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Testing repetitive tDCS on daily smoking behaviour: A placebo controlled EMA study

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Ilse Verveer[1], Danielle Remmerswaal[1], Joran Jongerling[1], Frederik M. van der Veen[1], Ingmar H. A. Franken[1]

[1]Erasmus University Rotterdam

1 Works for me dx.doi.org/10.17504/protocols.io.bcgdits6

Ilse Verveer

ABSTRACT

The aim of the study was to explore the effects of repetitive tDCS on smoking behaviour by means of ecological momentary assessments (EMA) in a sample of *ad libitum* smokers

Participants recruited for this study were smokers between the age of 18 and 65 years who smoked 10 cigarettes or more a day and who had the ability to speak, read, and write in Dutch. Exclusion criteria were: 1) Current substance use disorder of a substance other than nicotine or caffeine; 2) History of neurological or psychiatric disorders; 3) Any contraindication for electrical brain stimulation procedures (i.e. electronic implants or metal implants); 4) Pregnancy or breast-feeding; 5) Intentions to actively try to quit smoking in the next three months. Participants were recruited via advertisement at Erasmus University Rotterdam from October 2016 until March 2018 and received either course credit or a financial compensation of 20 euro

The current study employed a double-blind, randomized, sham-controlled design in which subjects received a total of six tDCS sessions (active or sham) on three days in one week with at least one day in between. Participants were first randomly assigned to either sham or active tDCS. Then, before the tDCS sessions and at three months follow-up, participants completed the Fagerström Test of Nicotine Dependence (FTND; [28]). Breath carbon monoxide concentrations were also measured using a Micro+ Smokerlyzer (Bedfont Scientific Ltd., Rochester, UK) to objectively define smoking.

To measure changes in smoking behaviour, participants were asked to keep track of their cigarette consumption, craving and affect in an application on their mobile phones (EMA). Questions in the application were presented at four random times a day for three weeks in total (random assessments; RA's), starting the week before the first tDCS session. After three months, participants were asked to fill out the same four-time daily random assessments for one more week. In addition, participants were asked to start a session every time they smoked a cigarette (user-initiated smoking assessment; SA) for three months in total. An 'end of the day' assessment (EA) was also implemented for three months, which asked participants to fill out the total number of smoked cigarettes of that day.

EXTERNAL LINK

https://doi.org/10.1371/journal.pone.0233414

THIS PROTOCOL ACCOMPANIES THE FOLLOWING PUBLICATION

Verveer I, Remmerswaal D, Jongerling J, Veen FMvd, Franken IHA (2020) No effect of repetitive tDCS on daily smoking behaviour in light smokers: A placebo controlled EMA study. PLoS ONE 15(5): e0233414. doi: 10.1371/journal.pone.0233414

GUIDELINES

Participants are contacted by phone and provided with information about the study. If they are interested in participating, the tDCS sessions are scheduled in. One week before the first session, they are instructed by email to download the LifeData application on their smartphone. The start-up session of the application has to provide general information about how to use the app. From this moment on, they receive questions about their daily smoking behaviour. Daily smoking behaviour is measured for three weeks, starting the week before the first tDCS

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session, and for one more week at three months follow-up. During these periods, craving is measured for four times and participants are asksed to fill-out the total number of smoked cigarettes at the end of the day.

During the first session in the lab, participants are seated in a relaxing environment
Participants are provided with a thorough verbal explanation of the research procedure and the purpose of the investigation and are given the opportunity to ask any study related questions. Then written informed consents are obtained from participants before the start of the experiment. Before the tDCS session, they will fill out the FTND.

The first and last session start with obtaining breath carbon monoxide concentrations using a Micro+ Smokerlyzer
For every session, tDCS is applied:
The large rubber band is placed around the head right above the ears. Electrodes (35 cm^2) are placed over F3 (cathodal, blue line) and F4 (Anodal, red line) with a thick layer of high-conductive EEG gel underneath. Make sure the gel does not flow from underneath the electrodes. Once the electrodes are placed, you can apply the small rubber band over them and attach this to the larger band.
Before you turn on the system, tell participants again how tDCS works and what they may experience. Some can be nerveus, so make sure they feel comfortable before you start.
Now you can test the impedance. When the impedeance is too high, the system will automatically shut down. When this happens, we recommend to clean the skin before applying the electrodes with some scrub and alcohol pads.
After this, the tDCS session can start by filling out the code. Start the system again with the same code after the 20 minute break. Participants should be relaxed during the session but not sleepy or aroused. We recommend to let them watch a neutral movie or a nature serie (we used the serie Cosmos). Check in on the participant every now and then.

The next two tDCS sessions are the same with the same code for the same participant. In our protocol there was at least one day in between the sessions.

After three months, participants return to the lab for another breath carbon monoxide measure and to let them fill-out the FTND again. Here, participants are told if they had received sham or active tDCS.

BEFORE START

Request ethical approval and preregister your study
Create an app with the EMA questionnaires for example with the LifeData platform (www.lifedatacorp.com)
Test whether the tDCS system is working properly. Electrodes need to be replaced every once in a while.
Let an independent researcher randomly assign the codes for sham/active tDCS to the participant numbers, and program the protocol in the tDCS system.
Don't let the experimenter look up the codes until the experiment is done to remain the double-blind design.
Recruit a sufficient number of participants

MATERIALS

NAME	CATALOG #	VENDOR
Fagerström Test of Nicotine Dependence		
Micro Smokerlyzer		
DC-plus stimulator		
LifeData platform		

SAFETY WARNINGS

Make sure to strictly follow the tDCS guidelines.
Do not include participants with any contraindication for electrical brain stimulation procedures, such as history of epilepsy, electronic implants or metal implants.

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