
Negative Emotion PC1				
<i>Network pairs that survived $q < 0.05$</i>				
DAN-DMN	35.10	3.31	0.001	0.036
<i>Top 10 networks</i>				
DAN-DMN	35.10	3.31	0.001	0.036
SCN-VIS	-25.09	-2.64	0.011	0.092
DMN-DMN	-28.80	-2.64	0.008	0.092
DAN-FPN	-29.87	-2.45	0.015	0.092
SMN-VIS	25.22	2.43	0.016	0.092
LIM-SCN	23.35	2.41	0.018	0.092
DMN-SMN	-28.89	-2.41	0.015	0.092
DAN-LIM	24.21	2.20	0.026	0.116
LIM-SMN	-21.01	-1.89	0.069	0.274
SMN-VAN	-19.71	-1.75	0.076	0.275
Negative Emotion PC2				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
DMN-VAN	-26.08	-2.12	0.046	0.498
SCN-VAN	19.40	1.99	0.049	0.498
DMN-VIS	20.67	1.82	0.070	0.498
VAN-VIS	18.32	1.79	0.075	0.498
LIM-VIS	18.99	1.75	0.074	0.498
VIS-VIS	-18.99	-1.73	0.083	0.498
DMN-LIM	-17.32	-1.53	0.133	0.562
LIM-VAN	-17.72	-1.51	0.138	0.562
LIM-LIM	-15.50	-1.47	0.146	0.562
SMN-SMN	-15.40	-1.44	0.156	0.562

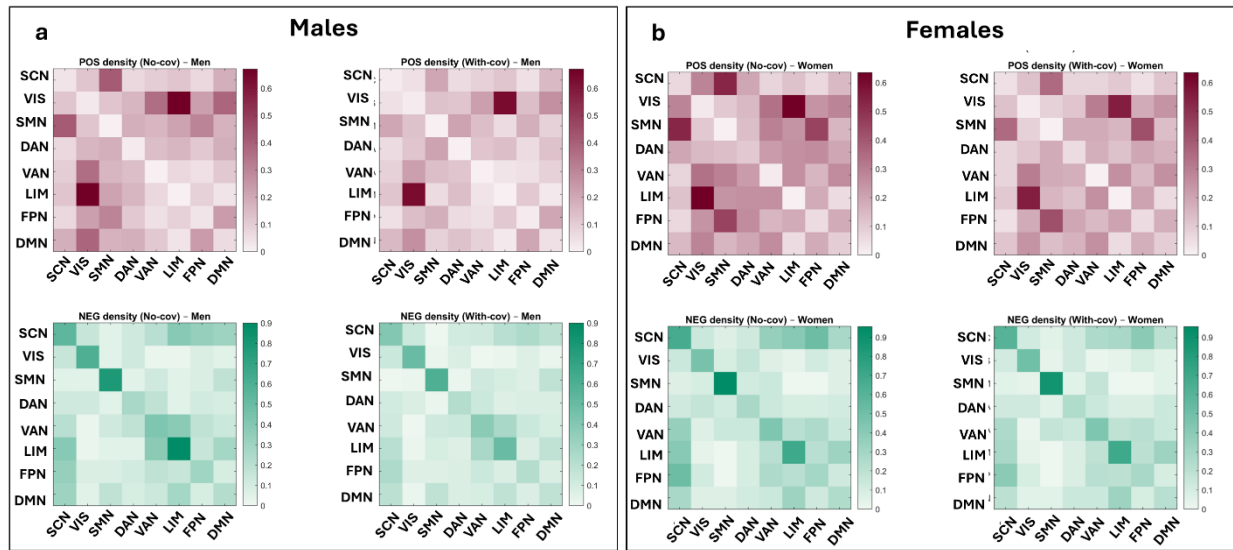
Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network

Supplementary Table S18. Moderation results across all networks in females

Network pair	Interaction β	t-value	p-value	q-value
<i>Cognitive PC1</i>				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
FPN-SCN	27.42	2.99	0.003	0.094
SMN-SMN	19.26	2.34	0.022	0.238
DMN-FPN	-18.88	-2.33	0.022	0.238
FPN-FPN	18.76	2.09	0.038	0.238
SCN-VAN	19.30	2.08	0.043	0.238
SMN-VAN	-19.85	-2.05	0.038	0.238
LIM-LIM	18.07	1.94	0.046	0.238
FPN-SMN	-16.73	-1.85	0.070	0.317
SCN-SMN	-16.76	-1.77	0.086	0.346
DMN-SCN	12.83	1.49	0.136	0.489
<i>Cognitive PC2</i>				
<i>Network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
LIM-LIM	-15.73	-2.35	0.018	0.662
SMN-SMN	-15.10	-1.74	0.079	0.814
FPN-SCN	-12.80	-1.50	0.132	0.814
LIM-VAN	11.28	1.40	0.165	0.814
DAN-VIS	-11.31	-1.32	0.190	0.814
DMN-DMN	-9.56	-1.31	0.189	0.814
DMN-VAN	10.24	1.31	0.194	0.814
LIM-VIS	8.99	1.26	0.201	0.814
DMN-LIM	-8.63	-1.25	0.213	0.814
DMN-VIS	7.92	1.11	0.261	0.814
<i>Positive Emotion PC1</i>				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
DAN-DAN	-22.74	-2.45	0.017	0.612
LIM-SCN	-15.21	-1.67	0.096	0.719
DMN-SCN	-15.94	-1.58	0.116	0.719
DAN-SCN	15.90	1.52	0.138	0.719
DAN-LIM	17.07	1.52	0.130	0.719
DMN-FPN	14.42	1.46	0.160	0.719
SMN-SMN	-13.78	-1.42	0.158	0.719
SMN-VAN	15.63	1.41	0.167	0.719
FPN-VAN	-13.57	-1.39	0.190	0.719
FPN-SMN	13.66	1.34	0.200	0.719
<i>Positive Emotion PC2</i>				

<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 network pairs</i>				
DAN-SCN	-25.16	-2.30	0.021	0.741
DMN-VAN	21.40	2.03	0.050	0.795
LIM-LIM	18.04	1.66	0.104	0.795
DMN-LIM	17.82	1.64	0.107	0.795
LIM-VIS	-15.94	-1.54	0.128	0.795
DMN-VIS	-14.03	-1.47	0.155	0.795
VAN-VAN	-12.46	-1.42	0.155	0.795
SCN-VAN	-13.85	-1.33	0.177	0.795
DAN-DMN	11.14	1.20	0.239	0.852
DMN-FPN	12.81	1.11	0.274	0.852
Negative Emotion				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
FPN-SMN	-30.77	-3.09	0.004	0.079
DMN-LIM	27.89	3.07	0.003	0.079
SMN-VIS	27.18	2.70	0.008	0.098
DMN-DMN	22.69	2.29	0.023	0.147
DAN-DAN	20.76	2.23	0.025	0.147
FPN-SCN	21.08	2.18	0.036	0.147
DAN-VAN	-20.89	-2.17	0.036	0.147
SCN-VIS	-21.18	-2.17	0.037	0.147
LIM-SMN	-19.32	-2.13	0.032	0.147
FPN-FPN	16.98	1.85	0.071	0.224
Negative Emotion PC2				
<i>No network pairs survived $q < 0.05$</i>				
<i>Top 10 networks</i>				
LIM-LIM	-18.81	-2.09	0.045	0.835
DMN-VIS	13.83	1.57	0.124	0.835
SCN-SMN	14.52	1.45	0.164	0.835
LIM-VIS	12.37	1.35	0.190	0.835
SCN-SCN	-12.21	-1.32	0.184	0.835
FPN-SMN	12.74	1.32	0.191	0.835
DMN-DMN	-11.93	-1.31	0.204	0.835
DAN-LIM	-10.76	-1.20	0.238	0.835
FPN-SCN	-12.32	-1.15	0.252	0.835
SMN-SMN	-9.91	-1.12	0.269	0.835

Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network.



