Supplementary Material to 'Grey-matter Structure in Cortical and Limbic Regions Correlates with General Cognitive Ability in Old Age'

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See main text for all abbreviations.

Table S1. Descriptives

S1A. Descriptive statistics for cognition variables

		Mean		SD		Skewness		Kurtosis		
Variable	N	Total sample	MR sample	Total sample	MR sample	Total sample	MR sample	Total sample	MR sample	Selectivity
EM_VLMT	1,466	8.52	8.50	2.67	2.50	-0.43	-0.34	2.51	2.68	0.01
EM_FP	1,466	0.26	0.28	0.21	0.20	-0.04	0.14	2.95	2.58	-0.05
EM_SE	1,466	0.28	0.29	0.14	0.13	-0.03	-0.11	2.94	2.97	-0.07
EM_OL	1,466	13.23	13.55	3.98	3.94	-0.01	0.00	2.97	3.12	-0.08
WM_SU	1,466	19.68	20.73	8.52	8.94	-0.19	-0.10	3.33	3.72	-0.12
WM_LU	1,461	38.49	38.71	10.64	10.64	-0.64	-0.74	3.28	3.29	-0.02
WM_NB	1,466	0.68	0.69	0.18	0.18	-0.49	-0.52	3.13	3.13	-0.06
R_PP	1,466	10.30	10.31	2.57	2.65	-1.21	-1.10	5.29	4.60	0.00
R_FA	1,466	11.53	11.81	5.09	5.41	-0.70	-0.44	3.25	3.55	-0.06
R_LS	1,466	9.03	9.10	6.30	6.58	0.06	0.13	1.76	1.83	-0.01

S1B. Descriptive statistics for brain structural variables

Variable	N	Mean	SD	Skewness	Kurtosis
ACC_MD	266	0.0013	0.0001	0.1646	2.6183
AMY_MD	266	0.0011	0.0001	0.7940	4.1009
CAU_MD	265	0.0013	0.0001	-0.0616	2.8486
DL_MD	260	0.0012	0.0001	0.1873	2.7295
HC_MD	267	0.0014	0.0001	0.6730	3.3145
HES_MD	262	0.0012	0.0001	0.4211	3.6773
INS_MD	267	0.0014	0.0001	0.1956	3.4073
MO_MD	262	0.0012	0.0001	0.3191	3.2604
NAC_MD	265	0.0011	0.0001	0.1881	2.8301
OCC_MD	262	0.0010	0.0001	0.4647	3.5693
PAL_MD	265	0.0012	0.0001	0.1555	3.0790
PAR_MD	262	0.0013	0.0001	0.4249	3.7913
PHG_MD	267	0.0013	0.0001	0.4623	3.2735
PRE_MD	262	0.0012	0.0001	0.3563	3.2142
PUT_MD	264	0.0009	0.0001	0.7390	4.5155
ACC_MT	192	346.4490	20.7970	-0.2205	3.8074
AMY_MT	192	365.4820	19.1990	-0.0101	4.6402
CAU_MT	188	297.7240	30.9730	0.0812	4.0261
DL_MT	186	299.6630	21.4160	0.7047	4.2374
HC_MT	191	331.6700	31.2620	-0.4576	4.0298
HES_MT	186	313.3770	34.3010	-0.3506	3.6782
INS_MT	190	319.7720	20.5460	-0.2089	3.6517
MO_MT	186	353.2130	17.4290	0.1933	3.9378
NAC_MT	188	335.7090	23.7760	0.2259	4.6481
OCC_MT	186	356.8750	18.1840	-0.0912	3.7360
PAL_MT	187	412.9450	13.0620	0.2639	5.6798
PAR_MT	186	282.0500	24.7900	0.2518	2.9003
PHG_MT	191	363.9280	15.1350	0.1994	4.2195
PRE_MT	186	336.0810	19.3930	0.0003	3.0441

Variable	N	Mean	SD	Skewness	Kurtosis
PUT_MT	188	406.9610	10.8880	0.1599	5.0819
ACC_C	235	0.4738	0.0410	-0.3323	3.3037
AMY_C	235	0.5324	0.0473	-0.2316	3.7496
CAU_C	230	0.4800	0.0496	0.9671	4.6509
DL_C	232	0.4459	0.0376	0.1691	3.0145
HC_C	234	0.4376	0.0376	-0.3689	3.1274
HES_C	232	0.3690	0.0410	0.1554	2.8220
INS_C	235	0.5015	0.0351	0.0180	3.4685
MO_C	232	0.4257	0.0289	-0.0664	3.4442
NAC_C	232	0.6653	0.0697	-0.1056	3.4211
OCC_C	232	0.4070	0.0347	0.0171	3.7892
PAL_C	232	0.3650	0.0761	0.7629	3.0942
PAR_C	232	0.3860	0.0251	-0.2359	2.8252
PHG_C	235	0.4796	0.0372	-0.5439	4.1561
PRE_C	232	0.3936	0.0306	-0.1856	3.7509
PUT_C	231	0.5334	0.0452	0.4107	3.4683

Figure S1. First-order correlations

This is a heatplot for an overview on the correlational patterns among all variables included in the current analyses. Variables are sorted by name. Blue cells code for positive correlations, red for negative. Color intensity codes for the strength of the correlation.

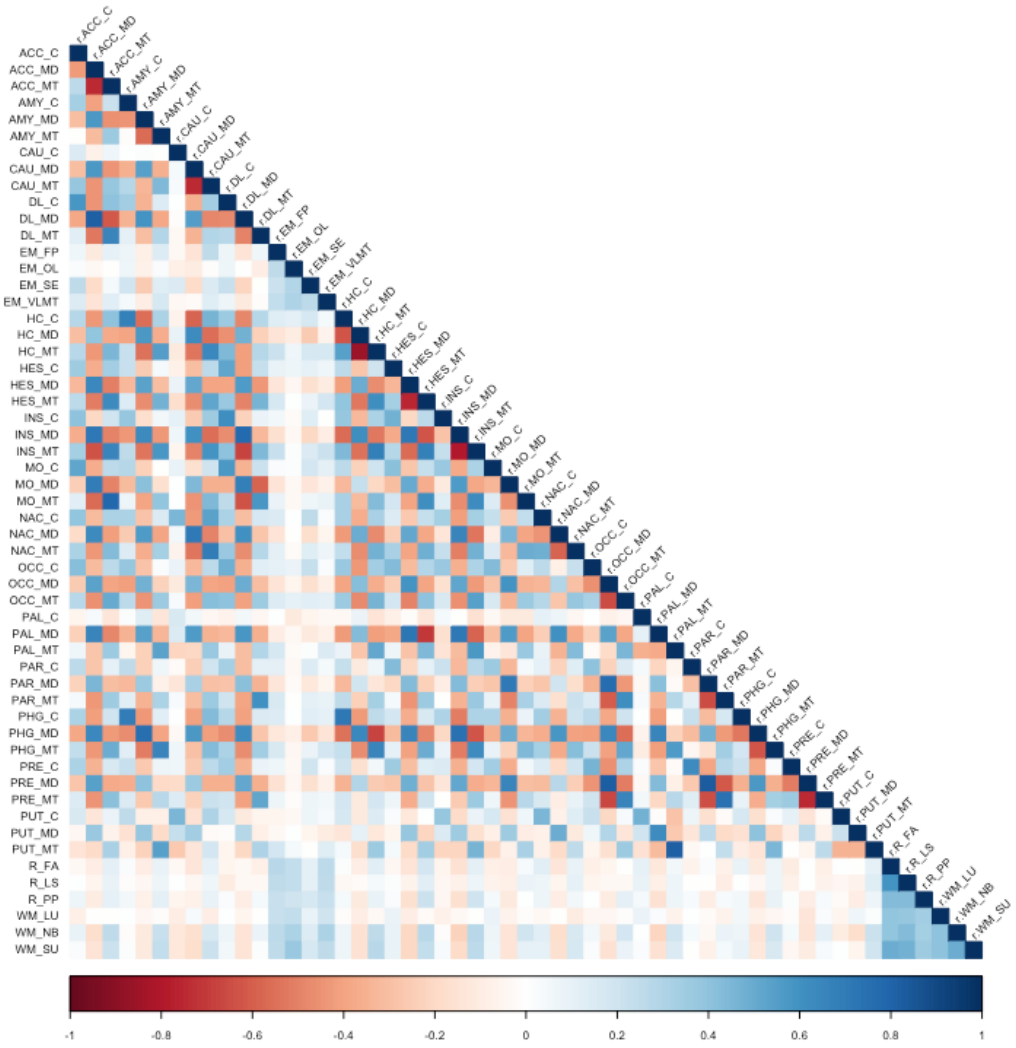

Table S2. Multivariate outliers

We excluded multivariate outliers with highly unlikely combinations of values ($p < .0001$ of robust Mahalanobis distances; detected using R-package faoutlier, version 0.7.2, Chalmers and Flora 2015, method "mve", in complete cases only). We looked for multivariate outlier in cognitive variables and brain structural variables separately. Here are the data of the excluded cases in the cognitive data.

