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Can a 12-week personalised walking programme guided by exercise testing and a wrist-worn monitor improve recovery after exercise in older adults?

Submission date
14/11/2026

Recruitment status
Not yet recruiting

Registration date
16/11/2026

Overall study status
Ongoing

Last Edited
16/11/2026

Condition category
Other

[X] 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
As people get older, their ability to recover after physical activity often becomes slower. One way to measure this recovery is to look at how quickly the body returns to normal oxygen use after exercise. Regular aerobic exercise, such as walking, may improve this process, but the best way to prescribe exercise for older adults is not fully understood. This study aims to find out whether a personalised 12-week walking programme, tailored to each person's fitness level and supported by a wrist-worn activity monitor, can improve recovery after exercise in adults aged 65 years and older.

Who can participate?
Adults aged 65 to 80 years who live independently in the community and can walk safely without assistance may be eligible to take part. Participants must not already be taking part in regular structured aerobic exercise several times per week and must be able to use a smartphone and wearable activity monitor, either independently or with routine help from a family member. People with certain medical conditions that could make exercise testing unsafe, including some heart, lung, neurological, or other serious health conditions, cannot take part.

What does the study involve?
A total of 120 participants will be recruited from two centres in China and randomly assigned to one of two groups.
Participants in the walking programme group will complete a 12-week personalised walking programme. They will take part in four walking sessions each week, with each session lasting about 40 minutes. Exercise intensity will be based on the results of a fitness assessment carried out before the programme begins. Participants will wear a wrist-worn device during exercise to monitor their heart rate and help ensure they are exercising at the planned intensity.
Participants in the comparison group will continue their usual daily activities and will not receive an individual exercise programme. They will receive general information about healthy ageing approximately every two weeks.

All participants will attend assessments before the study begins and again at the end of the 12-week period. These assessments will include exercise testing, measurements of oxygen use during and after exercise, heart rate recovery, and walking ability.

What are the possible benefits and risks of participating?
Participants in the walking programme may improve their fitness, walking ability, and recovery after exercise. The information gained from the study may also help researchers develop better exercise programmes for older adults.
The risks are expected to be low but may include tiredness, shortness of breath, muscle soreness, or discomfort during exercise testing and training. Steps will be taken to assess participants' health before enrolment and to make sure that exercise is carried out safely.

Where is the study run from?
The study is run by Shanghai University of Sport, China, and will be carried out at two participating centres in China.
When is the study starting and how long is it expected to run for?
The study is expected to begin recruiting participants in January 2027 and finish in December 2027. Each participant will take part in the study for approximately 12 weeks.

Who is funding the study?
The study is funded by the National Key Research and Development Program of China and the Shanghai Oriental Talent Program.

Who is the main contact?
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National Key R&D Program
2024YFC3607301

Study information

Scientific Title
Effect of 12-week wearable-supported, CPET-guided individualised aerobic walking versus usual lifestyle control on postexercise oxygen uptake recovery in community-dwelling adults aged 65 years or older: a two-centre, assessor-blinded, parallel-group randomised controlled trial

Study objectives
The primary objective is to determine whether 12 weeks of wearable-supported, cardiopulmonary exercise testing (CPET)-guided individualised aerobic walking improves early postexercise oxygen uptake recovery in community-dwelling adults aged 65 years or older, with $VO_2T12.5\%$ as the primary outcome.

Secondary objectives are to evaluate changes in VO_2peak, oxygen uptake at the ventilatory anaerobic threshold (VO_2VAT), 1-min heart-rate recovery (HRR1), and 6-min walk distance (6MWD). An exploratory objective is to examine the association between cumulative time in the individual target heart-rate zone (TIZ) and change in $VO_2T12.5\%$.

Ethics approval required
Ethics approval required

Ethics approval(s)
Approved 25/02/2025, Shanghai University of Sport Research Ethics Committee (No. 650 Qingyuan Ring Road, Yangpu District, Shanghai, 200438, China; +86 21 6550 8179; lunli@sus.edu.cn), ref: 102772025RT001

Primary study design
Interventional

Allocation
Randomized controlled trial

Masking

Blinded (masking used)

Control
Active

Assignment
Parallel

Purpose
Supportive care

Study type(s)

Health condition(s) or problem(s) studied
Postexercise oxygen uptake recovery, cardiorespiratory fitness, and physiological adaptation to aerobic exercise in community-dwelling older adults.

Interventions
This is a two-centre, two-arm, parallel-group, assessor-blinded superiority randomised controlled trial involving 120 community-dwelling adults aged 65 years or older. Participants will be randomly allocated in a 1:1 ratio to the intervention or control group using computer-generated permuted blocks of randomly varying size, stratified by study site and sex.

Intervention group: Participants will undertake a 12-week CPET-guided individualised aerobic walking programme, comprising four sessions per week (48 planned sessions). Each session will last approximately 40 min, including a 5-min warm-up, 30 min of target-intensity walking, and a 5-min cool-down. Exercise intensity will progress from 40–50% VO_2R during weeks 1–2, to 45–55% during weeks 3–6, and 50–60% during weeks 7–12. Individual target heart-rate zones will be derived from baseline CPET measurements. Participants will wear a Xiaomi Smart Band 9 Pro during training to monitor heart rate at 1-min intervals. Cumulative time in target zone (TIZ) will quantify the physiological exercise dose received. The Borg 6–20 rating of perceived exertion (RPE) will be used as a complementary intensity measure.