Supplementary Figure 5. CPM networks heatmaps without (left) and with covariates (right) in (a) males and (b) females.

Supplementary Table 19. Correlation of CPM selected network FCs with age in males (all sample using median rep)

Network pair	β	t-value	r	p-value	q-value
<i>CPM positive network</i>					
DAN-DAN	3.64	3.96	0.24	<0.001	<0.001
DAN-DMN	6.51	7.61	0.43	<0.001	<0.001
DAN-FPN	6.36	7.40	0.42	<0.001	<0.001
DAN-LIM	5.39	6.09	0.35	<0.001	<0.001
DAN-SCN	7.20	8.62	0.47	<0.001	<0.001
DAN-SM	5.71	6.51	0.37	<0.001	<0.001
DAN-VAN	7.23	8.67	0.47	<0.001	<0.001
DAN-VIS	7.17	8.58	0.47	<0.001	<0.001
DMN-DMN	6.31	7.33	0.41	<0.001	<0.001
DMN-FPN	8.06	10.02	0.53	<0.001	<0.001
DMN-LIM	4.26	4.69	0.28	<0.001	<0.001
DMN-SCN	8.61	11.02	0.56	<0.001	<0.001
DMN-SM	4.85	5.40	0.32	<0.001	<0.001
DMN-VAN	5.14	5.77	0.34	<0.001	<0.001
DMN-VIS	7.16	8.56	0.47	<0.001	<0.001
FPN-FPN	3.94	4.31	0.26	<0.001	<0.001
FPN-LIM	5.13	5.76	0.34	<0.001	<0.001
FPN-SCN	6.20	7.17	0.41	<0.001	<0.001
FPN-SMN	6.29	7.30	0.41	<0.001	<0.001

FPN-VAN	5.49	6.21	0.36	<0.001	<0.001
FPN-VIS	7.47	9.05	0.49	<0.001	<0.001
LIM-SCN	7.26	8.72	0.47	<0.001	<0.001
LIM-SMN	4.73	5.26	0.31	<0.001	<0.001
LIM-VAN	4.12	4.53	0.27	<0.001	<0.001
LIM-VIS	6.93	8.22	0.45	<0.001	<0.001
SCN-SCN	5.36	6.05	0.35	<0.001	<0.001
SCN-SMN	5.70	6.49	0.37	<0.001	<0.001
SCN-VAN	7.02	8.35	0.46	<0.001	<0.001
SCN-VIS	5.69	6.49	0.37	<0.001	<0.001
SMN-VAN	6.54	7.66	0.43	<0.001	<0.001
SMN-VIS	5.11	5.74	0.33	<0.001	<0.001
VAN-VIS	6.00	6.90	0.39	<0.001	<0.001
VIS-VIS	4.28	4.71	0.28	<0.001	<0.001
<i>CPM negative network</i>					
DAN-DAN	-7.08	-8.44	-0.46	<0.001	<0.001
DAN-DMN	-6.87	-8.13	-0.45	<0.001	<0.001
DAN-FPN	-6.83	-8.08	-0.45	<0.001	<0.001
DAN-LIM	-5.95	-6.83	-0.39	<0.001	<0.001
DAN-SCN	-6.47	-7.56	-0.42	<0.001	<0.001
DAN-SMN	-5.03	-5.64	-0.33	<0.001	<0.001
DAN-VAN	-8.18	-10.23	-0.54	<0.001	<0.001
DAN-VIS	-5.96	-6.85	-0.39	<0.001	<0.001
DMN-DMN	-8.62	-11.04	-0.56	<0.001	<0.001
DMN-FPN	-7.78	-9.56	-0.51	<0.001	<0.001
DMN-LIM	-6.06	-6.97	-0.40	<0.001	<0.001
DMN-SCN	-6.94	-8.23	-0.45	<0.001	<0.001
DMN-SMN	-4.96	-5.54	-0.32	<0.001	<0.001
DMN-VAN	-7.22	-8.67	-0.47	<0.001	<0.001
DMN-VIS	-6.95	-8.25	-0.45	<0.001	<0.001
FPN-FPN	-8.15	-10.19	-0.53	<0.001	<0.001
FPN-LIM	-6.39	-7.44	-0.42	<0.001	<0.001
FPN-SCN	-6.75	-7.95	-0.44	<0.001	<0.001
FPN-SMN	-3.94	-4.31	-0.26	<0.001	<0.001
FPN-VAN	-8.15	-10.18	-0.53	<0.001	<0.001
FPN-VIS	-7.01	-8.34	-0.46	<0.001	<0.001
LIM-LIM	-5.56	-6.30	-0.36	<0.001	<0.001
LIM-SCN	-6.71	-7.89	-0.44	<0.001	<0.001
LIM-SMN	-3.02	-3.26	-0.20	<0.001	<0.001
LIM-VAN	-5.93	-6.81	-0.39	<0.001	<0.001
LIM-VIS	-3.82	-4.17	-0.25	<0.001	<0.001

SCN-SCN	-7.48	-9.07	-0.49	<0.001	<0.001
SCN-SMN	-5.65	-6.43	-0.37	<0.001	<0.001
SCN-VAN	-6.32	-7.34	-0.41	<0.001	<0.001
SCN-VIS	-7.66	-9.36	-0.50	<0.001	<0.001
SMN-SMN	-6.84	-8.09	-0.45	<0.001	<0.001
SMN-VAN	-6.06	-6.98	-0.40	<0.001	<0.001
SMN-VIS	-6.17	-7.13	-0.40	<0.001	<0.001
VAN-VAN	-8.51	-10.83	-0.56	<0.001	<0.001
VAN-VIS	-4.79	-5.33	-0.31	<0.001	<0.001
VIS-VIS	-7.90	-9.76	-0.52	<0.001	<0.001

Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network.

Supplementary Table 20. Correlation of CPM selected network FCs with age in females (all sample using median rep)

Network pair	β	t-value	r	p-value	q-value
<i>CPM positive network</i>					
DAN-DAN	5.62	7.17	0.36	<0.001	<0.001
DAN-DMN	7.15	9.60	0.46	<0.001	<0.001
DAN-FPN	7.88	10.90	0.51	<0.001	<0.001
DAN-LIM	5.04	6.34	0.33	<0.001	<0.001
DAN-SCN	5.07	6.39	0.33	<0.001	<0.001
DAN-SMN	5.81	7.46	0.38	<0.001	<0.001
DAN-VAN	7.61	10.41	0.49	<0.001	<0.001
DAN-VIS	7.24	9.75	0.47	<0.001	<0.001
DMN-DMN	6.89	9.16	0.45	<0.001	<0.001
DMN-FPN	8.90	12.96	0.58	<0.001	<0.001
DMN-LIM	5.04	6.35	0.33	<0.001	<0.001
DMN-SCN	7.95	11.04	0.52	<0.001	<0.001
DMN-SMN	6.64	8.75	0.43	<0.001	<0.001
DMN-VAN	5.55	7.08	0.36	<0.001	<0.001
DMN-VIS	5.97	7.70	0.39	<0.001	<0.001
FPN-FPN	4.32	5.34	0.28	<0.001	<0.001
FPN-LIM	5.79	7.43	0.38	<0.001	<0.001
FPN-SCN	5.93	7.63	0.38	<0.001	<0.001
FPN-SMN	6.83	9.05	0.44	<0.001	<0.001
FPN-VAN	6.47	8.48	0.42	<0.001	<0.001
FPN-VIS	7.12	9.55	0.46	<0.001	<0.001

