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Digital meditation at scale: a randomized citizen science trial comparing four meditation practices

Submission date
06/08/2026

Recruitment status
No longer recruiting

Registration date
12/08/2026

Overall study status
Completed

Last Edited
14/08/2026

Condition category
Other

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

Plain English summary of protocol
Not provided at time of registration

Contact information

Type(s)
Principal investigator, Public, Scientific

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Study information

Scientific Title
Employing citizen science for meditation effect discovery

Study objectives
This study aimed to:
1. Evaluate whether 4 weeks of app-delivered meditation improved psychological, cognitive, and

physiological outcomes relative to an active classical music control
2. Compare the effectiveness of four meditation techniques (mindful body scan, loving-kindness, nondual, and mantra) against one another
3. Explore whether individual differences in age, sex, anxiety and depression symptoms, personality, and trait nondual awareness moderated meditation response

Ethics approval required
Ethics approval required

Ethics approval(s)
Approved 22/10/2024, The Institute of Noetic Sciences Institutional Review Board (7250 Redwood Blvd, Ste 208, Novato, 94945-3271, United States of America; +1 (0)707 775 3500; irb@noetic.org), ref: IORG#0003743

Primary study design
Interventional

Allocation
Randomized controlled trial

Masking
Blinded (masking used)

Control
Active

Assignment
Parallel

Purpose
Treatment

Study type(s)

Health condition(s) or problem(s) studied
Psychological well-being, cognitive function, and neurophysiological outcomes in non-clinical adults

Interventions
The method of randomization was simple randomization. A randomized list of the numerals 1 through 5 was generated, with each numeral representing a study arm. Participants for each run were then randomly ordered and assigned according to this intervention randomization list

Intervention 1: Mindful body scan meditation. 15-minute daily guided body scan practice delivered via the Muse smartphone app for 28 days, in which attention is directed sequentially through regions of the body.

Intervention 2: Loving-kindness meditation. 15-minute daily guided practice delivered via the Muse smartphone app for 28 days, cultivating compassion toward oneself and others through mental imagery.

Intervention 3: Nondual meditation. 15-minute daily guided practice delivered via the Muse smartphone app for 28 days, attenuating the separation between observer and observed through direct examination of conscious experience.

Intervention 4: Mantra meditation. 15-minute daily guided practice delivered via the Muse smartphone app for 28 days, repeating the mantra "Om" either aloud or silently.

Active control: Classical music listening. 15-minute daily listening to calming classical music delivered via the Muse smartphone app for 28 days.

Intervention Type
Behavioural

Primary outcome(s)
1. Overall well-being measured using the Arizona Integrative Outcomes Scale (AIOS) at baseline and 4 weeks

2. Pain measured using the Pain Numeric Rating Scale at baseline and 4 weeks

3. Sleep quality measured using the Sleep Quality Scale at baseline and 4 weeks

4. Psychological flourshing measured using the 8-item Flourishing Scale at baseline and 4 weeks

5. Positive and negative affect measured using the Positive and Negative Affect Scale at baseline and 4 weeks

6. Self-transcendence measured using the Cloninger Self-Transcendence Scale at baseline and 4 weeks

7. Nondual Awareness measured using the Nondual Awareness Dimensional Assessment, state version at baseline and 4 weeks

8. Interoceptive awareness measured using the Brief Multidimensional Assessment of Interoceptive Awareness (MAIA), 8 subscales at baseline and 4 weeks

9. Self-compassion measured using the Self-Compassion Scale Short Form (SCS-SF) at baseline and 4 weeks

10. Compassion for others measured using the Dispositional Positive Emotion Scales, Compassion subscale (DPES) at baseline and 4 weeks

11. Cognitive control measured using the Stroop task at baseline and 4 weeks

12. Working memory measured using the 2-back task at baseline and 4 weeks

Key secondary outcome(s)
1. Resting EEG spectral power measured using the Muse EEG headband Welch's method across five frequency bands (delta, theta, alpha, beta, gamma) at baseline and 4 weeks

2. Temporal alpha asymmetry measured using the Muse EEG headband, ln(right) minus ln(left) at TP9/TP10 at baseline and 4 weeks

3. Individual alpha frequency measured using the Muse EEG headband, alpha center of gravity (7-13 Hz) at baseline and 4 weeks

4. Theta/beta power ratio measured using the Muse EEG headband at baseline and 4 weeks

5. Heart rate and heart rate variability measured using the Muse photoplethysmography (PPG), 8 indices (mean heart rate, standard deviation of normal-to-normal [SDNN], low frequency [LF], high frequency [HF], LF/HF, sample entropy, Poincaré standard deviation [SD]1/SD2, phase-rectified signal averaging - acceleration/deceleration capacity [PRSA AC/DC]) at baseline and 4 weeks

6. Heartbeat-evoked potentials measured using Muse EEG and PPG, frontal and temporoparietal amplitudes in early and late windows at baseline and 4 weeks

Completion date
04/12/2025

Eligibility

Key inclusion criteria
1. English-speaking adults aged 18 years or older
2. Owned or willing to purchase a Muse electroencephalography (EEG) headband
3. Willing to accept randomization to any study arm
4. Willing to refrain from initiating or changing other therapies during the study

Healthy volunteers allowed
No

Age group
Mixed

Lower age limit
18 Years

Upper age limit
100 Years

Sex
All

Total final enrolment
1211

Key exclusion criteria
1. Patient Health Questionnaire-9 (PHQ-9) score greater than 14 (moderately severe to severe depression; threshold was initially >9, raised to >14 via approved protocol amendment)
2. Any endorsement of PHQ-9 item 9 (thoughts of self-harm, score >0)
3. Self-reported post-traumatic stress disorder (PTSD), schizophrenia, bipolar disorder, depression with psychotic features, or depression with prior psychiatric hospitalization or suicide attempt

4. Axis II personality disorders
5. Vulnerable populations (prisoners, children, pregnant individuals)

Date of first enrolment
09/12/2024

Date of final enrolment
07/10/2025

Locations

Countries of recruitment
United States of America

Study participating centre
Institute of Noetic Sciences
United States of America

Sponsor information

Organisation
Institute of Noetic Sciences

ROR
https://ror.org/03xq12h43

Funder(s)

Funder type

Funder Name
InnerScience Research Fund

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not expected to be made available