

## **Role of subcortical structures on cognitive and social function in schizophrenia**

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**Supplementary Table 1** Comparison of the WAIS-III and UPSA-B indices between patients with schizophrenia and HCs.

	SZ (N = 163)		HC (N = 620)		Effect size, <i>d</i>	Statistics	
	Mean	SD	Mean	SD		<i>t</i> or $\chi^2$	<i>p</i>
<b>WAIS-III</b>							
<i>Full-Scale IQ</i>	88.1	17.9	112.0	12.1	-1.57	<i>t</i> (781) = 20.12	<u><math>7.3 \times 10^{-73}</math></u>
Verbal IQ	91.8	17.3	113.0	13.2	-1.38	<i>t</i> (781) = 17.04	<u><math>1.4 \times 10^{-55}</math></u>
Performance IQ	85.8	18.0	108.3	12.4	-1.46	<i>t</i> (781) = 18.60	<u><math>3.4 \times 10^{-64}</math></u>
Verbal Comprehension Index	94.0	16.5	110.7	13.1	-1.12	<i>t</i> (781) = 13.62	<u><math>4.7 \times 10^{-38}</math></u>
Perceptual Organization Index	89.8	18.9	107.9	13.2	-1.11	<i>t</i> (781) = 14.10	<u><math>2.3 \times 10^{-40}</math></u>
Working Memory Index	90.2	17.9	109.6	15.1	-1.17	<i>t</i> (781) = 14.06	<u><math>3.3 \times 10^{-40}</math></u>
Processing Speed Index	80.3	16.1	109.8	13.8	-1.96	<i>t</i> (781) = 23.37	<u><math>5.1 \times 10^{-92}</math></u>
Vocabulary	8.9	3.5	12.4	3.1	-1.08	<i>t</i> (781) = 12.68	<u><math>1.2 \times 10^{-33}</math></u>
Similarities	8.8	3.1	11.8	2.4	-1.08	<i>t</i> (781) = 13.24	<u><math>3.0 \times 10^{-36}</math></u>
Information	9.1	3.1	11.5	2.7	-0.82	<i>t</i> (781) = 9.73	<u><math>3.3 \times 10^{-21}</math></u>
<i>Comprehension</i>	7.7	3.5	12.8	2.7	-1.65	<i>t</i> (781) = 20.39	<u><math>2.1 \times 10^{-74}</math></u>
Arithmetic	8.3	3.3	12.4	3.0	-1.33	<i>t</i> (781) = 15.55	<u><math>1.1 \times 10^{-47}</math></u>
Digit Span	9.6	3.3	11.2	3.1	-0.51	<i>t</i> (781) = 5.97	<u><math>3.6 \times 10^{-9}</math></u>
Letter-Number Sequencing	7.8	3.4	11.4	3.2	-1.06	<i>t</i> (781) = 12.29	<u><math>7.0 \times 10^{-32}</math></u>
<i>Picture Arrangement</i>	7.9	3.9	10.6	3.2	-0.75	<i>t</i> (781) = 9.02	<u><math>1.4 \times 10^{-18}</math></u>
Picture Completion	8.0	3.5	10.5	2.6	-0.81	<i>t</i> (781) = 10.07	<u><math>1.6 \times 10^{-22}</math></u>
Block Design	8.8	4.0	11.8	3.1	-0.83	<i>t</i> (781) = 10.19	<u><math>5.6 \times 10^{-23}</math></u>
Matrix Reasoning	8.5	3.5	11.7	2.6	-1.04	<i>t</i> (781) = 13.00	<u><math>4.3 \times 10^{-35}</math></u>
<i>Digit Symbol-Coding</i>	6.5	3.0	11.8	3.0	-1.79	<i>t</i> (781) = 20.44	<u><math>1.0 \times 10^{-74}</math></u>
Symbol Search	6.5	3.2	11.9	2.8	-1.79	<i>t</i> (781) = 21.19	<u><math>4.4 \times 10^{-79}</math></u>
<b>UPSA-B</b>							
Finance <sup>a</sup>	43.6	8.3	48.9	2.7	-0.85	<i>t</i> (217) = 7.00	<u><math>3.1 \times 10^{-11}</math></u>
Communication <sup>a</sup>	24.2	10.9	34.1	6.8	-1.09	<i>t</i> (217) = 8.18	<u><math>2.4 \times 10^{-14}</math></u>
<i>Total score of the UPSA-B<sup>a</sup></i>	67.8	16.8	82.9	7.8	-1.16	<i>t</i> (217) = 9.14	<u><math>4.6 \times 10^{-17}</math></u>

Legend: <sup>a</sup>Only 68 patients with schizophrenia and 151 HCs have the UPSA-B data; *Italic type* means cognitive indices of interest or social indices of interest; Underlining indicates  $p < 0.05$ .

Abbreviation: SZ, patients with schizophrenia; HCs, healthy controls; SD, standard deviation; WAIS-III, Wechsler Adult Intelligence Scale-Third Edition; IQ, intelligence quotient; UPSA-B, the University of California, San Diego, Performance-Based Skills Assessment Brief.

**Supplementary Table 2** Correlations between the MRI indices and the WAIS-III/UPSA-B indices in patients with schizophrenia.

	Lhippo		Rhippo		Lamyg		Ramyg	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
WAIS-III								
<i>Full-Scale IQ</i>	0.301	$9.6 \times 10^{-5}$	0.301	$9.4 \times 10^{-5}$	0.293	$1.5 \times 10^{-4}$	0.214	$6.0 \times 10^{-3}$
Verbal IQ	0.291	$1.7 \times 10^{-4}$	0.252	$1.1 \times 10^{-3}$	0.291	$1.6 \times 10^{-4}$	0.195	$1.3 \times 10^{-2}$
Performance IQ	0.272	$4.4 \times 10^{-4}$	0.318	$3.5 \times 10^{-5}$	0.253	$1.1 \times 10^{-3}$	0.206	$8.4 \times 10^{-3}$
Verbal Comprehension Index	0.314	$4.3 \times 10^{-5}$	0.275	$3.8 \times 10^{-4}$	0.330	$1.7 \times 10^{-5}$	0.216	$5.6 \times 10^{-3}$
Perceptual Organization Index	0.274	$4.1 \times 10^{-4}$	0.299	$1.1 \times 10^{-4}$	0.235	$2.5 \times 10^{-3}$	0.176	$2.4 \times 10^{-2}$
Working Memory Index	0.219	$5.0 \times 10^{-3}$	0.207	$8.1 \times 10^{-3}$	0.207	$7.9 \times 10^{-3}$	0.093	0.24
Processing Speed Index	0.252	$1.2 \times 10^{-3}$	0.252	$1.2 \times 10^{-3}$	0.166	$3.4 \times 10^{-2}$	0.173	$2.7 \times 10^{-2}$
Vocabulary	0.257	$9.5 \times 10^{-4}$	0.207	$8.0 \times 10^{-3}$	0.309	$5.9 \times 10^{-5}$	0.249	$1.4 \times 10^{-3}$
Similarities	0.255	$1.0 \times 10^{-3}$	0.220	$4.8 \times 10^{-3}$	0.311	$5.3 \times 10^{-5}$	0.172	$2.8 \times 10^{-2}$
Information	0.291	$1.6 \times 10^{-4}$	0.273	$4.1 \times 10^{-4}$	0.238	$2.2 \times 10^{-3}$	0.160	$4.1 \times 10^{-2}$
<i>Comprehension</i>	0.230	$3.1 \times 10^{-3}$	0.216	$5.6 \times 10^{-3}$	0.230	$3.2 \times 10^{-3}$	0.190	$1.5 \times 10^{-2}$
Arithmetic	0.187	$1.7 \times 10^{-2}$	0.149	$5.7 \times 10^{-2}$	0.166	$3.5 \times 10^{-2}$	0.033	0.67
Digit Span	0.201	$1.0 \times 10^{-2}$	0.166	$3.4 \times 10^{-2}$	0.165	$3.6 \times 10^{-2}$	0.126	0.11
Letter-Number Sequencing	0.155	$4.9 \times 10^{-2}$	0.192	$1.4 \times 10^{-2}$	0.198	$1.1 \times 10^{-2}$	0.090	0.25
<i>Picture Arrangement</i>	0.175	$2.6 \times 10^{-2}$	0.265	$6.3 \times 10^{-4}$	0.220	$4.8 \times 10^{-3}$	0.150	$5.6 \times 10^{-2}$
Picture Completion	0.264	$6.5 \times 10^{-4}$	0.275	$3.8 \times 10^{-4}$	0.266	$6.0 \times 10^{-4}$	0.165	$3.5 \times 10^{-2}$
Block Design	0.212	$6.5 \times 10^{-3}$	0.263	$6.8 \times 10^{-4}$	0.137	$8.1 \times 10^{-2}$	0.171	$2.9 \times 10^{-2}$
Matrix Reasoning	0.228	$3.4 \times 10^{-3}$	0.220	$4.8 \times 10^{-3}$	0.209	$7.4 \times 10^{-3}$	0.116	0.14
<i>Digit Symbol-Coding</i>	0.211	$6.9 \times 10^{-3}$	0.221	$4.6 \times 10^{-3}$	0.177	$2.4 \times 10^{-2}$	0.185	$1.8 \times 10^{-2}$
Symbol Search	0.245	$1.6 \times 10^{-3}$	0.243	$1.8 \times 10^{-3}$	0.122	0.12	0.131	$9.6 \times 10^{-2}$
UPSA-B								
Finance	0.229	$6.0 \times 10^{-2}$	0.245	$4.4 \times 10^{-2}$	0.222	$6.8 \times 10^{-2}$	-0.006	0.96
Communication	0.206	$9.3 \times 10^{-2}$	0.311	$9.9 \times 10^{-3}$	0.156	0.20	0.084	0.50
<i>Total score</i>	0.247	$4.3 \times 10^{-2}$	0.323	$7.2 \times 10^{-3}$	0.211	$8.4 \times 10^{-2}$	0.051	0.68