LIM-SCN	5.95	7.67	0.39	<0.001	<0.001
LIM-SMN	4.87	6.10	0.32	<0.001	<0.001
LIM-VAN	5.03	6.33	0.33	<0.001	<0.001
LIM-VIS	5.36	6.80	0.35	<0.001	<0.001
SCN-SCN	4.89	6.13	0.32	<0.001	<0.001
SCN-SMN	4.84	6.07	0.31	<0.001	<0.001
SCN-VAN	7.02	9.38	0.45	<0.001	<0.001
SCN-VIS	4.98	6.26	0.32	<0.001	<0.001
SMN-VAN	5.51	7.02	0.36	<0.001	<0.001
SMN-VIS	5.35	6.78	0.35	<0.001	<0.001
VAN-VAN	3.01	3.65	0.19	<0.001	<0.001
VAN-VIS	6.56	8.61	0.42	<0.001	<0.001
VIS-VIS	3.79	4.64	0.25	<0.001	<0.001
<i>CPM negative network</i>					
DAN-DAN	-6.94	-9.23	-0.45	<0.001	<0.001
DAN-DMN	-7.76	-10.67	-0.50	<0.001	<0.001
DAN-FPN	-7.39	-10.01	-0.48	<0.001	<0.001
DAN-LIM	-4.93	-6.19	-0.32	<0.001	<0.001
DAN-SCN	-8.24	-11.58	-0.53	<0.001	<0.001
DAN-SMN	-4.55	-5.66	-0.29	<0.001	<0.001
DAN-VAN	-8.58	-12.26	-0.56	<0.001	<0.001
DAN-VIS	-6.59	-8.66	-0.43	<0.001	<0.001
DMN-DMN	-9.10	-13.41	-0.59	<0.001	<0.001
DMN-FPN	-7.61	-10.40	-0.49	<0.001	<0.001
DMN-LIM	-6.00	-7.74	-0.39	<0.001	<0.001
DMN-SCN	-7.47	-10.14	-0.48	<0.001	<0.001
DMN-SMN	-5.15	-6.49	-0.33	<0.001	<0.001
DMN-VAN	-7.55	-10.29	-0.49	<0.001	<0.001
DMN-VIS	-7.39	-10.00	-0.48	<0.001	<0.001
FPN-FPN	-7.76	-10.67	-0.50	<0.001	<0.001
FPN-LIM	-6.67	-8.80	-0.43	<0.001	<0.001
FPN-SCN	-6.32	-8.23	-0.41	<0.001	<0.001
FPN-SMN	-2.24	-2.70	-0.15	<0.001	<0.001
FPN-VAN	-7.46	-10.13	-0.48	<0.001	<0.001
FPN-VIS	-7.01	-9.35	-0.45	<0.001	<0.001
LIM-LIM	-5.83	-7.48	-0.38	<0.001	<0.001
LIM-SCN	-5.85	-7.52	-0.38	<0.001	<0.001
LIM-VAN	-4.77	-5.97	-0.31	<0.001	<0.001
LIM-VIS	-3.86	-4.74	-0.25	<0.001	<0.001
SCN-SCN	-6.78	-8.98	-0.44	<0.001	<0.001
SCN-SMN	-5.14	-6.48	-0.33	<0.001	<0.001

SCN-VAN	-6.68	-8.81	-0.43	<0.001	<0.001
SCN-VIS	-6.72	-8.88	-0.44	<0.001	<0.001
SMN-SMN	-6.48	-8.50	-0.42	<0.001	<0.001
SMN-VAN	-6.11	-7.91	-0.40	<0.001	<0.001
SMN-VIS	-5.32	-6.74	-0.34	<0.001	<0.001
VAN-VAN	-8.88	-12.90	-0.57	<0.001	<0.001
VAN-VIS	-4.97	-6.24	-0.32	<0.001	<0.001
VIS-VIS	-6.58	-8.65	-0.43	<0.001	<0.001

Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network.

Supplementary Table 21. Correlation of CPM selected edge FCs with age in males (all sample using median rep; summary)

Network pair	Number of edges tested	Number of edges with $p < 0.05$	Number of edges with $q < 0.05$	Edges matching CPM direction (%)	Median r
CPM positive network					
DAN-DAN	2	2	2	100	0.18
DAN-DMN	67	67	67	100	0.21
DAN-FPN	22	22	22	100	0.20
DAN-LIM	12	12	12	100	0.27
DAN-SCN	17	17	17	100	0.19
DAN-SMN	38	38	38	100	0.19
DAN-VAN	26	26	26	100	0.21
DAN-VIS	41	41	41	100	0.23
DMN-DMN	15	15	15	100	0.18
DMN-FPN	72	72	72	100	0.21
DMN-LIM	4	4	4	100	0.21
DMN-SCN	71	71	71	100	0.25
DMN-SMN	58	58	58	100	0.21
DMN-VAN	32	32	32	100	0.21
DMN-VIS	155	155	155	100	0.23
FPN-FPN	3	3	3	100	0.17
FPN-LIM	6	6	6	100	0.22
FPN-SCN	14	14	14	100	0.21
FPN-SMN	55	55	55	100	0.24
FPN-VAN	8	8	8	100	0.22
FPN-VIS	49	49	49	100	0.21

LIM-SCN	10	10	10	100	0.35
LIM-SMN	15	15	15	100	0.19
LIM-VAN	4	4	4	100	0.24
LIM-VIS	57	57	57	100	0.32
SCN-SCN	5	5	5	100	0.26
SCN-SMN	93	93	93	100	0.21
SCN-VAN	20	20	20	100	0.22
SCN-VIS	34	34	34	100	0.21
SMN-VAN	28	28	28	100	0.23
SMN-VIS	28	28	28	100	0.18
VAN-VIS	74	74	74	100	0.23
VIS-VIS	4	4	4	100	0.21
<i>CPM negative network</i>					
DAN-DAN	27	27	27	100	0.20
DAN-DMN	35	35	35	100	0.23
DAN-FPN	20	20	20	100	0.20
DAN-LIM	4	4	4	100	0.25
DAN-SCN	30	30	30	100	0.20
DAN-SMN	9	9	9	100	0.19
DAN-VAN	31	31	31	100	0.21
DAN-VIS	29	29	29	100	0.20
DMN-DMN	62	62	62	100	0.21
DMN-FPN	29	29	29	100	0.21
DMN-LIM	33	33	33	100	0.22
DMN-SCN	114	114	114	100	0.22
DMN-SMN	60	60	60	100	0.22
DMN-VAN	37	37	37	100	0.23
DMN-VIS	18	18	18	100	0.21
FPN-FPN	22	22	22	100	0.25
FPN-LIM	10	10	10	100	0.22
FPN-SCN	69	69	69	100	0.26
FPN-SMN	13	13	13	100	0.18
FPN-VAN	27	27	27	100	0.24
FPN-VIS	18	18	18	100	0.23
LIM-LIM	9	9	9	100	0.25
LIM-SCN	31	31	31	100	0.21
LIM-SMN	3	3	3	100	0.18
LIM-VAN	22	22	22	100	0.23
LIM-VIS	2	2	2	100	0.24
SCN-SCN	65	65	65	100	0.24
SCN-SMN	10	10	10	100	0.19

SCN-VAN	39	39	39	100	0.21
SCN-VIS	40	40	40	100	0.27
SMN-SMN	71	71	71	100	0.28
SMN-VAN	20	20	20	100	0.23
SMN-VIS	11	11	11	100	0.20
VAN-VAN	27	27	27	100	0.27
VAN-VIS	3	3	3	100	0.25
VIS-VIS	81	81	81	100	0.29

Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network; Number of edges tested: the total edges tested for age association within each network pair, Number of edges with $p < 0.05$: edges with significant age associations, Number of edges with $q < 0.05$: edges significant after FDR correction across all tested edges, Edges matching CPM direction (%): the percentage of edges whose age-association direction matched the expected CPM direction, Median r: the median age-FC correlation coefficient across all tested edges within the network pair.

