Supplementary material

Methods

Table S1
Overview of the MRI sequences (in the order they were run) at baseline, post-treatment, and follow-up. Location I and location II are placeholders for the left DLPFC and TPC that were scanned in counterbalanced order.

Sequence	Time (min:s)
Structural T1 scan	07:07
MRS PRESS, location I	03:48
MRS MEGAPRESS, location I	10:12
MRS PRESS , location II	03:48
MRS MEGAPRESS, location II	10:12
Resting state fMRI	05:30
Dichotic listening/ fMRI	08:28
Arterial Spin Labelling*	04:14

Structural T1 scan, MRS, resting state fMRI: n=15; real/sham=9/6; Dichotic Listening/fMRI: n=11; real/sham= 6/5

*Not reported here.

Results

Structural analysis

Exploratory t-tests were carried out for all 74 regions per hemisphere provided by the analysis comparing baseline and post-treatment for the whole group (Figure S1), as well as the real (FigureS 2) and sham group (Figure S3) separately, for three anatomical measures: surface area, gray matter volume, and average cortical thickness. The presented *p*-values in Figure S1, S2, and S3 are not corrected for multiple testing, and all are above 0.001 (the most significant being $10^{-2.8}$= 0.0016). So, none would reach significance if, for instance, Bonferroni correction for 444 variables was done.

Figure S1

Overview of t-tests comparing the whole group between baseline and treatment surface area, gray matter volume, and average cortical thickness for all 74 brain regions per hemisphere.

All Subjects (L/R), -log10(pvalue)