S2A. Multivariate outliers in cognitive variables

EM				WM			R		
VLMT	FP	SE	OL	SU	LU	NB	PP	FA	LS
8.8	0.500	0.477	29	35	65	0.687	10	26	20
8.8	0.370	0.409	9	30	35	0.843	1	17	15
3.2	0.315	0.318	14	17	52	0.675	1	15	13
10.6	0.389	0.500	25	53	81	0.638	9	23	14
4.6	0.370	0.591	9	0	8	0.668	14	12	7
12.4	0.389	0.182	10	23	49	0.725	1	16	12
3.8	0.519	0.000	17	11	25	0.386	0	5	1
10.6	0.259	0.318	26	30	82	0.680	10	23	18
7.0	0.037	0.159	12	0	47	0.605	0	10	1
3.0	0.500	0.068	13	30	42	0.892	1	20	12
5.8	0.315	0.227	17	0	53	0.526	1	15	8

In the brain variables, we tested neocortical ROIs, limbic structures, and basal ganglia separately, because we wanted to model them separately. In neocortex, there were 12 cases, in limbic and basal ganglia structures 5 each. Here are the data of those cases. Note that empty cells mean that data were missing for that case in that variable.

S2B. Multivariate outliers in neocortical volumetric variables

ID	MO	DL	PRE	PAR	OCC	HES
1						
2						
3	0.37	0.41	0.37	0.36	0.37	0.36
4						
5	0.40	0.41	0.38	0.36	0.43	0.39
6	0.41	0.46	0.39	0.41	0.41	0.36
7	0.44	0.43	0.37	0.37	0.47	0.33
8	0.45	0.45	0.41	0.36	0.45	0.38
9	0.42	0.42	0.37	0.40	0.37	0.40
10						

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S2C. Multivariate outliers in neocortical MT variables

ID	MO	DL	PRE	PAR	OCC	HES
1	402.6	337.9	357.1	292.5	383.7	350.4
2	369.8	315.2	331.3	275.2	360.1	357.2
3	370.6	275.6	329.2	264.8	332.0	291.1
4	363.5	303.2	341.3	282.5	360.3	345.0
5	359.7	308.5	354.4	292.9	377.1	324.4
6	355.6	311.9	337.1	273.2	339.7	344.5
7	357.0	310.0	326.9	267.9	361.3	326.4
8	356.1	350.3	354.7	325.7	355.1	333.2
9	341.0	266.8	293.1	236.3	316.0	329.8
10	348.0	283.2	330.0	254.4	352.4	263.8

S2D. Multivariate outliers in neocortical MD variables

ID	MO	DL	PRE	PAR	OCC	HES
1	0.0011	0.0011	0.0012	0.0014	0.0010	0.0011
2	0.0011	0.0010	0.0012	0.0012	0.0009	0.0010
3						
4	0.0011	0.0011	0.0011	0.0012	0.0010	0.0012
5	0.0010	0.0011	0.0010	0.0011	0.0010	0.0012
6	0.0011	0.0011	0.0012	0.0013	0.0010	0.0012
7	0.0013	0.0011	0.0013	0.0013	0.0010	0.0012
8	0.0011	0.0011	0.0011	0.0012	0.0010	0.0012
9	0.0013	0.0013	0.0016	0.0017	0.0013	0.0013
10	0.0012	0.0012	0.0012	0.0013	0.0011	0.0013

S2E. Multivariate outliers in limbic volumetric variables

ID	PHG	HC	ACC	AMY	INS
1					
2	0.51	0.45	0.48	0.54	0.54
3	0.50	0.48	0.47	0.56	0.50
4	0.47	0.40	0.45	0.49	0.44

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S2F. Multivariate outliers in limbic MT variables

ID	PHG	HC	ACC	AMY	INS
1	373.2	378.2	372.4	396.5	358.9
2	370.2	365.1	357.9	377.1	326.8
3	366.6	346.3	375.0	369.7	339.0
4	360.0	323.0	351.5	364.5	330.8

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S2G. Multivariate outliers in limbic MD variables

ID	PHG	HC	ACC	AMY	INS
1	0.0012	0.0012	0.0011	0.0010	0.0012
2	0.0012	0.0012	0.0011	0.0010	0.0014
3	0.0013	0.0013	0.0012	0.0011	0.0013
4	0.0014	0.0014	0.0014	0.0010	0.0014

S2H. Multivariate outliers in basal ganglia volumetric variables

ID	CAU	PUT	NAC	PAL
1	0.43	0.49	0.60	0.33
2				
3	0.46	0.52	0.66	0.38
4				
5	0.47	0.51	0.67	0.31
6		0.64	0.82	0.54
7	0.47	0.52	0.68	0.43
8	0.48	0.57	0.66	0.42

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S2I. Multivariate outliers in basal ganglia MT variables

ID	CAU	PUT	NAC	PAL
1	390.9	415.2		435.4
2	324.0	443.5	372.4	448.2
3	332.7	444.9	381.7	449.6
4	283.5	421.8	334.6	421.1
5	283.6	417.6	340.7	418.0
6	286.5	390.7	334.8	385.2
7	326.8	399.6	361.0	405.0
8	269.2	410.3	330.8	407.3

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S2J. Multivariate outliers in basal ganglia MD variables

ID	CAU	PUT	NAC	PAL
1				
2	0.0012	0.0008	0.0011	0.0012
3	0.0012	0.0008	0.0010	0.0010
4	0.0013	0.0008	0.0012	0.0010
5				

ID	CAU	PUT	NAC	PAL
6	0.0014	0.0010	0.0011	0.0012
7	0.0012	0.0008	0.0010	0.0011
8	0.0015	0.0008	0.0012	0.0012

Here, we summarize how many outliers exactly were excluded at which step in which variable.

S2K. Available data in each variable before and after outlier exclusion

Variable	Sample size before exclusion of univariate outliers	Sample size before exclusion of multi-variate outliers	Sample size after exclusion of multi-variate outliers
age12	1,477	1,477	1,466
EM_VLMT	1,477	1,477	1,466
EM_FP	1,477	1,477	1,466
EM_SE	1,477	1,477	1,466
EM_OL	1,477	1,477	1,466
WM_SU	1,477	1,477	1,466
WM_LU	1,477	1,472	1,461
WM_NB	1,477	1,477	1,466
R_PP	1,477	1,477	1,466
R_FA	1,477	1,477	1,466
R_LS	1,477	1,477	1,466
ACC_MD	274	273	266
AMY_MD	274	273	266
CAU_MD	274	274	265
DL_MD	274	272	260
HC_MD	274	274	267
HES_MD	274	274	262
INS_MD	274	274	267
MO_MD	274	274	262
NAC_MD	274	274	265
OCC_MD	274	274	262
PAL_MD	274	274	265
PAR_MD	274	274	262
PHG_MD	274	274	267
PRE_MD	274	274	262

Variable	Sample size before exclusion of univariate outliers	Sample size before exclusion of multi-variate outliers	Sample size after exclusion of multi-variate outliers
PUT_MD	274	273	264
ACC_MT	199	199	192
AMY_MT	199	199	192
CAU_MT	199	199	188
DL_MT	199	199	186
HC_MT	199	198	191
HES_MT	199	199	186
INS_MT	199	197	190
MO_MT	199	199	186
NAC_MT	199	198	188
OCC_MT	200	199	186
PAL_MT	199	198	187
PAR_MT	199	199	186
PHG_MT	199	198	191
PRE_MT	199	199	186
PUT_MT	199	199	188
ACC_C	241	241	235
AMY_C	241	241	235
CAU_C	241	238	230
DL_C	241	241	232
HC_C	241	240	234
HES_C	241	241	232
INS_C	241	241	235
MO_C	241	241	232
NAC_C	241	241	232
OCC_C	241	241	232
PAL_C	241	241	232
PAR_C	241	241	232

Variable	Sample size before exclusion of univariate outliers	Sample size before exclusion of multi-variate outliers	Sample size after exclusion of multi-variate outliers
PHG_C	241	241	235
PRE_C	241	241	232
PUT_C	241	240	231

Table S3. Parameter estimates and fit indices

Parameter estimates and fit indices from the final, most inclusive models follow below, each one for the model with neocortical ROIs, limbic ROIs, and basal ganglia ROIs. Neocortex and limbic models include age and sex, but the basal ganglia model does not, because there was no association between general cognitive ability and general integrity, which we would have liked to test for confounding with age and sex. In the basal ganglia model, we fixed the loadings of the ROI factors and the method factors to the values estimated in the brain-data-only model that we fitted first to reduce the number of free parameters to facilitate estimation.

