

**Appendix 1** to Chien YL, Chen YC, Chiu YN, et al. A translational exploration of the effects of *WNT2* variants on altered cortical structures in autism spectrum disorder. *J Psychiatry Neurosci* 2021. doi: 10.1503/jpn.210022

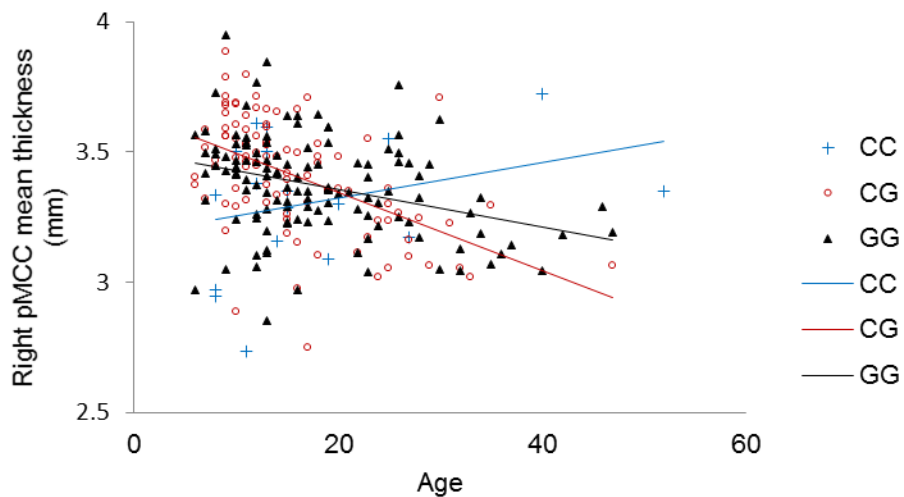
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**Supplementary Figure S1.** The brain regions which cortical thickness shows significant association with rs6950765 genotype: (a) Right middle-posterior part of the cingulate gyrus and sulcus (pMCC); (b) Right orbital gyri; (c) Right superior segment of the circular sulcus of the insula; (d) Right triangular part of the inferior frontal gyrus; (e) Right superior temporal sulcus (parallel sulcus)

(a) Right middle-posterior part of the cingulate gyrus and sulcus (pMCC)



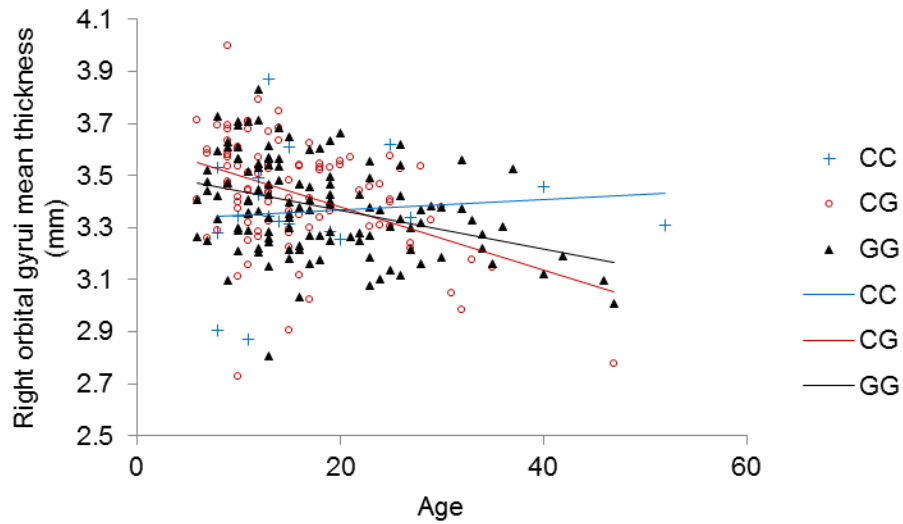
(b) Right orbital gyri

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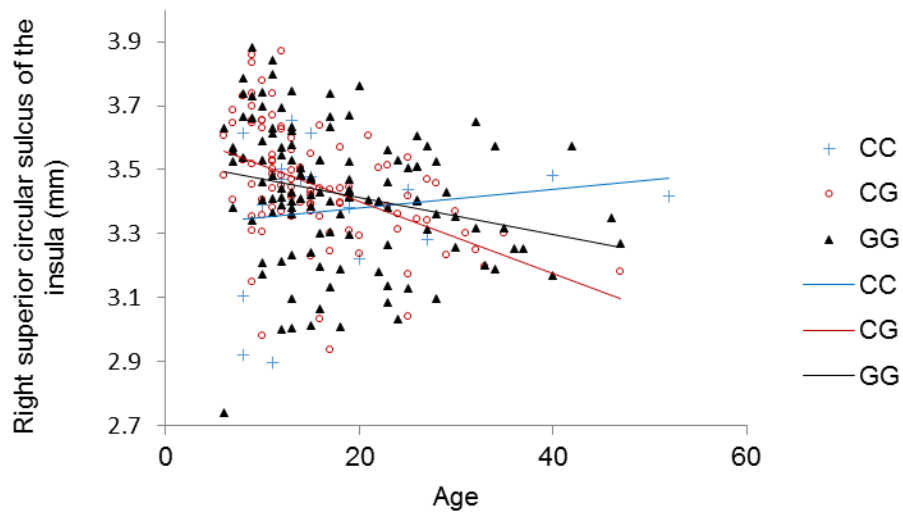
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(c) Right superior segment of the circular sulcus of the insula



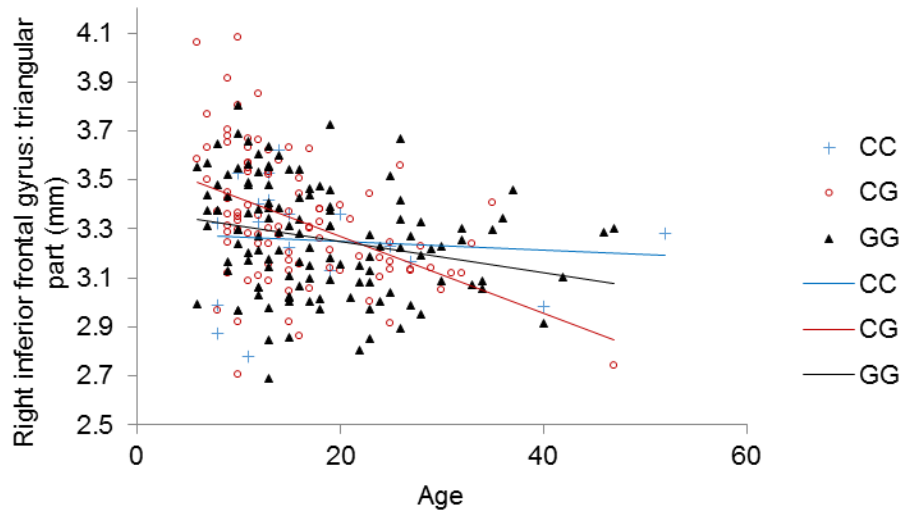
(d) Right triangular part of the inferior frontal gyrus

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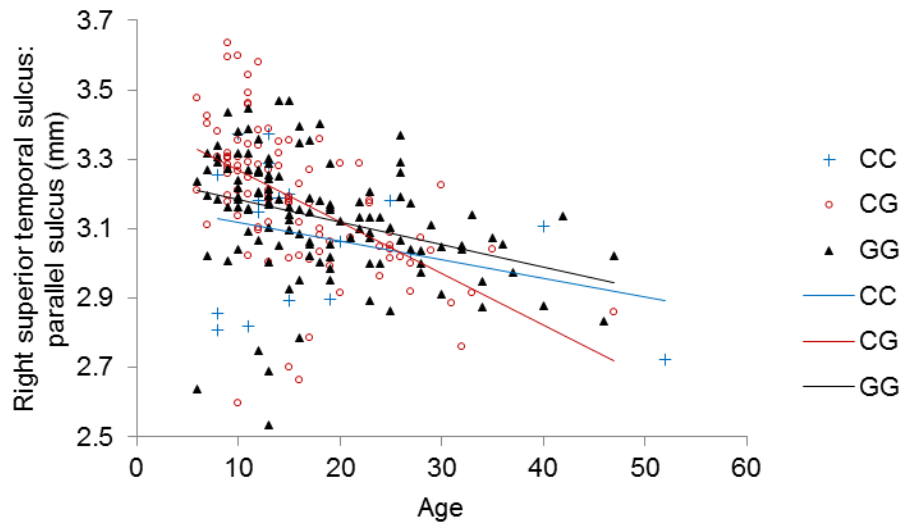
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(e) Right superior temporal sulcus (parallel sulcus)



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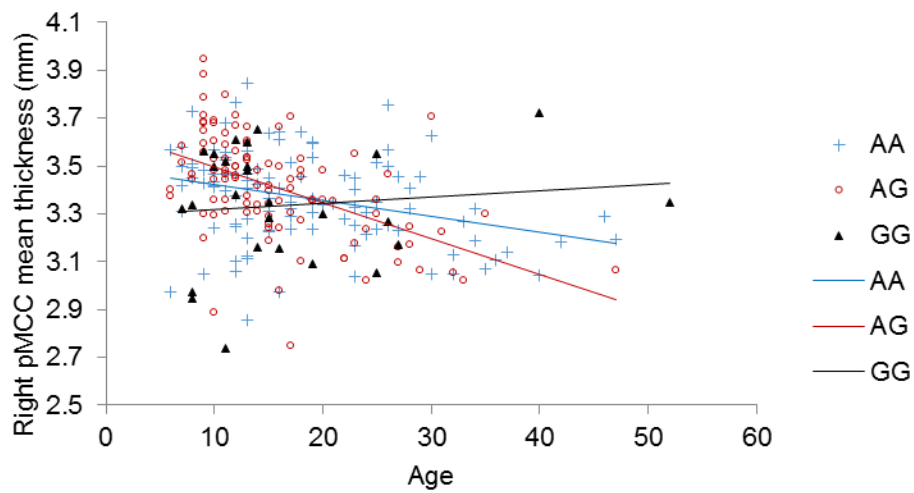
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**Supplementary Figure S2.** The brain regions which cortical thickness shows significant association with rs2896218: (a) Right middle-posterior part of the cingulate gyrus and sulcus (pMCC); (b) Right orbital gyri; (c) Right superior temporal sulcus (parallel sulcus)

(a) Right middle-posterior part of the cingulate gyrus and sulcus (pMCC)



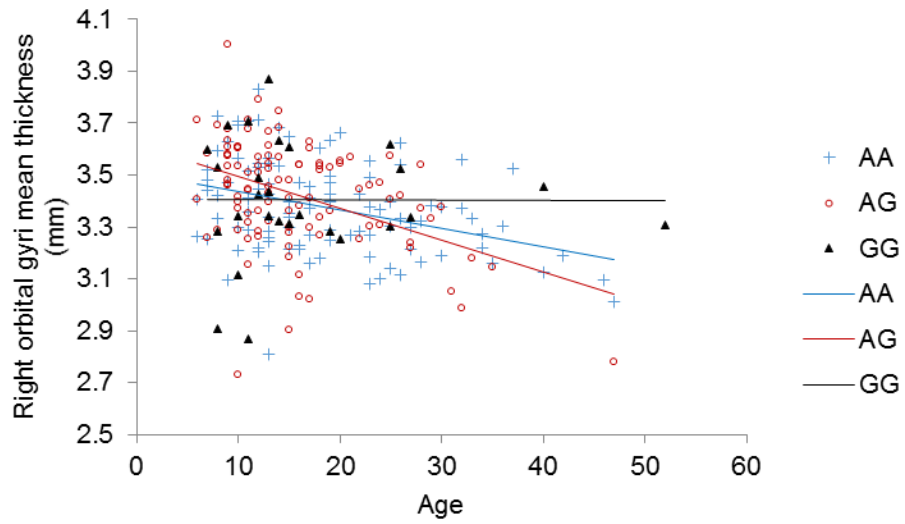
(b) Right orbital gyri

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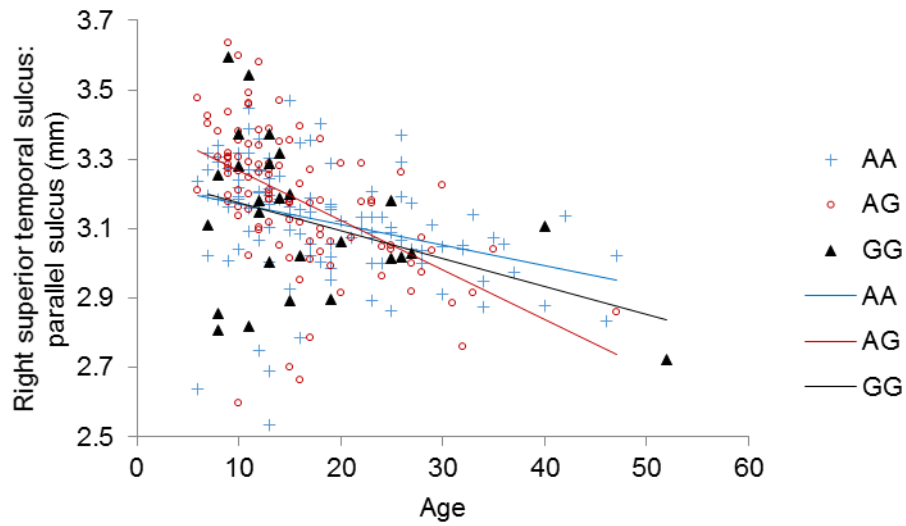
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(c) Right superior temporal sulcus (parallel sulcus)