Supplementary Table 22. Correlation of CPM selected edge FCs with age in females (all sample using median rep; summary)

Network pair	number of edges tested	number of edges with $p < 0.05$	number of edges with $q < 0.05$	edges matching CPM direction (%)	median r
<i>CPM positive network</i>					
LIM-VIS	54	54	54	100	0.24
LIM-SCN	10	10	10	100	0.23
FP-SMN	83	83	83	100	0.23
DMN-LIM	6	6	6	100	0.22
DMN-SCN	55	55	55	100	0.22
FPN-SCN	13	13	13	100	0.22
SCN-SMN	118	118	118	100	0.22
SCN-SCN	8	8	8	100	0.21
DMN-VAN	76	76	76	100	0.21
DMN-VIS	116	116	116	100	0.21
FPN-VIS	54	54	54	100	0.21
DAN-VIS	36	36	36	100	0.21
VAN-VIS	68	68	68	100	0.20
LIM-VAN	15	15	15	100	0.20
DMN-FPN	56	56	56	100	0.20
FPN-VAN	24	24	24	100	0.20
DAN-FPN	52	52	52	100	0.20
SCN-VAN	15	15	15	100	0.20
LIM-SMM	17	17	17	100	0.19
VAN-VAN	1	1	1	100	0.19

DAN-SMN	29	29	29	100	0.19
SMN-VAN	49	49	49	100	0.19
DMN-SMN	52	52	52	100	0.19
DAN-VAN	41	41	41	100	0.19
SMN-VIS	24	24	24	100	0.19
SCN-VIS	77	77	77	100	0.19
DAN-DMN	69	69	69	100	0.18
VIS-VIS	3	3	3	100	0.18
DAN-DAN	11	11	11	100	0.17
DMN-DMN	26	26	26	100	0.17
FPN-LIM	12	12	12	100	0.17
DAN-SCN	46	46	46	100	0.16
DAN-LIM	19	19	19	100	0.16
FPN-FPN	4	4	4	100	0.16
CPM negative network					
LIM-LIM	7	7	7	100	0.32
SMN-SMN	87	87	87	100	0.29
VAN-VAN	29	29	29	100	0.28
SCN-SCN	80	80	80	100	0.25
DAN-VAN	25	25	25	100	0.25
SCN-SMN	14	14	14	100	0.24
FPN-LIM	14	14	14	100	0.24
SCN-VIS	37	37	37	100	0.24
VIS-VIS	65	65	65	100	0.24
DMN-VAN	43	43	43	100	0.23
FPN-SCN	107	107	107	100	0.22
FPN-VAN	41	41	41	100	0.21
DAN-DAN	29	29	29	100	0.21
LIM-SCN	33	33	33	100	0.21
FPN-FPN	23	23	23	100	0.21
DAN-FPN	18	18	18	100	0.21
DAN-SCN	31	31	31	100	0.21
SMN-VAN	25	25	25	100	0.21
DMN-LIM	38	38	38	100	0.20
LIM-VIS	3	3	3	100	0.20
SCN-VAN	68	68	68	100	0.20
LIM-VAN	13	13	13	100	0.20
DMN-DMN	66	66	66	100	0.20
DAN-VIS	45	45	45	100	0.20
DMN-SCN	106	106	106	100	0.20
DAN-DMN	42	42	42	100	0.19

DMN-FPN	39	39	39	100	0.19
DAN-SMN	22	22	22	100	0.19
FPN-VIS	24	24	24	100	0.18
DMN-VIS	27	27	27	100	0.18
DMN-SMN	23	23	23	100	0.18
VAN-VIS	13	13	13	100	0.18
SMN-VIS	22	22	22	100	0.16
DAN-LIM	7	7	7	100	0.16
FPN-SMN	1	1	1	100	0.15

Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network; Number of edges tested: the total edges tested for age association within each network pair, Number of edges with $p < 0.05$: edges with significant age associations, Number of edges with $q < 0.05$: edges significant after FDR correction across all tested edges, Edges matching CPM direction (%): the percentage of edges whose age-association direction matched the expected CPM direction, Median r : the median age-FC correlation coefficient across all tested edges within the network pair.

Supplementary Table 23. Correlation of CPM selected network FCs with age in males (conservative held-out analysis; summary)

Network Pair	Median selected edges per fold	Median β	Median r	Median p-value	Reps with $p < 0.05$ (%)	Reps direction matches CPM (%)
<i>CPM positive network</i>						
DAN-DAN	5.5	1.75	0.11	<0.001	44	100
DAN-DMN	92	5.31	0.35	<0.001	100	100
DAN-FPN	31.5	5.13	0.34	<0.001	100	100
DAN-LIM	19	4.62	0.30	<0.001	100	100
DAN-SCN	27	4.94	0.32	<0.001	100	100
DAN-SMN	53	4.43	0.29	<0.001	100	100
DAN-VAN	37.5	5.83	0.38	<0.001	100	100
DAN-VIS	53	6.29	0.41	<0.001	100	100
DMN-DMN	26.5	2.92	0.19	<0.001	92	100
DMN-FPN	103	5.91	0.39	<0.001	100	100
DMN-LIM	6	3.25	0.21	<0.001	97	100
DMN-SCN	87.5	8.12	0.53	<0.001	100	100
DMN-SMN	76	4.44	0.29	<0.001	100	100
DMN-VAN	52	3.48	0.23	<0.001	100	100
DMN-VIS	190.5	6.77	0.44	<0.001	100	100
FPN-FPN	4	2.69	0.18	0.004	85	100

