# Supplementary materials

Disentangling pain and fatigue in chronic fatigue syndrome: a resting state connectivity study before and after cognitive behavioral therapy

Marieke E. van der Schaaf, Linda Geerligs, Ivan Toni, Hans Knoop, Joukje M. Oosterman

## Supplementary Methods

## Inclusion and exclusion criteria

Inclusion criteria for all participants were: female, between 18 and 65[[1]](#footnote-1) years old, no use of psychotropic medication 6 months prior to testing, no current psychiatric disorder, except for specific phobias, as assessed with the Mini-International Neuropsychiatric Interview (MINI) (1), no severe obesity (BMI≤40), no contra-indication for MR-examinations, normal hearing and (corrected) vision, sufficient command of the Dutch language. Additional inclusion criteria for CFS patients were: meeting U.S. Centers for Disease Control (CDC) criteria for CFS including severe fatigue lasting longer than 6 months and at least 4 out of 8 additional symptoms (post-exertional malaise, unrefreshing sleep, memory and concentration problems, muscle pain, joint pain, headaches, tender lymph nodes and sore throat) (2, 3), a score of 40 or higher on the subscale fatigue severity of the checklist individual strength (CIS-fatigue) (4), and a score of 700 or higher on the Sickness Impact Profile 8 (SIP8 total) (5) assessing the level of functional disability. Physicians of the department of internal medicine evaluated the medical records of referred patients. When the physicians deemed the patients not sufficiently examined, they were seen for history, full physical examination, case history evaluation and laboratory tests following the National CFS guideline, as used at the department of internal medicine, in accordance with the guidelines of the CDC (3, 6). Additional inclusion criteria for healthy controls were a score lower than 35 on the CIS- fatigue subscale and no chronic medical condition, including no chronic pain (See (7)).

## Clinical data

Education was measured using a 7-point ordinal rating scale, using the following categories: 1) unfinished primary school, 2) finished primary school, 3) unfinished low-level secondary education, 4) finished lower vocational training, 5) advanced vocational training or lower professional education, 6) finished higher professional education or senior general secondary education and 7) university degree (8).

## Neuroimaging preprocessing

Images were pre-processed and analyzed using SPM12 (Wellcome Department of Cognitive Neurology, London) and FSL (FMRIB's Software Library, Version 5.0.9, www.fmrib.ox.ac.uk/fsl). Images were first checked for spike-artefacts and realigned to the first volume using data from the shortest TE. After realignment, TE’s were combined into a single dataset using a weighted summation of the four Tes using in-house scripts (9). For this, the first 20 multi echo scans were used to calculate contrast-to-noise ratio maps for each TE. These maps were then used to calculate an optimal voxel-wise weighting between the four echoes using in-house software, maximizing the contribution of each echo according to its contrast-to-noise ratio.

Next, FSL was used to remove motion artifacts using data-driven Independent Component Analysis-based strategy for Automatic Removal of Motion Artefacts (ICA-AROMA), which has shown to robustly minimize motion artifacts on functional connectivity measures (10, 11). For this, realigned and combined images were first registered to high resolution structural and/or standard space images using FLIRT in FSL (12). Registration from high resolution structural to standard space was then further refined using FNIRT linear registration in FSL. Images were minimally smoothed with an isotropic Gaussian kernel of 5mm full width at half maximum. Probabilistic ICA was achieved using Multivariate Exploratory Linear Decomposition into Independent Components (MELODIC, part of the FMRIB Software Library (FSL)), with automatic estimation of the number of independent components. Next, IC components were identified as motion-related artefacts based on its high-frequency content, correlation with realignment parameters obtained from the first realignment step, edge fraction, and CSF fraction. An IC was classified as motion-related when it exceeded at least one of three criteria: 1) exceeding a decision boundary combining the edge fraction and maximum RP correlation, 2) a CSF fraction > 10%, or 3) a high-frequency content > 35% (non-aggressive denoising) (10). ICs identified as motion artefacts were removed from the fMRI data.

De-noised native space data was then further processed in SPM12. Anatomical scans were coregisterred to the functional data, segmented and normalized using tissue probability maps (TPM) and smoothed again with an additional isotropic Gaussian kernel of an additional 3mm full-width at half-maximum for further statistical analysis. WM and CSF signals were created by averaging across voxels in the associated mask image, after ICA-AROMA but before smoothing.

First level analysis: auto-correlation

Data for network and seed-based analysis were pre-whitened by inverting an autocorrelation model(13). The autocorrelation in the GLM error was modelled by a family of 8 exponentials with half-lives from 0.5 to 64 TRs, given evidence that an AR(1) plus white noise model is not sufficient for resting-state data (14). The autocorrelation hyperparameters were estimated using Restricted Maximum Likelihood Estimation. Efficiency of estimating the autocorrelation hyperparameters was increased by pooling across voxels within each ROI, but done separately for each ROI, to allow for true differences in autocorrelation between functional regions.

## Exploratory seed-based analyses

Remaining seed-based connectivity was explored for results that did not surface from the network analyses. Statistical inferences for these exploratory analyses were based on cluster-level statistics familywise error (FWE) correction for multiple comparisons, with cluster-forming threshold of p = .001 [pwb\_cluster]. Critical p-value for these exploratory analyses was set to p<.002, bonferroni correcting for the 3 seeds, 2 group comparisons (CFS vs HC and CBT vs WL) and the 4 covariates (i.e. 24 comparisons).

## Exploratory network analyses

Our main analysis was limited to 4 networks selected based on previous results from our group. However, additional networks, including the basal ganglia or mesolimbic networks might also be of interest for understanding the neurobiology of CFS. Accordingly, to provide a complete overview of all connections in the dataset, a supplementary exploratory analysis was conducted including extracted data from all 122 MIST regions. Pearson’s correlation between all 122 regions was estimated from the whitened residuals of first level model (44). The correlation matrices were Fisher z-transformed and reduced by averaging the values across all regions within the major networks. To give a complete overview of all possible connections, analysis was performed at 4 atlas levels (s7, s12, s20 and s36) (see <https://simexp.github.io/multiscale_dashboard/index.html>). For each level we used regression analysis in matlab to 1) compare CFS and HC at baseline (Figure S4), 2) assess regression with clinical outcome measures at baseline (i.e. CIS-fatigue, POMS-fatigue, RAND-pain and pain occurrence) (Figure S5 and S6) 3) compare the change in CBT and WL groups (T1 minus T0) (Figure S7).

# Supplementary Results: Exploratory seed-based results

## Baseline: CFS vs HC

Compared to HC, CFS showed higher connectivity between the DLPFC-seed and the Left Herschl’s gyrus (left: T = 4,15, pwb\_cluster = .007, xyz = -50,-14,-8; right: T = 4,18, pwb\_cluster = .037, xyz = 56,-12,6). Regression analysis on data extracted from the left Herschl’s gyrus cluster did not reveal a significant correlation with any of the 4 covariates (all p>.05). No significant group differences were observed for the PMN-seed and SMN-seed.

## Treatment: CBT vs WL

Compared to WL, CBT decreased connectivity between the DLPFC-seed and the intra-parietal sulcus (IPL; T = 4.90,, pwb\_cluster <.001, xyz = 40,-60,40) and posterior cingulate cortex (PCC; T = 4.76, pwb\_cluster <.001, xyz = 2, -28, 34). Regression analysis within the CBT group between the data extracted from the IPL or PCC clusters and each covariate separately did not reveal any significant relationships (all p>.05).

## Regression with change in pain and fatigue in CFS group

Whole brain regression within the CBT group revealed a significant relationship between ΔRAND-pain and Δconnectivity between the SMN-seed and the right anterior insula (T = 6.32, pwb\_cluster <.001, xyz = 36,30,-2) and left posterior insula (T = 6.00, pwb\_cluster <.001, xyz = -46,2,10). Larger reductions in pain-severity were associated with larger reductions in functional connectivity between the SMN-seed and these regions.

# Supplementary Results: Exploratory matrix analysis

Results are summarized in Table S2, reporting both fdr-corrected p-values and uncorrected p-values. All uncorrected results are visualized per comparison and atlas level in circular plots in Figures S3-S6. Below we summarize the results. For each comparison we first repeat the fdr-corrected result from the main analysis (that only included 4 selected networks), and then report whether this result was confirmed across atlas levels and what additional results were found. These results need to be interpreted with caution given its exploratory nature and uncorrected thresholds.

