


Please cite the Published Version

Low, Daniel, Bailey, Daniel, Pearson, Gladys  and Duncan, Michael (2023) The BASES Expert Statement on Physical Activity and Limiting Sedentary Behaviour for Effective Management of Sarcopenia in Community-dwelling Older Adults. The Sport and Exercise Scientist, 77. ISSN 1754-3444

Publisher: British Association of Sport and Exercise Sciences (BASES)

Version: Published Version

Downloaded from: <https://e-space.mmu.ac.uk/639898/>

Usage rights:  In Copyright

Additional Information: First published in The Sport and Exercise Scientist, Autumn 2023, issue 77. Published by the Chartered Association of Sport and Exercise Sciences - www.cases.org.uk<<http://www.cases.org.uk>>

Enquiries:

If you have questions about this document, contact openresearch@mmu.ac.uk. Please include the URL of the record in e-space. If you believe that your, or a third party's rights have been compromised through this document please see our Take Down policy (available from <https://www.mmu.ac.uk/library/using-the-library/policies-and-guidelines>)



The BASES Expert Statement on Physical Activity and Limiting Sedentary Behaviour for Effective Management of Sarcopenia in Community-dwelling Older Adults

Produced on behalf of the British Association of Sport and Exercise Sciences by Dr Daniel Low, Dr Daniel Bailey, Dr Gladys Pearson and Prof. Michael Duncan FBASES.

Introduction

Sarcopenia is an ageing-related disease, characterised by muscle mass and strength loss. The global prevalence of sarcopenia in community-dwelling older adults is estimated to be 10-40% and is associated with adverse health outcomes, such as functional impairment, loss of independence, and increased risk and incidence of falls and mortality (Mayhew *et al.*, 2019).

Sarcopenia diagnosis and prognosis can be made through the determination of muscle strength, mass and quality. Severe sarcopenia is considered in the presence of low muscle strength, mass and quality, and reduced functional performance below a threshold unlikely to facilitate independent living; the criteria of each component depend on the diagnostic methodology used.

There are three general approaches to maintaining or increasing muscle mass and function: physical activity (PA) (particularly resistance exercise training, RET), nutrition (particularly the consumption of protein; see Maden-Wilkinson *et al.*, 2022), and hormonal/pharmacological. This Expert Statement provides a review and recommendations for increasing PA and limiting sedentary behaviour as intervention strategies for the prevention and management of sarcopenia in community-dwelling older adults.

structured resistance exercise tends to be used given its success with slowing and preventing muscle loss, and relatively low number of associated contraindications/adverse events when carried out properly (appropriate training or supervision is, therefore, recommended).

Meta-analytic evidence suggests that RET using resistance bands, ankle weights and free weights leads to gains in muscle strength, mass and physical function in older adults, including those with sarcopenia (Vlietstra *et al.*, 2018); these benefits occur independent of dietary changes. Gait and balance training for 20-30 minutes alongside RET is also effective. Adherence and factors affecting implementation of these interventions (e.g. experiences of group versus home-based exercise) are seldom reported (Vlietstra *et al.*, 2018). Nonetheless, a prescribed RET frequency of between 1-3 sessions per week improves sarcopenia. As substantial benefits are seen with two sessions per week, this may be optimal for promoting adherence more so than higher frequencies. Strength gains can occur at a low intensity ($\leq 50\%$ 1 repetition maximum [RM]), yet greater gains are achieved at higher intensities e.g. 80% 1RM (Beckwée *et al.*, 2019). For the majority of individuals with sarcopenia, lower RET intensities may be more feasible and tolerable initially. A progressive training approach should be implemented so individuals can achieve optimal

“ **A whole-body approach targeting the major muscle groups should be taken and the choice of specific exercises should be prescribed considering the needs, capabilities and enjoyment of the individual to maximise adherence.** ”

