

Appendix 1 to Lim L, Hart H, Howells H, et al. Altered white matter connectivity in young people exposed to childhood abuse: a tract-based spatial statistics (TBSS) and tractography study. *J Psychiatry Neurosci* 2019.

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Supplementary Materials

Participants

Besides undergoing a urine test for drug abuse, participants were also asked as part of the DAWBA assessment if they had used any drugs (cannabis, ecstasy, solvents, amphetamines, tranquillisers, cocaine, crack, opiates, other drugs) in the past 4 weeks, on a scale of 0 (No), 1 (Occasionally), 2 (Only at weekends), 3 (Most days), 4 (Every day). As shown on the table below, most of the participants did not use any drugs in the last 4 weeks before the scan and there were no significant differences between the 3 groups.

Table S1. Drugs used in the past 4 weeks in the childhood abuse, psychiatric control and healthy control groups.

Drugs	Childhood abuse Mean (SD)	Psychiatric Controls Mean (SD)	Healthy Controls Mean (SD)	F(2, 60)	P value
Cannabis	0.25(0.44)	0(0)	0.37(0.95)	1.74	0.19
Ecstasy	0(0)	0(0)	0.11(0.32)	2.11	0.13
Solvents	0(0)	0(0)	0(0)	-	-
Amphetamines	0(0)	0(0)	0(0)	-	-
Tranquillisers	0(0)	0(0)	0.05(0.22)	1.00	0.38
Cocaine	0(0)	0(0)	0(0)	-	-
Crack	0(0)	0(0)	0(0)	-	-
Opiates	0(0)	0(0)	0(0)	-	-
Other drugs	0(0)	0(0)	0(0)	-	-

MRI Data Acquisition

MRI data were acquired using a 3T GE Signa HDx system (General Electric, USA) at the Centre for Neuroimaging Sciences, King's College London, UK. The body coil was used for radio

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frequency (RF) transmission and an eight-channel head coil for RF reception allowing a parallel imaging (ASSET) speed up factor of 2. High-resolution structural three-dimensional (3D) T1-weighted images were acquired with full head-coverage, 166 contiguous slices, 1.2 mm thickness, a 256 x 256 x 166 matrix and a repetition time/echo time of 7/2.8 ms (field of view 260 mm).

Consistent image quality was ensured by a semi-automated quality control procedure. DTI-MRI data were acquired using a spin-echo echo-planar imaging double refocused sequence providing whole head coverage with isotropic image resolution (2.4 x 2.4 x 2.4 mm; 32 diffusion-weighted volumes with different non-collinear diffusion directions with b-factor 1300 s/mm², and four non-diffusion-weighted volumes; 60 slices without slice gap; echo time = 104.5 ms; repetition time = 20 R-R intervals; 128 x 128 acquisition matrix; field of view 307 x 307 mm). The acquisition was gated to the cardiac cycle using a digital pulse oximeter placed on participants' forefinger.

Diffusion Tensor MRI Preprocessing

Diffusion tensor imaging data were preprocessed using ExploreDTI (www.exploredti.org) and corrected for eddy current and motion artefacts through iterative correction to the four non-diffusion weighted volumes. For each participant, the raw data set was examined in a slice-wise manner to exclude subject movement during the scan. In compliance with the study protocol, participants who generated corrupted images on more than two diffusion-weighted imaging volumes would have been excluded. Seven participants had to be excluded after inspection. The b-matrix was reoriented (Leemans and Jones, 2009), and the tensor was estimated using a non-linear least square approach in StarTrack software (Jones and Basser, 2004, www.natbrainlab.com).