**CFS-HC at baseline:**

Result (fdr-corrected) described in the main manuscript:

No difference between CFS and HC at baseline.

Result (uncorrected) supplementary analysis:

CFS patients had lower connectivity between the cerebellum and the basal ganglia/thalamus compared to HC across the s12, s20 and s36 level (uncorrected p<.05; Table S2). Higher atlas levels suggest that this was driven by the connection of the motor-cerebellum with basal ganglia/thalamus (Figure S3).

**Regression with POMS-fatigue and CIS-fatigue at baseline:**

Result (fdr-corrected) described in the main manuscript:

Negative relationship between POMS-fatigue and DMN-SMN connectivity.

Positive relationship between POMS-fatigue and PMN-SMN and within SMN connectivity

Result (uncorrected) supplementary analysis:

The negative relationship between POMS-fatigue and DMN-SMN connectivity was confirmed across all MIST atlas levels (with an uncorrected p<.05, Table S2; Figure S4). Higher atlas levels suggest that this result was driven by the connection of the SMN with the posterior-medial and lateral parts of the DMN. The positive relationship between POMS-fatigue and PMN-SMN and within SMN connectivity was only observed at the s36 level, and may therefore reflect a result that is quite specific to the premotor and supplementary motor regions, and is less robustly represented within a larger medial ventral attention network (Figure S4). Additional results (uncorrected) supplementary analysis: Higher POMS-fatigue levels were associated with lower connectivity between the (motor) cerebellum and the mesolimbic network across all MIST atlas levels (with an uncorrected p<.05, see table S2). Higher POMS-fatigue levels were associated with higher connectivity between the posterior-medial DMN (precuneus and cingulate gyrus) and Lateral Ventral Attention Network (including the post-central sulcus) and between the lateral DMN (including the medial temporal gyrus) and the Auditory Network/Posterior Insula across the S12, S20 and S36 levels. Higher CIS-fatigue was associated with higher connectivity between the different parts of the DMN at the s12, s20 and s36 level (all with an uncorrected p<.05, Figure S4; TableS2).

**Regression with RAND-pain and pain occurrence at baseline:**

Result (fdr-corrected) described in the main manuscript:

Negative relationship between RAND-pain and PMN-DMN connectivity.

Trend for an association between RAND-pain and connectivity between the PMN and FPN

Result (uncorrected) supplementary analysis:

The negative relationship between RAND-pain and PMN-DMN connectivity was confirmed across all MIST atlas levels (with an uncorrected p<.05; Table S2; Figure S5). Higher pain levels were associated with lower connectivity between the DMN and the (medial) ventral attention network. Higher atlas levels suggest that this result was driven by the connection of the premotor and SMA network (s36) with different parts of the DMN. The trend for an association between RAND-pain and connectivity between the PMN and FPN was confirmed across the s12, s20 and s36 level (with an uncorrected p<.05; Table S2; Figure S5). Additional results (uncorrected) supplementary analysis: Higher RAND-pain was associated with lower SMN-FPN connectivity at the s7, s20 and s36 level level. Higher Pain occurrence was associated with higher connectivity between the lateral DMN (i.e. medial temporal gyrus) and Basal Ganglia and Thalamus at the s12, s20 and s36 level (with an uncorrected p<.05, see table S2).

**CBT vs WL:**

Result (fdr-corrected) described in the main manuscript:

CBT increased SMN-DMN connectivity compared to WL.

Result (uncorrected) supplementary analysis: Compared to WL, CBT increased SMN-DMN connectivity across all MIST atlas levels (with an uncorrected p<.05; table S2; Figure S7). Additional results (uncorrected) supplementary analysis: compared to WL, CBT increased connectivity between the mesolimbic network and associative cerebellum across the s20 and s36 atlas level. Compared to WL, CBT decreased connectivity between the Visual Network and Auditory Network/Posterior Insula across the s12, s20 and s36 atlas level (with an uncorrected p<.05; Table S2; Figure S6)

To summarize, supplementary analysis confirmed our main results across different atlas levels at an uncorrected threshold with most robust confirmation for the negative relationship between POMS-fatigue and SMN-DMN connectivity at baseline, which was increased by CBT compared to WL. Several additional connections were highlighted by our supplementary analysis, that may be of interest for future resting state studies in CFS patients. These include 1) lower connectivity between cerebellum and basal ganglia/thalamus in CFS compared to HC at baseline, which was not affected by CBT/WL and 2) Higher fatigue levels being associated with lower connectivity between cerebellum and mesolimbic network at baseline, which was increased by CBT compared to WL.

