e-Methods

*Magnetic resonance imaging*

Subjects received 3.0 Tesla magnetic resonance scans (GE Signa HDxt), using a 3D-T1 weighted fast spoiled gradient-echo (repetition time 7.8 ms, echo time 3.0 ms, inversion time 450 ms, flip angle 12, 0.9x0.9x1 mm voxel size), 2D T2-weighted fast spin-echo (repetition time 9680 ms, echo time 22/112 ms, flip angle 90, 3 mm contiguous axial slices, in-plane resolution 0.6x0.6 mm), and 2D spin-echo T1-weighted imaging (repetition time 475 ms, echo time 9.0 ms, flip angle 90, 3 mm contiguous axial slices, in-plane resolution 0.7x1 mm). Diffusion tensor imaging based on echo planar imaging also covered the entire brain, using five volumes without directional weighting (i.e. b0) and 30 volumes with non-collinear diffusion gradients (i.e. 30 directions, b=1000s/mm², repetition time 13000ms, echo time 91ms, flip angle 90, 53 contiguous axial slices of 2.4mm, in-plane resolution 2x2mm). Resting state (i.e. eyes closed, no task) functional magnetic resonance scans also covered the entire brain, using 202 volumes, of which the first two were discarded (echo planar imaging, repetition time 2200 ms, echo time 35 ms, flip angle 80, 3 mm contiguous axial slices, in-plane resolution 3.3x3.3 mm).

*Image processing: Thalamic functional connectivity*

Functional image preprocessing used the standard FSL pipeline, including motion correction, smoothing and high-pass filtering (100s cut-off); resting state data were kept in subject space. Functional connectivity between the thalamus and the rest of the brain was assessed using an atlas outlined in Supplementary Fig. 1. Cortical regions of the atlas were derived from the standard space AAL (automated anatomical labeling) atlas,¹ which was registered to each subject’s 3DT1 scan. This was done by calculating the nonlinear registration parameters from subject space to standard space, using FNIRT (part of FSL), and afterwards inverting this registration, resulting in an individualized atlas in subject space. The cortical atlas was then masked with individual grey matter masks derived
from SIENAX, before adding deep grey matter regions derived from FIRST. The complete atlas was then co-registered to the subject’s functional scan, using an inverted boundary-based registration matrix (BBR, part of FSL5).

**Image processing: Tract-based spatial statistics (TBSS)**

Diffusion tensor image preprocessing was also performed using FSL5, including motion- and eddy-current correction on images and gradient-vectors, and was followed by diffusion tensor fitting. Fractional anisotropy (FA) and mean diffusivity (MD) were derived for each voxel, as well as axial (AD) and radial diffusivity (RD). Each subject’s FA image was used to calculate non-linear registration parameters to the FMRIB58_FA brain, which were then applied to the diffusivity images as well. The registered FA images were averaged into a mean FA image, which was skeletonized using the tract-based spatial statistics (TBSS) pipeline, as part of FSL, using a thresholding of 0.2 to include only white matter. As part of this pipeline, for each subject every skeleton voxel was filled with the maximum FA found in a voxel perpendicular to the local skeleton direction. The projection parameters for each voxel were then also applied to the diffusivity data to create skeletonized FA and diffusivity data in standard space for each subject.

**References**
