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Maccarone *et al.*'s comments on *Cohort studies using 3D-CT are needed to assess whether "home Gym-Bed" exercises are beneficial against sarcopenia*

Maria Chiara Maccarone,² Allegra Caregnato,¹ Gianluca Regazzo,¹ Alessandra Carriero,¹ Giacomo Casellato,¹ Claudia Finamoni,¹ Rossella Jirillo,¹ Olena Laskova,¹ Elena Marigo,¹ Daniela Yolanda Sánchez,¹ Irene Seno,¹ Chiara Venturin,¹ Hillary Veronese,¹ Barbara Ravara,^{3,4,5} Walter Giurati,³ Ugo Carraro,^{1,3,4,5} Stefano Masiero^{1,2,4}

¹Physical Medicine and Rehabilitation School, University of Padova, Padua, Italy; ²Department of Neuroscience, Section of Rehabilitation, University of Padova, Padua, Italy; ³Department of Biomedical Sciences, University of Padova, Padua, Italy; ⁴CIR-Myo-Interdepartmental Research Center of Myology, University of Padova, Padua, Italy; ⁵A&CM-C Foundation for Translational Myology, Padua, Italy

Key words: sarcopenia; home Gym-Bed; Padua prospective observational study; quality of life; compliance.

We appreciate the insightful comments provided by Josef Finsterer regarding our article on the first evidence on the effects of the Home Full-Body in-Bed Gym protocol as a potential intervention to mitigate age-related muscle loss based on the preliminary positive results of a Padua prospective observational study.¹ We acknowledge the importance of the points raised and would like to address them in this response.

At the University of Padua, we conducted a study aimed at evaluating the impact of a home-based Full-Body in-Bed Gym protocol on various outcomes in elderly individuals, which was published in 2023.¹ The rationale of our proposal is based on the fact that functional muscle decay of aging is inevitable, but that the general population is highly hypoactive, let's say "lazy". The increase in daily muscular activity even through "*Home In-Bed Gym*" recovers at least in part the potential abilities progressively lost. Therefore, it is easy to rejuvenate the "lazy" population, that is, the vast majority of elderly. We included 22 participants with a median age of 71.90 years, who engaged in the exercise program three times a week for two months. Although the improvement in sarcopenia risk was not statistically significant, there was a positive trend. This can be explained by the small number of patients we evaluated in this initial study on an elderly population. While our results regarding sarcopenia risk were

not statistically significant, we believe that the observed trends warrant further investigation with larger sample sizes and longer follow-up periods to better understand the potential benefits of this protocol. Nevertheless, our study did not focus solely on sarcopenia prevention but also evaluated quality of life, including both mental and physical components, as well as pain reduction, all of which showed statistically significant improvements. These outcomes are of fundamental importance since, in elderly individuals, both physical and mental health play a crucial role in maintaining overall well-being. Various studies suggest that exercise can contribute to enhanced self-confidence and emotional well-being, as well as prevent cognitive decline.^{2,3} Participation in easily accessible home-based exercise programs should be encouraged to achieve these numerous benefits and improve overall quality of life. An important finding from our study was related to compliance: the high compliance rate over six months supports the feasibility and sustainability of the program, suggesting that it could be extended over a longer period.

We agree that comorbidities and medications can influence muscle mass and should be considered in future studies. While our study aimed to reflect real-world conditions by including subjects with common age-related comorbidities, we excluded those with orthopedic issues, severe cardiovascular or oncological diseases, and significant neurological disorders.

Finally, we recognize that factors such as diet, hormonal levels, and genetics also affect muscle mass. While our study mainly examined the functional effects of the Home Full-Body in-Bed Gym program, incorporating assessments of these factors could offer a more complete understanding of the intervention's impact. Additionally, future research should use consistent imaging methods to reliably assess changes in muscle volume. The study by Quadrelli *et al.*, which employed advanced imaging techniques like 256-slice CT scanners and 3D muscle segmentation with DAFNE software, complements our research by tracking muscle mass changes over a decade.⁴ Future studies should include standardized imaging protocols to accurately measure muscle mass changes and consider these additional variables to fully evaluate their interactions with exercise programs.

In conclusion, we appreciate the constructive feedback and acknowledge the limitations of our study. We hope that our response clarifies the scope of our research and contributes to the ongoing discussion on effective strategies for addressing age-related muscle loss. Case reports and preliminary clinical studies are useful, if not essential, steps toward organizing randomized, double-blind, placebo-controlled, cross-over trials.

Our preliminary positive results suggest that the Home Full-Body in-Bed Gym program holds potential benefits, particularly in improving quality of life and pain management. To build upon these findings,

future research should incorporate advanced imaging techniques and comprehensive assessments of dietary and hormonal influences. Such an approach will be essential to validate and expand upon our findings. In light of the valuable feedback and the identified areas for further investigation, we invite Josef Finsterer, readers of his Letter and other experts in the field to collaborate with us on future comprehensive studies.

Please message us if anyone is interested in participating in such a study!

Conflict of Interest

The authors declare no financial, personal, or other conflicts of interest.

Contributions

MCM and UC – development of the study design; MCM, AC, GR, AC, GC, CF, RJ, OL, EM, DYS, IS, CV and HV - data collection; MCM, UC and SM data interpretation; MCM, AC UC and SM – writing; BR, WG, UC and SM - supervision. All authors read and approved the final edited manuscript.

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Correspondence

Maria Chiara Maccarone, Rehabilitation Unit, Department of Neuroscience, University of Padova, Via Giustiniani 2, 35128 Padua, Italy

ORCID iD: 0000-0003-2793-1334

Email: mariachiara.maccarone@phd.unipd.it

E-mails and ORCID iD of co-authors

Allegra Caregnato: allegra.caregnato@studenti.unipd.it

ORCID iD: 0000-0001-8926-5301

Gianluca Regazzo: gianluca.regazzo@studenti.unipd.it

ORCID iD: 0009-0004-6277-4199

Alessandra Carriero: alessandra.carriero@studenti.unipd.it

ORCID iD: 0009-0008-2356-5457

Giacomo Casellato: giacomo.casellato@studenti.unipd.it

ORCID iD: 0009-0000-6788-6238

Claudia Finamoni: claudia.finamoni@studenti.unipd.it

ORCID iD: 0009-0005-3603-4725

Rossella Jirillo: rossella.jirillo@studenti.unipd.it

ORCID iD: 0009-0009-2495-1074

Olena Laskova: olena.laskova@studenti.unipd.it

ORCID iD: 0009-0006-2387-0190

Elena Marigo: elena.marigo.1@studenti.unipd.it

ORCID iD: 0000-0002-0263-0351

Daniela Yolanda Sánchez: danielayolanda.sanchez@studenti.unipd.it

ORCID iD: 0009-0008-9532-6746

Irene Seno: irene.seno@studenti.unipd.it

ORCID iD: 0009-0001-9142-6482

Chiara Venturin: chiara.venturin@studenti.unipd.it

ORCID iD: 0009-0003-7682-9421

Hillary Veronese: hillary.veronese@studenti.unipd.it

ORCID iD: 0009-0000-4818-0264

Barbara Ravara: barbara.ravara@unipd.it

ORCID iD: 0000-0002-0159-3245

Walter Giurati: walter.giurati@unipd.it

ORCID iD: 0000-0000-9991-3488

Ugo Carraro: ugo.carraro@unipd.it

ORCID iD: 0000-0002-0159-3245

Stefano Masiero: stef.masiero@unipd.it

ORCID iD: 0000-0002-0361-4898

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