FPN-LIM	8	4.69	0.31	<0.001	100	100
FPN-SCN	20	4.31	0.28	<0.001	100	100
FPN-SMN	74.5	5.70	0.37	<0.001	100	100
FPN-VAN	14	3.43	0.22	<0.001	98	100
FPN-VIS	66	6.32	0.41	<0.001	100	100
LIM-SCN	12	7.32	0.48	<0.001	100	100
LIM-SMN	21	3.67	0.24	<0.001	100	100
LIM-VAN	6	3.15	0.21	<0.001	99	100
LIM-VIS	60.5	6.74	0.44	<0.001	100	100
SCN-SCN	5	5.11	0.33	<0.001	100	100
SCN-SMN	109	5.31	0.35	<0.001	100	100
SCN-VAN	24.5	5.91	0.39	<0.001	100	100
SCN-VIS	53.5	4.27	0.28	<0.001	100	100
SMN-VAN	44	5.56	0.36	<0.001	100	100
SMN-VIS	48	3.62	0.24	<0.001	100	100
VAN-VAN	1	-2.50	-0.17	0.232	17	0
VAN-VIS	88	5.63	0.37	<0.001	100	100
VIS-VIS	7	3.34	0.22	<0.001	100	100
<i>CPM negative network</i>						
DAN-DAN	34	-6.16	-0.40	<0.001	100	100
DAN-DMN	50	-6.15	-0.40	<0.001	100	100
DAN-FPN	27	-5.06	-0.33	<0.001	100	100
DAN-LIM	9	-3.74	-0.25	<0.001	100	100
DAN-SCN	40.5	-5.28	-0.35	<0.001	100	100
DAN-SMN	16	-3.17	-0.21	<0.001	98	100
DAN-VAN	36	-7.61	-0.50	<0.001	100	100
DAN-VIS	41	-4.98	-0.33	<0.001	100	100
DMN-DMN	90	-5.38	-0.35	<0.001	100	100
DMN-FPN	44.75	-5.07	-0.33	<0.001	100	100
DMN-LIM	45.5	-4.45	-0.29	<0.001	100	100
DMN-SCN	140	-6.61	-0.43	<0.001	100	100
DMN-SMN	74	-4.35	-0.28	<0.001	100	100
DMN-VAN	54.5	-5.30	-0.35	<0.001	100	100
DMN-VIS	23	-5.52	-0.36	<0.001	100	100
FPN-FPN	33	-6.04	-0.40	<0.001	100	100
FPN-LIM	14	-4.52	-0.30	<0.001	100	100
FPN-SCN	82.75	-6.47	-0.42	<0.001	100	100
FPN-SMN	18	-3.31	-0.22	<0.001	100	100
FPN-VAN	41.5	-6.05	-0.40	<0.001	100	100
FPN-VIS	26	-5.69	-0.37	<0.001	100	100
LIM-LIM	10	-5.29	-0.35	<0.001	100	100

LIM-SCN	39	-5.73	-0.38	<0.001	100	100
LIM-SMN	7	-2.59	-0.17	0.006	100	100
LIM-VAN	23	-5.49	-0.36	<0.001	100	100
LIM-VIS	3	-3.51	-0.23	<0.001	100	100
SCN-SCN	74	-6.79	-0.44	<0.001	100	100
SCN-SMN	15	-3.84	-0.25	<0.001	100	100
SCN-VAN	54	-5.40	-0.35	<0.001	100	100
SCN-VIS	51.5	-7.28	-0.48	<0.001	100	100
SMN-SMN	79	-6.27	-0.41	<0.001	100	100
SMN-VAN	25	-5.29	-0.35	<0.001	100	100
SMN-VIS	23	-3.47	-0.23	<0.001	100	100
VAN-VAN	32	-7.90	-0.52	<0.001	100	100
VAN-VIS	6.5	-3.09	-0.20	<0.001	98	100
VIS-VIS	92	-7.58	-0.50	<0.001	100	100

Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network; Median selected edges per fold: the median number of CPM-selected edges within each network pair across held-out folds, Median β : the median regression coefficient for the association between CPM-selected network-pair FC and age, Median r: the median correlation coefficient between network-pair FC and age, Median p-value: the median significance value across repetitions/folds, Reps with $p < 0.05$ (%): the percentage of repetitions showing a significant age association, Reps direction matches CPM (%): the percentage of repetitions in which the age-FC association was in the expected CPM direction.

Supplementary Table 24. Correlation of CPM selected network FCs with age in females (conservative held-out analysis; summary)

Network Pair	Median selected edges per fold	Median β	Median r	Median p-value	Reps with $p < 0.05$ (%)	Reps direction matches CPM (%)
<i>CPM positive network</i>						
DAN-DAN	16.75	5.22	0.34	<0.001	100	100
DAN-DMN	98.5	5.74	0.37	<0.001	100	100
DAN-FPN	65.5	6.64	0.43	<0.001	100	100
DAN-LIM	23.5	4.30	0.28	<0.001	100	100
DAN-SCN	61.5	4.15	0.27	<0.001	100	100
DAN-SMN	40	4.72	0.31	<0.001	100	100
DAN-VAN	56	6.82	0.44	<0.001	100	100
DAN-VIS	49.75	5.90	0.38	<0.001	100	100
DMN-DMN	34	4.38	0.28	<0.001	100	100
DMN-FPN	78.5	5.59	0.36	<0.001	100	100
DMN-LIM	8	3.62	0.23	<0.001	100	100

DMN-SCN	69.5	7.28	0.47	<0.001	100	100
DMN-SMN	70.5	5.33	0.35	<0.001	100	100
DMN-VAN	92.5	5.02	0.33	<0.001	100	100
DMN-VIS	151.5	5.30	0.34	<0.001	100	100
FPN-FPN	5	3.75	0.24	<0.001	100	100
FPN-LIM	14	4.72	0.31	<0.001	100	100
FPN-SCN	15	5.57	0.36	<0.001	100	100
FPN-SMN	108	6.03	0.39	<0.001	100	100
FPN-VAN	33	5.44	0.35	<0.001	100	100
FPN-VIS	73	5.91	0.38	<0.001	100	100
LIM-SCN	11	5.77	0.37	<0.001	100	100
LIM-SMN	25	4.07	0.26	<0.001	100	100
LIM-VAN	20	4.15	0.27	<0.001	100	100
LIM-VIS	55	5.28	0.34	<0.001	100	100
SCN-SCN	10	4.54	0.29	<0.001	100	100
SCN-SMN	132.5	4.59	0.30	<0.001	100	100
SCN-VAN	19	5.98	0.39	<0.001	100	100
SCN-VIS	100	4.29	0.28	<0.001	100	100
SMN-VAN	61.5	5.08	0.33	<0.001	100	100
SMN-VIS	36.5	3.71	0.24	<0.001	100	100
VAN-VAN	4	1.96	0.13	0.019	81	100
VAN-VIS	84.5	5.71	0.37	<0.001	100	100
VIS-VIS	5.5	2.79	0.18	<0.001	100	100
<i>CPM negative network</i>						
DAN-DAN	34	-6.27	-0.41	<0.001	100	100
DAN-DMN	62.5	-6.43	-0.42	<0.001	100	100
DAN-FPN	23	-6.11	-0.40	<0.001	100	100
DAN-LIM	11	-3.77	-0.24	<0.001	100	100
DAN-SCN	42.5	-7.05	-0.46	<0.001	100	100
DAN-SMN	36	-3.52	-0.23	<0.001	100	100
DAN-VAN	32.5	-7.17	-0.46	<0.001	100	100
DAN-VIS	64	-5.63	-0.36	<0.001	100	100
DMN-DMN	88	-5.76	-0.37	<0.001	100	100
DMN-FPN	51.5	-5.71	-0.37	<0.001	100	100
DMN-LIM	48.5	-4.80	-0.31	<0.001	100	100
DMN-SCN	131	-6.55	-0.42	<0.001	100	100
DMN-SMN	42.5	-4.04	-0.26	<0.001	100	100
DMN-VAN	58	-6.19	-0.40	<0.001	100	100
DMN-VIS	35	-5.82	-0.38	<0.001	100	100
FPN-FPN	30	-6.43	-0.42	<0.001	100	100
FPN-LIM	18.5	-5.70	-0.37	<0.001	100	100

