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A trial investigating the effectiveness of transcutaneous auricular vagus nerve stimulation (taVNS) for misophonia

Submission date
05/12/2025

Recruitment status
Recruiting

Registration date
09/12/2025

Overall study status
Ongoing

Last Edited
09/12/2025

Condition category
Signs and Symptoms

[X] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[_] Results
[_] Individual participant data
[X] Record updated in last year

Plain English summary of protocol

Background and study aims
Misophonia is a sound sensitivity disorder in which certain sounds (or “triggers”) generate unusually strong negative reactions. Triggers are often sounds generated by the human body (e.g. voices, chewing, and breathing), causing strong feelings of anxiety, anger, and disgust. Misophonia can have a profound negative impact on daily life across social, educational, and work contexts. This study is testing a new potential treatment for misophonia called transcutaneous Vagal Nerve Stimulation (tVNS). tVNS is a safe and non-invasive method of stimulating the vagus nerve with a small hand-held device. The device sends gentle electrical pulses to regions of the ear for short periods (e.g. 30 minutes) over the course of several weeks. Because tVNS has been shown to improve symptoms in disorders such as migraine, tinnitus, epilepsy and depression, it is interesting to explore whether it might also help people with misophonia.

Who can participate?
Patients aged 18-40 years old who are not currently receiving active treatment for misophonia

What does the study involve?
Participants who meet the criteria for this study will be asked to complete some online questionnaires 1-3 days before their first site visit. The questionnaires will ask about misophonia symptoms, mental health, and hearing problems (such as tinnitus or hyperacusis). The questionnaire will take around 20 minutes.

Site Visit 1 (3 hours– with breaks):
Participants will be prepared for an MRI scan. The scanning session will take around 1 hour. Participants will also be asked to watch video clips (including misophonic triggers) and rate how they made them feel. This part of the scanning session will last around 30 minutes.

After the MRI scan, they will complete an short audiology session in which they will be asked to listen to some sounds and say whether they can hear them, and then whether they find them uncomfortably loud. Participants will then complete a sound task on a computer lasting 30

minutes where they will have to respond to different sounds (including misophonic sounds) whilst their heart rate and skin conductance (i.e., how sweaty their fingers get) are monitored. The bodily responses will be measured with sensors attached to fingers on their non-dominant hand and placed on their chest and hip. These sensors will not be uncomfortable or cause any harm.

Once they have had a break following the scanning session, the researcher will show them how to use the tVNS machine and the associated app. They will set their stimulation parameters so that they are at a comfortable level for you, guided by the researcher. This will take around 30 minutes.

Administering tVNS at home (20 hours stimulation over 4 weeks)
The tVNS administration will involve participants turning on the tVNS device and attaching the earpiece electrode to the correct location on their left ear. Once fitted correctly they will need to wear the earpiece for 30-minutes. They will need to do this twice a day for at least 5 days per week for the next 4 weeks.

At the end of every week, they will be sent a questionnaire to monitor any potential side effects of the tVNS.
At the end of the 4 weeks, they will be sent a final online questionnaire which will contain the same questionnaires as the start of the study, and also some more general questions about how they found the tVNS treatment (e.g., how easy was it to use).

Site Visit 2 (between 2-3 hours total – with breaks):
During their second site visit, they will return their tVNS device and take the MRI task, the audiology task and the computer task or the second time.

Questionnaire at home:
Finally 4 weeks after the second visit they will be sent a questionnaire to complete at home.

What are the possible benefits and risks of participating?

Where is the study run from?
The study may help improve participants misophonia symptoms, but this cannot be guaranteed. However, even if there are no direct benefits, their participation will help improve the knowledge about misophonia and potential treatments.

The device being used to deliver tVNS is a CE certified medical device that has undergone rigorous checking to ensure its safe use. There has been lots of research on the safety profile and effects of tVNS. The most common side effect (experienced by up to 18% of people) is skin irritation or discomfort at the site of stimulation (the ear). This is often mild and resolves quickly. Other reported, but extremely rare, side effects (occurring in less than 1% of people) include nasopharyngitis (cold like symptoms), headache, dizziness, and nausea). If participants have depression there is risk of a temporary worsening of symptoms. Participants will be asked to contact the research team if they are experiencing any adverse effects, which will be further investigated.

Participants are also free to stop the stimulation at any time if they become concerned. Since the device being used is an electrical one, there are also several potential hazards (e.g., if the device malfunctions or overheats). Participants will be provided with a safety booklet to ensure safety (e.g., not using the device when sleeping, keeping the device out of reach of children when not in use).

When is the study starting and how long is it expected to run for?
January 2026 to July 2026.

Who is funding the study?
The Misophonia Research Fund (MRF) awarded by the REAM foundation, UK.