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**Supplementary Table S1.** Demographics and cortical thickness of the whole sample

	TDC (N=121)		ASD (N=117)		F or $\chi^2$	p		
	Mean	SD or (%)	Mean	SD or (%)				
Age (range)	21.033 (7-52)	9.716	13.112 (6-28)	4.664	63.14	<.0001		
Full-scale IQ	112.592	11.297	99.983	20.147	35.54	<.0001		
Male	75	(61.98)	112	(95.73%)	$\chi^2=40.23$	<.0001		
Left handedness	116	(98.87%)	108	(92.31%)	$\chi^2=1.36$	0.243		
<b>Global cortical thickness (mm)</b>					<b>t</b>	<b>p</b>		
Right hemisphere	3.086	0.126	3.100	0.165	-2.93	0.004		
Left hemisphere	3.090	0.129	0.108	0.164	-2.87	0.005		
<b>Regional cortical thickness (mm)</b>					<b>t</b>	<b>p</b>	<b>FDR q-value</b>	
Right middle-posterior part of the <i>cingulate gyrus and sulcus</i> (pMCC)	3.389	0.206	3.373	0.213	-3.89	0.000	0.001	
Right posterior transverse collateral sulcus	2.764	0.260	2.735	0.279	-3.15	0.002	0.003	
Right <i>orbital gyri</i>	3.412	0.186	3.387	0.211	-3.63	0.000	0.001	
Right superior segment of the <i>circular sulcus of the insula</i>	3.435	0.173	3.426	0.221	-3.09	0.002	0.003	
Right <i>posterior ramus</i> (or segment) of <i>the lateral sulcus</i> (or fissure)	3.215	0.197	3.182	0.236	-3.22	0.002	0.003	
Right <i>triangular part of the inferior frontal gyrus</i>	3.292	0.216	3.288	0.270	-2.38	0.018	0.018	
Right <i>superior temporal sulcus</i> (parallel sulcus)	3.145	0.170	3.154	0.203	-2.91	0.004	0.005	
Right <i>orbital part of the inferior frontal gyrus</i>	3.419	0.265	3.398	0.306	-2.49	0.014	0.015	
Right <i>lateral occipito-temporal gyrus</i> (fusiform gyrus, O4-T4)	3.463	0.180	3.421	0.228	-3.28	0.001	0.003	

**Note.** Cortical thickness was compared by generalized linear model, covarying sex, age, full-scale IQ, handedness, and intracranial volumes



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**Supplementary Table S2.** Left hemisphere cortical regions that show significantly reduced thickness in two-stage sharpened method ( $p < 0.05$ ) but not in classical one-stage method

GLM (sex age FIQ hand)	TDC (N=51)		ASD (N=88)		p	Classical one-stage method	Two-stage sharpened method
	Mean	SD	Mean	SD			
Left precuneus (medial part of P1)	3.254	0.193	3.164	0.250	0.002	0.069	0.035
Left superior occipital sulcus and transverse occipital sulcus	2.834	0.193	2.739	0.237	0.003	0.069	0.035
Left superior parietal lobule (lateral part of P1)	2.933	0.187	2.873	0.222	0.004	0.069	0.035
Left middle-posterior part of the cingulate gyrus and sulcus (pMCC)	3.457	0.178	3.372	0.244	0.004	0.069	0.035

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**Supplementary Table S3.** Comparison of genotype frequency between ASD and TDC

	<u>Dominant model</u>	<u>Recessive model</u>	<u>Over-dominant model</u>	<u>Overall</u>
<b>rs2285545</b>	AA (n=89) vs. AC + CC (n=149)	AA + AC(n=192) vs. CC (n=49)	AC (n=103) vs. AA+CC (n=135)	AA (n=89) vs. AC (n=103) vs. CC (n=49)
chi-square	1.978	0.016	2.174	2.484
p-values	0.160	0.899	0.140	0.289
Hypothesised OR	1.3	1.03	1.3	
Bayes factor	1.15	1	1.21	
	<u>Dominant model</u>	<u>Recessive model</u>	<u>Over-dominant model</u>	<u>Overall</u>
<b>rs2896218</b>	AA (n=107) vs. AG+GG (n=131)	AA+AG (n=211) vs. GG (n=27)	AG (n=104) vs. AA+GG (n=134)	AA (n=107) vs. AG (n=104) vs. GG (n=27)
chi-square	0.881	0.499	0.240	1.062
p-values	0.348	0.480	0.624	0.588
Hypothesised OR	1.07	1.06	1.03	
Bayes factor	1	1	1	
	<u>Dominant model</u>	<u>Recessive model</u>	<u>Over-dominant model</u>	<u>Overall</u>
<b>rs6950765</b>	GG (n=123) vs. GC +CC (n=115)	GG +GC (n=220) vs. CC (n=18)	GC (n=97) vs. GG + CC (n=141)	GG (n=123) vs. GC (n=97) vs. CC (n=18)
chi-square	0.809	0.319	0.373	0.907
p-values	0.368	0.572	0.541	0.636
Hypothesised OR	1.05	1.06	1.03	
Bayes factor	1	1	1	

**Note.** Bayes factors were calculated for each model of each SNP on the [BayesFactor.info \(https://harry-tattan-birch.shinyapps.io/bayes-factor-calculator/\)](https://harry-tattan-birch.shinyapps.io/bayes-factor-calculator/). The Bayes factor shows how much more or less probable the data are under the alternative hypothesis compared with a null hypothesis of zero effect. A Bayes factor greater than 3 indicates moderate relative evidence for an effect corresponding to a p-values of <.05 (Scott, Samaha, Chrisley, & Dienes, 2018), while a Bayes factor less than 1/3 indicates moderate relative evidence for no effect. A Bayes factor of 1 shows the data were equally probable under both the alternative and null hypotheses, so they provide no relative evidence at all.

**Supplementary Table S4.** The thickness of the cortical regions that were altered in ASD for each genotype of *WNT2* SNPs

	<u>rs2285545</u>						<u>rs2896218</u>						<u>rs6950765</u>					
	AA		CA		CC		AA		AG		GG		CC		CG		GG	
	(N = 89)	(N = 103)	(N = 46)	(N = 107)	(N = 104)	(N = 27)	(N = 18)	(N = 97)	(N = 123)									
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Left hemisphere	3.11	0.15	3.09	0.14	3.09	0.15	3.08	0.14	3.12	0.15	3.09	0.16	3.07	0.17	3.12	0.16	3.08	0.13
Right hemisphere	3.11	0.15	3.09	0.14	3.09	0.15	3.07	0.14	3.11	0.15	3.09	0.16	3.06	0.16	3.12	0.16	3.08	0.13
Right middle-posterior part of the <i>cingulate gyrus and sulcus</i> (pMCC)	3.39	0.22	3.37	0.20	3.38	0.21	3.36	0.19	3.41	0.22	3.34	0.24	3.31	0.26	3.41	0.22	3.37	0.19
Right posterior transverse collateral sulcus	2.72	0.29	2.77	0.26	2.74	0.25	2.74	0.28	2.77	0.26	2.74	0.25	2.75	0.24	2.76	0.26	2.74	0.28
Right <i>orbital gyri</i>	3.40	0.20	3.40	0.20	3.41	0.19	3.38	0.18	3.42	0.21	3.40	0.23	3.36	0.23	3.43	0.21	3.38	0.18
Right superior segment of the <i>circular sulcus of the insula</i>	3.43	0.18	3.43	0.21	3.44	0.20	3.42	0.21	3.45	0.18	3.39	0.20	3.37	0.22	3.45	0.18	3.42	0.21
Right <i>posterior ramus</i> (or segment) <i>of the lateral sulcus</i> (or fissure)	3.21	0.24	3.19	0.21	3.19	0.20	3.17	0.20	3.22	0.23	3.22	0.24	3.19	0.26	3.24	0.22	3.17	0.20
Right <i>triangular part of the inferior frontal gyrus</i>	3.32	0.27	3.27	0.23	3.29	0.22	3.27	0.22	3.31	0.26	3.28	0.24	3.25	0.23	3.33	0.26	3.26	0.23
Right <i>superior temporal sulcus</i> (parallel sulcus)	3.17	0.19	3.14	0.18	3.12	0.19	3.12	0.17	3.19	0.19	3.12	0.22	3.08	0.20	3.18	0.20	3.13	0.17
Right <i>orbital part of the inferior frontal gyrus</i>	3.46	0.28	3.38	0.28	3.38	0.26	3.40	0.26	3.39	0.30	3.50	0.32	3.49	0.24	3.41	0.31	3.39	0.27
Right <i>lateral occipito-temporal gyrus</i> (fusiform gyrus, O4-T4)	3.44	0.21	3.45	0.20	3.45	0.21	3.43	0.20	3.45	0.22	3.46	0.19	3.42	0.20	3.46	0.22	3.43	0.20

**Supplementary Table S5.** SNP main effect in genotype association analysis, dominant model, recessive model, and over-dominant model in the whole sample

<b>rs2285545</b>	<b><u>Genotype association</u></b>		<b><u>Dominant model</u></b>		<b><u>Recessive model</u></b>		<b><u>Over-dominant model</u></b>	
	AA (n=89) vs. AC (n=103) vs. CC (n=46)		AA (n=89) vs. CA + CC (n=149)		AA + AC(n=192) vs. CC (n=49)		CA (n=103) vs. AA + CC (n=135)	
	F	p-values	F	p-values	F	p-values	F	p-values
Left hemisphere	0.103	0.902	0.046	0.831	0.204	0.652	0.011	0.918
Right hemisphere	0.231	0.794	0.204	0.652	0.412	0.522	0.002	0.968
Right middle-posterior part of the <i>cingulate gyrus and sulcus</i> (pMCC)	0.188	0.829	0.086	0.770	0.372	0.542	0.052	0.821
Right posterior transverse collateral sulcus	1.799	0.168	1.779	0.184	3.070	0.081	0.031	0.860
Right <i>orbital gyri</i>	0.595	0.553	0.283	0.596	0.466	0.496	1.256	0.264
Right superior segment of the <i>circular sulcus of the insula</i>	0.576	0.563	0.505	0.478	0.228	0.633	0.997	0.319
Right <i>posterior ramus</i> (or segment) of the <i>lateral sulcus</i> (or fissure)	0.117	0.889	0.093	0.761	0.216	0.642	0.000	0.986
Right <i>triangular part of the inferior frontal gyrus</i>	2.163	0.117	1.530	0.217	4.066	0.045	0.099	0.753
Right <i>superior temporal sulcus</i> (parallel sulcus)	0.911	0.404	0.954	0.330	0.246	0.621	1.931	0.166
Right <i>orbital part of the inferior</i>	1.718	0.182	3.420	0.066	0.725	0.395	1.349	0.247

<i>frontal gyrus</i>								
Right lateral occipito-temporal gyrus (fusiform gyrus, O4-T4)	0.218	0.805	0.404	0.525	0.005	0.943	0.344	0.558

<b>rs2896218</b>	<b><u>Genotype association</u></b>		<b><u>Dominant model</u></b>		<b><u>Recessive model</u></b>		<b><u>Over-dominant model</u></b>	
	AA (n=107) vs. AG (n=104) vs. GG (n=27)		AA (n=107) vs. AG+GG (n=131)		AA+AG (n=211) vs. GG (n=27)		AG (n=104) vs. AA+GG (n=134)	
	F	p-values	F	p-values	F	p-values	F	p-values
Left hemisphere	0.460	0.632	0.110	0.741	0.554	0.458	1.008	0.316
Right hemisphere	0.704	0.496	0.160	0.689	0.857	0.355	1.477	0.226
Right middle-posterior part of the cingulate gyrus and sulcus (pMCC)	1.443	0.238	1.884	0.171	0.248	0.619	1.861	0.174
Right posterior transverse collateral sulcus	0.057	0.945	0.020	0.888	0.060	0.807	0.177	0.675
Right orbital gyri	0.521	0.594	0.000	0.983	0.922	0.338	0.875	0.351
Right superior segment of the circular sulcus of the insula	0.747	0.475	1.237	0.267	0.014	0.905	0.842	0.360
Right posterior ramus (or segment) of the lateral sulcus (or fissure)	0.844	0.431	0.119	0.731	1.688	0.195	1.265	0.262
Right triangular part of the inferior frontal gyrus	0.211	0.810	0.129	0.720	0.157	0.692	0.490	0.485
Right superior temporal sulcus	2.084	0.127	1.154	0.284	1.645	0.201	4.101	<b>0.044</b>

