Supplementary material

Negative childhood experiences alter a prefrontal-insular-motor cortical network in healthy adults: A preliminary multimodal rsfMRI-fMRI-MRS-dMRI study

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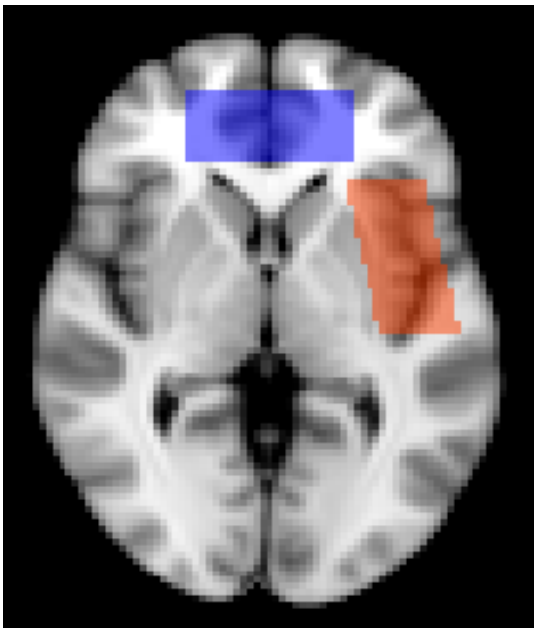
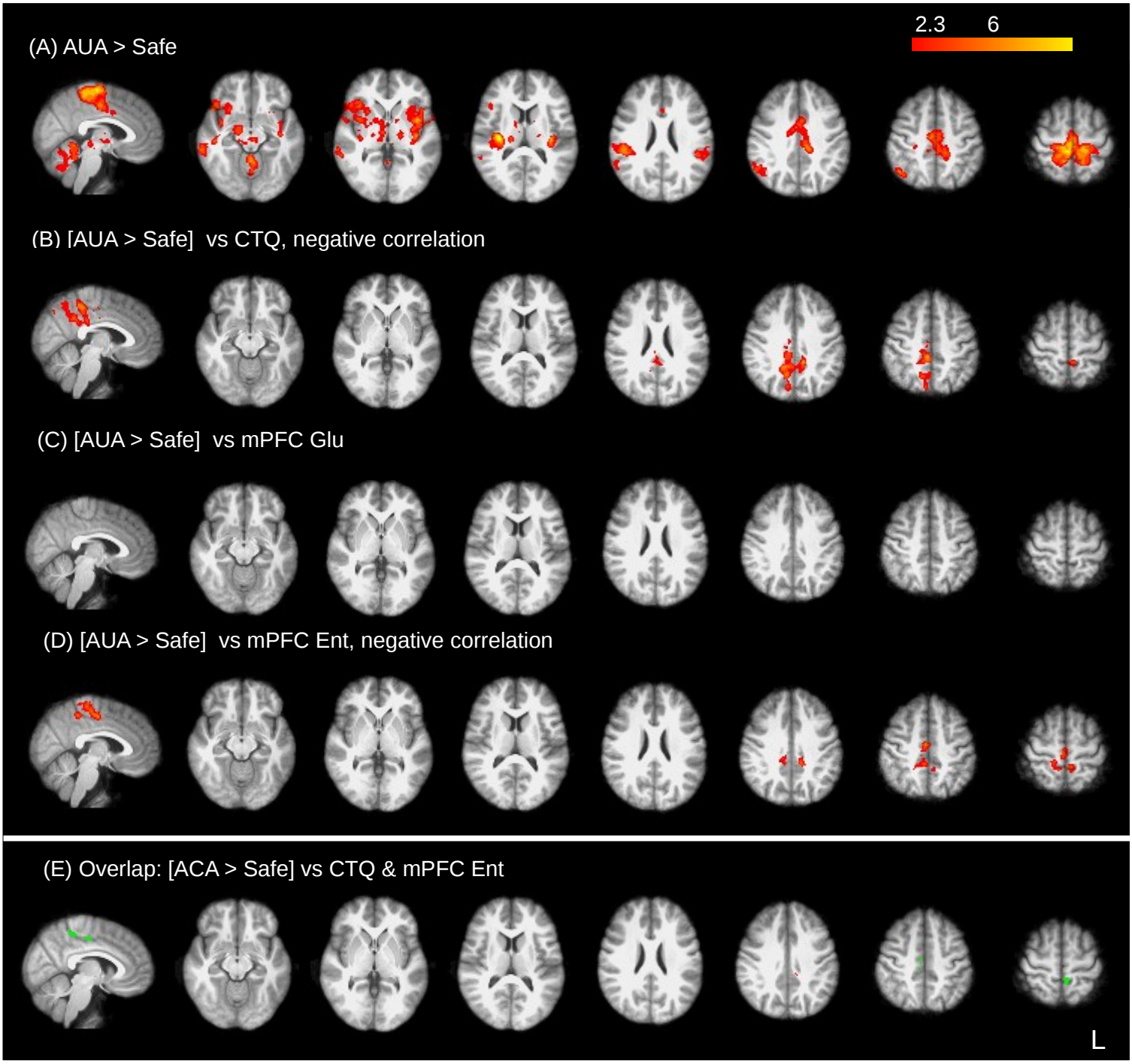
Supplementary figures