S3A. NEOCORTEX model (including covariates)

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
age	=~	age12	1.000	0.000			1.000
age	~~	age	14.980	0.553	27.074	0.000	1.000
age12	~1		70.619	0.101	698.600	0.000	18.246
sex	=~	sex01	1.000	0.000			1.000
sex	~~	sex	0.250	0.009	27.074	0.000	1.000
sex01	~1		0.512	0.013	39.240	0.000	1.025
age	~~	sex	0.025	0.051	0.505	0.614	0.013
EM	=~	EM_VLMT	1.000	0.000			0.535
EM	=~	EM_FP	0.908	0.074	12.202	0.000	0.486
EM	=~	EM_SE	0.780	0.069	11.266	0.000	0.418
EM	=~	EM_OL	1.113	0.083	13.475	0.000	0.596
WM	=~	WM_LU	1.000	0.000			0.586
WM	=~	WM_SU	1.256	0.065	19.362	0.000	0.739
WM	=~	WM_NB	1.144	0.062	18.587	0.000	0.672
R	=~	R_FA	1.000	0.000			0.765
R	=~	R_PP	0.758	0.038	19.892	0.000	0.580
R	=~	R_LS	1.000	0.039	25.829	0.000	0.765
EM_VLMT	~~	EM_VLMT	2.851	0.131	21.804	0.000	0.713
EM_FP	~~	EM_FP	3.052	0.133	23.031	0.000	0.764

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
EM_SE	~~	EM_SE	3.300	0.137	24.157	0.000	0.825
EM_OL	~~	EM_OL	2.576	0.131	19.724	0.000	0.645
WM_LU	~~	WM_LU	2.637	0.112	23.617	0.000	0.656
WM_SU	~~	WM_SU	1.817	0.095	19.080	0.000	0.454
WM_NB	~~	WM_NB	2.190	0.102	21.545	0.000	0.548
R_FA	~~	R_FA	1.661	0.092	18.101	0.000	0.415
R_PP	~~	R_PP	2.656	0.111	23.924	0.000	0.664
R_LS	~~	R_LS	1.661	0.092	18.104	0.000	0.415
EM	~~	EM	0.556	0.078	7.148	0.000	0.485
WM	~~	WM	0.000	0.000			0.000
R	~~	R	0.655	0.082	8.028	0.000	0.280
G	=~	EM	0.748	0.050	14.822	0.000	0.718
G	=~	WM	1.144	0.052	21.886	0.000	1.000
G	=~	R	1.264	0.050	25.360	0.000	0.849
G	~~	G	1.000	0.000			0.947
EM_VLMT	~1		5.000	0.052	95.754	0.000	2.501
EM_FP	~1		5.000	0.052	95.753	0.000	2.501
EM_SE	~1		5.000	0.052	95.754	0.000	2.501
EM_OL	~1		5.000	0.052	95.753	0.000	2.501
WM_LU	~1		5.009	0.052	95.550	0.000	2.499
WM_SU	~1		5.000	0.052	95.754	0.000	2.501
WM_NB	~1		5.000	0.052	95.754	0.000	2.501
R_FA	~1		5.000	0.052	95.686	0.000	2.499
R_PP	~1		5.000	0.052	95.715	0.000	2.500
R_LS	~1		5.000	0.052	95.687	0.000	2.499
PFC	=~	DL_C	1.000	0.000			0.484

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
PFC	=~	DL_MT	1.428	0.222	6.429	0.000	0.662
PFC	=~	DL_MD	-1.906	0.258	-7.398	0.000	-0.873
PFC	=~	MO_C	0.736	0.142	5.163	0.000	0.356
PFC	=~	MO_MT	1.676	0.248	6.764	0.000	0.797
PFC	=~	MO_MD	-1.485	0.208	-7.154	0.000	-0.685
PRE	=~	PRE_C	1.000	0.000			0.386
PRE	=~	PRE_MT	1.479	0.300	4.930	0.000	0.556
PRE	=~	PRE_MD	-1.800	0.340	-5.298	0.000	-0.679
PAR	=~	PAR_C	1.000	0.000			0.250
PAR	=~	PAR_MT	2.455	0.781	3.144	0.002	0.601
PAR	=~	PAR_MD	-2.065	0.639	-3.232	0.001	-0.504
OCC	=~	OCC_C	1.000	0.000			0.405
OCC	=~	OCC_MT	1.679	0.284	5.903	0.000	0.661
OCC	=~	OCC_MD	-2.045	0.302	-6.765	0.000	-0.798
HES	=~	HES_C	1.000	0.000			0.389
HES	=~	HES_MT	2.422	0.427	5.676	0.000	0.929
HES	=~	HES_MD	-2.243	0.394	-5.697	0.000	-0.850
V	=~	PRE_C	1.000	0.000			0.594
V	=~	DL_C	0.809	0.162	4.995	0.000	0.472
V	=~	MO_C	0.900	0.171	5.271	0.000	0.525
V	=~	PAR_C	1.142	0.143	7.979	0.000	0.665
V	=~	OCC_C	0.936	0.156	5.996	0.000	0.549
V	=~	HES_C	0.916	0.168	5.459	0.000	0.532
MT	=~	PRE_MT	1.000	0.000			0.786
MT	=~	DL_MT	0.602	0.101	5.958	0.000	0.456
MT	=~	MO_MT	0.098	0.081	1.210	0.226	0.076
MT	=~	PAR_MT	0.847	0.110	7.700	0.000	0.656
MT	=~	OCC_MT	0.564	0.079	7.124	0.000	0.437

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
MT	=~	HES_MT	-0.060	0.081	-0.731	0.464	-0.046
MD	=~	PRE_MD	1.000	0.000			0.704
MD	=~	DL_MD	0.286	0.075	3.813	0.000	0.191
MD	=~	MO_MD	0.830	0.080	10.365	0.000	0.559
MD	=~	PAR_MD	1.198	0.082	14.634	0.000	0.828
MD	=~	OCC_MD	0.878	0.056	15.780	0.000	0.602
MD	=~	HES_MD	0.268	0.073	3.663	0.000	0.184
DL_C	~~	DL_C	2.132	0.247	8.622	0.000	0.543
DL_MT	~~	DL_MT	1.511	0.209	7.221	0.000	0.353
DL_MD	~~	DL_MD	0.878	0.160	5.493	0.000	0.200
PRE_C	~~	PRE_C	1.889	0.256	7.370	0.000	0.499
PRE_MT	~~	PRE_MT	0.292	0.210	1.388	0.165	0.073
PRE_MD	~~	PRE_MD	0.171	0.100	1.705	0.088	0.043
PAR_C	~~	PAR_C	1.951	0.284	6.865	0.000	0.496
PAR_MT	~~	PAR_MT	0.855	0.196	4.362	0.000	0.209
PAR_MD	~~	PAR_MD	0.250	0.108	2.312	0.021	0.061
OCC_C	~~	OCC_C	2.078	0.238	8.741	0.000	0.535
OCC_MT	~~	OCC_MT	1.533	0.183	8.399	0.000	0.373
HES_C	~~	HES_C	2.242	0.262	8.573	0.000	0.566
HES_MT	~~	HES_MT	0.547	0.224	2.437	0.015	0.134
HES_MD	~~	HES_MD	1.013	0.184	5.508	0.000	0.243
MO_C	~~	MO_C	2.349	0.270	8.708	0.000	0.598
MO_MT	~~	MO_MT	1.465	0.210	6.971	0.000	0.360
MO_MD	~~	MO_MD	0.948	0.127	7.449	0.000	0.219
PFC	~~	PFC	0.304	0.088	3.446	0.001	0.330
PRE	~~	PRE	0.169	0.067	2.518	0.012	0.300
PAR	~~	PAR	0.054	0.040	1.351	0.177	0.220
OCC	~~	OCC	0.216	0.068	3.175	0.001	0.340
HES	~~	HES	0.167	0.070	2.394	0.017	0.279

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
V	~~	V	1.334	0.339	3.941	0.000	1.000
MD	~~	MD	1.963	0.316	6.212	0.000	1.000
MT	~~	MT	2.462	0.405	6.079	0.000	1.000
Gb	=~	PFC	0.611	0.092	6.662	0.000	0.818
Gb	=~	PRE	0.489	0.099	4.916	0.000	0.837
Gb	=~	PAR	0.341	0.105	3.233	0.001	0.883
Gb	=~	OCC	0.505	0.087	5.832	0.000	0.812
Gb	=~	HES	0.511	0.098	5.238	0.000	0.849
Gb	~~	Gb	1.000	0.000			0.606
V	~~	MD	-0.562	0.193	-2.913	0.004	-0.347
V	~~	MT	0.049	0.187	0.264	0.792	0.027
MT	~~	MD	-1.391	0.284	-4.901	0.000	-0.633
DL_C	~1		5.054	0.125	40.569	0.000	2.551
DL_MT	~1		5.007	0.134	37.370	0.000	2.421
DL_MD	~1		5.085	0.116	43.695	0.000	2.430
MO_C	~1		5.037	0.127	39.673	0.000	2.541
MO_MT	~1		4.997	0.127	39.393	0.000	2.476
MO_MD	~1		5.045	0.120	42.145	0.000	2.425
PRE_C	~1		5.031	0.124	40.571	0.000	2.586
PRE_MT	~1		5.014	0.129	39.016	0.000	2.511
PRE_MD	~1		5.057	0.114	44.399	0.000	2.541
PAR_C	~1		5.019	0.128	39.162	0.000	2.529
PAR_MT	~1		5.032	0.132	38.262	0.000	2.485
PAR_MD	~1		5.024	0.119	42.217	0.000	2.476
OCC_C	~1		5.027	0.125	40.206	0.000	2.551
OCC_MT	~1		5.006	0.131	38.334	0.000	2.469

