Mapping Cortical Brain Asymmetry in 17,141 Healthy Individuals Worldwide via the ENIGMA Consortium

Abbreviated title: Mapping Cortical Brain Asymmetry

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Supporting Information

SI Materials and Methods

Datasets. The primary datasets used in this study for large-scale meta-analysis were from members of the Lateralization Working Group within the ENIGMA Consortium (1). There were 99 independent samples, including 17,141 healthy participants from diverse ethnic backgrounds. Samples were drawn from the general population or were healthy controls from clinical studies. While we made use of control data from case-control cohorts of psychiatric diseases, no data from the affected cases in these datasets were used in the present study. For more details on each sample, see Dataset S1. All local institutional review boards permitted the use of extracted measures of the completely anonymized data.

Handedness was known for a subset of the participants. The method of assessment varied across samples (see *Further Information about Each Dataset* below). An ambidextrous category was not included, resulting in 827 left-handed and 11,237 right-handed participants in total.

Two additional datasets were used to estimate heritability of asymmetry measures, i.e. the GOBS dataset and the HCP dataset. GOBS is a family study comprising 1,443 individuals with MRI data (836 females), aged between 18 and 85 years at the time of scanning (2). All GOBS subjects are Mexican Americans and belong to pedigrees of varying sizes (the largest pedigree has 143 members). The HCP is a large-scale project comprising 1,113 individuals with MRI data (606 females, age range 22-37 years at the time of scanning) of varying ethnicities (http://humanconnectome.org/). The HCP contains 143 monozygotic twin pairs and 85 dizygotic twin pairs, as well as unrelated individuals.

Image Acquisition and Processing. Structural T1-weighted MRI scans were acquired and analyzed locally. Images were acquired at different field strengths (1.5 T and 3 T). All images were analyzed using the automated and validated pipeline "*recon-all*" implemented in *FreeSurfer* (version 5.3 for 91 of 99 samples). Briefly, the processing pipeline consists of 34 stages described in the help document of "*recon-all*", the main stages of which include normalization of brain signal intensity, skull-stripping, white matter and gray matter segmentation, and delineation of the gray-white interface (inner surface) and the pial surface (outer surface). Next, the surface is divided into separate cortical regions using an

automated labeling approach, where not only location information based on the probabilistic surface-based atlas, but also local curvature and contextual information (e.g., sulcal and gyral geometry) of subject-specific surface are taken into consideration. Finally, surface area and mean cortical thickness was extracted for each of the 68 regions (34 per hemisphere) in the parcellation scheme (i.e., Desikan-Killiany atlas) (3), as well as each hemisphere. Calculations were made in each subject's native space.

In the present study, we chose this parcellation approach mainly because it is well-established in the surface space, and has been widely used in brain structure studies. For example, this pipeline has also been shown to have an overall high level of validity when comparing with manual labeling regions, and high test-retest reliability (3). Furthermore, no differences were found in the labeling accuracy between the two hemispheres (3). In addition, as this surface-based parcellation is integrated in the automated reconstruction pipeline in *FreeSurfer*, it is feasible to apply for large collaborative projects, and this also has the advantage of providing a comparable normative resource for future studies (e.g., altered asymmetry in disorders). For more details on the image processing, please refer to (3).

For each dataset, segmentations of 68 (34 per hemisphere) cortical regions were statistically evaluated and in some cases visually inspected for outliers. Besides regional measures of cortical thickness and surface area, two hemisphere-level measures (average cortical thickness and total surface area), as well as the intracranial volume (ICV) were obtained for each participant. Quality control and data analysis were performed following standardized ENIGMA protocols (see http://enigma.ini.usc.edu/protocols/imaging-protocols/). In addition, following Guadalupe et al. (2016), we performed several checks to assess potential errors in the left-right orientation of the data. Further details for the datasets (*Further Information about Each Dataset*) and orientation checking (*Left-right Orientation Checks*) can be found below.

Within-dataset Analyses. For each dataset, descriptive and statistical analyses of the asymmetries in both cortical thickness and surface area were performed at each participating site using a single script in the R language, based on unified table-formatted data. For each global hemispheric or regional measure, an asymmetry index (AI) was defined as (L-R)/((L+R)/2), where L and R are the

corresponding thickness or area measures on the left and right hemisphere, respectively. Thus, positive and negative AI values indicate leftward and rightward asymmetry, respectively. In addition, it is important to note that in the definition of the AI, the difference (i.e., L-R) was normalized with the bilateral area or thickness as denominator (i.e., L+R), such that the measure does not necessarily scale with the overall magnitude of L and R. To exclude possible outliers in measures of cortical thickness, surface area, or AIs, we followed Guadalupe et al. (2016) and used an adaptive threshold (SD_{thre}) depending on each dataset's sample size: $N < 150$, $SD_{thr} = 2.5$; $150 \leq N \leq 1000$, $SD_{thr} = 3$; $N > 1000$, $SD_{thr} = 3.5$. The adaptive threshold method was applied because outliers at similar levels can have different influences in datasets with different sample sizes. For example, while outliers at 3SD might have strong influence in small samples, the influence of data points at 3SD in much larger datasets would be very limited. Using a single threshold suitable for small samples could exclude too many subjects for datasets with large sample sizes, which is not necessary, but instead reduces the statistical power. The median number of individuals that was excluded in each dataset are given in *SI Data sheet S1*. The number varied within datasets depending on the specific regional measure.

Statistical tests were run for each hemisphere-level or regional measure separately. Paired t-tests were used to assess inter-hemispheric differences. Cohen's d was calculated based on each paired t-test result to estimate the effect size of population-level asymmetry. All differences between sexes (-1=females, 1=males) were assessed with linear regression models adjusted for age, age^2, and ICV. Cohen's d was calculated to estimate the effect size for each comparison. Furthermore, we examined the age effects on the AIs in cortical thickness and surface area, adjusting for sex and ICV. Similarly, we examined associations between ICV and the AIs in cortical thickness and surface area, adjusting for age, age^2, and sex. In addition, if handedness information was available, AI differences between handedness groups (-1=left; 1=right) were assessed with linear regression models adjusted for all the other covariates. For each analysis above, additional covariates of scanners were included when more than one scanner was used at one site.

We additionally used the primary data of the BIG dataset (*SI Data sheet S1*) to compare models with and without including the age^2 term, and found the identical sets of significant effects for the other factors, that is age, sex, ICV all showed precisely the same patterns of significant effects across

cortical regions. This showed that the models were not confounded by collinearity between age and age^2.

Meta-analyses. All regression models and effect size estimates were fitted at each participating site separately. We then combined the output statistics from each dataset using inverse variance-weighted random-effect meta-analyses (4) with the R package *metafor*, version 1.9-9. This method tests one overall effect, while weighting each dataset's contribution by the inverse of its corresponding sampling variance. Thus, unlike fixed-effect meta-analysis, this method takes into account variability across different studies. In addition, test statistics in the meta-analyses were computed based on a standard normal distribution (test="z" by default).

A Cohen's d effect size estimate of population-level asymmetry (hemispheric difference) was obtained using a random-effect meta-analysis model for each region and each cortical measure (cortical thickness and surface area). Note that including results based on too few participants may reduce reliability, and therefore we only included datasets with a sample size larger than 15. In the meta-analysis, heterogeneity of each effect was assessed via the I^2 value, which describes the percentage of total variation across studies that is due to heterogeneity rather than chance. I^2 values of 25%, 50%, and 75% indicate a low, moderate, and high heterogeneity, respectively.

Similarly, Cohen's d estimates of sex and handedness effects on asymmetry were obtained by meta-analysis for each cortical region. Again we only included samples with at least 15 participants per group. In addition, we confirmed that variances in the AIs of each region were similar between males and females, and between right- and left-handers, using two individual datasets (BIG and BIL&GIN; we applied the F-test comparing the standard deviations between sex and handedness groups, and found no significant differences for any asymmetry measures, BIG: $F[df1, df2]$ = 0.92~1.14, $ps > 0.10$, $df1$ = 1193~1352, $df2$ = 729~971; BIL&GIN: $F[df1, df2]$ = 0.83~1.23, $ps > 0.10$, $df1$ = 226~231, $df2$ = 207~220); and similarly no handedness differences were found (BIG: $F[df1, df2]$ = 0.87~1.17, $ps > 0.10$, $df1$ = 1657~1992, $df2$ = 91~102; BILGIL: $F[df1, df2]$ = 0.73~1.20, $ps > 0.10$, $df1$ = 239~247, $df2$ = 196~204).

For meta-analyses of the correlations of asymmetries with age or ICV, predictors were treated as continuous variables, so that effect sizes were expressed as partial-correlation *r*. For meta-analyses of age effects, we only included samples with a minimum 5-year range in the initial analysis, and in a subsequent analysis we further restricted to samples with age ranges larger than 20 years, to better capture the age effects in our data.

In this study, we report uncorrected *p* values with a significance threshold determined by Bonferroni correction for multiple comparisons within each separate meta-analysis (i.e. correction separately for analysis of 34 regional surface area asymmetries and 34 regional thickness asymmetries, $p = 0.05/34 = 0.00147$). No correction was done for global hemispheric measures of asymmetry.

Moderator analyses with meta-regression. Meta-regressions were performed to evaluate the potential moderating effects on meta-analysis effect sizes. We tested whether moderating factors, including median age, median ICV, sex ratio, handedness ratio, and MRI scanner field strength (3T, $N = 63$ datasets versus 1.5T, $N = 28$ datasets), influenced the effect size estimates across datasets in the meta-analyses. Each moderator variable was separately included as a fixed effect predictor in the meta-regression model. All statistical analyses were conducted using the R software package *metafor,* and Bonferroni correction was applied for multiple comparisons ($p < 0.00147$; see above).

Heritability estimation. Furthermore, we estimated the heritability of asymmetries in cortical thickness and surface area, firstly using the GOBS dataset ($N = 1{,}443$; see 'Datasets' above). For more details about this cohort, see McKay et al. (2014). Specifically, we estimated the narrow-sense heritability (i.e., the proportion of overall variance explained by additive genetic effects) of each AI using variance-components analysis (5). Briefly, each AI was entered as a dependent variable into a linear mixed-effects model, which included fixed effects of age, sex, and ICV, and a random effect of genetic similarity, whose covariance structure was determined by the pedigrees. We refer to these as univariate polygenic models. Second, we estimated the genetic correlations between left and right thickness/area measures by extending the univariate polygenic models to incorporate two traits at once; these bivariate polygenic models simultaneously estimate the heritability of left and right paired

measures, along with their genetic correlation (which indicates the extent to which their variation is influenced by the same genetic factors).

Finally, we performed similar heritability analyses in the HCP cohort (N = 1,113; see 'Datasets' above) to replicate findings observed with the GOBS dataset. HCP is a large-scale project which includes monozygotic (MZ) and dizygotic (DZ) twin pairs, as well as unrelated individuals. Precisely the same analyses were conducted in this second cohort, except for the covariance structure calculation across individuals. Specifically, in the twin study, MZ twins are coded as 1 as they share 100% of their DNA sequence, DZ twins and siblings are coded as 0.5 as they share on average 50%, and unrelated individuals are coded as zero as they share on average zero.

SI Results

Moderator analyses using meta-regression. As shown in Fig. 2, 3 and *SI Data sheet S2*, we observed moderate to substantial heterogeneity in the asymmetry distributions across datasets (I^2 ranges from 36% to 98%).

To further address the heterogeneity across the samples included in the meta-analyses, we investigated several moderating variables, including sex ratio, median age, handedness ratio, and median ICV. Moderator analyses revealed an influence of the median age of samples on the global hemispheric difference in surface area ($Z = 2.09$, $p = 0.036$), suggesting a reduced rightward asymmetry with increasing age. No other potential moderators showed significant effects on global cortical thickness or surface area asymmetry ($p > 0.10$). Moderator analyses for each specific region suggested an influence of the median age of samples on the asymmetry of the surface area of the paracentral gyrus ($Z = -4.35$, $p = 1.38e-5$), and an influence of median ICV on the asymmetry of the surface area in the insula ($Z = -3.18$, $p = 0.0014$). Given that both the paracentral gyrus and insula showed significant rightward asymmetry in surface area, these findings indicate a decreasing rightward asymmetry with increasing age and with ICV, respectively. In addition, we found a significant effect of scanner field strength on the surface area asymmetry in the insula ($Z = 4.12$, $p = 3.82e-5$). However, this could be largely reduced by including the other moderating variables (i.e., sex ratio, median age, handedness ratio, and median ICV) in the analysis ($Z = 2.35$, $p = 0.019$). Similarly, we additionally ran separate meta-analyses for studies with 1.5T and 3T scanners in order to gauge whether magnet field strength was an important factor affecting asymmetry measures, but we found similar results at 1.5T and 3T. For example, the population-level asymmetries in cortical thickness across the 34 regions from the two analyses showed high correlations ($r = 0.88$, $p = 7.53e-12$).

Relationship between asymmetry of cortical thickness and surface area. Previous studies have suggested that thickness and surface area are evolutionarily, genetically, and developmentally distinct (6, 7). We confirmed a lack of correlation across regions between the asymmetries of thickness and surface areas, which further supports their independent natures. Specifically, effect sizes of cortical thickness and surface area were found to be independent, as illustrated by the absence of a significant

correlation between thickness and surface area asymmetries across all cortical regions (r = -0.14, p = 0.416).

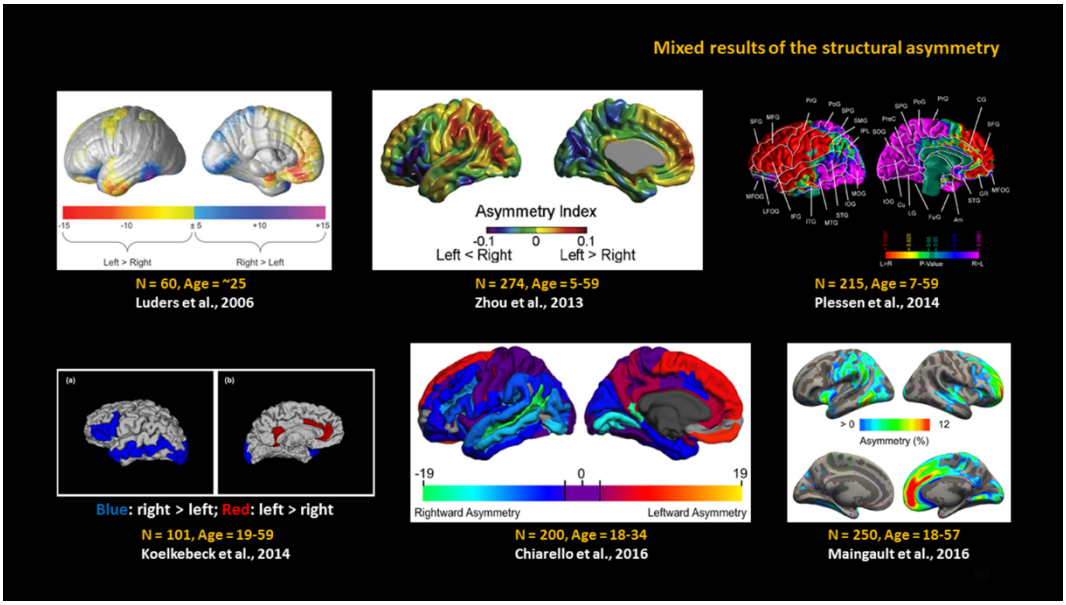
Moreover, with data on participants' sex, age, handedness, and ICV, we found no overall correlations between the effects of these factors across regions, on either cortical thickness or surface area. Specifically, we did not observe a significant correlation across regions of the sex effects on the asymmetries of cortical thickness and surface area (r = 0.14, p = 0.434). Similarly, no significant correlation was found between the age effects across regions on cortical thickness asymmetry and surface area asymmetry (ps > 0.05 for both age-range thresholds of 5 and 20 years). Similar findings were found between the handedness effects across regions for cortical thickness asymmetry and surface area asymmetry (r = -0.15, p = 0.403), and between the effects of ICV (r = -0.14, p = 0.417).

These findings further elaborated the largely independent nature of regional area versus thickness variability.

References

1. Thompson PM*, et al.* (2014) The ENIGMA Consortium: large-scale collaborative analyses of neuroimaging and genetic data. *Brain Imaging Behav* 8(2):153-182.
2. McKay DR*, et al.* (2014) Influence of age, sex and genetic factors on the human brain. *Brain Imaging Behav* 8(2):143-152.
3. Desikan RS*, et al.* (2006) An automated labeling system for subdividing the human cerebral cortex on MRI scans into gyral based regions of interest. *Neuroimage* 31(3):968-980.
4. Borenstein M, Hedges LV, Higgins JP, & Rothstein HR (2010) A basic introduction to fixed-effect and random-effects models for meta-analysis. *Research synthesis methods* 1(2):97-111.
5. Almasy L & Blangero J (1998) Multipoint quantitative-trait linkage analysis in general pedigrees. *Am J Hum Genet* 62(5):1198-1211.
6. Panizzon MS*, et al.* (2009) Distinct genetic influences on cortical surface area and cortical thickness. *Cereb Cortex* 19(11):2728-2735.
7. Raznahan A*, et al.* (2011) How Does Your Cortex Grow? *Journal of Neuroscience* 31(19):7174-7177.
8. Luders E*, et al.* (2006) Hemispheric asymmetries in cortical thickness. *Cereb Cortex* 16(8):1232-1238.
9. Zhou D, Lebel C, Evans A, & Beaulieu C (2013) Cortical thickness asymmetry from childhood to older adulthood. *Neuroimage* 83:66-74.
10. Plessen KJ, Hugdahl K, Bansal R, Hao X, & Peterson BS (2014) Sex, age, and cognitive correlates of asymmetries in thickness of the cortical mantle across the life span. *J Neurosci* 34(18):6294-6302.
11. Koelkebeck K*, et al.* (2014) The contribution of cortical thickness and surface area to gray matter asymmetries in the healthy human brain. *Hum Brain Mapp* 35(12):6011-6022.
12. Chiarello C, Vazquez D, Felton A, & McDowell A (2016) Structural asymmetry of the human cerebral cortex: Regional and between-subject variability of surface area, cortical thickness, and local gyrification. *Neuropsychologia* 93(Pt B):365-379.
13. Maingault S, Tzourio-Mazoyer N, Mazoyer B, & Crivello F (2016) Regional correlations between cortical thickness and surface area asymmetries: A surface-based morphometry study of 250 adults. *Neuropsychologia* 93:350-364.

SI Figures



SI Fig. S1. Mixed results of the structural asymmetry in cortical thickness in previous studies. Details for each study please refer to *References* above (8-13).

SI Datasets

SI Data sheet S1. Brief summary of each dataset used in the meta-analysis.

SI Data sheet S2. Meta-analysis of population-level asymmetry.

SI Data sheet S3. Meta-analysis of sex effects on cortical asymmetries.

SI Data sheet S4. Meta-analysis of age effects on cortical asymmetries.

SI Data sheet S5. Meta-analysis of group differences by handedness on cortical asymmetries.

SI Data sheet S6. Meta-analysis of ICV effects on cortical asymmetry.

SI Data sheet S7. Heritability of cerebral cortical anatomical asymmetries.

