

Supplemental material for “Associations between cortisol stress responses and limbic volume and thickness in young adults” – correlation and multiple linear regression results

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Table 1. Results of bivariate correlations between individual cortisol increases (nmol/l) and structural measures (volume in cm³ and thickness in cm) of the limbic system. *indicates significant results ($p < .05$).

	Correlation with cortisol increase					
	Left hemisphere			Right hemisphere		
	<i>r</i> ²	<i>n</i>	<i>p</i> -value	<i>r</i> ²	<i>n</i>	<i>p</i> -value
volume (cm³)						
thalamus	.220	66	.075	.116	66	.353
ncl. caudatus	.254*	66	.040	.291*	66	.018
ncl. accumbens	.232	66	.061	-.020	66	.876
putamen	.201	66	.106	.268*	66	.030
hippocampus	.236	66	.056	.138	66	.268
amygdala	.310*	66	.011	.031	66	.803
thickness (cm)						
rostral anterior cingulate cortex (rACC)	-.175	59	.184	-.036	60	.787
caudal anterior cingulate cortex (cACC)	-.082	54	.557	.150	63	.241
posterior cingulate cortex (PCC)	-.239	59	.069	.137	62	.289
parahippocampus	.326*	58	.013	.025	61	.848
lateral orbitofrontal (IOFC)	.227	58	.087	.057	59	.669
medial orbitofrontal (mPFC)	.073	64	.568	.050	62	.701

Table 2. Multiple linear regression models for limbic structure measures of the left hemisphere including sex, age, and total brain volume (where appropriate) as control variables and cortisol as well as the interaction sex*cortisol as variables of interest. *B* represents the unstandardized regression coefficient, *SE B* the standard error of *B*, and β the standardized regression coefficient. The last column shows the significance thresholds after correction for multiple testing (false discovery rate, FDR) for the two variables of interest cortisol and sex*cortisol. *indicates significant results ($p < .05$).

	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i> -value	<i>FDR threshold</i>
Left thalamic volume (n = 66)						
constant	3139.343	1286.354		2.440	.018*	
sex	-158.543	211.130	-.092	-.751	.456	
age	-35.565	23.713	-.130	-1.500	.139	
total brain volume	.509	.083	.689	6.145	.001*	
cortisol	22.670	22.666	.121	1.00	.321	.023
sex*cortisol	-3.645	13.653	-.031	-.267	.790	.044
Left ncl. caudatus volume (n = 66)						
constant	142.508	74.630		1.910	.061	
sex	-2.430	12.249	-.029	-.198	.834	
age	-.770	1.376	-.057	-.559	.578	
total brain volume	.021	.005	.589	4.470	.001*	
cortisol	-.226	1.315	-.024	-.172	.864	.046
sex*cortisol	1.556	.792	.265	1.964	.054	.006
Left ncl. accumbens volume (n = 66)						
constant	-8.826	138.252		-.064	.949	
sex	-32.991	22.691	-.190	-1.454	.151	
age	2.125	2.549	.077	.834	.408	
total brain volume	.042	.009	.559	4.680	.001*	
cortisol	-.402	2.436	-.021	-.165	.870	.048
sex*cortisol	1.525	1.467	.127	1.039	.303	.021
Left putamen volume (n = 66)						
constant	751.055	1051.231		.714	.478	
sex	-26.161	172.539	-.022	-.152	.880	
age	18.069	19.378	.095	.932	.355	
total brain volume	.311	.068	.604	4.597	.001*	
cortisol	-7.679	18.523	-.059	-.415	.680	.040
sex*cortisol	17.332	11.158	.209	1.553	.126	.013
Left hippocampal volume (n = 66)						
constant	2228.533	669.605		3.328	.001*	
sex	-179.239	109.903	-.216	-1.631	.108	
age	-4.079	12.343	-.031	-.330	.742	
total brain volume	.194	.043	.545	4.498	.001*	
cortisol	8.358	11.799	.092	.708	.481	.029
sex*cortisol	-1.075	7.107	-.019	-.151	.880	.050