(Continued) **Supplementary Table 2** Correlations between the MRI indices and the WAIS-III/UPSA-B indices in patients with schizophrenia.

	Lthal		Rthal		Laccumb		Raccumb	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
WAIS-III								
<i>Full-Scale IQ</i>	0.136	$8.4 \times 10^{-2}$	0.299	$1.0 \times 10^{-4}$	0.179	$2.2 \times 10^{-2}$	0.267	$5.6 \times 10^{-4}$
Verbal IQ	0.159	$4.3 \times 10^{-2}$	0.300	$1.0 \times 10^{-4}$	0.160	$4.2 \times 10^{-2}$	0.265	$6.4 \times 10^{-4}$
Performance IQ	0.095	0.23	0.254	$1.1 \times 10^{-3}$	0.181	$2.0 \times 10^{-2}$	0.229	$3.2 \times 10^{-3}$
Verbal Comprehension Index	0.157	$4.5 \times 10^{-2}$	0.281	$2.8 \times 10^{-4}$	0.156	$4.7 \times 10^{-2}$	0.251	$1.3 \times 10^{-3}$
Perceptual Organization Index	0.088	0.26	0.192	$1.4 \times 10^{-2}$	0.145	$6.5 \times 10^{-2}$	0.201	$1.0 \times 10^{-2}$
Working Memory Index	0.144	$6.7 \times 10^{-2}$	0.247	$1.5 \times 10^{-3}$	0.086	0.27	0.210	$7.2 \times 10^{-3}$
Processing Speed Index	0.100	0.20	0.261	$7.6 \times 10^{-4}$	0.16	$4.1 \times 10^{-2}$	0.244	$1.7 \times 10^{-3}$
Vocabulary	0.127	0.11	0.262	$7.3 \times 10^{-4}$	0.144	$6.6 \times 10^{-2}$	0.238	$2.2 \times 10^{-3}$
Similarities	0.136	$8.4 \times 10^{-2}$	0.26	$8.1 \times 10^{-4}$	0.121	0.12	0.208	$7.7 \times 10^{-3}$
Information	0.134	$8.9 \times 10^{-2}$	0.208	$7.6 \times 10^{-3}$	0.144	$6.6 \times 10^{-2}$	0.210	$7.1 \times 10^{-3}$
<i>Comprehension</i>	0.137	$8.1 \times 10^{-2}$	0.296	$1.3 \times 10^{-4}$	0.165	$3.6 \times 10^{-2}$	0.209	$7.4 \times 10^{-3}$
Arithmetic	0.094	0.24	0.214	$6.1 \times 10^{-3}$	0.128	0.10	0.161	$3.9 \times 10^{-2}$
Digit Span	0.135	$8.6 \times 10^{-2}$	0.218	$5.1 \times 10^{-3}$	0.050	0.52	0.243	$1.8 \times 10^{-3}$
Letter-Number Sequencing	0.109	0.17	0.162	$3.9 \times 10^{-2}$	0.031	0.70	0.140	$7.5 \times 10^{-2}$
<i>Picture Arrangement</i>	0.091	0.25	0.297	$1.2 \times 10^{-4}$	0.144	$6.7 \times 10^{-2}$	0.131	$9.7 \times 10^{-2}$
Picture Completion	0.076	0.33	0.147	$6.1 \times 10^{-2}$	0.177	$2.4 \times 10^{-2}$	0.183	$1.9 \times 10^{-2}$
Block Design	0.073	0.35	0.132	$9.2 \times 10^{-2}$	0.086	0.27	0.172	$2.8 \times 10^{-2}$
Matrix Reasoning	0.084	0.29	0.214	$6.0 \times 10^{-3}$	0.117	0.14	0.163	$3.7 \times 10^{-2}$
<i>Digit Symbol-Coding</i>	0.051	0.51	0.219	$5.0 \times 10^{-3}$	0.179	$2.2 \times 10^{-2}$	0.266	$6.0 \times 10^{-4}$
Symbol Search	0.123	0.12	0.256	$9.6 \times 10^{-4}$	0.121	0.12	0.188	$1.6 \times 10^{-2}$
UPSA-B								
Finance	0.188	0.12	0.345	$4.0 \times 10^{-3}$	0.277	$2.2 \times 10^{-2}$	0.206	$9.2 \times 10^{-2}$
Communication	0.184	0.13	0.434	$2.2 \times 10^{-4}$	0.184	0.13	0.230	$5.9 \times 10^{-2}$
<i>Total score</i>	0.212	$8.2 \times 10^{-2}$	0.452	$1.1 \times 10^{-4}$	0.256	$3.5 \times 10^{-2}$	0.251	$3.9 \times 10^{-2}$

(Continued) **Supplementary Table 2** Correlations between the MRI indices and the WAIS-III/UPSA-B indices in patients with schizophrenia.