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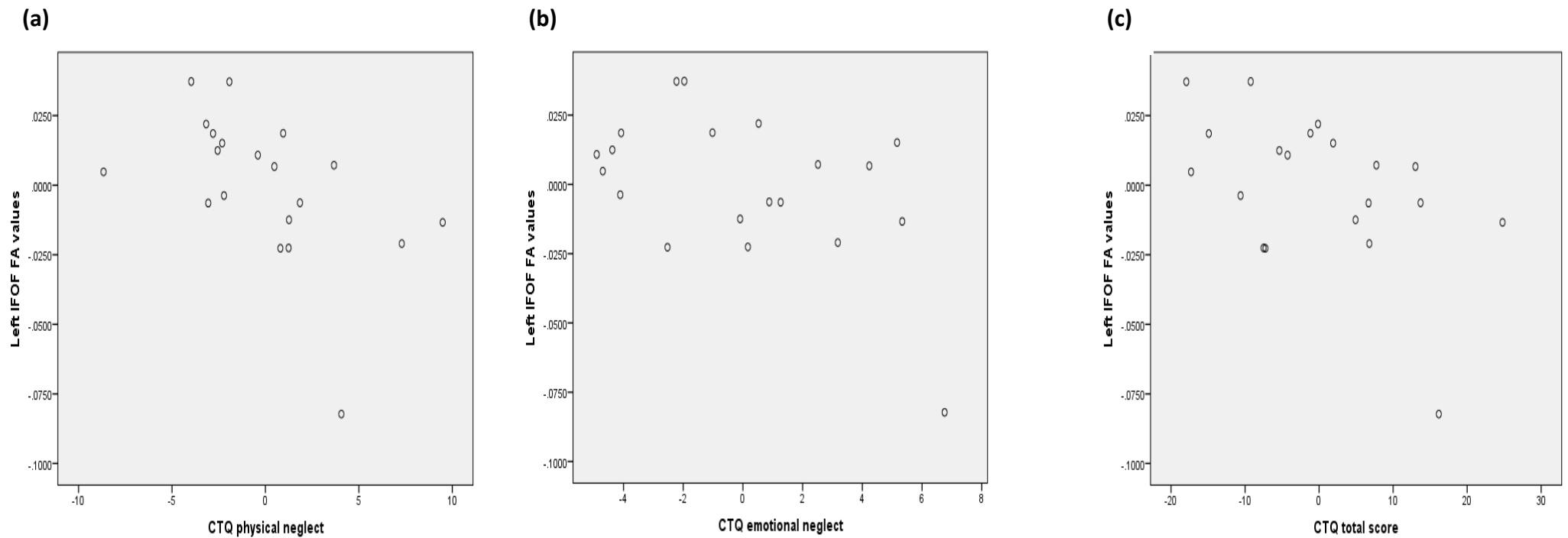
Tractography maps were generated, including fractional anisotropy (FA), mean diffusivity and radial diffusivity. Whole brain tractography was performed by selecting all seed voxels with FA > 0.2. Streamlines were propagated using Euler integration (Basser et al 2000), and a step size of 1mm. The algorithm stopped tracking where FA < 0.2 or when the angle between two consecutive tracking steps was > 35°. Finally, diffusion tensor maps and whole brain tractography were exported to Trackvis (Wang et al 2007) for virtual manual dissection of the tracts, which was performed with the assistance of a white matter atlas (Catani & Thiebaut de Schotten, 2012) and a skilled anatomist (H.Howells).

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Figure S1. Associations between left Inferior Fronto-Occipital Fasciculus (IFOF) FA values and (a) CTQ physical neglect, (b) CTQ emotional neglect and (c) CTQ total score within the abuse group.



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References

- Basser PJ, Pajevic S, Pierpaoli C, Duda J, Aldroubi A (2000): In vivo fiber tractography using DT-MRI data. *Magn Reson Med* 44: 625–32.
- Catani M, Thiebaut De Schotten, M (2012): *Atlas of Human Brain Connections*. Oxford: Oxford University Press.
- Jones DK, Basser PJ (2004): "Squashing peanuts and smashing pumpkins": how noise distorts diffusion-weighted MR data. *Magn Reson Med* 52: 979–93.
- Leemans A, Jones DK (2009): The B-matrix must be rotated when correcting for subject motion in DTI data. *Magn Reson Med* 61: 1336–49.
- Wang R, Benner T, Sorensen A, Wedeen V (2007): Diffusion toolkit: a software package for diffusion imaging data processing and tractography. *Proc Int Soc Magn Reson Med* 15: 3720.