

Exercise among Older Adults: New Perspectives with Innovative Training Interventions

Bewegung bei älteren Menschen: Neue Perspektiven mit innovativen Trainingsinterventionen

Biological aging can differ from chronological aging and is influenced by a range of factors, including genetics, health-conscious behaviors, as well as environmental and social factors. This multifactorial process is reflected in heterogeneous aging phenotypes. Accordingly, tailored exercise programs that are designed to address distinct aging phenotypes, vary in their mode of delivery (in-person, remote, hybrid), and can be implemented in different settings are therefore desirable.

Aging is a universal and inevitable process, characterized by (patho-)physiological changes and functional decline over time, leading to increased vulnerability to diseases and, ultimately, death. Lifestyle factors, most notably physical activity and tailored exercise interventions, play a significant role in shaping aging phenotypes. A healthy lifestyle can help mitigate declines in physical performance, support social participation and exert a fundamental positive impact on cognitive capacity (5).

General Considerations

Recommendations for physical activity and training change with advancing age. Strength training and balance training become increasingly important in later life, reflecting the hierarchical priority of underlying functional abilities. First, sufficient muscle strength is required as a prerequisite for basic activities such as rising from a chair. Next, adequate balance is necessary to initiate locomotion. Only then can endurance be effectively trained through traditional types of endurance exercises, such as walking or cycling. Accordingly, training recommendations for older people must be tailored to the individual's functional status (8). Diagnostic assessment procedures should consider the demands of everyday life and be adapted both to the individual's typical load profile and their habitual mobility routines (7).

Significance of Muscle Mass and Function

Strength training aimed at maintaining, or ideally increasing, muscle mass and strength in old age is particularly valuable, e.g. for preventing musculoskeletal frailty and falls (11). Greater muscle mass also promotes better metabolic health and, among other benefits, is associated with improved glucose homeostasis (6). Currently, next-generation muscle hypertrophy-stimulating drugs, such as

bimagrumab, an activin type II receptor blocker, are receiving growing attention. Future research should investigate their effects in the context of sarcopenia and sarcopenia-related diseases, including whether these drugs can enhance the positive effects of physical training and in which individuals their use (in addition to physical training) may be advisable, also considering possible side effects (9). However, optimizing muscle mass and function should primarily rely on strength training combined with appropriate nutritional strategies, in particular adequate protein intake and/or the use of dietary supplements (e.g. creatine) (3, 12).

New Approaches to Exercise Interventions

During prolonged periods of involuntary inactivity, e.g. hospitalization, it is particularly important to stimulate the muscles continuously to prevent atrophy in older people. Many hospitalized older patients are medically unstable or experience symptoms that make conventional exercise impossible. Numerous studies have demonstrated that neuromuscular electrostimulation can improve muscle strength, size, and functional performance in hospitalized adults (1). Supervised electromyostimulation (EMS) training may also be beneficial for older people outside the hospital setting, preferably as active EMS training (i.e. where EMS is applied during actively performed exercises) (2).

New types of training can complement, or in some cases even replace, traditional forms of training. Virtual reality exergaming is an innovative approach to promoting the health and well-being of older adults, and it is often highly enjoyable for participants. It can be particularly suitable for immobile older people, provided that appropriate systems are available in their living environments. A meta-analysis has shown that VR exergaming can have a positive impact on physical function, cognition, and depression among older nursing home residents (10). Exergaming combines motor and cognitive tasks, a combination with significant benefits even for older people with dementia (4). However, guidance from professional staff is helpful for the handling of technical components and recommended to ensure that the exercise intensity and other variables are appropriate for effective training.

New technologies also enable digital interventions that can be delivered as group programs, e.g. when participants use tablets. This can increase accessibility to relevant courses, e.g. fall prevention >



Prof. Dr. Christina Brinkmann
Associate Editor, *German Journal of Sports Medicine*



PD Dr. Jessica Koschate-Storm
Carl von Ossietzky
University Oldenburg



Article incorporates the Creative Commons Attribution – Non Commercial License. <https://creativecommons.org/licenses/by-nc-sa/4.0/>



Scan QR Code and read article online.

