Project Title: Effects of transcranial direct current stimulation (tDCS) on cognition in older adults with mild cognitive impairment: A randomized controlled trial

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Statistical analysis

SPSS version 26 or newer will be used for the statistical analysis. Intention-to-treat analysis will be used. Little's Missing Completely at Random (MCAR) test will be used to evaluate whether data missing at the baseline, post-intervention and follow-up stages are systematically linked to included variables. Multiple imputation methods will be used to handle missing data. At the baseline session, the age and years of education will be compared between the groups using independent-samples *t*-tests. A chi-square test will be performed to evaluate differences in the proportions of men to women between the groups. Correlational analysis will be conducted between demographic variables (age, gender, and education) and primary and secondary outcomes at the baseline session. Variables with significant correlation will be regarded as potentially confounding variables.

A mixed repeated measures analysis of variance with the stimulation method (anodal/sham) as the between-subjects factor (independent variable) will be used to test differences in the dependent variables that include neurocognitive test scores, computer task accuracy (d') and reaction times at 3 time points (pre, post, and follow-up). The two ERP components (P550 and LPC) included in this analysis will be determined based on a visual inspection and findings from previous studies. The average ERP amplitudes at P500 will be determined at approximately 360 and 700 milliseconds after the stimulus, and the LPC will be determined at approximately 700 and 1,000 ms after the stimulus. The exact time windows used to calculate the average amplitudes will be adjusted based on the latency of the components in the actual data. To test the amplitudes of P550 and LPC, analyses (i.e., mixed repeated measures ANOVAs) will include stimulation method (anodal, sham) × response (remembered, forgotten) x time (pre, post, and follow-up). Significant interaction effects will be subjected to post-hoc analyses. Sensitivity tests that include potential confounders (i.e., demographic variables, primary and secondary outcomes) will be conducted to test the robustness of the outcomes. If any of the results do not meet the sphericity requirements, the Greenhouse–Geisser correction will be applied. The *p* levels of all post-hoc analyses will be adjusted using the Bonferroni correction (i.e., $p < 0.05$/number of comparisons). Only results that meet the corrected *p* value cut-off will be considered significant in the post-hoc analyses.