FPN-SCN	122	-5.95	-0.39	<0.001	100	100
FPN-SMN	2	-1.83	-0.12	0.030	70	100
FPN-VAN	50	-6.85	-0.44	<0.001	100	100
FPN-VIS	33	-5.87	-0.38	<0.001	100	100
LIM-LIM	8	-5.47	-0.35	<0.001	100	100
LIM-SCN	39	-5.27	-0.34	<0.001	100	100
LIM-SMN	1	2.51	0.16	0.173	13	0
LIM-VAN	15	-4.65	-0.30	<0.001	100	100
LIM-VIS	4.5	-1.95	-0.13	0.020	72	100
SCN-SCN	82	-6.73	-0.44	<0.001	100	100
SCN-SMN	15	-4.69	-0.30	<0.001	100	100
SCN-VAN	81.5	-6.21	-0.40	<0.001	100	100
SCN-VIS	43	-5.99	-0.39	<0.001	100	100
SMN-SMN	90	-6.39	-0.41	<0.001	100	100
SMN-VAN	31	-5.57	-0.36	<0.001	100	100
SMN-VIS	40.5	-3.85	-0.25	<0.001	100	100
VAN-VAN	32.5	-8.43	-0.55	<0.001	100	100
VAN-VIS	18	-3.81	-0.25	<0.001	100	100
VIS-VIS	78	-6.20	-0.40	<0.001	100	100

Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network; Median selected edges per fold: the median number of CPM-selected edges within each network pair across held-out folds, Median β : the median regression coefficient for the association between CPM-selected network-pair FC and age, Median r : the median correlation coefficient between network-pair FC and age, Median p-value: the median significance value across repetitions/folds, Reps with $p < 0.05$ (%): the percentage of repetitions showing a significant age association, Reps direction matches CPM (%): the percentage of repetitions in which the age-FC association was in the expected CPM direction.

Supplementary Table 25. Correlation of CPM selected edge FCs with age in males (conservative held-out analysis; summary)

Network Pair	Unique edges selected across Reps	Median edge r	Median edge p-value	Median edge p-value < 0.05 (%)	Median Reps with p-value < 0.05 (%)	Median Reps in CPM direction (%)
<i>CPM positive network</i>						
DMN-SCN	114	0.20	0.001	64.91	100.00	100.00
DMN-VIS	259	0.18	0.003	69.50	100.00	100.00
LIM-SCN	14	0.29	0.000	85.71	100.00	100.00
LIM-VIS	69	0.30	0.000	86.96	100.00	100.00
SCN-SCN	8	0.21	0.000	75.00	100.00	100.00

FPN-SMN	108	0.16	0.005	63.89	99.50	100.00
VAN-VIS	123	0.18	0.003	65.04	99.00	100.00
SCN-SMN	150	0.18	0.004	66.67	98.00	100.00
SMN-VAN	63	0.12	0.029	53.97	73.00	100.00
FPN-VIS	109	0.09	0.021	54.13	66.67	100.00
DMN-FPN	156	0.11	0.025	55.13	64.83	99.00
LIM-SMN	33	0.11	0.017	51.52	63.00	99.00
DMN-SMN	127	0.10	0.014	58.27	79.00	98.00
FPN-LIM	14	0.09	0.011	71.43	95.00	89.50
SMN-VIS	81	0.05	0.080	41.98	15.38	88.00
DAN-DMN	166	0.04	0.050	50.00	50.00	82.50
DAN-FPN	59	0.04	0.039	52.54	66.67	78.00
DAN-SMN	97	0.03	0.036	51.55	58.00	77.00
DAN-VIS	97	0.02	0.011	56.70	87.00	67.00
DAN-VAN	69	0.00	0.051	47.83	50.00	52.00
VIS-VIS	14	0.00	0.064	42.86	46.00	51.50
DMN-DMN	54	-0.01	0.053	50.00	50.00	42.00
DMN-VAN	102	-0.03	0.135	38.24	15.91	24.50
FPN-SCN	41	-0.04	0.088	41.46	17.00	17.00
FPN-VAN	31	-0.05	0.135	41.94	22.45	11.00
DAN-LIM	39	-0.06	0.071	41.03	50.00	9.00
SCN-VIS	111	-0.05	0.134	38.74	18.18	9.00
LIM-VAN	16	-0.16	0.122	37.50	20.71	5.59
SCN-VAN	51	-0.10	0.013	56.86	72.00	3.00
DAN-SCN	61	-0.07	0.056	49.18	50.00	3.00
VAN-VAN	7	-0.41	0.038	57.14	71.43	0.00
FPN-FPN	14	-0.30	0.057	42.86	36.75	0.00
DMN-LIM	19	-0.25	0.090	47.37	25.00	0.00
DAN-DAN	22	-0.27	0.090	31.82	11.25	0.00
<i>CPM negative network</i>						
FPN-SCN	118	-0.18	0.004	65.25	100.00	100.00
LIM-LIM	10	-0.23	0.000	90.00	100.00	100.00
LIM-VAN	30	-0.19	0.002	73.33	100.00	100.00
SCN-SCN	92	-0.20	0.001	70.65	100.00	100.00
SMN-SMN	90	-0.27	0.000	80.00	100.00	100.00
VAN-VAN	43	-0.20	0.001	69.77	100.00	100.00
VIS-VIS	104	-0.26	0.000	80.77	100.00	100.00
DMN-SCN	197	-0.18	0.004	65.48	99.00	100.00
SCN-VIS	76	-0.16	0.005	60.53	98.00	100.00
DAN-VAN	55	-0.17	0.007	60.00	92.00	100.00
LIM-SCN	50	-0.17	0.006	62.00	88.50	100.00

LIM-VIS	4	-0.20	0.004	100.00	78.50	100.00
DMN-SMN	118	-0.16	0.009	56.78	70.50	100.00
DAN-DAN	51	-0.16	0.009	56.86	65.00	100.00
DMN-LIM	71	-0.11	0.027	56.34	60.00	100.00
FPN-FPN	47	-0.12	0.042	51.06	53.00	100.00
DMN-DMN	137	-0.11	0.014	56.20	66.67	99.00
LIM-SMN	11	-0.09	0.073	36.36	25.00	99.00
FPN-SMN	30	-0.08	0.036	53.33	51.50	97.00
FPN-VAN	67	-0.09	0.058	44.78	34.00	96.00
SCN-SMN	25	-0.08	0.060	48.00	35.71	95.00
DMN-FPN	76	-0.05	0.022	55.26	65.71	86.00
FPN-VIS	45	-0.03	0.067	48.89	39.29	80.00
SMN-VAN	46	-0.04	0.031	56.52	63.33	76.00
DAN-DMN	94	-0.02	0.053	47.87	49.50	65.50
SCN-VAN	100	-0.01	0.064	47.00	45.83	61.00
FPN-LIM	26	-0.01	0.044	50.00	56.67	55.00
DMN-VAN	101	0.00	0.043	51.49	50.00	52.00
DAN-VIS	78	0.01	0.060	43.59	39.50	44.50
DAN-SCN	81	0.04	0.063	44.44	40.00	21.00
DMN-VIS	49	0.06	0.034	55.10	62.50	9.00
DAN-FPN	61	0.11	0.074	37.70	33.33	3.06
DAN-SMN	39	0.14	0.148	33.33	15.79	1.18
DAN-LIM	23	0.15	0.125	30.43	13.33	1.14
SMN-VIS	59	0.11	0.154	27.12	15.38	1.04
VAN-VIS	20	0.19	0.100	30.00	20.87	0.00

Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network; Unique edges selected across reps: the number of distinct CPM-selected edges within each network pair across repetitions, Median edge r: the median age-FC correlation coefficient across selected edges, Median edge p-value: the median significance value across selected edges, Median edge p-value < 0.05 (%): the percentage of selected edges with significant age associations, Median reps with p-value < 0.05 (%): the median percentage of repetitions in which selected edges showed significant age associations, Median reps in CPM direction (%): the median percentage of repetitions in which selected edges showed age-FC associations in the expected CPM direction.