(parallel sulcus)								
Right orbital part of the inferior frontal gyrus	2.266	0.106	3.364	0.068	0.176	0.675	2.526	0.113
Right lateral occipito-temporal gyrus (fusiform gyrus, O4-T4)	0.389	0.678	0.266	0.607	0.717	0.398	0.245	0.621

<b>rs6950765</b>	<b>Genotype association</b>		<b><u>Dominant model</u></b>		<b><u>Recessive model</u></b>		<b><u>Over-dominant model</u></b>	
	GG (n=123) vs. GC (n=97) vs. CC (n=18)		GG (n=123) vs. GC +CC (n=115)		GG +GC (n=220) vs. CC (n=18)		GC (n=97) vs. GG + CC (n=141)	
	F	p-values	F	p-values	F	p-values	F	p-values
Left hemisphere	0.936	0.394	0.649	0.421	0.664	0.416	1.541	0.216
Right hemisphere	1.182	0.309	1.013	0.315	0.646	0.422	2.058	0.153
Right middle-posterior part of the cingulate gyrus and sulcus (pMCC)	1.758	0.175	0.235	0.628	2.498	0.115	1.713	0.192
Right posterior transverse collateral sulcus	0.038	0.962	0.062	0.803	0.001	0.978	0.083	0.773
Right orbital gyri	1.239	0.291	1.176	0.279	0.629	0.428	2.224	0.137
Right superior segment of the circular sulcus of the insula	0.785	0.457	0.002	0.960	1.421	0.234	0.373	0.542
Right posterior ramus (or segment) of the lateral sulcus (or fissure)	1.719	0.181	3.043	0.082	0.008	0.927	3.285	0.071
Right triangular part of the inferior	1.725	0.180	2.098	0.149	0.443	0.506	3.323	0.070

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<i>frontal gyrus</i>								
Right superior temporal sulcus (parallel sulcus)	2.303	0.102	0.459	0.499	3.026	0.083	2.613	0.107
Right orbital part of the inferior frontal gyrus	1.001	0.369	0.179	0.673	1.926	0.167	0.152	0.697
Right lateral occipito-temporal gyrus (fusiform gyrus, O4-T4)	0.573	0.565	0.701	0.403	0.146	0.702	1.082	0.299

**Supplementary Table S6.** Genetic associations in dominant model, recessive model, and over-dominant model in the whole sample

<b>rs2285545</b>	<b><u>Dominant model</u></b>		<b><u>Recessive model</u></b>		<b><u>Over-dominant model</u></b>	
	AA (n=89) vs. CA + CC (n=149)		AA + AC(n=192) vs. CC (n=49)		CA (n=103) vs. AA + CC (n=135)	
	F	p-values	F	p-values	F	p-values
Left hemisphere	1.317	0.252	2.003	0.158	3.720	0.055
Right hemisphere	1.425	0.234	1.665	0.198	3.610	0.059
Right middle-posterior part of the <i>cingulate gyrus and sulcus</i> (pMCC)	0.014	0.906	3.158	0.077	1.232	0.268
Right posterior transverse collateral sulcus	0.767	0.382	3.343	0.069	0.001	0.981
Right <i>orbital gyri</i>	0.780	0.378	0.287	0.593	2.518	0.114
Right superior segment of the <i>circular sulcus of the insula</i>	0.137	0.712	4.217	<b>0.041</b>	1.976	0.161
Right <i>posterior ramus</i> (or segment) <i>of the lateral sulcus</i> (or fissure)	0.410	0.523	0.566	0.452	1.241	0.266
Right <i>triangular part of the inferior frontal gyrus</i>	1.189	0.277	1.664	0.198	2.510	0.115
Right <i>superior temporal sulcus</i> (parallel sulcus)	0.759	0.385	1.146	0.286	2.412	0.122
Right <i>orbital part of the inferior frontal gyrus</i>	0.628	0.429	0.812	0.368	2.085	0.150
Right <i>lateral occipito-temporal gyrus</i> (fusiform gyrus, O4-T4)	0.054	0.817	0.959	0.328	0.802	0.371

<b>rs2896218</b>	<b><u>Dominant model</u></b>		<b><u>Recessive model</u></b>		<b><u>Over-dominant model</u></b>	
	AA (n=107) vs. AG+GG (n=131)		AA+AG (n=211) vs. GG (n=27)		AG (n=104) vs. AA+GG (n=134)	
	F	p-values	F	p-values	F	p-values



Left hemisphere	2.774	0.097	2.886	0.091	8.233	<b>0.004</b>
Right hemisphere	2.792	0.096	2.635	0.106	7.855	<b>0.006</b>
Right middle-posterior part of the <i>cingulate gyrus and sulcus</i> (pMCC)	0.847	0.358	9.693	<b>0.002</b>	10.850	<b>0.001</b>
Right posterior transverse collateral sulcus	0.479	0.490	0.036	0.851	1.693	0.195
Right <i>orbital gyri</i>	0.031	0.860	6.703	<b>0.010</b>	6.020	<b>0.015</b>
Right superior segment of the <i>circular sulcus of the insula</i>	0.289	0.591	2.784	0.097	2.099	0.149
Right <i>posterior ramus</i> (or segment) of the <i>lateral sulcus</i> (or fissure)	0.616	0.433	0.810	0.369	1.858	0.174
Right <i>triangular part of the inferior frontal gyrus</i>	2.728	0.100	1.612	0.206	5.343	<b>0.022</b>
Right <i>superior temporal sulcus</i> (parallel sulcus)	5.866	<b>0.016</b>	0.304	0.582	7.835	<b>0.006</b>
Right <i>orbital part of the inferior frontal gyrus</i>	0.000	0.992	0.247	0.620	0.135	0.714
Right <i>lateral occipito-temporal gyrus</i> (fusiform gyrus, O4-T4)	0.002	0.961	1.070	0.302	0.444	0.506

<b>rs6950765</b>	<b><u>Dominant model</u></b>		<b><u>Recessive model</u></b>		<b><u>Over-dominant model</u></b>	
	GG (n=123) vs. GC +CC (n=115)		GG +GC (n=220) vs. CC (n=18)		GC (n=97) vs. GG + CC (n=141)	
	F	p-values	F	p-values	F	p-values
Left hemisphere	1.640	0.202	5.902	<b>0.016</b>	8.042	<b>0.005</b>
Right hemisphere	1.643	0.201	5.822	<b>0.017</b>	7.963	<b>0.005</b>
Right middle-posterior part of the <i>cingulate gyrus and sulcus</i> (pMCC)	0.284	0.594	16.489	<b>0.000</b>	10.616	<b>0.001</b>
Right posterior transverse collateral sulcus	0.110	0.741	0.114	0.736	0.264	0.608
Right <i>orbital gyri</i>	0.001	0.972	9.448	<b>0.002</b>	6.165	<b>0.014</b>

**Appendix 1** to Chien YL, Chen YC, Chiu YN, et al. A translational exploration of the effects of *WNT2* variants on altered cortical structures in autism spectrum disorder. *J Psychiatry Neurosci* 2021. doi: 10.1503/jpn.210022

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Right superior segment of the <i>circular sulcus of the insula</i>	0.240	0.625	6.649	<b>0.011</b>	3.564	0.060
Right <i>posterior ramus</i> (or segment) of the <i>lateral sulcus</i> (or fissure)	0.142	0.706	1.597	0.208	1.275	0.260
Right <i>triangular part of the inferior frontal gyrus</i>	2.033	0.155	3.068	0.081	4.931	<b>0.027</b>
Right <i>superior temporal sulcus</i> (parallel sulcus)	4.373	<b>0.038</b>	1.856	0.174	8.885	<b>0.003</b>
Right <i>orbital part of the inferior frontal gyrus</i>	0.438	0.509	0.279	0.598	1.146	0.286
Right <i>lateral occipito-temporal gyrus</i> (fusiform gyrus, O4-T4)	0.171	0.680	2.302	0.131	2.105	0.148

**Note.** Red: p-value < 0.05, bold: FDR q-value < 0.05

**Supplementary Table S7.** Age × SNP interaction in TDC and in ASD separately (only the models of positive interaction were presented)

	rs2896218		Age × rs2896218		R <sup>2</sup>	rs6950765		Age × rs6950765		R <sup>2</sup>
	Cohen's <i>d</i>	statistics	Cohen's <i>d</i>	statistics		Cohen's <i>d</i>	statistics	Cohen's <i>d</i>	statistics	
<b>TDC</b> (n = 118)										
Left hemisphere (mean thickness)	AA vs. GG: 0.056 AG vs. GG: 0.167	F=2.14, <i>p</i> =0.122	age×AA: -0.618 age×AG: -0.765 age×GG: -0.271	F=4.08, <i>p</i> =0.020	0.55	CC vs. GG: 0.013 CG vs. GG: 0.187	F=2.18, <i>p</i> =0.118	age×CC: -0.255 age×CG: -0.760 age×GG: -0.625	F=4.05, <i>p</i> =0.0201	0.56
Right hemisphere (mean thickness)	AA vs. GG: 0.095 AG vs. GG: 0.230	F=3.73, <i>p</i> =0.027	age×AA: -0.597 age×AG: -0.773 age×GG: -0.229	F=5.30, <i>p</i> =0.006	0.54	CC vs. GG: -0.015 CG vs. GG: 0.179	F=0.03, <i>p</i> =0.017	age×CC: -0.220 age×CG: -0.739 age×GG: -0.621	F=0.065, <i>p</i> =0.033	0.54
Right middle-posterior part of the <i>cingulate gyrus</i> and <i>sulcus</i> (pMCC)	AA vs. GG: 0.211 AG vs. GG: 0.328	F=8.22, <i>p</i> =0.001**	age×AA: -0.379 age×AG: -0.617 age×GG: 0.0169	F=9.08, <i>p</i> =0.000**	0.39	CC vs. GG: -0.188 CG vs. GG: 0.212	F=6.72, <i>p</i> =0.002*	age×CC: 0.063 age×CG: -0.617 age×GG: -0.400	F=10.18, <i>p</i> <0.001**	0.40
Right <i>orbital gyri</i>	AA vs. GG: 0.250 AG vs. GG: 0.328	F=6.38, <i>p</i> =0.002*	age×AA: -0.500 age×AG: -0.590 age×GG: 0.005	F=7.66, <i>p</i> =0.001**	0.42	CC vs. GG: -0.156 CG vs. GG: 0.087	F=2.57, <i>p</i> =0.081	age×CC: -0.038 age×CG: -0.526 age×GG: -0.490	F=4.49, <i>p</i> =0.013	0.39
Right superior segment of the <i>circular sulcus</i> of the <i>insula</i>	–	–	–	–	–	CC vs. GG: -0.099 CG vs. GG: 0.145	F=2.53, <i>p</i> =0.084	age×CC: -0.001 age×CG: -0.447 age×GG: -0.293	F=4.19, <i>p</i> =0.018	0.28
<b>ASD</b> (n = 122)										

Left hemisphere mean thickness	–	–	–	–	–	CC vs. GG: -0.169 CG vs. GG: 0.188	F=5.85, <i>p</i> =0.004	age×CC: 0.102 age×CG: -0.296 age×GG: -0.095	F=4.24, <i>p</i> =0.017	0.15
Right hemisphere mean thickness	–	–	–	–	–	CC vs. GG: -0.148 CG vs. GG: 0.196	F=5.48, <i>p</i> =0.005	age×CC: 0.091 age×CG: -0.290 age×GG: -0.083	F=3.93, <i>p</i> =0.022	0.14
Right middle-posterior part of the <i>cingulate gyrus and sulcus</i> (pMCC)	–	–	–	–	–	CC vs. GG: -0.216 CG vs. GG: 0.142	F=6.00, <i>p</i> =0.003*	age×CC: 0.135 age×CG: -0.244 age×GG: -0.099	F=3.96, <i>p</i> =0.022	0.15
Right <i>orbital gyri</i>	–	–	–	–	–	CC vs. GG: -0.206 CG vs. GG: 0.062	F=3.74, <i>p</i> =0.027	age×CC: 0.123 age×CG: -0.194 age×GG: -0.202	F=3.32, <i>p</i> =0.040	0.14
Right <i>superior temporal sulcus</i> (parallel sulcus)	–	–	–	–	–	CC vs. GG: -0.145 CG vs. GG: 0.209	F=5.86, <i>p</i> =0.004*	age×CC: 0.073 age×CG: -0.276 age×GG: -0.079	F=3.30, <i>p</i> =0.041	0.17

