**Supplementary materials**

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**Supplementary Table 1: Distribution of antipsychotic medication types used.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | SCZ (n=56) | BPD (n=31) | All patients (n=87) |
| *SGA* |  |  |  |
| Olanzapine (N05AH03) | 26 (46%) | 4 (13%) | 31 (35%) |
| Aripiprazole (N05AX12) | 17 30%) | 11 (35%) | 28 (32%) |
| Quetiapine (N05AH04) | 5 (9%) | 13 (42%) | 18 (20%) |
| Risperidone (N05AX08) | 9 (16%) | 2 (6%) | 11 (13%) |
| Paliperidone (N05AX13) | 8 (14%) | 1 (3%) | 9 (10%) |
| Ziprazidone (N05AE04) | 3 (5%) | 0 (0%) | 3 (3%) |
| Clozapine (N05AH02) | 2 (3%) | 0 (0%) | 2 (2%) |
|  |  |  |  |
| *FGA* |  |  |  |
| Zuclopenthixol (N05AF05) | 2 (3%) | 0 (0%) | 2 (2%) |
| Haloperidol (N05AD01) | 1 (2%) | 0 (0%) | 1 (1%) |
| Chlorprothixene (N05AF03) | 0 (0%) | 1 (3%) | 1 (1%) |

Anatomical Therapeutic Chemical (ATC) classification codes are provided in the parentheses.

Abbreviations: SCZ: Schizophrenia. BPD: Bipolar disorder. SGA: Second generation antipsychotic agent. FGA: First generation antipsychotic agent.

**Supplementary table 2: Analysis of cluster-wise T1w/T2w values, antipsychotic medication use and interaction with age in patients with schizophrenia (SCZ).**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Region | AP | AP × age | CPZ | CPZ × age |
|  | *β* | *p* | *β* | *p* | *β* | *p* | *β* | *p* |
| *Left hemisphere* |  |  |  |  |  |  |  |  |
| Superior frontal | .06 | .72 | .83 | .49 | −.03 | .82 | .42 | **.02** |
| Pars opercularis | .15 | .40 | 1.41 | .24 | −.13 | .32 | .32 | .10 |
| Caudal anterior cingulate | .02 | .91 | −.60 | .62 | −.03 | .82 | .19 | .34 |
| Precuneus | .04 | .83 | .03 | .98 | −.01 | .95 | .37 | .06 |
| Insula | .11 | .56 | 1.53 | .22 | .05 | .71 | .29 | .14 |
| Middle temporal | .14 | .42 | 1.88 | .12 | −.06 | .64 | .19 | .32 |
| Precentral | .02 | .90 | 1.89 | .08 | .11 | .35 | .35 | **.04** |
| Superior temporal | .22 | .23 | 2.55 | **.04** | −.09 | .51 | .26 | .18 |
| Fusiform gyrus | .11 | .53 | 1.16 | .34 | −.15 | .27 | .32 | .09 |
| Supramarginal | .19 | .30 | 1.98 | .11 | −.05 | .73 | .36 | .06 |
| Lateral occipital | .22 | .20 | 2.43 | **.04** | −.13 | .31 | .34 | .06 |
| Banks of the superior temporal sulcus | .01 | .95 | 1.37 | .26 | −.17 | .20 | .39 | **.04** |
|  |  |  |  |  |  |  |  |  |
| *Right hemisphere* |  |  |  |  |  |  |  |  |
| Rostral middle frontal | .12 | .52 | 1.44 | .25 | .05 | .71 | .36 | .06 |
| Superior parietal | .08 | .65 | 1.09 | .38 | .03 | .79 | .49 | **.01** |
| Insula (1) | −.01 | .97 | .50 | .69 | −.02 | .88 | .33 | .09 |
| Superior temporal | .10 | .58 | 1.64 | .17 | −.05 | .68 | .32 | .08 |
| Superior frontal (1) | .13 | .46 | 1.97 | .10 | −.12 | .38 | .27 | .15 |
| Precuneus (1) | .05 | .78 | .82 | .50 | .08 | .55 | .36 | .06 |
| Precuneus (2) | .17 | .35 | 1.62 | .18 | −.11 | .42 | .38 | **.05** |
| Insula (2) | .17 | .36 | 1.01 | .41 | .05 | .71 | .30 | .13 |
| Superior frontal (2) | .11 | .46 | 1.37 | .19 | .14 | .22 | .34 | **.03** |
| Postcentral | .38 | .04 | 1.94 | .10 | .00 | .99 | .35 | .07 |

Linear regression models (AP and AP x age: n=63, CPZ and CPZ x age: n=55) adjusted for age and sex. The age and CPZ variables were centered prior to analysis. P-values below 0.05 (not corrected for multiple testing) are marked in bold. Abbreviations: AP = Antipsychotic medication status. CPZ = Chlorpromazine-equivalent dose.