	Lcaud		Rcaud		Lput		Rput	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
WAIS-III								
<i>Full-Scale IQ</i>	0.134	$8.8 \times 10^{-2}$	0.060	0.45	0.171	$2.9 \times 10^{-2}$	0.183	$1.9 \times 10^{-2}$
Verbal IQ	0.156	$4.6 \times 10^{-2}$	0.060	0.45	0.177	$2.4 \times 10^{-2}$	0.180	$2.2 \times 10^{-2}$
Performance IQ	0.091	0.25	0.059	0.46	0.141	$7.2 \times 10^{-2}$	0.160	$4.2 \times 10^{-2}$
Verbal Comprehension Index	0.188	$1.6 \times 10^{-2}$	0.094	0.23	0.182	$2.0 \times 10^{-2}$	0.152	$5.2 \times 10^{-2}$
Perceptual Organization Index	0.088	0.27	0.048	0.54	0.115	0.14	0.146	$6.4 \times 10^{-2}$
Working Memory Index	0.022	0.78	-0.052	0.51	0.119	0.13	0.139	$7.7 \times 10^{-2}$
Processing Speed Index	0.014	0.86	-0.014	0.86	0.114	0.15	0.128	0.10
Vocabulary	0.229	$3.3 \times 10^{-3}$	0.128	0.10	0.183	$1.9 \times 10^{-2}$	0.147	$6.0 \times 10^{-2}$
Similarities	0.098	0.21	0.045	0.57	0.114	0.15	0.096	0.22
Information	0.159	$4.3 \times 10^{-2}$	0.063	0.42	0.163	$3.7 \times 10^{-2}$	0.138	$8.0 \times 10^{-2}$
<i>Comprehension</i>	0.172	$2.8 \times 10^{-2}$	0.089	0.26	0.204	$9.2 \times 10^{-3}$	0.230	$3.2 \times 10^{-3}$
Arithmetic	0.093	0.24	0.002	0.98	0.111	0.16	0.119	0.13
Digit Span	0.002	0.98	-0.047	0.55	0.068	0.39	0.120	0.13
Letter-Number Sequencing	-0.051	0.52	-0.094	0.23	0.104	0.19	0.109	0.16
<i>Picture Arrangement</i>	0.023	0.78	0.024	0.76	0.109	0.17	0.099	0.21
Picture Completion	0.080	0.31	0.052	0.51	0.097	0.22	0.125	0.11
Block Design	0.061	0.44	0.009	0.91	0.095	0.23	0.091	0.25
Matrix Reasoning	0.08	0.31	0.068	0.39	0.105	0.18	0.160	$4.2 \times 10^{-2}$
<i>Digit Symbol-Coding</i>	0.136	$8.4 \times 10^{-2}$	0.096	0.22	0.168	$3.2 \times 10^{-2}$	0.162	$3.9 \times 10^{-2}$
Symbol Search	-0.114	0.15	-0.126	0.11	0.046	0.56	0.068	0.39
UPSA-B								
Finance	0.141	0.25	0.093	0.45	0.158	0.20	0.188	0.12
Communication	0.171	0.16	0.166	0.18	0.086	0.48	0.161	0.19
<i>Total score</i>	0.181	0.14	0.154	0.21	0.134	0.28	0.197	0.11

(Continued) **Supplementary Table 2** Correlations between the MRI indices and the WAIS-III/UPSA-B indices in patients with schizophrenia.

	Lpal		Rpal	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
WAIS-III				
<i>Full-Scale IQ</i>	-0.037	0.64	-0.036	0.65
Verbal IQ	0.014	0.86	0.002	0.98
Performance IQ	-0.085	0.28	-0.070	0.37
Verbal Comprehension Index	0.049	0.54	0.015	0.85
Perceptual Organization Index	-0.077	0.33	-0.064	0.42
Working Memory Index	-0.031	0.70	0.001	0.99
Processing Speed Index	-0.048	0.54	0.007	0.93
Vocabulary	0.072	0.36	0.012	0.88
Similarities	-0.019	0.81	-0.034	0.67
Information	0.037	0.64	0.026	0.74
<i>Comprehension</i>	-0.001	0.99	0.019	0.81
Arithmetic	-0.003	0.97	-0.053	0.50
Digit Span	-0.022	0.78	0.037	0.64
Letter-Number Sequencing	-0.058	0.47	-0.004	0.96
<i>Picture Arrangement</i>	-0.104	0.19	-0.117	0.14
Picture Completion	0.011	0.89	0.023	0.77
Block Design	-0.101	0.20	-0.125	0.11
Matrix Reasoning	-0.083	0.29	-0.036	0.65
<i>Digit Symbol-Coding</i>	-0.003	0.97	0.055	0.49
Symbol Search	-0.088	0.26	-0.034	0.66
UPSA-B				
Finance	0.094	0.45	0.168	0.17
Communication	-0.049	0.69	0.125	0.31
<i>Total score</i>	0.014	0.91	0.164	0.18

Legend: *Italic type* means cognitive indices of interest or social indices of interest; Underlining indicates  $p < 1.79 \times 10^{-3}$  (0.05/28).

Abbreviations: IQ, intelligence quotient; WAIS-III, Wechsler Adult Intelligence Scale-Third Edition; UPSA-B, the University of California, San Diego, Performance-Based Skills Assessment Brief; Lhippo, left hippocampus; Rhippo, right hippocampus; Laccumb, left accumbens; Raccumb, right accumbens; Lthal, left thalamus; Rthal, right thalamus; Lamyg, left amygdala; Ramyg, right amygdala; Lcaud, left caudate; Rcaud, right caudate; Lput, left putamen; Rput, right putamen; Lpal, left pallidum; Rpal, right pallidum.

**Supplementary Table 3** Correlations between the MRI indices and the WAIS-III/UPSA-B indices in HCs.

	Lhippo		Rhippo		Lamyg		Ramyg	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
WAIS-III								
<i>Full-Scale IQ</i>	0.043	0.29	0.040	0.32	0.032	0.42	0.047	0.24
Verbal IQ	0.045	0.26	0.033	0.41	0.033	0.41	0.054	0.18
Performance IQ	0.017	0.68	0.031	0.44	0.020	0.62	0.015	0.72
Verbal Comprehension Index	0.055	0.17	0.043	0.29	0.039	0.34	0.078	5.1×10 <sup>-2</sup>
Perceptual Organization Index	0.016	0.68	0.044	0.28	0.010	0.80	0.003	0.94
Working Memory Index	0.010	0.80	-0.009	0.81	0.042	0.29	-0.004	0.92
Processing Speed Index	-0.023	0.57	-0.046	0.25	-0.006	0.87	0.025	0.54
Vocabulary	0.052	0.20	0.044	0.27	0.059	0.14	0.055	0.17
Similarities	0.092	0.02	0.057	0.16	0.041	0.31	0.069	8.7×10 <sup>-2</sup>
Information	0.010	0.81	0.012	0.77	-0.009	0.82	0.079	5.0×10 <sup>-2</sup>
<i>Comprehension</i>	0.006	0.87	-0.007	0.86	-0.008	0.84	0.028	0.48
Arithmetic	0.006	0.89	0.005	0.89	0.014	0.73	0.030	0.45
Digit Span	0.039	0.33	0.040	0.32	0.052	0.20	-0.014	0.73
Letter-Number Sequencing	-0.014	0.73	-0.063	0.12	0.041	0.30	-0.014	0.74
<i>Picture Arrangement</i>	0.012	0.77	0.021	0.60	0.030	0.46	-0.005	0.90
Picture Completion	0.020	0.62	0.055	0.17	0.001	0.98	0.007	0.87
Block Design	0.020	0.63	0.042	0.30	0.003	0.95	0.005	0.89
Matrix Reasoning	-0.005	0.89	-0.003	0.95	0.018	0.66	-0.004	0.91
<i>Digit Symbol-Coding</i>	0.012	0.77	-0.016	0.68	0.013	0.75	0.048	0.23
Symbol Search	-0.053	0.19	-0.064	0.11	-0.028	0.49	-0.008	0.84
UPSA-B								
Finance	-0.060	0.47	-0.035	0.67	-0.112	0.17	-0.112	0.17
Communication	-0.036	0.66	-0.018	0.83	-0.006	0.94	0.014	0.86
<i>Total score</i>	-0.052	0.53	-0.028	0.73	-0.044	0.59	-0.026	0.75

(Continued) **Supplementary Table 3** Correlations between the MRI indices and the WAIS-III/UPSA-B indices in HCs.