Control group: Participants will maintain their habitual lifestyle without an individualised exercise prescription, CPET-derived target heart-rate zones, or wearable-based training feedback. General healthy-ageing information will be provided approximately every 2 weeks.

All participants will undergo baseline and week-12 assessments. Post-intervention assessments will be completed within 3–7 days after the 12-week programme, with CPET scheduled at least 48 h after the final training session. Two methodological substudies will assess the test-retest reliability of $VO_2T12.5\%$ and the accuracy of wearable heart-rate monitoring against the Polar H10 chest strap.

Intervention Type
Behavioural

Primary outcome(s)
1. Time to 12.5% postexercise oxygen uptake recovery measured using $VO_2T12.5\%$ (seconds) derived from breath-by-breath gas exchange measured using the COSMED K5 during standardised postexercise recovery following treadmill CPET. It is defined as the elapsed time from the end of loaded exercise (t = 0 s) to the first processed observation at which VO_2 remains

at or below the 12.5% recovery threshold for the remainder of the recovery recording. The threshold is calculated as VO_2peak – 0.125 × (VO_2peak – VO_2rest). VO_2peak is the highest 30-s moving-average VO_2 during loaded exercise, while VO_2rest is obtained from a separate standardised semi-recumbent resting gas-exchange assessment. Recovery comprises 60 s of active walking at 2.5 km/h and 0% grade, followed by 2 min of seated upright recovery. Linear interpolation will be used when necessary at baseline and week 12. Post-intervention assessment will be conducted within 3–7 days after completion of the 12-week intervention, with CPET performed at least 48 h after the final training session.

2. Peak oxygen uptake (VO_2peak) measured using the highest 30-s moving-average oxygen uptake achieved during symptom-limited treadmill CPET using the COSMED K5, expressed in mL /kg/min at baseline and week 12

3. Oxygen uptake at the ventilatory anaerobic threshold (VO_2VAT) measured using during treadmill CPET using the V-slope method supported by ventilatory equivalents for oxygen and carbon dioxide at baseline and week 12

Key secondary outcome(s)

Completion date
31/12/2027

Eligibility

Key inclusion criteria
1. Aged 65 years or older
2. Habitually resided at an altitude of 1,500–2,500 m for at least 12 months and intends to remain in the study region throughout the intervention
3. Living independently in the community
4. Able to walk independently without physical assistance and safely use a treadmill
5. Able to understand study instructions and communicate with the research team
6. No structured moderate-to-vigorous aerobic training on three or more days per week during the preceding 3 months.
7. Has access to a smartphone and can use the study wearable device independently or with routine assistance from a family member
8. Willing to provide written informed consent

Healthy volunteers allowed
Yes

Age group
Senior

Lower age limit
65 Years

Upper age limit
80 Years

Sex
All

Total final enrolment
0

Key exclusion criteria
1. Physician-diagnosed hypertension, current antihypertensive medication use, or an average screening blood pressure of at least 140/90 mmHg confirmed on repeat measurement
2. Type 1 or type 2 diabetes mellitus, use of glucose-lowering medication, or screening values consistent with diabetes when recent clinical data are available
3. Known coronary artery disease, heart failure, cardiomyopathy, clinically important valvular disease, clinically significant arrhythmia, previous myocardial infarction, or other cardiovascular disease incompatible with maximal exercise testing
4. Chronic respiratory disease that materially limits exercise tolerance
5. Previous stroke or neurological disorder that materially affects gait, balance, or exercise capacity
6. Severe musculoskeletal disease, recent fracture or surgery, or persistent pain that precludes safe treadmill walking
7. Cognitive impairment or psychiatric illness that compromises informed consent, safety, or adherence
8. Active cancer or clinically important renal, hepatic, systemic, or acute illness
9. BMI ≥35 kg/m² when body size or mobility would compromise safe treadmill testing
10. Use of beta-blockers, ivabradine, non-dihydropyridine calcium-channel blockers, or other medications expected to substantially alter the exercise heart-rate response
11. An absolute contraindication to maximal exercise testing identified during medical screening
12. Concurrent participation in another structured exercise intervention
13. Any condition judged by the study physician or principal investigator to compromise participant safety or the validity of physiological measurements

Date of first enrolment
01/01/2027

Date of final enrolment
30/06/2027

Locations

Countries of recruitment
China

Sponsor information

Organisation
Shanghai University of Sport

ROR
https://ror.org/0056pyw12

Funder(s)

Funder type

Funder Name
National Key Research and Development Program of China

Alternative Name(s)
, National Basic Research Program of China (973 Program), Special Fund for the National Key Research and Development Plan, China National Key Research and Development Plan Project, National Key Research and Development of China, National Key Research and Development Program, National Key R&D Program of China, National Key R&D Programmes of China, China's National Key R&D Programmes, National Basic Research Program of China, 973 Program, National Program on Key Basic Research Project (973 Program), National Plan on Key Basic Research and Development, National Basic Research Program, NKRDPC, NKPs

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
China

Funder Name
Shanghai Oriental Talent Program

Results and Publications

Individual participant data (IPD) sharing plan
De-identified individual participant data supporting the primary and key secondary outcomes, together with the data dictionary and study protocol, will be made available after publication of the primary results. Requests should be submitted to the corresponding author, Prof. Jie Zhuang (zhuangjiesh@163.com), and will be reviewed by the principal investigator and research team. Access will be granted to qualified researchers for scientifically sound secondary analyses, subject to relevant ethics approval, participant consent, a data-use agreement, and applicable data-protection requirements. Direct personal identifiers will not be shared. Data will be available for five years after publication.

IPD sharing plan summary
Available on request