

OPP: APPLICATION FIELDS & INNOVATIVE TECHNOLOGIES

Guiding exoskeleton development for healthy ageing: Co-design insights from older adults

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Purpose Healthy ageing, as defined by the World Health Organization (WHO), is the process of acquiring and maintaining the functional ability that promotes well-being as people age (WHO, 2015). This functional ability is related to a person's intrinsic capacity as well as the environment in which they live and with which they interact. To promote healthy ageing, lower limb exoskeletons (LLEs) could represent a game-changer, as they may act as (1) an assessment tool (Moeller et al., 2023), able to measure intrinsic capacity, and (2) an augmentation tool (Grimmer et al., 2019), providing additional support for improved functional ability in daily life. According to the importance of including end-users in the development of technology (i.e. user-centred approach), the purpose of this study is to capture the insights of older adults (aged 65 and above) on the needs and requirements of LLEs that can be implemented in a home environment. **Methods** Three focus group discussions were organised, implementing the PERCEPT methodology (Bourazeri & Stumpf, 2018). Within this methodology, participants co-create a set of personas that are further used throughout the co-design process, by discussing different topics. All sessions were structured by a pre-designed interview guide with open-ended questions. Data analysis includes verbatim transcription, followed by thematic analysis (NVivo version 14), utilising Braun and Clarke's methodology (Braun & Clarke, 2006). **Results and Discussion** This study is part of the interdisciplinary RevalExo project, aimed at developing LLEs for healthy ageing. Four older adults (gender: two male and two female; age: 74-88 years; Montreal Cognitive Assessment: 25-27; Short Physical Performance Battery: 5-11) with mobility problems participated in three two-hour group discussions (6 hours in total). Topics included activities that would benefit from additional assistance (i.e. ASSIST), parameters that need to be assessed by an exoskeleton (i.e. ASSESS), the influence of fatigue on daily life and activities (i.e. FATIGUE), and the optimal design and usability of LLEs (i.e. DESIGN & USABILITY) (Figure 1). Key recommendations of the participants include the need of a device that can facilitate everyday activities, such as stair walking and crouching, and that can reduce the risk of falling. LLEs should be modular, discrete, lightweight and accessible to use. The methodological approach and findings of this qualitative study will inspire researchers to develop assistive LLEs to enhance the intrinsic capacity and functional ability of older adults during daily life. Furthermore, the results of this study will also inform future research related to assessing feelings of fatigue, including the use of assistive technology to support when intrinsic capacity is reduced. Indeed, within the field of healthy ageing, vital capacity is considered to be the underlying physiological determinant of intrinsic capacity and fatigue plays an important role within this (Bautmans et al., 2022).

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Keywords: healthy ageing, exoskeletons, assistive technology, older adults, fatigue

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Acknowledgement This research was supported by the strategic basic research project RevalExo (grant no. S001024N) funded by the Research Foundation – Flanders (FWO).