	Lthal		Rthal		Laccumb		Raccumb	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
WAIS-III								
<i>Full-Scale IQ</i>	0.092	2.2×10 <sup>-2</sup>	0.091	2.4×10 <sup>-2</sup>	0.026	0.53	0.083	4.0×10 <sup>-2</sup>
Verbal IQ	0.082	4.2×10 <sup>-2</sup>	0.061	0.13	0.019	0.63	0.082	4.1×10 <sup>-2</sup>
Performance IQ	0.067	9.6×10 <sup>-2</sup>	0.092	2.2×10 <sup>-2</sup>	0.021	0.61	0.060	0.13
Verbal Comprehension Index	0.079	4.9×10 <sup>-2</sup>	0.068	9.3×10 <sup>-2</sup>	0.026	0.53	0.086	3.3×10 <sup>-2</sup>
Perceptual Organization Index	0.043	0.28	0.079	4.8×10 <sup>-2</sup>	0.006	0.89	0.051	0.20
Working Memory Index	0.040	0.32	0.067	9.8×10 <sup>-2</sup>	0.006	0.89	0.037	0.36
Processing Speed Index	0.040	0.32	0.031	0.44	0.025	0.54	0.015	0.72
Vocabulary	0.092	2.2×10 <sup>-2</sup>	0.070	8.0×10 <sup>-2</sup>	0.029	0.47	0.061	0.13
Similarities	0.073	6.9×10 <sup>-2</sup>	0.081	4.4×10 <sup>-2</sup>	0.025	0.53	0.090	2.5×10 <sup>-2</sup>
Information	0.038	0.35	0.028	0.48	0.020	0.62	0.072	7.4×10 <sup>-2</sup>
<i>Comprehension</i>	0.073	6.7×10 <sup>-2</sup>	0.012	0.76	-0.010	0.80	0.076	6.0×10 <sup>-2</sup>
Arithmetic	0.027	0.50	0.028	0.48	0.013	0.74	0.024	0.55
Digit Span	0.054	0.18	0.061	0.13	0.011	0.78	0.043	0.29
Letter-Number Sequencing	0.017	0.67	0.076	5.9×10 <sup>-2</sup>	-0.013	0.75	0.012	0.77
<i>Picture Arrangement</i>	0.022	0.59	0.052	0.19	0.029	0.46	0.033	0.41
Picture Completion	0.028	0.48	0.081	4.3×10 <sup>-2</sup>	0.045	0.26	0.032	0.43
Block Design	0.016	0.70	0.062	0.12	-0.016	0.69	0.026	0.52
Matrix Reasoning	0.057	0.16	0.031	0.44	-0.015	0.71	0.051	0.20
<i>Digit Symbol-Coding</i>	0.087	3.1×10 <sup>-2</sup>	0.054	0.18	0.019	0.64	0.039	0.33
Symbol Search	-0.019	0.65	0.002	0.97	0.026	0.52	-0.010	0.81
UPSA-B								
Finance	-0.047	0.57	-0.075	0.36	-0.002	0.98	-0.007	0.93
Communication	0.014	0.86	-0.013	0.88	0.057	0.49	-0.042	0.61
<i>Total score</i>	-0.004	0.96	-0.037	0.65	0.049	0.55	-0.039	0.63



(Continued) **Supplementary Table 3** Correlations between the MRI indices and the WAIS-III/UPSA-B indices in HCs.

	Lcaud		Rcaud		Lput		Rput	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
WAIS-III								
<i>Full-Scale IQ</i>	0.036	0.37	0.024	0.55	-0.010	0.81	0.006	0.88
Verbal IQ	0.052	0.19	0.059	0.14	-0.006	0.89	0.025	0.54
Performance IQ	0.003	0.95	-0.031	0.44	-0.001	0.99	-0.015	0.70
Verbal Comprehension Index	0.070	$8.1 \times 10^{-2}$	0.069	$8.5 \times 10^{-2}$	-0.005	0.90	0.025	0.54
Perceptual Organization Index	0.022	0.58	0.011	0.78	0.010	0.80	0.004	0.92
Working Memory Index	-0.002	0.96	-0.022	0.59	0.023	0.57	0.030	0.46
Processing Speed Index	0.003	0.94	-0.049	0.22	0.009	0.83	0.018	0.66
Vocabulary	0.081	$4.3 \times 10^{-2}$	0.065	0.10	-0.007	0.87	0.032	0.42
Similarities	0.066	0.10	0.082	$4.2 \times 10^{-2}$	0.038	0.34	0.035	0.39
Information	0.027	0.49	0.030	0.45	-0.039	0.34	0.002	0.95
<i>Comprehension</i>	0.035	0.39	0.074	$6.7 \times 10^{-2}$	-0.028	0.48	0.017	0.66
Arithmetic	0.053	0.19	0.048	0.24	-0.005	0.90	-0.013	0.75
Digit Span	-0.035	0.39	-0.035	0.39	0.019	0.64	0.038	0.34
Letter-Number Sequencing	-0.016	0.68	-0.050	0.21	0.046	0.25	0.052	0.20
<i>Picture Arrangement</i>	-0.039	0.33	-0.077	$5.5 \times 10^{-2}$	-0.028	0.49	-0.083	$3.9 \times 10^{-2}$
Picture Completion	0.023	0.57	-0.001	0.97	0.044	0.27	0.016	0.69
Block Design	0.015	0.72	0.019	0.64	0.005	0.90	-0.001	0.98
Matrix Reasoning	0.010	0.81	0.005	0.89	-0.030	0.46	-0.006	0.89
<i>Digit Symbol-Coding</i>	0.011	0.79	-0.030	0.46	0.012	0.77	0.037	0.35
Symbol Search	0.000	1.00	-0.050	0.21	0.004	0.93	-0.002	0.95
UPSA-B								
Finance	0.000	1.00	0.048	0.56	-0.086	0.30	-0.034	0.68
Communication	0.043	0.60	0.038	0.64	0.006	0.94	-0.061	0.45
<i>Total score</i>	0.038	0.65	0.050	0.54	-0.024	0.77	-0.066	0.42

(Continued) **Supplementary Table 3** Correlations between the MRI indices and the WAIS-III/UPSA-B indices in HCs.

	Lpal		Rpal	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
WAIS-III				
<i>Full-Scale IQ</i>	-0.002	0.96	0.012	0.77
Verbal IQ	-0.002	0.97	0.028	0.49
Performance IQ	0.005	0.91	-0.007	0.86
Verbal Comprehension Index	0.015	0.70	0.035	0.39
Perceptual Organization Index	0.011	0.78	-0.006	0.89
Working Memory Index	0.021	0.61	0.022	0.58
Processing Speed Index	0.024	0.55	-0.032	0.43
Vocabulary	0.010	0.80	0.030	0.46
Similarities	0.041	0.31	0.038	0.35
Information	-0.001	0.97	0.029	0.47
<i>Comprehension</i>	-0.016	0.70	-0.005	0.90
Arithmetic	-0.011	0.79	0.015	0.70
Digit Span	-0.020	0.62	0.013	0.75
Letter-Number Sequencing	0.074	$6.5 \times 10^{-2}$	0.018	0.65
<i>Picture Arrangement</i>	-0.035	0.39	0.016	0.70
Picture Completion	0.066	$9.9 \times 10^{-2}$	-0.011	0.79
Block Design	-0.025	0.54	-0.031	0.44
Matrix Reasoning	-0.015	0.71	0.033	0.41
<i>Digit Symbol-Coding</i>	0.029	0.48	-0.030	0.45
Symbol Search	0.018	0.65	-0.025	0.54
UPSA-B				
Finance	-0.113	0.17	-0.022	0.79
Communication	0.121	0.14	0.035	0.67
<i>Total score</i>	0.067	0.42	0.023	0.78

Legend: *Italic type* means cognitive indices of interest or social indices of interest; there was no significant correlation in HCs [ $p < 1.79 \times 10^{-3}$  (0.05/28)].