Physical activity and sarcopenia

Observational evidence shows that increased daily PA and time spent in moderate-to-vigorous intensity PA (MVPA) are beneficially associated with sarcopenia outcomes (Steffl *et al.*, 2017). Physical activity interventions in the form of supervised or home-based

strength gains that result from higher intensities, which, in turn, will improve the ability to undertake activities of daily living (ADL). A single set of 6-12 repetitions for each exercise is generally sufficient to improve muscle function and physical performance initially. For gains in muscle strength over the long-term, 2-3 sets are recommended

(Beckwée *et al.*, 2019). A whole-body approach targeting the major muscle groups should be taken and the choice of specific exercises should be prescribed considering the needs, capabilities and enjoyment of the individual to maximise adherence.

Sedentary behaviour and sarcopenia

Higher amounts of daily sedentary behaviour are associated with reduced muscle mass and physical function, and increased risk of sarcopenia (Gianoudis, 2015). Conversely, regularly interrupting prolonged periods of sedentary behaviour with short bouts of light intensity PA (e.g. standing or slow walking) is associated with improved physical function, ability to carry out ADL and reduced risk of sarcopenia. The benefits of reducing and interrupting sedentary behaviour appear independent from MVPA (Sardinha *et al.*, 2014). Targeting reductions in sedentary behaviour separately from MVPA may thus be needed for optimal sarcopenia management. However, there is limited literature investigating sedentary behaviour interventions on sarcopenia-related outcomes. An intervention comprising functional test feedback, visual and real-time feedback on sedentary time, and motivational interviewing led to improvements in physical function (timed up and go and sit-to-stand tests) and quality of life after 14 weeks in older adults with frailty (Harvey *et al.* 2018). A similar 12-week intervention comprising of real-time self-monitoring of sedentary time, behavioural consultations and goal setting improved older adults' physical function (standing up from a chair) (Barone Gibbs *et al.*, 2017). The potential of sedentary behaviour interventions to improve sarcopenia-related outcomes is thus indicated. That said, the minimum clinically important change (MCIC) in sarcopenia indicators to assess the meaningfulness of individual responses to sedentary behaviour and PA interventions appears seldom used or available.

Mechanisms

Skeletal muscle phenotypes, particularly muscle mass, muscle strength and physical function, are determined by multiple factors. Heritability is proposed to explain 45–82% of the variability in these phenotypes. Nonetheless, studies typically show poor correlations between indices of muscle mass and physical function. This mismatch is considered to reflect changes in muscle quality.

Skeletal muscle-related functional impairment may result from low skeletal muscle mass (Janssen *et al.*, 2002) and a decrease in muscle fibre pennation angle, sarcomere number, myofibrillar packing density, increased connective tissue accumulation, a change in the ultrastructure of muscle fibres, and/or change in fibre recruitment capacity. Non-muscular factors include altered activation capacity, fewer receptor cells in vestibular organs, alteration in sensory perception, slower reaction times, and increased tendon compliance. A number of these pathways are proposed to be improved by PA and sedentary behaviour interventions (Wullems *et al.*, 2016).

Conclusions and Recommendations

- RET appears an effective management strategy for sarcopenia. There is potential for other modes of exercise to have beneficial effects, although evidence is not yet sufficiently robust to recommend in sarcopenia management.
- Individual exercise prescription is needed. For example, exercise intensity and volume should be prescribed and reviewed based on the person's technical proficiency, functional capacity and exercise tolerance.
- Reducing and interrupting sedentary behaviour with light-intensity activity such as standing and slow walking has potential to positively impact sarcopenia outcomes. Research is in its infancy so definitive recommendations cannot be made.
- PA and sedentary behaviour interventions for sarcopenia management should consider the needs, capabilities, motivation, and enjoyment of participants. Studies examining these aspects are scarce.
- High-quality markers of change are not available to assess the importance of change due to an intervention. Consequently,

statistics such as the MCIC are required to understand whether clinical symptoms are sufficiently changed.