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
OCC_MD	~1		5.047	0.115	43.894	0.000	2.470
HES_C	~1		5.030	0.127	39.707	0.000	2.527
HES_MT	~1		5.041	0.120	42.034	0.000	2.500
HES_MD	~1		5.048	0.113	44.646	0.000	2.473
G	~~	Gb	0.268	0.075	3.576	0.000	0.268
R	~~	PRE	-0.109	0.047	-2.301	0.021	-0.327
G	~	age	-0.054	0.008	-7.104	0.000	-0.205
G	~	sex	-0.206	0.059	-3.501	0.000	-0.100
Gb	~	age	-0.157	0.021	-7.334	0.000	-0.472
Gb	~	sex	1.080	0.172	6.272	0.000	0.420
age12	~~	age12	0.000	0.000			0.000
sex01	~~	sex01	0.000	0.000			0.000
OCC_MD	~~	OCC_MD	0.000	0.000			0.000
age	~1		0.000	0.000			0.000
sex	~1		0.000	0.000			0.000
EM	~1		0.000	0.000			0.000
WM	~1		0.000	0.000			0.000
R	~1		0.000	0.000			0.000
G	~1		0.000	0.000			0.000
PFC	~1		0.000	0.000			0.000
PRE	~1		0.000	0.000			0.000
PAR	~1		0.000	0.000			0.000
OCC	~1		0.000	0.000			0.000
HES	~1		0.000	0.000			0.000
V	~1		0.000	0.000			0.000

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standardized parameter estimate
MT	~1		0.000	0.000			0.000
MD	~1		0.000	0.000			0.000
Gb	~1		0.000	0.000			0.000

Fit indices for NEOCORTEX model (including covariates)

CFI	AIC	BIC	RMSEA	SRMR
0.92	83,431.7	84,082.41	0.03	0.07

S3B. LIMBIC model (including covariates)

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standardized parameter estimate
age	=~	age12	1.000	0.000			1.000
age	~~	age	14.980	0.553	27.074	0.000	1.000
age12	~1		70.620	0.101	698.601	0.000	18.246
sex	=~	sex01	1.000	0.000			1.000
sex	~~	sex	0.250	0.009	27.074	0.000	1.000
sex01	~1		0.512	0.013	39.240	0.000	1.025
age	~~	sex	0.025	0.051	0.505	0.614	0.013
EM	=~	EM_VLMT	1.000	0.000			0.536
EM	=~	EM_FP	0.908	0.074	12.203	0.000	0.486
EM	=~	EM_SE	0.781	0.069	11.272	0.000	0.418
EM	=~	EM_OL	1.113	0.083	13.477	0.000	0.596
WM	=~	WM_LU	1.000	0.000			0.584
WM	=~	WM_SU	1.262	0.065	19.333	0.000	0.740
WM	=~	WM_NB	1.145	0.062	18.524	0.000	0.671

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
R	=~	R_FA	1.000	0.000			0.765
R	=~	R_PP	0.758	0.038	19.885	0.000	0.580
R	=~	R_LS	0.999	0.039	25.802	0.000	0.764
EM_VLMT	~~	EM_VLMT	2.851	0.131	21.805	0.000	0.713
EM_FP	~~	EM_FP	3.053	0.133	23.037	0.000	0.764
EM_SE	~~	EM_SE	3.299	0.137	24.155	0.000	0.825
EM_OL	~~	EM_OL	2.576	0.131	19.727	0.000	0.645
WM_LU	~~	WM_LU	2.646	0.112	23.654	0.000	0.658
WM_SU	~~	WM_SU	1.810	0.095	19.033	0.000	0.453
WM_NB	~~	WM_NB	2.197	0.102	21.579	0.000	0.550
R_FA	~~	R_FA	1.660	0.092	18.066	0.000	0.415
R_PP	~~	R_PP	2.655	0.111	23.910	0.000	0.664
R_LS	~~	R_LS	1.663	0.092	18.107	0.000	0.416
EM	~~	EM	0.555	0.078	7.145	0.000	0.484
WM	~~	WM	0.000				0.000
R	~~	R	0.653	0.082	8.014	0.000	0.280
G	=~	EM	0.748	0.050	14.826	0.000	0.718
G	=~	WM	1.140	0.052	21.801	0.000	1.000
G	=~	R	1.263	0.050	25.349	0.000	0.849
G	~~	G	1.000	0.000			0.947
EM_VLMT	~1		5.000	0.052	95.754	0.000	2.501
EM_FP	~1		5.000	0.052	95.753	0.000	2.501
EM_SE	~1		5.000	0.052	95.754	0.000	2.501
EM_OL	~1		5.000	0.052	95.754	0.000	2.501
WM_LU	~1		5.009	0.052	95.546	0.000	2.499
WM_SU	~1		5.000	0.052	95.754	0.000	2.501
WM_NB	~1		5.000	0.052	95.754	0.000	2.501

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
R_FA	~1		5.000	0.052	95.754	0.000	2.501
R_PP	~1		5.000	0.052	95.754	0.000	2.501
R_LS	~1		5.000	0.052	95.754	0.000	2.501
PHG	=~	PHG_C	1.000	0.000			0.352
PHG	=~	PHG_MT	2.132	0.382	5.581	0.000	0.689
PHG	=~	PHG_MD	-2.979	0.515	-5.786	0.000	-0.974
HC	=~	HC_C	1.000	0.000			0.566
HC	=~	HC_MT	1.762	0.181	9.718	0.000	0.943
HC	=~	HC_MD	-1.731	0.168	-10.300	0.000	-0.909
ACC	=~	ACC_C	1.000	0.000			0.400
ACC	=~	ACC_MT	2.048	0.360	5.690	0.000	0.798
ACC	=~	ACC_MD	-2.564	0.432	-5.934	0.000	-0.983
AMY	=~	AMY_C	1.000	0.000			0.281
AMY	=~	AMY_MT	2.470	0.564	4.376	0.000	0.634
AMY	=~	AMY_MD	-3.802	0.811	-4.688	0.000	-0.996
INS	=~	INS_C	1.000	0.000			0.212
INS	=~	INS_MT	4.423	1.504	2.941	0.003	0.885
INS	=~	INS_MD	-4.646	1.559	-2.979	0.003	-0.943
V	=~	PHG_C	1.000	0.000			0.785
V	=~	HC_C	0.841	0.079	10.627	0.000	0.651
V	=~	ACC_C	0.265	0.093	2.857	0.004	0.199
V	=~	AMY_C	0.945	0.094	10.046	0.000	0.730
V	=~	INS_C	0.430	0.102	4.203	0.000	0.323
MT	=~	PHG_MT	1.000	0.000			0.549
MT	=~	HC_MT	0.571	0.109	5.258	0.000	0.319
MT	=~	ACC_MT	0.375	0.106	3.526	0.000	0.208
MT	=~	AMY_MT	1.050	0.133	7.879	0.000	0.566

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
MT	=~	INS_MT	0.628	0.108	5.788	0.000	0.339
MD	=~	PHG_MD	1.000	0.000			0.018
MD	=~	HC_MD	23.779	92.892	0.256	0.798	0.417
MD	=~	ACC_MD	-10.519	44.037	-0.239	0.811	-0.184
MD	=~	AMY_MD	5.064	16.923	0.299	0.765	0.089
MD	=~	INS_MD	7.774	28.574	0.272	0.786	0.136
HC_C	~~	HC_C	0.927	0.136	6.807	0.000	0.256
HC_MT	~~	HC_MT	0.037	0.088	0.419	0.676	0.009
HC_MD	~~	HC_MD	0.000				0.000
PHG_C	~~	PHG_C	0.918	0.170	5.389	0.000	0.260
PHG_MT	~~	PHG_MT	0.942	0.184	5.133	0.000	0.224
PHG_MD	~~	PHG_MD	0.212	0.162	1.308	0.191	0.052
ACC_C	~~	ACC_C	3.107	0.295	10.525	0.000	0.801
ACC_MT	~~	ACC_MT	1.310	0.163	8.016	0.000	0.320
ACC_MD	~~	ACC_MD	0.000				0.000
AMY_C	~~	AMY_C	1.411	0.190	7.406	0.000	0.388
AMY_MT	~~	AMY_MT	1.210	0.204	5.918	0.000	0.278
INS_C	~~	INS_C	3.277	0.312	10.501	0.000	0.851
INS_MT	~~	INS_MT	0.447	0.111	4.025	0.000	0.103
INS_MD	~~	INS_MD	0.391	0.106	3.675	0.000	0.093
HC	~~	HC	0.464	0.095	4.881	0.000	0.399
PHG	~~	PHG	0.067	0.027	2.468	0.014	0.152
ACC	~~	ACC	0.221	0.078	2.817	0.005	0.356
AMY	~~	AMY	0.100	0.044	2.282	0.023	0.349
INS	~~	INS	0.034	0.024	1.436	0.151	0.197
V	~~	V	2.174	0.332	6.543	0.000	1.000
MD	~~	MD	0.001	0.010	0.125	0.900	1.000
MT	~~	MT	1.266	0.275	4.600	0.000	1.000