**Figure S1. Flow chart of included participants.**

Notes: Resting state scans were assessed at the end of the scanning protocol; accordingly, due to time-issues these scans were not collected for several participants. This is indicated as “No RS data” in the flow chart. Reasons for exclusion for follow up included pregnancy (n=1) and anti-depressant use (n=2). Two patients were excluded after randomization (1xCBT, 1xWL) because they did not score ≥700 on the Sickness Impact Profile-8 (SIP8total) (these are included in the upper right box).

Enrollment

Assessed for eligibility (n= 969)

Baseline

Follow-up

No RS data (n=12)

Movement/technical (n=3)

No RS data (n=5)

Movement/technical (n=2)

No RS data (n=1)

Movement/technical (n=1)

**Total HC Baseline: 29**

**Total CFS Baseline: 72**

CBT (n= 44)

WL (n= 22)

Drop-out (n=8)

No RS data (n=2)

Movement/technical (n=0)

Excluded (n=2)

Drop-out (n=1)

No RS data (n=1)

Movement/technical (n=1)

Excluded (n=1)

Drop-out (n=3)

No RS data (n=1)

Movement/technical (n=0)

**Total HC follow-up: 25**

**Total CBT follow-up: 33**

**Total WL follow-up:18**

CBT (n= 59)

CFS eligible for baseline (n= 94)

**Excluded (n= 874):**

Not meeting inclusion criteria (n= 684)

* Male (n=308)
* Age (n = 46)
* Not meeting CDC-screening criteria (n= 181)
* Psychiatric co-morbidity (n=43)
* Medication use (n=138)
* MR-incompatible (n = 36)

Cancelled first appointment (n= 20)

Conflict with other study (n= 20)

Declined to participate (n= 51)

Incidental finding MRI (n=1)

Other reasons (n=31)

HC eligible for baseline (n=30)

Declined randomization

after baseline (n= 6)

WL (n= 29)

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**Figure S2.** Visualization of the change in SMNseed-mPFC connectivity in the successful CBT group as defined by a CIS-fatigue <35 on Day 2 and a reliable change index of 1.96 (7) (Success, N=18 ), the unsuccessful CBT group (No Success, N=15 ), WL (n=18) and HC (n=25) groups.

\* p<.05, \*\* p<.001, \*\*p<.0001, ns = not significant.

**Figure S3-S6** Visualization of the uncorrected results (punc = 0.05) of the supplementary network analysis, including all 122 MIST regions at the s7 (A;E), s12 (B;F), s20(C;G) and s36 (D;H) level. Connections that are included in the main analysis are indicated by the coloured lines (Red: Connections with SensoriMotorNetwork (SMN); Yellow: Connections with Default Mode Network (DMN); Blue: Connections with Fronto Parietal Network (FPN)). Connections that involve new networks are indicated in grey. For an overview of the regions see <https://simexp.github.io/multiscale_dashboard/index.html>.