Region	prepost.lh.SurfArea	prepost.lh.GrayVol	prepost.lh.ThickAvg	prepost.rh.SurfArea	prepost.rh.GrayVol	prepost.rh.ThickAvg
G_and_S_frontomargin	0.2	0.1	0.0	0.4	0.2	0.2
G_and_S_occipital_inf	0.9	1.2	0.5	0.4	0.3	0.2
G_and_S_paracentral	0.7	0.8	0.2	0.1	0.7	0.6
G_and_S_subcentral	0.1	1.1	0.2	1.2	1.1	0.2
G_and_S_transv_frontopol	0.2	0.0	0.4	1.0	0.2	0.8
G_and_S_cingul-Ant	0.1	0.1	0.1	0.3	0.3	0.0
G_and_S_cingul-Mid-Ant	1.1	1.5	0.5	1.1	1.3	0.4
G_and_S_cingul-Mid-Post	0.6	0.4	0.1	0.2	0.3	0.1
G_cingul-Post-dorsal	0.0	0.0	0.1	0.6	0.2	0.6
G_cingul-Post-ventral	0.6	0.5	0.1	0.3	0.3	0.2
G_cuneus	0.7	0.0	0.5	0.0	0.1	0.2
G_front_inf-Opercular	0.6	0.5	0.0	0.2	0.2	0.8
G_front_inf-Orbital	0.2	0.3	0.2	0.7	0.3	0.0
G_front_inf-Triangul	0.5	0.7	0.4	0.4	0.5	0.2
G_front_middle	0.2	0.7	0.2	0.5	0.3	0.3
G_front_sup	1.2	0.6	0.0	0.9	0.5	0.5
G_Ins_lg_and_S_cent_ins	0.3	0.9	0.4	0.1	0.3	0.3
G_insular_short	1.3	0.1	0.4	0.1	0.0	0.2
G_occipital_middle	0.2	0.1	0.3	0.6	0.6	0.0
G_occipital_sup	0.1	0.2	0.1	0.3	0.1	0.3
G_oc-temp_lat-fusifor	0.9	0.4	0.7	1.3	0.1	1.7
G_oc-temp_med-Lingual	0.6	0.0	0.3	0.7	0.3	0.8
G_oc-temp_med-Parahip	0.4	0.0	0.3	0.1	0.2	0.0
G_orbital	0.6	0.3	0.0	0.1	0.1	0.1
G_pariet_inf-Angular	0.7	0.3	0.2	0.6	0.1	0.4
G_pariet_inf-Supramar	1.0	0.2	0.2	0.0	0.3	0.5
G_parietal_sup	0.1	0.2	0.6	0.0	0.4	0.6
G_postcentral	0.3	0.6	0.2	0.5	0.2	0.1
G_precentral	0.0	0.0	0.1	0.2	0.7	0.6
G_precuneus	0.7	0.5	0.2	0.4	0.0	0.2
G_rectus	0.0	0.1	0.1	0.8	1.1	0.2
G_subcallosal	0.1	0.1	0.7	0.2	0.4	0.1
G_temp_sup-G_T_transv	0.1	0.0	0.1	0.1	0.1	0.2
G_temp_sup-Lateral	0.8	1.3	1.0	0.1	0.5	0.2
G_temp_sup-Plan_polar	0.2	0.2	0.8	0.4	0.6	0.3
G_temp_sup-Plan_tempo	0.0	0.0	0.1	1.0	1.2	0.6
G_temporal_inf	0.3	0.1	0.7	0.3	1.1	0.3
G_temporal_middle	1.0	0.5	0.6	0.0	0.3	0.2
Lat_Fis-ant-Horizont	1.2	1.2	0.8	0.4	0.0	0.4
Lat_Fis-ant-Vertical	0.2	0.3	0.5	0.1	0.1	0.1
Lat_Fis-post	0.2	0.1	0.1	1.2	0.6	0.0
Pole_occipital	0.3	0.7	0.2	0.2	0.1	0.2
Pole_temporal	0.5	0.1	0.3	0.2	0.3	0.6
S_calcarine	0.2	0.1	0.4	0.1	0.2	0.5
S_central	0.8	0.3	0.2	0.9	1.1	0.5
S_cingul-Marginalis	0.2	0.1	0.5	0.3	0.4	0.2
S_circular_insula_ant	0.0	0.2	1.4	0.1	0.1	0.2
S_circular_insula_inf	0.2	0.2	0.1	0.3	0.2	0.5
S_circular_insula_sup	0.5	0.5	0.0	0.3	0.1	2.1
S_collat_transv_ant	0.0	0.0	0.0	0.9	0.7	0.3
S_collat_transv_post	0.0	0.0	0.3	0.1	0.2	0.2
S_front_inf	0.1	0.1	0.6	0.2	0.3	0.2
S_front_middle	1.4	1.9	1.5	0.2	0.2	0.3
S_front_sup	0.1	0.1	0.6	0.4	0.4	0.2
S_interm_prim-Jensen	0.8	0.6	0.0	0.2	0.4	0.1
S_intrapariet_and_P_trans	0.6	0.6	0.2	0.1	0.1	0.0
S_oc_middle_and_Lunatus	0.1	0.3	0.1	0.2	0.1	0.2
S_oc_sup_and_transversal	0.8	1.0	0.1	0.5	0.4	0.3
S_occipital_ant	0.2	0.5	0.5	-0.0	0.2	0.2
S_oc-temp_lat	0.4	0.5	0.1	1.2	1.4	0.0
S_oc-temp_med_and_Lingual	0.6	0.4	0.2	0.2	0.3	0.2
S_orbital_lateral	0.5	0.1	0.3	0.1	0.0	0.1
S_orbital_med-olfact	0.6	0.1	0.3	0.1	0.1	0.3
S_orbital-H_Shaped	0.7	0.7	0.3	0.3	0.2	0.1
S_parieto_occipital	0.0	0.1	0.1	0.2	0.2	0.3
S_pericallosal	0.0	0.1	0.2	0.1	0.5	0.5
S_postcentral	0.3	0.5	0.3	0.8	0.8	0.3
S_precentral-inf-part	0.7	1.1	0.2	0.4	0.4	0.1
S_precentral-sup-part	0.7	0.2	1.0	0.2	0.1	0.4
S_suborbital	0.5	0.3	0.5	0.1	0.1	0.2
S_subparietal	0.6	0.7	0.0	0.0	0.0	0.0
S_temporal_inf	0.5	0.0	0.9	0.3	0.1	0.9
S_temporal_sup	0.1	0.0	0.2	0.1	0.1	0.0
S_temporal_transverse	0.4	0.5	0.7	0.5	0.6	0.5

Note. SurfArea = surface area; GrayVol = gray matter volume; ThickAvg = average cortical thickness; lh = left hemisphere; rh = right hemisphere. *p*-values are expressed as the negative exponents of ten. For example, 0.2 translates into $p = 10^{-0.2} = 0.631$). This corresponds with approximately 1.3 for p=0.05, 2.0 for p=0.01, and 3.0 for p=0.001.

Figure S2

T-tests for all the 74 regions per hemisphere in the structural analysis in the real tDCS group (Stim) between baseline and post-treatment are given for surface area, gray matter volume, and average cortical thickness.

