

# Application Fields and Innovative Technologies

**As-Tra – User-Centered Development, and Evaluation of a Technical Assistance System for Older Adults to Sustainably Improve Nutrition and Physical Activity** Rebecca Diekmann<sup>1</sup>, Mareike Förster<sup>1</sup>, René Puhlemann<sup>1</sup>, Marianne Timper<sup>1</sup>, Vincent Quinten<sup>1</sup>. *Gerontechnology* 25(s)

**Purpose** Nutrition and physical activity are two elements that contribute significantly to maintaining health status in old age. However, implementing recommendations or initiating therapies to promote physical activity or dietary changes in everyday life is often problematic for seniors [1, 2]. Technical assistance systems could help to identify health risks early, offer individualized interventions, and thus maintain the independence of older adults [3]. **Objective** The AS-Tra project (Assistance System for the Sustainable Improvement of the Nutritional and Mobility Status of Older Adults Considering the Transtheoretical Model of Behavior Change) aims to develop and evaluate an innovative technical assistance system. The system consists of a tablet-based app and a measurement and training station (MuTS) and is aimed at seniors ( $\geq 70$  years) with nutritional and/or physical activity deficits. **Method** Using the Medical Research Council Framework for the development of complex interventions, the following project phases are carried out: A) Feasibility study using focus groups to determine the usage context and needs of the target group. Based on these findings, a prototype of the assistance system is developed and evaluated in iterative test cycles. Both quantitative data (System Usability Scale (SUS), task completion, time required) and qualitative data (thinking-aloud) are collected. B) A pilot study with  $n = 10$  participants was performed over 4 weeks to examine usability and identify optimization potential. Independent use of the target group is evaluated, taking into account the individual phase of the Transtheoretical Model of Behavior Change (TTM). C) A randomized controlled trial with a calculated case count of  $n = 124$  participants will investigate the effectiveness of the primary endpoints, gait speed, and protein intake, followed by the regular use of 12 weeks of the whole system under consideration of TTM. **Results** For A) five focus groups were conducted, each consisting of  $n = 21$  seniors ( $n = 11$  female (52%), mean age  $78.5 \pm 4.6$  years). Participants were generally open and interested in independently using digital systems to improve their health. Pulse measurement, handgrip strength measurement, and training focusing on balance, coordination, and reaction time were identified as preferred elements. Subsequently, three iterative test cycles were conducted with a total of  $n = 34$  participants (mean age  $78.6 \pm 5.6$  years). In the final iteration cycle, a mean score of  $78.18 \pm 12.6$  years was achieved. For B) a pilot study included 10 participants (one dropout,  $80 \pm 5$  years, 50% female). The SUS score was good ( $79 \pm 13.4$ ). The MuTS devices had minor technical problems (in  $<17\%$  of the usage), while 57% of the users experienced instability issues with the food diary in the tablet app, which therefore needed to be reprogrammed before RCT start. Overall, ratings of the system were very good, with slightly lower ratings (2–3 out of 5) for the tablet app and regular use. The RCT (for C) started mid-2025, currently 9 participants finalized the study period of 3 months in the intervention group, 11 in the control group. **Discussion** The first project phase (feasibility) demonstrated that the target group is generally open to and interested in independently monitoring and optimizing their diet and exercise. Through iterative optimizations, a user-friendly, self-contained measurement and training station system was developed. The pilot proved the usability of the system and prepared well for the following RCT whose results will be expected in spring 2027. This is the first project which aimed at the effect of an assistive system for the target group of older adults aged 70 years and above within a user-centred design process and under considerations of psychological models of behaviour change.

## References:

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**Keywords:** Gerontechnology, User-Centered Design, Digital Health Interventions

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**Acknowledgement:** This study was supported by the Federal Ministry of Research, Technology and Space, Germany