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Antipsychotic medication and weight gain: effects of neuromodulation and cognitive training

Submission date
21/09/2018

Recruitment status
No longer recruiting

Registration date
16/10/2018

Overall study status
Completed

Last Edited
26/10/2026

Condition category
Signs and Symptoms

[X] Prospectively registered
[X] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
Patients taking antipsychotic drugs often show increased calorie intake, increased food craving, binge eating and weight gain. Weight gain puts patients at increased risk for obesity-related conditions such as Type 2 diabetes and cardiovascular (heart and circulation) disease. It can also cause patients to stop taking their medications, which might mean that their mental illness gets worse. Drug treatments for this weight gain are not very effective and can have serious side effects. Behavioural treatments have limited effectiveness in acutely unwell patients who may find it hard to engage in therapy or exercise. Therefore, there is a need for the development of new treatments for weight management in patients receiving antipsychotic drugs.
Computerised Approach Bias Modification (ABM) training is a form of cognitive bias modification. It is thought to reduce approach tendencies and attention towards food cues in people who experience binge eating. It involves a simple training of arm movements in front of a computer screen. It seeks to alter responses towards food that people are not consciously aware of.
Transcranial direct current stimulation (tDCS) is a non-invasive form of brain stimulation. It stimulates specific brain areas using a mild electrical current (2 mA) via small electrodes placed on the scalp. Stimulation of the dorsolateral prefrontal cortex (DLPFC) with tDCS has been reported to reduce food cravings in healthy people and patients. It is thought that the control of eating is associated with neural networks in the prefrontal cortex that are also involved in self-regulation.
tDCS and ABM training might help people better regulate their eating behaviours. This study aims to investigate whether combining ABM training and tDCS (i.e. delivering the two treatments together) will have a stronger effect on reducing food cravings than either of the treatments alone. To our knowledge, this will be the first time that this combination will be used on people receiving antipsychotic medication.

Who can participate?
Male and female adults aged 18 to 65 who have schizophrenia or schizoaffective disorder and who have been on a stable dose of antipsychotic medication for at least 6 weeks prior to the study enrolment.

What does the study involve?
Participants are randomly allocated to one of two intervention groups. Participants will receive 5 sessions of ABM delivered in combination with either real tDCS or a placebo (dummy) version of tDCS. Food craving and other outcomes are measured in all participants at the start of the study, after treatment, and at the 2-week follow-up. Participants are also asked about their experience of this treatment.

What are the possible benefits and risks of participating?
Aside from monetary payment for participation, there are no direct benefits to taking part in this study, but the results may help to improve outcomes related to body weight for people taking antipsychotic medication in the future. TDCS has been shown to be safe when used correctly in a clinical setting. However, participants may find the procedure slightly uncomfortable. This is because a number of sensations can occur beneath the electrodes during stimulation including tingling, pain, itching, and burning. Not everyone feels these sensations or finds them uncomfortable, but if you do, remember you are free to stop the study at any point without giving an explanation. In some rarer cases, tDCS has been known to cause a headache, but this can be treated with mild painkillers (e.g. paracetamol). No side effects of ABM are known. The researchers will assess any discomfort during intervention sessions.

Where is the study run from?
King’s College London (UK)

When is the study starting and how long is it expected to run for?
June 2018 to March 2023

Who is funding the study?
South London and Maudsley NHS Foundation Trust Biomedical Research Centre (UK)

Who is the main contact?
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Contact information

Type(s)
Public

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Additional identifiers

Integrated Research Application System (IRAS)
251809

Study information

Scientific Title
ENTER: Effects of Neuromodulation and cognitive Training on Eating Responses

Acronym
ENTER

Study objectives
This study aims to investigate the feasibility of combining approach bias modification (ABM) training and transcranial direct current stimulation (tDCS) to reduce food cravings in people who take antipsychotic medication. The study will assess if there are synergistic effects of concurrent sessions of ABM + real tDCS on clinical outcomes in a population of service users with schizophrenia, compared to ABM + sham tDCS.

The primary aim is to assess the feasibility of using ABM training combined with tDCS in people with schizophrenia and to acquire data to inform the development of a large-scale randomised sham-controlled trial (RCT) of this intervention for weight management in this patient group. The specific objectives are to:
1. Establish the feasibility of conducting a large-scale RCT of [ABM + tDCS] in service users with schizophrenia by assessing recruitment, attendance, and retention rates.
2. Determine the practicality of simultaneously administering ABM and tDCS.
3. Estimate the treatment effect sizes and standard deviations for outcome measures to inform the sample size calculation for a large-scale RCT.
4. Determine whether service users with schizophrenia find concurrent [ABM + real tDCS] as acceptable and credible.

The secondary aim is to investigate the effects of five sessions of ABM training combined with tDCS on food craving, impulsivity (measured by temporal discounting), cognition, positive and negative symptoms in service users with schizophrenia. This involves examining:
1. Differences between pre [ABM + real/sham tDCS] VAS scores and post [ABM + real/sham tDCS] VAS scores (per each of the 5 treatment sessions and cumulatively over sessions).
2. Changes in scores on the questionnaires and performance in tasks regarding food, hunger, craving, impulsivity, temporal discounting, as well as general cognition, positive and negative symptoms of schizophrenia; measured at baseline and post-assessment.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 04/06/2019, NHS HRA South Central - Oxford B Research Ethics Committee (Whitefriars, Level 3, Block B, Lewin's Mead, Bristol, BS1 2NT; 020 7104 8049; nrescommittee.southcentral-oxfordb@nhs.net), ref: 19/SC/0279.