Supplementary Table 26. Correlation of CPM selected edge FCs with age in females (conservative held-out analysis; summary)

Network Pair	Unique edges selected	Median edge r	Median edge p-value	Median edge p-value < 0.05 (%)	Median Reps with p-value < 0.05 (%)	Median Reps in CPM direction (%)
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	across Reps					
<i>CPM positive network</i>						
DMN-VAN	127	0.16	0.003	66.93	100.0	100.0
FPN-SCN	22	0.15	0.006	77.27	100.0	100.0
FPN-SMN	145	0.16	0.002	66.21	100.0	100.0
LIM-SCN	13	0.21	0.000	69.23	100.0	100.0
LIM-VIS	60	0.23	0.000	90.00	100.0	100.0
SCN-SMN	162	0.18	0.001	74.07	100.0	100.0
DMN-SCN	103	0.15	0.003	59.22	99.0	100.0
VAN-VIS	112	0.16	0.003	66.96	99.0	100.0
LIM-VAN	25	0.17	0.002	64.00	98.0	100.0
SMN-VAN	86	0.15	0.004	63.95	97.0	100.0
SCN-SCN	16	0.15	0.006	62.50	94.5	100.0
FPN-LIM	22	0.15	0.004	81.82	93.5	100.0
FPN-VIS	108	0.13	0.009	57.41	90.5	100.0
SCN-VIS	151	0.14	0.006	60.26	90.0	100.0
DAN-FPN	99	0.15	0.006	59.60	89.0	100.0
DMN-VIS	224	0.15	0.006	60.27	88.0	100.0
DAN-LIM	36	0.13	0.015	58.33	86.5	100.0
DAN-VAN	82	0.13	0.006	57.32	86.5	100.0
DAN-DAN	25	0.11	0.041	52.00	86.0	100.0
FPN-VAN	44	0.15	0.007	59.09	83.0	100.0
DAN-SCN	96	0.10	0.031	53.13	62.3	100.0
SCN-VAN	31	0.11	0.037	58.06	60.0	100.0
DAN-VIS	80	0.10	0.055	48.75	47.5	100.0
LIM-SMN	44	0.08	0.029	52.27	56.5	97.5
DAN-DMN	170	0.08	0.053	48.82	47.2	96.0
DAN-SMN	68	0.07	0.021	54.41	76.0	94.5
VIS-VIS	9	0.04	0.094	33.33	6.0	86.0
DMN-FPN	137	0.03	0.029	55.47	66.7	84.0
VAN-VAN	8	-0.05	0.167	12.50	6.1	36.5
DMN-DMN	64	-0.02	0.051	48.44	45.9	34.5
DMN-SMN	142	-0.05	0.075	41.55	32.1	10.5
SMN-VIS	79	-0.04	0.058	46.84	40.0	9.0
DMN-LIM	21	-0.10	0.083	33.33	25.0	2.0
FPN-FPN	12	-0.25	0.034	66.67	69.2	0.0
<i>CPM negative network</i>						
FPN-SCN	146	-0.19	0.000	76.71	100.0	100.0
FPN-VAN	67	-0.17	0.001	70.15	100.0	100.0
LIM-LIM	9	-0.22	0.000	88.89	100.0	100.0
LIM-SCN	50	-0.18	0.001	70.00	100.0	100.0

LIM-VAN	17	-0.18	0.001	82.35	100.0	100.0
SCN-SCN	88	-0.24	0.000	92.05	100.0	100.0
SCN-SMN	23	-0.18	0.001	65.22	100.0	100.0
SCN-VAN	121	-0.16	0.003	63.64	100.0	100.0
SCN-VIS	61	-0.17	0.001	75.41	100.0	100.0
SMN-SMN	91	-0.27	0.000	96.70	100.0	100.0
VAN-VAN	44	-0.21	0.000	72.73	100.0	100.0
VIS-VIS	100	-0.20	0.000	72.00	100.0	100.0
DAN-DAN	49	-0.16	0.003	67.35	99.0	100.0
DMN-LIM	71	-0.16	0.003	59.15	98.0	100.0
FPN-LIM	27	-0.15	0.005	59.26	98.0	100.0
SMN-VAN	46	-0.15	0.005	63.04	95.5	100.0
DMN-SCN	198	-0.15	0.005	60.10	91.0	100.0
DMN-VAN	87	-0.14	0.009	60.92	88.0	100.0
DMN-DMN	130	-0.14	0.008	54.62	77.5	100.0
FPN-FPN	45	-0.15	0.006	53.33	75.0	100.0
DMN-FPN	87	-0.10	0.008	55.17	67.0	100.0
DAN-VIS	98	-0.10	0.008	59.18	88.0	99.5
DAN-LIM	18	-0.09	0.038	55.56	60.0	99.5
DAN-DMN	105	-0.08	0.046	50.48	50.0	98.0
DAN-VAN	56	-0.06	0.016	53.57	55.1	94.5
FPN-VIS	57	-0.04	0.027	56.14	68.0	85.0
SMN-VIS	77	-0.02	0.063	42.86	40.0	65.0
DAN-SCN	80	-0.02	0.059	47.50	46.0	64.0
DMN-SMN	84	-0.01	0.141	34.52	14.4	61.5
DAN-FPN	45	0.00	0.033	57.78	60.0	54.0
LIM-VIS	9	0.01	0.083	33.33	33.3	39.0
DAN-SMN	72	0.03	0.054	48.61	37.2	27.0
VAN-VIS	43	0.09	0.034	58.14	56.0	2.2
DMN-VIS	79	0.12	0.033	59.49	78.0	1.0
FPN-SMN	8	0.19	0.082	37.50	38.6	0.0
LIM-SMN	3	0.21	0.219	0.00	5.4	0.0

Note: DAN: Dorsal Attention Network, DMN: Default Mode Network, FPN: Frontoparietal Network, LIM: Limbic network, SCN: Subcortical network, SMN: Somatomotor network, VAN: ventral attention network, VIS: visual network; Unique edges selected across reps: the number of distinct CPM-selected edges within each network pair across repetitions, Median edge r: the median age-FC correlation coefficient across selected edges, Median edge p-value: the median significance value across selected edges, Median edge p-value < 0.05 (%): the percentage of selected edges with significant age associations, Median reps with p-value < 0.05 (%): the median percentage of repetitions in which selected edges showed significant age associations, Median reps in CPM direction (%): the median percentage of repetitions in which selected edges showed age-FC associations in the expected CPM direction.

Supplementary Data 1. Individual edge level correlation of CPM selected edge FC with age in males and females (all sample using median rep)

Supplementary Data 2. Correlation of CPM selected network FCs at each repetition, with age in males and females (conservative held-out analysis)

Supplementary Data 3. Individual edge level correlation of CPM selected edges with age in males and females (conservative held-put analysis; summary across repetitions)

STROBE checklist: observational studies

	Item No.	Recommendation	Page No.	Relevant manuscript sections
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	1	See title
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2	See abstract
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-5	Introduction, paragraph 1-6
Objectives	3	State specific objectives, including any prespecified hypotheses	5-6	Introduction, paragraph 7-12
Methods				
Study design	4	Present key elements of study design early in the paper	5-6, 17-21	Introduction, paragraph 7-12; Methods section 4.1-4.6.
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	17-18	Methods, section 4.1.
Participants	6	(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants	17-18	Methods, section 4.1.
		(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed Case-control study—For matched studies, give matching criteria and the number of controls per case		Not applicable.
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	17-19, 21-22	Methods, section 4.1, 4.3, 4.7.
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	17-18, 21-22	Methods, section 4.1, 4.7.
Bias	9	Describe any efforts to address potential sources of bias		Not applicable.
Study size	10	Explain how the study size was arrived at	17-18	Methods, section 4.1.
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	19-22	Methods, section 4.3, 4.6, 4.7.
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	19-24	Methods, section 4.3, 4.6, 4.7, 4.8.
		(b) Describe any methods used to examine subgroups and interactions	21-22	Methods, section 4.7.
		(c) Explain how missing data were addressed		Subjects with missing data excluded.
		(d) Cohort study—If applicable, explain how loss to follow-up was addressed Case-control study—If applicable, explain how matching of cases and controls was addressed Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy		Not applicable

		(e) Describe any sensitivity analyses	19-20, 23-24	Methods, section 4.4, 4.8
Results				
Participants	13*	(a) Report numbers of individuals at each stage of study—e.g. numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed	7, 17-18	Results, first paragraph; Methods, section 4.1
		(b) Give reasons for non-participation at each stage		
		(c) Consider use of a flow diagram		
Descriptive data	14*	(a) Give characteristics of study participants (e.g. demographic, clinical, social) and information on exposures and potential confounders	7, 34	Results, first paragraph; Table 1.
		(b) Indicate number of participants with missing data for each variable of interest		
		(c) <i>Cohort study</i> —Summarize follow-up time (e.g., average and total amount)		
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time	7, 34	Results, first paragraph; Table 1.
		<i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure		
		<i>Cross-sectional study</i> —Report numbers of outcome events or summary measures		
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included		Wherever applicable, both unadjusted and adjusted statistics are reported in the Results.
		(b) Report category boundaries when continuous variables were categorized		Not applicable.
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period		Not applicable.
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	9-12	Results, section 2.4, 2.5, 2.6.
Discussion				
Key results	18	Summarize key results with reference to study objectives	12	Discussion, first paragraph.
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	16-17	Discussion, paragraph 17.
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	12-17	Throughout discussion.
Generalizability	21	Discuss the generalizability (external validity) of the study results	12	Discussion, first paragraph.
Other information				
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	24	Acknowledgement

TRIPOD Checklist: Prediction Model Development and Validation

Section/Topic	Item	D/V	Checklist Item	Page
Title and abstract				
Title	1	D;V	Identify the study as developing and/or validating a multivariable prediction model, the target population, and the outcome to be predicted.	1
Abstract	2	D;V	Provide a summary of objectives, study design, setting, participants, sample size, predictors, outcome, statistical analysis, results, and conclusions.	2
Introduction				
Background and objectives	3a	D;V	Explain the medical context (including whether diagnostic or prognostic) and rationale for developing or validating the multivariable prediction model, including references to existing models.	3-7
Background and objectives	3b	D;V	Specify the objectives, including whether the study describes the development or validation of the model or both.	5-6
Methods				
Source of data	4a	D;V	Describe the study design or source of data (e.g., randomized trial, cohort, or registry data), separately for the development and validation data sets, if applicable.	Section 4.1: page 17-18; Section 4.4: page 19-20
Source of data	4b	D;V	Specify the key study dates, including start of accrual; end of accrual; and, if applicable, end of follow-up.	Section 4.1: page 17-18
Participants	5a	D;V	Specify key elements of the study setting (e.g., primary care, secondary care, general population) including number and location of centres.	Not applicable
Participants	5b	D;V	Describe eligibility criteria for participants.	Section 4.1: page 17-18
Participants	5c	D;V	Give details of treatments received, if relevant.	Not applicable
Outcome	6a	D;V	Clearly define the outcome that is predicted by the prediction model, including how and when assessed.	Section 4.1: page 17-18; Section 4.3: page 19.
Outcome	6b	D;V	Report any actions to blind assessment of the outcome to be predicted.	Not applicable. Public domain data.
Predictors	7a	D;V	Clearly define all predictors used in developing or validating the multivariable prediction model, including how and when they were measured.	Section 4.1: page 17-18; Section 4.3: page 19.
Predictors	7b	D;V	Report any actions to blind assessment of predictors for the outcome and other predictors.	Not applicable
Sample size	8	D;V	Explain how the study size was arrived at.	Section 4.1: page 17-18
Missing data	9	D;V	Describe how missing data were handled (e.g., complete-case analysis, single imputation, multiple imputation) with details of any imputation method.	complete-case analysis
Statistical analysis methods	10a	D	Describe how predictors were handled in the analyses.	Section 4.3: page 19.
Statistical analysis methods	10b	D	Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation.	Section 4.3: page 19.
Statistical analysis methods	10c	V	For validation, describe how the predictions were calculated.	Section 4.3, 4.4: page 19-20.
Statistical analysis methods	10d	D;V	Specify all measures used to assess model performance and, if relevant, to compare multiple models.	Section 4.3: page 19.
Statistical analysis methods	10e	V	Describe any model updating (e.g., recalibration) arising from the validation, if done.	Not done.
Risk groups	11	D;V	Provide details on how risk groups were created, if done.	Not applicable.
Development vs. validation	12	V	For validation, identify any differences from the development data in setting, eligibility criteria, outcome, and predictors.	Not applicable.

Section/Topic	Item	D/V	Checklist Item	Page
Results				
Participants	13a	D;V	Describe the flow of participants through the study, including the number of participants with and without the outcome and, if applicable, a summary of the follow-up time. A diagram may be helpful.	Section 4.3: page 19.
Participants	13b	D;V	Describe the characteristics of the participants (basic demographics, clinical features, available predictors), including the number of participants with missing data for predictors and outcome.	Section 4.3: page 19; Section 2: page 7, Table 1.
Participants	13c	V	For validation, show a comparison with the development data of the distribution of important variables (demographics, predictors and outcome).	Not done.
Model development	14a	D	Specify the number of participants and outcome events in each analysis.	Section 4.3: page 19; Section 2: page 7, Table 1.
Model development	14b	D	If done, report the unadjusted association between each candidate predictor and outcome.	Both unadjusted and adjusted model statistics are reported in results.
Model specification	15a	D	Present the full prediction model to allow predictions for individuals (i.e., all regression coefficients, and model intercept or baseline survival at a given time point).	Not applicable.
Model specification	15b	D	Explain how to use the prediction model.	Not applicable.
Model performance	16	D;V	Report performance measures (with CIs) for the prediction model.	Section 2.1, 2.3, 2.5: page 7-11
Model-updating	17	V	If done, report the results from any model updating (i.e., model specification, model performance).	Not applicable.
Discussion				
Limitations	18	D;V	Discuss any limitations of the study (such as nonrepresentative sample, few events per predictor, missing data).	Page 16-17
Interpretation	19a	V	For validation, discuss the results with reference to performance in the development data, and any other validation data.	Page 12
Interpretation	19b	D;V	Give an overall interpretation of the results, considering objectives, limitations, results from similar studies, and other relevant evidence.	Page 12-17
Implications	20	D;V	Discuss the potential clinical use of the model and implications for future research.	Page 12-17
Other information				
Supplementary information	21	D;V	Provide information about the availability of supplementary resources, such as study protocol, Web calculator, and data sets.	Data and code availability statement provided in page 24.
Funding	22	D;V	Give the source of funding and the role of the funders for the present study.	Page 24

**Items relevant only to the development of a prediction model are denoted by D, items relating solely to a validation of a prediction model are denoted by V, and items relating to both are denoted D;V.*