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
Gb	=~	HC	0.666	0.085	7.823	0.000	0.775
Gb	=~	PHG	0.486	0.088	5.554	0.000	0.921
Gb	=~	ACC	0.505	0.090	5.604	0.000	0.803
Gb	=~	AMY	0.345	0.078	4.431	0.000	0.807
Gb	=~	INS	0.298	0.102	2.919	0.004	0.896
Gb	~~	Gb	1.000	0.000			0.636
V	~~	MD	-0.005	0.024	-0.202	0.840	-0.090
V	~~	MT	-0.249	0.188	-1.330	0.183	-0.150
MT	~~	MD	-0.006	0.028	-0.220	0.826	-0.152
HC_C	~1		5.046	0.118	42.927	0.000	2.650
HC_MT	~1		5.091	0.115	44.098	0.000	2.528
HC_MD	~1		5.056	0.112	45.056	0.000	2.464
PHG_C	~1		5.037	0.120	42.044	0.000	2.681
PHG_MT	~1		5.010	0.131	38.256	0.000	2.444
PHG_MD	~1		5.007	0.107	46.809	0.000	2.472
ACC_C	~1		5.051	0.125	40.348	0.000	2.564
ACC_MT	~1		5.123	0.124	41.376	0.000	2.533
ACC_MD	~1		5.045	0.112	45.189	0.000	2.454
AMY_C	~1		5.041	0.123	40.968	0.000	2.643
AMY_MT	~1		5.036	0.136	36.905	0.000	2.412
AMY_MD	~1		5.059	0.111	45.486	0.000	2.473
INS_C	~1		5.024	0.127	39.475	0.000	2.560
INS_MT	~1		5.049	0.121	41.652	0.000	2.422
INS_MD	~1		5.025	0.110	45.860	0.000	2.446
G	~~	Gb	0.251	0.063	3.975	0.000	0.251

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
G	~	age	-0.055	0.008	-7.124	0.000	-0.206
G	~	sex	-0.208	0.059	-3.531	0.000	-0.101
Gb	~	age	-0.137	0.017	-8.035	0.000	-0.424
Gb	~	sex	1.090	0.141	7.755	0.000	0.435
age12	~~	age12	0.000	0.000			0.000
sex01	~~	sex01	0.000	0.000			0.000
AMY_MD	~~	AMY_MD	0.000	0.000			0.000
age	~1		0.000	0.000			0.000
sex	~1		0.000	0.000			0.000
EM	~1		0.000	0.000			0.000
WM	~1		0.000	0.000			0.000
R	~1		0.000	0.000			0.000
G	~1		0.000	0.000			0.000
PHG	~1		0.000	0.000			0.000
HC	~1		0.000	0.000			0.000
ACC	~1		0.000	0.000			0.000
AMY	~1		0.000	0.000			0.000
INS	~1		0.000	0.000			0.000
V	~1		0.000	0.000			0.000
MT	~1		0.000	0.000			0.000
MD	~1		0.000	0.000			0.000
Gb	~1		0.000	0.000			0.000

Fit indices for LIMBIC model (including covariates)

CFI	AIC	BIC	RMSEA	SRMR
0.92	80,975.28	81,557.21	0.03	0.08

S3C. BASAL GANGLIA model

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standardized parameter estimate
EM	=~	EM_VLMT	1.000	0.000			0.535
EM	=~	EM_FP	0.904	0.074	12.189	0.000	0.484
EM	=~	EM_SE	0.775	0.069	11.214	0.000	0.415
EM	=~	EM_OL	1.121	0.083	13.493	0.000	0.600
WM	=~	WM_LU	1.000	0.000			0.588
WM	=~	WM_SU	1.249	0.065	19.336	0.000	0.737
WM	=~	WM_NB	1.140	0.061	18.566	0.000	0.673
R	=~	R_FA	1.000	0.000			0.766
R	=~	R_PP	0.755	0.038	19.830	0.000	0.578
R	=~	R_LS	0.998	0.039	25.732	0.000	0.764
EM_VLMT	~~	EM_VLMT	2.852	0.131	21.815	0.000	0.713
EM_FP	~~	EM_FP	3.061	0.133	23.091	0.000	0.766
EM_SE	~~	EM_SE	3.310	0.137	24.205	0.000	0.828
EM_OL	~~	EM_OL	2.557	0.131	19.589	0.000	0.640
WM_LU	~~	WM_LU	2.628	0.112	23.512	0.000	0.654
WM_SU	~~	WM_SU	1.826	0.096	19.060	0.000	0.457
WM_NB	~~	WM_NB	2.188	0.102	21.418	0.000	0.547
R_FA	~~	R_FA	1.654	0.092	17.962	0.000	0.414
R_PP	~~	R_PP	2.662	0.111	23.925	0.000	0.666
R_LS	~~	R_LS	1.662	0.092	18.043	0.000	0.416
EM	~~	EM	0.551	0.077	7.126	0.000	0.481
WM	~~	WM	0.000	0.000			0.000
R	~~	R	0.666	0.082	8.090	0.000	0.284

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
G	=~	EM	0.771	0.052	14.861	0.000	0.720
G	=~	WM	1.180	0.054	22.024	0.000	1.000
G	=~	R	1.295	0.051	25.292	0.000	0.846
G	~~	G	1.000	0.000			1.000
EM_VLMT	~1		5.000	0.052	95.754	0.000	2.501
EM_FP	~1		5.000	0.052	95.753	0.000	2.501
EM_SE	~1		5.000	0.052	95.754	0.000	2.501
EM_OL	~1		5.000	0.052	95.754	0.000	2.501
WM_LU	~1		5.009	0.052	95.539	0.000	2.498
WM_SU	~1		5.000	0.052	95.754	0.000	2.501
WM_NB	~1		5.000	0.052	95.754	0.000	2.501
R_FA	~1		5.000	0.052	95.754	0.000	2.501
R_PP	~1		5.000	0.052	95.754	0.000	2.501
R_LS	~1		5.000	0.052	95.754	0.000	2.501
CAU	=~	CAU_C	1.000	0.000			0.131
CAU	=~	CAU_MT	6.217	0.000			0.861
CAU	=~	CAU_MD	-5.256	0.000			-0.675
PUT	=~	PUT_C	1.000	0.000			0.487
PUT	=~	PUT_MT	-0.831	0.000			-0.399
PUT	=~	PUT_MD	0.261	0.000			0.128
NAC	=~	NAC_C	1.000	0.000			0.580
NAC	=~	NAC_MT	0.959	0.000			0.570
NAC	=~	NAC_MD	-1.150	0.000			-0.686
PAL	=~	PAL_C	1.000	0.000			0.435

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
PAL	=~	PAL_MT	-0.951	0.000			-0.400
PAL	=~	PAL_MD	-0.355	0.000			-0.152
V	=~	PUT_C	1.000	0.000			0.816
V	=~	CAU_C	0.637	0.000			0.529
V	=~	NAC_C	0.402	0.000			0.331
V	=~	PAL_C	0.570	0.000			0.477
MT	=~	PUT_MT	1.000	0.000			0.840
MT	=~	CAU_MT	0.555	0.000			0.508
MT	=~	NAC_MT	0.587	0.000			0.518
MT	=~	PAL_MT	1.083	0.000			0.916
MD	=~	PUT_MD	1.000	0.000			0.752
MD	=~	CAU_MD	0.789	0.000			0.585
MD	=~	NAC_MD	0.940	0.000			0.727
MD	=~	PAL_MD	1.005	0.000			0.757
CAU_C	~~	CAU_C	2.811	0.291	9.671	0.000	0.702
CAU_MT	~~	CAU_MT	0.000				0.000
CAU_MD	~~	CAU_MD	0.844	0.113	7.497	0.000	0.202
PUT_C	~~	PUT_C	0.402	0.248	1.620	0.105	0.097
PUT_MT	~~	PUT_MT	0.580	0.142	4.075	0.000	0.135
PUT_MD	~~	PUT_MD	1.701	0.192	8.874	0.000	0.418
NAC_C	~~	NAC_C	2.256	0.248	9.099	0.000	0.554
NAC_MT	~~	NAC_MT	1.583	0.191	8.282	0.000	0.408
PAL_C	~~	PAL_C	2.305	0.268	8.589	0.000	0.583
PAL_MT	~~	PAL_MT	0.000				0.000
PAL_MD	~~	PAL_MD	1.639	0.187	8.748	0.000	0.404