Stim (L/R), -log10(pvalue)

Region	prepost.lh.SurfArea	prepost.lh.GrayVol	prepost.lh.ThickAvg	prepost.rh.SurfArea	prepost.rh.GrayVol	prepost.rh.ThickAvg
G_and_S_frontomargin	0.5	0.0	0.0	1.2	0.6	0.2
G_and_S_occipital_inf	1.2	1.1	0.2	0.5	0.2	0.8
G_and_S_paracentral	0.7	0.6	0.2	0.2	0.3	0.4
G_and_S_subcentral	0.0	0.4	0.1	2.6	2.3	0.3
G_and_S_transv_frontopol	0.2	0.1	1.3	1.3	0.8	0.7
G_and_S_cingul-Ant	0.6	0.2	0.0	0.7	0.8	0.1
G_and_S_cingul-Mid-Ant	0.3	0.8	0.3	0.6	0.9	0.1
G_and_S_cingul-Mid-Post	0.6	0.5	0.3	0.2	0.3	0.2
G_cingul-Post-dorsal	0.4	0.1	0.3	0.2	0.3	0.3
G_cingul-Post-ventral	0.3	0.3	0.2	0.2	0.2	0.1
G_cuneus	0.1	0.2	0.1	0.4	0.1	0.3
G_front_inf-Opercular	0.2	0.5	0.1	0.0	0.7	0.6
G_front_inf-Orbital	0.9	0.7	0.5	0.2	0.0	0.1
G_front_inf-Triangul	2.0	0.9	0.0	0.0	0.1	0.0
G_front_middle	0.1	0.8	0.2	0.5	0.1	1.6
G_front_sup	0.6	0.0	0.1	0.9	0.8	0.3
G_Ins_lg_and_S_cent_ins	0.7	0.9	0.0	0.4	0.4	0.0
G_insular_short	0.6	0.0	0.5	0.2	0.3	0.4
G_occipital_middle	0.1	0.1	0.5	0.5	0.4	0.1
G_occipital_sup	0.2	0.6	0.4	0.5	0.7	0.1
G_oc-temp_lat-fusifor	0.1	0.0	0.1	1.1	0.1	2.3
G_oc-temp_med-Lingual	0.1	0.2	0.4	0.7	0.2	0.7
G_oc-temp_med-Parahip	2.0	0.2	0.6	0.3	0.7	0.0
G_orbital	0.1	0.5	0.4	0.1	0.0	0.2
G_pariet_inf-Angular	0.9	0.2	0.2	0.1	0.1	0.5
G_pariet_inf-Supramar	0.4	0.3	0.2	0.3	0.7	0.6
G_parietal_sup	0.3	0.1	0.8	0.2	0.7	0.8
G_postcentral	0.2	0.1	0.2	0.8	0.0	0.4
G_precentral	0.1	0.2	0.1	0.2	1.8	0.6
G_precuneus	0.5	0.6	0.0	0.2	0.1	0.2
G_rectus	1.7	0.4	0.0	0.2	0.7	0.8
G_subcallosal	0.3	0.8	0.6	0.1	0.0	0.2
G_temp_sup-G_T_transv	0.3	0.5	0.0	0.0	0.1	0.1
G_temp_sup-Lateral	0.3	0.5	0.7	0.1	0.5	0.2
G_temp_sup-Plan_polar	0.1	0.1	0.1	0.7	1.2	0.4
G_temp_sup-Plan_tempo	0.2	0.2	0.3	0.2	0.3	0.6
G_temporal_inf	0.0	0.0	0.1	0.0	0.3	0.1
G_temporal_middle	0.3	0.5	0.3	0.3	0.1	0.2
Lat_Fis-ant-Horizont	0.6	0.7	0.9	0.8	1.0	0.2
Lat_Fis-ant-Vertical	0.2	0.7	0.7	0.1	0.4	0.2
Lat_Fis-post	0.7	0.0	0.5	1.0	0.6	0.1
Pole_occipital	0.7	0.8	0.2	0.8	0.2	0.0
Pole_temporal	0.2	0.4	0.1	0.1	0.5	0.5
S_calcarine	0.1	0.1	0.1	0.7	0.3	0.3
S_central	0.1	0.1	0.4	0.6	0.5	0.2
S_cingul-Marginalis	0.2	0.1	0.5	0.3	0.4	0.1
S_circular_insula_ant	0.0	0.3	1.6	0.2	0.4	0.5
S_circular_insula_inf	0.0	0.2	0.2	0.0	0.1	0.3
S_circular_insula_sup	0.3	0.3	0.2	0.0	0.2	1.1
S_collat_transv_ant	0.2	0.1	0.1	0.4	0.0	0.5
S_collat_transv_post	0.0	0.1	0.0	0.3	0.2	0.4
S_front_inf	0.0	0.1	0.0	1.2	0.6	0.4
S_front_middle	0.6	1.0	1.3	0.1	0.1	1.0
S_front_sup	0.1	0.0	1.1	0.4	0.5	0.3
S_interm_prim-Jensen	0.1	0.1	0.2	0.3	0.1	0.3
S_intrapariet_and_P_trans	0.3	0.4	0.6	0.0	0.4	0.7
S_oc_middle_and_Lunatus	0.1	0.5	0.3	0.2	0.4	0.5
S_oc_sup_and_transversal	0.4	0.7	0.5	0.8	1.2	0.3
S_occipital_ant	0.0	0.2	0.0	0.0	0.3	0.6
S_oc-temp_lat	0.4	0.6	0.7	0.4	0.5	0.4
S_oc-temp_med_and_Lingual	0.4	0.4	0.1	0.8	1.4	0.4
S_orbital_lateral	0.1	0.0	0.0	0.0	0.1	1.0
S_orbital_med-olfact	0.1	0.2	0.3	0.1	0.0	0.1
S_orbital-H_Shaped	0.5	0.2	0.0	0.8	1.1	0.1
S_parieto_occipital	0.0	0.0	0.2	0.2	0.1	0.0
S_pericallosal	0.2	0.3	0.4	0.4	0.7	0.3
S_postcentral	0.1	0.4	1.0	0.1	0.0	0.0
S_precentral-inf-part	0.1	0.8	1.0	0.7	0.8	0.1
S_precentral-sup-part	0.3	0.0	1.0	0.3	0.2	1.8
S_suborbital	0.8	0.6	0.3	0.1	0.2	1.0
S_subparietal	0.1	0.3	0.2	0.6	0.7	0.0
S_temporal_inf	0.4	0.0	0.5	0.2	0.6	1.2
S_temporal_sup	0.1	0.2	0.2	0.1	0.1	0.0
S_temporal_transverse	0.3	0.2	0.1	0.1	0.1	0.2