Who is the main contact?
1. Dr Louisa Rinaldi, L.Rinaldi@sussex.ac.uk
2. Dr Giulia Poerio, g.l.poerio@sussex.ac.uk

Contact information

Type(s)
Principal investigator, Public, Scientific

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Study information

Scientific Title
Effect and neurophysiological mechanisms of transcutaneous auricular vagus nerve stimulation (taVNS) in misophonia: a single centre double-blinded randomised sham-controlled trial

Acronym
taVNS-MISO

Study objectives
1) Establish whether taVNS improves misophonia symptoms.
2) Explore whether taVNS is associated with improvements in secondary outcomes, including mental health comorbidities, especially those known to be linked to misophonia such as OCD, anxiety, and depression.

3) Determine the safety, tolerability, feasibility, and acceptability of taVNS in misophonia.
4) Understand neurophysiological mechanisms underlying misophonia and symptom improvement.

Ethics approval required
Ethics approval required

Ethics approval(s)
approved 18/08/2025, Brighton and Sussex Medical School Research Governance and Ethics Committee (RGEC) at the University of Sussex (BSMS teaching building, University of Sussex Falmer, Brighton, BN1 9PX, United Kingdom; -; rgec@bsms.ac.uk), ref: ERA/GLP28/4/1

Primary study design
Interventional

Allocation
Randomized controlled trial

Masking
Blinded (masking used)

Control
Placebo

Assignment
Single

Purpose
Treatment

Study type(s)

Health condition(s) or problem(s) studied
Misophonia

Interventions
After enrolling in the study, participants are invited to come to their first on-site visit, where they will complete baseline assessments before they are randomly allocated to receive either active taVNS or sham stimulation with the tVNS R device (tVNS Technologies GmbH). Random allocation sequencing is generated within SPSS (RV.UNIFORM(0,1)) by an independent research assistant not involved in any other aspect of the study. The randomisation order will be kept in numbered sealed envelopes such that participants get their assignment to the condition according to the order they enter the study.

The tVNS R device has a stimulation unit and an ear electrode which delivers a low-voltage electrical signal to the ear. Stimulation is applied to the left ear, with active stimulation applied to the cymba concha (rich vagus nerve branch distributions) and sham stimulation to the superior scapha (no vagus nerve distribution). Electrical stimulation consists of a 25Hz wave delivered in 28s-on 32s-off bursts. Active and sham devices are identical, with the only

difference being the stimulation location. An unblinded researcher (EMWK) will be setting the stimulation parameters for each participant and providing device training for at-home administration according to the randomisation schedule.

The device is explained to the participant and then fitted by the EMWK to set stimulation intensity. Participants are instructed on how to use the device independently (both oral and written instructions for how to apply stimulation at home are provided). For maximum efficacy, stimulation intensity is adjusted and set to individual thresholds. We will ensure participant tolerance of stimulation by setting individual stimulation thresholds during device training. Current will be introduced at the lowest intensity (0.1mA) and gradually increased to a level at which the participant just begins to report discomfort (maximum intensity is 5mA). The device will then be adjusted to an intensity below the reported discomfort level and will remain at this intensity for 1 minute to confirm tolerance. This intensity will be considered the maximum tolerated stimulation intensity for the participant and stimulation throughout the intervention will be administered at this level, with the option to lower up to 0.3mA if required. If an individual's stimulation tolerance lowers during the study beyond 0.3mA, then we will repeat the stimulation tolerance protocol described above and adjust accordingly. Rates of stimulation and any changes will be reported in a stimulation tolerance monitoring log.

Participants use the device at home for at least 30 minutes twice daily, at least 5 days per week, for the treatment period (4 weeks). Protocol compliance is monitored via the tVNS R stimulation logs and reminders to simulate are sent via a study app. At the end of the 4 weeks, participants stop stimulation and attend their second on-site visit where we administer the same assessments, and participants are then followed up with a questionnaire after another 4 weeks.

Intervention Type
Device

Phase
Not Applicable

Drug/device/biological/vaccine name(s)
tVNS R transcutaneous vagal nerve stimulation (tVNS) device

Primary outcome(s)
1. Misophonia Severity measured using the Sussex Misophonia Scale and the AMISO-R at T1 (pre-treatment), T2 (post-treatment - 4 weeks), and T3 (follow up - 4 weeks post treatment)

Key secondary outcome(s))
1. Mental Health measured using The Symptom Checklist-90-Revised questionnaire at Assessed at T1 (pre-treatment), T2 (post-treatment at 4 week), T3 (follow up - 4 weeks post treatment)

2. Resting-state neural activity measured using a 6-minute task-free, resting-state functional MRI (rs-fMRI) scan to capture brain activity at rest (eyes open, look at fixation cross) at T1 and T2

