

# Enhancing balance in older adults with sensory integration training

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<b>Registration date</b> 03/10/2024	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
<b>Last Edited</b> 02/10/2024	<b>Condition category</b> Other	<input type="checkbox"/> Individual participant data <input type="checkbox"/> Record updated in last year

## Plain English summary of protocol

### Background and study aims

This study investigates the effects of sensorimotor integrative resistance training combined with moderate-intensity resistance training on dual-task dynamic balance abilities in older adults, aiming to reduce fall risk and improve balance control.

### Who can participate?

Older adults aged 60 to 80 years old with a Mini-Mental State Examination score of 27 or higher and unrestricted or slightly restricted joint mobility that does not affect daily activities.

### What does the study involve?

Participants are randomly divided into four groups: control, medium-intensity resistance training (MIRT), low-intensity sensorimotor integrative resistance training (LIRT-SI), and medium-intensity sensorimotor integrative resistance training (MIRT-SI). The intervention consists of training sessions conducted three times per week for 16 weeks. Participants perform 4 to 6 sets of 8 to 12 repetitions per session, with intensity adjusted throughout the program. Dual-task balance tests are used to assess outcomes.

### What are the possible benefits and risks of participating?

Participants may experience improvements in balance, posture control, and cognitive functions. Risks include the potential for muscle soreness or injury associated with resistance training, although precautions like supervision and heart rate monitoring minimize these risks.

### Where Is the Study Run From?

The study is conducted at a community fitness center for older adults in Shanghai.

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

December 2023 to December 2024

### Who is funding the study?

Shandong Sport University, China

Who is the main contact?  
Dr Haixia Li, lihaixiatutor1@163.com

## Contact information

### Type(s)

Public, Scientific, Principal investigator

### Contact name

Dr Haixia Li

### Contact details

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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

Sensorimotor integrative resistance training improves dual-task balance abilities in older adults

### Study objectives

The hypothesis for this study could be stated as:

Moderate-intensity sensorimotor integrative resistance training (MIRT-SI) improves dual-task balance abilities more effectively than traditional resistance training in older adults.

### Ethics approval required

Ethics approval required

### Ethics approval(s)

approved 01/12/2023, Shandong Sports University Ethics Committee (Lichen District, Jinan Shandong, 250102, China; +86 0531-89655058; chenyanglei@sdpei.edu.cn), ref: 2023030

## **Study design**

Randomized controlled trial

## **Primary study design**

Interventional

## **Study type(s)**

Quality of life

## **Health condition(s) or problem(s) studied**

Quality of life improvement in dual-task balance abilities in older adults

## **Interventions**

In this experiment, the participants are randomly divided into four groups: control (C), medium-intensity resistance training (MIRT), low-intensity sensorimotor integrative resistance training (LIRT-SI), and medium-intensity sensorimotor integrative resistance training (MIRT-SI), with 13 individuals in each group. Randomisation is done by drawing lots.

The intervention will be conducted using SMART series sensorimotor integrative resistance training equipment at a community fitness center for older individuals in Shanghai. All participants in the intervention groups will engage in training 3 times per week for 16 weeks, with each session comprising 4 to 6 sets of 8 to 12 repetitions each. Rest periods will be 2 min between sets or 5 min between larger sets. The training intensity is maintained at 60 to 75% of the target heart rate, with load increments of 5 to 10% every four weeks. The training sessions will be supervised in person by one or two coaches. Participants in the MIRT group focused solely on performing the exercises at a set intensity. In contrast, participants in the LIRT-SI and MIRT-SI groups will be required to concentrate on controlling the speed of their movements within a specified range, while also achieving the appropriate exercise intensity. Participants in the LIRT-SI group, although engaged in low-intensity resistance training, perform sensory integration exercises that use a larger angular velocity ( $60^{\circ}/s$ ) than the exercises performed by participants in the MIRT-SI group ( $45^{\circ}/s$ ). This requires maintaining a motion speed consistent with the predefined angular velocity, thus increasing the difficulty and demanding greater concentration. Before and after each training session, the professional coaches conduct health assessments as well as warm-up activities and cool-down exercises, respectively. The intensity of the training will be dynamically adjusted in real time using a Polar heart rate monitor (Polar Electro, Kempele, Finland). Data are collected one week before the experiment began (denoted as T1) and in the 8th (T2) and 16th (T3) weeks of the intervention period. All data will be collected by the same team at the same location using consistent instruments and methods.

## **Intervention Type**

Behavioural

## **Primary outcome(s)**

Dual-task dynamic balance ability measured using the Dual-task 10-meter walking test (DT-10MWT) one week before the experiment begins (denoted as T1) and in the 8th (T2) and 16th (T3) weeks of the intervention period

## **Key secondary outcome(s)**

The following Secondary outcome measures are assessed one week before the experiment begins (denoted as T1) and in the 8th (T2) and 16th (T3) weeks of the intervention period:

1. Dual-task lower-limb walking capabilities measured using the Dual-task timed up-and-go test

(DT-TUGT)

2. Balance control measured using the Dual-task static balance test with a Win-pod static balance device over a 30-second test period, performed twice with a one-minute rest

**Completion date**

31/12/2024

## **Eligibility**

**Key inclusion criteria**

1. Mini-Mental State Examination score of 27 or above
2. Unrestricted joint mobility or slight restrictions that did not affect activities of daily living

**Participant type(s)**

Healthy volunteer

**Healthy volunteers allowed**

No

**Age group**

Senior

**Lower age limit**

60 years

**Upper age limit**

80 years

**Sex**

All

**Total final enrolment**

52

**Key exclusion criteria**

1. Mini-Mental State Examination score below 27
2. Presence of severe cardiovascular or cerebrovascular diseases
3. Presence of motor disabilities or inability to perform free and voluntary movements
4. Significant joint mobility restrictions that affect activities of daily living
5. Presence of osteoarthritis

**Date of first enrolment**

01/01/2024

**Date of final enrolment**

31/03/2024

## **Locations**

**Countries of recruitment**

China

### Study participating centre

#### Community fitness centre

Zhongyuan, Jialong, and Daning neighborhoods of Yangpu District

Shanghai

China

250102

## Sponsor information

### Organisation

Shandong Sport University

### ROR

<https://ror.org/026b4k258>

## Funder(s)

### Funder type

University/education

### Funder Name

Shandong Sport University

## Results and Publications

### Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study are/will be available upon request from Dr Haixia Li, [lihaixiatutor1@163.com](mailto:lihaixiatutor1@163.com)

### IPD sharing plan summary

Available on request

### Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Participant information sheet</a>	Participant information sheet	11/11/2025	11/11/2025	No	Yes