Left-right Orientation Checks

To assure the correct left/right orientation of the processed images is of special importance for brain asymmetry studies. In the present study, we followed Guadalupe et al. (2016) and did a number of checks to assess potential errors in the left-right orientation of the data.

First, unlike the other axes (anterior-posterior and superior-inferior), it is hard to detect potential orientation flips on the left-right axis from visual features. Actually, this is an old issue in previous imaging processing, and such problems are actually much more unlikely since the adoption of the NIFTI format for imaging data (http://nifti.nimh.nih.gov/).

Second, several strategies have been used to check the orientation information in the conversion from DICOM to NIFTI. The BIL&GIN, NESDA, MAS and OATS samples have made use of paramagnetic fiducial markers on a subset of their subjects, thus eliminating orientation ambiguity. In QTIM and SHIP, subjects with a known unilateral brain abnormality were used to check the correct orientation of the image after conversion. In BIG, CLiNG, GEB, GBB and HMS, a few examples were manually checked for potential mismatches between the DICOM and NIFTI header information, i.e., a correct flip from 'radiological' to 'neurological' orientation.

Moreover, we checked the consistency between several commonly used DICOM-to-NIFTI conversion tools, and DICOM images obtained from different scanners (using examples downloaded from the manufacturer's websites). The conversion tools included:

mri_convert: (https://surfer.nmr.mgh.harvard.edu/pub/docs/html/mri_convert.help.xml.html)

MRIConvert: (http://lcni.uoregon.edu/downloads/mriconvert)

dcm2nii: (http://www.cabiatl.com/mricro/mricron/dcm2nii.html)

spm_dicom_convert: http://www.fil.ion.ucl.ac.uk/spm/

Given no problem was found, such orientation issue would unlikely be a big contribution to the present results.

Finally, we found that, although thickness asymmetry showed large heterogeneity across samples, the heterogeneity of surface area asymmetry is much smaller. Except a few samples, size effect and direction of surface area asymmetries are consistent between sample and with the expected literature (i.e. large rightward asymmetry). This consistent asymmetry in surface area suggests that the "opposite" asymmetry issue in cortical thickness would unlikely be caused by incorrect orientation issues. In addition, we further identified several samples showing "opposite" asymmetry in both hemispheric cortical thickness and surface area compared with the population-level direction. Seven groups were obtained, including MuensterCohort (N = 739), SanPaulo3 (N = 85), NESDA (N = 65), VanHolst (N = 24), 01_Cheng_3T (N = 93), UMCG (N = 23) and Sjoerds (N = 20). After further checking with the contributors, no problem was found. These results further confirmed correct orientation and the present results.

Further Information about Each Dataset

We listed the datasets used in the present study, along with a brief introduction for each dataset, and information for handedness assessment, imaging scanning and data analysis. Note that one dataset could come from several projects. Thus, we included the further information for the all projects.

DStein

Dataset Name: **Addiction_DStein**

Project Name: Meth-CT

Dan J. Stein, Anne Uhlmann

1. Brief introduction, funding with ethical standards

The Meth-CT studies investigate structural and functional brain alterations in methamphetamine-dependent individuals compared to healthy controls, and the neural underpinnings of psychotic symptoms. Research was supported by the Department of Psychiatry and Mental Health and the Human Research Ethics Committee, University of Cape Town, and the Medical Research Council, South Africa.

2. Handedness Assessment Information

Self-report.

A subgroup completed Edinburgh Handedness Inventory.

3. Image Scanning and Data analysis

3T Siemens Allegra scanner; a 3D T1-weighted multiecho MPRAGE sequence was performed; anatomical imaging acquisition parameters: TR=2530ms; graded TE=1.53, 3.21, 4.89, 6.57ms; flip angle=7˚; slices=160; voxel size=1x1x1mm^3

Freesurfer 5.3 was used.

Quinn

Dataset Name: **MacMasterMDD**

We could use "MacMasterMDD" as the merged project heading. So that the samples could be MacMasterMDD_IWK, MacMasterMDD_Remady, MacMasterMDD_MDDEX, and MacMasterMDD_BMI.

IWK MDD Cohort:

1. Brief introduction, funding with ethical standards

IWK Research Ethics Board approved. Funding from the Halifax Stanley Centre. Research population of first-episode major depressive youth (11-21 years of age) and healthy controls.

2. Handedness Assessment Information

Self-report.

3. Image Scanning and Data analysis

1.5T Siemens Magnetom Vision. A sagittal scout series was acquired to test image quality. 3D fast low angle shot (FLASH) sequence was used to acquire data from 124 1.5 mm-thick contiguous coronal slices through the entire brain (echo time = 5ms, repetition time = 25ms, acquisition matrix = 256 x 256 pixels, field of view = 24 cm and flip angle = 40°). Freesurfer 5.3 was used.

MDDEX (24612):

1. Brief introduction, funding with ethical standards

Written consent was obtained from participants or guardians with approval from the Conjoint Health Research Ethics Board at the University of Calgary. Support for this research in part from the Cuthbertson and Fischer Chair in Paediatric Mental Health, the Alberta Children's Hospital Foundation, Alberta Children's Hospital Research Institute for Child and Maternal Health, the Mathison Centre for Mental Health Research & Education, the Hotchkiss Brain Institute, and the University of Calgary. This pediatric sample (18-24 years of age).

2. Handedness Assessment Information

Self-Report.

3. Image Scanning and Data analysis

Scanning was performed on a 3T GE Discovery MR750 at the Alberta Children's Hospital. Anatomical imaging acquisition parameters: axial acquisition, repetition time (TR), 2200 milliseconds (ms); echo time (TE), 3.04 ms; TI, 766, 780; flip angle, 13 degrees; 208 partitions; 256 × 256 matrix; and field of view, 256. Freesurfer 5.3 was used.

Remady (24656):

1. Brief introduction, funding with ethical standards

Written consent was obtained from participants or guardians with approval from the Conjoint Health Research Ethics Board at the University of Calgary. Support for this research in part from the

Cuthbertson and Fischer Chair in Paediatric Mental Health, the Alberta Children's Hospital Foundation, Alberta Children's Hospital Research Institute for Child and Maternal Health, the Mathison Centre for Mental Health Research & Education, the Hotchkiss Brain Institute, and the University of Calgary. This pediatric sample (12-21 years of age).

2. Handedness Assessment Information

Self-Report.

3. Image Scanning and Data analysis

Scanning was performed on a 3T GE Discovery MR750 at the Alberta Children's Hospital. Anatomical imaging acquisition parameters: axial acquisition, repetition time (TR), 2200 milliseconds (ms); echo time (TE), 3.04 ms; TI, 766, 780; flip angle, 13 degrees; 208 partitions; 256 × 256 matrix; and field of view, 256. Freesurfer 5.3 was used.

BMI (24796):

1. Brief introduction, funding with ethical standards

Written consent was obtained from participants or guardians with approval from the Conjoint Health Research Ethics Board at the University of Calgary. Support for this research in part from the Cuthbertson and Fischer Chair in Paediatric Mental Health, the Alberta Children's Hospital Foundation, Alberta Children's Hospital Research Institute for Child and Maternal Health, the Mathison Centre for Mental Health Research & Education, the Hotchkiss Brain Institute, and the University of Calgary. This pediatric sample (7-12 years of age).

2. Handedness Assessment Information

Self-Report.

3. Image Scanning and Data analysis

Scanning was performed on a 3T GE Discovery MR750 at the Alberta Children's Hospital. Anatomical imaging acquisition parameters: axial acquisition, repetition time (TR), 2200 milliseconds (ms); echo time (TE), 3.04 ms; TI, 766, 780; flip angle, 13 degrees; 208 partitions; 256 × 256 matrix; and field of view, 256. Freesurfer 5.3 was used.

NeuroIMAGE

Project Name: The **NeuroIMAGE** (International Multicentre ADHD genetics) project

1. Brief introduction, funding with ethical standards

NeuroIMAGE is an integrated DNA-cognition-MRI-phenotype project with the aim to identify cognitive, neural and genetic underpinnings of ADHD. The project includes research groups at three sites in the Netherlands: Nijmegen, Amsterdam and Groningen. Between 2004-2006, a cohort of 350 ADHD families (probands with ADHD combined type and one or more siblings) and 150 control families (control probands with one or more siblings) was gathered as part of the Dutch side of the International Multisite ADHD Genetics (IMAGE) project. Data collection included detailed information on ADHD status, and extensive phenotypic, neuropsychological and genetic data. From 2009-2011, this cohort was invited for a follow-up investigation as part of the NeuroIMAGE project, and the sample was enlarged with 100 new children. ADHD status, phenotypic and neuropsychological data were again collected, furthermore magnetic resonance imaging (MRI) brain scans were acquired and additional genome-wide genotyping completed.

This work was supported by NIH Grant R01MH62873 (to Stephen V. Faraone), NWO Large Investment Grant 1750102007010 and NWO Brain & Cognition an Integrative Approach grant (433-09-242) (to Jan Buitelaar), and grants from Radboud University Nijmegen Medical Center, University Medical Center Groningen and Accare, and VU University Amsterdam. The research leading to these results also received funding from the European Community's Seventh Framework Programme (FP7/2007– 2013) under grant agreement numbers 278948 (TACTICS), 602450 (IMAGEMEND) and n° 602805 (Aggressotype), and from the European Community's Horizon 2020 Programme (H2020/2014 – 2020) under grant agreement n° 643051 (MiND). Barbara Franke is supported by a Vici grant from NWO (grant number 016-130-669). In addition, Jan Buitelaar and Barbara Franke are supported by a grant for the ENIGMA Consortium (grant number U54 EB020403) from the BD2K Initiative of a cross-NIH partnership.

The study was approved by the regional ethics committee (CMO Regio Arnhem – Nijmegen; 2008/163; ABR: NL23894.091.08) and the medical ethical committee of the VU University Medical Center. All participants and their parents (if the participant was younger than 18 years) signed informed consent; parents signed informed consent for participants under twelve years of age.

2. Handedness Assessment Information

N/A

3. Image Scanning and Data analysis

MRI data in NeuroIMAGE were acquired with either a 1.5 Tesla Siemens Sonata or Avanto scanner. Of each participant, two high-resolution T1-weighted MP-RAGE anatomical scan were obtained (176 sagittal slices, repetition time = 2730 ms, echo time = 2.95 ms, voxel size = 1.0 x 1.0 x 1.0 mm, field of view = 256 mm). FreeSurfer version 5.3 was used.

Anna

Dataset Name: **OCD_Lazaro**

Project Name: The Genetics and Brain Imaging of Pediatric OCD (Clínic_Barcelona)

1. Brief introduction, funding with ethical standards

The data are part of two extensive projects titled “Structural, metabolic and functional abnormalities in children and adolescents with obsessive-compulsive disorder assessed by magnetic resonance (volumetric, spectroscopic and functional). Changes according the therapeutic response” and “Analysis of polimorphisms in candidate genes in early onset obsessive-compulsive disorder. Relationship with cerebral abnormalities and symptom dimensions. These projects were funding by two grants (Marató-TV3 01/2010 and Marató-TV3 091710).

2. Handedness Assessment Information

Handedness was assessed with a Spanish version of The Edinburgh Inventory (Oldfield, 1971).

Oldfield RC. The assessment and analysis of handedness: The Edinburgh Inventory. Neuropsychologia 1971; 9:97-113.

3. Image Scanning and Data analysis

Mri data were acquired with either a 1.5 Tesla General Electric scaner or 3 Tesla Siemens Tim Trio scanner. 3D structural T1-weighted FSRGE sequence (0.98x0.98x1.5mm^3 voxel sieze) has been used in 1.5 T and MPRAGE sequence (1x1x1 mm^3 voxel size) in 3 T. FreeSurfer version 5.3 was used

03_Huyser

Project Name: Chaim Huyser (**OCD_Huyser**)

1. Brief introduction, funding with ethical standards

The database is established since 2006 in the department of child and adolescent psychiatry AMC and de Bascule, academic center child and adolescent psychiatry for the project neuroimaging studies in pediatric obsessive-compulsive disorder. In these studies a longitudinal approach was used to investigate the mechanism of change during cognitive behavioral therapy on a neural level for children and adolescents with a obsessive-compulsive disorder.

Prof. F. Boer, Prof. DJ Veltman, Prof. O. vd Heuvel, Prof E. de Haan, Dr. L. Wolters and Dr. C. Huyser were the main investigators in these studies.

These studies were approved by the Ethical committee of the Academic Medical Center in Amsterdam (MEC 06/053#06.17.0749). All patients and controls and their patients gave written consent. The studies were supported by a grant from the Amsterdam school of neuroscience (ONWA) for scan costs.

2. Handedness Assessment Information

Self report when in doubt confirmation with the Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

MRI data were acquired with a 3 Tesla Philips Interna scanner. The parameters used were matrix 256x256, 182 slices and, voxel size 1 x 1 x 1.2 mm. Images were processed with FreeSurfer version 5.3.

3T_Child_Adolescent_Lateralization

3 Tesla - 14 Subjects (Up to 18 years old)

Project Name: Neuroimaging Studies in Obsessive Compulsive Disorder and Schizophrenia (**NSIOCDS_3T_Child**)

Principal Investigators:

Prof. Y.C. Janardhan Reddy

Prof. Ganesan Venkatasubramanian

Dr. Janardhanan C Narayanaswamy

1. Brief introduction, funding with ethical standards

The 3 Tesla structural MRI data from 171 healthy subjects were obtained as part of three funded projects Government of India grants to the Wellcome-DBT India Alliance grant to Dr. Venkatasubramanian (500236/Z/11/Z), Prof. Reddy (SR/S0/HS/0016/2011) and Dr. Narayanaswamy (DST INSPIRE faculty grant -IFA12-LSBM-26) of the Department of Science and Technology; the Government of India grants to Prof. Reddy No.BT/PR13334/Med/30/259/2009) and Dr. Narayanaswamy (BT/06/IYBA/2012) of the Department of Biotechnology.

These research studies examined patients with schizophrenia or obsessive-compulsive disorder and the healthy controls were recruited as comparison subjects.

2. Handedness Assessment Information

Self-report confirmed by Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

Structural MRI data details

3T Pediatric - (Philips Achieva): matrix 256X256, 165 slices, voxel size: 1.0 X 1.0 X 1.0 mm;

Y.C. Janardhan Reddy

Ganesan Venkatasubramanian

Janardhanan C Narayanaswamy

TOP3T_GE750

Project Name: TOP3T GE750 and STROKEMRI2 (**TOP3T_2**)

1. Brief introduction, funding with ethical standards

Participants were recruited from two concurrent projects (STROKEMRI and TOP) using the same MRI scanner and pulse sequences. For STROKEMRI, participants were recruited from social media and newspaper ads. Inclusion criteria were: (i) age 18 years or older, (ii) history of neurologic, psychiatric condition as well as alcohol or substance abuse, (iii) abnormal radiological findings requiring medical follow-up (e.g. silent stroke, tumor). For TOP, subjects were invited after a stratified random selection drawn from the Norwegian National Population Registry. All underwent initial interview where demographic and clinical information was obtained. Exclusion criteria included a history of head trauma with loss of consciousness of more than 10 minutes duration, moderate to severe psychiatric or somatic disease, first-degree relatives with mental illnesses (schizophrenia, bipolar disorder, and major depression disorder), excessive substance abuse during the last 12 months, or not being able to perform an MRI scan. Blood samples were taken for standard hospital hematological screening to rule out on-going illnesses and a urine sample was collected to screen for substance abuse.

The TOP study was supported by the Research Council of Norway (#160181, 190311, 223273, 213837, 249711), the South-East Norway Health Authority (2014114, 2014097, 2017- 112), and the Kristian Gerhard Jebsen Stiftelsen (SKGJ-MED-008) and the European Community's Seventh Framework Programme (FP7/2007–2013), grant agreement no. 602450 (IMAGEMEND).

2. Handedness Assessment Information

Self-reported.

3. Image Scanning and Data analysis

T1-weighted MRI scans were obtained from a General Electric Medical Systems (Discovery MR750) 3.0T scanner with a 32-channel head coil at Oslo University Hospital using a sagittal T1-weighted fast spoiled gradient echo (FSPGR) sequence with the following parameters: TR: 8.16 ms; TE: 3.18 ms; TI: 450 ms; FA: 12°; voxel size: 1.0x1.0x1.0 mm; slices: 188; FOV: 256 x 256 x 188 mm; duration: 288 s.

FreeSurfer version 5.3 was used for data processing.

StenerEOP

Project Name: **Youth-TOP/NORMENT EOP**

1. Brief introduction, funding with ethical standards

Youth-Top is an ongoing research project focused on longitudinal brain imaging and etiological outcome factors in Early Onset Psychosis (EOP). Adolescent patients (12-18 years) dagnosed with EOP are recruited from clinics in the Oslo region, and healthy adolescent controls are randomly selected from the Norwegian population register in the same catchment area. Youth-TOP is part of the K.G. Jebsen Centre for Psychosis Research and The Norwegian Centre for Mental Disorders Research (NORMENT), a collaboration between The University of Oslo, the University of Bergen and Oslo University Hospital. Funding is provided by the Norwegian Research Council (NFR), the South-Eastern Norway Regional Health Authority and the KG Jebsen Foundation. The Norwegian Regional Committee for Medical Research Ethics and the Norwegian Data Protection Agency have approved the study. All patients, healthy controls, and their parents give written informed consent prior to inclusion into the project.

2. Handedness Assessment Information

Self-report

3. Image Scanning and Data analysis

Magnetic resonance images in Youth-Top were acquired with a 3T GE scanner at Oslo University Hospital with one major upgrade within the acquisition period. Before upgrade : GE Signa HDxt 3T scanner, T1-weighted 3D fast spoiled gradient echo sequence (FSPGR; 1mm isotropic voxel size). After upgrade: GE Discovery MR750 scanner, T1-weighted 3D IR-prepared FSPGR sequence (BRAVO; 1mm isotropic voxel size). FreeSurfer version 5.3 was used.

TOP3T_0

Project Name: TOP3T and STROKEMRI1 (**TOP3T_1**)

1. Brief introduction, funding with ethical standards

Participants were recruited from two concurrent projects (STROKEMRI and TOP) using the same MRI scanner and pulse sequences. For STROKEMRI, subjects were recruited through a newspaper ad and social media. Exclusion criteria included estimated IQ < 70, previous history of alcohol-and substance abuse, history of neurologic or psychiatric disease, participants presently on any medication significantly affecting the nervous system and contraindications for MRI. All participants were self-sufficient and living independently, and reported no reason to suspect marked cognitive decline or undiagnosed dementia. For TOP, subjects were invited after a stratified random selection drawn from the Norwegian National Population Registry. All underwent initial interview where demographic and clinical information was obtained. Exclusion criteria included a history of head trauma with loss of consciousness of more than 10 minutes duration, moderate to severe psychiatric or somatic disease, first-degree relatives with mental illnesses (schizophrenia, bipolar disorder, and major depression disorder), excessive substance abuse during the last 12 months, or not being able to perform an MRI scan. Blood samples were taken for standard hospital hematological screening to rule out on-going illnesses and a urine sample was collected to screen for substance abuse.

The TOP study was supported by the Research Council of Norway (#160181, 190311, 223273, 213837, 249711), the South-East Norway Health Authority (2014114, 2014097, 2017- 112), and the Kristian Gerhard Jebsen Stiftelsen (SKGJ-MED-008) and the European Community's Seventh Framework Programme (FP7/2007–2013), grant agreement no. 602450 (IMAGEMEND).

