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EFFECTS OF WORKING MEMORY TRAINING COUPLED WITH TDCS IN HEALTHY OLDER ADULTS

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Background: Working memory training (WMT) has been proposed as a tool to enhance working memory (WM). However, there is limited evidence of transfer effects to other cognitive domains. Transcranial direct current stimulation (tDCS) has been suggested to enhance cognitive gains when coupled with cognitive training. Nevertheless, few studies have explored the synergetic effects of WMT coupled with tDCS in older adults.

Aims: To assess the effects of 5-days WMT coupled with tDCS on near- (Digit Span) and far- (Raven Advanced Progressive Matrices - RAPM) transfer tasks.

Method: 54 healthy old adults ($M_{age} = 68.6$; 32 females) were randomly assigned to one of three groups: 1) WMT (dual n-back task) + atDCS (anodal, 2 mA; 20min; placed over left dorsolateral prefrontal cortex); 2) WMT + sham tDCS; 3) double-placebo. Assessments were carried out at baseline; post-training; and at a 15 days follow-up.

Results: The analyses showed that only atDCS+WMT group displayed a significant improvement in reasoning (RAPM) at post training and follow-up and in short-term memory (forward digit span) at follow-up. Those results are in line with studies performed in the context of this project. First, our meta-analysis showed small significant and long-lasting near transfer effects of WMT. Additionally, by conducting a systematic review, we suggested that tDCS may modulate WM in older adults boosting their cognitive processes.

Conclusion: tDCS boosted WMT effects producing near and far transfer (to short-term memory and reasoning), which is observed especially at follow-up assessment.

Keywords: Working memory training, aging, tDCS

Publications:

Teixeira-Santos, A. C., Moreira, C. S., Magalhães, R., Magalhães, C., Pereira, D. R., Leite, J., Carvalho, S., & Sampaio, A. (2019). Reviewing working memory training gains in healthy old people: A meta-analytic review of transfer for cognitive outcomes. *Neuroscience & Biobehavioral Reviews*(103): 163-177doi: <https://doi.org/10.1016/j.neubiorev.2019.05.009>.

Teixeira-Santos, A. C., Pinal, D., Pereira, D. R., Leite, J., Carvalho, S., & Sampaio, A. (2020). Probing the relationship between late endogenous ERP components with fluid intelligence in healthy older adults. *Scientific Reports*, 10, 11167. <https://doi.org/10.1038/s41598-020-67924-4>

Teixeira-Santos, A. C., Moreira, C. S., Pereira, D.R., Pinal, D., Fregni, F., Leite, J., Carvalho, S., & Sampaio, A. (submitted). Working memory training coupled with tDCS in older adults: A randomized, controlled experiment.

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