Abbreviations: HC, healthy control; IQ, intelligence quotient; WAIS-III, Wechsler Adult Intelligence Scale-Third Edition; UPSA-B, the University of California, San Diego, Performance-Based Skills Assessment Brief; Lhippo, left hippocampus; Rhippo, right hippocampus; Laccumb, left accumbens; Raccumb, right accumbens; Lthal, left thalamus; Rthal, right thalamus; Lamyg, left amygdala; Ramyg, right amygdala; Lcaud, left caudate; Rcaud, right caudate; Lput, left putamen; Rput, right putamen; Lpal, left pallidum; Rpal, right pallidum.

## **Supplementary figure legends**

**Supplementary Figure 1** The histograms of the age distribution in schizophrenia group and healthy control group. The unit of age is year.

**Supplementary Figure 2** The correlation map among the regional brain volumes in all participants. Abbreviations: L, left; R, right.

**Supplementary Figure 3** The correlation map among the regional brain volumes in schizophrenia group. Abbreviations: L, left; R, right.

**Supplementary Figure 4** The correlation map among the regional brain volumes in healthy control group. Abbreviations: L, left; R, right.

**Supplementary Figure 5** The correlation map among the premorbid IQ and cognitive and social indices in all participants. Abbreviations: IQ, intelligence quotient; UPSA-B, the University of California, San Diego, Performance-Based Skills Assessment Brief.

**Supplementary Figure 6** The correlation map among the premorbid IQ and cognitive and social indices in schizophrenia group. Abbreviations: IQ, intelligence quotient; UPSA-B, the University of California, San Diego, Performance-Based Skills Assessment Brief.

**Supplementary Figure 7** The correlation map among the premorbid IQ and cognitive

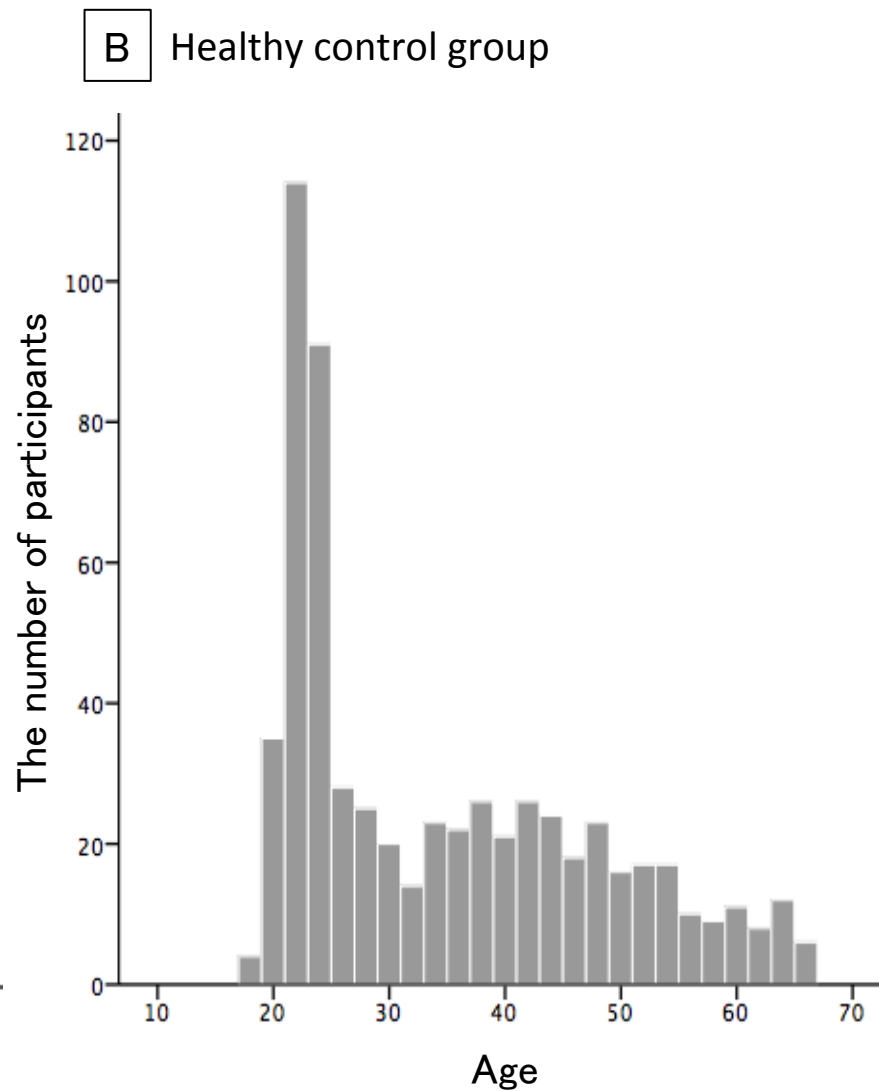
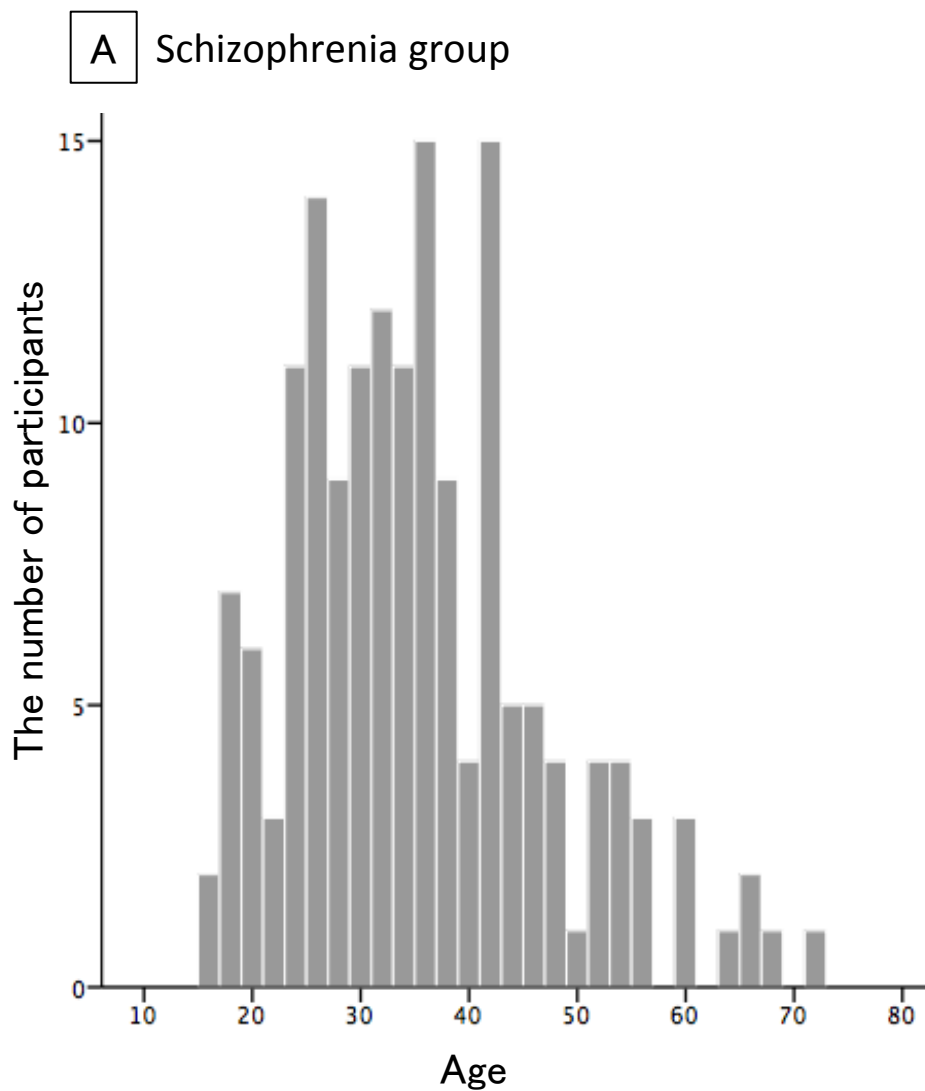
and social indices in healthy control group. Abbreviations: IQ, intelligence quotient; UPSA-B, the University of California, San Diego, Performance-Based Skills Assessment Brief.