**Supplementary table 3: Analysis of cluster-wise T1w/T2w values, antipsychotic medication use and interaction with age in patients with bipolar disorder (BD).**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Region | AP | AP × age | CPZ | CPZ × age |
|  | *β* | *p* | *β* | *p* | *β* | *p* | *β* | *p* |
| *Left hemisphere* |  |  |  |  |  |  |  |  |
| Superior frontal | .00 | .97 | .05 | .72 | −.02 | .92 | .07 | .73 |
| Pars opercularis | −.03 | .78 | .09 | .52 | .00 | .99 | .11 | .58 |
| Caudal anterior cingulate | .02 | .87 | .05 | .73 | .12 | .50 | .30 | .10 |
| Precuneus | .05 | .60 | .17 | .19 | −.16 | .43 | .09 | .66 |
| Insula | −.05 | .62 | .11 | .39 | .01 | .94 | .21 | .26 |
| Middle temporal | .06 | .59 | .06 | .64 | −.11 | .56 | .19 | .34 |
| Precentral | .02 | .85 | .08 | .55 | .03 | .90 | .22 | .28 |
| Superior temporal | .07 | .51 | .00 | .99 | −.17 | .36 | .23 | .21 |
| Fusiform gyrus | −.06 | .57 | .01 | .96 | −.33 | .08 | .13 | .50 |
| Supramarginal | .00 | .97 | .07 | .61 | −.12 | .54 | .24 | .21 |
| Lateral occipital | −.05 | .62 | .04 | .76 | −.36 | .06 | .15 | .44 |
| Banks of the superior temporal sulcus | .08 | .41 | .17 | .20 | −.08 | .68 | .16 | .41 |
|  |  |  |  |  |  |  |  |  |
| *Right hemisphere* |  |  |  |  |  |  |  |  |
| Rostral middle frontal | −.05 | .60 | .07 | .60 | −.14 | .44 | .01 | .97 |
| Superior parietal | −.03 | .77 | −.04 | .75 | −.15 | .43 | .15 | .44 |
| Insula (1) | −.10 | .36 | .13 | .34 | −.05 | .81 | .11 | .58 |
| Superior temporal | −.01 | .96 | .04 | .76 | −.06 | .77 | .19 | .33 |
| Superior frontal (1) | −.02 | .88 | .14 | .28 | −.08 | .70 | .13 | .52 |
| Precuneus (1) | .09 | .39 | .22 | .10 | −.12 | .56 | .23 | .26 |
| Precuneus (2) | .04 | .73 | .15 | .25 | −.18 | .35 | .22 | .26 |
| Insula (2) | −.05 | .65 | .22 | .10 | −.01 | .94 | .12 | .53 |
| Superior frontal (2) | −.02 | .83 | .26 | .05 | −.19 | .28 | −.03 | .88 |
| Postcentral | .08 | .48 | .16 | .25 | −.30 | .12 | .04 | .84 |

Linear regression models (AP and AP x age: n=91, CPZ and CPZ x age: n=31) adjusted for age and sex. The age and CPZ variables were centered prior to analysis. P-values below 0.05 (not corrected for multiple testing) are marked in bold. Abbreviations: AP = Antipsychotic medication status. CPZ = Chlorpromazine-equivalent dose.

