**RESULTS**

**VBM Analysis**

 In tables S1 to S4 the differences between the groups are presented.

Table S1. Differences in gray matter volume derived from Control > PANDAS contrast.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **MNI coordinates** |  |  |
| **Lobe** | **Gyrus** | **Side** | **BA** | **Rangea** | **K** | **X** | **Y** | **Z** | **Z-value** | **P** |
| *Frontal* |  |  |  |  |  |  |  |  |  |  |
|  | Middle | Left | 10 | 1 | 1291 | -39 | 51 | 7.5 | 4.41516668 | 5.0466E-06 |
|  | Superior | Left | 10 | 0 |  | -33 | 61.5 | 9 | 4.3357907 | 7.2619E-06 |
|  | Middle  | Left | 46 | 0 |  | -46.5 | 46.5 | 10.5 | 3.71005237 | 0.00010361 |
|  | Inferior | Right | 45 | 3 | 469 | 46.5 | 28.5 | 10.5 | 4.07212982 | 2.3293E-05 |
|  | Superior | Right | 10 | 2 | 876 | 42 | 58.5 | 6 | 3.50508907 | 0.00022823 |
|  | Middle | Right | 10 | 1 |  | 31.5 | 64.5 | 3 | 3.32265241 | 0.00044583 |
|  | Middle | Right | 9 | 3 |  | 31.5 | 45 | 16.5 | 3.24879927 | 0.00057947 |
|  | Superior | Right | 8 | 1 | 18 | 18 | 51 | 46.5 | 2.9029998 | 0.00184803 |
|  | Medial | Right | 10 | 0 | 61 | 6 | 69 | -16.5 | 2.88531052 | 0.00195514 |
| *Temporal* |  |  |  |  |  |  |  |  |  |  |
|  | Inferior | Right | 37 | 0 | 255 | 54 | -42 | -22.5 | 3.29564354 | 0.00049098 |
|  | Fusiform | Left | 37 | 1 | 50 | -49.5 | -61.5 | -13.5 | 3.01661568 | 0.00127807 |
| *Occipital* |  |  |  |  |  |  |  |  |  |  |
|  | Middle Temporal | Right | 19 | 3 | 99 | 46.5 | -64.5 | 18 | 4.10888154 | 1.9879E-05 |
|  | Middle | Left | 19 | 0 | 45 | -39 | -84 | 12 | 3.0557693 | 0.00112242 |
|  | Middle Temporal | Right | 37 | 5 | 80 | 40.5 | -61.5 | 6 | 3.01400123 | 0.00128913 |
|  | Cuneus | Left | 17 | 2 | 39 | -19.5 | -91.5 | 16.5 | 2.97074379 | 0.0014854 |
|  | Inferiorl | Left | 18 | 1 | 54 | -42 | -91.5 | -4.5 | 2.78413139 | 0.00268356 |
|  | Fusiform | Left | 18 | 1 | 21 | -21 | -96 | -9 | 2.70393141 | 0.00342622 |
| *Limbic* |  |  |  |  |  |  |  |  |  |  |
|  | Posterior Cingulate | Right | 23 | 0 | 369 | 7.5 | -28.5 | 27 | 4.07510279 | 2.2997E-05 |
|  | Parahippocampal | Right | 36 | 0 | 133 | 33 | -25.5 | -31.5 | 3.17973091 | 0.00073706 |
| *Cerebellum* |  |  |  |  |  |  |  |  |  |  |
| *Anterior* | Culmen | Right | --- | 1 | 25 | 3 | -52.5 | -24 | 2.75477368 | 0.00293664 |
|  | Culmen | Left | --- | 0 | 18 | -12 | -42 | -24 | 2.63085801 | 0.00425848 |
| *Posterior* | Cerebellar Tonsil | Left | --- | 0 | 393 | -30 | -67.5 | -45 | 3.42962654 | 0.00030221 |
|  | Inferior Semi-Lunar Lobule | Right | --- | 0 | 101 | 22.5 | -69 | -45 | 2.94699036 | 0.00160442 |

a Distance to nearest gray matter in mm. BA=Brodmann Area. K=cluster size.