**Note.** For the nine cortical regions, \* False Discovery Rate correction: *q*-value < 0.05, \*\* *q*-value < 0.01

**Supplementary Table S8.** Genetic associations in dominant model, recessive model, and over-dominant model in (a) ASD or (b) TDC

**(a) ASD**

<b>rs2285545</b>	<b><u>Dominant model</u></b>		<b><u>Recessive model</u></b>		<b><u>Over-dominant model</u></b>	
	AA (n=49) vs. CA+CC (n=68)		AA+AC(n=94) vs. CC (n=23)		CA (n=45) vs. AA+CC (n=72)	
	F	p-values	F	p-values	F	p-values
Left hemisphere	0.985	0.322	1.483	0.225	0.986	0.323
Right hemisphere	1.090	0.298	1.208	0.273	0.909	0.342
Right middle-posterior part of the <i>cingulate gyrus and sulcus</i> (pMCC)	0.046	0.831	2.819	0.095	0.005	0.946
Right posterior transverse collateral sulcus	1.234	0.268	2.382	0.124	0.004	0.947
Right <i>orbital gyri</i>	1.085	0.299	0.579	0.448	0.368	0.546
Right superior segment of the <i>circular sulcus of the insula</i>	0.010	0.920	3.005	0.084	3.608	0.060
Right <i>posterior ramus</i> (or segment) <i>of the lateral sulcus</i> (or fissure)	0.339	0.561	0.465	0.496	0.131	0.718
Right <i>triangular part of the inferior frontal gyrus</i>	0.654	0.419	0.867	0.353	0.065	0.800
Right <i>superior temporal sulcus</i> (parallel sulcus)	0.618	0.433	0.898	0.344	0.597	0.441
Right <i>orbital part of the inferior frontal gyrus</i>	0.528	0.468	0.664	0.416	2.965	0.088
Right <i>lateral occipito-temporal gyrus</i> (fusiform gyrus, O4-T4)	0.040	0.842	0.903	0.343	0.346	0.558

<b>rs2896218</b>	<b><u>Dominant model</u></b>		<b><u>Recessive model</u></b>		<b><u>Over-dominant model</u></b>	
	AA (n=49) vs. AG+GG (n=68)		AA+AG (n=102) vs. GG (n=15)		AG (n=53) vs. AA+GG (n=64)	
	F	p-values	F	p-values	F	p-values

Left hemisphere	0.775	0.381	1.884	0.173	3.831	0.053
Right hemisphere	0.749	0.389	1.427	0.235	3.329	0.071
Right middle-posterior part of the <i>cingulate gyrus and sulcus</i> (pMCC)	0.229	0.633	4.093	<b>0.045</b>	4.901	<b>0.029</b>
Right posterior transverse collateral sulcus	1.618	0.206	0.635	0.427	0.625	0.431
Right <i>orbital gyri</i>	0.420	0.518	3.098	0.081	0.604	0.439
Right superior segment of the <i>circular sulcus of the insula</i>	0.071	0.790	1.062	0.305	0.911	0.342
Right <i>posterior ramus</i> (or segment) <i>of the lateral sulcus</i> (or fissure)	0.430	0.513	0.169	0.682	0.962	0.329
Right <i>triangular part of the inferior frontal gyrus</i>	0.029	0.864	1.496	0.224	0.308	0.580
Right <i>superior temporal sulcus</i> (parallel sulcus)	1.278	0.261	1.118	0.293	3.649	0.059
Right <i>orbital part of the inferior frontal gyrus</i>	0.587	0.445	0.363	0.548	2.339	0.129
Right <i>lateral occipito-temporal gyrus</i> (fusiform gyrus, O4-T4)	0.001	0.971	0.592	0.443	0.280	0.598

<b>rs6950765</b>	<b><u>Dominant model</u></b>		<b><u>Recessive model</u></b>		<b><u>Over-dominant model</u></b>	
	GG (n=57) vs. GC+CC (n=60)		GG+GC (n=107) vs. CC (n=10)		GC (n=50) vs. GG+CC (n=67)	
	F	p-values	F	p-values	F	p-values
Left hemisphere	1.729	0.190	5.345	<b>0.023</b>	5.427	<b>0.022</b>
Right hemisphere	1.728	0.190	4.554	<b>0.035</b>	5.581	<b>0.020</b>
Right middle-posterior part of the <i>cingulate gyrus and sulcus</i> (pMCC)	0.304	0.582	7.261	<b>0.008</b>	4.433	<b>0.038</b>
Right posterior transverse collateral sulcus	0.084	0.773	1.081	0.301	0.385	0.536
Right <i>orbital gyri</i>	0.000	0.998	7.756	<b>0.006</b>	1.142	0.288

Right superior segment of the <i>circular sulcus of the insula</i>	0.301	0.584	3.276	0.073	1.245	0.267
Right <i>posterior ramus</i> (or segment) of the <i>lateral sulcus</i> (or fissure)	0.149	0.700	1.542	0.217	1.820	0.180
Right <i>triangular part of the inferior frontal gyrus</i>	2.246	0.135	4.593	0.034	1.655	0.201
Right <i>superior temporal sulcus</i> (parallel sulcus)	4.444	0.036	3.885	0.051	4.681	0.033
Right <i>orbital part of the inferior frontal gyrus</i>	0.458	0.499	1.979	0.162	5.144	0.025
Right <i>lateral occipito-temporal gyrus</i> (fusiform gyrus, O4-T4)	0.174	0.677	2.277	0.134	1.958	0.165

**(b) TDC**

<b>rs2285545</b>	<b><u>Dominant model</u></b>		<b><u>Recessive model</u></b>		<b><u>Over-dominant model</u></b>	
	AA (n=40) vs. CA+CC (n=81)		AA+AC(n=98) vs. CC (n=23)		CA (n=58) vs. AA+CC (n=63)	
	F	p-values	F	p-values	F	p-values
Left hemisphere	1.466	0.229	1.170	0.282	1.328	0.252
Right hemisphere	1.108	0.295	1.476	0.227	1.183	0.279
Right middle-posterior part of the <i>cingulate gyrus and sulcus</i> (pMCC)	0.410	0.523	2.483	0.118	1.275	0.261
Right posterior transverse collateral sulcus	0.036	0.850	1.029	0.313	0.046	0.831
Right <i>orbital gyri</i>	1.156	0.285	0.020	0.886	1.635	0.204
Right superior segment of the <i>circular sulcus of the insula</i>	0.516	0.474	2.031	0.157	1.113	0.294
Right <i>posterior ramus</i> (or segment) of the <i>lateral sulcus</i> (or fissure)	1.217	0.272	1.254	0.265	1.929	0.168
Right <i>triangular part of the inferior frontal gyrus</i>	3.254	0.074	1.999	0.160	4.040	0.047
Right <i>superior temporal sulcus</i> (parallel sulcus)	1.118	0.292	1.869	0.174	2.096	0.150
Right <i>orbital part of the inferior frontal gyrus</i>	1.337	0.250	0.000	0.993	1.152	0.285

Right lateral occipito-temporal gyrus (fusiform gyrus, O4-T4)	0.058	0.810	0.224	0.637	0.022	0.882
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<b>rs2896218</b>	<u>Dominant model</u>		<u>Recessive model</u>		<u>Over-dominant model</u>	
	AA (n=58) vs. AG+GG (n=63)		AA+AG (n=109) vs. GG (n=12)		AG (n=51) vs. AA+GG (n=70)	
	F	p-values	F	p-values	F	p-values
Left hemisphere	1.113	0.294	2.838	0.095	3.872	0.052
Right hemisphere	1.158	0.284	4.343	<b>0.039</b>	5.252	<b>0.024</b>
Right middle-posterior part of the <i>cingulate gyrus and sulcus</i> (pMCC)	0.456	0.501	10.793	<b>0.001</b>	8.600	<b>0.004</b>
Right posterior transverse collateral sulcus	0.090	0.765	0.001	0.974	1.069	0.303
Right <i>orbital gyri</i>	0.104	0.748	12.536	<b>0.001</b>	7.238	<b>0.008</b>
Right superior segment of the <i>circular sulcus of the insula</i>	0.060	0.806	4.114	<b>0.045</b>	1.793	0.183
Right <i>posterior ramus</i> (or segment) <i>of the lateral sulcus</i> (or fissure)	0.482	0.489	0.339	0.562	0.513	0.475
Right <i>triangular part of the inferior frontal gyrus</i>	1.123	0.292	0.603	0.439	1.548	0.216
Right <i>superior temporal sulcus</i> (parallel sulcus)	3.324	0.071	0.083	0.774	3.025	0.085
Right <i>orbital part of the inferior frontal gyrus</i>	0.083	0.773	0.887	0.348	0.203	0.653
Right lateral occipito-temporal gyrus (fusiform gyrus, O4-T4)	0.028	0.868	1.492	0.224	0.226	0.636

<b>rs6950765</b>	<u>Dominant model</u>		<u>Recessive model</u>		<u>Over-dominant model</u>	
	GG (n=123) vs. GC +CC (n=115)		GG +GC (n=220) vs. CC (n=18)		GC (n=97) vs. GG + CC (n=141)	
	F	p-values	F	p-values	F	p-values



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Left hemisphere	1.567	0.213	2.586	0.111	4.230	<b>0.042</b>
Right hemisphere	0.986	0.323	3.627	0.059	3.927	0.050
Right middle-posterior part of the <i>cingulate gyrus and sulcus</i> (pMCC)	0.338	0.562	13.047	<b>0.000</b>	9.050	<b>0.003</b>
Right posterior transverse collateral sulcus	0.004	0.952	0.001	0.979	0.472	0.493
Right <i>orbital gyri</i>	0.030	0.863	7.335	<b>0.008</b>	4.447	<b>0.037</b>
Right superior segment of the <i>circular sulcus of the insula</i>	0.378	0.540	4.723	<b>0.032</b>	3.518	0.063
Right <i>posterior ramus</i> (or segment) <i>of the lateral sulcus</i> (or fissure)	0.554	0.458	0.198	0.657	0.439	0.509
Right <i>triangular part of the inferior frontal gyrus</i>	2.241	0.137	0.253	0.616	1.836	0.178
Right <i>superior temporal sulcus</i> (parallel sulcus)	1.896	0.171	0.089	0.766	1.783	0.185
Right <i>orbital part of the inferior frontal gyrus</i>	0.060	0.807	0.056	0.814	0.011	0.918
Right <i>lateral occipito-temporal gyrus</i> (fusiform gyrus, O4-T4)	0.131	0.718	1.331	0.251	0.969	0.327

**Note.** Red: p-value < 0.05, bold: FDR q-value < 0.05

**Appendix 1** to Chien YL, Chen YC, Chiu YN, et al. A translational exploration of the effects of *WNT2* variants on altered cortical structures in autism spectrum disorder. *J Psychiatry Neurosci* 2021. doi: 10.1503/jpn.210022

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**Supplementary Table S9.** The SNP-by-age interaction on the cortical thickness across the 74 brain regions bilaterally: (a) ASD + TDC, (b) ASD, and (c) TDC. **Note.** *All the SNP main effect and SNP-by-case interaction did not pass FDR correction, therefore those results were not presented.*