Note. SurfArea = surface area; GrayVol = gray matter volume; ThickAvg = average cortical thickness; lh = left hemisphere; rh = right hemisphere. *p*-values are expressed as the negative exponents of ten.

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Figure S3

T-tests for all the 74 regions per hemisphere in the structural analysis in the sham tDCS group (Sham) between baseline and post-treatment are given for surface area, gray matter volume, and average cortical thickness.

Sham (L/R), -log10(pvalue)

Region	prepost.lh.SurfArea	prepost.lh.GrayVol	prepost.lh.ThickAvg	prepost.rh.SurfArea	prepost.rh.GrayVol	prepost.rh.ThickAvg
G_and_S_frontomargin	1.1	0.2	0.0	0.1	0.2	0.0
G_and_S_occipital_inf	0.0	0.3	0.3	0.0	0.2	0.1
G_and_S_paracentral	0.2	0.4	0.1	0.1	0.7	0.4
G_and_S_subcentral	0.2	0.8	0.2	0.0	0.0	0.2
G_and_S_transv_frontopol	0.1	0.2	0.5	0.2	0.3	0.3
G_and_S_cingul-Ant	0.4	0.4	0.1	0.4	0.4	0.0
G_and_S_cingul-Mid-Ant	1.2	0.9	0.3	0.7	0.7	0.8
G_and_S_cingul-Mid-Post	0.1	0.0	0.1	0.1	0.1	0.1
G_cingul-Post-dorsal	0.7	0.1	0.8	0.5	0.1	0.5
G_cingul-Post-ventral	0.4	0.5	0.0	0.1	0.2	0.4
G_cuneus	0.9	0.1	0.5	1.1	0.0	0.5
G_front_inf-Opercular	0.4	0.1	0.3	0.4	0.2	0.3
G_front_inf-Orbital	1.5	0.9	0.3	1.0	0.6	0.1
G_front_inf-Triangul	0.0	0.2	0.9	1.0	1.0	0.2
G_front_middle	0.1	0.3	0.0	0.1	0.7	0.9
G_front_sup	0.8	1.2	0.4	0.0	0.1	0.3
G_Ins_lg_and_S_cent_ins	0.6	0.2	0.5	0.3	0.0	0.5
G_insular_short	1.8	0.2	0.0	0.0	0.3	0.4
G_occipital_middle	0.6	0.2	0.6	0.3	0.3	0.0
G_occipital_sup	0.5	0.3	0.3	0.6	0.4	0.3
G_oc-temp_lat-fusifor	1.1	0.6	0.8	0.5	0.0	0.4
G_oc-temp_med-Lingual	0.8	0.5	1.8	0.1	0.3	0.2
G_oc-temp_med-Parahip	0.3	0.2	0.0	1.1	1.0	0.0
G_orbital	0.7	0.1	0.8	0.0	0.1	0.1
G_pariet_inf-Angular	0.0	0.2	0.4	1.1	0.4	0.1
G_pariet_inf-Supramar	0.7	0.0	0.5	0.2	0.4	0.1
G_parietal_sup	0.3	0.1	0.1	0.2	0.3	0.1
G_postcentral	0.2	0.9	0.9	0.1	0.2	0.1
G_precentral	0.1	0.3	0.6	0.0	0.0	0.1
G_precuneus	0.3	0.0	0.2	0.3	0.1	0.1
G_rectus	0.5	0.5	0.1	1.6	0.6	0.4
G_subcallosal	0.4	0.6	0.2	0.2	0.6	0.6
G_temp_sup-G_T_transv	0.2	0.3	0.1	0.1	0.0	0.1
G_temp_sup-Lateral	0.6	0.9	0.5	0.1	0.2	0.0
G_temp_sup-Plan_polar	0.3	0.4	1.0	0.2	0.2	0.1
G_temp_sup-Plan_tempo	0.2	0.2	0.2	2.5	1.9	0.1