Table S2. Differences in gray matter volume derived from PANDAS > Control contrast.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **MNI coordinates** |  |  |
| **Lobe** | **Gyrus** | **Side** | **BA** | **Rangea** | **K** | **X** | **Y** | **Z** | **Z-value** | **P** |
| *Frontal* |  |  |  |  |  |  |  |  |  |  |
|  | Middle | Right | 6 | 0 | 422 | 28.5 | -3 | 61.5 | 4.43270898 | 4.6528E-06 |
|  | Medial | Right | 6 | 1 |  | 18 | -9 | 54 | 3.33793493 | 0.00042202 |
|  | Middle | Right | 6 | 1 |  | 36 | 7.5 | 58.5 | 3.19940284 | 0.00068856 |
|  | Paracentral | Right | 31 | 1 |  | 4.5 | -6 | 45 | 2.88822999 | 0.00193708 |
|  | Medial | Right | 6 | 1 | 54 | 6 | -1.5 | 66 | 3.06433137 | 0.00109079 |
|  | Paracentral | Left | 5 | 2 | 26 | -18 | -31.5 | 51 | 2.93235433 | 0.00168201 |
|  | Middle | Right | 47 | 0 | 10 | 36 | 40.5 | -21 | 2.8914951 | 0.00191707 |
|  | Middle | Left | 9 | 1 | 19 | -34.5 | 42 | 34.5 | 2.81167039 | 0.00246425 |
|  | Precentral | Right | 4 | 0 | 22 | 64.5 | -13.5 | 40.5 | 2.74283688 | 0.00304555 |
|  | Middle | Left | 8 | 0 | 16 | -45 | 36 | 36 | 2.72199611 | 0.00324445 |
| *Parietal* |  |  |  |  |  |  |  |  |  |  |
|  | Postcentral | Left | 1 | 1 | 341 | -67.5 | -16.5 | 24 | 3.75810152 | 8.5604E-05 |
|  | Supramarginal | Left | 40 | 4 | 293 | -36 | -43.5 | 34.5 | 3.52860961 | 0.00020887 |
|  | Precuneus | Right | 7 | 0 | 171 | 7.5 | -39 | 48 | 3.50116159 | 0.00023162 |
|  | Superior | Left | 7 | 0 | 179 | -24 | -61.5 | 60 | 3.44456004 | 0.00028599 |
|  | Inferior | Right | 40 | 1 | 74 | 51 | -31.5 | 40.5 | 3.38177317 | 0.0003601 |
|  | Precuneus | Right | 7 | 3 | 99 | 25.5 | -67.5 | 37.5 | 3.19822554 | 0.00069138 |
|  | Precuneus | Left | 7 | 1 | 25 | -13.5 | -46.5 | 45 | 2.95530526 | 0.0015618 |
|  | Angular | Left | 39 | 5 | 48 | -27 | -55.5 | 40.5 | 2.87748464 | 0.0020043 |
|  | Postcentral | Right | 2 | 1 | 68 | 70.5 | -19.5 | 31.5 | 2.83123307 | 0.00231845 |
|  | Postcentral | Right | 1 | 0 | 51 | 60 | -10.5 | 51 | 2.78181401 | 0.0027028 |
|  | Precuneus | Left | 7 | 0 | 16 | -10.5 | -75 | 48 | 2.74629473 | 0.00301363 |
|  | Precuneus | Left | 7 | 2 | 11 | -18 | -69 | 42 | 2.6661228 | 0.00383658 |
| *Occipital* |  |  |  |  |  |  |  |  |  |  |