**Supplementary Figure 8** The Scatter plots between subcortical brain volumes and age in all participants. The unit of subcortical regional volumes is  $\text{mm}^3$ ; The unit of age is year.

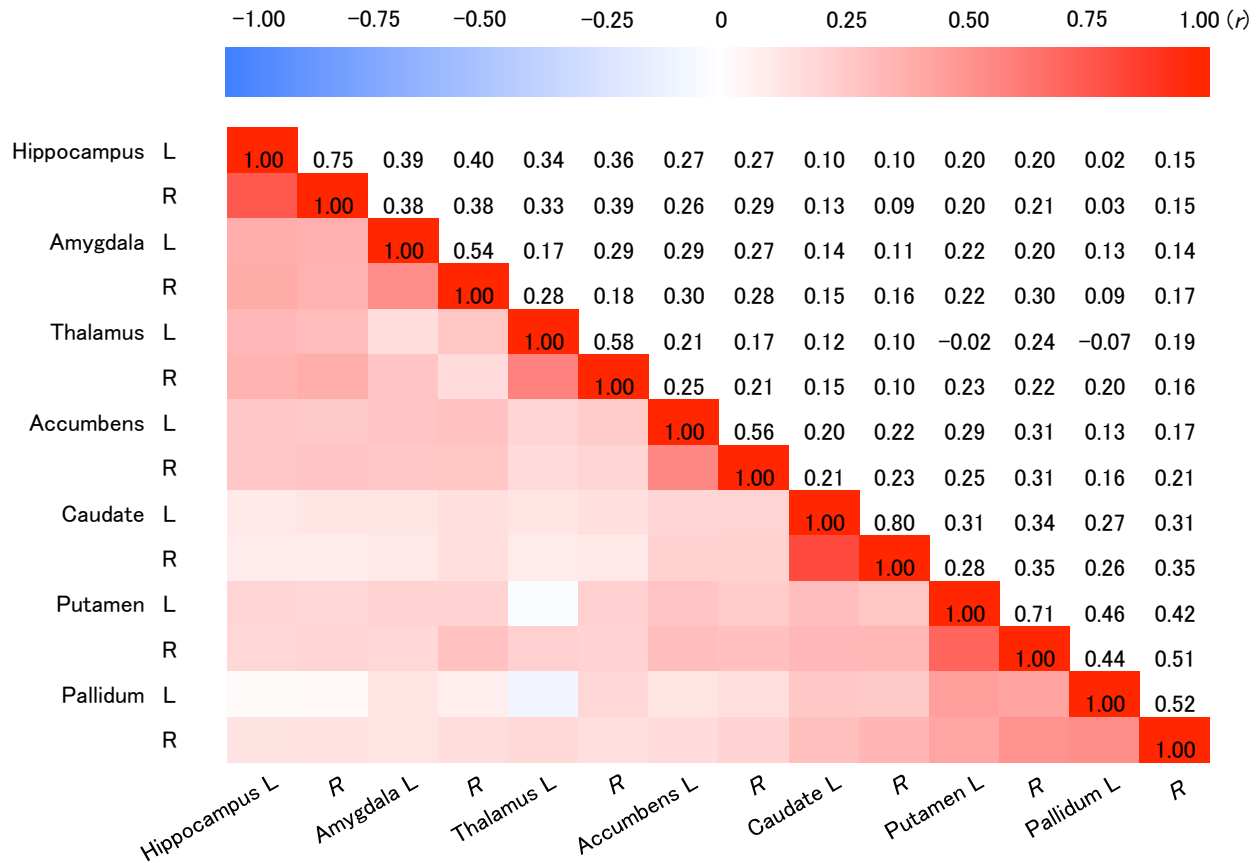
**Supplementary Figure 9** The Scatter plots between subcortical brain volumes and age in schizophrenia group. The unit of subcortical regional volumes is  $\text{mm}^3$ ; The unit of age is year.

**Supplementary Figure 10** The Scatter plots between subcortical brain volumes and age in healthy control group. The unit of subcortical regional volumes is  $\text{mm}^3$ ; The unit of age is year.

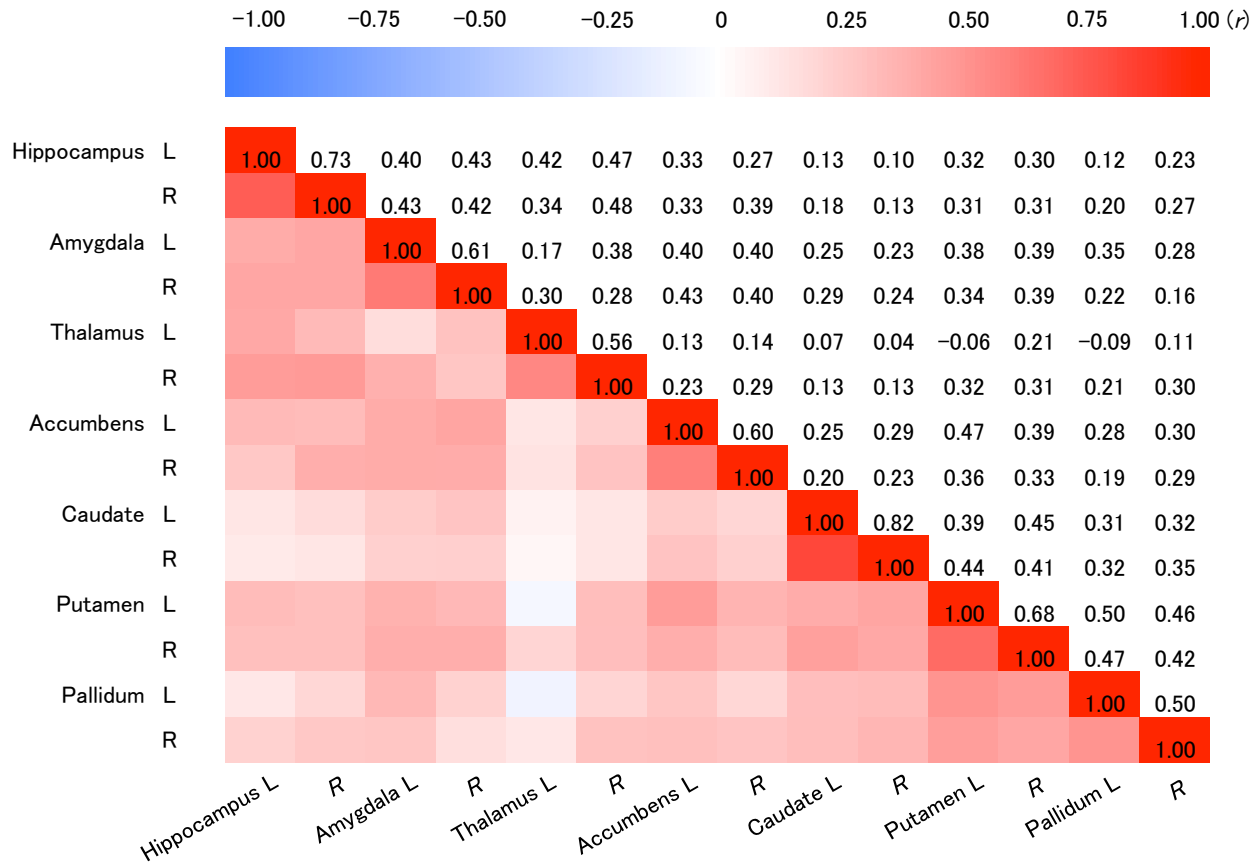
# Koshiyama *et al.*, Supplementary Figure 1