G_temporal_inf	0.8	0.2	1.2	0.5	0.9	0.4
G_temporal_middle	1.1	0.1	0.9	0.3	0.4	0.3
Lat_Fis-ant-Horizont	0.9	0.7	0.3	0.3	0.9	0.9
Lat_Fis-ant-Vertical	0.0	0.0	0.1	0.0	0.1	0.2
Lat_Fis-post	0.2	0.1	0.4	0.4	0.1	0.2
Pole_occipital	0.1	0.0	0.1	0.6	0.0	0.2
Pole_temporal	0.3	0.1	0.4	0.4	0.0	0.3
S_calcarine	0.2	0.1	0.5	0.3	0.5	0.3
S_central	2.8	0.6	0.2	0.5	1.0	0.5
S_cingul-Marginalis	0.1	0.0	0.1	0.1	0.1	0.1
S_circular_insula_ant	0.0	0.0	0.0	0.4	0.4	0.4
S_circular_insula_inf	0.5	0.1	0.1	0.4	0.3	0.3
S_circular_insula_sup	0.4	0.4	0.3	0.7	0.6	1.5
S_collat_transv_ant	0.2	0.1	0.1	0.7	1.3	0.3
S_collat_transv_post	0.0	0.1	0.3	0.1	0.8	0.6
S_front_inf	0.2	0.1	1.5	0.3	0.1	0.7
S_front_middle	1.1	1.2	0.4	0.1	0.4	0.4
S_front_sup	0.0	0.2	0.0	0.0	0.1	0.4
S_interm_prim-Jensen	1.0	0.7	0.2	0.6	0.4	0.1
S_intrapariet_and_P_trans	0.5	0.4	0.1	0.5	0.5	0.4
S_oc_middle_and_Lunatus	0.1	0.1	0.3	1.0	0.8	0.3
S_oc_sup_and_transversal	0.5	0.5	0.3	0.0	0.2	0.5
S_occipital_ant	0.2	0.4	0.8	0.0	0.0	0.1
S_oc-temp_lat	0.1	0.1	1.1	1.1	1.6	0.8
S_oc-temp_med_and_Lingual	0.5	0.0	0.4	0.5	0.4	0.1
S_orbital_lateral	0.7	0.2	0.4	0.2	0.1	0.8
S_orbital_med-olfact	0.7	0.0	0.2	0.3	0.2	0.4
S_orbital-H_Shaped	0.5	0.6	0.6	0.6	0.9	0.2
S_parieto_occipital	0.0	0.2	0.1	0.5	0.1	0.4
S_pericallosal	0.4	0.3	0.2	0.5	0.1	0.6
S_postcentral	0.9	0.1	0.7	1.0	1.0	0.8
S_precentral-inf-part	1.0	0.4	1.0	0.4	0.4	0.2
S_precentral-sup-part	0.6	0.6	0.2	0.1	0.3	0.4
S_suborbital	0.0	0.1	0.4	0.4	0.6	0.4
S_subparietal	0.8	0.9	0.1	0.1	0.2	0.0
S_temporal_inf	0.2	0.0	0.5	0.4	0.2	0.1
S_temporal_sup	0.0	0.3	0.6	0.2	0.2	0.0
S_temporal_transverse	0.9	1.2	1.0	0.8	0.5	1.1

Note. SurfArea = surface area; GrayVol = gray matter volume; ThickAvg = average cortical thickness; lh = left hemisphere; rh = right hemisphere. *p*-values are expressed as the negative exponents of ten.

The means for Glx and GABA across all time points for both real and sham tDCS groups are presented in Table S2. Figure S2 depicts the voxel placement (panel A), a typical MR spectroscopy spectrum as provided by LCModel (panel B), and mean Glx and GABA levels for the DLPFC and TPC in real and sham participants across baseline, post-treatment, and follow-up (panels C to F).