2. Handedness Assessment Information

Self-reported.

3. Image Scanning and Data analysis

A 3 Tesla a General Electric Medical Systems Signa HDxT scanner at Oslo University Hospital was used to collect MR data using a 8-channel head coil. A T1-weighted 3D Fast Spoiled Gradient Echo (FSPGR) sequence was used with the following parameters: repetition time (TR) = 7.8 ms, echo time (TE) = 2.956 ms, inversion time (TI) = 450 ms, flip angle 12°, matrix = 256 x 256 mm, in-plane resolution=1x1mm, slice thickness=1.2mm; acquisition time=7min 8s, 166 sagittal slices.

FreeSurfer version 5.3 was used for data processing.

Colm_UCSF

Project Name: A CROSS-SECTIONAL AND LONGITUDINAL FUNCTIONAL MRI STUDY OF ADOLESCENT DEPRESSION (**Colm_UCSF**)

1. Brief introduction, funding with ethical standards

Participants provided written informed assent and their parents/legal guardians supplied written informed consent. The institutional review boards at University of California (UC) San Diego, UC San Francisco, Rady Children's Hospital, and the county of San Diego approved this study.

This work was supported by the Brain and Behavior Research Foundation grant (formerly NARSAD) to T.T.Y. and by a US National Institute of Mental Health (NIMH) grant to T.T.Y. (R01MH085734).

2. Handedness Assessment Information

Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

Magnetic resonance imaging data were acquired on a 3T GE MR750 MRI system (Milwaukee, WI) at UC San Diego. A T1-weighted (T1w) scan (TR/TE=8.1ms/3.17ms, flip angle=12°, 256×256 matrix, 1×1×1mm voxels, 168 sagittal slices) was acquired. Freesurfer version 5.3 was used.

Project Name: A CROSS-SECTIONAL AND LONGITUDINAL FUNCTIONAL MRI STUDY OF ADOLESCENT DEPRESSION

Colm G. Connolly, PhD 1; Tiffany C. Ho, PhD 1,2 Alan N. Simmons, PhD 6,7; Tony T. Yang, MD, PhD 1

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OXUK

Project Name: Oxford Early Onset Psychosis study (**OXEOP**)

1. Brief introduction, funding with ethical standards

Study of early-onset schizophrenia versus healthy adolescent controls.

MRC funded grant number: G0500092 - Anatomical connectivity in early onset schizophrenia

Ethics : The study was undertaken in accordance with the guidance of the Oxford Psychiatric Research Ethics Committee and written consent was obtained from all participants (and their parents.

2. Handedness Assessment Information

Edinburgh Handedness Questionnaire (Oldfield, 1971)

3. Image Scanning and Data analysis from (Douaud et al., 2007)

The participants underwent the same imaging protocol with a whole-brain T1-weighted and diffusion-weighted scanning using a 1.5T Sonata MR imager (Siemens, Erlangen, Germany) with a standard quadrature head coil and maximum 40mT.m 1 gradient capability.

The 3D T1-weighted FLASH sequence was performed with the following parameters: coronal orientation, matrix 256 256, 208 slices, 1 1 mm2 in-plane resolution, slice thickness 1 mm, TE/TR=5.6/12ms, flip angle =19 .

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Douaud, G., Smith, S., Jenkinson, M., Behrens, T., Johansen-Berg, H., Vickers, J., . . . James, A. (2007). Anatomically related grey and white matter abnormalities in adolescent-onset schizophrenia. Brain, 130(Pt 9), 2375-2386. doi:awm184 [pii]10.1093/brain/awm184

Oldfield, R. C. (1971). The assessment and analysis of handedness: the Edinburgh inventory. Neuropsychologia, 9(1), 97-113.

GloriaBPSydney

Project Name: The '**Bipolar Kids and Sibs**' Study (**Bipolar Kids and Sibs**)

1. Brief introduction, funding with ethical standards

The 'Bipolar Kids and Sibs' Study, is internationally one of the largest and most richly phenotyped 'high-risk' prospective studies of young people at high genetic risk of developing bipolar disorder.

The study is approved by the Human Research Ethics Committee of the University of New South Wales, and complies with the guidelines of the Australian National Health and Medical Research Council.

All participants are involved in an ongoing longitudinal study of at-risk individuals aged 12 to 30 years, in which those aged between 12 and 21 years at the Sydney site contribute clinical and genetic data to a National Institute of Mental Health funded collaborative study of an at-risk cohort. This study is funded by the Australian National Medical and Health Research Council (programme grant 1037196) and the Lansdowne Foundation.

2. Handedness Assessment Information

Self-report

3. Image Scanning and Data analysis

Images were acquired with a 3-T Philips Achieva scanner at Neuroscience Research Australia in Sydney. Each scan started with 1 min of standard scout images to adjust head positioning, followed by a reference scan to resolve sensitivity variations. A total of 180 T1-weighted anatomic three dimensional turbo field-echo sagittal images (voxel size=$1\times1\times1mm^3$ resolution; field of view=$256 \times 256 \times 180mm^3$; repetition time/echo time= 5.5/2.5 ms; flip angle = 8°) were acquired to allow subsequent spatial normalization. FreeSurfer version 5.3 was used.

Orr

Project Name: Cannabis (**Addiction_Orr**)

Catherine Orr, Hugh Garavan

1. Brief introduction, funding with ethical standards

Resting state fMRI was used to investigate intrinsic brain dynamics and functional connectivity that discriminated cannabis dependent adolescents (n=17) from matched controls. We identified reduced interhemispheric connectivity and elevated connectivity within the right hemisphere.

The study was approved by the School of Psychology in Trinity College Dublin and was conducted in accordance with the declaration of Helsinki.

2. Handedness Assessment Information

Self Report

3. Image Scanning and Data analysis

3T, MPRAGE, TR=2300ms, TE=3ms, flip angle=12˚, matrix=256x256x180, voxelsize=0.9mm^3

QTIM

Project Name: Queensland Twin Imaging (**QTIM**) Study

1. Brief introduction, funding with ethical standards

For the Queensland Twin Imaging (QTIM) study, based at QIMR Berghofer Medical Research Institute, data collection took place from 2007 untill 2012. Most individuals had previously participated in the Brisbane Adolescent Twin Study (Wright and Martin, 2004). QTIM is funded by the National Institutes of Health (project ROI HD HD050735; NIH Award 1U54EB020403-01, subaward no. 56929223) and the NHMRC (1009064, 496682). Ethics approval was given by the Human Research Ethics Committees of the Queensland Institute of Medical Research, University of Queensland, and Uniting Health Care. We thank the twins and siblings for their participation, Marlene Grace and Ann Eldridge for twin recruitment, Aiman Al Najjar and other radiographers for scanning, and Kerrie McAloney and Daniel Park for research support.

2. Handedness Assessment Information

Non-right handed twins were excluded from participating in the study. Data about handedness was available from the Brisbane Adolescent Twin Study (the Annett Handedness Questionnaire 6-items). Also, participants were screened for left handedness before coming in for imaging.

3. Image Scanning and Data analysis

The structural MRI scans were obtained at a 4 Tesla (Siemens Bruker), acquiring a 3D structural T1-weighted image (T1/TR/TE = 700/1500/3.35 ms; flip angle = 8°, slice thickness = 0.9 mm, FOV = 230 mm; 240 or 256 × 256 × 256 matrix depending on the acquisition orientation (81% (838) coronal, 19% (202) sagittal). Signal inhomogeneity was removed and the scans were registered to standard space using the Statistical Parametric Mapping (SPM) software package. Images were segmented and processed with Freesurfer 5.3.

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NORM_Moscow

Project Name: The R_SCZ database (**R_SCZ**)

1. Brief introduction, funding with ethical standards

The R_SCZ database has been established in Moscow in 2009 by an initiative of the Laboratory of Neuroimaging and Multimodal Analysis of the Mental Health Research Center (MHRC, Moscow). The R_SCZ database has been supported by MHRC and by a research grant from The Russian Foundation for Basic Research (grant code 15-06-05758 A; grantee Dr. Irina Lebedeva, PhD, DrSci (biol), the head of the Laboratory of Neuroimaging and Multimodal analysis, MHRC). We would also like to thank Tolibdzhon A. Akhadov, the head of Department of Radiology, Children's Clinical and Research Institute of Emergency Surgery and Trauma (Moscow, Russia) for his contribution to the R_SCZ database and to all persons who kindly participated in this research.

2. Handedness Assessment Information

Self-report and self-report confirmed by Annett's questionnaire for a part of the sample

3. Image Scanning and Data analysis

MRI data were acquired on a Philips Achiva 3T MRI scanner (Philips Medical Systems, Netherlands) with a 8-channel head coil. The T1-weighted structural brain scans were acquired using a turbo field echo sequence covering the whole brain. Parameters were as follows: repetition time = 8.2 ms, echo time = 3.7 ms, flip angle = 8o, SENSE factor = 1.5, field of view = 240 mm, voxel size of 0.83 × 0.83 mm with a slice thickness of 1 mm, no gap. FreeSurfer version 5.3.0 was used.

GEB

Project Name: Gene Environment Brain & Behavior (**GEB^2**)

1. Brief introduction, funding with ethical standards

Gene Environment Brain & Behavior (GEB^2) aims to investigate association among neural substrates, cognitive functions, and genetic origins. Two cohorts of college students were recruited from Beijing Normal University, Beijing, China. Cohort 1 consisted of 294 participants (age: 17–24, mean age = 20.7; 155 females), and Cohort 2 consisted of 201 participants (age: 18–23, mean age = 20.3; 123 females). Both gene, behavioral and MRI protocols were approved by the Institutional Review Board of Beijing Normal University. Written informed consent was obtained from all participants prior to the experiment.

The project was supported by National Natural Science Foundation of China (31230031, 31221003, 31471067, 31470055)

2. Handedness Assessment Information

Subjects's handedness assessment information was acquired through self-report.

3. Image Scanning and Data analysis

All MR imaging was done at the BNU Imaging Center for Brain Research, Beijing, China, on a Siemens 3T whole-body scanner (MAGENTOM Trio, a Tim system) with a 12-channel phase d-array head coil. Structural T1-weighted images were acquired with a 3D magnetization-prepared rapid acquisition gradient echo (MP-RAGE) sequence (TR/TE/TI = 2530/3.39/1100 ms, flip angle = 7°, FOV = 256 × 256 mm, voxel size = 1.0×1.0×1.33 mm). For volume segmentation and surface reconstruction, FreeSurfer version 5.0.1 was used.

ASY_results_MuensterCohort

Project Name: **Muenster** Neuroimaging Cohort

1. Brief introduction, funding with ethical standards

The Muenster Neuroimaging Cohort is a MRI study that has been ongoing since 2009 – focusing on the biological mechanisms of depression. This study was approved by the ethics committee of the Medical Faculty of Münster University and was in accordance with the Declaration of Helsinki.

This work was funded by the German Research Foundation (SFB-TRR58, Project C09 to UD) and the Interdisciplinary Center for Clinical Research (IZKF) of the medical faculty of Münster (grant Dan3/012/17 to UD).

2. Handedness Assessment Information

Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

MRI data were acquired with a 3T scanner Philips Gyroscan Intera with a 3D fast gradient echo sequence (Acquisition direction anterior-posterior, Number of Slices 320, Slice Gap 0mm, (0.5x0.5x0.5 mm^3 voxel size), TI 814.5 ms, TE 3.4 ms, TR 3.4 ms, FA 9°).

Data was processed with FreeSurfer (version 5.3.0) according to protocols of the ENIGMA Consortium.

GRADUAL

Project Name: Gene-Brain-Behavior (GBB) Project (**GBB_ GRADUAL**)

1. Brief introduction, funding with ethical standards

The Gene-Brain-Behavior（GBB）Project was initiated in Southwest University in 2011, which is an ongoing project exploring the associations among individual differences in brain structure and function, creativity, and mental health. The project was approved by the Southwest University Brain Imaging Center Institutional Review Board, and written informed consent was obtained from each subject. Participants received payment depending on time and tasks completed.This research was supported by the National Natural Science Foundation of China (31271087; 31470981; 31571137; 31500885), National Outstanding young people plan, the Program for the Top Young Talents by Chongqing, the Fundamental Research Funds for the Central Universities (SWU1509383,SWU1509451), Natural Science Foundation of Chongqing (cstc2015jcyjA10106), Fok Ying Tung Education Foundation (151023) , General Financial Grant from the China Postdoctoral Science Foundation (2015M572423, 2015M580767), Special Funds from the Chongqing Postdoctoral Science Foundation (Xm2015037), Key research for Humanities and social sciences of Ministry of Education(14JJD880009).

2. Handedness Assessment Information

Part of subjects were confirmed by Edinburgh Handedness Inventory, and the rest were confirmed by self report.

3. Image Scanning and Data analysis

Imaging data were collected using an 8-channel head coil on a Siemens 3T Trio scanner (Siemens Medical Systems, Erlangen, Germany) at the Brain Imaging Center, Southwest University. The same scanner and sequences were used at both time points. High-resolution, three-dimensional T1-weighted structural images were obtained using a Magnetization Prepared Rapid Acquisition Gradient-echo (MPRAGE) sequence (TR/TE =1900 ms/2.52 ms, FA = 9 degrees, FOV= 256 × 256 mm2; slices = 176; thickness = 1.0 mm; voxel size = 1×1×1 mm3). FreeSurfer version 5.3 was used.

SaoPaulo1

Project Name: São Paulo 1 – **ESTADO-NARSAD** Project

1. Brief introduction, funding with ethical standards

Healthy volunteers matched for age and gender with ADHD patients were recruited through advertisement in the local community and constituted our HC group. All subjects in the HC group also underwent clinical interviewing, including the SCID and the K-SADS-PL screening, in order to exclude psychiatric disorders and previous use of psychopharmacological agents.

In addition to the clinical instruments mentioned above, both patients and HC were screened for substance use with the Alcohol Use Disorders Identification Test (AUDIT) [30] and the South Westminster Questionnaire [31]. Diagnostic criteria for substance abuse or dependence were assessed using the SCID [32]. Handedness was assessed using the Edinburgh inventory [33]. Moreover, a general medical history, including information about cerebrovascular risk factors, and data on the use of psychotropic and general medications, was obtained through interviews with patients and/or their family.

Exclusion criteria for both groups were: substance abuse or dependence (current and lifetime); the presence of medical conditions or neurological disorders which could affect the central nervous system; history of mental retardation as assessed by clinical interviews with the patients and a close relative if necessary; past history of head trauma with loss of consciousness; and contraindications for MRI scanning.

This study was approved by our local ethics committee: “Comissão de Ética para Análise de Projetos de Pesquisa” – CAPPesq from the board of the University o Sao Paulo Medical School, and “Comissão Nacional de Ética em Pesquisa – Conep”. After complete description of the study to the subjects, written informed consent was obtained.

The present investigation was supported by a 2010 NARSAD Independent Investigator Award (NARSAD: The Brain and Behavior Research Fund) awarded to Geraldo F. Busatto. Geraldo F. Busatto is also partially funded by CNPq-Brazil. Marcus V. Zanetti is funded by FAPESP, Brazil (no. 2013/03905-4).

2. Handedness Assessment Information

Edimburgh handed ness questionnaire.

3. Image Scanning and Data analysis

Morphological data was acquired using a T1-weighted magnetization-prepared rapid gradient echo sequence (MPRAGE) using the following parameters: TR=2,400 ms, TE=3.65 ms, NEX=1, field of view (FOV)=240 mm, flip angle=8o, matrix=192×192 pixels, slice thickness=1.2 mm (no gap between slices), voxel size=1.3×1.3×12 mm, resulting in 160 slices covering the whole brain.

The DTI sequence was acquired using cardiac gating, a 12-channel head coil and parallel imaging. DTI was based on an echo-planar image (EPI) acquisition and consisted of one image without diffusion gradient (b=0 s/mm2) plus diffusion-weighted images (DWI) acquired along 64 non-colinear directions (b=1,000 s/mm2) using the following parameters: TR=8,000 ms, TE=110 ms, NEX=2, FOV=240 mm, matrix=120×120 pixels, slice thickness=2.7 mm (no gap between slices), voxel size=2.0×2.0×2.7 mm, resulting in 50 slices covering the whole brain.

The two sequences were acquired in up to 25 minutes. The imaging protocol also included a T2-weighted turbo spin-echo transaxial sequence (24 slices, slice thickness=5 mm, 1 mm gap) and a fluid

attenuated inversion recovery (FLAIR) transaxial sequence (24 slices, slice thickness=5 mm, 1 mm gap). Individual image inspection of the datasets of each subject was performed visually by an expert neuroradiologist aiming to identify silent gross brain lesions and artifacts that could interfere with image processing and analysis.

The T1-weighted images were pre-processed by correcting for signal inhomogeneities followed by skull-stripping and cerebellum removal. The MNI_N3 Software Package [34], available in: http://www.bic.mni.mcgill.ca/software/N3/, was used for correcting for signal inhomogeneities. Then, the skull-stripping and cerebellum removal were performed using a novel automated method known as Multi-Atlas Skull-Stripping (MASS version 1.0) [35]. Skull-stripping was then manually corrected when necessary.

FreeSurfer processing: regular automatic reconstruction procedure version 5.3 ran in a Mac OS platform, followed by the regular ENIGMA quality control protocol.

Just a correction on São Paulo 1: the skullstrip step from FreeSurfer 5.3 was skipped, once another skullstrip protocol had already been performed before the FreeSurfer's automatic reconstruction.

Ozlem

Project Name: **Neuro-ADAPT**

Ozlem Korucuoglu

PI: Reinout W. Wiers

1. Brief introduction, funding with ethical standards

This study focuses on differences in neural activity and frontostriatal functional connectivity during an alcohol-taste cue paradigm between the OPRM1 (rs1799971) AG-genotypes (n =16) and AA-genotypes (n= 20) in a sample of young healthy individuals (17–21 year olds).

The study was approved by the Ethics Committee of the Faculty of Social and Behavioral Sciences of the University of Amsterdam.

OK received support for the Neuro-ADAPT study from VICI grant no. 453.08.01 from the Netherlands Organization for Scientific Research (NWO) awarded to Reinout W Wiers.

2. Handedness Assessment Information

Handedness was assessed via self-report.

3. Image Scanning and Data analysis

3T, Gradient Echo, TR=8.17ms, TE=3.8ms, flip angle=8˚, matrix=240x240 x220, voxelsize=1x1x1mm^3

BIG

Project Name: **BIG**

The Brain Imaging Genetics (BIG) database was established in Nijmegen in 2007. This resource is now part of Cognomics, a joint initiative by researchers of the Donders Centre for Cognitive Neuroimaging, the Human Genetics and Cognitive Neuroscience departments of the Radboud University Medical Center, and the Max Planck Institute for Psycholinguistics. The Cognomics Initiative is supported by the participating departments and centres and by external grants, i.e. the Biobanking and Biomolecular Resources Research Infrastructure (Netherlands) (BBMRI-NL), the Hersenstichting Nederland, and the Netherlands Organisation for Scientific Research (NWO). The research on BIG also receives funding from the European Community's Seventh Framework Programme (FP7/2007–2013) under grant agreements #602450 (IMAGEMEND) and #602805 (Aggressotype) and from the National Institutes of Health (NIH) Consortium grant U54 EB020403, supported by a cross-NIH alliance that funds Big Data to Knowledge Centers of Excellence. We would also like to thank Hans van Bokhoven for his contributions to the Cognomics initiative and to all persons who kindly participated in this research. In addition, AF Marquand gratefully acknowledges support from the Language in Interaction project, funded by the NWO under the Gravitation Programme (grant 024.001.006).

Handedness assessment was based on self-report data.

MRI data in BIG were acquired with either a 1.5 Tesla Siemens Sonata or Avanto scanner or a 3 Tesla Siemens Trio or TimTrio scanner (Erlangen, Germany). Given that images were acquired during several smaller scale studies, the parameters used were slight variations of a standard T1-weighted three-dimensional magnetization prepared rapid gradient echo sequence (MPRAGE; 1.0×1.0×1.0 mm voxel size). FreeSurfer version 5.3 was used.

Xiang-Zhen Kong; Tulio Guadalupe

Language and Genetics Department, Max Planck Institute for Psycholinguistics

Simon E. Fisher; Clyde Francks

Language and Genetics Department, Max Planck Institute for Psycholinguistics; Donders Institute for Brain, Cognition and Behavior, Radboud University

Cousijn

Project Name: Cannabis Prospective (**Addiction_Cousijn**)

PIs

Janna Cousijn

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Department of Psychiatry, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands

Arkin Institute of Mental Health, the Netherlands

1. Brief introduction, funding with ethical standards

This study investigated the predictive role of neurocognitive functions in the progression from cannabis use to dependence in at-risk young adults. The Medical Ethics committee of the Academic Medical Center of the University of Amsterdam approved the study.

JC & AG received funding for the Cannabis Prospective study from ZonMW grant no.31180002 from the Netherlands Organization for Scientific Research (NWO)

2. Handedness Assessment Information

Self-report

3. Image Scanning and Data analysis

3T, Turbo Field Echo, TR=9.6 ms, TE=4.6ms, flip angle 8°, matrix=256×256x182, voxel size =1x1x1.2mm^3

CAMH_ASD

Project Name: **CAMH**

1. Brief introduction, funding with ethical standards

The CAMH dataset was collected in Toronto with support from the CAMH Foundation and the Canadian Institutes of Health Research.

2. Handedness Assessment Information

Self report confirmed by Edinburgh Hand Dominanace Questionnaire

3. Image Scanning and Data analysis

The MR images at CAMH were acquired using an 8-channel head coil on a 1.5-T system (EchoSpeed; General Electric Medical Systems). Axial inversion recovery–prepared spoiled gradient recall (SPGR) images were acquired using a 1.5-mm-thick slice acquisition with the following image parameters: echo time (TE), 5.3 milliseconds; repetition time (TR), 12.3 milliseconds; time to inversion, 300.0 milliseconds; and flip angle, 20°, final voxel size 0.8x0.8x1.5mm. FreeSurfer version 5.3 was used.

ClarissaBr

Project Name: The Brazilian Institute of Neuroscience and Neurotechnology (**BRAINN**)

1. Brief introduction, funding with ethical standards

The Brazilian Institute of Neuroscience and Neurotechnology (BRAINN) was launched in 2013 by FAPESP (SÃO PAULO RESEARCH FOUNDATION, grant 2013/07559-3) as a Research, Innovation and Dissemination Center (RIDC).

The central biological questions of our project are the investigation of basic mechanisms that lead to epilepsy and stroke and the injury mechanisms that follow the disease onset and progression and are related to prevention, treatment and rehabilitation. Our goals are to develop new methods and techniques to improve the understanding of mechanisms of damage, plasticity and repair in epilepsy and stroke; and to apply these results to improve diagnosis, prevention and treatment. This initiative foresees the creation of a new environment for scientific and technological development, new clinical applications, education and interaction with the business sector.

This research proposal is outstanding as it is clinically important, realistic and scientifically highly original, combining genetics, neurobiology, pharmacology, neuroimaging, computer sciences, robotics, physics and engineering. Results will benefit patients with epilepsy, stroke and other prevalent diseases, and contribute substantially to ongoing scientific discussions within neurology, psychiatry, and cognitive neuroscience.

2. Handedness Assessment Information

For most of the subjects, we used self-report information. Some subjects had confirmation by Edinburgh Handedness Inventory.

3. Image Scanning and Data analysis

MRI data were acquired with a single 3T PHILIPS scanner (ACHIEVA-INTERA), with similar protocol (T1 weighted, 1x1x1mm). All images were processed with FreeSurfer version 5.3

ClinG_sample

Project Name: Clinical Neuroscience Göttingen Study (**CliNG**)

1. Brief introduction, funding with ethical standards

The CliNG database was established in Göttingen, Germany between 2008 – 2015. Recruitment for the CliNG study sample was partially supported by the Deutsche Forschungsgemeinschaft (DFG) via the Clinical Research Group 241 'Genotype-phenotype relationships and neurobiology of the longitudinal course of psychosis', TP2 (PI Gruber; http://www.kfo241.de; grant number GR 1950/5-1).

2. Handedness Assessment Information

Self report.

3. Image Scanning and Data analysis

MRI data in CliNG were acquired with a 3 Tesla Siemens TIM Trio scanner (Erlangen, Germany). Following acquisition parameters were used: T1-weighted, 3D magnetization prepared rapid gradient echo sequence (MPRAGE) (TR/TE/TI/FA=2250 ms/3.26 ms/900 ms/9°; image matrix = 256 x 256; duration 8 min and 26 sec) generating 192 sagittal slices with a voxel size of 1 mm^3. Version of FreeSurfer: 5.3.

EstherCOBRE

Project Name: COBRE

1. Brief introduction, funding with ethical standards

Informed consent was obtained from all subjects according to institutional guidelines at the University of New Mexico Human Research Protections Office, and all data were anonymized prior to group analysis.

This research was supported by NIH1R01-EB006841, NIH1R01-EB005846, NIH2R01-EB000840, NIH1 P20 RR021938-01 and DOEDEFG02-08ER64581 (to VDC); the national high tech development plan (863 plan) 2015AA020513 (to JS); R01 MH65304 and VA CSR&D IIR-04-212-3 (to JMC). TW is supported by the Netherlands Organization for Health Research and Development (ZonMw) TOP project number 91211021 and the Simons Foundation Autism Research Initiative (SFARI - 307280).

2. Handedness Assessment Information

Self-report

3. Image Scanning and Data analysis

All images were collected on a single 3-Tesla Siemens Trio scanner with a 12-channel radio frequency coil. High resolution T1-weighted structural images were acquired with a five-echo MPRAGE sequence with TE = 1.64, 3.5, 5.36, 7.22, 9.08 ms, TR = 2.53 s, TI = 1.2 s, flip angle = 7°, number of excitations = 1, slice thickness = 1 mm, field of view = 256 mm, resolution = 256 × 256.

EstherMCIC

Project Name: **MCIC**

1. Brief introduction, funding with ethical standards

The Mind Clinical Imaging Consortium (MCIC) study of schizophrenia (Gollub et al., 2013) was established to further the understanding of the underlying pathophysiological mechanisms of schizophrenia through structural magnetic resonance imaging (MRI) and a large number of clinical and neurophysiological measures. The MCIC is comprised of investigators from academic departments located at four research sites: the University of New Mexico (UNM), the University of Minnesota (UMN), Massachusetts General Hospital (MGH), and the University of Iowa (UI). Imaging and behavior data from the MCIC study are available via the collaborative informatics and neuroimaging suit (COINS) data exchange (http://coins.mrn.org/dx; Wood et al., 2014).

All subjects provided informed consent to participate in the study that was approved by the human research committees at each of the sites.

This work was supported primarily by the Department of Energy DE-FG02-99ER62764 through its support of the Mind Research Network (MRN, formerly known as the MIND Institute) and the consortium as well as by the National Association for Research in Schizophrenia and Affective Disorders (NARSAD) Young Investigator Award (to SE) as well as through the Blowitz-Ridgeway and Essel Foundations, and through NWO ZonMw TOP 91211021, the DFG research fellowship (to SE), the Mind Research Network, National Institutes of Health through NCRR 5MO1-RR001066 (MGH General Clinical Research Center), NIMH K08 MH068540, the Biomedical Informatics Research Network with NCRR Supplements to P41 RR14075 (MGH), M01 RR 01066 (MGH), NIBIB R01EB006841 (MRN), R01EB005846 (MRN), 2R01 EB000840 (MRN), 1RC1MH089257 (MRN), as well as grant U24 RR021992, P20RR021938/P20GM103472 and R01MH094524.

2. Handedness Assessment Information

Handedness were recorded using the Hollingshead index (Hollingshead, 1965) and Annett Scale of Hand Preference (Annett, 1970), respectively.

3. Image Scanning and Data analysis

A T1-weighted structural MRI with a coronal gradient echo sequence was acquired at each of the four sites using 1.5T Siemens Sonata (MGH, UI, UNM) or a 3T Siemens Trio (UMN). The following parameters were used: TR=2530ms for 3T, TR=12ms for 1.5T; TE=3.81 for 3T, TE=4.76ms for 1.5T; TI=1100 for 3T; Bandwidth=180 for 3T, Bandwidth=110 for 1.5T; voxel size: 0.625×0.625; slice thickness 1.5mm; FOV, 256×256×128 cm matrix; FOV=16cm; NEX=1 for 3T, NEX=3 for 1.5T. According to the guidelines developed by the biomedical informatics research network (BIRN) test bed for morphometry (Jovicich et al., 2006, 2009) a preceding study was implemented with human phantoms to establish cross-site MRI acquisition calibration and reliability.

ASY_results_FOR2107

Project Name: **FOR2107**

Project Name: FOR2107 (Münster)

1. Brief introduction, funding with ethical standards

As central project of FOR2107, this study collects MRI data in parallel in Marburg and Münster – more subprojects (e.g. biodata, animal studies) are affiliated.

This study was approved by the ethics committee of the Medical Faculty of Münster University and was in accordance with the Declaration of Helsinki. This work was funded by the German Research Foundation (DFG, grant FOR2107 DA1151/5-1 and DA1151/5-2 to Udo Dannlowski; HA7070/2-2 to Tim Hahn).

2. Handedness Assessment Information

Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

MRI data in Muenster were acquired with a 3T Siemens PRISMA including a T1-weighted mprage whole-brain scan (Acquisition direction anterior-posterior, Number of Slices 192, Slice Gap 0mm (1.0x1.0x1.0 mm^3, TI 900ms, TE 2.28 ms, TR 2130.0 ms, FA 8°)

Data was processed with FreeSurfer (5.3.0) according to protocols of the ENIGMA Consortium.

Project Name: FOR2107 (Marburg)

1. Brief introduction, funding with ethical standards

As central project of FOR2107, this study collects MRI data in parallel in Marburg and Münster – more subprojects (e.g. biodata, animal studies) are affiliated.

This study was approved by the ethics committee of the Medical Faculty of Marburg University and was in accordance with the Declaration of Helsinki.

This work was funded by the German Research Foundation (DFG, grant FOR2107 KI 588/14-1 to TK and KO4291/3-1 to AK) .

2. Handedness Assessment Information

Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

MRI data in Marburg were acquired with a 3T Siemens Magnetom TiroTim syngo including a T1-weighted mprage whole-brain (Acquisition direction anterior-posterior, Number of Slices 176, Slice Gap 0.5mm (1.0x1.0x1.0 mm^3, TI 900ms, TE 2.26 ms, TR 1900 ms, FA 9°).

Data was processed with FreeSurfer (5.3.0) according to protocols of the ENIGMA Consortium.

NUIG

Dataset Name: **NUIG**

Project Name: The Galway First Episode Psychosis Study

1. Brief introduction, funding with ethical standards

The Galway First Episode Psychosis Study explores changes in brain structure and functioning associated with psychotic illness at an early stage of illness onset. This NUI Galway study was supported by the NUI Galway Millennium Fund and grant funding from the Health Research Board (HRA_POR/2011/100).

2. Handedness Assessment Information

Self-reported.

3. Image Scanning and Data analysis

MRI data in the Galway Bipolar Study were acquired on a **1.5T Tesla Siemens** Magnetom Symphony, software platform Numaris 2004A, running VA30A software (Erlangen, Germany). The parameters used were T1-weighted three-dimensional magnetization prepared rapid gradient echo sequence (MPRAGE; 0.45 x 0.45 x 0.9 mm voxel size). FreeSurfer version 5.3 was used.

Project Name: The Galway Bipolar Study: An investigation into neurobiological markers in patients with euthymic bipolar disorder

1. Brief introduction, funding with ethical standards

The Galway Bipolar Study explores structural and diffusion magnetic resonance imaging changes and the potential links with clinical and functional factors. This NUI Galway study was supported by the NUI Galway Millennium Fund and grant funding from the Health Research Board (HRA_POR/2011/100).

2. Handedness Assessment Information

Self-reported.

3. Image Scanning and Data analysis

MRI data in the Galway Bipolar Study were acquired on a **1.5T Tesla Siemens** Magnetom Symphony, software platform Numaris 2004A, running VA30A software (Erlangen, Germany). The parameters used were T1-weighted three-dimensional magnetization prepared rapid gradient echo sequence (MPRAGE; 0.45 x 0.45 x 0.9 mm voxel size). FreeSurfer version 5.3 was used.

Genevieve McPhilemy, Theophilus Akudjedu, Giulia Tronchin, Colm McDonald, Dara M. Cannon

Centre for Neuroimaging & Cognitive Genomics (NICOG), Clinical Neuroimaging Laboratory, NCBES Galway Neuroscience Centre, College of Medicine Nursing and Health Sciences, National University of Ireland Galway, H91 TK33 Galway, Ireland.

01_Cheng_1.5T

Project Name: Yuqi Cheng 1.5T (**OCD_Cheng_1.5T**)

1. Brief introduction, funding with ethical standards

The database was established in Kunming in 2007. This resource was approved by the ethics committee of the First Affiliated Hospital of Kunming Medical College. This study was supported the Funding of Yunnan Provincial Health Science and Technology Plan (2010NS016, 2011WS008), the united founding of Yunnan Administration of Science & Technology and Kunming Medical College(2011FB167),

2. Handedness Assessment Information

Self report confirmed by Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

MRI data were acquired with a 1.5 Tesla GE Signa Excite scanner. The parameters used were matrix matrix matrix 256x256, 172 slices and, voxel size 0.93x0.93x0.9 mm. Images were processed with FreeSurfer version 5.3.

SaoPaulo3

Project Name: **Wellcome Study**

1. Brief introduction, funding with ethical standards

Incidence population-based case-control study of psychosis, using a determined geographical area in São Paulo, Brazil. For the control group, a total of 114 people from the catchment area were recruited for MRI (controls are patients' neighbors), but 11 were excluded owing to the presence of silent gross brain lesions and 9 owing to artifacts during image acquisition, resulting in a final sample of 94 controls.

All participants were screened for substance use with the Alcohol Use Disorders Identification Test (AUDIT; Saunders et al, 1993) and the South West- minster Questionnaire (Menezes et al, 1996). Diagnostic criteria for substance abuse or dependence were assessed using the SCID (First et al, 1995). Handedness was assessed with Annett's Hand Preference Questionnaire (Annett, 1970). The study was approved by local ethics committees and written informed consent was obtained from all participants.

This study was funded by the Wellcome Trust, UK.

2. Handedness Assessment Information

Handedness was assessed with Annett's Hand Preference Questionnaire (Annett, 1970).

3. Image Scanning and Data analysis

Imaging data were acquired using two MRI scanners (at the Clinics Hospital of the University of Sa˜ o Paulo 1.5 T GE Signa scanner, General Electric, Milwaukee Wisconsin, USA). In total 72 people with psychosis and 57 controls were investigated using scanner 1 and 50 people with psycho- sis and 37 controls using scanner 2. Exactly the same acquisition protocols were used (a T1-SPGR sequence providing 124 contigu- ous slices, voxel size 0.8660.8661.5 mm, echo time 5.2 ms, resolution time 21.7 ms, flip angle 20, field of vision 22, matrix 2566192).

FreeSurfer processing: regular automatic reconstruction version 5.3 procedure ran in a Mac OS platform, followed by white matter mask correction for regions with poor cortical delineation (mainly in the temporal lobe; majority of subjects) and then by the regular ENIGMA quality control protocol.

1.5T_Adults_Lateralization

1.5 Tesla - 20 Subjects (>18 years old - adults)

Project Name: Neuroimaging Studies in Obsessive Compulsive Disorder and Schizophrenia (**NSIOCDS_1.5T_Adults**)

Principal Investigators:

Prof. Y.C. Janardhan Reddy

Prof. Ganesan Venkatasubramanian

Dr. Janardhanan C Narayanaswamy

1. Brief introduction, funding with ethical standards

The 3 Tesla structural MRI data from 171 healthy subjects were obtained as part of three funded projects Government of India grants to the Wellcome-DBT India Alliance grant to Dr. Venkatasubramanian (500236/Z/11/Z), Prof. Reddy (SR/S0/HS/0016/2011) and Dr. Narayanaswamy (DST INSPIRE faculty grant -IFA12-LSBM-26) of the Department of Science and Technology; the Government of India grants to Prof. Reddy No.BT/PR13334/Med/30/259/2009) and Dr. Narayanaswamy (BT/06/IYBA/2012) of the Department of Biotechnology.

These research studies examined patients with schizophrenia or obsessive-compulsive disorder and the healthy controls were recruited as comparison subjects.

2. Handedness Assessment Information

Self-report confirmed by Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

Structural MRI data details

1.5T Adult – (Siemens Vision): matrix 256X160, 160 slices, voxel size 0.98X0.98X1 mm

3T_Adults_Lateralization

3 Tesla - 171 Healthy Subjects (>18 years old - adults)

Project Name: Neuroimaging Studies in Obsessive Compulsive Disorder and Schizophrenia (**NSIOCDS_3T_Adults**)

Principal Investigators:

Prof. Y.C. Janardhan Reddy

Prof. Ganesan Venkatasubramanian

Dr. Janardhanan C Narayanaswamy

1. Brief introduction, funding with ethical standards

The 3 Tesla structural MRI data from 171 healthy subjects were obtained as part of three funded projects Government of India grants to the Wellcome-DBT India Alliance grant to Dr. Venkatasubramanian (500236/Z/11/Z), Prof. Reddy (SR/S0/HS/0016/2011) and Dr. Narayanaswamy (DST INSPIRE faculty grant -IFA12-LSBM-26) of the Department of Science and Technology; the Government of India grants to Prof. Reddy No.BT/PR13334/Med/30/259/2009) and Dr. Narayanaswamy (BT/06/IYBA/2012) of the Department of Biotechnology.

These research studies examined patients with schizophrenia or obsessive-compulsive disorder and the healthy controls were recruited as comparison subjects.

2. Handedness Assessment Information

Self-report confirmed by Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

Structural MRI data details

3T Adult - (Siemens Skyra): matrix 256X256, 192 slices, voxel size 1.0 X 1.0 X 1.0 mm;

EStein

Project Name: EStein (**Addiction_EStein**)

Cocaine:

Eliot A. Stein, Elisabeth C. Caparelli

1. Brief introduction, funding with ethical standards

Data was collected to study cocaine dependence. All these studies were IRB approved where participants signed an IRB approved consent form. Approval for data/results sharing with the ENIGMA consortium was provided by the Office of Human Subjects Research Protections.

