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The influence of mindfulness training on stress-eating behavior on both the behavioral and neuronal levels

Submission date
17/05/2023

Recruitment status
No longer recruiting

Registration date
19/05/2023

Overall study status
Completed

Last Edited
28/04/2025

Condition category
Other

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

Plain English summary of protocol

Background and study aims
Frequently engaging in stress-related overeating behavior can lead to weight gain and a heightened BMI, which can, in turn, increase the risk of metabolic and cardiovascular diseases. Mindfulness training could serve as an intervention strategy for stress-eating behaviors through its ability to regulate emotions, decrease sensitivity to stress, and increase body awareness. Mindfulness training could thereby effectively help individuals develop a healthier relationship with food.

Who can participate?
Meditation-naïve, healthy, right-handed participants between the ages of 18 and 45 who have the tendency to over eat when stressed.

What does the study involve?
To investigate whether mindfulness can serve as an intervention strategy for stress-eating behaviors, a longitudinal experiment was conducted. Participants were either placed into a food-related mindfulness condition or an active control condition for 31 days. Behavioral and neuroimaging data were acquired prior-to and upon completing the mindfulness training.

What are the possible benefits and risks of participating?
Participants in both conditions will be exposed to similar benefits as well as risks. For example, whether participants receive information pertaining to mindfulness meditation (including daily guided meditation sessions) in the experimental condition or receive information pertaining to overall health in the control condition, both groups will be provided with the opportunity to prove their health. Our aim in the study was therefore to observe how mindfulness training differentiates itself from the active control group by means of its ability to reduce stress-eating tendencies and improve overall perceived mindfulness.
While both groups will primarily be exposed to benefiting from participating in this study, neuroimaging studies comes with inherent risks. While extensive measures are taken to ensure minimal risk for every participant, the MRI machine is a large piece of medical, technological, equipment and if necessary, precautionary, measures are not taken, participants can experience

the heating of the skin or injury due to undisclosed metal (i.e., paramagnetic material) in the body or in metal brought into the MRI room.
Additionally, while mindfulness meditation has been demonstrated to be effective in reducing stress and anxiety levels, initial exposure to mindfulness (given its ability to increase awareness of bodily sensations) could highlight or draw attention existing stress or anxiety symptoms causing the participant to experience initial, increased, discomfort.

Where is the study run from?
Technical University of Munich (Germany)

When is the study starting and how long is it expected to run for?
January 2018 to June 2021

Who is funding the study?
Investigator initiated and funded

Who is the main contact?
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Contact information

Type(s)
Scientific

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Additional identifiers

Study information

Scientific Title
Stress as a mediator of overeating and the effectiveness of mindfulness training as an intervention strategy

Study objectives
Mindfulness training, through its ability to reduce stress and increase body awareness, could serve as an intervention strategy for stress-related overeating behavior. This study, therefore, sought to observe the effects of mindfulness training on eating behavior on the behavioral and neuronal levels. We hypothesized that mindfulness training will not only reduce stress-eating and emotional eating tendencies, but that these behavioral changes would also be reflected on the neuronal level through changes in brain function and structure in and between areas associated with reward, emotion, processing, and brains areas fundamental to regulating eating behavior (including the hypothalamus and insula).

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 30/04/2019, Ethics committee of Technische Universität München (Ismaninger Straße 22, 81675 München, Germany; +49 89 4140-7737; ethikkommission@mri.tum.de), ref: 71/19 S-SR

Primary study design
Interventional

Study design
Longitudinal single-blinded randomized controlled trial

Study type(s)
Other

Health condition(s) or problem(s) studied
Effects of mindfulness meditation on stress-eating behavior, brain structure, and brain function in healthy adults who have the tendency to overeat when stressed.

Interventions
Participants were pseudo-randomly assigned to either a mindfulness meditation training program or an active control training program that provided participants with information pertaining to overall health. Both training programs were web-based and delivered over the span of 31 days.

Participants were pseudo-randomly allocated to conditions using an online tool. Given single-blinded nature of the study, the experimenter was aware of the condition and was therefore able to allocate the participant into the appropriate training group.

Intervention Type
Behavioural

Primary outcome(s)
1. Stress and emotional eating measured using standardized, behavioral questionnaires (SEES and SSES) at pre-/post- intervention
2. Perceived mindfulness measured using the standardized behavioral questionnaire (MAAS) at pre-/post-intervention
3. Brain structure and function measured through the acquisition of neuroimaging data (BOLD, resting-state, fMRI, DTI, MPGRAGE) at pre-/post-intervention

Key secondary outcome(s)
Food cravings and restraint measured using the standardized behavioral questionnaires (FCT-S, FCT-T, and the Restraint Scale) at pre-/post- intervention

Completion date
01/06/2021

Eligibility

Key inclusion criteria
Meditation-naïve, healthy, right-handed participants between the ages of 18 and 45 years who have the tendency to over eat when stressed

Participant type(s)
Healthy volunteer

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 Years

Upper age limit
45 Years

Sex
All

Total final enrolment
80

Key exclusion criteria
1. BMI exceeds the range: 18 - 30 kg/m²
2. Dietary restrictions (including veganism and vegetarianism)
3. Smokers
4. Use of oral contraceptives
5. Untreated thyroid dysfunction
6. Respiratory disease
7. Metal implants
8. Claustrophobia
9. Left-handedness
10. Reduced olfaction

Date of first enrolment
01/05/2019

Date of final enrolment
01/03/2021

Locations

Countries of recruitment
Germany

Study participating centre
Klinikum Rechts der Isar, Technical University of Munich
Ismaninger Str. 22
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Sponsor information

Organisation
Technical University of Munich

ROR
https://ror.org/02kkvpp62

Funder(s)

Funder type
Other

Funder Name
Investigator initiated and funded

Results and Publications

Individual participant data (IPD) sharing plan
Data will be made publicly available on OSF. Activation clusters in the form of .nii images will be uploaded into the repository.

IPD sharing plan summary
Stored in publicly available repository

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		27/03/2024	28/03/2024	Yes	No
Results article		25/04/2025	28/04/2025	Yes	No