The impact of tDCS on rumination:
A systematic review of the sham-controlled studies among healthy and clinical samples

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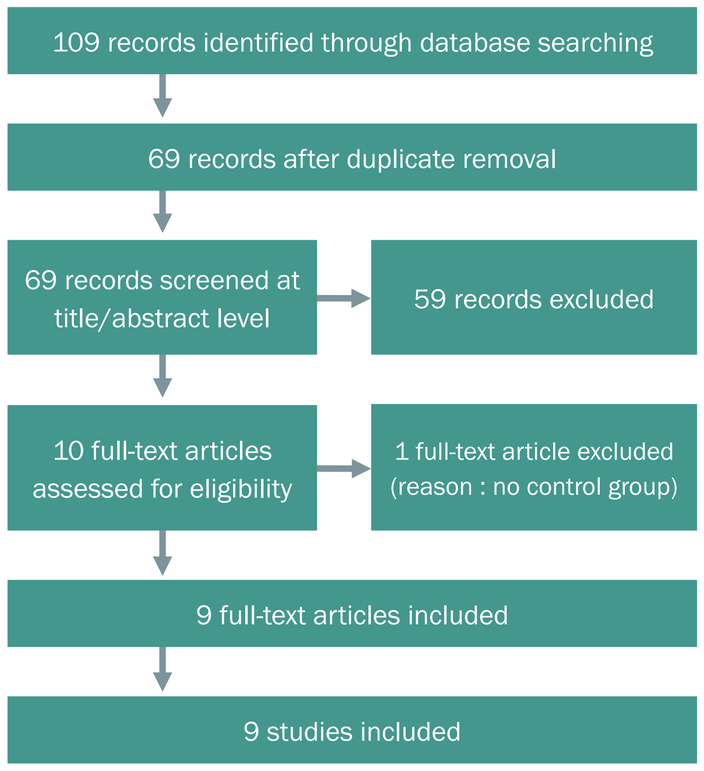
Aim of this Systematic Review

→ To assess the sham-controlled studies, conducted among both healthy and clinical samples, investigating the effectiveness of tDCS in reducing rumination

→ And to identify the most desirable combination of stimulation parameters and research protocols to do so

Flow Diagram



Method

Search Strategy

Relevant studies, published in English so far, were identified following a systematic search of the Scopus, PubMed, and PsycINFO database using the keywords depicted as follows:

("tDCS" OR "transcranial direct current stimulation" OR "brain stimulation" OR "neuro modulation" OR "direct stimulation" OR "transcranial electric stimulation" OR "electric stimulation" OR "non-invasive brain stimulation") AND ("rumination" OR "repetitive negative thinking" OR "post event processing" OR "post-event processing" OR "negative thinking" OR "repetitive thinking" OR "worry" OR "repetitive thought" OR "brooding" OR "intrusive thoughts" OR "ruminative" OR "worrying" OR "self-reflexion")

Inclusion criteria

a) active tDCS, b) sham tDCS, c) at least one measure of rumination, d) healthy adult participants or patients with psychiatric disorders (regardless of the disorder)

Study Selection & Data extraction

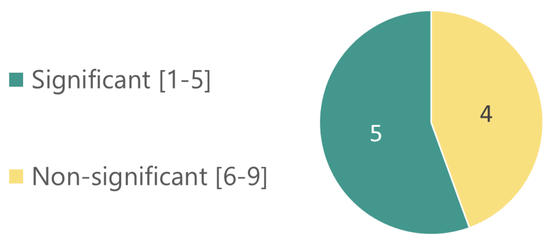
→ Done by two indepedent assessors (YH & BÖ)

→ *Quality assesment :* the Risk of Bias tool 2 [10]. Six studies have an overall risk-of-bias judgment of « some concerns », three studies have an overall « low concerns » judgement