**(a) ASD + TDC**

Cortical thickness	<u>Age × rs2285545</u>		<u>Age × rs2896218</u>		<u>Age × rs6950765</u>	
	F	p-values	F	p-values	F	p-values
lh_G_and_S_frontomargin	0.164	0.686	3.648	<b>0.028</b>	2.986	0.052
lh_G_and_S_occipital_inf	0.568	0.452	2.696	0.070	1.643	0.196
lh_G_and_S_paracentrals	1.571	0.211	2.485	0.086	1.287	0.278
lh_G_and_S_subcentrals	0.079	0.779	1.140	0.322	1.578	0.209
lh_G_and_S_transv_frontopol	0.397	0.529	2.410	0.092	2.349	0.098
lh_G_and_S_cingul_Ants	0.103	0.749	1.921	0.149	2.190	0.114
lh_G_and_S_cingul_Mid_Ant	0.338	0.562	0.607	0.546	0.713	0.491
lh_G_and_S_cingul_Mid_Post	0.204	0.652	2.842	0.060	3.863	<b>0.022</b>
lh_G_cingul_Post_dorsal	0.002	0.964	2.343	0.098	3.144	<b>0.045</b>
lh_G_cingul_Post_ventral	0.304	0.582	0.073	0.929	0.471	0.625
lh_G_cuneuss	0.516	0.473	3.409	<b>0.035</b>	4.363	<b>0.014</b>
lh_G_front_inf_Opercular	2.145	0.144	1.354	0.260	2.612	0.076
lh_G_front_inf_Orbitals	1.456	0.229	0.886	0.414	1.222	0.297
lh_G_front_inf_Triangul	2.663	0.104	4.706	<b>0.010</b>	4.596	<b>0.011</b>
lh_G_front_middles	4.317	<b>0.039</b>	4.471	<b>0.012</b>	3.976	<b>0.020</b>
lh_G_front_sups	0.383	0.537	7.935	<b>0.000</b>	6.495	<b>0.002</b>
lh_G_Ins_lg_and_S_cent_ins	0.268	0.605	3.482	<b>0.032</b>	5.401	<b>0.005</b>
lh_G_insular_shorts	0.315	0.575	1.384	0.253	2.085	0.127
lh_G_occipital_middles	0.025	0.874	0.401	0.670	0.430	0.651
lh_G_occipital_sups	0.663	0.416	3.193	<b>0.043</b>	4.902	<b>0.008</b>
lh_G_oc_temp_lat_fusifor	0.071	0.790	0.452	0.637	0.745	0.476
lh_G_oc_temp_med_Lingual	0.238	0.626	4.350	<b>0.014</b>	5.496	<b>0.005</b>
lh_G_oc_temp_med_Parahip	0.393	0.532	0.951	0.388	0.836	0.435
lh_G_orbitals	0.563	0.454	5.198	<b>0.006</b>	5.343	<b>0.005</b>
lh_G_pariet_inf_Angular	2.702	0.102	2.980	0.053	3.281	<b>0.039</b>
lh_G_pariet_inf_Supramar	0.312	0.577	3.533	<b>0.031</b>	5.044	<b>0.007</b>

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lh_G_parietal_sup	4.424	<b>0.037</b>	3.435	<b>0.034</b>	3.647	<b>0.028</b>
lh_G_postcentrals	1.793	0.182	1.506	0.224	2.230	0.110
lh_G_precentrals	0.150	0.699	1.189	0.306	0.229	0.796
lh_G_precuneuss	1.622	0.204	5.136	<b>0.007</b>	4.512	<b>0.012</b>
lh_G_rectuss	1.747	0.188	1.126	0.326	2.518	0.083
lh_G_subcallosals	0.429	0.513	0.279	0.757	0.167	0.846
lh_G_temp_sup_G_T_transv	0.115	0.734	0.364	0.695	0.441	0.644
lh_G_temp_sup_Laterals	0.163	0.687	0.265	0.767	0.188	0.829
lh_G_temp_sup_Plan_polar	1.981	0.161	0.677	0.509	0.407	0.666
lh_G_temp_sup_Plan_tempo	0.029	0.866	0.701	0.497	1.504	0.225
lh_G_temporal_infs	0.210	0.647	3.064	<b>0.049</b>	2.582	0.078
lh_G_temporal_middles	0.495	0.483	0.279	0.757	0.197	0.822
lh_Lat_Fis_ant_Horizont	2.092	0.149	1.437	0.240	1.262	0.285
lh_Lat_Fis_ant_Vertical	0.225	0.635	2.584	0.078	3.456	<b>0.033</b>
lh_Lat_Fis_posts	0.030	0.863	1.882	0.155	4.532	<b>0.012</b>
lh_Pole_occipitals	0.006	0.939	0.217	0.805	0.040	0.961
lh_Pole_temporals	0.268	0.605	2.218	0.111	2.201	0.113
lh_S_calcarines	0.257	0.613	4.539	<b>0.012</b>	5.898	<b>0.003</b>
lh_S_centrales	0.099	0.753	0.511	0.601	0.539	0.584
lh_S_cingul_Marginaliss	1.460	0.228	2.305	0.102	5.689	<b>0.004</b>
lh_S_circular_insula_ant	1.720	0.191	2.313	0.101	2.099	0.125
lh_S_circular_insula_inf	1.846	0.176	3.651	<b>0.028</b>	3.200	<b>0.043</b>
lh_S_circular_insula_sup	0.097	0.755	1.551	0.214	3.350	<b>0.037</b>
lh_S_collat_transv_ants	2.067	0.152	1.545	0.215	3.102	<b>0.047</b>
lh_S_collat_transv_post	0.029	0.866	0.894	0.410	1.338	0.264
lh_S_front_infs	0.000	0.986	2.611	0.076	3.867	<b>0.022</b>
lh_S_front_middles	0.064	0.800	1.738	0.178	1.557	0.213
lh_S_front_sup	0.976	0.324	4.217	<b>0.016</b>	5.951	<b>0.003</b>
lh_S_interprim_Jensen	0.147	0.701	0.453	0.636	1.102	0.334
lh_S_intrapariet_and_P_trans	1.221	0.270	5.371	<b>0.005</b>	4.575	<b>0.011</b>
lh_S_oc_middle_and_Lunatus	0.142	0.707	3.078	<b>0.048</b>	4.965	<b>0.008</b>
lh_S_oc_sup_and_transversal	0.834	0.362	2.046	0.132	2.792	0.063
lh_S_occipital_ants	0.628	0.429	1.474	0.231	1.686	0.188
lh_S_oc_temp_lats	1.406	0.237	3.456	<b>0.033</b>	3.915	<b>0.021</b>

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lh_S_oc_temp_med_and_Lingual	1.315	0.253	1.311	0.272	1.403	0.248
lh_S_orbital_laterals	0.466	0.495	0.977	0.378	2.451	0.088
lh_S_orbital_med_olfact	0.523	0.470	2.353	0.097	5.275	<b>0.006</b>
lh_S_orbital_H_Shaped	0.933	0.335	7.390	<b>0.001</b>	9.969	<b>0.000</b>
lh_S_parieto_occipitals	0.119	0.731	2.701	0.069	4.260	<b>0.015</b>
lh_S_pericallosals	0.330	0.566	1.040	0.355	1.502	0.225
lh_S_postcentrals	1.414	0.236	7.627	<b>0.001</b>	7.813	<b>0.001</b>
lh_S_precentral_inf_part	0.824	0.365	2.203	0.113	1.612	0.202
lh_S_precentral_sup_part	0.543	0.462	2.568	0.079	2.190	0.114
lh_S_suborbitals	4.105	<b>0.044</b>	3.934	<b>0.021</b>	3.463	<b>0.033</b>
lh_S_subparietals	0.166	0.684	1.846	0.160	1.527	0.219
lh_S_temporal_infs	0.040	0.841	2.681	0.071	3.149	<b>0.045</b>
lh_S_temporal_sups	0.180	0.672	2.289	0.104	4.698	<b>0.010</b>
lh_S_temporal_transverse	0.675	0.412	0.416	0.660	0.684	0.506
rh_G_and_S_frontomargin	1.260	0.263	2.905	0.057	2.541	0.081
rh_G_and_S_occipital_inf	0.124	0.725	1.797	0.168	2.418	0.091
rh_G_and_S_paracentrals	0.662	0.417	1.007	0.367	1.026	0.360
rh_G_and_S_subcentrals	0.482	0.488	1.398	0.249	1.360	0.259
rh_G_and_S_transv_frontopol	0.548	0.460	2.413	0.092	2.042	0.132
rh_G_and_S_cingul_Ants	1.197	0.275	5.246	<b>0.006</b>	7.913	<b>0.000</b>
rh_G_and_S_cingul_Mid_Ant	0.122	0.727	2.969	0.053	3.201	<b>0.043</b>
rh_G_and_S_cingul_Mid_Post	0.014	0.906	8.028	<b>0.000</b>	11.043	<b>0.000</b>
rh_G_cingul_Post_dorsal	0.306	0.581	1.629	0.198	2.363	0.096
rh_G_cingul_Post_ventral	0.018	0.894	0.881	0.416	1.390	0.251
rh_G_cuneuss	0.035	0.852	4.932	<b>0.008</b>	4.582	<b>0.011</b>
rh_G_front_inf_Opercular	0.670	0.414	1.364	0.258	1.545	0.215
rh_G_front_inf_Orbitals	0.628	0.429	0.239	0.788	0.736	0.480
rh_G_front_inf_Triangul	1.189	0.277	3.827	<b>0.023</b>	4.058	<b>0.019</b>
rh_G_front_middles	4.658	<b>0.032</b>	6.515	<b>0.002</b>	6.185	<b>0.002</b>
rh_G_front_sups	1.543	0.215	4.591	<b>0.011</b>	4.210	<b>0.016</b>
rh_G_Ins_lg_and_S_cent_ins	0.690	0.407	0.007	0.993	0.104	0.902
rh_G_insular_shorts	1.000	0.318	0.967	0.382	2.953	0.054
rh_G_occipital_middles	0.146	0.702	1.591	0.206	2.130	0.121
rh_G_occipital_sups	0.269	0.604	1.102	0.334	1.429	0.242

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rh_G_oc_temp_lat_fusifor	0.054	0.817	0.589	0.556	1.678	0.189
rh_G_oc_temp_med_Lingual	0.277	0.599	4.107	<b>0.018</b>	5.414	<b>0.005</b>
rh_G_oc_temp_med_Parahip	0.598	0.440	1.123	0.327	1.490	0.228
rh_G_orbitals	0.780	0.378	4.269	<b>0.015</b>	5.477	<b>0.005</b>
rh_G_pariet_inf_Angular	4.831	<b>0.029</b>	2.293	0.103	2.075	0.128
rh_G_pariet_inf_Supramar	0.119	0.731	1.717	0.182	1.521	0.221
rh_G_parietal_sup	2.915	0.089	3.528	<b>0.031</b>	3.057	<b>0.049</b>
rh_G_postcentral	0.276	0.600	2.681	0.071	2.841	0.060
rh_G_precentral	0.025	0.875	1.353	0.261	0.863	0.423
rh_G_precuneus	2.948	0.087	6.030	<b>0.003</b>	5.401	<b>0.005</b>
rh_G_rectuss	3.076	0.081	2.709	0.069	3.068	<b>0.048</b>
rh_G_subcallosals	0.217	0.641	1.020	0.362	0.494	0.611
rh_G_temp_sup_G_T_transv	0.704	0.402	0.322	0.725	0.125	0.882
rh_G_temp_sup_Laterals	1.869	0.173	0.283	0.754	0.151	0.860
rh_G_temp_sup_Plan_polar	1.874	0.172	1.479	0.230	0.761	0.468
rh_G_temp_sup_Plan_tempo	0.116	0.734	2.917	0.056	2.144	0.119
rh_G_temporal_infs	0.930	0.336	0.678	0.508	1.556	0.213
rh_G_temporal_middles	4.238	<b>0.041</b>	0.562	0.571	0.720	0.488
rh_Lat_Fis_ant_Horizont	0.266	0.606	1.988	0.139	1.734	0.179
rh_Lat_Fis_ant_Vertical	2.324	0.129	1.161	0.315	0.414	0.661
rh_Lat_Fis_posts	0.410	0.523	1.160	0.315	1.106	0.333
rh_Pole_occipitals	0.961	0.328	3.809	<b>0.024</b>	3.514	<b>0.031</b>
rh_Pole temporals	0.580	0.447	0.451	0.638	1.027	0.360
rh_S_calcarines	0.008	0.927	4.057	<b>0.019</b>	3.938	<b>0.021</b>
rh_S centrals	0.352	0.553	1.420	0.244	2.599	0.077
rh_S_cingul_Marginalis	3.347	0.069	4.990	<b>0.008</b>	5.741	<b>0.004</b>
rh_S_circular_insula_ant	0.942	0.333	1.912	0.150	3.009	0.051
rh_S_circular_insula_inf	2.014	0.157	0.131	0.877	0.120	0.887
rh_S_circular_insula_sup	0.137	0.712	2.291	0.104	4.682	<b>0.010</b>
rh_S_collat_transv_ants	0.855	0.356	2.424	0.091	5.187	<b>0.006</b>
rh_S_collat_transv_post	0.767	0.382	0.419	0.658	0.076	0.927
rh_S_front_infs	0.805	0.371	2.229	0.110	3.376	<b>0.036</b>
rh_S_front_middles	0.854	0.357	2.933	0.055	3.314	<b>0.038</b>
rh_S_front_sups	0.828	0.364	2.852	0.060	4.274	<b>0.015</b>