**Supplementary Table 4 – Associations between cluster-wise T1w/T2w values and PANSS total scores and symptom factors.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Region | PANSS total score1 | Positive factor | Negative factor | Disorganized factor | Excited factor | Depressive factor |
|  | *β* | *p* | *pcorr* | *β* | *p* | *pcorr* | *β* | *p* | *pcorr* | *β* | *p* | *pcorr* | *β* | *p* | *pcorr* | *β* | *p* | *pcorr* |
| *Left hemisphere* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Superior frontal | .04 | .68 | .96 | .10 | .32 | .94 | .01 | .91 | .98 | .08 | .36 | .94 | .14 | .09 | .76 | -.07 | .37 | .94 |
| Pars opercularis | .03 | .76 | .96 | .05 | .51 | .96 | -.03 | .72 | .96 | .10 | .24 | .83 | .14 | .07 | .76 | -.03 | .70 | .96 |
| Caudal anterior cingulate | .04 | .68 | .96 | .07 | .45 | .96 | .02 | .81 | .97 | .05 | .55 | .96 | .13 | .10 | .76 | -.07 | .41 | .94 |
| Precuneus | .05 | .61 | .96 | .14 | .14 | .76 | -.04 | .67 | .96 | .05 | .55 | .96 | .14 | .09 | .76 | -.04 | .65 | .96 |
| Insula | .02 | .81 | .97 | .12 | .20 | .76 | -.03 | .79 | .97 | .17 | .04 | .76 | .11 | .17 | .76 | -.11 | .18 | .76 |
| Middle temporal | .07 | .45 | .96 | .10 | .32 | .94 | .00 | .99 | .99 | .14 | .10 | .76 | .16 | .05 | .76 | -.01 | .89 | .98 |
| Precentral | .00 | .99 | .99 | .05 | .63 | .96 | -.01 | .91 | .98 | .07 | .42 | .94 | .08 | .30 | .94 | -.03 | .70 | .96 |
| Superior temporal | .05 | .47 | .96 | .09 | .32 | .94 | -.04 | .68 | .96 | .12 | .17 | .76 | .11 | .17 | .76 | -.03 | .70 | .96 |
| Fusiform gyrus | -.03 | .76 | .96 | .09 | .35 | .94 | -.01 | .89 | .98 | -.03 | .71 | .96 | .07 | .40 | .94 | -.05 | .55 | .96 |
| Supramarginal | -.05 | .62 | .96 | .03 | .73 | .96 | -.12 | .20 | .76 | .08 | .36 | .94 | .11 | .20 | .76 | -.03 | .72 | .96 |
| Lateral occipital | .05 | .59 | .96 | .14 | .14 | .76 | -.04 | .64 | .96 | .04 | .67 | .96 | .13 | .10 | .76 | .02 | .78 | .96 |
| Banks of the superior temporal sulcus | -.01 | .92 | .98 | .10 | .31 | .94 | -.04 | .68 | .96 | .03 | .76 | .96 | .13 | .11 | .76 | -.08 | .31 | .94 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Right hemisphere* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Rostral middle frontal | .09 | .36 | .94 | .17 | .08 | .76 | -.06 | .55 | .96 | .13 | .13 | .76 | .21 | .01 | .52 | -.01 | .94 | .98 |
| Superior parietal | .04 | .65 | .96 | .03 | .78 | .96 | -.02 | .85 | .98 | .08 | .38 | .94 | .10 | .22 | .79 | .04 | .66 | .96 |
| Insula (1) | .17 | .08 | .76 | .21 | .03 | .75 | .03 | .78 | .96 | .23 | .009 | .52 | .20 | .01 | .52 | -.01 | .91 | .98 |
| Superior temporal | .08 | .39 | .94 | .13 | .17 | .76 | .02 | .85 | .98 | .11 | .20 | .76 | .12 | .13 | .76 | -.01 | .86 | .98 |
| Superior frontal (1) | .05 | .60 | .96 | .05 | .57 | .96 | -.05 | .56 | .96 | .16 | .06 | .76 | .11 | .17 | .76 | .07 | .40 | .94 |
| Precuneus (1) | .06 | .55 | .96 | .09 | .35 | .94 | .01 | .92 | .98 | .05 | .55 | .96 | .13 | .12 | .76 | -.09 | .93 | .98 |
| Precuneus (2) | -.02 | .86 | .98 | .05 | .63 | .96 | .06 | .50 | .96 | .05 | .58 | .96 | .07 | .42 | .94 | .00 | .97 | .99 |
| Insula (2) | .12 | .20 | .76 | .13 | .17 | .76 | .04 | .65 | .96 | .16 | .07 | .76 | .18 | .02 | .75 | -.04 | .62 | .96 |
| Superior frontal (2) | .03 | .74 | .96 | -.02 | .85 | .98 | .01 | .88 | .98 | .03 | .71 | .96 | .07 | .35 | .94 | .10 | .22 | .8 |
| Postcentral | -.07 | .51 | .96 | -.09 | .33 | .94 | -.02 | .83 | .98 | .00 | .99 | .99 | .00 | .99 | .99 | .00 | .99 | .99 |

Linear regression models (n=155) adjusted for age, sex, and diagnosis.