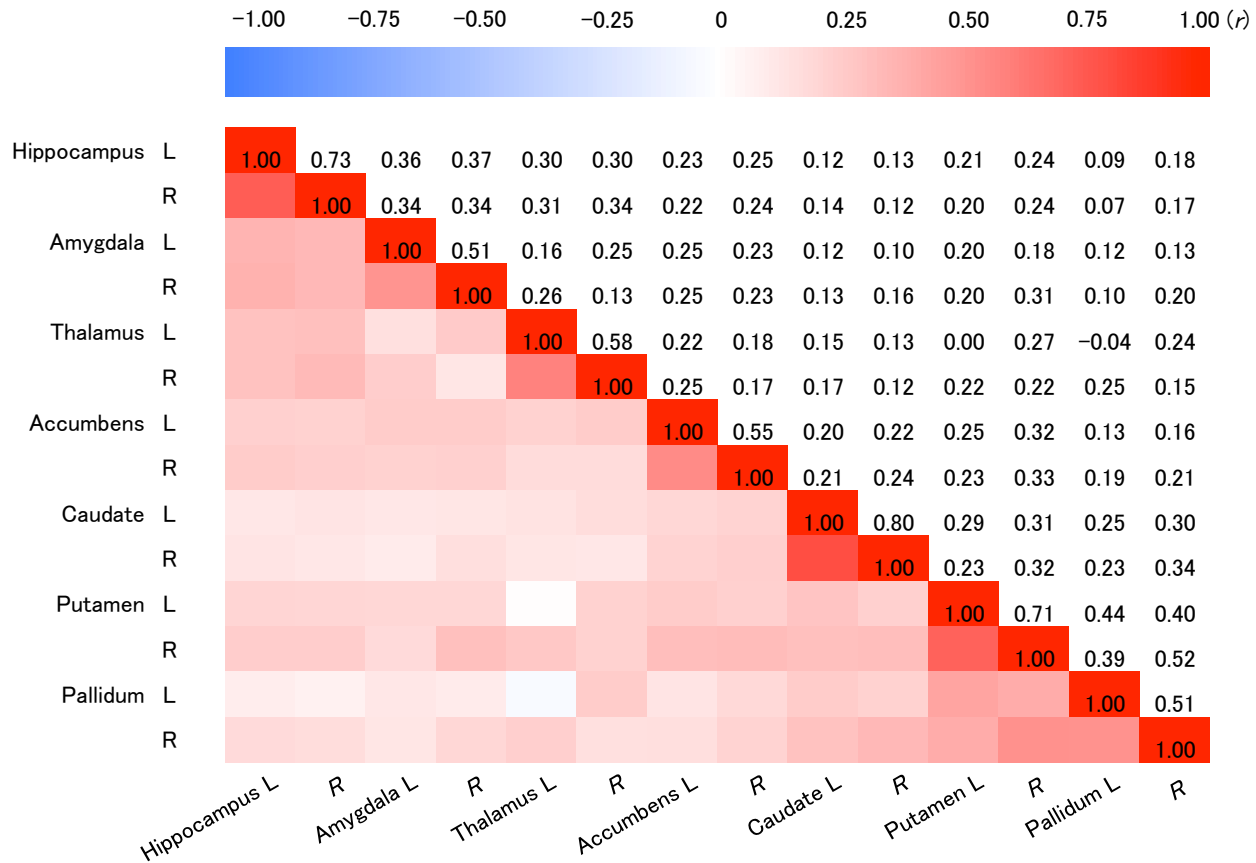
# Koshiyama *et al.*, Supplementary Figure 2



# Koshiyama *et al.*, Supplementary Figure 3



# Koshiyama *et al.*, Supplementary Figure 4



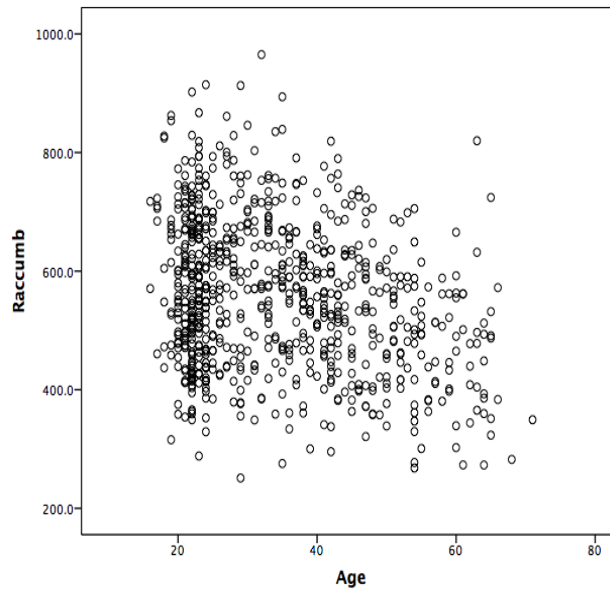
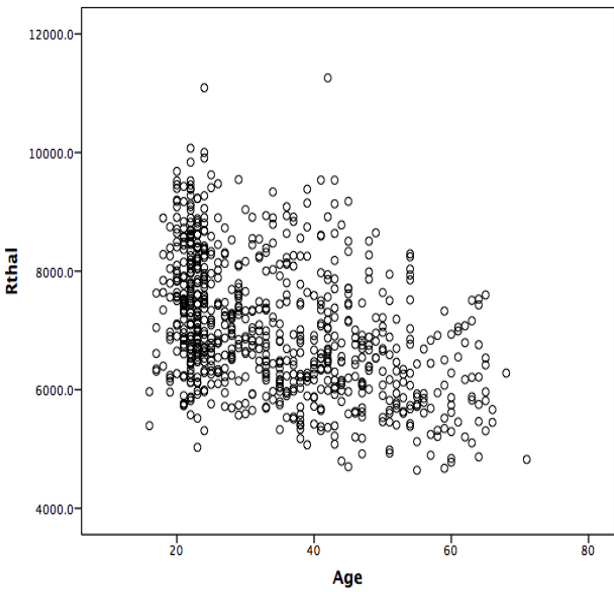
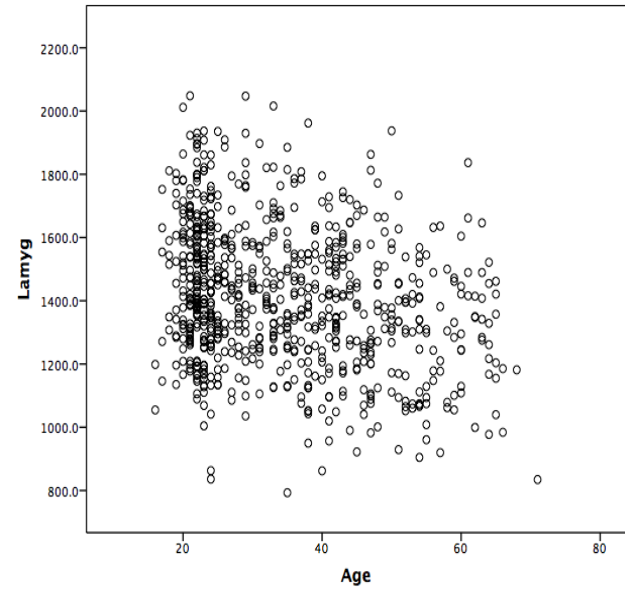
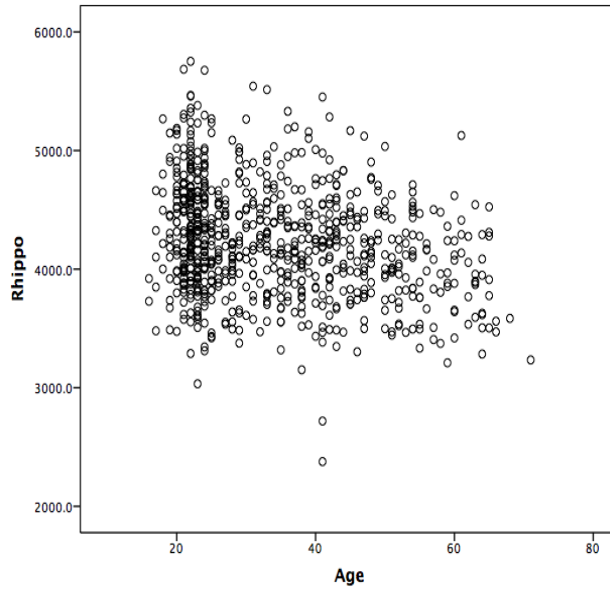
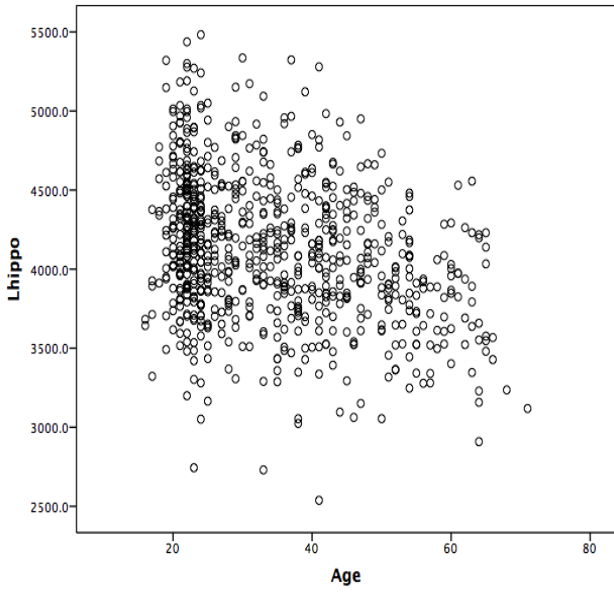