None of the other metabolites or parameters (choline, creatine, myo-inositol and NAA) showed a significant main effect or interaction involving the factor Stimulation. The SNR did not differ between groups (all $Fs_{(1,18)} \leq 2.00$, $ps \geq .182$, $\eta_p^2 s \leq .143$).

Table S2

Descriptive means for Glx and GABA by real and sham group (values in institutional units).

Test	Baseline		Post-treatment		Follow-up	
	Real	**Sham**	**Real**	**Sham**	**Real**	**Sham**
Glx DLPFC	13.0	13.6	12.4	14.1	12.2	13.6
Glx TPC	12.6	12.4	12.6	12.7	12.7	14.0
GABA DLPFC	2.5	2.3	2.5	2.6	2.4	2.2
GABA TPC	2.3	2.5	2.4	2.3	2.4	2.5

Glx – glutamine + glutamate, GABA - γ-aminobutyric acid.

Figure S4
MR spectroscopy setup and results.

Notes. Panel A) Voxel placement (in orange) during MRS acquisition of the DLPC and TPC (sagittal and axial view) from one participant and the electrical field simulation for the group (in blue). Panel B) Typical successfully acquired MRS spectrum as given by LCModel. The black line denotes the measured data, the red line the model. Concentration estimates for the different neurotransmitters are given in the right-hand box. Mean Glx and GABA levels (institutional units of concentration, similar to mmol) in the DLPFC (panel C, E) and TPC (panel D, F) with AHRS as covariate. All Error bars denote 95% CI. Real tDCS in red, sham tDCS in blue.

In the dichotic listening task, we found a significant main effect *Attentional focus* ($F_{(2,16)}$=5.38, p=.016, η_p^2=.402), with the highest accuracy rate in the no attentional focus condition (*M*=35.0 %, *SD*=1.1%), compared to attentional focus left (*M*=33.7 %, *SD*=1.5%) and right (*M*=34.6 %, *SD*=1.3%), and a significant interaction between *Attentional focus* and baseline AHRS scores ($F_{(2,16)}$=4.70, p=.025, η_p^2=.370).

Figure S5 below depicts a T-contrast across all three attentional focus conditions showing typical auditory cortex and temporo-parietal cortex activations during dichotic listening (p<.05 (FWE)).

Figure S5

T-contrasts for dichotic listening paradigm.
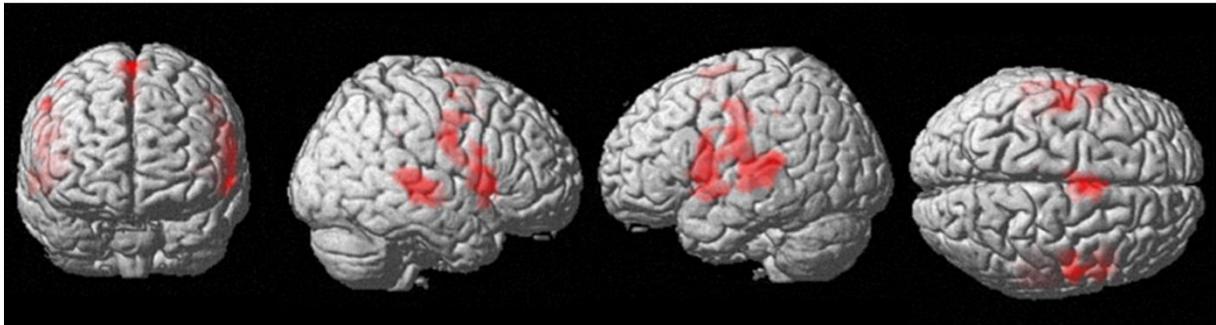
Figure S6