- Knowledge gaps prevent effective translation from research to practice in regard to interventions for sarcopenia management in community-dwelling older adults. Researchers need to ensure that factors affecting implementation of the intervention, fidelity measures and process evaluations are included to address this issue.

For success, PA and sedentary behaviour interventions require cross sector collaboration including involvement from sport and exercise scientists, public health, local and national government, and community groups. ■



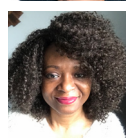
Dr Daniel Low

Daniel is a Senior Lecturer in Sport, Health and Exercise Sciences at Brunel University London. His research explores falls risk in older adults.



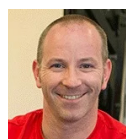
Dr Daniel Bailey

Daniel is a Senior Lecturer in Sport, Health and Exercise Sciences at Brunel University London. His research focuses on developing and evaluating sedentary behaviour interventions.



Dr Gladys Pearson

Gladys is a Reader in Muscle-Tendon physiology at the Manchester Metropolitan University. Her research ranges from optimising physiology techniques, through to ageing frailty.



Prof Michael Duncan FBASES

Mike is a Professor of Sport and Exercise Sciences at Coventry University. His research focuses on enhancing movement across the lifecourse.

References:

- Barone Gibbs, B. *et al.* (2017).** Reducing sedentary behavior versus increasing moderate-to-vigorous intensity physical activity in older adults. *Journal of Aging and Health*, 29, 247-267.
- Beckwée, D. *et al.* (2019).** Exercise Interventions for the prevention and treatment of sarcopenia, a systematic umbrella review. *The Journal of Nutrition, Health and Aging*, 23, 494-502.
- Gianoudis, J., Bailey, C.A. & Daly R.M. (2015).** Associations between sedentary behaviour and body composition, muscle function and sarcopenia in community-dwelling older adults. *Osteoporosis International*, 26, 571-579.
- Harvey, J., Chastin, S. & Skelton, D. (2018).** Breaking sedentary behaviour has the potential to increase/maintain function in frail older adults. *Journal of Frailty, Sarcopenia Falls*, 3, 26-34.
- Janssen, I., Heymsfield, S.B. & Ross, R. (2002).** Low relative skeletal muscle mass (sarcopenia) in older persons is associated with functional impairment and physical disability. *Journal of the American Geriatric Society*, 50, 889-896.
- Maden-Wilkinson, T. *et al.* (2022).** The BASES Expert Statement on optimising protein intake recommendations for skeletal muscle mass in older adults to support healthy ageing. Available: 9345_bas_bases_tses_summer_2022_online_pg_8_9609.pdf
- Mayhew, A.J. *et al.* (2019).** The prevalence of sarcopenia in community-dwelling older adults, an exploration of differences between studies and within definitions: a systematic review and meta-analyses. *Age and Ageing*, 48, 48-56.
- Sardinha, L.B. *et al.* (2014).** Breaking-up sedentary time is associated with physical function in older adults. *Journals of Gerontology: Medical Sciences*, 70, 119-124.
- Steffl, M. *et al.* (2017).** Relationship between sarcopenia and physical activity in older people: a systematic review and meta-analysis. *Clinical Interventions in Aging*, 12, 835-845.
- Vlietstra, L., Hendrickx, W. & Waters, D.L. (2018).** Exercise interventions in healthy older adults with sarcopenia: A systematic review and meta-analysis. *Australasian Journal on Ageing*, 37, 169-183.
- Wullems, J.A. *et al.* (2016).** A review of the prevalence of sedentarism in older adults, its physiology/health impact and non-exercise mobility counter-measures. *Biogerontology*, 17, 547-565.

Download a PDF of this article: www.bases.org.uk/BASES-Expert-Statements

Copyright © BASES, 2023

Permission is given for reproduction in substantial part. We ask that the following note be included: "First published in *The Sport and Exercise Scientist*, Issue 77, Autumn 2023. Published by the British Association of Sport and Exercise Sciences - www.bases.org.uk"