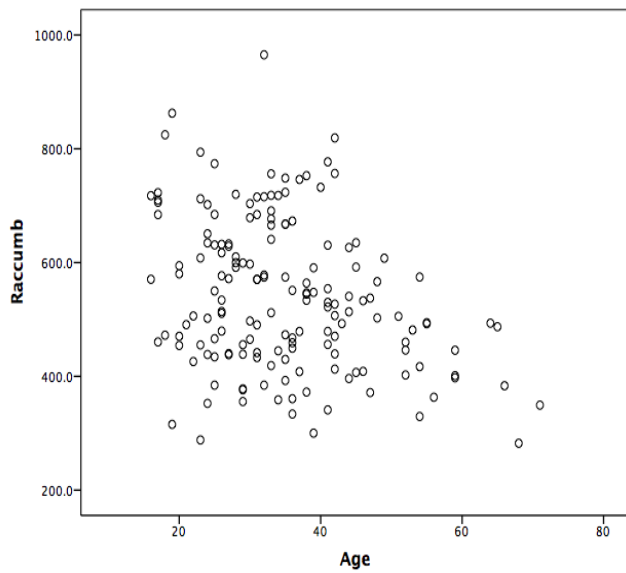
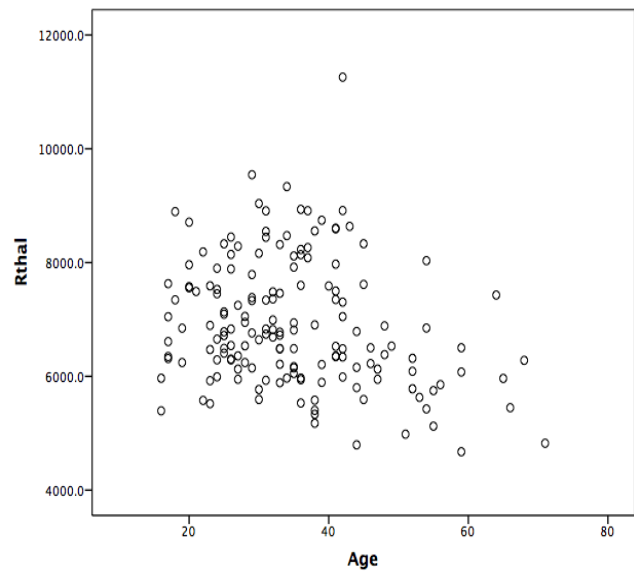
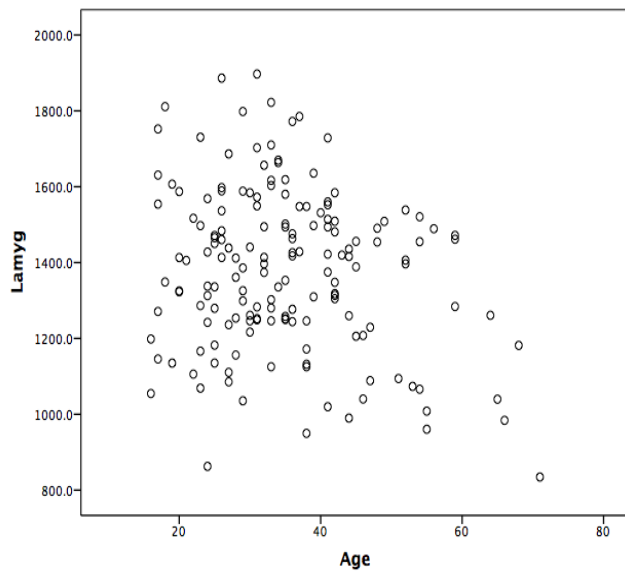
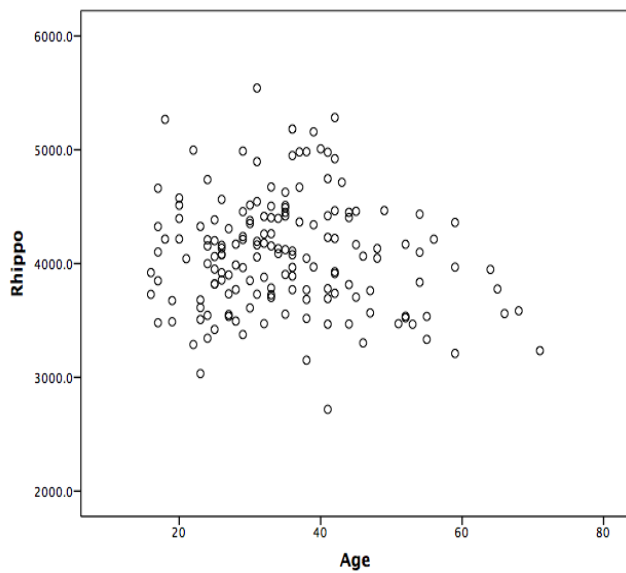
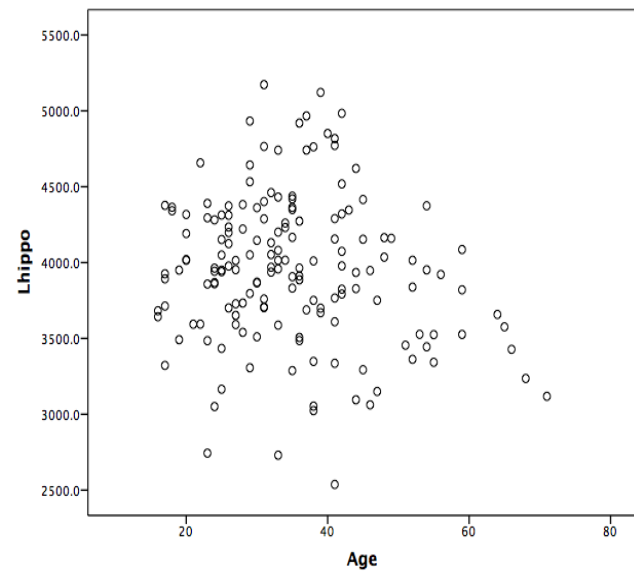




# Koshiyama *et al.*, Supplementary Figure 8



# Koshiyama *et al.*, Supplementary Figure 9



# Koshiyama *et al.*, Supplementary Figure 10