Supplementary figure 1: Location of MRS voxels. Blue – mPFC. Red – left insula



Supplementary figure 2: Figure 3: Brain maps showing (A) the basic contrast of the anticipation of uncertain aversion > safe [AUA > Safe]; (B) the negative correlation between [AUA > Safe] contrast values and CTQ scores; (C) the positive correlation between [AUA > Safe] contrast values and mPFC Glu; (D) the negative correlation between [AUA > Safe] contrast values and mPFC entropy; and (E) the overlap, in green, between each of these maps. Results are thresholded at $p < 0.05$, FWE corrected ($n = 14$), other than [AUA > Safe] vs mPFC Glu which is thresholded at $p < 0.005$, uncorrected. Results are shown superimposed on the study mean anatomical image. Sagittal $x = 6$.

Supplementary tables

	Complete group (n = 25)	MRS+rest subgroup (n=12)
Age	22 ± 3.9	23 ± 3.5
Sex	9F	6F
Years in education	13 ± 5.69	14 ± 3.93
IQ	113 ± 8.42	112 ± 9.33
CTQ	36.9 ± 5.4	37 ± 5.1
ASI	14.3 ± 6.2	13.6 ± 6.6

Supplementary table 1: Subject demographics and test scores (mean ± S.D.). Values are given for the whole group as well as the subgroup for whom usable MRI data was available. IQ = estimated IQ (as measured using the Shipley Institute of Living Scale), CTQ = childhood trauma questionnaire, ASI = anxiety sensitivity index.

Region		x,y,z	voxels	Z-max
post-insula/HG	R	38 -20 12	22676	6.36
	L	-34 -22 14		
ant-insula/operculum	R	38 4 8		
		62 8 10		
	L	-36 0 6		
		-52 -4 6		
POC	L	-48 -40 22		
	R	42 -28 18		
cerebellum	L/R	-6 -46 -22		
		0 -50 -12		
thalamus	L	-18 -22 6		
		-8 -20 -6		
	R	14 -14 -6		
mid-insula	L	-38 -8 -8		
post-SMG	R	58 -30 30		
		20 8 -10		
VS	L	-12 0 0		
	R	14 4 -2		
		14 8 -12		
amygdala	R	24 2 -16		
	L	-18 -4 -16		
SMC	R	12 -40 72	11916	6.31
		10 -16 72		
	L	-16 -32 56		
		-6 -36 50		
MCC/ACC	L	-12 6 36		
	R	6 4 36		
precuneus	L/R	-10 -48 58		
PCC	L/R	0 -20 46		
		-10 -20 38		
MCC/SMA	L/R	-2 -4 42		
ACC	L/R	4 22 18		
		14 16 30		
paracingulate gyrus	L/R	6 14 52		
cerebellum	L	-20 -44 -52	257	5.09
brain-stem	L/R	-2 -36 -40	199	4.71
1^{o} MC	L	-40 -10 48	195	4.22
		-38 -20 38		
2^{o} visual	L/R	22 -60 2	137	4.34
		22 -70 10		

Supplemetary table 2a: Results for contrast [ACA > Safe]. Coordinates are in MNI space. Significance threshold is $p < 0.05$, FWE corrected ($Z > 2.3$). SMC = sensory-motor cortex; SMA = supplementary motor area; HG = Herschl's gyrus; 1^{o} MC = primary motor cortex; 2^{o} visual = secondary visual cotex; ACC = anterior cingulate cortex; POC = parietal operculum cortex; VS = ventral striatum; MCC = mid-cingulate cortex; ACC = anterior cingulate cortex; PCC = posterior cingulate cortex