1For PANSS total score and negative symptom factor n=154 due to missing data in one participant.

**Supplementary Table 5 – Associations with PANSS total scores and symptom factors in patients with schizophrenia (SCZ).**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Region | PANSS total score | Positive factor | Negative factor | Disorganized factor | Excited factor | Depressive factor |
|  | *β* | *p* | *β* | *p* | *β* | *p* | *β* | *p* | *β* | *p* | *β* | *p* |
| *Left hemisphere* |  |  |  |  |  |  |  |  |  |  |  |  |
| Superior frontal | −.01 | .92 | .13 | .30 | −.06 | .62 | .02 | .87 | .06 | .63 | −.09 | .47 |
| Pars opercularis | −.03 | .81 | .09 | .46 | −.10 | .42 | .04 | .75 | .05 | .69 | −.02 | .87 |
| Caudal anterior cingulate | .07 | .61 | .16 | .19 | −.02 | .88 | .06 | .64 | .11 | .36 | −.06 | .64 |
| Precuneus | .01 | .95 | .20 | .11 | −.13 | .31 | −.01 | .93 | .09 | .47 | −.01 | .95 |
| Insula | .00 | .99 | .14 | .26 | −.09 | .51 | .17 | .21 | .06 | .65 | −.05 | .71 |
| Middle temporal | .02 | .89 | .14 | .25 | −.10 | .42 | .09 | .50 | .12 | .33 | .09 | .46 |
| Precentral | .00 | .98 | .11 | .32 | −.06 | .59 | .06 | .62 | .10 | .40 | −.02 | .85 |
| Superior temporal | .02 | .88 | .13 | .29 | −.12 | .34 | .06 | .64 | .10 | .41 | .03 | .79 |
| Fusiform gyrus | −.13 | .32 | .10 | .41 | −.14 | .28 | −.16 | .20 | −.04 | .75 | −.02 | .88 |
| Supramarginal | −.06 | .63 | .11 | .38 | −.16 | .21 | .05 | .71 | .06 | .64 | .00 | .99 |
| Lateral occipital | −.02 | .89 | .17 | .16 | −.14 | .26 | −.08 | .54 | .13 | .28 | .05 | .70 |
| Banks of the superior temporal sulcus | −.04 | .78 | .15 | .23 | −.14 | .26 | −.01 | .95 | .11 | .39 | −.04 | .75 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Right hemisphere* |  |  |  |  |  |  |  |  |  |  |  |  |
| Rostral middle frontal | .07 | .61 | .20 | .12 | −.08 | .56 | .10 | .45 | .18 | .14 | .06 | .66 |
| Superior parietal | −.03 | .80 | .06 | .66 | −.08 | .53 | −.02 | .88 | .01 | .95 | .07 | .59 |
| Insula (1) | .13 | .33 | .27 | **.03** | −.09 | .49 | .22 | .09 | .23 | .07 | −.01 | .93 |
| Superior temporal | .10 | .43 | .16 | .18 | −.01 | .93 | .06 | .65 | .17 | .17 | .05 | .66 |
| Superior frontal (1) | −.05 | .68 | .02 | .90 | −.16 | .19 | .04 | .78 | .08 | .53 | .10 | .43 |
| Precuneus (1) | −.03 | .81 | .14 | .24 | −.08 | .52 | −.07 | .61 | .04 | .75 | −.04 | .75 |
| Precuneus (2) | −.12 | .36 | .03 | .83 | −.14 | .28 | −.06 | .66 | −.03 | .81 | −.05 | .70 |
| Insula (2) | .11 | .40 | .18 | .14 | −.05 | .68 | .15 | .23 | .19 | .13 | .00 | .99 |
| Superior frontal (2) | −.02 | .82 | .01 | .96 | −.01 | .92 | −.03 | .80 | −.01 | .96 | .11 | .30 |
| Postcentral | −.12 | .33 | -.13 | .30 | −.04 | .74 | −.05 | .70 | −.09 | .46 | .05 | .67 |

Linear regression models (n=64) adjusted for age, sex, and diagnosis. P-values below 0.05 (not corrected for multiple testing) are marked in bold.

Abbreviations: PANSS: Positive and negative syndrome scales.

**Supplementary Table 6 – Associations with PANSS total scores and symptom factors in patients with bipolar disorders (BD).**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Region | PANSS total score1 | Positive factor | Negative factor | Disorganized factor | Excited factor | Depressive factor |
|  | *β* | *p* | *β* | *p* | *β* | *p* | *β* | *p* | *β* | *p* | *β* | *p* |
| *Left hemisphere* |  |  |  |  |  |  |  |  |  |  |  |  |
| Superior frontal | .13 | .21 | .02 | .86 | .17 | .11 | .12 | .26 | .21 | **.04** | −.04 | .71 |
| Pars opercularis | .13 | .23 | −.05 | .67 | .12 | .26 | .13 | .20 | .24 | **.02** | −.03 | .77 |
| Caudal anterior cingulate | .05 | .65 | −.09 | .38 | .15 | .14 | .02 | .82 | .15 | .15 | −.05 | .68 |
| Precuneus | .13 | .22 | −.02 | .81 | .17 | .11 | .09 | .36 | .18 | .08 | −.05 | .66 |
| Insula | .08 | .45 | .06 | .56 | .11 | .28 | .15 | .13 | .16 | .12 | −.15 | .16 |
| Middle temporal | .13 | .20 | −.01 | .95 | .18 | .09 | .14 | .17 | .18 | .08 | −.10 | .35 |
| Precentral | .01 | .89 | −.08 | .46 | .11 | .31 | .02 | .86 | .05 | .61 | −.03 | .80 |
| Superior temporal | .09 | .38 | −.02 | .88 | .14 | .19 | .15 | .15 | .11 | .28 | −.07 | .50 |
| Fusiform gyrus | .15 | .17 | .04 | .68 | .21 | **.04** | .12 | .27 | .18 | .10 | −.06 | .59 |
| Supramarginal | .02 | .84 | −.11 | .28 | .03 | .79 | .09 | .38 | .14 | .15 | −.03 | .78 |
| Lateral occipital | .15 | .18 | .05 | .65 | .13 | .22 | .14 | .20 | .12 | .25 | .01 | .92 |
| Banks of the superior temporal sulcus | .05 | .65 | −.01 | .93 | .16 | .13 | .02 | .84 | .14 | .18 | −.11 | .32 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Right hemisphere* |  |  |  |  |  |  |  |  |  |  |  |  |
| Rostral middle frontal | .11 | .28 | .08 | .41 | .03 | .74 | .10 | .31 | .21 | **.03** | −.05 | .62 |
| Superior parietal | .16 | .12 | −.03 | .77 | .13 | .22 | .16 | .12 | .20 | .06 | .02 | .86 |
| Insula (1) | .20 | .06 | .07 | .54 | .20 | .05 | .19 | .07 | .17 | .10 | .00 | .97 |
| Superior temporal | .06 | .58 | .05 | .67 | .11 | .29 | .13 | .22 | .06 | .55 | −.06 | .60 |
| Superior frontal (1) | .20 | .05 | .12 | .26 | .16 | .13 | .27 | **.01** | .14 | .19 | .07 | .54 |
| Precuneus (1) | .19 | .08 | −.04 | .72 | .18 | .09 | .17 | .10 | .22 | **.04** | .04 | .75 |
| Precuneus (2) | .13 | .20 | .08 | .46 | .09 | .38 | .12 | .24 | .15 | .14 | .06 | .57 |
| Insula (2) | .11 | .31 | .03 | .75 | .16 | .13 | .11 | .30 | .17 | .10 | −.07 | .50 |
| Superior frontal (2) | .09 | .41 | −.04 | .71 | .07 | .51 | .02 | .88 | .14 | .19 | .09 | .43 |
| Postcentral | .01 | .89 | −.03 | .81 | .03 | .76 | .00 | .96 | .06 | .56 | −.03 | .78 |

Linear regression models (n=91) adjusted for age, sex, and diagnosis. P-values below 0.05 (not corrected for multiple testing) are marked in bold.

Abbreviations: PANSS: Positive and negative syndrome scales.

1For PANSS total score and negative symptom factor n=90 due to missing data in one participant

**Supplementary Figure 1 – Age slopes in all significant clusters**



Scatterplots showing the associations with age for each significant cluster from the surface analyses for SCZ (red line), BPD (blue line) and CTR (green line). The x-axes represent age, and the y-axes represent mean T1w/T2-ratio values within the cluster.