|  | Lingual | Left | 30 | 2 |  | 33 | -70.5 | -1.5 | 2.88698721 | 0.00194475 |
|  | Lingual | Right | 18 | 1 | 341 | -67.5 | -16.5 | 24 | 3.75810152 | 8.5604E-05 |
|  | Lingual | Right | 19 | 4 | 293 | -36 | -43.5 | 34.5 | 3.52860961 | 0.00020887 |
| *Limbic* |  |  |  |  |  |  |  |  |  |  |
|  | Parahippocampal | Right | 27 | 1 | 1959 | 18 | -33 | -4.5 | 4.16106031 | 1.5839E-05 |
|  | Parahippocampal | Right | 19 | 1 | 177 | 28.5 | -49.5 | -3 | 3.40632815 | 0.00032921 |
|  | Cingulate | Left | 24 | 2 | 545 | -7.5 | -12 | 46.5 | 3.26035537 | 0.00055636 |
|  | Cingulate | Left | 24 | 0 |  | -3 | -1.5 | 43.5 | 3.08661939 | 0.00101223 |
|  | Cingulate | Left | 32 | 1 | 207 | -4.5 | 24 | 30 | 3.24200656 | 0.00059346 |
|  | Posterior Cingulate | Left | 23 | 1 | 34 | 1.5 | -58.5 | 18 | 2.74516429 | 0.00302403 |
| *Sub-lobar* |  |  |  |  |  |  |  |  |  |  |
|  | Thalamus | Left | --- | 0 |  | -16.5 | -31.5 | 0 | 3.35194133 | 0.00040124 |
|  | Claustrum | Left | --- | 2 | 382 | -34.5 | -3 | -10.5 | 3.27065923 | 0.00053649 |
|  | Lentiform Nucleus | Left | Putamen | 0 |  | -30 | -6 | 0 | 3.12358952 | 0.0008933 |
|  | Thalamus | Left | --- | 5 | 332 | -1.5 | -1.5 | 16.5 | 3.16287601 | 0.00078109 |
|  | Thalamus | Right | --- | 0 |  | 10.5 | -7.5 | 15 | 2.92054202 | 0.00174712 |
|  | Lentiform Nucleus | Right | LateralGlobus Pallidus | 0 | 402 | 25.5 | -4.5 | -6 | 3.13154011 | 0.00086946 |
|  | Claustrum | Right | --- | 2 |  | 36 | -6 | -12 | 2.96010023 | 0.00153769 |
|  | Lentiform Nucleus | Right | Putamen | 0 |  | 31.5 | -6 | 0 | 2.89469225 | 0.00189765 |
|  | Insula | Right | 13 | 3 | 152 | 45 | 10.5 | 13.5 | 3.06399449 | 0.00109201 |
|  | Insula | Right | --- | 2 | 19 | 43.5 | 9 | -3 | 2.9785142 | 0.00144825 |
|  | Thalamus | Right | Pulvinar | 2 | 89 | 15 | -34.5 | 12 | 2.96759744 | 0.00150069 |
| *Cerebellum* |  |  |  |  |  |  |  |  |  |  |
| Anterior | Culmen | Left | --- | 0 | 279 | 0 | -60 | 0 | 3.13827235 | 0.00084973 |
|  | Culmen | Left | --- | 0 |  | -12 | -60 | -3 | 3.04483437 | 0.00116404 |
| Posterior  | Declive | Right | --- | 0 | 43 | 19.5 | -61.5 | -12 | 2.85257387 | 0.00216834 |
|  | Declive | Right | --- | 0 |  | 25.5 | -55.5 | -13.5 | 2.68068413 | 0.00367359 |