**FigureS3:** Comparison between ME/CFS group with the HC group at baseline



**Figure S4:** Regression with Poms Fatigue (A-D) and CIS-Fatigue (E-H) within the ME/CFS group at T0/Baseline.



**Figure S5:** Regression with RAND-pain (A-D) and Pain occurrence (E-H) within the ME/CFS group at T0/Baseline.



**Figure S6:** Comparison between CBT and WL (T1 minus T1)

**Table S1. Details about regions included in the main network-based analysis**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Network (S7 level)** | **Network (s36 Level)** | **label\_s122** | **Name (s122 level)** | **size** | **x** | **y** | **z** |
| 1 | SOMATOMOTOR\_NETWORK | SOMATOMOTOR\_NETWORK\_ventrolateral | MOTnet\_am | SOMATOMOTOR\_NETWORK\_anteromedial | 229 | -2.95 | -12.06 | 52.55 |
| 2 | SOMATOMOTOR\_NETWORK | SOMATOMOTOR\_NETWORK\_dorsolateral | L\_MOTnet\_dl | left\_SOMATOMOTOR\_NETWORK\_dorsolateral | 229 | -40.99 | -22.62 | 61.9 |
| 3 | SOMATOMOTOR\_NETWORK | SOMATOMOTOR\_NETWORK\_dorsolateral | MOTnet\_m | SOMATOMOTOR\_NETWORK\_medial | 394 | -0.48 | -25.2 | 61.99 |
| 4 | SOMATOMOTOR\_NETWORK | SOMATOMOTOR\_NETWORK\_dorsolateral | MOTnet\_ml | SOMATOMOTOR\_NETWORK\_mediolateral | 556 | -3.19 | -25.39 | 65.93 |
| 5 | SOMATOMOTOR\_NETWORK | SOMATOMOTOR\_NETWORK\_medial | R\_MOTnet\_dl | right\_SOMATOMOTOR\_NETWORK\_dorsolateral | 410 | 37.27 | -20.68 | 59.74 |
| 6 | SOMATOMOTOR\_NETWORK | SOMATOMOTOR\_NETWORK\_medial | MOTnet\_l | SOMATOMOTOR\_NETWORK\_lateral | 434 | 5.6 | -11.65 | 47.38 |
| 7 | SOMATOMOTOR\_NETWORK | SOMATOMOTOR\_NETWORK\_medial | MOTnet\_vl | SOMATOMOTOR\_NETWORK\_ventrolateral | 961 | -4.96 | -5.6 | 29.2 |
| 8 | DEFAULT\_MODE\_NETWORK | MIDDLE\_TEMPORAL\_GYRUS | R\_ANGgyr | right\_ANGULAR\_GYRUS | 298 | 53.82 | -53.25 | 17.68 |
| 9 | DEFAULT\_MODE\_NETWORK | MIDDLE\_TEMPORAL\_GYRUS | R\_MTgyr\_a | right\_MIDDLE\_TEMPORAL\_GYRUS\_anterior | 399 | 53.12 | -1.2 | -23.12 |
| 10 | DEFAULT\_MODE\_NETWORK | MIDDLE\_TEMPORAL\_GYRUS | L\_ANGgyr | left\_ANGULAR\_GYRUS | 318 | -52.46 | -57.35 | 17.49 |
| 11 | DEFAULT\_MODE\_NETWORK | MIDDLE\_TEMPORAL\_GYRUS | L\_MTgyr\_p | left\_MIDDLE\_TEMPORAL\_GYRUS\_posterior | 338 | -58.99 | -32.78 | -5.46 |
| 12 | DEFAULT\_MODE\_NETWORK | MIDDLE\_TEMPORAL\_GYRUS | L\_MTgyr\_a | left\_MIDDLE\_TEMPORAL\_GYRUS\_anterior | 537 | -44.49 | -6.74 | -20.97 |
| 13 | DEFAULT\_MODE\_NETWORK | MIDDLE\_TEMPORAL\_GYRUS | R\_MTgyr\_p | right\_MIDDLE\_TEMPORAL\_GYRUS\_posterior | 513 | 59.46 | -31.99 | -5.68 |