CORRESPONDING ADDRESS:

Prof. Dr. Christian Brinkmann
IST University of Applied Sciences Düsseldorf
German Sport University Cologne
Am Sportpark Müngersdorf 6
50933 Köln, Germany
✉: c.brinkmann@dshs-koeln.de

programs. Numerous studies on such interventions, when supervised by trained personnel, have demonstrated clinically significant improvements in strength and balance (13). Given that older people are often far more familiar with modern technology than in previous decades, remote or hybrid programs can serve as effective alternatives, particularly when traditional in-person exercise programs are difficult to access, e.g., in rural areas or during times of increased risk of infections.

Outlook

Personalized exercise programs that account for the diversity of aging phenotypes are becoming increasingly important. The integration of new technologies and digital delivery methods offers many advantages. However, a key challenge remains ensuring sustainable financing for comprehensive exercise programs for older people that can be delivered in various settings and tailored to participants' individual needs. Achieving this would help maximize "lifespan" and "healthspan" for as many people as possible. ■

Literatur

- (1) Alqurashi HB, Robinson K, O'Connor D, et al. The effects of neuromuscular electrical stimulation on hospitalised adults: systematic review and meta-analysis of randomised controlled trials. *Age Ageing*. 2023;52:afad236. doi:10.1093/ageing/afad236
- (2) Bloeckl J, Raps S, Weineck M, et al. Feasibility and Safety of Whole-Body Electromyostimulation in Frail Older People-A Pilot Trial. *Front Physiol*. 2022;13:856681. doi:10.3389/fphys.2022.856681
- (3) Bonilla DA, Stout JR, Candow DG, et al. The power of creatine plus resistance training for healthy aging: enhancing physical vitality and cognitive function. *Front Physiol*. 2024;15:1496544. doi:10.3389/fphys.2024.1496544
- (4) Gao Y, Liu N. Effectiveness of cognitive-motor dual task training in preventing falls in community older adults: A meta-analysis and systematic review. *Geriatr Nurs*. 2025;64:103366. doi:10.1016/j.gerinurse.2025.05.005
- (5) Gianfredi V, Nucci D, Pennisi F, Maggi S, Veronese N, Soysal P. Aging, longevity, and healthy aging: the public health approach. *Aging Clin Exp Res*. 2025;37:125. doi:10.1007/s40520-025-03021-8
- (6) Havers T, Held S, Schönfelder M, Geisler S, Wackerhage H. Effects of Skeletal Muscle Hypertrophy on Fat Mass and Glucose Homeostasis in Humans and Animals: A Narrative Review with Systematic Literature Search. *Sports Med*. 2025;55:1867-1885. doi:10.1007/s40279-025-02263-w
- (7) Hoffmann U, Faber F, Drescher U, Koschate J. Cardiorespiratory kinetics in exercise physiology: estimates and predictions using randomized changes in work rate. *Eur J Appl Physiol*. 2022;122:717-726. doi:10.1007/s00421-021-04878-z
- (8) Izquierdo M, de Souto Barreto P, Arai H, et al. Global consensus on optimal exercise recommendations for enhancing healthy longevity in older adults (ICFSR). *J Nutr Health Aging*. 2025;29:100401. doi:10.1016/j.jnha.2024.100401
- (9) Kaiser M, Parikh MA, Turitto G, Frishman WH, Peterson SJ. Bimagrumab: Novel Medical Therapy for Inclusion Body Myositis, Sarcopenia, and Medication-Induced Lean Body Mass Loss. *Cardiol Rev*. 2025. Epub ahead of print. doi:10.1097/CRD.0000000000001113
- (10) Peng Y, Wang Y, Zhang L, et al. Virtual reality exergames for improving physical function, cognition and depression among older nursing home residents: A systematic review and meta-analysis. *Geriatr Nurs*. 2024;57:31-44. doi:10.1016/j.gerinurse.2024.02.032
- (11) Tsvetkov D, Meyer-Tönnies MJ, Tsvetkov MV, et al. Effective Therapeutic Strategies to Prevent Frailty and Falls in Community-Dwelling Older Adults. *Aging Dis*. 2025. Epub ahead of print. doi:10.14336/AD.2025.0445
- (12) Whaikid P, Piaseu N. The effectiveness of protein supplementation combined with resistance exercise programs among community-dwelling older adults with sarcopenia: a systematic review and meta-analysis. *Epidemiol Health*. 2024;46:e2024030. doi:10.4178/epih.e2024030
- (13) Wing D, Nichols JF, Parra MT, Barkai HS, Moran RJ. Digitally Delivered, Group-Based Exercise Interventions for Older Adults: Scoping Review. *J Med Internet Res*. 2025;27:e73578. doi:10.2196/73578