Data collection was supported by the Intramural Research Program of NIDA/NIH.

2. Handedness Assessment Information

Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

3T, MPRAGE, TR=1900ms, TE=3.51ms, flip angle= 9˚, matrix=256x192x208, voxel size =1x1x1mm3

Smokers:

Eliot A. Stein, Elisabeth C. Caparelli

1. Brief introduction, funding with ethical standards

Data was collected to study cocaine dependence. All these studies were IRB approved where participants signed an IRB approved consent form. Data provided for this collaboration that came from protocol that are already closed, are covered by a repository protocol that covers data analysis.

Approval for data/results sharing with the ENIGMA consortium was provided by the Office of Human Subjects Research Protections.

Data collection was supported by the Intramural Research Program of NIDA/NIH.

2. Handedness Assessment Information

Information about the dominant hand depending on the study came from: Edinburgh Handedness Inventory, question regarding the dominant hand at either phone screening or during physical and history questioner.

3. Image Scanning and Data analysis

3T, MPRAGE, TR=2500ms, TE=4.38ms, flip angle=8˚, matrix=256x192x160 voxel size=1x1x1mm3

London

Project Names: **Addiction_London**

Early methamphetamine abstinence: fMRI and Cognition

Neural systems, inhibitory control, and methamphetamine dependence

Authors:

Edythe D. London, Angelica M. Morales

1. Brief introduction, funding with ethical standards

These projects examined how structural and functional brain abnormalities were associated with attention, working memory (R01DA015179, EDL), response inhibition, cognitive flexibility and decision making in methamphetamine users (R01DA020726, P20DA022539, EDL). Additional support for these projects came from the Thomas P. and Katherine K. Pike Chair in Addiction Studies and the Endowment from the Marjorie Greene Family Trust (EDL).

2. Handedness Assessment Information

Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

1.5T, MPRAGE, TR=1900ms, TE=4.38ms, flip angle=15˚, matrix=256x256x160, voxel size=1x1x1mm^3

Luijten

Project Name: DABIS (**Addiction_Luijten**)

Maartje Luijten, Dick Veltman

Maartje Luijten, PhD

Behavioural Science Institute, Radboud University

PO Box 9104, 6500 HE Nijmegen, Montessorilaan 3, the Netherlands

1. Brief introduction, funding with ethical standards

This project investigated whether brain activation associated with attentional bias as measured with fMRI is depending on dopamine transmission using a placebo controlled double blind randomized trial with haloperidol. ML & DV received funding for the DABIS study from VIDI grant no.016.08.322 from the Netherlands Organization for Scientific Research (NWO) awarded to Ingmar H A Franken. The study was conducted in accordance with the Declaration of Helsinki and all procedures were carried out after participants signed informed consent. The ethics committee of Erasmus MC University Medical Centre Rotterdam approved this study.

2. Handedness Assessment Information

Self-report – indeed self report

3. Image Scanning and Data analysis

3T, Inversion Recovery Fast Spoiled Gradient Recalled Echo (FSPGR), TR=10.6ms, TE=2.2ms, matrix=416x256x 192, voxel size = 1x1x1mm^3

Paulus

Project Name: Relapse (**Addiction_Paulus**)

Martin Paulus, Scott Mackey

1. Brief introduction, funding with ethical standards

The study was designed to identify behavioral and neural predictors of relapse in treatment seeking methamphetamine dependent patients

MP received funding from NIMH: R01 DA018307

Approval for the study was obtained from the University of California San Diego Human Research Protections Program. Each subject gave informed consent prior to participating.

2. Handedness Assessment Information

Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

3T, Spoiled gradient recalled (SPGR), TR=8 ms, TE=3ms, flip angle=12°, matrix=192× 256x172, voxel size=0.97x 0.97x1mm3

Yucel

Project Name: **Addiction_Yucel**

Chronic Cannabis- Memory:

Murat Yucel

1. Brief introduction, funding with ethical standards

The goal of this study was to examine the impact of long-term cannabis use on human brain structure and function.

Authorship should include Murat Yucel, Nadia Solowij, Valentina Lorenzetti and Yann Chye

I can confirm that local IRB approval was obtained. That is, this study was approved by the local Human Research and Ethics Board, and all participants provided written, informed consent before participation.

This study was funded by National Health and Medical Research Council (NHMRC) of Australia (Project Grant 459111). MY was supported by a National Health and Medical Research Council Fellowship (#1117188) and the David Winston Turner Endowment Fund.

2. Handedness Assessment Information

EHI

3. Image Scanning and Data analysis

3T, MPRAGE, TR=1900ms, TE=2.15ms, flip angle=, matrix=256x256x176, voxelsize=1x1x1mm3

Chronic Cannabis:

Nadia Solowij

1. Brief introduction, funding with ethical standards

This study recruited an exceptionally well-characterized sample of very heavy long-term cannabis users and matched controls (as well as people with schizophrenia with and without comorbid very heavy long-term cannabis use), with the aim to assess brain structure and function.

The study was supported by grants from the Clive and Vera Ramaciotti Foundation (NS), the Schizophrenia Research Institute using infrastructure funding from NSW Health (NS), the University of Wollongong (NS), the National Health and Medical Research Council Program Grant (350241 MY), Project Grant (459111 NS) and Clinical Career Development Award (509345 MY), and an Australian Research Council Future Fellowship (FT110100752 NS).

The study was approved by the University of Wollongong and South East Sydney and Illawarra Local Health Disctrict Human Research Ethics Committee. Participants provided written informed consent to participate in the study.

2. Handedness Assessment Information

Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

3T, Spoiled Gradient-Recalled Echo, TR=6.4ms, TE=2.9ms, flip angle=8˚, matrix= 256x256x180, voxel size=1x1x1mm3

Key authorships: Solowij, Yücel

Chronic cannabis users (Barcelona):

Rocio Martin-Santosa, Albert Batallaa,b

1. Department of Psychiatry and Psychology, Hospital Clínic, IDIBAPS, CIBERSAM, University of Barcelona, Barcelona, Spain.

2. Department of Psychiatry, Donders Institute for Brain, Cognition and Behaviour, Radboud University Medical Center, Nijmegen, The Netherlands.

1. Brief introduction, funding with ethical standards

Chronic cannabis users who began using cannabis before 16 years of age were matched to healthy volunteers in terms of age, educational level and IQ. Participants were male Caucasians, aged between 18 and 30 years.

Funding: This study has been done in part with Spanish grants: Plan Nacional sobre Drogas, Ministerio de Sanidady Consumo PNSD/2011/050 and PNSD2006/101; and the support of DIUE of Generalitat de Catalunya SGR2009/1435.

The study was approved by the Ethical and Clinical Research Committee of CEIC-Parc de Salut Mar, Barcelona, Spain.

2. Handedness Assessment Information

Self-report.

3. Image Scanning and Data analysis

1.5T, Fast Spoiled Gradient Inversion-Recovery, TR=11.8 ms, TE=4.2ms, flip angle= 15˚, matrix=256x256x124, voxel size=1.17x1.17x 1.2mm^3

ADS:

Nick Allen, Sarah Whittle

1. Brief introduction, funding with ethical standards

The broad aim of the ADS was to prospectively examine biopsychosocial risk and protective factors for emotional and behavioral problems during adolescence. 415 early adolescents were selected (from a community sample of >2000) into the study based on temperamental risk/resilience. 245 adolescents consented to participate in longitudinal research. These adolescents were invited to participate in 4 assessment waves from age 12 to 19.

This research was supported by grants from the Colonial Foundation, the National Health and Medical Research Council (NHMRC; Australia; Program Grant 350241), the Australian Research Council (ARC; Discovery Grants DP0878136 & DP1092637), and The University of Melbourne.

The ADS was approved by the Human Research Ethics Committee at The University of Melbourne, Australia. Consent to participate in the study was obtained from both the child and at least one parent at all time points.

2. Handedness Assessment Information

Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

3T, gradient echo volumetric acquisition, TR=36ms, TE=9ms, flip angle=35˚, matrix=410x410, voxel size=1.5x0.49x0.49 mm^3

Kwon_3T

Project Name: **Seoul III** dataset (previously named as Kwon_3T)

1. Brief introduction, funding with ethical standards

The Seoul III dataset was acquired from the OCD clinic at Seoul National University Hospital (SNUH). This study was approved from the Institutional Review Board of SNUH, and was supported by National Research Foundation of Korea grant funded by the Ministry of Education, Science and Technology (MEST) of the Republic of Korea (2011-0015639 and 2012-0005150), a grant of the Korea Health Technology R&D Project, Ministry of Health & Welfare of the Republic of Korea (A110094), and Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Science, ICT and Future Planning (2013R1A2A1A03071089).

2. Handedness Assessment Information

Not included in this analysis.

3. Image Scanning and Data analysis

In the Seoul III dataset, the whole-brain anatomy was assessed using high-resolution T1-weighted, three-dimensional Magnetization Prepared Rapid Gradient Echo (TR = 1,670 ms; TE = 1.89 ms; FOV = 250 mm; FA = 9°; voxel size = 1 × 0.977 × 0.977 mm) at 3-Tesla scanner (Siemens Magnetom Trio, Erlangen, Germany). For MRI data processing, FreeSurfer version 5.3 was used.

KwonNMC_15T

Project Name: **Seoul II** dataset (previously named as KwonNMC_15T)

1. Brief introduction, funding with ethical standards

The Seoul II dataset was acquired from the OCD clinic at Seoul National University Hospital (SNUH). This study was approved from the Institutional Review Board of SNUH, and was supported by grants (M103KV010012-06K2201-01210, 2009K001270, and 2010K000817) from Brain Research Center of the 21st Century Frontier Research Program funded by the Ministry of Science and Technology of the Republic of Korea, a grant (M10644020003-08N4402-00310) from the Cognitive Neuroscience Program of the Korean Ministry of Science and Technology of the Republic of Korea, the Korea Research Foundation grants funded by the Korean Government (KRF-2007-313-E00306 and KRF-2008-313-E00341), World Class University program through the Korea Science and Engineering Foundation funded by the Ministry of Education, Science and Technology (R31-10089, and R32-10142), a grant from the Seoul National University Hospital Research Fund (04-2008-104), and a grant from the National Research Foundation of Korea (2012-0005150) funded by the Ministry of Education, Science and Technology (MEST) of the Republic of Korea.

2. Handedness Assessment Information

Not included in this analysis.

3. Image Scanning and Data analysis

Images for the Seoul II dataset were acquired in axial plane using a 1.5-T scanner (Avanto, Siemens, Erlangen, Germany) and T1-weighted 3-D magnetization-prepared rapid-acquisition gradient echo (MPRAGE) sequence. Parameters were as follows: echo time/repetition time = 4.76/1160 msec; flip angle = 15°; field of view = 230 mm; voxel size = 0.45 × 0.45 × 0.9 mm.

KwonSNU_15T

Project Name: **Seoul I** dataset (previously named as KwonSNU_15T)

1. Brief introduction, funding with ethical standards

The Seoul I dataset was acquired from the OCD clinic at Seoul National University Hospital (SNUH). This study was approved from the Institutional Review Board of SNUH, and was supported by the Korean Research Foundation (1998-003-F00172), Korean Health Research and Development Grant (HMP-98-N-2-0029), Korea Research Foundation Grant (KRF-2001-044-F00182), Korean Research Foundation (2001-041-F00182), Seoul National University Hospital Research Fund (11-2003-001), and Brain Research Center of the 21st Century Frontier Research Program by Ministry of Science and Technology of Republic of Korea (M103KV010007 04K2201 007 10).

2. Handedness Assessment Information

Not included in this analysis.

3. Image Scanning and Data analysis

MRI data in Seoul I dataset were acquired with three-dimensional T1-weighted spoiled gradient echo sequence on a 1.5 Tesla GE SIGNA Scanner (GE Medical System, Milwaukee, USA). Imaging parameters were as follows: 1.5 mm sagittal slices; echo time=5.5 ms; repetition time=14.4 ms; rotation angle=20°; field of view = 21 × 21 cm; and a matrix of 256 × 256. For MRI data processing, FreeSurfer version 5.3 was used.

BILGIN

Project Name: The **BIL&GIN** database

1. Brief introduction, funding with ethical standards

The BIL&GIN was designed to allow an in-depth exploration of hemispheric specialization and of its variability in human. A local ethics committee (CCPRB Basse-Normandie) approved the experimental protocol. Participants gave their informed, written consent, and received compensation for their participation in the study. All participants were free of brain abnormalities as assessed by inspection of their structural T1-MRI scans by a trained radiologist.

2. Handedness Assessment Information

- Self reported handedness: Participants were asked whether they considered themselves as either right-handed, left-handed, or forced left-handed.
- Manual preference strength: Manual preference strength was evaluated using the Edinburgh inventory score, broom item discarded).
- Manual skill: We used the finger-tapping test for assessing manual skill.

3. Image Scanning and Data analysis

- BIL&GIN structural MRI dataset was acquired with a 3T Tesla Philips ACHIVA scanner (Philips Medical Systems, Best, The Netherlands). The acquisition protocol included a high-resolution 3D T1-weighted sequence (3D-FFE-TFE; TR = 20 ms; TE = 4.6 ms; flip angle = 10°; inversion time = 800 ms; turbo field echo factor = 65; sense factor = 2; matrix size = 256 × 256 × 180 mm3; 1mm3 isotropic voxel size).
- Reconstruction of cortical surfaces and measurement cortical thickness and surface area were performed using the FreeSurfer 5.3.0 image analysis suite. FreeSurfer constructs models of the cortical surface (white and pial). Each pial and white surface on each axial, sagittal and coronal section of each participant were visually checked twice and identified segmentation errors were reported in 48 cases (11%). A correction procedure consisting of manually adding an average of 9 control points (SD, 7) in the misclassified white matter was applied in these 48 cases. The automatic FreeSurfer segmentation procedure was then re-applied on these individuals, resulting in an accurate surface reconstruction after a novel round of quality control visual check.

TOP15T

Project Name: **TOP1.5T**

1. Brief introduction, funding with ethical standards

All participants were recruited between 2003 and 2009 as part of an ongoing study of psychotic disorders (Thematically Organized Psychosis (TOP) study). After complete description of the study, all participants gave informed consent to participate. The study was approved by the Regional Committee for Medical Research Ethics and the Norwegian Data Inspectorate. Exclusion criteria for all participants were a history of moderate or severe head injury, neurological disorder, IQ <65, and age outside the range 18 to 65 years. Participants were excluded if they had abused cannabis within the last 3 months, if they had a dependency on the drug, if they or any of their first-degree relatives had a lifetime history of severe psychiatric disorder, or if they had a history of medical problems thought to interfere with brain function.

The TOP study was supported by the Research Council of Norway (#160181, 190311, 223273, 213837, 249711), the South-East Norway Health Authority (2014114, 2014097, 2017- 112), and the Kristian Gerhard Jebsen Stiftelsen (SKGJ-MED-008) and the European Community's Seventh Framework Programme (FP7/2007–2013), grant agreement no. 602450 (IMAGEMEND).

2. Handedness Assessment Information

Self-reported.

3. Image Scanning and Data analysis

T1-weighted MRI data were acquired on a 1.5 T Siemens Magnetom Sonata (Siemens Medical Solutions, Erlangen, Germany) using a standard head coil at Oslo University Hospital and a 3D T1-weighted magnetization prepared rapid acquisition gradient echo (MPRAGE) sequence with the following parameters: TR/TE/TI/FOV/FA/matrix = 2730 ms/3.93 ms/1000 ms/240 mm/7°/192 × 256; voxel size 1.33 × 0.94 × 1 mm, 160 sagittal slices. The sequence was repeated twice and the two scans were averaged after rigid registration to increase signal-to-noise ratio. FreeSurfer version 5.3 was used for data processing.

SaudEPIGEN

Project Name: **EPIGEN-Ireland**

Analysts: Saud Alhusaini and Christopher D. Whelan

Principal Investigators: Gianpiero L. Cavalleri, Colin P. Doherty, Norman Delanty

1. Brief introduction, funding with ethical standards

The Epilepsy Genetics (EPIGEN) Consortium was established to undertake genetic mapping analyses to enable the detection of variants that influence the development and treatment of common forms of epilepsy. The EPIGEN-Ireland study consisted of epilepsy cohorts recruited from specialized epilepsy clinics at Beaumont Hospital at St. James's Hospital, Dublin, Ireland. Patients were mostly of Irish ethnicity. As part of the study, epilepsy patients as well as healthy control subjects underwent detailed phenotyping that included brain imaging. The work was supported by research grants from the Science Foundation Ireland (Research Frontiers Program award 08/RFP/GEN1538) and Brainwave–the Irish Epilepsy Association.

2. Handedness Assessment Information

Self reports supported by Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

MRI data were acquired on 3 Tesla scanner (Achieva, Philips Medical Systems, The Netherlands) at the Centre for Advanced Medical Imaging, St. James's Hospital. A three-dimensional (3D) T1-weighted turbo field echo sequence (TR/TE = 8.5/3.9 ms, flip angle = 8° turbo factor n = 240, field of view = 25.6x25.6 cm^2) with 160 slices and an isotropic spatial resolution of 1.0 mm3 was used to acquire the images. FreeSurfer version 5.3.0 was used to process MR images.

MatthewSacchet

Project Name: **Stanford**

1. Brief introduction, funding with ethical standards

The Stanford dataset was established with the support of NIMH Grant R01MH59259 to Ian Gotlib, and the National Science Foundation Integrative Graduate Education and Research Traineeship (NSF IGERT) Recipient Award 0801700 and National Science Foundation Graduate Research Fellowship Program (NSF GRFP) DGE-1147470 to Matthew Sacchet.

2. Handedness Assessment Information

Self-report

3. Image Scanning and Data analysis

MRI data were acquired using a 1.5T GE Signa Excite MR system. Whole-brain T1-weighted (T1w) images were collected using a spoiled gradient echo (SPGR) pulse sequence (116 sagittal slices; through-plane resolution = 1.5 mm; in-plane resolution = 0.86 x 0.86 mm; flip angle = 15 degrees; repetition time [TR] = 8.3-10.1 ms; echo time [TE] = 1.7-3.0; inversion time [TI] = 300 ms; matrix = 256 x 192). During the period of several years in which data were collected, no major scanner upgrades that would influence SPGR images were undertaken. FreeSurfer version 5.3 was used to process the T1w images.

AnneU

Project Name: **CIAM** (South Africa)

Research Team: Anne Uhlmann, Henk S Temmingh, Dan J Stein, Fleur M Howells (PI)

1. Brief introduction, funding with ethical standards

The CIAM study was conducted at the University of Cape Town, Department of Psychiatry and Mental Health, and was supported by the Department of Psychiatry and Mental Health and University Research Committee, University of Cape Town, South Africa and the National Research Foundation South Africa.

2. Handedness Assessment Information

Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

MRI data were acquired with a 3 Tesla Siemens Allegra scanner (Erlangen, Germany), using a 3D T1-weighted multiecho magnetization prepared rapid acquisition gradient echo (MEMPRAGE) sequence. Parameters were as follows: TR=2530ms; TE=1.53, 3.21, 4.89, 6.57ms; flip angle=7°, voxel size=1.3×1.0×1.3 mm, 128 slices. FreeSurfer version 5.3 was used for analysis.

