**Supplementary file 1A**. Baseline measurements of the cortical excitability protocols

|  |  |  |  |
| --- | --- | --- | --- |
| **Protocol** | **measurement** | **Experimental session** | |
|  | **Sufficient sleep** | **Sleep deprivation** |
| Single-pulse MEP | SI 1mV (%) | 50.40 ± 9.419 | 49.633 ± 8.973 |
|  |  |  |
| RMT | %MSO | 40.733 ± 7.319 | 40.466 ± 7.560 |
|  |  |  |  |
| AMT | %MSO | 34.60 ± 7.308 | 34.566 ± 6.941 |
|  |  |  |  |
| I-O curve | RMT intensity MEP | 0.176 ± 0.097 | 0.260 ± 0.171 |
|  |  |  |
| SICI-ICF | Single-pulse MEP | 1.033 ± 0.160 | 1.073 ± 0.190 |
|  |  |  |
| I-wave facilitation | Single-pulse MEP | 1.052 ± 0.216 | 1.096 ± 0.154 |
|  |  |  |
| SAI | Single-pulse MEP | 1.081 ± 0.143 | 1.089 ± 0.137 |
|  |  |  |

**Supplementary file 1B**. Results of repeated-measures ANOVAs for control MEPs (RMT intensity MEP for I-O curve, single-pulse MEP for other protocols), SI1mV, and %MSO for RMT/AMT.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Protocol** | **Measurement** | **Factor** | ***df*** | ***F*** | ***p*** |
| Single-pulse MEP | SI1mV | Sleep condition | 1 | 2.72 | 0.109 |
|  |  |  |  |  |  |
| RMT | %MSO | Sleep condition | 1 | 0.231 | 0.634 |
|  |  |  |  |  |  |
| AMT | %MSO | Sleep condition | 1 | 0.012 | 0.915 |
|  |  |  |  |  |  |
| I-O curve | RMT intensity MEP | Sleep condition | 1 | 5.89 | **0.022** |
|  |  |  |  |  |  |
| SICI-ICF | Single-pulse MEP | Sleep condition | 1 | 1.01 | 0.322 |
|  |  |  |  |  |  |
| I-wave facilitation | Single-pulse MEP | Sleep condition | 1 | 1.01 | 0.323 |
|  |  |  |  |  |  |
| SAI | Single-pulse MEP | Sleep condition | 1 | 0.09 | 0.766 |
|  | | | | | |

**Supplementary file 1C**. Baseline measurements of the neuroplasticity sessions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **tDCS** | **Sleep condition** | **baseline MEP** | | **SI1mV (%)** | |
| **Active** | **sham** | **Active** | **sham** |
| Anodal stimulation | sufficient sleep | 1.002±0.071 | 1.019±0.071 | 48.666±8.050 | 48.533±7.827 |
| sleep deprivation | 1.020±0.081 | 1.026±0.068 | 46.80 ±6.667 | 46.90±6.644 |
|  |  |  |  |  |  |
| Cathodal stimulation | sufficient sleep | 1.027±0.037 | 1.005±0.065 | 51.333±10.244 | 50.866±10.183 |
| sleep deprivation | 1.001±0.088 | 1.018±0.056 | 50.566±10.051 | 50.133±10.043 |
|  |  |  |  |  |  |
|  | | | | | |

