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A fully remote randomized trial of digital cognitive training for cognitive control in adults

Submission date
11/08/2026

Recruitment status
No longer recruiting

Registration date
18/08/2026

Overall study status
Completed

Last Edited
13/08/2026

Condition category
Other

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

Plain English summary of protocol
Background and study aims
Cognitive control refers to mental abilities that support attention, working memory, and goal-directed behavior. Individual differences in cognitive control are associated with variation in everyday functioning and cognitive performance. The aim of this study was to characterize cognitive control abilities in healthy adults and evaluate the effects of digital cognitive training interventions delivered remotely through mobile devices and computers on cognitive performance. The study also examined relationships between laboratory-based cognitive measures and real-world cognitive functioning.

Who can participate?
Healthy adults aged 18 to 65 years who were fluent in English, had access to a computer or mobile device with internet connectivity, and had normal or corrected-to-normal vision and hearing. Individuals with neurological or psychiatric disorders were excluded.

What does the study involve?
Participants completed the study entirely remotely using the Nexus online research platform. After providing consent and completing baseline assessments, participants were randomly assigned to one of four digital applications, including three cognitive training interventions and one active placebo control application. Participants completed approximately 40 minutes of training per day, 5 days per week, for 6 weeks. Before and after the intervention period, participants completed cognitive assessments and questionnaires measuring attention, working memory, cognitive control, stress, and related outcomes.

What are the possible benefits and risks of participating?
Participants contributed to research investigating cognitive control and digital cognitive training interventions. Risks were considered minimal and included possible mental fatigue, boredom, frustration during cognitive tasks, or discomfort when answering questionnaires.

Where is the study run from?
Neuroscape, Department of Neurology, University of California, San Francisco (UCSF), San Francisco, California, USA. All study procedures were conducted remotely through the Nexus online platform.

When is the study starting and how long is it expected to run for?
March 2024 to February 2025

Who is funding the study?
National Institute on Aging, National Institutes of Health (NIH)USA)

Who is the main contact?
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Contact information

Type(s)
Principal investigator, Public, Scientific

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Study information

Scientific Title
A randomized controlled trial in adults comparing mobile-delivered cognitive training with an active placebo control application for improving cognitive control, attention, and working memory

Acronym
UCSF MEC Study

Study objectives
The primary objective of this study is to evaluate the effects of remotely delivered digital cognitive training interventions on cognitive control abilities in healthy adults. Secondary objectives are to characterize individual differences in cognitive control, examine relationships

between laboratory-based and real-world measures of cognitive functioning, and compare the effects of different digital cognitive training approaches on attention, working memory, executive function, and related cognitive outcomes.

Ethics approval required
Ethics approval required

Ethics approval(s)
Approved 20/02/2022, University of California San Francisco Institutional Review Board (675 Nelson Rising Ln, San Francisco, 94158, United States of America; +1 (415) 476-1814; IRB@ucsf.edu), ref: 22-36343

Primary study design
Interventional

Allocation
Randomized controlled trial

Masking
Blinded (masking used)

Control
Active

Assignment
Parallel

Purpose
Basic science

Study type(s)

Health condition(s) or problem(s) studied
Healthy adults

Interventions
Participants are randomly assigned to one of four digital intervention arms delivered remotely through the Nexus research platform (we used a block randomization approach using an online tool, with block size of 4):

-Meditrain: a mindfulness-based digital cognitive training application designed to engage attention and self-regulation processes
-Engage: an adaptive attention training application incorporating game-like elements designed to engage cognitive control processes
-Coherence: an adaptive rhythm-based training application designed to engage attention, synchronization, and working memory processes
-Worder (active placebo control): a word-search game designed to maintain participant engagement without specifically targeting cognitive control mechanisms

Participants complete approximately 40 minutes of training per day, 5 days per week, for 6 weeks. Cognitive assessments and questionnaires are administered remotely before and after

the intervention period to evaluate attention, working memory, cognitive control, stress, and related outcomes. Participants are allocated to intervention arms through random assignment using the Nexus platform.

Intervention Type
Behavioural

Primary outcome(s)
1. Vigilance without distraction measured using response time variability in a custom mobile continuous performance task (CPT) at pre-training and post-training

2. Participants' ability to maintain an accurate mental representation of items in working memory either in presence or absence of distracting or interfering information measured using Response time variability in a delayed recognition working memory paradigm at Pre-Training and Post-Training

3. Rhythmicity - a rhythm synchronization game designed to assess and engage attention, timing, coordination, and working memory through auditory and visual rhythmic tasks measured using variability of tapping relative to the target beat (STD) at pre-training and post-training

Key secondary outcome(s)
1. ACE-X (Explorer) - A battery of adaptive cognitive control assessments testing attention, working memory, and multitasking abilities measured using response time variability, response time, span count at pre-training and post-training

Completion date
02/02/2025

Eligibility

Key inclusion criteria
1. Adults aged 18–65 years
2. Access to a computer or mobile device with internet connectivity
3. Fluent in English
4. Normal or corrected-to-normal vision and hearing
5. Able to provide informed consent
6. Willing to participate in a fully remote digital cognitive training study

Healthy volunteers allowed
Yes

Age group
Mixed

Lower age limit
18 Years

Upper age limit
65 Years

Sex
All

Total final enrolment
156

Key exclusion criteria
1. Under 18 years of age
2. Self-reported neurological disorder
3. Self-reported psychiatric disorder
4. Inability to complete study procedures remotely
5. Inability to provide informed consent

Date of first enrolment
01/03/2024

Date of final enrolment
01/01/2025

Locations

Countries of recruitment
United States of America

Sponsor information

Organisation
University of California, San Francisco

ROR
https://ror.org/043mz5j54

Funder(s)

Funder type

Funder Name
Neuroscape Network

Funder Name
Patrick J. McGovern Foundation

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not expected to be made available