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
CAU	~~	CAU	0.013	0.009	1.471	0.141	0.190
PUT	~~	PUT	0.201	0.194	1.035	0.300	0.203
NAC	~~	NAC	0.738	0.125	5.881	0.000	0.538
PAL	~~	PAL	0.602	0.120	5.029	0.000	0.805
V	~~	V	2.765	0.359	7.711	0.000	1.000
MD	~~	MD	2.301	0.240	9.577	0.000	1.000
MT	~~	MT	3.021	0.337	8.975	0.000	1.000
Gb	=~	CAU	0.236	0.022	10.591	0.000	0.900
Gb	=~	PUT	0.886	0.112	7.907	0.000	0.892
Gb	=~	NAC	0.795	0.088	9.011	0.000	0.679
Gb	=~	PAL	0.382	0.096	3.980	0.000	0.442
Gb	~~	Gb	1.000	0.000			1.000
V	~~	MT	-0.650	0.287	-2.267	0.023	-0.225
V	~~	MD	0.877	0.241	3.636	0.000	0.348
MT	~~	MD	-1.498	0.246	-6.092	0.000	-0.568
CAU_C	~1		5.012	0.131	38.215	0.000	2.505
CAU_MT	~1		4.987	0.122	40.856	0.000	2.628
CAU_MD	~1		5.086	0.122	41.713	0.000	2.486
PUT_C	~1		5.069	0.131	38.785	0.000	2.487
PUT_MT	~1		5.012	0.144	34.801	0.000	2.422
PUT_MD	~1		5.013	0.123	40.885	0.000	2.485
NAC_C	~1		5.092	0.128	39.765	0.000	2.523
NAC_MT	~1		4.981	0.133	37.404	0.000	2.528
NAC_MD	~1		5.051	0.117	43.080	0.000	2.576
PAL_C	~1		5.018	0.129	38.960	0.000	2.525
PAL_MT	~1		4.993	0.144	34.792	0.000	2.431

Left-hand side variable	Lavaan operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
PAL_MD	~1		5.017	0.123	40.925	0.000	2.490
G	~~	Gb	0.101	0.071	1.436	0.151	0.101
NAC_MD	~~	NAC_MD	0.000	0.000			0.000
EM	~1		0.000	0.000			0.000
WM	~1		0.000	0.000			0.000
R	~1		0.000	0.000			0.000
G	~1		0.000	0.000			0.000
CAU	~1		0.000	0.000			0.000
PUT	~1		0.000	0.000			0.000
NAC	~1		0.000	0.000			0.000
PAL	~1		0.000	0.000			0.000
V	~1		0.000	0.000			0.000
MT	~1		0.000	0.000			0.000
MD	~1		0.000	0.000			0.000
Gb	~1		0.000	0.000			0.000

Fit indices for BASAL GANGLIA model

CFI	AIC	BIC	RMSEA	SRMR
0.94	68,850.59	69,226.2	0.03	0.09

Parameter estimates and fit indices from the brain-only-models:

S3D. NEOCORTEX model, brain only (including covariates)

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
age	loading	age12	1.000	0.000			1.000
sex	loading	sex01	1.000	0.000			1.000
PFC	loading	DL_C	1.000	0.000			0.489
PFC	loading	DL_MT	1.453	0.224	6.488	0.000	0.678
PFC	loading	DL_MD	-1.878	0.253	-7.429	0.000	-0.870
PFC	loading	MO_C	0.731	0.141	5.172	0.000	0.358
PFC	loading	MO_MT	1.675	0.247	6.792	0.000	0.803
PFC	loading	MO_MD	-1.481	0.207	-7.170	0.000	-0.688
PRE	loading	PRE_C	1.000	0.000			0.399
PRE	loading	PRE_MT	1.495	0.298	5.017	0.000	0.579
PRE	loading	PRE_MD	-1.751	0.324	-5.409	0.000	-0.680
PAR	loading	PAR_C	1.000	0.000			0.252
PAR	loading	PAR_MT	2.533	0.801	3.162	0.002	0.624
PAR	loading	PAR_MD	-2.096	0.645	-3.248	0.001	-0.516
OCC	loading	OCC_C	1.000	0.000			0.412
OCC	loading	OCC_MT	1.682	0.281	5.978	0.000	0.671
OCC	loading	OCC_MD	-2.026	0.295	-6.867	0.000	-0.803
HES	loading	HES_C	1.000	0.000			0.392
HES	loading	HES_MT	2.423	0.426	5.690	0.000	0.935
HES	loading	HES_MD	-2.217	0.388	-5.711	0.000	-0.846
V	loading	PRE_C	1.000	0.000			0.590
V	loading	DL_C	0.811	0.162	5.003	0.000	0.470
V	loading	MO_C	0.908	0.171	5.296	0.000	0.527
V	loading	PAR_C	1.144	0.144	7.956	0.000	0.664
V	loading	OCC_C	0.936	0.156	6.000	0.000	0.546

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
V	loading	HES_C	0.924	0.169	5.466	0.000	0.534
MT	loading	PRE_MT	1.000	0.000			0.777
MT	loading	DL_MT	0.585	0.099	5.889	0.000	0.440
MT	loading	MO_MT	0.076	0.082	0.923	0.356	0.058
MT	loading	PAR_MT	0.826	0.107	7.690	0.000	0.636
MT	loading	OCC_MT	0.552	0.079	6.958	0.000	0.424
MT	loading	HES_MT	-0.084	0.082	-1.028	0.304	-0.065
MD	loading	PRE_MD	1.000	0.000			0.699
MD	loading	DL_MD	0.283	0.075	3.767	0.000	0.190
MD	loading	MO_MD	0.828	0.082	10.084	0.000	0.557
MD	loading	PAR_MD	1.186	0.082	14.419	0.000	0.818
MD	loading	OCC_MD	0.872	0.056	15.584	0.000	0.596
MD	loading	HES_MD	0.269	0.073	3.668	0.000	0.185
Gb	loading	PFC	0.613	0.092	6.673	0.000	0.821
Gb	loading	PRE	0.511	0.101	5.062	0.000	0.850
Gb	loading	PAR	0.344	0.106	3.260	0.001	0.893
Gb	loading	OCC	0.512	0.087	5.908	0.000	0.817
Gb	loading	HES	0.507	0.097	5.229	0.000	0.843
age	(co)varianc e	age	15.108	1.196	12.629	0.000	1.000
sex	(co)varianc e	sex	0.235	0.019	12.629	0.000	1.000
age	(co)varianc e	sex	-0.037	0.106	-0.349	0.727	-0.020
DL_C	(co)varianc e	DL_C	2.129	0.247	8.628	0.000	0.540
DL_MT	(co)varianc e	DL_MT	1.497	0.208	7.207	0.000	0.346
DL_MD	(co)varianc e	DL_MD	0.909	0.160	5.664	0.000	0.207
PRE_C	(co)varianc e	PRE_C	1.880	0.255	7.364	0.000	0.493

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
PRE_MT	(co)varianc e	PRE_MT	0.247	0.206	1.201	0.230	0.061
PRE_MD	(co)varianc e	PRE_MD	0.198	0.098	2.024	0.043	0.049
PAR_C	(co)varianc e	PAR_C	1.956	0.284	6.883	0.000	0.496
PAR_MT	(co)varianc e	PAR_MT	0.854	0.194	4.401	0.000	0.207
PAR_MD	(co)varianc e	PAR_MD	0.272	0.110	2.479	0.013	0.066
OCC_C	(co)varianc e	OCC_C	2.074	0.237	8.756	0.000	0.532
OCC_MT	(co)varianc e	OCC_MT	1.534	0.183	8.403	0.000	0.370
HES_C	(co)varianc e	HES_C	2.230	0.261	8.531	0.000	0.561
HES_MT	(co)varianc e	HES_MT	0.498	0.234	2.132	0.033	0.122
HES_MD	(co)varianc e	HES_MD	1.047	0.189	5.547	0.000	0.250
MO_C	(co)varianc e	MO_C	2.343	0.269	8.694	0.000	0.595
MO_MT	(co)varianc e	MO_MT	1.443	0.211	6.843	0.000	0.352
MO_MD	(co)varianc e	MO_MD	0.947	0.131	7.244	0.000	0.217
PFC	(co)varianc e	PFC	0.307	0.089	3.435	0.001	0.326
PRE	(co)varianc e	PRE	0.169	0.067	2.531	0.011	0.278
PAR	(co)varianc e	PAR	0.051	0.038	1.351	0.177	0.203
OCC	(co)varianc e	OCC	0.220	0.068	3.212	0.001	0.332
HES	(co)varianc e	HES	0.177	0.073	2.428	0.015	0.290
V	(co)varianc e	V	1.326	0.337	3.930	0.000	1.000