HMS_sample

Project Name: Homburg Multidiagnosis Study (**HMS**)

1. Brief introduction, funding with ethical standards

The HMS database was established in Homburg, Germany between 2004-2007.

2. Handedness Assessment Information

Self-report confirmed by Edinburgh Handedness Inventory.

3. Image Scanning and Data analysis

MRI data in HMS were acquired with a 1.5 Tesla Siemens Sonata scanner (Erlangen, Germany). Following acquisition parameters were used: T1-weighted, magnetization prepared rapid gradient echo sequence (MPRAGE) (TR/TE/TI/FA=1900 ms/4.0 ms/700 ms/15°; image matrix = 256 x 256) generating 176 consecutive sagittal slices with a voxel size of 1 mm^3. Version of FreeSurfer: 5.3.

JPCapeTown

Project Name: Delineating endophenotypes of obsessive-compulsive disorder and hair-pulling disorder (HPD, or trichotillomania): An integrated pharmacological, neurocognitive, genetic and imaging study (**JPCapeTown**)

1. Brief introduction, funding with ethical standards

This ongoing project draws on the expertise of 2 teams, in South Africa (UCT and SU), and the UK (Cambridge University). This is a case-control cross-sectional study including resting-state functional magnetic resonance imaging, structural brain imaging, fMRI, magnetic resonance spectroscopy (MRS) and Diffusion Tensor Imaging (DTI). In addition, all participants undergo neurocognitive assessments and venesection, with their DNA stored for genetic analysis. Thus it is aimed to investigate the role of polymorphisms in specific candidate genes in accounting for variance in neuroimaging and cognitive-affective data in 4 participant groups (OCD, HPD, OCD relatives, healthy controls), 50 in each group); and to assess the differences between groups in terms of performance on behavioral tasks.

This work was supported by the Medical Research Council of South Africa, the Obsessive-Compulsive Foundation (Dan J. Stein), the National Research Foundation of South Africa (Christine Lochner), and an unrestricted grant from Lundbeck H/S, and we acknowledge the contribution of our research assistants.

The study protocol and patient information and consent forms have been approved by the HREC of the Faculty of Health Sciences, Stellenbosch University, as well as by the Ethics Committee of the University of Cape Town (UCT) (SU HREC reference number N14/05/053; UCT HREC reference number: 770/2014). Approval was obtained for the procedural and ethical details of the study.

The study is conducted in accordance with the guidelines of the International Conference on Harmonisation Good Clinical Practice Guidelines (ICH/GCP, 1996), The Declaration of Helsinki (Edinburgh 2000) and The Medical Research Council of South Africa's guidelines (2002) on the ethical conduct of research studies in humans.

2. Handedness Assessment Information

Self-report confirmed by Edinburgh Handedness Inventory.

3. Image Scanning and Data analysis

All OCD/HPD cases, first-degree relatives of OCD patients, and normal controls are imaged using MRI using voxel based morphometry (VBM) or Freesurfer V5.3, rigorous methods for assessing the

volume and thickness of brain regions likely involved in mediating cognitive tasks. Those with clinically relevant structural abnormalities are excluded. Sequences include ME-MPRAGE (T1), T2, FLAIR, rs fMRI, 3 fMRI tasks, DTI (AP-PA) and MRS.

Scanner information: 2 scanners (Tygerberg from 2007 – 2014; UCT from 2014 onwards):

T1 MPRAGE information:

Tygerberg: Siemens Magnetom Allegra 3T; voxel size (1.0×1.0×1.0 [mm]), slices (160), FoV read (256mm), slice thickness (1mm), distance factor (50%), TR (2530.0 ms), Base resolution (256), scan time: 10:49, flip angle: 9.1, Echo spacing: 8.9

UCT: Siemens Magnetom Skyra 3T; voxel size (1.0×1.0×1.0 [mm]), slices (160), FoV read (256mm), slice thickness (1mm), distance factor (50%), TR (2530.0 ms), Base resolution (256), scan time: 6:02, flip angle: 7.0, Echo spacing: 9.8

Christine Lochner

SU/UCT MRC Unit on Risk and Resilience in Mental Disorders, Department of Psychiatry, Stellenbosch University, South Africa

Dan J. Stein

SU/UCT MRC Unit on Risk and Resilience in Mental Disorders, Department of Psychiatry and Mental Health, University of Cape Town, South Africa

Garavan

Project Name: Trinity-THC (**Addiction_Garavan**)

Hugh Garavan, Robert Hester

1. Brief introduction, funding with ethical standards

We examined cognition in chronic cannabis users in comparison to matched (education, age, gender) healthy controls. We were specifically interested in whether previous reports of diminished error-related activity were associated with decrements in behavioural measures of error awareness and learning from error performance.

IRB approval was obtained from Trinity College Dublin IRB.

Funding source: This research was supported by USPHS grant from the National Institute on Drug Abuse: DA01865-01, Australian Research Council Grant (RH) DP0556602 and Australian National Health and Medical Research Council Career Development Award 519730 (RH).

2. Handedness Assessment Information

Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

3T, MPRAGE, TR=2s, TE=3ms, flip angle=12˚, matrix=256x256x176, voxelsize=0.9mm^3

Sinha

Project Name: **Addiction_Sinha**

IRC:

Rajita Sinha, Sara Blaine

1. Brief introduction, funding with ethical standards

This study enrolled health controls and alcohol dependent treatment seeking men and women to assess brain response to stress, drug cue and neutral-control exposure during early treatment.

IRB was obtained from Yale Univ School of Medicine

Rajita Sinha received funds from NIH/NIDA:

P50-DA016556, R01-AA013892, UL1-DE019586, PL1-DA024859

2. Handedness Assessment Information

Self-report

3. Image Scanning and Data analysis

3T, MPRAGE, TR =2530ms, TE=3.34ms, 1 flip angle=7˚, matrix/FOV = 256x256x176, voxel size = $1x1x1mm^3$

SCOR:

Rajita Sinha, Sara Blaine

1. Brief introduction, funding with ethical standards

This study enrolled health controls and cocaine dependent treatment seeking men and women to assess brain response to stress, drug cue and neutral-control exposure during early treatment.

IRB was obtained from Yale Univ School of Medicine

Rajita Sinha received funds from NIH/NIDA:

P50-DA016556, R01-AA013892, UL1-DE019586, PL1-DA024859

2. Handedness Assessment Information

Self-report

3. Image Scanning and Data analysis

3T, MPRAGE, TR =2530ms, TE=3.34ms, 1 flip angle=7˚, matrix=256x256x176, voxel size = $1x1x1mm^3$

HUBIN_KASP

Project Name: **HUBIN_KASP**

1. Brief introduction, funding with ethical standards

KaSP:

Karolinska Schizophrenia Project (KaSP) is a multidisciplinary research consortium that investigates the pathophysiology of schizophrenia. KaSP enrolls first-episode mostly drug naïve patients in Stockholm in a programme involving CSF and blood sampling, structural and functional MR examinations, molecular PET, cardiovascular measures and extensive clinical characterization including cognitive function. One major objective is to examine immune-related pathways in schizophrenia.

The study was approved by the Regional Ethics Committee in Stockholm and conformed to the tenets of the Declaration of Helsinki. Subjects were included after providing written informed consent after receiving a complete description of the study. Diagnosis was established based on a structured clinical interview of the DSM-IV or a consensus diagnostic procedure. Subjects were included from Jan 2011. The project is ongoing.

KaSP was supported by the Swedish Research Council (K2015-62X-15077-12-3), and by grants from the Swedish Medical Research Council (SE: 2009-7053; 2013-2838; SC: 523- 2014-3467), the Swedish Brain Foundation, Åhlén-siftelsen, Svenska Läkaresällskapet, Petrus och Augusta Hedlunds Stiftelse, Torsten Söderbergs Stiftelse, the AstraZeneca-Karolinska Institutet Joint Research Program in Translational Science, Söderbergs Königska Stiftelse, Professor Bror Gadelius Minne, Knut och Alice Wallenbergs stiftelse, Stockholm County Council (ALF and PPG), Centre for Psychiatry Research, KID-funding from the Karolinska Institutet.

HUBIN:
The HUBIN project has since 1999 investigated patients with schizophrenia spectrum disorder and control subjects with the aim to add to the understanding of the etiology and pathogenesis of the disorder. Patients have been recruited from psychiatric clinics in northwestern Stockholm County and control subjects either among subjects previously participating in biological psychiatric research at the Karolinska Institutet or drawn from a representative register of the population in Stockholm County. All participants had given informed consent prior to inclusion in the project. The Ethical Committee of the Karolinska Hospital, the Stockholm Regional Ethical Committee and the Swedish Data Inspection Board approved the study. The study was supported by the Swedish Research Council (grant numbers K2015-62X-15077-12-3), the regional agreement between Karolinska Institutet and Stockholm County Council, the Karolinska Institutet and the Knut and Alice Wallenberg Foundation.

2. Handedness Assessment Information

Self report.

3. Image Scanning and Data analysis

T1-images were acquired using a 3T GE scanner and 3D IR prep fast SPGR sequence with the following parameters: TR=7.904ms, TE=3.06ms, TI = 450ms, flip angle = 12, 146 sagittal slices, voxel size = 0.934 x 0.934 x 1.2 mm3, matrix = 256 x 256. FreeSurfer version 5.3 was used for data processing.

Malt

Project Name: **Oslo Malt** study (Elvsåshagen T, Bøen E, Malt UF)

1. Brief introduction, funding with ethical standards

The Oslo Malt study is a longitudinal study of brain structure and plasticity in healthy controls and individuals with bipolar II disorder. The study is conducted at Oslo University Hospital, Oslo, Norway. The study is funded by the Research Council of Norway (167153/V50, 204966/F20), the South-Eastern Norway Regional Health Authority, Oslo University Hospital, and research grants from Mrs. Aslaug Throne-Holst and from the Ebbe Frøland Foundation.

2. Handedness Assessment Information

Handedness was based on self report in a clinical interview with one of the study psychiatrists.

3. Image Scanning and Data analysis

Imaging was performed on a 3T Philips Achieva Scanner (Philips Healthcare, Eindhoven, the Netherlands) using an 8-channel SENSE head coil. The pulse sequence used for volumetric analyses was a T1-weighted 3D turbo field echo (TFE) sequence (TR/TE = 8.4 ms/2.3 ms, FOV = 256 mm × 256 mm × 220 mm, 1 mm isotropic resolution, TA = 7 min 40 s). The T1-weighted MR images were analysed using FreeSurfer version 5.1 (http://surfer.nmr.mgh.harvard.edu/).

MDD_Ilya

Project Name: **CODE**

1. Brief introduction, funding with ethical standards

The CODE cohort was collected from studies funded by Lundbeck and the German Research Foundation (WA 1539/4-1, SCHN 1205/3-1, SCHR 443/11-1).

2. Handedness Assessment Information

Self-report

3. Image Scanning and Data analysis

MRI data in CODE were acquired with either a 3T Siemens Trio (4 Sites) or 3T Philips Achieva (1 site) scanner. Acquisition parameters for the Siemens scanners were: T1 mprage, voxel size 1 mm x 1 mm x 1 mm; TR=1900 msec; TE=2.52 msec; Sample 1: 192 slices, Sample 2: 176 slices (except 1 site: 192). For the Philips scanner: T1 3D-TFE, voxel size 1 mm x 1 mm x 1 mm; TR=8.3 msec; TE=3.8 msec; 170 slices. FreeSurfer version 5.3 was used, running on Ubuntu 12.04 LTS (Linux 64bit).

Foxe

Project Name: Cocaine (**Addiction_Foxe**)

Authors: Hugh Garavan, John Foxe

1. Brief introduction, funding with ethical standards

These projects studied cognitive control and reward processing in current and abstinent cocaine users.

HG & JF received funds from NIDA: R01-DA014100

The research received ethics approval from IRB boards.

2. Handedness Assessment Information

Self-report

3. Image Scanning and Data analysis

3T, MPRAGE, TR=11.6ms, TE=4.9ms, flip angle = 8°, matrix=256×256x172, voxel size = 1.2×1.2x1.2 mm^3

Christoph

Project Name: S:t Göran Bipolar project (**SBP**)

1. Brief introduction, funding with ethical standards

The S:t Göran Bipolar project (SBP) was established by Mikael Landén in 2005. Patients are currently recruited from Affektivt centrum, Norra Stockholms psykiatri and from 2009 also from Bipolärmottagningen in Gothenburg. Patients diagnosed with bipolar disorder are meticulously phenotyped and followed over time. The study participants are investigated using diagnostic, neuropsychological, neurological, imaging, genetic and biochemical approaches. This enables the identification of clinically relevant subgroups and markers and provides unique possibilities to study disease mechanisms. A long term aim is to identify factors and markers that are predictive of relapse, treatment response, side effects, cognitive and psychosocial functioning and quality of life for individuals suffering from bipolar syndromes.

According to the Declaration of Helsinki, all study subjects consented orally and in writing to participate in the study. The study was approved by the Ethics committee of the Karolinska Institutet, Stockholm, Sweden.

The SBP is supported by grants from the Swedish Medical Research Council (K2014-62X-14647-12-51, K2010-61P-21568-01-4, and K2013-61X-08276-26-4), the Swedish foundation for Strategic Research (KF10-0039), the Swedish Brain foundation (FO2016-0176), and the Swedish Federal Government under the LUA/ALF agreement (ALFGBG-426721).

We thank the patients participating in this study. We also wish to thank the staff at the St. Göran bipolar affective disorder unit, including study nurses coordinator Lena Lundberg and Benita Gezelius, as well as data manager Mathias Kardell. We also thank Marie Tegnér and Yords Österman who performed the MR scanning.

2. Handedness Assessment Information

- Edinburgh Handedness Inventory (not provided)

3. Image Scanning and Data analysis

MRI scans were acquired at the MR Research Center, Karolinska University Hospital, Stockholm. Coronal 3D T1 weighted images were acquired with a spoiled gradient echo recall sequence (3D-SPGR, TR=21.0 ms, TE=6 ms, FOV=18 cm, flip angle=30˚, acquisition matrix=256×256×128, voxel size: 0.7x0.7x1.8mm^3) using a 1.5-Tesla MRI medical scanner (General Electric Signa Excite 1.5T) equipped with an eight channel head coil.

Images were processed using Freesurfer 5.1.

NESDA

Project Name: **NESDA**

1. Brief introduction, funding with ethical standards

The Netherlands Study of Depression and Anxiety (NESDA) is a prospective cohort study with the main aim to examine the long-term prognosis and co-morbidity of anxiety and depression in order to improve quality of care and prevent chronicity. The infrastructure for the NESDA study (http://www.nesda.nl) is funded through the Geestkracht program of the Netherlands Organisation for Health Research and Development (Zon-Mw, grant no 10-000-1002) and is supported by participating universities and mental health care organizations (VU University Medical Center, GGZ inGeest, Arkin, Leiden University Medical Center, GGZ Rivierduinen, University Medical Center Groningen, Lentis, GGZ Friesland, GGZ Drenthe, Scientific Institute for Quality of Healthcare (IQ healthcare), Netherlands Institute for Health Services Research (NIVEL) and Netherlands Institute of Mental Health and Addiction (Trimbos Institute).

Within the context of NESDA a nested study was performed in patients diagnosed with alcohol dependence, also including a healthy control group. This nested study was supported by a ZonMW grant no. 31160004 from the Netherlands Organization for Scientific Research (NWO).
Publications that came out of this nested study, and used the structural scans for coregistration purposes with functional MRI data:

1. Sjoerds, Z, Van den Brink, W, Beekman, ATF, Penninx, BWJH, Veltman, DJ (2013). Response inhibition in alcohol dependent patients and patients with depression/anxiety: an fMRI study. Psychological Medicine 44(8): 1713-1725.

2. Sjoerds, Z, De Wit, S, Van den Brink, W, Robbins, TW, Beekman, ATF, Penninx, BWJH, Veltman, DJ (2013). Behavioral and neuroimaging evidence for a bias to the habit system in alcohol dependent patients. Translational Psychiatry 3: e337.

3. Sjoerds, Z, Van den Brink, W, Beekman, ATF, Penninx, BWJH, Veltman, DJ (2014). Cue reactivity is associated with duration and severity of alcohol dependence: an fMRI study. PLOS One 9(1):e84560.

4. Sjoerds Z, Stufflebeam SM, Veltman DJ, Van den brink W, Penninx BWJH, Douw L (2017). Progressive loss of global and local brain network efficiency in alcohol dependence. Addiction Biology. Mar;22(2):523-534

2. Handedness Assessment Information

Handedness was assessed with the Dutch version of the self-report Hand Preference Questionnaire (van Strien 1992).

3. Image Scanning and Data analysis

Magnetic Resonance Imaging (MRI) data were obtained using 3T Phillips MRI scanners (Phillips Healthcare, Best, The Netherlands) located at the three participating centers, equipped with a SENSE 8-channel (LUMC and UMCG) and a SENSE 6-channel (AMC) receiver head coil. Three-dimensional T1-weighted images were collected using a gradient echo sequence (TR=9ms, TE=3.5ms, matrix size: 256x256, voxel size: 1x1x1mm, 170 slices). FreeSurfer version 5.3 was used.

02_Heuvel_1.5T

Project Name: **OCD_VUmc 1.5T**

1. Brief introduction, funding with ethical standards

The 1.5 T MRI data are collected in the context of two independent fMRI studies in OCD. The first study (PhD project of Odile van den Heuvel) studied cognitive paradigms in OCD, in comparison with panic disorder, hypochondriasis and healthy controls, both at baseline (ref 2-3) and after naturalistic follow-up (ref 4). The second study (PhD project of Peter Remijnse) studied cognitive paradigms in OCD, in comparison with depressive patients and healthy controls, both at baseline (ref 6-7-8) and after naturalistic follow-up (ref 5). The structural MRI scans have been pooled to perform a VBM study in the combined samples of OCD and controls (ref 1).

Supported by the Dutch Organization for Scientific Research (NWO) (grants 912-02-050, 907-00-012, 940-37-018, and 916.86.038).

Publications that came out of these 2 OCD studies:

1. van den Heuvel OA, Remijnse PL, Mataix-Cols D, Vrenken H, Groenewegen HJ, Uylings HB, van Balkom AJ, Veltman DJ. The major symptom dimensions of obsessive-compulsive disorder are mediated by partially distinct neural systems. Brain. 2009 Apr;132(Pt 4):853-68.

2. van den Heuvel OA, Veltman DJ, Groenewegen HJ, Witter MP, Merkelbach J, Cath DC, van Balkom AJ, van Oppen P, van Dyck R. Disorder-specific neuroanatomical correlates of attentional bias in obsessive-compulsive disorder, panic disorder, and hypochondriasis. Arch Gen Psychiatry. 2005 Aug;62(8):922-33.

3. van den Heuvel OA, Veltman DJ, Groenewegen HJ, Cath DC, van Balkom AJ, van Hartskamp J, Barkhof F, van Dyck R. Frontal-striatal dysfunction during planning in obsessive-compulsive disorder. Arch Gen Psychiatry. 2005 Mar;62(3):301-9.

4. van den Heuvel OA, Mataix-Cols D, Zwitser G, Cath DC, van der Werf YD, Groenewegen HJ, van Balkom AJ, Veltman DJ. Common limbic and frontal-striatal disturbances in patients with obsessive compulsive disorder, panic disorder and hypochondriasis. Psychol Med. 2011 Nov;41(11):2399-410.

