Muscle-Strengthening Exercise for Older Adults: A Critical Strategy for Maintaining Health and Independence

[1]Vitor A. A. A. Siqueira, [2]Eurico N. Wilhelm, [1]Emerson Sebastião

1 - Department of Health and Kinesiology. University of Illinois Urbana-Champaign, United States

2 – Department of Sport, Exercise and Rehabilitation. Northumbria University, United Kingdom

Corresponding author: Emerson Sebastião. Department of Health and Kinesiology. University of Illinois Urbana-Champaign. 906 South Goodwin Avenue, Urbana, IL – 61801, United States. Telephone: (217) 300-6497 | Fax: (217) 333-0404 | Email: esebast2@illinois.edu

Muscle-strengthening exercise (MSE) - also known as strength, weight, or resistance training - includes activities that use equipment such as free weights, resistance machines, resistance bands, or body weight (e.g., push-ups). While each method has unique characteristics and training settings, they all offer neuromuscular benefits that are dependent on individual training characteristics.

Individuals engage in MSE for various reasons, such as enhancing sports performance, aesthetic goals, rehabilitation for injury, and improving overall fitness and health. Regular participation in MSE enhances muscle strength, power, endurance, and skeletal muscle mass. For older adults, MSE is a critical component of healthy aging, defined by the World Health Organization as "the process of developing and maintaining the functional ability that enables well-being in older age." This infographic communicates the benefits of MSE for older adults and summarizes key MSE recommendations for this population. It aims to assist clinicians and health professionals in integrating MSE into routine care, thereby promoting better health outcomes and quality of life among older adults.

Clinical and epidemiological evidence shows that MSE is associated with numerous positive health outcomes, including reduced all-cause mortality, lower incidence of diabetes mellitus, and improved cardiometabolic, musculoskeletal, and mental health [1,2]. MSE helps maintain functional ability and independence, reduces fall risk, and assists with management of age-related conditions like sarcopenia, osteoporosis, frailty, dementia, and mild cognitive impairment. It also enhances cognitive function and body composition. Despite these benefits, 70-90% of adults worldwide do not meet recommended MSE levels, with older individuals less likely to comply with minimum guidelines [3].

The effectiveness of MSE depends on exercise training prescription variables, including (but not limited to training frequency, intensity, and volume [4, 5]. For older adults, national and international guidelines recommend at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity physical activity per week, with inclusion of MSE activities at least twice a week, following exercise training principles [4-7]. By incorporating regular MSE into their routines, older adults can significantly reduce age-related physiological decline, maintain independence, reduce the risk of morbidities, and improve overall health and well-being.

As the population continues to age, promoting MSE among older adults is crucial for enhancing longevity, healthspan, and active living. This is especially important as MSE, has often been overlooked in public health approaches to chronic disease prevention when compared to aerobic activities (e.g., walking), despite numerous health benefits that go beyond the well-known improvements in the skeletal muscle system.

Figure Legend

Figure 1 Muscle strengthening activities for older adults: types, benefits, and a simplified training program.

Compliance with Ethical Standards

Competing interests: The authors declare no conflict of interest related to this work.

Contributorship: VS, EW and ES conceived the idea. VS, EW and ES agreed on the initial content of the infographic, and VS created the infographic. VS developed the first draft of the commentary. All authors contributed to revising the infographic and commentary and approved the final versions.

Acknowledgments: None

Funding: None

Ethical approval: Not applicable

Data sharing statement: This infographic did not involve the collection, analysis, or use of any primary data. Therefore, no datasets were generated or used in the development of this work.

Patient consent for publication: Not applicable.

References

1. Currier BS, Mcleod JC, Banfield L, et al. Resistance training prescription for muscle strength and hypertrophy in healthy adults: a systematic review and Bayesian network meta-analysis British Journal of Sports Medicine 2023;57:1211-1220.

2. Garcia-Hermoso A, López-Gil JF, Ramírez-Vélez R, et al. Adherence to aerobic and muscle-strengthening activities guidelines: a systematic review and meta-analysis of 3.3 million participants across 32 countries British Journal of Sports Medicine 2023;57:225-229.

3. Bennie JA, Shakespear-Druery J, De Cocker K. Muscle-strengthening exercise epidemiology: a new frontier in chronic disease prevention. *Sports Med Open.* 2020;6(1):40. doi:10.1186/s40798-020-00271-w.

4. Fragala MS, Cadore EL, Dorgo S, et al. Resistance training for older adults: position statement from the National Strength and Conditioning Association. *J Strength Cond Res.* 2019;33(8):2019-2052. doi:10.1519/JSC.0000000000003230.

5. Izquierdo M, Merchant RA, Morley JE, et al. International exercise recommendations in older adults (ICFSR): expert consensus guidelines. *J Nutr Health Aging.* 2021;25(7):824-853. doi:10.1007/s12603-021-1665-8.

6. Chief Medical Officers' Physical Activity Guidelines. In: Department of Health and Social Care, ed. *GOV.UK.* London, UK; 2019.

7. Bull FC, Al-Ansari SS, Biddle S, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *Br J Sports Med.* 2020;54(24):1451-1462.

Muscle Strengthening Activities For Older Adults

TYPES

- Resistance machines
- Free weights
- Elastic bands
- Body weight
- Functional activities

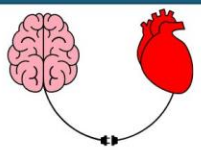
BENEFITS

- **Muscle mass and strength**
- **Bone mineral density, strength and resistance**
- **Cardiovascular function and endurance**
- **Cognitive function**
- **Risk of falls**

Muscle strengthening activities help maintain functional abilities and independence

Prevention

- **Sarcopenia** *(muscle loss)*
- **Frailty**
- **Osteoporosis** *(bone loss)*



- **Cognitive decline**
- **Cardiovascular diseases**
- **Premature death**

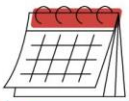
Simplified Training Programme Variables Recommendations

Volume

- **1-3 sets per exercise**
- **8-12 repetitions per set**
- **6-10 exercises for major muscle groups**

Intensity

- **Start with light loads** *(30-40% 1RM, or 13-15 on Borg RPE scale)*
- **Move to heavier loads** *(70-80% 1RM, or 15-18 on Borg RPE scale)*
- **Incorporate power exercises** *(high-velocity movements during the muscle shortening phase with moderate load: 40-60% of 1RM or 13-15 RPE)*



Frequency

- **2-3 days per week per muscle group**

*** Benefits can be amplified by a healthy diet and lifestyle.**