Electrical field simulation of tDCS for all participants in the real tDCS and sham tDCS groups.
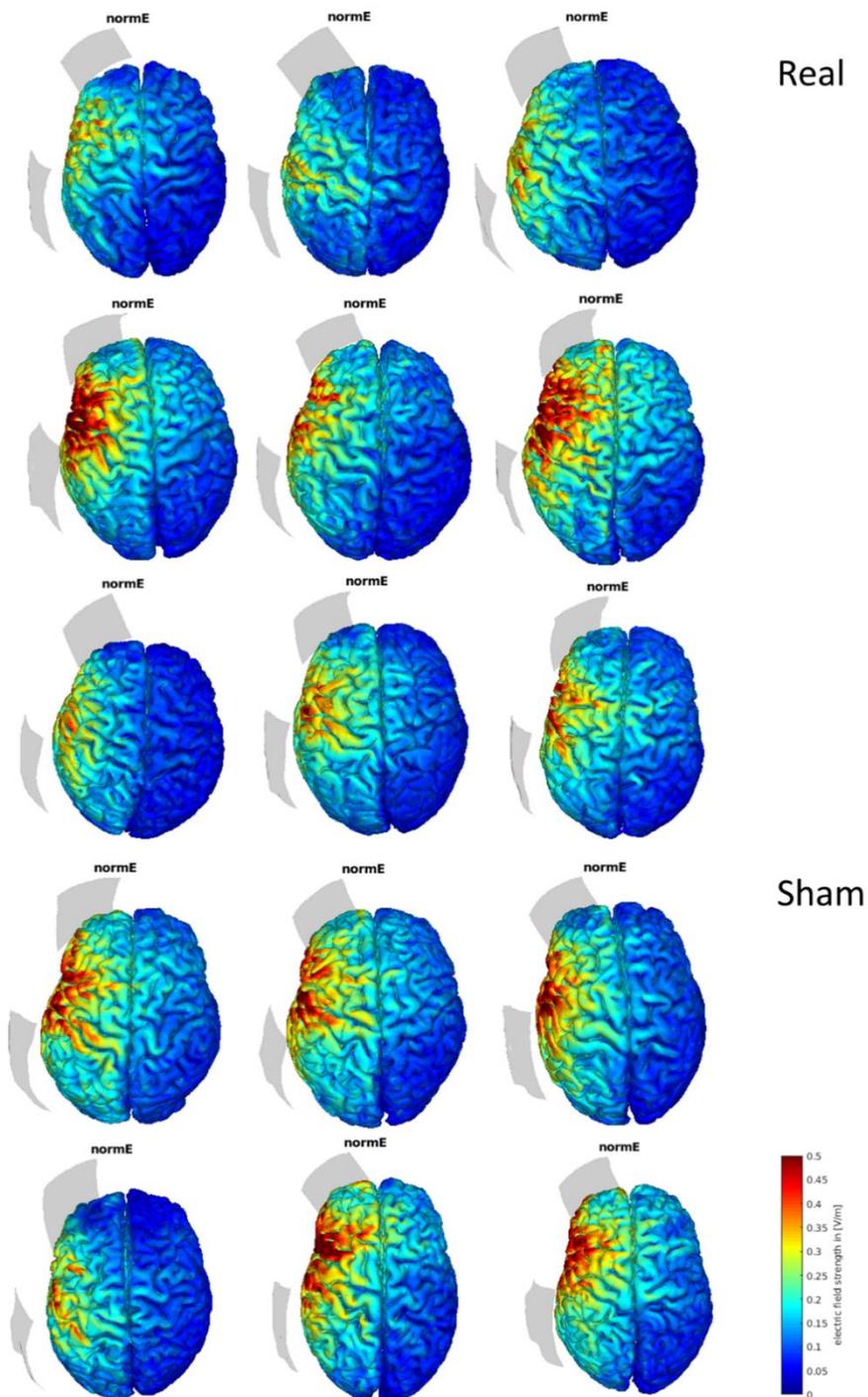
Notes. Electric fields (EF) (in V/m, maximum set on 0.5) for all participants receiving real and sham tDCS. Despite considerable inter-individual differences, no systematic differences between the two groups are observed (see main manuscript, section 4.6).

Correlations

In addition to the correlations provided in the main text, we explored whether changes in structural data were correlated with changes neurotransmitters. To this end, we computed correlations between structural changes at post-treatment and follow-up for all 12 chosen brain areas and changes in Glx and GABA at post-treatment and follow-up across all participants. None of these correlations were significant when corrected for multiple testing (all $rs \leq -.74$, $ps=.002$, $ps_{corr}=1.0$).

To see if changes in structural data are associated with the simulated electric field, post-treatment and follow-up change in structural data for all 12 chosen brain areas were correlated with electric field and focality measures for those participants only who received real tDCS. None of these correlations were significant (all $rs \leq -.79$, $ps=.011$, $ps_{corr}=1.0$) when corrected for multiple testing. Similarly, electric field and focality measures were correlated with Glx and GABA changes at post-treatment and follow-up in participants who received real tDCS. None were significant when corrected for multiple testing (all $rs \leq -.63$, $ps=.067$, $ps_{corr}=1.0$). All corrections are based on the Holm's method [1].

Blinding, expectations, and side effects

In the real tDCS group, 8/11 participants (73%) and 4/10 participants (40%) in the sham group guessed correctly that they received real or sham tDCS (Fisher's Exact test, $p=.142$, one-sided). The number of correct guesses in the real tDCS group ($p=.227$) and sham group ($p=.754$) did not differ significantly from 50% as indicated by a binominal test. The experimenter guessed correctly for 5/11 (46%) of the participants in the real group and for 7/10 (70%) in the sham group (Fisher's Exact test, $p=.245$, one-sided). The number of total correct guesses did not differ significantly from 50% ($p=.664$).

