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Effects of 12 weeks of interval block resistance training versus circuit resistance training on body composition, performance and autonomic recovery in adults.

Submission date
02/02/2025

Recruitment status
No longer recruiting

Registration date
04/02/2025

Overall study status
Completed

Last Edited
16/04/2025

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
This study is looking at two types of strength exercises, block training and circuit training, to see how they affect body shape, muscle strength, fitness levels, and recovery in young adults. The goal is to find out which type of exercise is better for improving health and physical performance.

Who can participate?
Physically active adults who are willing to take part in a 12-week exercise program can participate in this study.

What does the study involve?
Participants will be randomly assigned to either block training or circuit training groups. They will follow their assigned exercise program for 12 weeks. Before and after the program, participants will have their body composition measured (using body mass index and waist circumference), muscle strength tested (using a hand grip dynamometer), fitness levels assessed (using the 6-minute walk test), and movement speed evaluated (using a running anaerobic sprint test).

What are the possible benefits and risks of participating?
Participants may benefit from improved fitness, muscle strength, and body composition. However, as with any exercise program, there is a risk of injury. The study will be conducted under professional supervision to minimize these risks.

Where is the study run from?
The study will be conducted at the Municipal Stadium in Pirque, Chile.

When is the study starting and how long is it expected to run for?
January 2025 to April 2025

Who is funding the study?
Investigator initiated and funded

Who is the main contact?
Hector Fuentes-Barria, hefuentes_@unap.cl

Contact information

Type(s)
Public, Scientific, Principal investigator

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Additional identifiers

Clinical Trials Information System (CTIS)
Nil known

ClinicalTrials.gov (NCT)
Nil known

Protocol serial number
Nil known

Study information

Scientific Title
Effects of block versus circuit resistance exercise on body composition and performance in adults. Randomized controlled trial

Study objectives
Are there significant differences in physical activity levels, body composition, muscle strength, functional capacity, sprint performance, and recovery curve in adults participating in a block resistance training program compared to a circuit resistance training program?

Ethics approval required
Ethics approval required

Ethics approval(s)
approved 31/01/2025, Scientific Ethics Committee / Central University of Chile (Lord Cochrane 417, Torre A, Piso 6, Santiago, 8320000, Chile; +56 225826000; francisco.leon@ucentral.cl), ref: 02/2025

Study design
Interventional randomized controlled double-blind trial

Primary study design
Interventional

Study type(s)
Diagnostic

Health condition(s) or problem(s) studied
Overall fitness and recovery in healthy adults

Interventions
Current interventions as of 16/04/2025:
The study involved a 12-week resistance training program with three weekly sessions (Monday, Wednesday, and Friday), each lasting 48 to 57 minutes. The participants were randomly assigned to either an experimental group (EG) or a control group (CG) using a stratified 1:1 allocation method to ensure unbiased group distribution.

The EG performed resistance exercises in blocks (Push-ups, Mountain climbers, Squats, Jumping Jacks, Burpees, and Skipping), while the CG performed the same exercises in a circuit format. The intensity was monitored using Polar® devices, and the training volume was the same for both groups, with differences only in the exercise distribution. The program was structured into warm-up (5 min), main phase (38-47 min), and cool-down (5 min). Heart rate was targeted at 60-90% of the maximum rate over the 12 weeks, with adjustments based on Karvonen's formula. Both groups rested between repetitions and sets according to a fixed schedule, with total training time ranging from 38 to 47 minutes per session. Assessments were conducted before and after the program to evaluate physical activity levels, body composition, muscle strength, functional capacity, sprint performance, and recovery.

Previous interventions:
The study involved a 12-week resistance training program with three weekly sessions (Monday, Wednesday, and Friday), each lasting 43 to 52 minutes. The participants were randomly assigned to either an experimental group (EG) or a control group (CG) using a stratified 1:1 allocation method to ensure unbiased group distribution.

The EG performed resistance exercises in blocks (Push-ups, Mountain climbers, Squats, Jumping Jacks, Burpees, and Skipping), while the CG performed the same exercises in a circuit format. The intensity was monitored using Polar® devices, and the training volume was the same for both groups, with differences only in the exercise distribution. The program was structured into warm-up (5 min), main phase (38-47 min), and cool-down (5 min). Heart rate was targeted at 60-90% of the maximum rate over the 12 weeks, with adjustments based on Karvonen's formula. Both groups rested between repetitions and sets according to a fixed schedule, with total training time ranging from 38 to 47 minutes per session. Assessments were conducted before and after the program to evaluate physical activity levels, body composition, muscle strength, functional capacity, sprint performance, and recovery.

Intervention Type
Behavioural

Primary outcome(s)
Body composition is measured using the Metabolic Equivalent of Task, Body Mass Index and waist circumference at baseline and 12 weeks

Key secondary outcome(s))
Current secondary outcome measures as of 16/04/2025:
At baseline and 12 weeks:
1. Muscle strength measured using the right and left hand grip dynamometer
2. Speed assessed using a running anaerobic sprint test
3. Functional capacity measured using the 6-minute walking test
4. Recovery capacity using heart rate variability in the LF/HF ratio and RMSSD

Previous secondary outcome measures:
At baseline and 12 weeks:
1. Muscle strength measured using the right and left hand grip dynamometer
2. Speed assessed using a 35-meter sprint
3. Functional capacity measured using the 6-minute walking test
4. Recovery capacity using heart rate variability in the LF/HF ratio and RMSSD

Completion date
30/04/2025

Eligibility

Key inclusion criteria
1. Aged between 18 and 30 years and classified as a physically active adult.
2. Refrain from engaging in moderate or intense physical activity during the 48 hours prior to each session to prevent interference with acute training responses.
3. Attend all scheduled training sessions punctually throughout the 12-week intervention.
4. Read, understand, and sign the informed consent form before undergoing evaluations.

Participant type(s)
Healthy volunteer

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 years

Upper age limit
30 years

Sex

All

Total final enrolment
30

Key exclusion criteria
1. Diagnosis of conditions such as hypertension, type 2 diabetes, coronary artery disease, or other cardiovascular or metabolic disorders.
2. Body mass index within the overweight or obese range, along with a waist circumference exceeding the high cardiometabolic risk threshold for the Chilean adult population.
3. Handgrip strength below the threshold for muscle weakness risk classification in the Chilean adult population.
4. Performance below the reference threshold for reduced functional capacity in the Chilean adult population.
5. Participation in another training program during the intervention, which could interfere with the study protocol response.

Date of first enrolment
01/02/2025

Date of final enrolment
02/02/2025

Locations

Countries of recruitment
Chile

Study participating centre
Pirque municipal stadium
G-405 14, Pirque, Metropolitan Region.
Santiago.
Chile
9480000

Sponsor information

Organisation
Central University of Chile

Funder(s)

Funder type

Other

Funder Name
Investigator initiated and funded

Results and Publications

Individual participant data (IPD) sharing plan
The data sets generated and/or analyzed during the study will be available upon request to the authors.
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IPD sharing plan summary
Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Participant information sheet	in Spanish		04/02/2025	No	Yes
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes