

Effect of Multicomponent Exercise and Nutrition Intervention on Frailty Status in Older Adults: A Network Meta-Analysis

多成分运动和营养干预对老年人衰弱状态的影响：网络 meta 分析

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REVIEW TITLE AND BASIC DETAILS

Review title

Effect of Multicomponent Exercise and Nutrition Intervention on Frailty Status in Older Adults: A Network Meta-Analysis

Condition or domain being studied

Frailty

Rationale for the review

Compare the effects of multicomponent exercise, nutritional intervention, their combination, and routine care on frailty status and physical function in older adults with frailty.

Review objectives

This study employs network meta-analysis (NMA) to integrate direct and indirect evidence, systematically comparing the efficacy differences among "multicomponent exercise plus nutrition," multicomponent Exercise, nutritional intervention, and routine care control groups, aiming to identify the optimal intervention combination. The findings will provide

critical evidence for updating frailty management guidelines, thereby facilitating optimized resource allocation and personalized intervention strategies. Comparative efficacy of multicomponent exercise with or without dietary supplements in frailty intervention

本研究采用网络 meta 分析（NMA）整合直接和间接证据，系统比较“多成分运动加营养干预”、多成分运动、营养干预和常规护理对照组之间的疗效差异，旨在确定最优的干预组合。研究结果将为更新衰弱管理指南提供关键证据，从而促进资源的优化配置和个人化干预策略的制定。多成分运动加或不加膳食补充剂在衰弱干预中的疗效比较

Keywords

Frailty; Multicomponent exercise; Nutrition

Country

China

ELIGIBILITY CRITERIA

Population

Included

Population (P): Elderly individuals aged ≥ 60 years, regardless of whether they have been diagnosed with frailty, pre-frailty, or have frailty-related risks.

Excluded

Elderly individuals with severe diseases (e.g., advanced cancer) or receiving other treatments that may interfere with intervention effects (e.g., surgical rehabilitation therapy) were excluded.

Intervention(s) or exposure(s)

Included

Nutritional supplement; Multiple Component Intervention; Exercise therapy

Interventions (I):

- (1) Standalone multicomponent exercise interventions, comprising combinations of two or more exercise types (e.g., aerobic, resistance, balance, flexibility training);
- (2) Nutrition interventions with dietary supplements, including amino acid supplements (e.g., leucine, branched-chain amino acids) and protein supplements (e.g., whey protein, casein);
- (3) Combined interventions of multicomponent exercise and nutritional supplementation.

Comparator(s) or control(s)

Included

PICO tags selected: Usual Care; Placebo

Study design

Only randomized study types will be included.

Context

Randomized controlled trials (RCTs) investigating multicomponent exercise, nutritional intervention, or their combination in frail older adults will be included in this study.

TIMELINE OF THE REVIEW

Date of first submission to PROSPERO

27 May 2025

Review timeline

Start date: 1 January 2025. End date: 25 June 2025.

Date of registration in PROSPERO

28 May 2025

AVAILABILITY OF FULL PROTOCOL

Availability of full protocol

A full protocol has not been written.

SEARCHING AND SCREENING

Search for unpublished studies

Both published and unpublished studies will be sought.

Main bibliographic databases that will be searched

The main databases to be searched are *CENTRAL - Cochrane Central Register of Controlled Trials*, *Embase - Embase via Ovid*, *Embase.com*, *MEDLINE*, *PsycInfo* and *PubMed*.

Search language restrictions

There are no language restrictions.

Search date restrictions

There are no search date restrictions.

Other methods of identifying studies

Other studies will be identified by: *contacting authors or experts, looking through all the articles that cite the papers included in the review ("snowballing"), reference list checking, searching conference proceedings, searching dissertation and thesis databases and searching trial or study registers.*

Link to search strategy

A full search strategy is not available.

Selection process

Studies will be screened independently by at least two people (or person/machine combination) with a process to resolve differences.

Other relevant information about searching and screening

None

DATA COLLECTION PROCESS

Data extraction from published articles and reports

Data will be extracted independently by at least two people (or person/machine combination) with a process to resolve differences.

Authors will be asked to provide any required data not available in published reports.

Study risk of bias or quality assessment

Risk of bias will be assessed using: *AMSTAR-2*, *Cochrane RoB-1* and *Cochrane RoB-2*

Data will be assessed independently by at least two people (or person/machine combination) with a process to resolve differences.

Additional information will be sought from study investigators if required information is unclear or unavailable in the study publications/reports.

Reporting bias assessment

Risk of bias due to missing results will be assessed

Certainty assessment

The study applied the GRADE system to evaluate the quality of evidence included.

OUTCOMES TO BE ANALYSED

Main outcomes

The primary outcome was improvement in frailty level

Additional outcomes

Secondary outcomes included gait speed, Short Physical Performance Battery (SPPB), and Timed Up-and-Go test (TUG).

PLANNED DATA SYNTHESIS

Strategy for data synthesis

Network meta-analysis under the frequentist framework was performed using R software with the netmeta package. For each outcome, network plots of interventions were constructed and relative effects between interventions were calculated. Random-effects models were applied, and surface under the cumulative ranking curve (SUCRA) values were computed to estimate ranking probabilities of interventions.

Heterogeneity was assessed using the I^2 statistic. Significant heterogeneity was considered when $I^2 \geq 50\%$ or $P \leq 0.10$. Consistency between direct and indirect evidence was evaluated through consistency tests, including local and global tests. Network meta-regression was used to explore potential effect modifiers, such as participant age, intervention duration, and intervention intensity.