	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i> -value	<i>FDR threshold</i>
Left amygdalar volume (n = 66)						
constant	612.708	316.366		1.937	.057	
sex	-147.817	51.925	-.332	-2.847	.006*	
age	-2.282	5.832	-.032	-.391	.697	
total brain volume	.092	.020	.480	4.498	.001*	
cortisol	11.935	5.575	.245	2.141	.036*	.002
sex*cortisol	-5.461	3.358	-.178	-1.626	.109	.010
Left rostral anterior cingulate cortex (rACC) thickness (n = 59)						
constant	3.759	.248		15.150	.001*	
sex	.033	.068	.070	.492	.624	
age	-.016	.010	-.220	-1.634	.108	
cortisol	-.013	.010	-.256	-1.331	.189	.016
sex*cortisol	.003	.006	.096	.517	.607	.035
Left caudal anterior cingulate cortex (cACC) thickness (n = 59)						
constant	2.779	.302		9.195	.001*	
sex	.003	.087	.005	.037	.971	
age	.003	.012	.037	.267	.791	
cortisol	-.006	.012	-.105	-.529	.599	.033
sex*cortisol	-.004	.007	-.104	-.552	.583	.031
Left posterior cingulate cortex (PCC) thickness (n = 54)						
constant	2.564	.181		14.133	.001	
sex	-.026	.050	-.078	-.526	.601	
age	.007	.007	.127	.883	.381	
cortisol	-.020	.009	-.278	-1.218	.229	.019
sex*cortisol	.005	.005	.214	.951	.346	.025
Left parahippocampal thickness (n = 58)						
constant	2.581	.346		7.451	.001*	
sex	.059	.095	.089	.623	.536	
age	.014	.014	.136	1.000	.322	
cortisol	.031	.015	.389	2.075	.043*	.004
sex*cortisol	-.004	.009	-.071	-.393	.696	.042
Left lateral orbitofrontal cortex (IOFC) thickness (n = 58)						
constant	3.136	.185		16.987	.001*	
sex	-.046	.050	-.135	-.912	.366	
age	.001	.007	.011	.076	.940	
cortisol	.014	.007	.360	1.951	.056	.008
sex*cortisol	-.007	.005	-.267	-1.512	.136	.015
Left medial orbitofrontal cortex (mOFC) thickness (n = 64)						
constant	2.846	.203		14.035	.001*	
sex	-.078	.055	-.203	-1.428	.159	
age	.004	.008	.068	.510	.612	
cortisol	.004	.008	.096	.514	.609	.038
sex*cortisol	-.004	.005	-.148	-.825	.413	.027

Table 3. Multiple linear regression models for limbic structure measures of the left hemisphere including sex, age, and total brain volume (where appropriate) as control variables and cortisol as well as the interaction sex*cortisol as variables of interest. *B* represents the unstandardized regression coefficient, *SE B* the standard error of *B*, and β the standardized regression coefficient. The last column shows the significance thresholds after correction for multiple testing (false discovery rate, FDR) for the two variables of interest cortisol and sex*cortisol. *indicates significant results ($p \leq .05$).