a Distance to nearest gray matter in mm. BA=Brodmann Area. K=cluster size.

Table S3. Differences in white matter volume derived from Control > PANDAS contrast.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **MNI coordinates** |  |  |
| **Lobe** | **Gyrus** | **Side** | **BA** | **Rangea** | **K** | **X** | **Y** | **Z** | **Z-value** | **P** |
| *Frontal* |  |  |  |  |  |  |  |  |  |  |
|  | Inferior | Right | 46 | 2 | 1330 | 18 | -34.5 | -1.5 | 4.60785167 | 2.0343E-06 |
|  | Middle | Right | 10 | 5 |  | 28.5 | -48 | 0 | 3.9543639 | 3.8369E-05 |
|  | Medial | Right | 10 | 1 |  | 34.5 | -36 | -7.5 | 3.26381923 | 0.00054961 |
|  | Superior | Right | 10 | 2 | 294 | -60 | -45 | 4.5 | 4.01012199 | 3.0344E-05 |
|  | Middle | Right | 8 | 1 |  | -60 | -36 | 0 | 3.50604489 | 0.00022741 |
|  | Superior | Left | 9 | 2 |  | -66 | -42 | -4.5 | 2.69453649 | 0.00352433 |
|  | Middle | Left | 6 | 0 | 1373 | -24 | -55.5 | 10.5 | 3.98481035 | 3.3767E-05 |
|  | Superior | Left | 9 | 5 |  | -15 | -34.5 | 0 | 3.88884302 | 5.0362E-05 |
| *Parietal*  |  |  |  |  |  |  |  |  |  |  |
|  | Superior | Left | 7 | 0 | 82 | -46.5 | -82.5 | 7.5 | 3.17458469 | 0.00075026 |
|  | Supramarginal | Left | 40 | 2 | 176 | 22.5 | 48 | -15 | 3.12360731 | 0.00089324 |
|  | Postcentral | Left | 1 | 3 |  | 19.5 | 55.5 | -10.5 | 2.82901823 | 0.00233455 |
|  | Postcentral | Right | 2 | 1 | 100 | 51 | -64.5 | 36 | 3.11130028 | 0.00093133 |
| *Temporal* |  |  |  |  |  |  |  |  |  |  |
|  | Middle | Left | 22 | 1 | 52 | -49.5 | -24 | 66 | 2.84962615 | 0.00218853 |
|  | Middle | Left | 22 | 3 | 28 | -13.5 | 61.5 | 18 | 2.81785894 | 0.00241725 |
|  | Middle | Left | 21 | 2 | 27 | -30 | 16.5 | 60 | 2.78806435 | 0.0026512 |
|  | Middle | Left | 19 | 1 | 32 | 42 | -30 | 69 | 2.78710284 | 0.00265908 |
|  | Middle | Left | 39 | 0 | 67 | -28.5 | -66 | -3 | 2.78482662 | 0.00267782 |
|  | Superior | Left | 39 | 0 |  | -30 | -78 | -6 | 2.74360892 | 0.00303839 |
|  | Middle | Right | 39 | 2 | 16 | -12 | 51 | 28.5 | 2.72303153 | 0.00323429 |
| *Occipital* |  |  |  |  |  |  |  |  |  |  |
|  | Cuneus | Left | 30 | 5 | 81 | 49.5 | 33 | 1.5 | 3.19492131 | 0.00069934 |
|  | Middle | Left | 19 | 2 | 1092 | 36 | 34.5 | 15 | 3.18056299 | 0.00073495 |
|  | Fusiform | Left | 19 | 3 |  | 16.5 | 40.5 | 9 | 3.02318254 | 0.00125066 |
|  | Lingual | Left | 18 | 2 |  | 34.5 | 40.5 | 6 | 3.00114971 | 0.00134481 |
| *Limbic*  |  |  |  |  |  |  |  |  |  |  |
|  | Parahippocampal | Right | 27 | 1 |  | -25.5 | -48 | 1.5 | 3.16412692 | 0.00077774 |
|  | Parahippocampal | Right | 19 | 3 | 524 | -40.5 | -81 | 28.5 | 3.85949564 | 5.6811E-05 |
|  | Parahippocampal | Right | --- | 0 |  | -51 | -70.5 | 27 | 3.31949322 | 0.0004509 |
|  | Parahippocampal | Left | 30 | 3 |  | -30 | -79.5 | 15 | 2.98474723 | 0.00141906 |
|  | Parahippocampal | Left | 27 | 1 | 650 | -1.5 | -15 | 13.5 | 3.54637119 | 0.00019529 |
|  | Parahippocampal | Left | 19 | 3 |  | 4.5 | -4.5 | 18 | 3.20118728 | 0.00068431 |
|  | Anterior Cingulate | Right | 24 | 2 |  | 0 | 3 | 10.5 | 2.93570554 | 0.00166395 |
|  | Anterior Cingulate | Right | 32 | 1 | 33 | -54 | -58.5 | 33 | 3.42280128 | 0.0003099 |
|  | Parahippocampal | Left | 19 | 5 | 436 | 4.5 | 34.5 | 0 | 3.38743404 | 0.00035275 |
|  | Anterior Cingulate | Right | 32 | 0 | 42 | -34.5 | -51 | 64.5 | 3.24600544 | 0.00058518 |
| *Sub-lobar* |  |  |  |  |  |  |  |  |  |  |
|  | Thalamus | Left | MedialDorsalNucleus | 2 | 65 | -45 | -43.5 | 3 | 3.04603909 | 0.00115939 |
|  | Thalamus | Right | --- | 5 | 38 | -60 | -45 | 37.5 | 2.9807989 | 0.00143749 |
|  | Caudate | Left | CaudateBody | 4 | 153 | -39 | -25.5 | -7.5 | 2.97269004 | 0.00147601 |
|  | Caudate | Left | CaudateTail | 2 | 13 | 43.5 | 31.5 | 39 | 2.92552137 | 0.0017194 |

a Distance to nearest gray matter in mm. BA=Brodmann Area. K=cluster size.