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
MD	(co)varianc e	MD	1.972	0.323	6.109	0.000	1.000
MT	(co)varianc e	MT	2.448	0.409	5.990	0.000	1.000
Gb	(co)varianc e	Gb	1.000	0.000			0.593
V	(co)varianc e	MT	0.040	0.187	0.216	0.829	0.022
V	(co)varianc e	MD	-0.560	0.195	-2.869	0.004	-0.346
MT	(co)varianc e	MD	-1.382	0.289	-4.783	0.000	-0.629
age12	(co)varianc e	age12	0.000	0.000			0.000
sex01	(co)varianc e	sex01	0.000	0.000			0.000
OCC_MD	(co)varianc e	OCC_MD	0.000	0.000			0.000
Gb	regression	age	-0.158	0.022	-7.330	0.000	-0.473
Gb	regression	sex	1.120	0.174	6.438	0.000	0.419
age12	mean/ intercept		70.136	0.218	322.280	0.000	18.044
sex01	mean/ intercept		0.379	0.027	13.962	0.000	0.782
DL_C	mean/ intercept		5.019	0.126	39.714	0.000	2.528
DL_MT	mean/ intercept		4.956	0.138	35.917	0.000	2.384
DL_MD	mean/ intercept		5.145	0.124	41.423	0.000	2.456
MO_C	mean/ intercept		5.012	0.128	39.200	0.000	2.525
MO_MT	mean/ intercept		4.938	0.132	37.292	0.000	2.439
MO_MD	mean/ intercept		5.094	0.125	40.905	0.000	2.439
PRE_C	mean/ intercept		5.008	0.125	39.976	0.000	2.564

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
PRE_MT	mean/ intercept		4.978	0.132	37.777	0.000	2.472
PRE_MD	mean/ intercept		5.095	0.119	42.729	0.000	2.536
PAR_C	mean/ intercept		4.999	0.129	38.901	0.000	2.518
PAR_MT	mean/ intercept		4.982	0.135	36.864	0.000	2.450
PAR_MD	mean/ intercept		5.062	0.122	41.511	0.000	2.486
OCC_C	mean/ intercept		4.998	0.126	39.598	0.000	2.532
OCC_MT	mean/ intercept		4.957	0.134	36.876	0.000	2.433
OCC_MD	mean/ intercept		5.103	0.121	42.060	0.000	2.486
HES_C	mean/ intercept		5.002	0.128	39.086	0.000	2.509
HES_MT	mean/ intercept		4.970	0.128	38.712	0.000	2.455
HES_MD	mean/ intercept		5.109	0.121	42.218	0.000	2.496
age	mean/ intercept		0.000	0.000			0.000
sex	mean/ intercept		0.000	0.000			0.000
PFC	mean/ intercept		0.000	0.000			0.000
PRE	mean/ intercept		0.000	0.000			0.000
PAR	mean/ intercept		0.000	0.000			0.000
OCC	mean/ intercept		0.000	0.000			0.000
HES	mean/ intercept		0.000	0.000			0.000
V	mean/ intercept		0.000	0.000			0.000

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
MT	mean/ intercept		0.000	0.000			0.000
MD	mean/ intercept		0.000	0.000			0.000
Gb	mean/ intercept		0.000	0.000			0.000

Fit indices for NEOCORTEX brain-only model (including covariates)

CFI	AIC	BIC	RMSEA	SRMR
0.9	16,958.85	17,282.66	0.08	0.08

S3E. LIMBIC model, brain only (including covariates)

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standardized parameter estimate
age	loading	age12	1.000	0.000			1.000
sex	loading	sex01	1.000	0.000			1.000
PHG	loading	PHG_C	1.000	0.000			0.353
PHG	loading	PHG_MT	2.139	0.384	5.571	0.000	0.691
PHG	loading	PHG_MD	-2.980	0.515	-5.788	0.000	-0.974
HC	loading	HC_C	1.000	0.000			0.566
HC	loading	HC_MT	1.769	0.183	9.690	0.000	0.944
HC	loading	HC_MD	-1.733	0.169	-10.242	0.000	-0.908
ACC	loading	ACC_C	1.000	0.000			0.403
ACC	loading	ACC_MT	2.037	0.357	5.710	0.000	0.798
ACC	loading	ACC_MD	-2.553	0.428	-5.967	0.000	-0.984
AMY	loading	AMY_C	1.000	0.000			0.280
AMY	loading	AMY_MT	2.479	0.570	4.349	0.000	0.634
AMY	loading	AMY_MD	-3.818	0.819	-4.664	0.000	-0.996
INS	loading	INS_C	1.000	0.000			0.213
INS	loading	INS_MT	4.439	1.518	2.925	0.003	0.885
INS	loading	INS_MD	-4.657	1.571	-2.963	0.003	-0.943
V	loading	PHG_C	1.000	0.000			0.784
V	loading	HC_C	0.843	0.079	10.647	0.000	0.652
V	loading	ACC_C	0.265	0.093	2.856	0.004	0.198
V	loading	AMY_C	0.947	0.094	10.046	0.000	0.731
V	loading	INS_C	0.431	0.102	4.211	0.000	0.323
MT	loading	PHG_MT	1.000	0.000			0.548
MT	loading	HC_MT	0.571	0.108	5.279	0.000	0.319
MT	loading	ACC_MT	0.379	0.106	3.565	0.000	0.211
MT	loading	AMY_MT	1.053	0.133	7.887	0.000	0.567

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
MT	loading	INS_MT	0.630	0.108	5.835	0.000	0.339
MD	loading	PHG_MD	1.000	0.000			0.021
MD	loading	HC_MD	19.909	59.667	0.334	0.739	0.419
MD	loading	ACC_MD	-8.503	27.764	-0.306	0.759	-0.179
MD	loading	AMY_MD	4.358	10.960	0.398	0.691	0.092
MD	loading	INS_MD	6.664	18.630	0.358	0.721	0.140
Gb	loading	HC	0.663	0.084	7.858	0.000	0.776
Gb	loading	PHG	0.486	0.087	5.560	0.000	0.923
Gb	loading	ACC	0.504	0.090	5.616	0.000	0.801
Gb	loading	AMY	0.343	0.078	4.417	0.000	0.809
Gb	loading	INS	0.296	0.102	2.904	0.004	0.896
age	(co)varianc e	age	15.108	1.196	12.629	0.000	1.000
sex	(co)varianc e	sex	0.235	0.019	12.629	0.000	1.000
age	(co)varianc e	sex	-0.037	0.106	-0.349	0.727	-0.020
HC_C	(co)varianc e	HC_C	0.928	0.136	6.799	0.000	0.255
HC_MT	(co)varianc e	HC_MT	0.031	0.088	0.349	0.727	0.007
HC_MD	(co)varianc e	HC_MD	0.000	0.000			0.000
PHG_C	(co)varianc e	PHG_C	0.921	0.170	5.418	0.000	0.261
PHG_MT	(co)varianc e	PHG_MT	0.942	0.182	5.162	0.000	0.223
PHG_MD	(co)varianc e	PHG_MD	0.213	0.162	1.315	0.189	0.052
ACC_C	(co)varianc e	ACC_C	3.103	0.295	10.524	0.000	0.798
ACC_MT	(co)varianc e	ACC_MT	1.314	0.164	8.025	0.000	0.319
ACC_MD	(co)varianc e	ACC_MD	0.000				0.000

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
AMY_C	(co)varianc e	AMY_C	1.408	0.190	7.390	0.000	0.387
AMY_MT	(co)varianc e	AMY_MT	1.209	0.205	5.901	0.000	0.276
INS_C	(co)varianc e	INS_C	3.277	0.312	10.500	0.000	0.850
INS_MT	(co)varianc e	INS_MT	0.449	0.112	4.022	0.000	0.102
INS_MD	(co)varianc e	INS_MD	0.389	0.107	3.626	0.000	0.092
HC	(co)varianc e	HC	0.463	0.095	4.856	0.000	0.398
PHG	(co)varianc e	PHG	0.065	0.027	2.439	0.015	0.148
ACC	(co)varianc e	ACC	0.226	0.080	2.837	0.005	0.358
AMY	(co)varianc e	AMY	0.099	0.044	2.270	0.023	0.346
INS	(co)varianc e	INS	0.034	0.024	1.429	0.153	0.198
V	(co)varianc e	V	2.172	0.333	6.530	0.000	1.000
MD	(co)varianc e	MD	0.002	0.012	0.163	0.871	1.000
MT	(co)varianc e	MT	1.270	0.275	4.621	0.000	1.000
Gb	(co)varianc e	Gb	1.000	0.000			0.628
V	(co)varianc e	MT	-0.257	0.188	-1.364	0.172	-0.155
V	(co)varianc e	MD	-0.006	0.023	-0.251	0.802	-0.090
MT	(co)varianc e	MD	-0.008	0.028	-0.277	0.782	-0.157
age12	(co)varianc e	age12	0.000	0.000			0.000
sex01	(co)varianc e	sex01	0.000	0.000			0.000