Expectations for the treatment were generally high, with only 19% of participants expecting less than 5 on the 0-10 scale. Means in the real tDCS and sham group (M=6.8) did not differ significantly (see Table 1).

The number of participants reporting side effects are presented in Table 4 below. Chi-squared tests showed significant difference in neck pain (χ^2=25.37, p<.001), tingling sensation (all χ^2=22.60, p<.001) and red skin (all χ^2=29.10, p<.001) in reports of any of the side effects between real tDCS and sham groups, when mild, moderate, and severe reports were combined into "present" versus "absent". Note that neck pain was more reported in the sham group.

Participants did not guess significantly above chance level, but there was, descriptively, a tendency towards guessing that participants received real tDCS (n=13) versus guessing whether they received sham (n=8). This may be due to the tDCS-like sensations that participants experienced at the beginning of sham and, possibly, reflect participants' hope to receive real treatment. Nevertheless, it seems fair to conclude that the blinding worked reasonably well.

Table S3

Frequency of adverse events as measured with the tDCS Adverse Effects Questionnaire in number of

occurrences in all real and sham tDCS sessions (n=210).

Adverse effects	Real tDCS (110 sessions)				Sham tDCS (100 sessions)				
	Mild	Moderate	Severe	∑	Mild	Moderate	Severe	∑	*p* for Chi^2
Headache	6	2	-	**8**	14	-	-	**14**	.031
Neckpain	1	-	-	**1**	9	10	2	**21**	**<.001**
Pain in Skull	9	5	-	**14**	10	-	-	**10**	.102
Tingling	40	22	-	**62**	21	3	1	**25**	**<.001**
Itching	31	7	-	**38**	19	2	-	**21**	.141
Burning sensation	35	3	-	**38**	18	7	2	**27**	.05
Red skin	34	1	-	**35**	2	-	-	**2**	**<.001**
Sleepiness	11	9	1	**21**	16	7	1	**24**	.474
Concentration	10	6	-	**16**	8	1	-	**9**	.242
Change in Humor	2	-	-	**2**	7	5	-	**12**	.005

CONSORT 2010 checklist of information to include when reporting a randomised trial*

Section/Topic	Item No	Checklist item	Reported on page No
Title and abstract			
	1a	Identification as a randomised trial in the title	1
	1b	Structured summary of trial design, methods, results, and conclusions	1
Introduction			
Background and objectives	2a	Scientific background and explanation of rationale	1-2
	2b	Specific objectives or hypotheses	2
Methods			
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	6, table 2
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	15
Participants	4a	Eligibility criteria for participants	3
	4b	Settings and locations where the data were collected	3
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	3 and 5
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	3
	6b	Any changes to trial outcomes after the trial commenced, with reasons	3
Sample size	7a	How sample size was determined	15
	7b	When applicable, explanation of any interim analyses and stopping guidelines	NA
Randomisation:			
	8a	Method used to generate the random allocation sequence	3-4

Sequence generation	8b	Type of randomisation; details of any restriction (such as blocking and block size)	3-4
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	3-4
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	3-4
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	3-4
	11b	If relevant, description of the similarity of interventions	5
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	6-10
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses	Supplementary Material (SM)

Results

Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	4, table 1
	13b	For each group, losses and exclusions after randomisation, together with reasons	4, table 1
Recruitment	14a	Dates defining the periods of recruitment and follow-up	6
	14b	Why the trial ended or was stopped	6
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	4, table 1
Numbers analysed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	5, figure 1
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	10-14
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended	NA

Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	SM
Harms	19	All important harms or unintended effects in each group (for specific guidance see CONSORT for harms)	SM page 15-16

Discussion

Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	15
Generalisability	21	Generalisability (external validity, applicability) of the trial findings	15
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	14-16

Other information

Registration	23	Registration number and name of trial registry	3
Protocol	24	Where the full trial protocol can be accessed, if available	NA
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	16

* We strongly recommend reading this statement in conjunction with the CONSORT 2010 Explanation and Elaboration for important clarifications on all the items. If relevant, we also recommend reading CONSORT extensions for cluster randomised trials, non-inferiority and equivalence trials, non-pharmacological treatments, herbal interventions, and pragmatic trials. References to this checklist, see www.consort-statement.org.

References

1.   Aickin, M. and H. Gensler, *Adjusting for multiple testing when reporting research results: the Bonferroni vs Holm methods.* American journal of public health, 1996. **86**(5): p. 726-728.