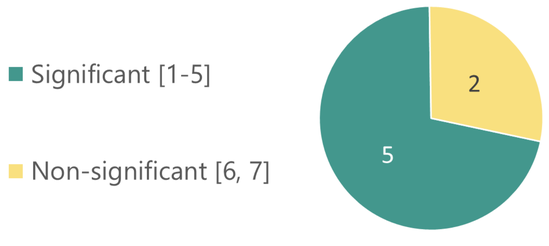
Data Synthesis

Effects of tDCS on rumination

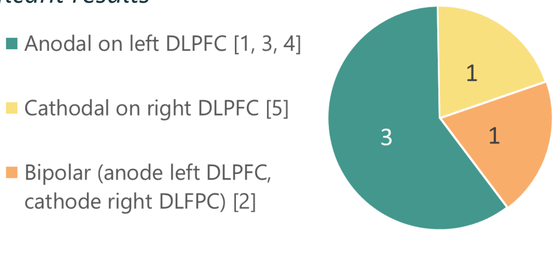
Studies with significant results



When excluding the studies with only trait measures of rumination

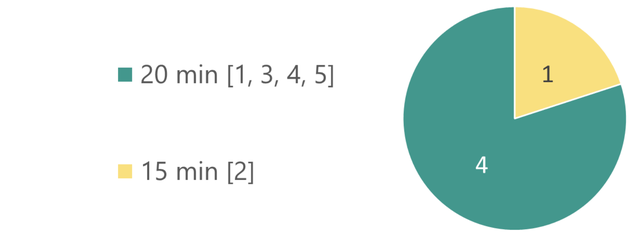


Electrodes positioning among studies with significant results

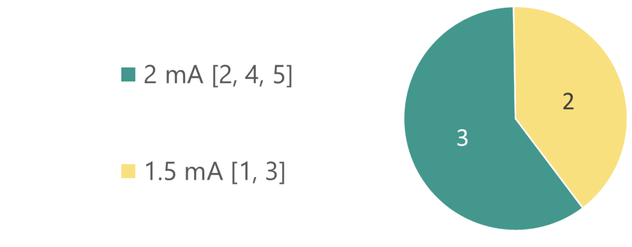


Stimulation parameters of studies with significant results

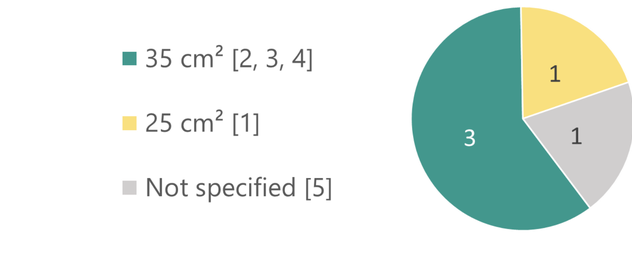
Duration



Voltage

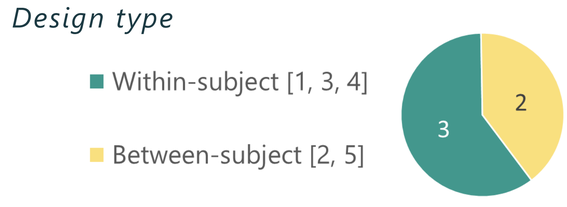


Electrode size

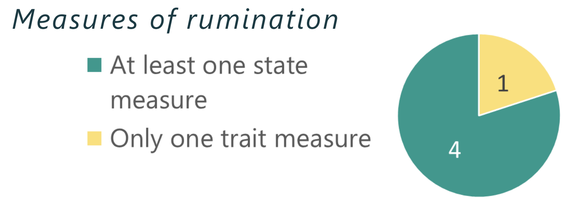


Study design of studies with significant results

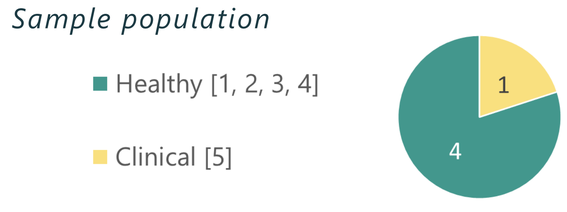
Design type



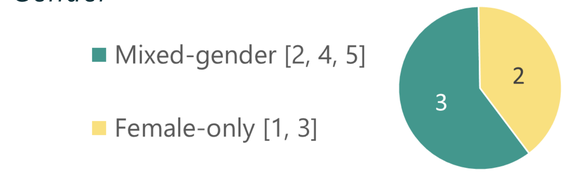
Measures of rumination



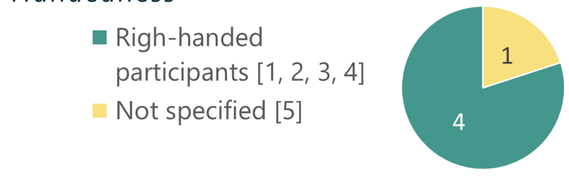
Sample population



Gender



Handedness



Discussion

Main findings

→ **tDCS significantly reduces rumination** in one session [1-4] or 10 sessions [5] when using anode stimulation on left DLPFC *and/or* cathode stimulation on right DLPFC

Limitations

→ Small number of studies and huge heterogeneity

→ Lack of multi-session studies

→ Lack of studies with follow-up

Future studies

→ Assessing state rumination

→ Replication in clinical samples

→ Controlling for handedness [11] (e.g., only right-handed participants)

References

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Preregistered Systematic Review

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