5. Vriend C, de Wit SJ, Remijnse PL, van Balkom AJ, Veltman DJ, van den Heuvel OA. Switch the itch: a naturalistic follow-up study on the neural correlates of cognitive flexibility in obsessive-compulsive disorder. Psychiatry Res. 2013 Jul 30;213(1):31-8.

6. Remijnse PL, van den Heuvel OA, Nielen MM, Vriend C, Hendriks GJ, Hoogendijk WJ, Uylings HB, Veltman DJ. Cognitive inflexibility in obsessive-compulsive disorder and major depression is associated with distinct neural correlates. PLoS One. 2013 Apr 24;8(4):e59600.

7. Remijnse PL, Nielen MM, van Balkom AJ, Hendriks GJ, Hoogendijk WJ, Uylings HB, Veltman DJ. Differential frontal-striatal and paralimbic activity during reversal learning in major depressive disorder and obsessive-compulsive disorder. Psychol Med. 2009 Sep;39(9):1503-18.

8. Remijnse PL, Nielen MM, van Balkom AJ, Cath DC, van Oppen P, Uylings HB, Veltman DJ. Reduced orbitofrontal-striatal activity on a reversal learning task in obsessive-compulsive disorder. Arch Gen Psychiatry. 2006 Nov;63(11):1225-36.

2. Handedness Assessment Information

self report

3. Image Scanning and Data analysis

MRI data were acquired with a 1.5 Tesla Siemens Sonata scanner. The parameters used were matrix 256x160, 160 slices and, voxel size 1x1x1.5 mm. Images were processed with FreeSurfer version 5.3.

04_Mataix_Cols

Project Name: **OCD_Mataix-Cols** OCD studies

1. Brief introduction, funding with ethical standards

These structural scans come from a series of studies conducted at King's College London and funded by the Wellcome Trust (Mary L Phillips, PI) and a pump priming grant from the South London and Maudsley Trust, London (project grant no. 064846; David Mataix-Cols PI). The broad aims of these studies were to examine the neuropsychological and neural correlates of various symptom dimensions of obsessive-compulsive disorder (OCD) and to identify neural predictors of treatment outcome in this disorder. We would like to thank Prof Mary L Phillips, Dr Natalia Lawrence and Sarah Wooderson for their contribution to the project (obtaining funding, data collection) and to all persons who kindly participated in this research.

2. Handedness Assessment Information

Self report

3. Image Scanning and Data analysis

MRI data were acquired with a 1.5 Tesla GE Signa scanner. The parameters used were matrix 256x256, 124 slices, 0.94x0.94x1.5. Images were processed with FreeSurfer version 5.3.

SHIP-TREND-0

Project Name: **SHIP-TREND**

1. Brief introduction, funding with ethical standards

SHIP-TREND is a general population based cohort which is comprised of adult German residents and which is independent of the SHIP cohort.

A separate stratified random sample of 8,016 adults aged 20 to 79 years was drawn for SHIP-TREND. The target sample size was chosen to achieve a final sample size similar to that of SHIP-0. The baseline examinations (SHIP-TREND-0) were performed from June 2009 until October 2012 (n=4422).

The SHIP-TREND study was approved by the ethics committee of the University of Greifswald. Written informed consent was obtained from all participants.

SHIP is part of the Community Medicine Research net of the University of Greifswald, Germany, which is funded by the Federal Ministry of Education and Research (grants no. 01ZZ9603, 01ZZ0103, and 01ZZ0403), the Ministry of Cultural Affairs and the Social Ministry of the Federal State of Mecklenburg-West Pomerania. MRI scans in SHIP-TREND have been supported by a joint grant from Siemens Healthineers, Erlangen, Germany and the Federal State of Mecklenburg-West Pomerania.

2. Handedness Assessment Information

Self-report

3. Image Scanning and Data analysis

Subjects from SHIP-TREND-0 were asked to participate in a whole-body magnetic resonance imaging (MRI) assessment. After exclusion of subjects who refused participation or who fulfilled exclusion criteria for MRI (e.g. cardiac pacemaker) 2154 subjects from SHIP-TREND-0 underwent the MRI scanning.

Image Acquisition: All images were obtained using the same 1.5 T Siemens MRI scanner (Magnetom Avanto, Siemens Medical Systems, Erlangen, Germany) with a T1-weighted magnetization prepared rapid acquisition gradient echo (MPRAGE) sequence and following parameters: axial plane, TR=1900 ms, TE=3.4 ms and Flip angle=15° and an original resolution of 1.0 x 1.0 x 1.0mm^3.

FreeSurfer version 5.3 was used.

Hans Jörgen Grabe

Department of Psychiatry and Psychotherapy, University Medicine Greifswald, Germany; German Center for Neurodegenerative Diseases (DZNE), Rostock/ Greifswald, Germany

Katharina Wittfeld

German Center for Neurodegenerative Diseases (DZNE), Rostock/ Greifswald, Germany

Henry Völzke

Institute for Community Medicine, University Medicine Greifswald, Germany; DZHK (German Centre for Cardiovascular Research), partner site Greifswald, Germany; German Centre for Diabetes Research (DZD), Site Greifswald, Germany

Robin Bülow

Department of Diagnostic Radiology and Neuroradiology, University Medicine Greifswald, Greifswald, Germany

Momenan

Project Name: NIAAA (**Addiction_NIAAA**)

Reza Momenan

1. Brief introduction, funding with ethical standards

The data in this study are provided from an omnibus neuroimaging assessment protocol and a functional neuroanatomy of motivation and emotion in Alcoholics and Non-Alcoholics protocol.

Both protocols are IRB approved. Participants enrolled in both protocols are consented.

Data collection by RM was supported by the Intramural Clinical and Biological Research (DICBR) Program of the National Institute on Alcohol Abuse and Alcoholism (NIAAA), National Institutes of Health.

2. Handedness Assessment Information

Self-report and Edinburgh Handedness Inventory were used to determine the handedness. Individuals with positive scores of the EHI were considered Right Handed.

3. Image Scanning and Data analysis

3T, MPRAGE , TR=4.5-7.8 ms, TE=2.2-3.1ms, flip angle =6˚, voxelsize=0.9x0.9 x1-1.5mm^3

4. NIAAA, Contibutors

Reza Momenan, Ph.D., Michael Kerich, B.S.

Clinical NeuroImaging Research Core, National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health

VanHolst

Project Name: **ADPG** study

Anneke E. Goudriaan, Ruth J. van Holst

1. Brief introduction, funding with ethical standards

Similarities and differences in between alcohol dependence and gambling addiction were assessed with fMRI. AG & RvH received funing for the ADPG study from ZonMW grant no.91676084 from the Netherlands Organization for Scientific Research (NWO).

2. Handedness Assessment Information

Self-report

3. Image Scanning and Data analysis

3T, Gradient Echo, TR=9ms TE=4.20ms, flip angle 8°, matrix=256×256x170, voxel size=1×1x1mm3

IRB approval was obtained

02_Heuvel_3T

Project Name: **OCD_VUmc 3T**

1. Brief introduction, funding with ethical standards

The data have been collected in the context of an fMRI study in unmedicated adult OCD patients, their unaffected siblings and healthy controls at baseline during cognitive tasks (ref 1-2-3), pre- and post single-session rTMS (ref 4) and in a subsample also after naturalistic follow-up (work in progress). We also used the DTI data to perform a comparison between OCD, siblings and controls (ref 5).

Supported in part by the Netherlands Society for Scientific Research (NWO-ZonMw VENI grant 916.86.036 to Dr. van den Heuvel; NWO-ZonMw AGIKO stipend 920-03-542 to Dr. de Vries), and a NARSAD Young Investigators Award to Dr. van den Heuvel, Amsterdam Brain Imaging Platform to Dr. van den Heuvel, the Netherlands Brain Foundation (2010(1)-50 to Dr. van den Heuvel).

Publications related to the studies:

1. de Wit SJ, de Vries FE, van der Werf YD, Cath DC, Heslenfeld DJ, Veltman EM, van Balkom AJ, Veltman DJ, van den Heuvel OA. Presupplementary motor area hyperactivity during response inhibition: a candidate endophenotype of obsessive-compulsive disorder. Am J Psychiatry. 2012 Oct;169(10):1100-8.

2. de Vries FE, de Wit SJ, Cath DC, van der Werf YD, van der Borden V, van Rossum TB, van Balkom AJ, van der Wee NJ, Veltman DJ, van den Heuvel OA. Compensatory frontoparietal activity during working memory: an endophenotype of obsessive-compulsive disorder. Biol Psychiatry. 2014 Dec 1;76(11):878-87.

3. van Velzen LS, de Wit SJ, Ćurčić-Blake B, Cath DC, de Vries FE, Veltman DJ, van der Werf YD, van den Heuvel OA. Altered inhibition-related frontolimbic connectivity in obsessive-compulsive disorder. Hum Brain Mapp. 2015 Oct;36(10):4064-75.

4. de Wit SJ, van der Werf YD, Mataix-Cols D, Trujillo JP, van Oppen P, Veltman DJ, van den Heuvel OA. Emotion regulation before and after transcranial magnetic stimulation in obsessive compulsive disorder. Psychol Med. 2015 Oct;45(14):3059-73.

5. Fan S, van den Heuvel OA, Cath DC, van der Werf YD, de Wit SJ, de Vries FE, Veltman DJ, Pouwels PJ. Mild White Matter Changes in Un-medicated Obsessive-Compulsive Disorder Patients and Their Unaffected Siblings. Front Neurosci. 2016 Jan 11;9:495.

2. Handedness Assessment Information

Edinburgh handedness inventory

3. Image Scanning and Data analysis

MRI data were acquired with a 3 Tesla GE Signa HDxt scanner. The parameters used matrix 256x256, 172 slices and, voxel size 1x0.977x0.977mm. Images were processed with FreeSurfer version 5.3.

01_Cheng_3T

Project Name: Cheng Yuqi (**OCD_Cheng_3T**)

1. Brief introduction, funding with ethical standards

The database was established in Kunming in 2010. This resource was approved by the ethics committee of the First Affiliated Hospital of Kunming Medical University. This study was supported by grants from National Natural Science Foundation of China (NSFC) (81101005,), the Ministry of Science and Technology of Yunnan Province(2012FB158), the Funding of Yunnan Provincial Health Science and Technology Plan (2014NS171, 2014NS172), the united founding of Yunnan Administration of Science & Technology and Kunming Medical College(2011FB167).

2. Handedness Assessment Information

Self report confirmed by Edinburgh Handedness Inventory

3. Image Scanning and Data analysis

MRI data were acquired with a 3 Tesla Philips Achieva scanner. The parameters used were matrix matrix 228 x 228, 230 slices and, voxel size 1.1 x 1.1 x 0.6 mm^3. Images were processed with FreeSurfer version 5.3.

UMCG_sample_groenewold

Project Name: **DIP GRONINGEN**

1. Brief introduction, funding with ethical standards

DIP was conducted in Groningen, the Netherlands between 2012 and 2014. Data collection for DIP, as contributed to ENIGMA projects, was funded by the Gratama Foundation, the Netherlands. The Medical Ethical Committee of the University Medical Center Groningen approved of the DIP study.

2. Handedness Assessment Information

Self-report

3. Image Scanning and Data analysis

MRI data in DIP were acquired with a 3 Tesla Philips Intera scanner (Best, the Netherlands). A 3D gradient-echo T1-weighted sequence was acquired (170 slices; TR=9ms; TE=3.6ms; matrix=256x231; voxel size=1.0x1.0x1.0mm; scan duration=4:11min.) FreeSurfer version 5.3 was used for processing.

Sjoerds

Project Name: NESDA-AD (**Addiction_NESDA-AD**)

Zsuzsika Sjoerds & Dick J. Veltman

1. Brief introduction, funding with ethical standards

In this study we examined the neural correlates of cognitive control and habit formation in alcohol dependent patients compared with healthy controls.

ZS & DV received funding for the NESDA-AD study from ZonMW grant no. 31160004 from the Netherlands Organization for Scientific Research (NWO).

The VU University Medical Center Ethical Review Board approved this study, and written informed consent according to the declaration of Helsinki was obtained from all participants prior to study.

2. Handedness Assessment Information

The Dutch questionnaire for handedness (Van Strien, 1992).

Van Strien, J.W. (1992). Classificatie van links- en rechtshandige proefpersonen. Nederlands Tijdschrift voor de Psychologie en Haar Grensgebieden, 47, 88-92.

3. Image Scanning and Data analysis

3T, Gradient Echo, TR=9ms, TE 3.6 ms, flip angle=8˚, matrix= 256x231x170, voxel size=1x1x1mm^3

Schmaal

Dataset Name: **Addiction_TrIp**

Project Name: TrIP study

Lianne Schmaal, Dick Veltman

1. Brief introduction, funding with ethical standards

The main aim of the neuroimaging substudies of the TrIP study was to identify neurobiological mechanisms underlying a single dose administration of the modafinil and N-acetylcysteine in alcohol and substance use dependent individuals.

LS & DV received funding for the TrIP study from ZonMW grant no. 31160003 from the Netherlands Organization for Scientific Research (NWO).

2. Handedness Assessment Information

Self-report

3. Image Scanning and Data analysis

3T, Gradient Echo, TR=9ms, TE=3.5ms, flip angle=8˚, matrix=256x256x170, voxel size=1x1x1mm^3

Affiliations Lianne:

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2 Centre for Youth Mental Health, The University of Melbourne, Melbourne, Australia.

3 Department of Psychiatry, Amsterdam Neuroscience, VU University Medical Center, Amsterdam, The Netherlands

OLDERS

Project Name: Gene-Brain-Behavior (GBB) Project (**GBB_OLDERS**)

1. Brief introduction, funding with ethical standards

The Gene-Brain-Behavior（GBB）Project was initiated in Southwest University in 2011, which is an ongoing project exploring the associations among individual differences in brain structure and function, creativity, and mental health. The project was approved by the Southwest University Brain Imaging Center Institutional Review Board, and written informed consent was obtained from each subject. Participants received payment depending on time and tasks completed.This research was supported by the National Natural Science Foundation of China (31271087; 31470981; 31571137; 31500885), National Outstanding young people plan, the Program for the Top Young Talents by Chongqing, the Fundamental Research Funds for the Central Universities (SWU1509383,SWU1509451), Natural Science Foundation of Chongqing (cstc2015jcyjA10106), Fok Ying Tung Education Foundation (151023) , General Financial Grant from the China Postdoctoral Science Foundation (2015M572423, 2015M580767), Special Funds from the Chongqing Postdoctoral Science Foundation (Xm2015037), Key research for Humanities and social sciences of Ministry of Education(14JJD880009).

2. Handedness Assessment Information

Part of subjects were confirmed by Edinburgh Handedness Inventory, and the rest were confirmed by self report.

3. Image Scanning and Data analysis

Imaging data were collected using an 8-channel head coil on a Siemens 3T Trio scanner (Siemens Medical Systems, Erlangen, Germany) at the Brain Imaging Center, Southwest University. The same scanner and sequences were used at both time points. High-resolution, three-dimensional T1-weighted structural images were obtained using a Magnetization Prepared Rapid Acquisition Gradient-echo (MPRAGE) sequence (TR/TE =1900 ms/2.52 ms, FA = 9 degrees, FOV= 256 × 256 mm^2; slices = 176; thickness = 1.0 mm; voxel size = 1×1×1 mm^3). FreeSurfer version 5.3 was used

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SHIP-2

Project Name: Study of Health in Pomerania (**SHIP**)

1. Brief introduction, funding with ethical standards

SHIP is a general population based sample. The target population was comprised of adult German residents (20-79 years in 1997-2001) in northeastern Germany living in 3 cities and 29 communities, with a total population of 212,157. The net sample comprised 6,267 eligible subjects, of which 4,308 Caucasian subjects participated in SHIP-0. Follow-up examination (SHIP-1) was conducted 5 years after baseline (2002-2006) and included 3300 subjects. From 2008 to 2012 the third phase of data collection (SHIP-2, N=2333) was carried out.

The SHIP study was approved by the ethics committee of the University of Greifswald. Written informed consent was obtained from all participants.

SHIP is part of the Community Medicine Research net of the University of Greifswald, Germany, which is funded by the Federal Ministry of Education and Research (grants no. 01ZZ9603, 01ZZ0103, and 01ZZ0403), the Ministry of Cultural Affairs and the Social Ministry of the Federal State of Mecklenburg-West Pomerania. MRI scans in SHIP have been supported by a joint grant from Siemens Healthineers, Erlangen, Germany and the Federal State of Mecklenburg-West Pomerania.

2. Handedness Assessment Information

Self-report

3. Image Scanning and Data analysis

Subjects from SHIP-2 were asked to participate in a whole-body magnetic resonance imaging (MRI) assessment. After exclusion of subjects who refused participation or who fulfilled exclusion criteria for MRI (e.g. cardiac pacemaker) 1163 subjects from SHIP-2 underwent the MRI scanning.

Image Acquisition: All images were obtained using the same 1.5 T Siemens MRI scanner (Magnetom Avanto, Siemens Medical Systems, Erlangen, Germany) with a T1-weighted magnetization prepared rapid acquisition gradient echo (MPRAGE) sequence and following parameters: axial plane, TR=1900 ms, TE=3.4 ms and Flip angle=15° and an original resolution of 1.0 x 1.0 x 1.0mm^3.

FreeSurfer version 5.3 was used.

NicolaOATS

Project Name: **OATS**

1. Brief introduction, funding with ethical standards

Participants in the Older Australian Twins Study (OATS) were aged 65 years and over, and were recruited from the Twins Research Australia and through a recruitment drive. Inclusion criteria included an ability to consent, a co-twin who consented to participate, completion of some education in English and at least a low average IQ. Exclusion criteria included inadequate English to complete the assessment and/or a current diagnosis of an acute psychosis. More details can be found in Sachdev et al. (2009).

OATS was approved by the appropriate ethics committees of the Twins Research Australia, University of New South Wales, University of Melbourne, Queensland Institute of Medical Research and the South Eastern Sydney and Illawarra Area Health Service. All participants provided written informed consent.

We would like to acknowledge and thank the OATS participants, their supporters and the OATS Research Team. OATS is supported by a National Health and Medical Research Council (NHMRC)/Australian Research Council Strategic Award (Grant 401162) and the NHMRC Project Grant (1045325). OATS was facilitated through access to the Australian Twin Registry, which is funded by the NHMRC Enabling Grant 310667.

2. Handedness Assessment Information

Self reported.

3. Image Scanning and Data analysis

Participants were invited to undergo a brain MRI scan. A total of 414 individuals underwent a MRI brain scan after excluding participants due to contraindications.