Primary study design

Interventional

Study design
Single-centre randomised sham-controlled feasibility study

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Weight gain in patients taking antipsychotic medication for schizophrenia or schizoaffective disorder

Interventions
Participants will be allocated to either one of the two intervention conditions or the control condition in a randomised order. Randomisation will be performed by by a researcher from the department who is independent from the study.

Participants will be allocated to either one of the two intervention conditions or the control condition in a randomised order. All participants will receive five sessions of concurrent ABM and real or sham (placebo) tDCS over three to four weeks. The study's trained researcher will place the anode over the right dorsolateral prefrontal cortex (dlPFC) and the cathode over the left dlPFC to administer real or sham tDCS. The ABM programme will use an implicit learning paradigm, in which participants are systematically trained to show avoidance behaviour (via a computer joystick) in response to visual cues of high calorie food. ABM and tDCS will be delivered at the same time, i.e. participants will engage in ABM training whilst receiving brain stimulation. Each session will last 20 minutes.

Food craving and other outcomes will be measured in all participants at baseline, post-treatment and at the 2-week follow-up to assess outcomes of each study group. In particular, the researchers are interested in changes in the frequency of food craving, and thought processes and emotions related to food and eating. They will also ask participants about their experience of this treatment.

Intervention Type
Mixed

Primary outcome(s)
The primary aim is to assess the feasibility of using ABM training combined with tDCS in people with schizophrenia and to acquire data to inform the development of a large-scale randomised sham-controlled trial (RCT) of this intervention for weight management in this patient group. The specific outcome measures include:
1. Recruitment assessed using recruitment records from the beginning to the end of the recruitment period
2. Attendance assessed using attendance records from the beginning to the recruitment till the end of the trial
3. Acceptability to service users assessed using VAS scores after each treatment session

Key secondary outcome(s)
The secondary aim is to investigate the effects of five sessions of ABM training combined with tDCS on food craving, impulsivity, cognition, positive and negative symptoms in service users with schizophrenia. The specific outcome measures include:

1. Food craving assessed using Food Craving Questionnaire - State (FCQ-S) along with Visual Analogue Scales (VAS) at baseline and post-treatment sessions, and Food Cravings Questionnaire - Trait - Reduced (FCQ-T-r) at baseline, post-treatment and follow-up sessions
2. Disordered eating behaviour assessed using Eating Disorder Examination (EDE-Q) at baseline and post-treatment sessions
3. Impulsiveness assessed using Barrett Impulsiveness Scale (BIS-11) at baseline and post-treatment sessions
4. Depression, anxiety and stress assessed using Depression, Anxiety and Stress Scale (DASS-21) at baseline, post-treatment and follow-up sessions
5. Positive and negative symptoms of schizophrenia assessed using Positive and Negative Syndrome Scale (PANSS-6) at baseline and post-treatment sessions
6. Cognition assessed using Montreal Cognitive Assessment (MoCA) at baseline and post-treatment sessions
7. Approach bias towards high-calorie food items assessed using Food Approach-Avoidance Task (F-AAT) and Stimulus Response Compatibility Task (SRC) at baseline and post-treatment sessions

Completion date
31/03/2023

Eligibility

Key inclusion criteria
1. Aged between 18 and 65 years
2. On a stable dose of antipsychotic medication for at least 6 weeks prior to the study enrolment
3. DSM-V diagnosis of schizophrenia or schizoaffective disorder

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Mixed

Lower age limit
18 Years

Upper age limit
65 Years

Sex
All

Total final enrolment
28

Key exclusion criteria
1. Significant/unstable medical or psychiatric disorder other than schizophrenia or schizoaffective disorder (e.g. substance dependence)

2. For those taking antidepressant medication - not being on a stable dose for 6 weeks prior to study enrolment
3. Allergies to any of the foods presented in the study
4. Cannot understand verbal English or written information in English
5. History of epileptic seizures, stroke or brain injury
6. Any implanted metal devices in the head
7. Frequent or severe headaches or dizziness
8. Pregnant
9. A tDCS safety questionnaire will also be administered and if considered not safe to deliver tDCS, individuals will subsequently be excluded on this basis

Date of first enrolment
07/01/2019

Date of final enrolment
04/03/2023

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
KIng's College London, Institute of Psychiatry, Psychology and Neuroscience
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Sponsor information

Organisation
King's College London

ROR
https://ror.org/0220mzb33

Funder(s)

Funder type
Government

Funder Name
NIHR Biomedical Research Centre

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Data sharing statement to be made available at a later date

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		26/10/2026	26/10/2026	Yes	No
Protocol article		06/03/2020	10/03/2020	Yes	No
HRA research summary			28/06/2023	No	No
Other publications	Participant experiences	21/06/2021	05/11/2024	Yes	No