

How do two types of intense exercise affect a brain neurotrophic factor?

Submission date 03/07/2025	Recruitment status No longer recruiting	<input type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
Registration date 03/07/2025	Overall study status Completed	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
Last Edited 03/07/2025	Condition category Other	<input type="checkbox"/> Individual participant data <input checked="" type="checkbox"/> Record updated in last year

Plain English summary of protocol

Background and study aims

Exercise is linked to neuroplasticity, our brain's ability to adapt to different environments and experiences. When we exercise, various brain health protective neurotrophic factors are released that improve brain functioning and health. Therefore, it is important to research the optimal exercise protocols, in terms of intensity, type and goal, to promote this neuroplasticity. This study aimed to test two high-intensity exercise protocols and how they affect a specific neurotrophic factor, brain-derived neurotrophic factor, as well as lactate concentration (an indicator of fatigue and metabolism).

Who can participate?

Young healthy adults aged 20-30 years, with both females and males included

What does the study involve?

Participants were randomly allocated into three groups. One experimental exercise group completed a 15-minute high-intensity protocol, while another one had a 15-minute maximum intensity protocol. The control group watched a 15-minute educational video. Brain-derived neurotrophic factor was measured in saliva with participants passively drooling into a specific tube. Lactate concentration was measured from capillary blood.

What are the possible benefits and risks of participating?

There is a possibility that the exercise will be tiring or cause physical or psychological fatigue. The tests can cause psychological fatigue. During the exercise, heart rate will be monitored to control the intensity, and a team of sports scientists will be present to monitor the process and stop the study if necessary. The risk will be reduced by warming up so that the exercise load increases gradually.

Where is the study run from?

Sports Physiology Laboratory, Faculty of Biology, University of Latvia (Latvia)

When is the study starting and how long is it expected to run for?

November 2023 to February 2025

Who is funding the study?

We acknowledge the donation of SIA "Mikrotīkls" (MikroTik) administered by the University of Latvia Foundation, project no. 2322

Who is the main contact?

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Additional identifiers

EudraCT/CTIS number

Nil known

IRAS number

ClinicalTrials.gov number

Nil known

Secondary identifying numbers

Nil known

Study information

Scientific Title

Effects of high-intensity training and reduced exertion high-intensity training on brain-derived neurotrophic factor: a block randomized controlled trial

Study objectives

H1: Lactate and brain-derived neurotrophic factor (BDNF) will increase after acute exercise, compared to baseline, but will not increase in the control group.

H2: Brain-derived neurotrophic factor (BDNF) will increase with increased lactate.

Q1: Will the reduced-exertion high-intensity training (REHIT) load lead to a higher BDNF post-exercise increase than high-intensity training (HIIT)?

Ethics approval required

Ethics approval required

Ethics approval(s)

Approved 12/01/2024, Life science and medicine scientific research ethics committee of the University of Latvia (Raiņa bulvāris 19, Riga, LV-1586, Latvia; +371 (0)67033881; lu@lu.lv), ref: No. 71-35/2

Study design

Three-group pre-post block randomized controlled trial

Primary study design

Interventional

Secondary study design

Randomised controlled trial

Study setting(s)

Laboratory

Study type(s)

Efficacy

Participant information sheet

Not available retrospectively, as study data collection is already finished

Health condition(s) or problem(s) studied

Acute exercise effect on brain-derived neurotrophic factor

Interventions

Block randomization was used to assign participants to three groups. One experimental exercise group completed a 15-minute HIIT protocol, while another one had a 15-minute REHIT protocol, and the control group watched a 15-minute educational video.

Intervention Type

Behavioural

Primary outcome measure

Brain-derived neurotrophic factor (BDNF) measured in saliva using an ELISA kit pre-exercise and directly after the main part of the exercise (before cooldown)

Secondary outcome measures

1. Lactate measured pre-exercise and directly after the main part of the exercise (before cooldown)
2. Glucose measured pre-exercise and directly after the main part of the exercise (before cooldown)

Both measured in capillary blood samples using a Biosen Lactate and Glucose Analyser

Overall study start date

23/11/2023

Completion date

12/02/2025

Eligibility

Key inclusion criteria

1. Young adults, aged 20 - 30 years, without any medical conditions that would limit their ability to exercise
2. No colourblind vision, as some of the cognitive tests (not included in the analysis) were in various colour forms
3. Non-smokers
4. Exercise up to three times a week.

Participant type(s)

Healthy volunteer

Age group

Adult

Lower age limit

20 Years

Upper age limit

30 Years

Sex

Both

Target number of participants

66

Total final enrolment

60

Key exclusion criteria

1. Athletes
2. People who have health conditions that do not allow them to exercise

Date of first enrolment

11/03/2024

Date of final enrolment

12/02/2025

Locations

Countries of recruitment

Latvia

Study participating centre

Sports Physiology Laboratory, Faculty of Biology, University of Latvia

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Sponsor information

Organisation

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University/education

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Funder(s)

Funder type

Industry

Funder Name

SIA "Mikrotīkls" (MikroTik)

Results and Publications

Publication and dissemination plan

This study is submitted to a peer-reviewed journal

Intention to publish date

01/11/2025

Individual participant data (IPD) sharing plan

The datasets generated and/or analysed during the current study will be published as a supplement to the results publication.

IPD sharing plan summary

Published as a supplement to the results publication