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rh_S_interm_prim_Jensen	3.812	0.052	6.090	<b>0.003</b>	5.268	<b>0.006</b>
rh_S_intrapariet_and_P_trans	0.820	0.366	3.197	<b>0.043</b>	3.382	<b>0.036</b>
rh_S_oc_middle_and_Lunatus	3.369	0.068	0.118	0.888	0.039	0.961
rh_S_oc_sup_and_transversal	0.050	0.823	1.777	0.171	3.195	<b>0.043</b>
rh_S_occipital_ants	0.118	0.732	0.296	0.744	1.150	0.318
rh_S_oc_temp_lats	0.239	0.625	0.958	0.385	2.554	0.080
rh_S_oc_temp_med_and_Lingual	0.120	0.729	2.821	0.062	5.488	<b>0.005</b>
rh_S_orbital_laterals	1.033	0.311	2.913	0.056	3.453	<b>0.033</b>
rh_S_orbital_med_olfact	1.467	0.227	1.356	0.260	1.681	0.189
rh_S_orbital_H_Shaped_s	3.334	0.069	4.266	<b>0.015</b>	4.440	<b>0.013</b>
rh_S_parieto_occipitals	1.517	0.219	2.532	0.082	3.442	<b>0.034</b>
rh_S_pericallosals	0.703	0.403	0.594	0.553	0.819	0.442
rh_S_postcentrals	2.210	0.138	3.683	<b>0.027</b>	3.258	<b>0.040</b>
rh_S_precentral_inf_part	0.966	0.327	1.205	0.302	0.967	0.382
rh_S_precentral_sup_part	0.022	0.883	1.313	0.271	1.393	0.250
rh_S_suborbitals	3.026	0.083	1.406	0.247	0.643	0.527
rh_S_subparietals	0.087	0.768	3.070	<b>0.048</b>	2.871	0.059
rh_S_temporal_infs	0.615	0.434	0.486	0.616	1.106	0.333
rh_S_temporal_sups	0.759	0.385	4.266	<b>0.015</b>	4.826	<b>0.009</b>
rh_S_temporal_transverse	0.618	0.433	0.543	0.582	0.275	0.760

**Note.** *p*-values < 0.05, marked in red; FDR *q*-values < 0.05, in bold font

### (b) ASD

	<u>Age × rs2285545</u>		<u>Age × rs2896218</u>		<u>Age × rs6950765</u>	
	F	p-values	F	p-values	F	p-values
lh_G_and_S_frontomargin	1.894	0.153	2.112	0.100	2.166	0.093
lh_G_and_S_occipital_inf	0.922	0.399	0.714	0.545	1.587	0.193
lh_G_and_S_paracentrals	5.328	<b>0.005</b>	2.357	0.073	3.341	<b>0.020</b>
lh_G_and_S_subcentrals	5.005	<b>0.007</b>	2.690	<b>0.047</b>	2.709	<b>0.046</b>
lh_G_and_S_transv_frontopol	0.334	0.717	0.885	0.449	2.703	<b>0.046</b>
lh_G_and_S_cingul_Ants	1.516	0.222	1.754	0.157	1.451	0.229
lh_G_and_S_cingul_Mid_Ant	4.914	<b>0.008</b>	3.118	<b>0.027</b>	2.978	<b>0.032</b>
lh_G_and_S_cingul_Mid_Post	4.948	<b>0.008</b>	2.948	<b>0.034</b>	3.249	<b>0.023</b>
lh_G_cingul_Post_dorsal	3.541	<b>0.031</b>	2.378	0.071	2.865	<b>0.038</b>

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lh_G_cingul_Post_ventral	1.972	0.142	1.362	0.255	1.757	0.156
lh_G_cuneuss	3.211	<b>0.042</b>	1.344	0.261	2.306	0.078
lh_G_front_inf_Opercular	2.609	0.076	0.638	0.591	0.403	0.751
lh_G_front_inf_Orbitals	2.438	0.090	2.135	0.097	2.860	<b>0.038</b>
lh_G_front_inf_Triangul	3.234	<b>0.041</b>	0.825	0.481	0.628	0.598
lh_G_front_middles	2.809	0.062	2.168	0.093	3.115	<b>0.027</b>
lh_G_front_sups	3.033	0.050	3.271	<b>0.022</b>	4.432	<b>0.005</b>
lh_G_Ins_lg_and_S_cent_ins	2.822	0.062	1.497	0.216	2.469	0.063
lh_G_insular_shorts	0.375	0.688	0.793	0.499	1.415	0.239
lh_G_occipital_middles	2.545	0.081	1.645	0.180	1.631	0.183
lh_G_occipital_sups	3.575	<b>0.030</b>	2.508	0.060	3.214	<b>0.024</b>
lh_G_oc_temp_lat_fusifor	0.836	0.435	0.498	0.684	1.233	0.299
lh_G_oc_temp_med_Lingual	1.597	0.205	0.917	0.433	1.227	0.301
lh_G_oc_temp_med_Parahip	6.723	<b>0.001</b>	4.737	<b>0.003</b>	4.422	<b>0.005</b>
lh_G_orbitals	3.150	<b>0.045</b>	4.293	<b>0.006</b>	5.171	<b>0.002</b>
lh_G_pariet_inf_Angular	5.501	<b>0.005</b>	4.472	<b>0.005</b>	5.397	<b>0.001</b>
lh_G_pariet_inf_Supramar	2.882	0.058	2.405	0.068	3.024	<b>0.030</b>
lh_G_parietal_sups	6.412	<b>0.002</b>	3.426	<b>0.018</b>	4.358	<b>0.005</b>
lh_G_postcentrals	1.744	0.177	0.634	0.594	0.392	0.759
lh_G_precentrals	2.700	0.069	1.778	0.152	1.920	0.127
lh_G_precuneuss	5.144	<b>0.007</b>	4.039	<b>0.008</b>	4.208	<b>0.006</b>
lh_G_rectuss	1.459	0.235	0.538	0.657	0.602	0.614
lh_G_subcallosals	0.164	0.848	0.147	0.931	0.491	0.689
lh_G_temp_sup_G_T_transv	3.153	<b>0.045</b>	0.470	0.703	0.497	0.684
lh_G_temp_sup_Laterals	3.245	<b>0.041</b>	2.483	0.062	2.210	0.088
lh_G_temp_sup_Plan_polar	2.249	0.108	1.260	0.289	1.616	0.187
lh_G_temp_sup_Plan_tempo	1.592	0.206	1.362	0.255	1.923	0.127
lh_G_temporal_infs	6.188	<b>0.002</b>	4.575	<b>0.004</b>	4.517	<b>0.004</b>
lh_G_temporal_middles	3.293	<b>0.039</b>	2.369	0.071	2.286	0.080
lh_Lat_Fis_ant_Horizont	1.272	0.282	0.994	0.397	1.038	0.377
lh_Lat_Fis_ant_Vertical	3.793	<b>0.024</b>	0.096	0.962	0.035	0.991
lh_Lat_Fis_posts	1.451	0.237	1.155	0.328	1.669	0.174
lh_Pole_occipitals	2.730	0.067	1.092	0.353	1.394	0.245
lh_Pole temporals	0.294	0.745	1.123	0.341	0.934	0.425

**Appendix 1** to Chien YL, Chen YC, Chiu YN, et al. A translational exploration of the effects of *WNT2* variants on altered cortical structures in autism spectrum disorder. *J Psychiatry Neurosci* 2021. doi: 10.1503/jpn.210022

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lh_S_calcarines	0.350	0.705	0.421	0.738	0.873	0.456
lh_S centrals	3.417	0.034	2.375	0.071	2.104	0.101
lh_S_cingul_Marginaliss	3.961	0.020	0.879	0.453	1.252	0.292
lh_S_circular_insula_ant	3.275	0.040	2.192	0.090	3.547	0.015
lh_S_circular_insula_inf	2.357	0.097	1.717	0.164	1.349	0.259
lh_S_circular_insula_sup	3.362	0.036	2.177	0.092	2.705	0.046
lh_S_collat_transv_ants	0.636	0.530	1.567	0.198	2.811	0.040
lh_S_collat_transv_post	2.073	0.128	1.956	0.121	2.527	0.058
lh_S_front_infs	3.791	0.024	3.182	0.025	4.405	0.005
lh_S_front_middles	3.060	0.049	1.645	0.180	1.611	0.188
lh_S_front_sups	3.098	0.047	1.714	0.165	2.221	0.086
lh_S_interm_prim_Jensen	0.464	0.629	0.427	0.734	0.921	0.431
lh_S_intrapariet_and_P_trans	3.493	0.032	1.098	0.351	1.522	0.210
lh_S_oc_middle_and_Lunatus	1.497	0.226	1.113	0.345	0.930	0.427
lh_S_oc_sup_and_transversal	9.511	0.000	2.826	0.039	2.807	0.040
lh_S_occipital_ants	4.900	0.008	0.732	0.534	1.192	0.314
lh_S_oc_temp_lats	1.321	0.269	2.783	0.042	1.814	0.145
lh_S_oc_temp_med_and_Lingual	2.065	0.129	1.578	0.196	2.173	0.092
lh_S_orbital_laterals	0.820	0.442	1.500	0.215	1.889	0.132
lh_S_orbital_med_olfact	0.052	0.949	1.165	0.324	1.447	0.230
lh_S_orbital_H_Shaped_s	0.969	0.381	2.347	0.074	3.070	0.029
lh_S_parieto_occipitals	4.195	0.016	4.105	0.007	5.228	0.002
lh_S_pericallosals	0.274	0.761	1.842	0.140	2.673	0.048
lh_S_postcentrals	3.076	0.048	1.228	0.300	1.037	0.377
lh_S_precentral_inf_part	1.775	0.172	1.413	0.240	1.675	0.173
lh_S_precentral_sup_part	1.405	0.248	1.080	0.358	1.336	0.264
lh_S_suborbitals	1.988	0.139	1.676	0.173	0.936	0.424
lh_S_subparietals	0.705	0.495	0.686	0.561	1.331	0.265
lh_S_temporal_infs	0.314	0.731	0.939	0.422	0.551	0.648
lh_S_temporal_sups	3.825	0.023	2.821	0.040	3.404	0.018
lh_S_temporal_transverse	4.311	0.015	1.306	0.273	1.197	0.312
rh_G_and_S_frontomargin	3.467	0.033	2.257	0.083	2.389	0.070
rh_G_and_S_occipital_inf	1.275	0.281	0.821	0.484	1.351	0.259
rh_G_and_S_paracentrals	3.151	0.045	1.845	0.140	2.708	0.046



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rh_G_and_S_subcentrals	1.711	0.183	1.562	0.199	1.901	0.130
rh_G_and_S_transv_frontopol	2.223	0.111	1.386	0.248	0.872	0.456
rh_G_and_S_cingul_Ants	2.910	0.056	1.204	0.309	1.867	0.136
rh_G_and_S_cingul_Mid_Ant	2.980	0.053	1.667	0.175	1.734	0.161
rh_G_and_S_cingul_Mid_Post	7.767	<b>0.001</b>	4.801	<b>0.003</b>	5.761	<b>0.001</b>
rh_G_cingul_Post_dorsal	2.743	0.066	2.343	0.074	3.255	<b>0.022</b>
rh_G_cingul_Post_ventral	2.089	0.126	1.732	0.161	2.243	0.084
rh_G_cuneuss	1.788	0.170	0.590	0.622	1.007	0.391
rh_G_front_inf_Opercular	1.845	0.160	0.813	0.488	1.560	0.200
rh_G_front_inf_Orbitals	3.510	<b>0.032</b>	2.808	<b>0.040</b>	2.619	0.052
rh_G_front_inf_Triangul	3.541	<b>0.031</b>	4.331	<b>0.005</b>	3.664	<b>0.013</b>
rh_G_front_middles	5.277	<b>0.006</b>	3.740	<b>0.012</b>	5.370	<b>0.001</b>
rh_G_front_sups	3.999	<b>0.020</b>	2.427	0.066	3.839	<b>0.010</b>
rh_G_Ins_lg_and_S_cent_ins	2.420	0.091	1.997	0.115	2.711	<b>0.046</b>
rh_G_insular_shorts	0.606	0.547	0.661	0.577	2.724	<b>0.045</b>
rh_G_occipital_middles	5.076	<b>0.007</b>	3.458	<b>0.017</b>	3.147	<b>0.026</b>
rh_G_occipital_sups	1.546	0.215	0.852	0.467	1.141	0.333
rh_G_oc_temp_lat_fusifor	6.477	<b>0.002</b>	3.631	<b>0.014</b>	3.719	<b>0.012</b>
rh_G_oc_temp_med_Lingual	3.190	<b>0.043</b>	1.381	0.249	1.418	0.238
rh_G_oc_temp_med_Parahip	2.363	0.096	1.685	0.171	2.190	0.090
rh_G_orbitals	7.944	<b>0.000</b>	5.010	<b>0.002</b>	5.086	<b>0.002</b>
rh_G_pariet_inf_Angular	2.330	0.100	2.005	0.114	3.422	<b>0.018</b>
rh_G_pariet_inf_Supramar	3.867	<b>0.022</b>	2.971	<b>0.033</b>	3.423	<b>0.018</b>
rh_G_parietal_sups	4.441	<b>0.013</b>	2.228	0.086	3.613	<b>0.014</b>
rh_G_postcentrals	1.127	0.326	0.324	0.808	0.274	0.844
rh_G_precentrals	1.673	0.190	0.922	0.431	1.682	0.172
rh_G_precuneuss	5.338	<b>0.005</b>	2.729	<b>0.045</b>	3.303	<b>0.021</b>
rh_G_rectuss	0.183	0.833	0.972	0.407	0.227	0.877
rh_G_subcallosals	0.088	0.915	0.149	0.930	0.578	0.630
rh_G_temp_sup_G_T_transv	2.341	0.099	1.891	0.132	1.917	0.128
rh_G_temp_sup_Laterals	2.556	0.080	1.644	0.180	1.655	0.178
rh_G_temp_sup_Plan_polar	0.050	0.951	0.971	0.407	0.376	0.770
rh_G_temp_sup_Plan_tempo	1.315	0.271	1.212	0.306	0.963	0.411
rh_G_temporal_infs	4.121	<b>0.017</b>	0.909	0.437	1.202	0.310

