The effects of frontal transcranial direct current stimulation on the control of social emotional behavior

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Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Other condition
Study type	Interventional

Summary

ID

NL-OMON38859

Source
ToetsingOnline

Brief title
tDCS PFC and control of social emotional behavior

Condition

- Other condition

Synonym
na

Health condition

na

Research involving
Human

Sponsors and support

Primary sponsor: Radboud Universiteit Nijmegen
Source(s) of monetary or material Support: Ministerie van OC&W,Mosaic grant;VIDI grant

Intervention

Keyword: prefrontal cortex, social emotional behavior, transcranial direct current stimulation

Outcome measures

Primary outcome

Reaction time and responses, made by the participant, will be used to test whether anodal tDCS of the vlPFC compared with the control tDCS conditions will decrease the instrumental biases evoked by the emotional faces. Furthermore, postural sway will be used to test whether anodal tDCS of the vlPFC compared with the other tDCS conditions will decrease reduction of postural sway evoked by negative emotional faces (as a measure of an automatic emotional response).

Secondary outcome

Enhanced freeze has been shown to be associated with anxiety, whereas decreased emotional influences on instrumental approach-avoidance biases have been found to be associated with instrumental aggression. To account for the effects of individual differences, subjective questionnaires will be administered to assess the individual differences in anxiety, aggression, and attentional control. Data of a non-social version of the task, in terms of reation time and responses, made by the participant, will be used to test whether offline tDCS of the vlPFC will decrease the instrumental biases evoked by the non-social emotional stimuli.

Study description

Background summary

A number of studies have employed the joystick affective approach-avoidance task (AAT) for studying control of social emotional behavior. Using this paradigm, it has been shown that reaction times are longer during approach of negative and avoidance of positive facial expressions (affect-incongruent), compared with the reaction times during the approach of positive and the avoidance of negative facial expressions (affect-congruent), referred to as the congruency-effect. This effect is due to the requirement to override the automatic emotional responses in the affect-incongruent condition. There is causal evidence that the vlPFC is crucial for overriding such automatic emotional responses. However, it remains unknown whether the vlPFC exerts its effect by inhibiting the emotional responses themselves in the affect-incongruent context, or by regulating their influence (i.e. transfer) on goal-driven (instrumental) behavior during performance of affect-incongruent trials, or even both.

Study objective

The aim is to specify the role of the vlPFC in the control of social emotional behavior. We will combine transcranial direct current stimulation (tDCS) and a modified version of the joystick affective AAT involving posturography (to assess postural control), which allows us to disentangle automatic emotional responses and instrumental responses. The primary objective is to causally test whether the vlPFC is involved in the control of social emotional behavior, by inhibiting emotional responses and/or by regulating the transfer of emotional responses onto instrumental behavior.

Study design

This involves an experimental between-subject design. Participants will receive one of the three tDCS conditions and perform a modified version of the joystick affective AAT involving posturography.

Intervention

Participants will receive one of the following three interventions:
1. Anodal tDCS of the vlPFC (experimental condition)
2. Cathodal tDCS of the vlPFC (to control for polarity)
3. Sham tDCS (to control for stimulation)

Study burden and risks

Participants will not directly benefit from their participation in the study, except for a compensatory (financial) incentive. Transcranial current stimulation (tCS) is a widely used non-invasive brain stimulation technique, applying weak direct/alternating currents (tDCS/tACS) via conductive rubber/sponge electrodes to the scalp. These weak currents can slightly shift the neurons* membrane potential and thereby increase or decrease spontaneous neuronal activity in the stimulated cortex, but (unlike TMS) they do not evoke action potentials. During the stimulation, participants may transiently experience light tingling, itching or burning sensations on the skin underlying the electrodes, which can be unpleasant. The most common side effects are a light transient headache and a feeling of fatigue. In the current study, healthy participants will be stimulated with a protocol that is considered safe with respect to the latest published safety guidelines. All subjects are screened for their relevant medical history and other tCS safety aspects (e.g. metal parts in the head, skin allergies). In summary, because the risk is negligible and the burden associated with participation can be considered minimal, we do not expect serious adverse events during the project.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

Only healthy, competent, women (18-35 years) with normal or corrected-to-normal vision will be included.

Exclusion criteria

• Serious head trauma or brain surgery
• Large or ferromagnetic metal parts in the head (except for a dental wire)
• Implanted cardiac pacemaker or neurostimulator
• Pregnancy
• Skin diseases at intended electrode sites (tCS)
• Disorders of vision (i.e., deviation from *normal or corrected-to-normal vision*)
• History or current presence of any neurologic or psychiatric disease
• Any prescribed medication that can alter cortical excitability (e.g. antiepileptics, tricyclic anti-depressives or benzodiazepines) or can have an influence on the participant*s vigilance or cognitive performance within two weeks prior to participation

Study design

Design

Study type:	Interventional
Intervention model:	Parallel
Allocation:	Randomized controlled trial
Masking:	Single blinded (masking used)
Control:	Placebo
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	01-11-2013
Enrollment:	150
Type:	Actual

Ethics review

Approved WMO Date:	04-07-2013
Application type:	First submission
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)
Approved WMO Date:	28-11-2013
Application type:	Amendment
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)
Approved WMO Date:	04-02-2014
Application type:	Amendment
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL44618.091.13