**Supplementary file 1D**. Reported side effects of tDCS during stimulation after sufficient sleep and sleep deprivation

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Side effects** | **Sleep condition** | | **Anodal-tDCS** | **Sham-tDCS** | **Cathodal-tDCS** | **Sham-tDCS** |
| Visual | | sufficient sleep | 0.00±0.00 | 0.00±0.00 | 0.00±0.00 | 0.00±0.00 |
|  | | sleep deprivation | 0.20±0.77 | 0.20±0.56 | 0.06±0.25 | 0.06±0.25 |
|  | |  |  |  |  |  |
| Itching | | sufficient sleep | 1.66±1.67 | 0.86±1.18 | 1.40±1.18 | 0.93±0.96 |
|  | | sleep deprivation | 2.26±1.57 | 1.26±1.43 | 1.66±1.58 | 0.93±1.16 |
|  | |  |  |  |  |  |
| Tingling | | sufficient sleep | 1.20±1.37 | 1.06±1.09 | 1.40±0.98 | 0.93±1.09 |
|  | | sleep deprivation | 1.46±1.12 | 1.00±0.92 | 1.20±1.26 | 1.00±1.25 |
|  | |  |  |  |  |  |
| Burning | | sufficient sleep | 1.26±1.43 | 1.26±1.16 | 0.73±0.96 | 0.73±1.27 |
|  | | sleep deprivation | 1.53±1.64 | 1.40±1.50 | 1.46±1.69 | 1.00±1.25 |
|  | |  |  |  |  |  |
| Pain | | sufficient sleep | 0.20±0.77 | 0.20±0.56 | 0.13±0.35 | 0.66±1.39 |
|  | | sleep deprivation | 0.46±1.24 | 0.26±0.70 | 0.60±1.05 | 0.33±0.61 |

**Supplementary file 1E**. Repeated-measures ANOVA results for the presence and intensity of reported tDCS side-effects

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Side effects** | ***Source*** | ***df*** | ***F*** | ***p*** | ***η*p2** |
| Visual phenomenon | sleep condition | 1 | 3.89 | 0.058 | 0.122 |
| group | 1 | 0.97 | 0.332 | 0.034 |
| tDCS state | 1 | 0.00 | 1.000 | 0.000 |
| sleep condition × group | 1 | 0.97 | 0.33 | 0.034 |
| group × tDCS state | 1 | 0.00 | 1.000 | 0.000 |
|  | sleep condition × tDCS state | 1 | 0.00 | 1.000 | 0.000 |
|  |  |  |  |  |  |
| Itching | sleep condition | 1 | 2.23 | 0.146 | 0.074 |
| group | 1 | 0.57 | 0.453 | 0.020 |
| tDCS state | 1 | 15.14 | **0.001** | 0.351 |
| sleep condition × group | 1 | 0.75 | 0.394 | 0.026 |
| group × tDCS state | 1 | 0.60 | 0.443 | 0.021 |
|  | sleep condition × tDCS state | 1 | 0.47 | 0.499 | 0.017 |
|  |  |  |  |  |  |
| Tingling | sleep condition | 1 | 0.01 | 0.924 | 0. 001 |
| group | 1 | 0.02 | 0.870 | 0.001 |
| tDCS state | 1 | 4.38 | **0.046** | 0.135 |
| sleep condition × group | 1 | 0.23 | 0.633 | 0.008 |
| group × tDCS state | 1 | 0.01 | 0.913 | 0.001 |
| sleep condition × tDCS state | 1 | 0.01 | 0.926 | 0.001 |
|  |  |  |  |  |
| Burning | sleep condition | 1 | 2.95 | 0.141 | 0.076 |
| group | 1 | 1.06 | 0.311 | 0.037 |
| tDCS state | 1 | 1.60 | 0.190 | 0.050 |
| sleep condition × group | 1 | 0.36 | 0.549 | 0.013 |
| group × tDCS state | 1 | 0.18 | 0.668 | 0.007 |
| sleep condition × tDCS state | 1 | 0.44 | 0.512 | 0.16 |
|  |  |  |  |  |  |
| Pain | sleep condition | 1 | 0.59 | 0.448 | 0.021 |
| group | 1 | 0.41 | 0.525 | 0.015 |
| tDCS state | 1 | 0.02 | 0.892 | 0.001 |
| sleep condition × group | 1 | 0.10 | 0.744 | 0.004 |
| group × tDCS state | 1 | 0.92 | 0.344 | 0.032 |
| sleep condition × tDCS state | 1 | 3.69 | 0.065 | 0.117 |