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
AMY_MD	(co)varianc e	AMY_MD	0.000	0.000			0.000
Gb	regression	age	-0.138	0.017	-7.978	0.000	-0.426
Gb	regression	sex	1.112	0.142	7.828	0.000	0.428
age12	mean/ intercept		70.136	0.218	322.279	0.000	18.044
sex01	mean/ intercept		0.379	0.027	13.962	0.000	0.782
HC_C	mean/ intercept		5.000	0.120	41.784	0.000	2.623
HC_MT	mean/ intercept		5.009	0.122	40.900	0.000	2.479
HC_MD	mean/ intercept		5.135	0.119	42.971	0.000	2.495
PHG_C	mean/ intercept		5.004	0.121	41.415	0.000	2.661
PHG_MT	mean/ intercept		4.938	0.136	36.322	0.000	2.401
PHG_MD	mean/ intercept		5.106	0.119	42.943	0.000	2.511
ACC_C	mean/ intercept		5.016	0.126	39.785	0.000	2.544
ACC_MT	mean/ intercept		5.052	0.129	39.184	0.000	2.491
ACC_MD	mean/ intercept		5.133	0.121	42.552	0.000	2.491
AMY_C	mean/ intercept		5.017	0.123	40.679	0.000	2.629
AMY_MT	mean/ intercept		4.978	0.140	35.642	0.000	2.380
AMY_MD	mean/ intercept		5.148	0.121	42.608	0.000	2.510
INS_C	mean/ intercept		5.003	0.127	39.272	0.000	2.549
INS_MT	mean/ intercept		4.958	0.130	38.184	0.000	2.367
INS_MD	mean/ intercept		5.119	0.120	42.581	0.000	2.483

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
age	mean/ intercept		0.000	0.000			0.000
sex	mean/ intercept		0.000	0.000			0.000
PHG	mean/ intercept		0.000	0.000			0.000
HC	mean/ intercept		0.000	0.000			0.000
ACC	mean/ intercept		0.000	0.000			0.000
AMY	mean/ intercept		0.000	0.000			0.000
INS	mean/ intercept		0.000	0.000			0.000
V	mean/ intercept		0.000	0.000			0.000
MT	mean/ intercept		0.000	0.000			0.000
MD	mean/ intercept		0.000	0.000			0.000
Gb	mean/ intercept		0.000	0.000			0.000

Fit indices for LIMBIC brain-only model (including covariates)

CFI	AIC	BIC	RMSEA	SRMR
0.89	14,501.08	14,779.7	0.1	0.1

S3F. BASAL GANGLIA model, brain only

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
CAU	loading	CAU_C	1.000	0.000			0.131
CAU	loading	CAU_MT	6.217	3.498	1.777	0.076	0.861
CAU	loading	CAU_MD	-5.256	2.933	-1.792	0.073	-0.675
PUT	loading	PUT_C	1.000	0.000			0.488
PUT	loading	PUT_MT	-0.831	0.204	-4.072	0.000	-0.399
PUT	loading	PUT_MD	0.261	0.146	1.781	0.075	0.128
NAC	loading	NAC_C	1.000	0.000			0.579
NAC	loading	NAC_MT	0.959	0.150	6.385	0.000	0.569
NAC	loading	NAC_MD	-1.150	0.156	-7.390	0.000	-0.685
PAL	loading	PAL_C	1.000	0.000			0.437
PAL	loading	PAL_MT	-0.951	0.303	-3.140	0.002	-0.402
PAL	loading	PAL_MD	-0.355	0.364	-0.976	0.329	-0.153
V	loading	PUT_C	1.000	0.000			0.815
V	loading	CAU_C	0.637	0.128	4.965	0.000	0.529
V	loading	NAC_C	0.402	0.095	4.243	0.000	0.331
V	loading	PAL_C	0.570	0.092	6.211	0.000	0.476
MT	loading	PUT_MT	1.000	0.000			0.840
MT	loading	CAU_MT	0.555	0.104	5.339	0.000	0.508
MT	loading	NAC_MT	0.587	0.095	6.201	0.000	0.518
MT	loading	PAL_MT	1.083	0.084	12.818	0.000	0.916
MD	loading	PUT_MD	1.000	0.000			0.752
MD	loading	CAU_MD	0.789	0.085	9.280	0.000	0.586
MD	loading	NAC_MD	0.940	0.089	10.552	0.000	0.728
MD	loading	PAL_MD	1.005	0.089	11.297	0.000	0.757
Gb	loading	CAU	0.234	0.131	1.788	0.074	0.892
Gb	loading	PUT	0.898	0.159	5.645	0.000	0.904

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
Gb	loading	NAC	0.792	0.146	5.416	0.000	0.679
Gb	loading	PAL	0.382	0.141	2.706	0.007	0.440
CAU_C	(co)varianc e	CAU_C	2.815	0.344	8.179	0.000	0.703
CAU_MT	(co)varianc e	CAU_MT	0.000	0.000			0.000
CAU_MD	(co)varianc e	CAU_MD	0.838	0.121	6.926	0.000	0.200
PUT_C	(co)varianc e	PUT_C	0.406	0.430	0.943	0.346	0.098
PUT_MT	(co)varianc e	PUT_MT	0.579	0.194	2.982	0.003	0.135
PUT_MD	(co)varianc e	PUT_MD	1.700	0.219	7.765	0.000	0.417
NAC_C	(co)varianc e	NAC_C	2.262	0.273	8.294	0.000	0.555
NAC_MT	(co)varianc e	NAC_MT	1.584	0.207	7.642	0.000	0.408
PAL_C	(co)varianc e	PAL_C	2.301	0.438	5.251	0.000	0.582
PAL_MT	(co)varianc e	PAL_MT	0.000				0.000
PAL_MD	(co)varianc e	PAL_MD	1.640	0.287	5.707	0.000	0.403
CAU	(co)varianc e	CAU	0.014	0.019	0.739	0.460	0.204
PUT	(co)varianc e	PUT	0.181	0.254	0.711	0.477	0.183
NAC	(co)varianc e	NAC	0.736	0.188	3.917	0.000	0.540
PAL	(co)varianc e	PAL	0.608	0.456	1.332	0.183	0.806
V	(co)varianc e	V	2.758	0.523	5.270	0.000	1.000
MD	(co)varianc e	MD	2.307	0.356	6.475	0.000	1.000
MT	(co)varianc e	MT	3.022	0.470	6.434	0.000	1.000

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
Gb	(co)varianc e	Gb	1.000	0.000			1.000
V	(co)varianc e	MT	-0.647	0.345	-1.876	0.061	-0.224
V	(co)varianc e	MD	0.878	0.264	3.332	0.001	0.348
MT	(co)varianc e	MD	-1.502	0.274	-5.487	0.000	-0.569
NAC_MD	(co)varianc e	NAC_MD	0.000	0.000			0.000
CAU_C	mean/ intercept		5.013	0.131	38.174	0.000	2.506
CAU_MT	mean/ intercept		4.996	0.122	40.937	0.000	2.634
CAU_MD	mean/ intercept		5.078	0.122	41.630	0.000	2.483
PUT_C	mean/ intercept		5.075	0.131	38.773	0.000	2.491
PUT_MT	mean/ intercept		5.008	0.144	34.755	0.000	2.420
PUT_MD	mean/ intercept		5.015	0.123	40.796	0.000	2.484
NAC_C	mean/ intercept		5.097	0.129	39.644	0.000	2.526
NAC_MT	mean/ intercept		4.986	0.133	37.448	0.000	2.532
NAC_MD	mean/ intercept		5.045	0.117	43.027	0.000	2.574
PAL_C	mean/ intercept		5.020	0.129	38.918	0.000	2.525
PAL_MT	mean/ intercept		4.991	0.144	34.747	0.000	2.428
PAL_MD	mean/ intercept		5.016	0.123	40.768	0.000	2.487
CAU	mean/ intercept		0.000	0.000			0.000
PUT	mean/ intercept		0.000	0.000			0.000

Left-hand side variable	Operator	Right-hand side variable	Parameter estimate	Standard error	z-value	p-value	Standar-dized parameter estimate
NAC	mean/ intercept		0.000	0.000			0.000
PAL	mean/ intercept		0.000	0.000			0.000
V	mean/ intercept		0.000	0.000			0.000
MT	mean/ intercept		0.000	0.000			0.000
MD	mean/ intercept		0.000	0.000			0.000
Gb	mean/ intercept		0.000	0.000			0.000

Fit indices for BASAL GANGLIA brain-only model

CFI	AIC	BIC	RMSEA	SRMR
0.88	10,378.03	10,579.8	0.12	0.11