| 14 | DEFAULT\_MODE\_NETWORK | POSTERIOR\_CINGULATE\_CORTEX\_and\_PRECUNEUS | PRC\_v | PRECUNEUS\_ventral | 356 | 0.35 | -52.18 | 26.7 |
| 15 | DEFAULT\_MODE\_NETWORK | POSTERIOR\_CINGULATE\_CORTEX\_and\_PRECUNEUS | PCcor | POSTERIOR\_CINGULATE\_CORTEX | 382 | 1.51 | -43.96 | 36.04 |
| 16 | DEFAULT\_MODE\_NETWORK | PRECUNEUS | PRC\_d | PRECUNEUS\_dorsal | 311 | 1.46 | -53.23 | 49.67 |
| 17 | DEFAULT\_MODE\_NETWORK | PRECUNEUS | PRC\_d | PRECUNEUS\_dorsal | 311 | -0.03 | -56.87 | 66.36 |
| 18 | DEFAULT\_MODE\_NETWORK | PRECUNEUS | POsul\_v | PARIETO\_OCCIPITAL\_SULCUS\_ventral | 324 | -1.71 | -49.05 | 7.1 |
| 19 | DEFAULT\_MODE\_NETWORK | PRECUNEUS | POsul\_d | PARIETO\_OCCIPITAL\_SULCUS\_dorsal | 786 | -3.78 | -69.42 | 42.13 |
| 20 | DEFAULT\_MODE\_NETWORK | PRECUNEUS | POsul | PARIETO\_OCCIPITAL\_SULCUS | 429 | -1 | -60.53 | 19.74 |
| 21 | DEFAULT\_MODE\_NETWORK | PERIGENUAL\_ANTERIOR\_CINGULATE\_CORTEX\_and\_VENTROMEDIAL\_PREFRONTAL\_CORTEX | L\_IPlob | left\_INFERIOR\_PARIETAL\_LOBULE | 206 | -48.23 | -65.34 | 33.46 |
| 22 | DEFAULT\_MODE\_NETWORK | PERIGENUAL\_ANTERIOR\_CINGULATE\_CORTEX\_and\_VENTROMEDIAL\_PREFRONTAL\_CORTEX | VMPFcor\_p | VENTRAL\_MEDIAL\_PREFRONTAL\_CORTEX\_posterior | 317 | 1.61 | 41.32 | -10.38 |
| 23 | DEFAULT\_MODE\_NETWORK | PERIGENUAL\_ANTERIOR\_CINGULATE\_CORTEX\_and\_VENTROMEDIAL\_PREFRONTAL\_CORTEX | L\_SFsul\_a | left\_SUPERIOR\_FRONTAL\_SULCUS\_anterior | 731 | -22.96 | 32.44 | 43.92 |
| 24 | DEFAULT\_MODE\_NETWORK | DEFAULT\_MODE\_NETWORK\_lateral | DMPFcor\_ac | DORSOMEDIAL\_PREFRONTAL\_CORTEX\_anterocaudal | 626 | -0.79 | 52.03 | 21.66 |
| 25 | DEFAULT\_MODE\_NETWORK | DEFAULT\_MODE\_NETWORK\_lateral | SFgyr\_ad | SUPERIOR\_FRONTAL\_GYRUS\_anterodorsal | 527 | 4.49 | 37.73 | 50.17 |
| 26 | DEFAULT\_MODE\_NETWORK | DEFAULT\_MODE\_NETWORK\_lateral | VMPFcor\_a | VENTRAL\_MEDIAL\_PREFRONTAL\_CORTEX\_anterior | 329 | -1.27 | 60.6 | -7.47 |
| 27 | DEFAULT\_MODE\_NETWORK | DEFAULT\_MODE\_NETWORK\_lateral | DMPFC\_ar | DORSOMEDIAL\_PREFRONTAL\_CORTEX\_anterororstral | 602 | 1.64 | 62.77 | 13.2 |
| 28 | DEFAULT\_MODE\_NETWORK | DEFAULT\_MODE\_NETWORK\_lateral | L\_IPlob | left\_INFERIOR\_PARIETAL\_LOBULE | 518 | -50.28 | -53.65 | 39.49 |
| 29 | DEFAULT\_MODE\_NETWORK | DEFAULT\_MODE\_NETWORK\_lateral | PGACcor | PERIGENUAL\_ANTERIOR\_CINGULATE\_CORTEX | 644 | -0.74 | 39.61 | 9.37 |
| 30 | FRONTO\_PARIETAL\_NETWORK\_and\_VISUAL\_DOWNSTREAM | FRONTO\_PARIETAL\_TASK\_CONTROL\_NETWORK | L\_MFgyr\_pr | left\_MIDDLE\_FRONTAL\_GYRUS\_posterorostral | 350 | -41.13 | 17.73 | 39.99 |