CURRENT REVIEW STAGE

Stage of the review at this submission

Review stage	Started	Completed
Pilot work	✓	✓
Formal searching/study identification	✓	✓
Screening search results against inclusion criteria	✓	✓
Data extraction or receipt of IPD		
Risk of bias/quality assessment		
Data synthesis		

Review status

The review is currently planned or ongoing.

Publication of review results

Results of the review will be published.

REVIEW AFFILIATION, FUNDING AND PEER REVIEW

Review team members

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No conflict of interest declared.

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No conflict of interest declared.

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No conflict of interest declared.

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No conflict of interest declared.

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Funding source

Review has no funding and no agreed support from an academic institution and is done in authors' own time.

Peer review

There has been no peer review of this planned review.

ADDITIONAL INFORMATION

Review conflict of interest

Declared individual interests are recorded under team member details.. No additional interests are recorded for this review.

Medical Subject Headings

Amino Acids; Amino Acids, Branched-Chain; Dietary Supplements; Exercise Therapy; Frailty; Humans; Leucine; Network Meta-Analysis; Whey Proteins

SIMILAR REVIEWS

Check for similar records already in PROSPERO

PROSPERO identified a number of existing PROSPERO records that were similar to this one (last check made on 22 April 2025). These are shown below along with the reasons given by that the review team for the reviews being different and/or proceeding.

- The Impact of Dietary Plans and Nutritional Supplements on Recovery, Graft Survival, and Overall Health in Kidney Transplant Recipients: A Systematic Review [published 6 November 2024] [CRD42024606524]. The review was judged **not to be similar**
- Micronutrient supplements for improving the physical and mental health and wellbeing of people with or without undernutrition being treated for tuberculosis disease: A systematic review. [published 5 March 2024] [CRD42024516411]. The review was judged **not to be similar**
- The association between dietary protein, amino acids, vitamin D, omega-3 fatty acids intake and sarcopenia: A systematic review and Meta-analysis [published 17 September 2024] [CRD42024587587]. The review was judged **not to be similar**
- Effectiveness of preconception nutritional supplements and behavioral interventions (Education and physical activity): A systematic review and meta-analysis protocol [published 30 September 2024] [CRD42024592645]. The review was judged **not to be similar**
- Nutrition interventions to treat malnutrition or frailty or poor functional ability in community-dwelling older adults [published 9 June 2017] [CRD42017069094]. The review was judged **not to be similar**
- The effectiveness of multicomponent interventions on progression of kidney disease in patients with Stages 3-4 pre-dialysis chronic kidney disease: systematic review and meta-analysis [published 15 October 2024] [CRD42024596842]. The review was judged **not to be similar**
- Comparative effectiveness of different dietary supplements in patients with polycystic ovary syndrome. A systematic review and network meta-analysis [published 25 June 2022] [CRD42022339692]. The review was judged **not to be similar**
- Effects of different supplements on diabetic nephropathy: a network meta-analysis [published 23 December 2024] [CRD42024627001]. The review was judged **not to be similar**
- Effects of Multicomponent Exercise Training on the Health of Older people with frailty: A Systematic Review and Meta-Analysis [published 27 November 2023] [CRD42023483900]. The review was judged **not to be similar**
- Effectiveness of dietary supplements in health-related conditions associated with spinal cord injuries [published 12 November 2015] [CRD42015028014]. The review was judged **not to be similar**

- Exercise Therapy Versus Nutritional Supplement for elderly with or without Sarcopenia: A Systematic Review +/- meta-analysis [published 25 July 2020] [CRD42020194222]. The review was judged **not to be similar**
- Nutritional Status and Dietary Intake Among Nigerian Adolescent: A Systematic Review [published 20 November 2023] [CRD42023481095]. The review was judged **not to be similar**
- Relative effectiveness of various interventions for frail elder adults: a systematic review and component network meta-analysis [published 24 October 2024] [CRD42024602557]. The review was judged **not to be similar**
- The effect of combined dietary and exercise interventions on body composition in cancer survivors: a systematic review and meta-analysis [published 10 January 2023] [CRD42023356656]. The review was judged **not to be similar**
- Barriers and facilitators to implementing a dietary nutrition intervention for community-dwelling elderly with sarcopenia: a systematic review applying the social-ecological model. [published 14 December 2022] [CRD42022381339]. The review was judged **not to be similar**
- The effects of exercise and dietary weight loss versus dietary weight loss alone on bone health in overweight and obese adults [published 16 September 2019] [CRD42019127460]. The review was judged **not to be similar**
- Comparative efficacy of dietary nutritional supplements for coronary heart disease in adults: A systematic review and network meta-analysis [published 10 September 2023] [CRD42023458984]. The review was judged **not to be similar**
- Effects of dietary supplements on markers of bone turnover in postmenopausal women: a network meta-analysis [published 23 December 2024] [CRD42024626695]. The review was judged **not to be similar**
- The Impact of Exercise Training on Liver Status and Body Function in Cirrhotic Patients: A Systematic review and Meta-Analysis [published 19 December 2023] [CRD42023491568]. The review was judged **not to be similar**
- The Impact of Dietary Supplements on Psychological and Physiological Symptoms of Premenstrual Syndrome and Premenstrual Dysphoric Disorder: A Systematic Review [published 8 July 2024] [CRD42024558451]. The review was judged **not to be similar**

PROSPERO version history

- [Version 1.0, published 28 May 2025](#)

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