	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i> -value	<i>FDR threshold</i>
Right thalamic volume (n = 66)						
constant	2708.071	1232.852		2.197	.032*	
sex	-262.004	202.348	-.161	-1.295	.200	
age	-14.137	22.726	-.055	-.622	.536	
total brain volume	.463	.079	.662	5.827	.001*	
cortisol	-21.733	21.724	-.122	-1.000	.321	.006
sex*cortisol	13.926	13.085	.124	1.064	.291	.004
Right ncl. caudatus volume (n = 66)						
constant	1573.423	701.440		2.243	.029*	
sex	-53.863	115.128	-.065	-.468	.624	
age	-9.114	12.930	-.069	-.705	.484	
total brain volume	.212	.045	.597	4.691	.001*	
cortisol	10.091	12.360	.112	.816	.417	.013
sex*cortisol	5.993	7.445	.105	.805	.424	.015
Right ncl. accumbens volume (n = 66)						
constant	909.175	850.731		1.069	.289	
sex	-118.810	139.631	-.158	-.851	.398	
age	-21.469	15.682	-.180	-1.369	.176	
total brain volume	.030	.055	.094	.556	.580	
cortisol	.376	14.990	.005	.025	.980	.050
sex*cortisol	-5.290	9.030	-.102	-.586	.560	.021
Right putamen volume (n = 66)						
constant	2101.282	720.711		2.916	.005*	
sex	-196.340	118.291	-.195	-1.660	.102	
age	-6.811	13.286	-.043	-.513	.610	
total brain volume	.271	.046	.627	5.843	.001*	
cortisol	9.717	12.699	.088	.765	.447	.016
sex*cortisol	1.884	7.650	.027	.246	.806	.038
Right hippocampal volume (n = 66)						
constant	613.994	1979.831		.310	.758	
sex	-39.574	324.950	-.022	-.122	.903	
age	43.731	36.496	.152	1.198	.236	
total brain volume	.210	.128	.271	1.649	.104	
cortisol	6.177	34.886	.031	.177	.860	.044
sex*cortisol	6.602	21.014	.053	.314	.754	.035

	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i> -value	<i>FDR threshold</i>
Right amygdalar volume (<i>n</i> = 66)						
constant	3112.376	1873.569		1.661	.102	
sex	-433.118	307.510	-.261	-1.408	.164	
age	-43.240	34.537	-.164	-1.252	.215	
total brain volume	.018	.121	.025	.147	.884	
cortisol	4.394	33.014	.024	.133	.895	.046
sex*cortisol	-11.208	19.886	-.098	-.564	.575	.023
Right rostral anterior cingulate cortex (rACC) thickness (<i>n</i> = 60)						
constant	3.463	.234		14.802	.001*	
sex	-.114	.064	-.254	-1.800	.077	
age	-.002	.010	-.023	-.175	.862	
cortisol	.002	.009	.036	.190	.850	.040
sex*cortisol	-.007	.005	-.221	-1.216	.229	.002
Right caudal anterior cingulate cortex (cACC) thickness (<i>n</i> = 63)						
constant	2.534	.265		9.553	.001*	
sex	.033	.074	.065	.448	.656	
age	.005	.011	.062	.461	.646	
cortisol	.004	.011	.079	.420	.676	.027
sex*cortisol	.004	.006	.123	.684	.497	.019
Right posterior cingulate cortex (PCC) thickness (<i>n</i> = 62)						
constant	2.833	.132		21.405	.001*	
sex	.031	.037	.123	.847	.400	
age	-.005	.005	-.131	-.959	.342	
cortisol	.003	.005	.090	.465	.644	.025
sex*cortisol	.003	.003	.164	.890	.377	.008
Right parahippocampal thickness (<i>n</i> = 61)						
constant	2.848	.288		9.884	.001*	
sex	.023	.078	.046	.298	.767	
age	.000	.012	.005	.033	.974	
cortisol	.001	.011	.017	.086	.931	.048
sex*cortisol	.001	.006	.035	.189	.851	.042
Right lateral orbitofrontal cortex (IOFC) thickness (<i>n</i> = 59)						
constant	2.712	.280		9.672	.001*	
sex	.071	.077	.138	.929	.357	
age	.013	.011	.164	1.159	.252	
cortisol	.004	.011	.058	.375	.709	.031
sex*cortisol	.004	.011	.062	.418	.678	.029
Right medial orbitofrontal cortex (mOFC) thickness (<i>n</i> = 62)						
constant	2.825	.199		14.199	.001*	
sex	-.089	.055	-.225	-1.616	.112	
age	.009	.008	.143	1.082	.284	
cortisol	.003	.009	.071	.355	.724	.033
sex*cortisol	-.004	.005	-.160	-.830	.410	.010