| 31 | FRONTO\_PARIETAL\_NETWORK\_and\_VISUAL\_DOWNSTREAM | FRONTO\_PARIETAL\_TASK\_CONTROL\_NETWORK | R\_IPsul | right\_INTRAPARIETAL\_SULCUS | 233 | 38.37 | -52.21 | 47.69 |
| 32 | FRONTO\_PARIETAL\_NETWORK\_and\_VISUAL\_DOWNSTREAM | FRONTO\_PARIETAL\_TASK\_CONTROL\_NETWORK | L\_MFgyr\_pc | left\_MIDDLE\_FRONTAL\_GYRUS\_posterocaudal | 208 | -41.19 | 1.19 | 47.89 |
| 33 | FRONTO\_PARIETAL\_NETWORK\_and\_VISUAL\_DOWNSTREAM | FRONTO\_PARIETAL\_TASK\_CONTROL\_NETWORK | R\_IFsul | right\_INFERIOR\_FRONTAL\_SULCUS | 526 | 44.72 | 16.73 | 23.98 |
| 34 | FRONTO\_PARIETAL\_NETWORK\_and\_VISUAL\_DOWNSTREAM | FRONTO\_PARIETAL\_TASK\_CONTROL\_NETWORK | L\_IPsul | left\_INTRAPARIETAL\_SULCUS | 458 | -37.57 | -57.82 | 49.71 |
| 35 | FRONTO\_PARIETAL\_NETWORK\_and\_VISUAL\_DOWNSTREAM | FRONTO\_PARIETAL\_TASK\_CONTROL\_NETWORK | R\_PORB | right\_PARS\_ORBITALIS | 351 | 42.57 | 42.79 | 10.85 |
| 36 | FRONTO\_PARIETAL\_NETWORK\_and\_VISUAL\_DOWNSTREAM | FRONTO\_PARIETAL\_TASK\_CONTROL\_NETWORK | L\_IFsul | left\_INFERIOR\_FRONTAL\_SULCUS | 702 | -45.37 | 20.36 | 21.66 |
| 37 | FRONTO\_PARIETAL\_NETWORK\_and\_VISUAL\_DOWNSTREAM | FRONTO\_PARIETAL\_TASK\_CONTROL\_NETWORK | R\_MFgyr\_p | right\_MIDDLE\_FRONTAL\_GYRUS\_posterior | 711 | 38.49 | 18.79 | 44.22 |
| 38 | VENTRAL\_ATTENTION\_NETWORK\_and\_SALIENCE\_NETWORK\_and\_BASAL\_GANGLIA\_and\_THALAMUS | PREMOTOR\_CORTEX\_and\_SUPPLEMENTARY\_  MOTOR\_CORTEX | CNGsul\_p | CINGULATE\_SULCUS\_posterior | 267 | -1.51 | 2.24 | 40.93 |
| 39 | VENTRAL\_ATTENTION\_NETWORK\_and\_SALIENCE\_NETWORK\_and\_BASAL\_GANGLIA\_and\_THALAMUS | PREMOTOR\_CORTEX\_and\_SUPPLEMENTARY\_  MOTOR\_CORTEX | PSMcor\_p | PRE\_SUPPLEMENTARY\_MOTOR\_CORTEX\_posterior | 342 | 1.38 | -3.41 | 61.18 |
| 40 | VENTRAL\_ATTENTION\_NETWORK\_and\_SALIENCE\_NETWORK\_and\_BASAL\_GANGLIA\_and\_THALAMUS | PREMOTOR\_CORTEX\_and\_SUPPLEMENTARY\_  MOTOR\_CORTEX | FEF | FRONTAL\_EYE\_FIELD | 926 | -1.51 | -2.11 | 57.6 |
| 41 | VENTRAL\_ATTENTION\_NETWORK\_and\_SALIENCE\_NETWORK\_and\_BASAL\_GANGLIA\_and\_THALAMUS | PREMOTOR\_CORTEX\_and\_SUPPLEMENTARY\_  MOTOR\_CORTEX | PSMcor\_a | PRE\_SUPPLEMENTARY\_MOTOR\_CORTEX\_anterior | 710 | -0.95 | 9.41 | 61.09 |

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1. The initial maximal age of 55 reported in van der Schaaf et al. (7) was extended to 65 due to low number of eligible patients. [↑](#footnote-ref-1)