3. Neural activity during a sound exposure fMRI paradigm, where participants watch 6 misophonic, 6 aversive, and 6 neutral 12-second audio-visual clips, measured using a 11-point Likert scales (rating videos on how "pleasant" the clips were from 0 (very unpleasant) to 10 (very pleasant), as well as how "disgusting" and "annoying" they were (both rated from 0 (not at all) to 10 (completely) and self report valence and arousal after each clip at T1 and T2

4. Resting heart rate and its variability measured using electrocardiogram (ECG), with electrodes placed on each side below the ribs, and on the right collarbone, for 5-minutes under task-free conditions (eyes open, look at fixation cross) at T1 and T2

5. Resting electrodermal activity measured using two Ag-AgCl electrodes wrapped around the index and ring finger of the left hand, acquired by applying a small direct current (0.5V) through electrodes, for 5-minutes under task-free conditions (eyes open, look at fixation cross) at T1 and T2

6. Heart rate and its variability measured using psychophysiology during Emotional Go-NoGo task at T1 and T2

7. Electrodermal activity measured using psychophysiology during Emotional Go-NoGo task at T1 and T2

8. Self reported valence and arousal measured using 11-point Likert scales before and after each block of the Go-NoGo task at T1 and T2

9. False alarm rates in each condition measured using failing to withhold a response on emotional Go-NoGo task at T1 and T2

10. Hearing sensitivity measured using Pure-Tone Audiometry using a calibrated clinical audiometer at T1

11. Sound tolerance, uncomfortable loudness levels (ULLs) measured using Uncomfortable Loudness Level (ULL) audiometry testing at T1 and T2

12. Tinnitus measured using The Tinnitus Functional Index (TFI) at T1 and T2

13. Hyperacusis measured using the Hyperacusis Questionnaire and the Hyperacusis Impact Questionnaire at T1 and T2

Completion date
30/09/2026

Eligibility

Key inclusion criteria
1. Moderate to severe misophonia symptoms (scores >20 on the revised Amsterdam Misophonia Scale and scores >75 on the Sussex Misophonia Scale)
2. Not currently receiving active treatment for misophonia or planning to during the study
3. Aged between 18-40 years
4. Native English Speaker
5. Right-handed
6. No history of brain injury or neurological conditions
7. Normal or corrected to normal vision
8. Normal hearing (except for hyperacusis, tinnitus, or misophonia)
9. Owning and being willing to use a personal smartphone for tolerability questionnaires and stimulation reminders to be sent via a study app.

Healthy volunteers allowed

No

Age group
Adult

Lower age limit
18 years

Upper age limit
40 years

Sex
All

Total final enrolment
0

Key exclusion criteria
1. Are or could be pregnant
2. Have active implants (e.g., cochlear or other metallic implant, implanted vagal nerve stimulator, cardiac pacemaker)
3. Have a cerebral shunt (e.g., for the treatment of hydrocephalus)
4. Have wounds or skin diseases at or near the ear
5. Have a history or family history of heart problems (e.g., cardiac arrhythmias)
6. Have a history of seizures or epilepsy
7. Any other contraindications to an MRI scan

Date of first enrolment
19/01/2026

Date of final enrolment
31/07/2026

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
Brighton and Sussex Medical School, University of Sussex
BSMS Teaching Building,
University of Sussex
Falmer,
UK
Brighton
England
BN1 9PX

Study participating centre
Clinical Imaging Sciences Centre, University of Sussex
Clinical Imaging Sciences Centre,
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School of Psychology University of Sussex
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Sponsor information

Organisation
University of Sussex

ROR
https://ror.org/00ayhx656

Funder(s)

Funder type

Funder Name
REAM Foundation

Alternative Name(s)
The REAM Foundation

Funding Body Type
Private sector organisation

Funding Body Subtype
Trusts, charities, foundations (both public and private)

Location
United States of America

Results and Publications

Individual participant data (IPD) sharing plan
All data are suitable for sharing in an anonymised format, with additional governance of access measures required for sharing individual data. At the end of the study, data will be collated into a single spreadsheet, with a data key indicating the content of each variable. The behavioural and questionnaire data will be stored in open data file formats, i.e. as comma-delimited text files (.csv). MRI images will be stored in DICOM and NIFTI file formats. All formats will allow sharing and long-term validity of the data. All original raw data will be retained for future use and access requests, and all analysis scripts will be made available. Study data will be deposited in the University of Sussex server via Figshare (www.sussex.figshare.com) or another online data repository (e.g. www.OpenfMRI.org) where appropriate. The data that will be deposited will be at the group level, allowing other users to undertake the same analyses as those reported in the published studies, as well as new ones. Anonymised individual participant datasets and supporting metadata will be made available upon request. For the datasets containing individual anonymised patient data, a data-sharing agreement will be required.

IPD sharing plan summary
Stored in publicly available repository

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Other files	version 1.0	04/12/2025	08/12/2025	No	No
Participant information sheet	version 1.0	04/12/2025	08/12/2025	No	Yes