**Supplementary Table S1**. **Study Flowchart**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **VISIT 1** | | **VISIT 21** | **VISIT 31** | **VISIT 41** |
|  | **Screening** | **Baseline** | **F/U** | **F/U** | **F/U** |
|  | **2 Week** | **4 Week** | **6 Week** |
| **Consent form** | ● |  |  |  |  |
| **Inclusion and exclusion criteria** | ● | |  |  |  |
| **Demographic information** | ● | |  |  |  |
| **Medical history inquiry** | ● | |  |  |  |
| **Vital signs and physical examination** | ● | | ● | ● | ● |
| **Drug interaction investigation** |  | ● | ● | ● | ● |
| **Education of using tDCS equipment** |  | ● | ● | ● |  |
| **2back test** | ● | | ● | ● | ● |
| **HAMD** | ● | | ● | ● | ● |
| **K-BDI-Ⅱ** | ● | | ● | ● | ● |
| **HAMA** | ● | | ● | ● | ● |
| **Q-LES** | ● | | ● | ● | ● |
| **CGI** | ● | | ● | ● | ● |
| **qEEG** | ● |  |  |  |  |
| **Adverse effects questionnaire** |  | ● | ● | ● | ● |

Abbreviations: F/U, Follow-up, tDCS, Transcranial Direct Current Stimulation; HAMD, Hamilton Depression Rating Scale; K-BDI-**Ⅱ**, Korean Beck Depression Inventory**Ⅱ**; HAMA, Hamilton Anxiety Rating Scale; QLES, Quality of Life Enjoyment and Satisfaction Questionnaire; CGI, Clinical Global Impression scale; qEEG, Quantitative Electroencephalography.

**1** Participants self-administered tDCS daily for 14 sessions over 2 weeks, totaling 42 sessions, with outcomes assessed in person at weeks 2, 4, and 6. Online meetings were not conducted.

**Supplementary Table S2. Results of linear mixed models on Total Accuracy score according to subgroup**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Subgroup** | **N (sham**1**/low/high)** | **Sum of Squares** | **Mean Square** | ***F* Value** | ***P* Value** |
| Onset Age |  |  |  |  |  |
| < 29 | 25/27/30 | 0.11 | 0.11 | 3.63 | 0.06 |
| ≥ 29 | 20/20/19 | 0.02 | 0.02 | 1.56 | 0.21 |
| Current Episode Duration |  |  |  |  |  |
| < 13 months | 33/34/41 | 0.11 | 0.11 | 4.96 | 0.03\* |
| ≥ 13 months | 12/13/8 | 0.03 | 0.03 | 0.77 | 0.38 |
| Age |  |  |  |  |  |
| < 45 | 33/33/35 | 0.12 | 0.12 | 4.54 | 0.03\* |
| ≥ 45 | 12/14/14 | 0.02 | 0.02 | 0.82 | 0.37 |
| Gender |  |  |  |  |  |
| Male | 15/10/14 | 0.02 | 0.02 | 0.59 | 0.45 |
| Female | 30/37/35 | 0.13 | 0.13 | 5.55 | 0.02\* |
| SSRIs |  |  |  |  |  |
| Being used | 28/28/29 | 0.12 | 0.12 | 5.13 | 0.02\* |
| Unused | 17/19/20 | 0.02 | 0.02 | 0.79 | 0.37 |
| SNRIs |  |  |  |  |  |
| Being used | 11/16/15 | 0.06 | 0.06 | 1.59 | 0.21 |
| Unused | 34/31/34 | 0.08 | 0.08 | 4.29 | 0.04\* |
| Antipsychotics |  |  |  |  |  |
| Being used | 16/16/20 | 0.08 | 0.08 | 2.80 | 0.10 |
| Unused | 29/31/29 | 0.06 | 0.06 | 2.78 | 0.10 |
| HAMA |  |  |  |  |  |
| ≤ median | 24/22/26 | 0.04 | 0.04 | 1.70 | 0.19 |
| > median | 21/25/23 | 0.10 | 0.10 | 3.81 | 0.05 |

*Note*, Interactive effects on 2-back test score are shown according to subgroup, time (baseline, week 2, 4 and 6) x group (sham vs low active vs high active).

1 The raw data for the 2-back test from one participant is not included due to technical error related to equipment malfunction.