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rh_G_temporal_middles	7.111	<b>0.001</b>	2.381	0.070	2.546	0.057
rh_Lat_Fis_ant_Horizont	0.750	0.474	2.313	0.077	1.556	0.201
rh_Lat_Fis_ant_Vertical	1.550	0.215	2.260	0.082	0.920	0.432
rh_Lat_Fis_posts	5.256	<b>0.006</b>	4.217	<b>0.006</b>	5.616	<b>0.001</b>
rh_Pole_occipitals	2.531	0.082	1.412	0.240	1.647	0.179
rh_Pole temporals	4.075	<b>0.018</b>	3.344	<b>0.020</b>	3.399	<b>0.019</b>
rh_S_calcarines	2.725	0.068	1.367	0.254	1.642	0.181
rh_S centrals	3.376	<b>0.036</b>	1.565	0.199	1.641	0.181
rh_S_cingul_Marginaliss	1.797	0.168	1.185	0.316	1.361	0.256
rh_S_circular_insula_ant	2.041	0.132	1.127	0.339	1.400	0.244
rh_S_circular_insula_inf	2.368	0.096	1.136	0.335	1.539	0.205
rh_S_circular_insula_sup	4.641	<b>0.011</b>	3.051	<b>0.029</b>	3.801	<b>0.011</b>
rh_S_collat_transv_ants	2.738	0.067	2.110	0.100	1.898	0.131
rh_S_collat_transv_post	4.871	<b>0.008</b>	3.775	<b>0.011</b>	3.580	<b>0.015</b>
rh_S_front_infs	4.247	<b>0.015</b>	2.534	0.058	4.049	<b>0.008</b>
rh_S_front_middles	4.978	<b>0.008</b>	2.088	0.103	3.008	<b>0.031</b>
rh_S_front_sups	4.761	<b>0.009</b>	1.719	0.164	2.419	0.067
rh_S_interm_prim_Jensen	3.427	<b>0.034</b>	2.546	0.057	2.294	0.079
rh_S_intrapariet_and_P_trans	6.888	<b>0.001</b>	3.359	<b>0.020</b>	3.677	<b>0.013</b>
rh_S_oc_middle_and_Lunatus	2.037	0.133	1.388	0.247	1.828	0.143
rh_S_oc_sup_and_transversal	5.262	<b>0.006</b>	2.598	0.053	2.334	0.075
rh_S_occipital_ants	3.567	<b>0.030</b>	0.681	0.564	0.889	0.447
rh_S_oc_temp_lats	2.241	0.109	0.886	0.449	0.550	0.649
rh_S_oc_temp_med_and_Lingual	2.197	0.114	0.716	0.543	0.524	0.666
rh_S_orbital_laterals	4.774	<b>0.009</b>	2.855	<b>0.038</b>	2.373	0.071
rh_S_orbital_med_olfact	1.061	0.348	0.579	0.629	0.686	0.561
rh_S_orbital_H_Shaped	3.153	<b>0.045</b>	2.257	0.083	1.941	0.124
rh_S_parieto_occipitals	4.515	<b>0.012</b>	1.923	0.127	1.815	0.145
rh_S_pericallosals	1.992	0.139	0.263	0.852	0.279	0.841
rh_S_postcentrals	6.068	<b>0.003</b>	1.191	0.314	1.172	0.321
rh_S_precentral_inf_part	3.501	<b>0.032</b>	2.083	0.103	2.057	0.107
rh_S_precentral_sup_part	1.144	0.320	0.715	0.544	0.697	0.555
rh_S_suborbitals	0.327	0.722	0.389	0.761	0.339	0.797
rh_S_subparietals	0.311	0.733	0.316	0.814	0.717	0.543

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rh_S_temporal_infs	2.780	0.064	1.645	0.180	0.716	0.543
rh_S_temporal_sups	5.032	<b>0.007</b>	3.622	<b>0.014</b>	5.043	<b>0.002</b>
rh_S_temporal_transverse	0.762	0.468	0.764	0.515	0.926	0.429

**Note.** *p*-values < 0.05, marked in red; FDR *q*-values < 0.05, in bold font

**(c) TDC**

	<u>Age × rs2285545</u>		<u>Age × rs2896218</u>		<u>Age × rs6950765</u>	
	F	p-values	F	p-values	F	p-values
lh_G_and_S_frontomargin	1.894	0.153	2.112	0.100	2.166	0.093
lh_G_and_S_occipital_inf	0.922	0.399	0.714	0.545	1.587	0.193
lh_G_and_S_paracentrals	5.328	<b>0.005</b>	2.357	0.073	3.341	<b>0.020</b>
lh_G_and_S_subcentrals	5.005	<b>0.007</b>	2.690	<b>0.047</b>	2.709	<b>0.046</b>
lh_G_and_S_transv_frontopol	0.334	0.717	0.885	0.449	2.703	<b>0.046</b>
lh_G_and_S_cingul_Ants	1.516	0.222	1.754	0.157	1.451	0.229
lh_G_and_S_cingul_Mid_Ant	4.914	<b>0.008</b>	3.118	<b>0.027</b>	2.978	<b>0.032</b>
lh_G_and_S_cingul_Mid_Post	4.948	<b>0.008</b>	2.948	<b>0.034</b>	3.249	<b>0.023</b>
lh_G_cingul_Post_dorsal	3.541	<b>0.031</b>	2.378	0.071	2.865	<b>0.038</b>
lh_G_cingul_Post_ventral	1.972	0.142	1.362	0.255	1.757	0.156
lh_G_cuneuss	3.211	<b>0.042</b>	1.344	0.261	2.306	0.078
lh_G_front_inf_Opercular	2.609	0.076	0.638	0.591	0.403	0.751
lh_G_front_inf_Orbitals	2.438	0.090	2.135	0.097	2.860	<b>0.038</b>
lh_G_front_inf_Triangul	3.234	<b>0.041</b>	0.825	0.481	0.628	0.598
lh_G_front_middles	2.809	0.062	2.168	0.093	3.115	<b>0.027</b>
lh_G_front_sups	3.033	0.050	3.271	<b>0.022</b>	4.432	<b>0.005</b>
lh_G_Ins_lg_and_S_cent_ins	2.822	0.062	1.497	0.216	2.469	0.063
lh_G_insular_shorts	0.375	0.688	0.793	0.499	1.415	0.239
lh_G_occipital_middles	2.545	0.081	1.645	0.180	1.631	0.183
lh_G_occipital_sups	3.575	<b>0.030</b>	2.508	0.060	3.214	<b>0.024</b>
lh_G_oc_temp_lat_fusifor	0.836	0.435	0.498	0.684	1.233	0.299
lh_G_oc_temp_med_Lingual	1.597	0.205	0.917	0.433	1.227	0.301
lh_G_oc_temp_med_Parahip	6.723	<b>0.001</b>	4.737	<b>0.003</b>	4.422	<b>0.005</b>
lh_G_orbitals	3.150	<b>0.045</b>	4.293	<b>0.006</b>	5.171	<b>0.002</b>
lh_G_pariet_inf_Angular	5.501	<b>0.005</b>	4.472	<b>0.005</b>	5.397	<b>0.001</b>
lh_G_pariet_inf_Supramar	2.882	0.058	2.405	0.068	3.024	<b>0.030</b>

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lh_G_parietal_sups	6.412	<b>0.002</b>	3.426	<b>0.018</b>	4.358	<b>0.005</b>
lh_G_postcentrals	1.744	0.177	0.634	0.594	0.392	0.759
lh_G_precentrals	2.700	0.069	1.778	0.152	1.920	0.127
lh_G_precuneuss	5.144	<b>0.007</b>	4.039	<b>0.008</b>	4.208	<b>0.006</b>
lh_G_rectuss	1.459	0.235	0.538	0.657	0.602	0.614
lh_G_subcallosals	0.164	0.848	0.147	0.931	0.491	0.689
lh_G_temp_sup_G_T_transv	3.153	<b>0.045</b>	0.470	0.703	0.497	0.684
lh_G_temp_sup_Laterals	3.245	<b>0.041</b>	2.483	0.062	2.210	0.088
lh_G_temp_sup_Plan_polar	2.249	0.108	1.260	0.289	1.616	0.187
lh_G_temp_sup_Plan_tempo	1.592	0.206	1.362	0.255	1.923	0.127
lh_G_temporal_infs	6.188	<b>0.002</b>	4.575	<b>0.004</b>	4.517	<b>0.004</b>
lh_G_temporal_middles	3.293	<b>0.039</b>	2.369	0.071	2.286	0.080
lh_Lat_Fis_ant_Horizont	1.272	0.282	0.994	0.397	1.038	0.377
lh_Lat_Fis_ant_Vertical	3.793	<b>0.024</b>	0.096	0.962	0.035	0.991
lh_Lat_Fis_posts	1.451	0.237	1.155	0.328	1.669	0.174
lh_Pole_occipitals	2.730	0.067	1.092	0.353	1.394	0.245
lh_Pole_temporals	0.294	0.745	1.123	0.341	0.934	0.425
lh_S_calcarines	0.350	0.705	0.421	0.738	0.873	0.456
lh_S_centrales	3.417	<b>0.034</b>	2.375	0.071	2.104	0.101
lh_S_cingul_Marginaliss	3.961	<b>0.020</b>	0.879	0.453	1.252	0.292
lh_S_circular_insula_ant	3.275	<b>0.040</b>	2.192	0.090	3.547	<b>0.015</b>
lh_S_circular_insula_inf	2.357	0.097	1.717	0.164	1.349	0.259
lh_S_circular_insula_sup	3.362	<b>0.036</b>	2.177	0.092	2.705	<b>0.046</b>
lh_S_collat_transv_ants	0.636	0.530	1.567	0.198	2.811	<b>0.040</b>
lh_S_collat_transv_post	2.073	0.128	1.956	0.121	2.527	0.058
lh_S_front_infs	3.791	<b>0.024</b>	3.182	<b>0.025</b>	4.405	<b>0.005</b>
lh_S_front_middles	3.060	<b>0.049</b>	1.645	0.180	1.611	0.188
lh_S_front_sups	3.098	<b>0.047</b>	1.714	0.165	2.221	0.086
lh_S_interm_prim_Jensen	0.464	0.629	0.427	0.734	0.921	0.431
lh_S_intrapariet_and_P_trans	3.493	<b>0.032</b>	1.098	0.351	1.522	0.210
lh_S_oc_middle_and_Lunatus	1.497	0.226	1.113	0.345	0.930	0.427
lh_S_oc_sup_and_transversal	9.511	<b>0.000</b>	2.826	<b>0.039</b>	2.807	<b>0.040</b>
lh_S_occipital_ants	4.900	<b>0.008</b>	0.732	0.534	1.192	0.314
lh_S_oc_temp_lats	1.321	0.269	2.783	<b>0.042</b>	1.814	0.145

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lh_S_oc_temp_med_and_Lingual	2.065	0.129	1.578	0.196	2.173	0.092
lh_S_orbital_laterals	0.820	0.442	1.500	0.215	1.889	0.132
lh_S_orbital_med_olfact	0.052	0.949	1.165	0.324	1.447	0.230
lh_S_orbital_H_Shaped	0.969	0.381	2.347	0.074	3.070	<b>0.029</b>
lh_S_parieto_occipitals	4.195	<b>0.016</b>	4.105	<b>0.007</b>	5.228	<b>0.002</b>
lh_S_pericallosals	0.274	0.761	1.842	0.140	2.673	<b>0.048</b>
lh_S_postcentrals	3.076	<b>0.048</b>	1.228	0.300	1.037	0.377
lh_S_precentral_inf_part	1.775	0.172	1.413	0.240	1.675	0.173
lh_S_precentral_sup_part	1.405	0.248	1.080	0.358	1.336	0.264
lh_S_suborbitals	1.988	0.139	1.676	0.173	0.936	0.424
lh_S_subparietals	0.705	0.495	0.686	0.561	1.331	0.265
lh_S_temporal_infs	0.314	0.731	0.939	0.422	0.551	0.648
lh_S_temporal_sups	3.825	<b>0.023</b>	2.821	<b>0.040</b>	3.404	<b>0.018</b>
lh_S_temporal_transverse	4.311	<b>0.015</b>	1.306	0.273	1.197	0.312
rh_G_and_S_frontomargin	3.467	<b>0.033</b>	2.257	0.083	2.389	0.070
rh_G_and_S_occipital_inf	1.275	0.281	0.821	0.484	1.351	0.259
rh_G_and_S_paracentrals	3.151	<b>0.045</b>	1.845	0.140	2.708	<b>0.046</b>
rh_G_and_S_subcentrals	1.711	0.183	1.562	0.199	1.901	0.130
rh_G_and_S_transv_frontopol	2.223	0.111	1.386	0.248	0.872	0.456
rh_G_and_S_cingul_Ants	2.910	0.056	1.204	0.309	1.867	0.136
rh_G_and_S_cingul_Mid_Ant	2.980	0.053	1.667	0.175	1.734	0.161
rh_G_and_S_cingul_Mid_Post	7.767	<b>0.001</b>	4.801	<b>0.003</b>	5.761	<b>0.001</b>
rh_G_cingul_Post_dorsal	2.743	0.066	2.343	0.074	3.255	<b>0.022</b>
rh_G_cingul_Post_ventral	2.089	0.126	1.732	0.161	2.243	0.084
rh_G_cuneuss	1.788	0.170	0.590	0.622	1.007	0.391
rh_G_front_inf_Opercular	1.845	0.160	0.813	0.488	1.560	0.200
rh_G_front_inf_Orbitals	3.510	<b>0.032</b>	2.808	<b>0.040</b>	2.619	0.052
rh_G_front_inf_Triangul	3.541	<b>0.031</b>	4.331	<b>0.005</b>	3.664	<b>0.013</b>
rh_G_front_middles	5.277	<b>0.006</b>	3.740	<b>0.012</b>	5.370	<b>0.001</b>
rh_G_front_sups	3.999	<b>0.020</b>	2.427	0.066	3.839	<b>0.010</b>
rh_G_Ins_lg_and_S_cent_ins	2.420	0.091	1.997	0.115	2.711	<b>0.046</b>
rh_G_insular_shorts	0.606	0.547	0.661	0.577	2.724	<b>0.045</b>
rh_G_occipital_middles	5.076	<b>0.007</b>	3.458	<b>0.017</b>	3.147	<b>0.026</b>
rh_G_occipital_sups	1.546	0.215	0.852	0.467	1.141	0.333

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rh_G_oc_temp_lat_fusifor	6.477	<b>0.002</b>	3.631	<b>0.014</b>	3.719	<b>0.012</b>
rh_G_oc_temp_med_Lingual	3.190	<b>0.043</b>	1.381	0.249	1.418	0.238
rh_G_oc_temp_med_Parahip	2.363	0.096	1.685	0.171	2.190	0.090
rh_G_orbitals	7.944	<b>0.000</b>	5.010	<b>0.002</b>	5.086	<b>0.002</b>
rh_G_pariet_inf_Angular	2.330	0.100	2.005	0.114	3.422	<b>0.018</b>
rh_G_pariet_inf_Supramar	3.867	<b>0.022</b>	2.971	<b>0.033</b>	3.423	<b>0.018</b>
rh_G_parietal_sups	4.441	<b>0.013</b>	2.228	0.086	3.613	<b>0.014</b>
rh_G_postcentrals	1.127	0.326	0.324	0.808	0.274	0.844
rh_G_precentrals	1.673	0.190	0.922	0.431	1.682	0.172
rh_G_precuneuss	5.338	<b>0.005</b>	2.729	<b>0.045</b>	3.303	<b>0.021</b>
rh_G_rectuss	0.183	0.833	0.972	0.407	0.227	0.877
rh_G_subcallosals	0.088	0.915	0.149	0.930	0.578	0.630
rh_G_temp_sup_G_T_transv	2.341	0.099	1.891	0.132	1.917	0.128
rh_G_temp_sup_Laterals	2.556	0.080	1.644	0.180	1.655	0.178
rh_G_temp_sup_Plan_polar	0.050	0.951	0.971	0.407	0.376	0.770
rh_G_temp_sup_Plan_tempo	1.315	0.271	1.212	0.306	0.963	0.411
rh_G_temporal_infs	4.121	<b>0.017</b>	0.909	0.437	1.202	0.310
rh_G_temporal_middles	7.111	<b>0.001</b>	2.381	0.070	2.546	0.057
rh_Lat_Fis_ant_Horizont	0.750	0.474	2.313	0.077	1.556	0.201
rh_Lat_Fis_ant_Vertical	1.550	0.215	2.260	0.082	0.920	0.432
rh_Lat_Fis_posts	5.256	<b>0.006</b>	4.217	<b>0.006</b>	5.616	<b>0.001</b>
rh_Pole_occipitals	2.531	0.082	1.412	0.240	1.647	0.179
rh_Pole_temporals	4.075	<b>0.018</b>	3.344	<b>0.020</b>	3.399	<b>0.019</b>
rh_S_calcarines	2.725	0.068	1.367	0.254	1.642	0.181
rh_S_centrales	3.376	<b>0.036</b>	1.565	0.199	1.641	0.181
rh_S_cingul_Marginaliss	1.797	0.168	1.185	0.316	1.361	0.256
rh_S_circular_insula_ant	2.041	0.132	1.127	0.339	1.400	0.244
rh_S_circular_insula_inf	2.368	0.096	1.136	0.335	1.539	0.205
rh_S_circular_insula_sup	4.641	<b>0.011</b>	3.051	<b>0.029</b>	3.801	<b>0.011</b>
rh_S_collat_transv_ants	2.738	0.067	2.110	0.100	1.898	0.131
rh_S_collat_transv_post	4.871	<b>0.008</b>	3.775	<b>0.011</b>	3.580	<b>0.015</b>
rh_S_front_infs	4.247	<b>0.015</b>	2.534	0.058	4.049	<b>0.008</b>
rh_S_front_middles	4.978	<b>0.008</b>	2.088	0.103	3.008	<b>0.031</b>
rh_S_front_sups	4.761	<b>0.009</b>	1.719	0.164	2.419	0.067

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rh_S_interm_prim_Jensen	3.427	<b>0.034</b>	2.546	0.057	2.294	0.079
rh_S_intrapariet_and_P_trans	6.888	<b>0.001</b>	3.359	<b>0.020</b>	3.677	<b>0.013</b>
rh_S_oc_middle_and_Lunatus	2.037	0.133	1.388	0.247	1.828	0.143
rh_S_oc_sup_and_transversal	5.262	<b>0.006</b>	2.598	0.053	2.334	0.075
rh_S_occipital_ants	3.567	<b>0.030</b>	0.681	0.564	0.889	0.447
rh_S_oc_temp_lats	2.241	0.109	0.886	0.449	0.550	0.649
rh_S_oc_temp_med_and_Lingual	2.197	0.114	0.716	0.543	0.524	0.666
rh_S_orbital_laterals	4.774	<b>0.009</b>	2.855	<b>0.038</b>	2.373	0.071
rh_S_orbital_med_olfact	1.061	0.348	0.579	0.629	0.686	0.561
rh_S_orbital_H_Shaped_s	3.153	<b>0.045</b>	2.257	0.083	1.941	0.124
rh_S_parieto_occipitals	4.515	<b>0.012</b>	1.923	0.127	1.815	0.145
rh_S_pericallosals	1.992	0.139	0.263	0.852	0.279	0.841
rh_S_postcentrals	6.068	<b>0.003</b>	1.191	0.314	1.172	0.321
rh_S_precentral_inf_part	3.501	<b>0.032</b>	2.083	0.103	2.057	0.107
rh_S_precentral_sup_part	1.144	0.320	0.715	0.544	0.697	0.555
rh_S_suborbitals	0.327	0.722	0.389	0.761	0.339	0.797
rh_S_subparietals	0.311	0.733	0.316	0.814	0.717	0.543
rh_S_temporal_infs	2.780	0.064	1.645	0.180	0.716	0.543
rh_S_temporal_sups	5.032	<b>0.007</b>	3.622	<b>0.014</b>	5.043	<b>0.002</b>
rh_S_temporal_transverse	0.762	0.468	0.764	0.515	0.926	0.429

**Note.** *p*-values < 0.05, marked in red; FDR *q*-values < 0.05, in bold font. The names of the brain regions can be referred to article entitled with “Automatically parcellating the human cerebral cortex. Fischl B, van der Kouwe A, Destrieux C, Halgren E, Ségonne F, Salat DH, Busa E, Seidman LJ, Goldstein J, Kennedy D, Caviness V, Makris N, Rosen B, Dale AM. *Cereb Cortex*. 2004 Jan;14(1):11-22. doi: 10.1093/cercor/bhg087.

<https://surfer.nmr.mgh.harvard.edu/ftp/articles/fischl04-parcellation.pdf>.

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**Supplementary Table S10.** Prediction of CTCF binding sites around rs6950765 and rs2896218 on CTCFBSDB 2.0 (<http://insulatordb.uthsc.edu/>)

<b>Motif PWM</b>	<b>Motif Sequence</b>	<b>Input Sequence Name</b>	<b>Motif Start Location</b>	<b>Motif Length</b>	<b>Motif Orientation</b>	<b>Score</b>
EMBL_M1	CTTCCCCTTGTGGC	rs2896218	298	14	+	13.2208
EMBL_M1	TGCCCTCAGGAGCT	rs6950765	249	14	+	6.33047
EMBL_M2	GGAACTTCA	rs2896218	698	9	+	6.58899
EMBL_M2	GGAAGAGCA	rs6950765	966	9	+	9.41403
MIT_LM2	TAAGCTCCTGAGGGCAGGA	rs6950765	246	19	-	8.04677
MIT_LM7	CCCCAAGCAGCTGGCACAGT	rs2896218	965	20	-	9.03359
MIT_LM7	TGTGCAGTTGATGGATCTAT	rs6950765	328	20	-	7.60958
MIT_LM23	AAGCCACAAGGGGAAGCTTC	rs2896218	294	20	-	6.98193

**Note.** CTCF uses different combinations of its zinc fingers to recognize divergent DNA sequences. Recent studies have identified core motifs for CTCFBS sequences and the motifs are represented by position weight matrices (PWM). Altogether, six PWM derived to accommodate the divergence of CTCFBS sequences have been identified and included in the web tool<sup>1,2,3</sup>. The EMBL\_M1 and EMBL\_M2 motifs were identified by Schmidt et al.<sup>1</sup>; and the LM2, LM7, and LM23 motifs were identified by Xie et al.<sup>3</sup> The web tool used the STORM program<sup>4</sup> and each of the six PWM to report the single best hit in the query sequence. The PWM score corresponds to the log-odds of the observed sequence being generated by the motif versus being generated by the background. A large positive score suggests a good match, while a negative score indicates that the best match to the query sequence was worse than would be expected in a random sequence of the same length. Usually a short sequence with a PWM score >3.0 is a suggestive match.



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<sup>1</sup> Schmidt, D., et al. (2012) Waves of retrotransposon expansion remodel genome organization and CTCF binding in multiple mammalian lineages. *Cell*, 148, 335-348.

<sup>2</sup> Kim, T.H., et al. (2007) Analysis of the vertebrate insulator protein CTCF-binding sites in the human genome. *Cell*, 128, 1231-1245.

<sup>3</sup> Xie, X., et al. (2007) Systematic discovery of regulatory motifs in conserved regions of the human genome, including thousands of CTCF insulator sites. *Proc Natl Acad Sci U S A*, 104, 7145-7150.

<sup>4</sup> Schones, D.E., et al. (2007) Statistical significance of cis-regulatory modules. *BMC Bioinformatics*, 8:19.