MRI data were obtained on three 1.5 Tesla scanners and a 3 Tesla scanner owing to the multi-site nature of this study. Siemens Magnetom Avanto and Sonata scanners (Siemens Medical Solutions, Malvern PA, USA) with similar years of manufacture and upgrade were used in centres 2 and 3, respectively. In centre 1, a 1.5 T Philips Gyroscan scanner (Philips Medical Systems, Best, Netherlands) was used initially, followed by a 3 Tesla Philips Achieva Quasar Dual scanner. See (Wen et al for details) 3D T1-weighted volumetric sequence was performed using a similar protocol for the 1.5 Tesla scanners in the three centres with in-plane resolution = 1×1 mm, slice thickness = 1.5 mm, slice number =144, TR (Repetition time) = 1530 ms, TE (Echo time) = 3.24 ms, TI (Inversion time) = 780 ms, and flip angle = 8. The acquisition parameters for the 3 Tesla Philips scanner in centre 1 were: TR/TE = 6.39/2.9 ms, in-plane resolution = 1×1 mm, slice thickness = 1 mm, slice number =190, resulting isotropic voxels of $1\times1\times1$ mm^3. Two 3D T1-weighted scans were acquired for each participant for an increased signal-to-noise ratio (SNR).

FreeSurfer version 5.3.0 was used.

References

Sachdev PS, Lammel A, Trollor JN, Lee T, Wright MJ, Ames D, Wen W, Martin NG, Brodaty H, Schofield PR; OATS research team. (2009). A Comprehensive Neuropsychiatric Study of Elderly Twins:The Older Australian Twins Study.Twin Res Hum Genet 12 (6) 573-582

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NicolaMAS

Project Name: **MAS**

1. Brief introduction, funding with ethical standards

Sydney Memory and Ageing Study (Sydney MAS) is a community-based longitudinal study of older adults aged 70-90 years living in Sydney, Australia. Briefly, 1037 non-demented community-dwelling participants were randomly recruited from the compulsory electoral rolls of two regions in Sydney, Australia. Inclusion criteria included sufficient English to complete the assessment. Exclusion criteria included psychotic symptoms or inability to complete the assessment due to a medical or psychological condition. More details can be found in Sachdev et al (2010).

Sydney MAS was approved by the Human Research Ethics Committees of the University of New South Wales and the South Eastern Sydney Local Health District. All participants gave written informed consent.

We would like to acknowledge and thank the Sydney MAS participants, their supporters and the Sydney MAS Research Team. Sydney MAS is supported by the National Health and Medical Research Council (NHMRC) Program Grants (350833, 56896, 109308).

2. Handedness Assessment Information

Self-reported.

3. Image Scanning and Data analysis

Participants were invited to undergo a brain MRI scan. A total of 542 individuals underwent a MRI brain scan after excluding participants due to contraindications. Participants were scanned using either a Philips 3T Intera Quasar scanner (Philips Medical Systems, Netherlands) or a Philips 3T Achieva Quasar Dual scanner. For further details see Jiang et al. 2013. Acquisition parameters for T1-weighted structural MRI scans were the same for both scanners: TR = 6.39 ms, TE = 2.9 ms, flip angle = 8°, matrix size = 256x256, FOV = 256x256x190, and slice thickness = 1 mm with no gap between; yielding 1x1x1 mm^3 isotropic voxels. FreeSurfer version 5.3.0 was used.

References

Jiang J, Sachdev P, Lipnicki DM, Zhang H, Liu T, et al. (2013) A longitudinal study of brain atrophy over two years in community-dwelling older individuals. NeuroImage 10.1016/j.neuroimage.2013.08.022.

Sachdev, P.S., Brodaty, H., Reppermund, S., Kochan, N.A., Trollor, J.N., Draper, B., Slavin, M.J., Crawford, J., Kang, K., Broe, G.A., Mather, K.A., Lux, O.; Memory and Ageing Study Team. (2010). The Sydney Memory and Ageing Study (MAS): methodology and baseline medical and neuropsychiatric characteristics of an elderly epidemiological non-demented cohort of Australians aged 70-90 years. Int Psychogeriatr Dec;22(8):1248-64.

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LBC1936

Project Name: **Lothian Birth Cohort of 1936**

1. Brief introduction, funding with ethical standards

The Lothian Birth Cohort of 1936 (LBC1936) were born in 1936, lived independently in the Lothian region of Scotland, and most had participated in the Scottish Mental Survey of 1947. They were assessed on cognitive and medical measures at age 70 years (n=1,091), and again with brain imaging traits at 73 years of age (n=866). (Deary et al, 2007, Wardlaw et al 2011). The study was approved by the Lothian (REC 07/MRE00/58) and Scottish Multicentre (MREC/01/0/56) Research Ethics Committees and all subjects give written informed consent. Data collection was supported by the Disconnected Mind project, funded by Age UK. J.M.W. is partly funded by the Scottish Funding Council as part of the SINAPSE Collaboration. The work was undertaken by The University of Edinburgh Centre for Cognitive Ageing and Cognitive Epidemiology, part of the cross-council Lifelong Health and Wellbeing Initiative (MR/K026992/1). Funding from the Biotechnology and Biological Sciences Research Council (BBSRC) and MRC is gratefully acknowledged. We thank the study participants. We also thank Catherine Murray for recruitment of the participants and the radiographers and other staff at the Brain Research Imaging Centre.

Refs:

Deary, I.J., Gow, A.J., Taylor, M.D., Corley, J., Brett, C., Wilson, V., Campbell, H., Whalley, L.J., Visscher, P.M., Porteous, D.J. Starr, J.M.. The Lothian Birth Cohort 1936: a study to examine influences on cognitive ageing from age 11 to age 70 and beyond. BMC Geriatr 7, 28 (2007). PMID 18053258

Wardlaw, J. M., Bastin, M. E., Valdes Hernandez, M. C., Munoz maniega, S., Royle, N. A., Morris, Z., Claysden, J. D., Sandeman, E. M., Eadie, E., Murray, C., Starr, J. M., & Deary, I. J. (2011). Brain ageing, cognition in youth and old age, and vascular disease in the Lothian Birth Cohort 1936: rationale, design and methodology of the imaging protocol. International Journal of Stroke, 6, 547-559.

2. Handedness Assessment Information

Writing hand.

3. Image Scanning and Data analysis

LBC1936 brain MRI data were acquired at the University of Edinburgh's Brain Research Imaging Centre using a GE Signa Horizon HDx 1.5T clinical scanner, with a self-shielding gradient set (33 mT/m maximum gradient strength), and a manufacturer-supplied eight-channel phased-array head coil. T1-, T2-, T2* and FLAIR-weighted structural scans were acquired for each participant. Each T1-weighted scan was acquired in the coronal plane using a three-dimensional inversion-recovery-prepared fast-spoiled gradient-echo sequence. Volumes comprised 160 1.3 mm thick slices with a resolution of 1 mm^2 and a 256 mm^2 field of view, covering the complete intracranial contents. Cortical parcellation was performed using FreeSurfer 5.1, and output was visually quality checked and manually edited.

Ref:

Wardlaw JM, Bastin ME, Valdes Hernandez MC, et al. Brain aging, cognition in youth and old age and vascular disease in the Lothian Birth Cohort 1936: rationale, design and methodology of the imaging protocol. International journal of stroke : official journal of the International Stroke Society 2011;6:547-559.

FIDMAG

1. Brief introduction, funding with ethical standards

Healthy individuals were recruited from non-medical staff working in the hospital, their relatives and acquaintances, plus independent sources in the community, in order to be included in healthy control groups of several studies of specific disorders such as schizophrenia or ADHD (see some references below).

Participants were questioned following a structured format and were excluded if they reported a history of mental illness, history of major mental illness in a first-degree relative and/or treatment with psychotropic medication apart from non-habitual use of anxiolytics/hypnotics.

Written informed consent was obtained from all participants. All studies were approved by the local research ethics committee.

2. Handedness Assessment Information

Self report.

3. Image Scanning and Data analysis

MRI data were acquired with the same 1.5-T GE Signa scanner using the same T1-weighted sequence with the following parameters: 180 axial slices, 1 mm slice thickness with no gap, 512×512 matrix size, 0.5×0.5×1 mm^3 voxel resolution, 4 ms echo time, 2000 ms repetition time, 15° flip angle. FreeSurfer version 5.3 was used.

References

- Landin-Romero R, Amann BL, Sarro S, et al. Midline Brain Abnormalities Across Psychotic and Mood Disorders. *Schizophr Bull.* 2016;42(1):229-238.
- Landin-Romero R, Sarro S, Fernandez-Corcuera P, et al. Prevalence of cavum vergae in psychosis and mood spectrum disorders. *J Affect Disord.* 2015;186:53-57.
- Moreno-Alcazar A, Ramos-Quiroga JA, Radua J, et al. Brain abnormalities in adults with Attention Deficit Hyperactivity Disorder revealed by voxel-based morphometry. *Psychiatry Res.* 2016;254:41-47.
- Radua J, Canales-Rodriguez EJ, Pomarol-Clotet E, Salvador R. Validity of modulation and optimal settings for advanced voxel-based morphometry. *Neuroimage.* 2014;86:81-90.
- Vicens V, Radua J, Salvador R, et al. Structural and functional brain changes in delusional disorder. *Br J Psychiatry.* 2016;208(2):153-159.

ACPU

Project Name: ADHD_ACPU

1. Brief introduction, funding with ethical standards
Typically developing male control participants were recruited through local schools and had no known current or previous psychiatric or neurological conditions. All participants/parents gave written informed consent. Approval was obtained from the Human Research Ethics Committee at the Royal Children's Hospital.
2. Handedness Assessment Information
Edinburgh Handedness Questionnaire or a subtest of the Scored Developmental Neurological Examination
3. Image Scanning and Data analysis
Neuroimaging data were collected from a single-site on a research-dedicated 3-Tesla Siemens TIM Trio MRI scanner (Siemens, Erlangen, Germany) at the Murdoch Childrens Research Institute, The Royal Children's Hospital, Melbourne. Using a 32-channel head coil a structural T1-weighted image acquire: TR = 1900 ms, flip angle 90°, FoV = 208*230, 232*256*192 matrix, slice thickness = 1.0 mm and inplane pixels = 0.9 *0.9 mm2. Images were processed with FreeSurfer version 5.3.0.

NICAP

Project Name: ADHD_NICAP

1. Brief introduction, funding with ethical standards

This sample of typically developing children were recruited as a part of the Neuroimaging of the Children's Attention Project (see Silk, et al. (2016) for a detailed protocol). The NICAP cohort is a community-based sample aged 9-11years recruited from 43 socio-economically diverse primary schools across Melbourne, Australia. The study was funded by the National Medical Health and Research Council of Australia (NHMRC; project grant #1065895). The Human Research Ethics Committee of the Royal Children's Hospital, Melbourne approved present study procedures (#34071), and parents/guardians of all participants provided written informed consent.

2. Handedness Assessment Information

Self report.

3. Image Scanning and Data analysis

Neuroimaging data were collected from a single-site on a research-dedicated 3-Tesla Siemens TIM Trio MRI scanner (Siemens, Erlangen, Germany) at the Murdoch Childrens Research Institute, The Royal Children's Hospital, Melbourne. Using a 32-channel head coil, participants undertook a 45min neuroimaging protocol which included a structural T1-weighted image acquired using a modified three-dimensional multi-echo magnetization-prepared rapid gradient-echo imaging (MEMPRAGE; TR = 2530ms, TEs = 1.77, 3.51, 5.32, 7.20 ms, flip angle 70, voxel size = 0.9mm3) incorporating navigator based prospective motion correction (MoCo). Images were processed with FreeSurfer version 5.3.0.

ADHD_Dundee

Dataset Name: **ADHD_Dundee**

Project Name: iBOCA

David Coghill, Blair Johnston, Douglas Steele

1. Brief introduction, funding with ethical standards

This study investigated structural and functional brain alterations in young people aged 10 - 18 years with ADHD as compared to healthy controls. The main aims of the study were to investigate dopamine functioning as look for predictors of response to treatment. The study was funded by an Anonymous Trust and received approval from the local NHS Ethics Committee.

2. Handedness Assessment Information

Self-report.

3. Image Scanning and Data analysis

The scans were collected at a single site (Ninewells Hospital Dundee) on a 3T Siemens Magnetom TrioTim syngo scanner, T1-weighted MP-RAGE anatomical scan with the following parameters: TR = 1900 ms, TE = 2.64 ms, flip angle = 9°, FOV = 200 mm, matrix = 256 x 256, 176 slices, voxel size 0.8x0.8x1 mm, slice thickness 1 mm

ADHD WUE

Dataset Name: **ADHD_Wuerzburg**

Project Name: ADHDEmotion

Annette Conzelmann, Paul Pauli, Georg Ziegler, Ramona Baur, Andreas Reif, Kathrin Zierhut, Klaus-Peter-Lesch

1. Brief introduction, funding with ethical standards

This study investigated structural and functional brain alterations in adults with ADHD as compared to healthy controls. It was funded by the DFG and received approval from the local Ethics Committee.

2. Handedness Assessment Information

Self-report.

3. Image Scanning and Data analysis

1,5T Siemens Magnetom Avanto; MPRAGE; TR = 2250 ms; TE = 3.93 ms; flip angle 8˚ ;slices 160; FoV 256; voxel size=1x1x1mm^3 . Freesurfer 5.3 was used.

GOBS

Dataset Name: **GOBS**

Project Name: Genetics of Brain Structure

1. Brief introduction, funding with ethical standards

GOBS subjects were recruited from two preceding studies: the San Antonio Family Heart Study and the San Antonio Family Gallbladder Study. GOBS is a family study comprising 1,443 individuals with MRI data (836 females), aged between 18 and 85 years at the time of scanning. All GOBS subjects are Mexican Americans and belong to pedigrees of varying sizes (the largest pedigree has 143 members).

2. Handedness Assessment Information

Inapplicable.

3. Image Scanning and Data analysis

All images were acquired on a Siemens 3 T TIM Treo MR scanner and a high-resolution phase array head coil housed in the Research Imaging Institute, UTHSCSA. Images for gray matter analyses included seven high-resolution T1-weighted 3D turbo-flash sequences with an adiabatic inversion contrast pulse and the following parameters: TE/TR/TI=3.04/2100/785 ms, flip angle=13°, 800 μm isotropic resolution, 200 mm FOV, 5-min duration (35-min total).

HCP

Dataset Name: **HCP**

Project Name: Human Connectome Project

1. Brief introduction, funding with ethical standards

The Human Connectome Project (HCP) was an ambitious 5-year effort to characterize brain connectivity and function and their variability in healthy adults. Participants were drawn from the May 2017 public data release from the HCP (S1200). The HCP is a large-scale project comprising 1,113 individuals with MRI data (606 females, age range 22-37 years at the time of scanning) of varying ethnicities (http://humanconnectome.org/). The HCP contains 143 monozygotic twin pairs and 85 dizygotic twin pairs, as well as unrelated individuals.

2. Handedness Assessment Information

Inapplicable.

3. Image Scanning and Data analysis

Images were acquired using a customized Siemens Skyra 3-T scanner with a 32-channel head coil. For details on data acquisition and preprocessing, see Glasser et al. (2013).

Glasser, M. F. et al. The minimal preprocessing pipelines for the Human Connectome Project. Neuroimage 80, 105–124 (2013).

Acknowledgements

ENIGMA Center. P.M.T., N.J., and D.P.H. were supported in part by a grant from the NIH Big Data to Knowledge (BD2K) Program (U54 EB020403).

Addiction_Cousijn. This study investigated the predictive role of neurocognitive functions in the progression from cannabis use to dependence in at-risk young adults. JC & AG received funding for the Cannabis Prospective study from ZonMW grant no.31180002 from the Netherlands Organization for Scientific Research (NWO)

Addiction_DStein. The Meth-CT studies investigate structural and functional brain alterations in methamphetamine-dependent individuals compared to healthy controls, and the neural underpinnings of psychotic symptoms. Research was supported by the Department of Psychiatry and Mental Health and the Human Research Ethics Committee, University of Cape Town, and the Medical Research Council, South Africa.

Addiction_EStein. Data collection was supported by the Intramural Research Program of NIDA/NIH.

Addiction_Foxe. These projects studied cognitive control and reward processing in current and abstinent cocaine users. HG & JF received funds from NIDA: R01-DA014100

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The ENIGMA co-authors declare no conflicts of interest except for the authors below:

Theo Van Erp consulted for Roche Pharmaceuticals and has a contract with Otsuka Pharmaceutical, Ltd.

Anders Dale is a Founder of CorTechs Labs, Inc. He serves on the Scientific Advisory Boards of CorTechs Labs and Human Longevity, Inc., and receives research funding through a Research Agreement with General Electric Healthcare.

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Paulo Mattos was on the speakers' bureau and/or acted as consultant for Janssen-Cilag, Novartis, and Shire in the previous five years; he also received travel awards to participate in scientific meetings from those companies. The ADHD outpatient program (Grupo de Estudos do Déficit de Atenção/Institute of Psychiatry) chaired by Dr. Mattos has also received research support from Novartis and Shire.The funding sources had no role in the design and conduct of the study; collection, management, analysis, or interpretation of the data; or preparation, review, or approval of the manuscript.

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Dr. Biederman's program has received departmental royalties from a copyrighted rating scale used for ADHD diagnoses, paid by Ingenix, Prophase, Shire, Bracket Global, Sunovion, and Theravance; these royalties were paid to the Department of Psychiatry at MGH.

In 2017, Dr. Biederman is a consultant for Aevi Genomics, Akili, Guidepoint, Ironshore, Medgenics, and Piper Jaffray. He is on the scientific advisory board for Alcobra and Shire. He received honoraria from the MGH Psychiatry Academy for tuition-funded CME courses. Through MGH corporate licensing, he has a US Patent (#14/027,676) for a non-stimulant treatment for ADHD, and a patent pending (#61/233,686) on a method to prevent stimulant abuse.

In 2016, Dr. Biederman received honoraria from the MGH Psychiatry Academy for tuition-funded CME courses, and from Alcobra and APSARD. He was on the scientific advisory board for Arbor Pharmaceuticals. He was a consultant for Akili and Medgenics. He received research support from Merck and SPRITES.

In 2015, Dr. Biederman received honoraria from the MGH Psychiatry Academy for tuition-funded CME courses, and from Avekshan. He received research support from Ironshore, Magceutics Inc., and Vaya Pharma/Enzymotec.

In 2014, Dr. Biederman received honoraria from the MGH Psychiatry Academy for tuition-funded CME courses. He received research support from AACAP, Alcobra, Forest Research Institute, and Shire Pharmaceuticals Inc.

In previous years, Dr. Biederman received research support, consultation fees, or speaker's fees for/from the following additional sources: Abbott, Alza, APSARD, AstraZeneca, Boston University, Bristol Myers Squibb, Cambridge University Press, Celltech, Cephalon, The Children's Hospital of Southwest Florida/Lee Memorial Health System, Cipher Pharmaceuticals Inc., Eli Lilly and Co., Esai, ElMindA, Fundacion Areces (Spain), Forest, Fundación Dr.Manuel Camelo A.C., Glaxo, Gliatech, Hastings Center, Janssen, Juste Pharmaceutical Spain, McNeil, Medice Pharmaceuticals (Germany), Merck, MGH Psychiatry Academy, MMC Pediatric, NARSAD, NIDA, New River, NICHD, NIMH, Novartis, Noven, Neurosearch, Organon, Otsuka, Pfizer, Pharmacia, Phase V Communications, Physicians Academy, The Prechter Foundation, Quantia Communications, Reed Exhibitions, Shionogi Pharma Inc, Shire, the Spanish Child Psychiatry Association, The Stanley Foundation, UCB Pharma Inc., Veritas, and Wyeth.

Henry Brodaty is on the Advisory Board for Nutricia and has conducted an Alzheimer's drug trial for Tau Therapeutics.