

Exercise programmes during compulsory substance use rehabilitation in men: a 6-month study of muscle mass, bone status, body fat, and heart rate variability

Submission date 27/04/2026	Recruitment status No longer recruiting	☐ Prospectively registered
Registration date 05/05/2026	Overall study status Completed	☐ Protocol
Last Edited 05/05/2026	Condition category Mental and Behavioural Disorders	☐ Statistical analysis plan
		☐ Results
		☐ Individual participant data
		☒ Record updated in last year

Plain English summary of protocol

Background and study aims

Substance use disorders can affect physical health as well as mental and social functioning. People undergoing rehabilitation may have reduced muscle mass, higher body fat, poorer bone health, and changes in heart rate variability, which is an indicator of autonomic nervous system function. Exercise is often used in rehabilitation settings, but it is still unclear whether different types of exercise are associated with different patterns of physical recovery. The aim of this study is to compare four routine exercise programme pathways in men undergoing compulsory substance use rehabilitation in China and to examine how these programmes are associated with changes in muscle mass, body fat, bone status, and heart rate variability over time.

Who can participate?

Men aged 18 to 60 years with a diagnosis of substance use disorder who are undergoing compulsory substance use rehabilitation in the study facility can participate if they are medically cleared for exercise and have been resident in the facility for at least 90 days before the baseline assessment.

What does the study involve?

Participants are assigned through routine institutional scheduling, not by investigator-driven random allocation, to one of four programme pathways: usual care control, rehabilitation exercise, aerobic running, or resistance equipment exercise. The study follows participants for 26 weeks. Physical assessments are carried out at baseline, 3 months, and 6 months for body composition and heart rate variability, while bone status is assessed at baseline and 6 months. The study compares how the different exercise programmes are associated with changes in these physiological measures over time.

What are the possible benefits and risks of participating?

Participants may benefit from taking part in supervised exercise programmes that could support physical rehabilitation. However, benefits cannot be guaranteed. Possible risks include exercise-

related fatigue, muscle soreness, minor strain, or discomfort during physical assessment procedures. To reduce risk, participants are medically screened before participation, exercise is supervised by trained staff, and routine institutional safety procedures are followed.

Where is the study run from?

The study is run from a compulsory substance use rehabilitation facility in China, with academic oversight from Zhejiang Police Vocational College (China)

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

April 2025 to January 2026

Who is funding the study?

The study is supported by the 2026 Soft Science Research Program of Zhejiang Province (No. 2026C35082) (China)

Who is the main contact?

Dr Dongming Jia, jiadm5332@126.com

Contact information

Type(s)

Principal investigator, Scientific, Public

Contact name

Prof Dongming Jia

ORCID ID

<https://orcid.org/0000-0001-7662-6788>

Contact details

Department of Criminal Justice, Zhejiang Police Vocational College, Zhejiang Province
Hangzhou
China
310018
+86 (0)13282135332
jiadm5332@126.com

Additional identifiers

Ethics approval number

HYFW2025G02

Study information

Scientific Title

A single-centre, assessor-blinded, non-randomized prospective interventional cohort study comparing routine exercise modalities for multidomain physiological adaptation in men undergoing compulsory substance use rehabilitation

Acronym

Study objectives

1. To evaluate the longitudinal associations of three structured exercise programmes – rehabilitation exercise, aerobic running, and resistance equipment exercise – relative to usual care control with skeletal muscle mass, percent body fat, calcaneal bone mineral density, and heart rate variability over 26 weeks in men undergoing compulsory substance use rehabilitation.
2. To compare programme-associated musculoskeletal and autonomic adaptation profiles across the four institutional routine pathways.
3. To conduct exploratory analyses examining whether early body-composition changes statistically mediate later changes in bone or autonomic outcomes.

Ethics approval required

Ethics approval required

Ethics approval(s)

Approved 01/04/2026, Ethics Committee of Zhejiang Police Vocational College (Xiasha Street 618, Hangzhou, 310018, China; +86 (0)1373540579; xueshx@163.com), ref: HYFW2025G02

Primary study design

Interventional

Allocation

Non-randomized controlled trial

Masking

Blinded (masking used)

Control

Active

Assignment

Parallel

Purpose

Treatment

Study type(s)

Health condition(s) or problem(s) studied

Substance use disorder (primarily methamphetamine, heroin, or other illicit substance use disorder) in men undergoing compulsory substance use rehabilitation

Interventions

Participants were assigned through routine institutional administrative scheduling based on residential-unit timetables and equipment capacity, rather than investigator-driven random allocation, to one of four parallel programme pathways.

The usual care control group continued routine institutional activities, including approximately 20 minutes per day of morning calisthenics and occupational activities, without additional structured exercise.

The rehabilitation exercise group received group-based rehabilitation calisthenics 5 days per week, 45 minutes per session, at light intensity (35%–50% of maximum heart rate).

The running programme group received structured aerobic running 5 days per week, 40 minutes per session, at moderate intensity (60%–75% of maximum heart rate), with pace adjusted monthly using submaximal step-test calibration.

The equipment exercise group received progressive resistance training 4 days per week, 50 minutes per session, involving 6 to 8 exercises at 65%–80% of one-repetition maximum, performed in 3 sets of 8 to 12 repetitions, with one-repetition maximum reassessed at weeks 4, 10, and 18.

Participants were followed for 26 weeks. Outcome assessors and data analysts were blinded to programme group labels.

Intervention Type

Behavioural

Primary outcome(s)

1. Skeletal muscle mass measured using multi-frequency bioelectrical impedance analysis (InBody 770) at baseline, 3 months, and 6 months
2. Heart rate variability measured using wrist-worn photoplethysmography over the 14-day window preceding each assessment visit at baseline, 3 months, and 6 months
3. Percent body fat measured using multi-frequency bioelectrical impedance analysis (InBody 770) at baseline, 3 months, and 6 months

Key secondary outcome(s)

Completion date

18/01/2026

Eligibility

Key inclusion criteria

1. Male sex
2. Aged 18 to 60 years
3. Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) diagnosis of substance use disorder, primarily involving methamphetamine, heroin, or other illicit substances
4. Resident in the compulsory rehabilitation facility for at least 90 days before baseline assessment
5. Medically cleared for participation in exercise programmes

Healthy volunteers allowed

No

Age group

Adult

Lower age limit

18 Years

Upper age limit

60 Years

Sex

Male

Total final enrolment

148

Key exclusion criteria

1. Cardiovascular disease or uncontrolled hypertension
2. Musculoskeletal injury precluding exercise participation
3. Use of medications affecting bone metabolism within the preceding 6 months
4. Participation in structured exercise within the preceding 90 days

Date of first enrolment

25/04/2025

Date of final enrolment

16/07/2025

Locations

Countries of recruitment

China

Sponsor information

Organisation

Zhejiang Police Vocational College

Funder(s)

Funder type

Funder Name

2026 Soft Science Research Program of Zhejiang Province (No. 2026C35082)

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary

Not expected to be made available