Covariate: Sex, Age, Onset Age, Current Episode Duration, Employment

\**p* < 0.05, \*\* *p* < 0.01, \*\*\* *p* < 0.001

**Supplementary Table S3. Results of linear mixed models on HAMD score according to subgroup**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Subgroup** | **N (sham/low/high)** | **Sum of Squares** | **Mean Square** | ***F* Value** | ***P* Value** |
| Onset Age |  |  |  |  |  |
| < 29 | 25/27/30 | 2.01 | 2.01 | 0.07 | 0.79 |
| ≥ 29 | 20/20/19 | 134.52 | 134.52 | 4.98 | 0.03\* |
| Current Episode Duration |  |  |  |  |  |
| < 13 months | 33/34/41 | 0.06 | 0.06 | 0.00 | 0.96 |
| ≥ 13 months | 12/13/8 | 233.68 | 233.68 | 8.88 | 0.004\*\* |
| Age |  |  |  |  |  |
| < 45 | 33/33/35 | 1.65 | 1.65 | 0.06 | 0.81 |
| ≥ 45 | 12/14/14 | 195.47 | 195.47 | 7.00 | 0.009\*\* |
| Gender |  |  |  |  |  |
| Male | 15/10/14 | 135.47 | 135.47 | 6.29 | 0.01\* |
| Female | 30/37/35 | 0.01 | 0.01 | 0.00 | 0.99 |
| SSRIs |  |  |  |  |  |
| Being used | 28/28/29 | 4.23 | 4.23 | 0.14 | 0.71 |
| Unused | 17/19/20 | 57.46 | 57.46 | 2.13 | 0.15 |
| SNRIs |  |  |  |  |  |
| Being used | 11/16/15 | 74.76 | 74.76 | 2.23 | 0.14 |
| Unused | 34/31/34 | 3.71 | 3.71 | 0.14 | 0.71 |
| Antipsychotics |  |  |  |  |  |
| Being used | 16/16/20 | 12.26 | 12.26 | 0.44 | 0.51 |
| Unused | 29/31/29 | 31.12 | 31.12 | 1.09 | 0.30 |
| HAMA |  |  |  |  |  |
| ≤ median | 24/22/26 | 41.40 | 41.40 | 1.66 | 0.20 |
| > median | 21/25/23 | 258.82 | 258.82 | 8.73 | 0.003\*\* |

*Note*, Interactive effects on HAMD score are shown according to Subgroup, Time (baseline, week 2, 4 and 6) × Group (sham vs low active vs high active).

Covariate: Sex, Age, Onset Age, Current Episode Duration, Employment

\**p* < 0.05, \*\* *p* < 0.01, \*\*\* *p* < 0.001

**Supplementary Table S4. Blinding Integrity**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **No. (%)** | | | Pearson Chi-Square | *P* Value \* |
| Sham  (n = 45) | Low Active  (n = 47) | High Active  (n = 49) |
| **First Guess (Week 2)** | | | | | |
| Sham | 11 (26.2) | 4 (8.5) | 7 (14.3) | 5.33 | 0.07 |
| Active | 31 (73.8) | 43 (91.5) | 42 (85.7) |
| **End Guess (Week 6)** | | | | | |
| Sham | 11 (33.3) | 2 (5.3) | 5 (16.1) | 9.65 | 0.008\*\* |
| Active | 22 (66.7) | 36 (94.7) | 26 (83.9) |

\*p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

**Supplementary Table S5. Adverse Effects Questionnaire Sheet**

*Instruction: Please check the level of side effects experienced in the past two weeks.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Symptom | None | Mild | Moderate | Severe |
| 1.Headache |  |  |  |  |
| 2.Neck pain |  |  |  |  |
| 3.Discomfort(left) |  |  |  |  |
| 4.Discomfort(right) |  |  |  |  |
| 5.Tingling |  |  |  |  |
| 6.Itchiness |  |  |  |  |
| 7.Burning sensation |  |  |  |  |
| 8.Skin redness |  |  |  |  |
| 9.Drowsiness |  |  |  |  |
| 10.Difficulty concentrating |  |  |  |  |
| 11.Fatigue |  |  |  |  |
| 12.Nausea |  |  |  |  |
| 13.Dizziness |  |  |  |  |