Region		x,y,z	voxels	Z-max
SMC	R	10 -34 66	6317	4.9
		22 -38 74		
	L	-14 -32 64		
		-18 -44 66		
MCC/SMA	L/R	4 -14 44		
		8 -6 36		
ACC	L/R	-2 20 24		
post-insula/HG	R	36 -20 12	4830	4.92
mid-temporal gyrus		66 -36 -10		
ant-insula/operculum		48 20 -4		
		38 28 0		
		60 20 4		
thalamus	R	10 -12 -2		
	L	-18 -24 -4		
mid-insula	R	38 4 0		
		40 0 -12		
mid-brain	L/R	-6 -22 -10		
		8 -28 -10		
VS	R	28 14 -2		
		10 2 2		
mid-insula	L	-38 4 0	1938	4.15
post-insula		-34 -24 14		
POC		-52 -32 20		
ant-insula/operculum		-44 16 4		
		-36 4 -18		
		-60 8 0		
post-SMG		-50 -48 32		
VS		-16 6 6		
Cerebellum	L/R	0-52 -8	1033	4.26
		-8 -62 -42		
		10 -66 -22		
Lat-OC	R	48 -60 46	722	3.76
SMG		60 -46 26		

Supplemetary table 2b: Results for contrast [AUA > Safe]. Coordinates are in MNI space. Significance threshold is $p < 0.05$, FWE corrected ($Z > 2.3$). SMC = sensory-motor cortex; SMA = supplementary motor area; HG = Herschl's gyrus; 1^o MC = primary motor cortex; 2^o visual = secondary visual cotex; ACC = anterior cingulate cortex; POC = parietal operculum cortex; VS = ventral striatum; MCC = mid-cingulate cortex; ACC = anterior cingulate cortex; PCC = posterior cingulate cortex; lat-OC = lateral occipital cortex; post-SMG = posterior supramarginal gyrus

Region		x,y,z	voxels	Z-max
SMC/PCC/precuneus/SMA	L/R	-10 -24 76	3533	3.5
post-SMG	R	56 -44 44	860	3.27
dmPFC/ACC	R	10 52 28	526	3.3
operculum/mid-insula/post-insula	L	-46 -24 18	1365	3.35

Supplementary table 3a: Cluster locations for [ACA vs Safe] vs CTQ regression. Note that the thalamus cluster is mostly in the right thalamus. Coordinates are in MNI space. Threshold is $p < 0.05$, FWE corrected ($Z > 2.3$). SMC = sensory-motor cortex; PCC = posterior cingulate cortex; SMA = supplementary motor area; Post-SMG = posterior supramarginal gyrus; dmPFC = dorsomedial prefrontal cortex; ACC = anterior cingulate cortex.

Region		x,y,z	voxels	Z-max
PCC/precuneus	L/R	-10 -44 40	2222	3.35

Supplementary table 3b: Cluster locations for [AUA vs Safe] vs CTQ regression. Coordinates are in MNI space. Threshold is $p < 0.05$, FWE corrected ($Z > 2.3$). PCC = posterior cingulate cortex.

Region		x,y,z	voxels	Z-max
SMC	L/R	4 -16 50	133	3.4
post-SMG	L	-64 -50 36	99	3.3
Insula/operculum	L	-44 2 8	67	3.36

Supplementary table 4: Cluster locations for [ACA vs Safe] vs mPFC Glu regression. Coordinates are in MNI space. Threshold is $p < 0.005$, uncorrected ($k > 50$). SMC = sensory-motor cortex; Post-SMG = posterior supramarginal gyrus.

Region		x,y,z	voxels	Z-max
SMC/SMA	L/R	-2 -18 52	933	4.18
operculum/mid-insula	L	-56 8 -4	627	3.73
1^o MC	L	-38 -18 52	611	3.44

Supplementary table 5a: Cluster locations for [ACA vs Safe] vs mPFC Ent regression. Coordinates are in MNI space. Threshold is $p < 0.05$, FWE corrected ($Z > 2.3$). SMC = sensory-motor cortex; SMA = supplementary motor area; 1^o MC = primary motor cortex.

Region		x,y,z	voxels	Z-max
SMC/precuneus/PCC	L/R	2 -16 50	1465	3.19

Supplementary table 5b: Cluster locations for [AUA vs Safe] vs mPFC Ent regression. Coordinates are in MNI space. Threshold is $p < 0.05$, FWE corrected ($Z > 2.3$). SMC = sensory-motor cortex; PCC = posterior cingulate cortex.

	Mean fractional anisotropy		
Sub	Motor ∩ mPFC	Motor ∩ Insula	mPFC ∩ Insula
1	0.3140	0.6012	0.4616
2	0.4650	0.5383	0.4574
3	0.4634	0.4168	0.4780
4	0.4686	0.5111	0.4659
5	0.4702	0.5079	0.4456
6	0.4923	0.4474	0.4295
7	0.4617	0.3731	0.4008
8	0.5135	0.3940	0.5157
9	0.4638	0.4780	0.4569
10	0.4454	0.5213	0.4712
11	0.4611	0.5376	0.4798

Supplementary table 6: Mean fractional anisotropy between ROIs for each participant.