Table S4. Differences in white matter volume derived from PANDAS > Control contrast.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **MNI coordinates** |  |  |
| **Lobe** | **Gyrus** | **Side** | **BA** | **Rangea** | **K** | **X** | **Y** | **Z** | **Z-value** | **P** |
| Frontal  |  |  |  |  |  |  |  |  |  |  |
|  | Sub-Gyral | Right  | 6 | 0 | 144 | 24 | 0 | 55.5 | 3.26057402 | 0.00055593 |
|  | Middle | Right  | 9 | 0 | 58 | 46.5 | 18 | 31.5 | 3.10105258 | 0.00096417 |
|  | Inferior  | Left  | 9 | 0 | 35 | -46.5 | 0 | 21 | 2.97015835 | 0.00148823 |
|  | Inferior | Right  | 47 | 0 | 20 | 15 | 22.5 | -28.5 | 2.78054527 | 0.00271338 |
|  | Precentral | Left  | 6 | 2 | 14 | -40.5 | -4.5 | 40.5 | 2.77959902 | 0.0027213 |
| Parietal |  |  |  |  |  |  |  |  |  |  |
|  | Postcentral | Left | 3 | 0 | 667 | -28.5 | -27 | 52.5 | 3.48911094 | 0.00024231 |
|  | Postcentral  | Left | 3 | 5 |  | -31.5 | -25.5 | 43.5 | 3.46944865 | 0.00026076 |
|  | Postcentral | Left  | 2 | 1 |  | -40.5 | -25.5 | 31.5 | 3.42020221 | 0.00031287 |
|  | Precuneus | Left | 7 | 0 | 27 | -3 | -70.5 | 46.5 | 2.96245237 | 0.001526 |
|  | Precuneus | Right | 31 | 1 | 12 | 28.5 | -75 | 28.5 | 2.74072605 | 0.00306518 |
| Temporal |  |  |  |  |  |  |  |  |  |  |
|  | Fusiform  | Right | 37 | 1 | 190 | 52.5 | -48 | -22.5 | 3.64708361 | 0.00013262 |
|  | Inferior | Right | 20 | 2 |  | 63 | -36 | -21 | 2.73343322 | 0.00313389 |
|  | Fusiform | Left | 37 | 0 | 70 | -49.5 | -60 | -16.5 | 3.56599042 | 0.00018124 |
|  | Fusiform | Right | 37 | 2 | 39 | 48 | -61.5 | -13.5 | 3.00506484 | 0.00132762 |
| Occipital |  |  |  |  |  |  |  |  |  |  |
|  | Precuneus | Left | 31 | 0 | 230 | -21 | -73.5 | 24 | 3.28004246 | 0.00051896 |
|  | Cuneus | Left | 17 | 3 |  | -24 | -79.5 | 19.5 | 3.09908419 | 0.0009706 |
|  | Middle | Left | 18 | 0 |  | -18 | -87 | 21 | 3.02280452 | 0.00125222 |
|  | Cuneus | Right | 18 | 0 | 25 | 4.5 | -97.5 | 9 | 2.9303372 | 0.00169297 |
| Limbic |  |  |  |  |  |  |  |  |  |  |
|  | Cingulate  | Right | 31 | 4 | 13 | 12 | -33 | 34.5 | 2.78951293 | 0.00263937 |
| Cerebellum |  |  |  |  |  |  |  |  |  |  |
| Anterior  | Culmen | Right | --- | 1 | 368 | 18 | -37.5 | -27 | 3.32952687 | 0.00043497 |
|  | --- | Left | --- | 0 | 67 | -9 | -43.5 | -28.5 | 2.84855786 | 0.00219589 |
|  | Culmen | Left | --- | 0 |  | -18 | -40.5 | -25.5 | 2.66052152 | 0.00390099 |
| Posterior | Declive | Right | --- | 2 | 278 | 33 | -82.5 | -12 | 4.35838602 | 6.5513E-06 |

a Distance to nearest gray matter in mm. BA=Brodmann Area. K=cluster size.

 Visual comparison of GPC analysis and VBM analysis of gray matter is presented in figure S1. First a mask of the neuroanatomical pattern of gray matter associated to the correct classification of patients was created (see Figure 4 in main text), this mask was used as inclusive in a re-run of VBM analysis to see if the neuroanatomical pattern of gray matter from the GPC analysis resembles the spatial distribution of increases or decreases of volume from the VBM analysis.



Figure S1. Visual comparison of GPC and VBM gray matter analysis. (a) up: Control > Early-onset OCD contrast without inclusive mask; bottom: Control > Early-onset OCD contrast with inclusive mask. (b) up: Early-onset OCD > Control contrast without inclusive mask; bottom: Early-onset OCD > Control contrast with inclusive mask.

 The results of the visual comparison of both analysis suggest that the neuroanatomical pattern derived from GPC analysis could be associated to a pattern of increases of volume of gray matter in the early-onset OCD group, this findings should be interpreted with caution since GPC and VBM analysis provide different information about the neuroanatomical features of the groups.

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