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Daryoush Daniel Vaziri

# Facilitating Daily Life Integration of Technologies for Active and Healthy Aging

## Understanding Demands of Older Adults in Health Technology Design

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Bonn, Germany

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*For my parents*

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# Abbreviations

AHA ..... *Active and healthy ageing*
ANOVA ..... *Analysis of variance*
DART ..... *Dynamic acceptance model for the re-evaluation of technology*
HCI ..... *Human computer interaction*
HIC ..... *Health insurance company*
HRT ..... *Hand reaction time*
HTU ..... *Health technology use*
ICT ..... *Information and communication technology*
IT ..... *Information technology*
ITT ..... *Intention-to-treat*
iTV ..... *Interactive television*
LL ..... *Living lab*
MET ..... *Melbourne Edge Test*
MS ..... *Microsoft*
*NGO* ..... *Non governmental organization*
PACES ..... *Physical activity enjoyment scale*
PC ..... *Personal computer*
PD ..... *Participatory design*
PEOU ..... *Perceived ease of use*
PPA ..... *Physiological profile assessment*
PU ..... *Perceived usefulness*
QoL ..... *Quality of life*
R&D ..... *Research and development*
RCT ..... *Randomized controlled trial*
SCT ..... *Social cognitive theory*
SD ..... *Secure digital*, *Standard deviation*
SES ..... *Socio-economic status*
SMM ..... *Senior mobility monitor*
SUS ..... *System usability scale*
TAM ..... *Technology acceptance model*

# Abstract

Diseases and related health problems in the ageing society increase dependency of older adults and their need for care. A consequence in most cases is reduced quality of life of older adults. On top of that, healthcare systems have to face considerable financial burdens in ageing societies. Hence, there is a large interest in innovative and effective ICT-based solutions that delay older adults' need for healthcare services, improve their quality of life and thus mitigate the pressure on healthcare systems. Here, a major challenge is the design of technologies that support active and healthy ageing (AHA) and allow a seamless integration into older adults' daily lives in order to create opportunities for long-term use and sustainable health impacts.

This thesis will present results of a participatory design process for technologies that support AHA in older adults. The design process involved older adults and relevant secondary stakeholders in the respective healthcare system. In a mixed methods approach, qualitative and quantitative methods were combined to create a detailed understanding of older adults' practices and attitudes with respect to health, quality of life and technology use for AHA support and their interactions with relevant stakeholders. Qualitative and quantitative data was collected from older adults aged 60+ and relevant secondary stakeholders like caregivers, policy makers or health insurance companies. Study setups were embedded in living lab structures and randomised controlled trial (RCT) studies. Results illustrate that the combination of multiple AHA technologies and their alignment towards older adults' social contexts and environments may increase their motivation to use technologies for AHA support and address their heterogeneous practices and attitudes more accurately. Furthermore, findings show that perspectives on health, quality of life and AHA technology use of older adults and relevant stakeholders considerably differ and affect their use of AHA technologies. Contradictive perspectives refer to different conceptions of independence, well-being, trust and privacy, which need to be negotiated for the design of technologies for AHA support to facilitate daily life integration.

Based on these findings, the author designed a prototype for an ICT-based solution that combines and aligns multiple AHA technologies and supports collaboration and cooperation between older adults and relevant stakeholders with respect to AHA. The evaluation of the prototype illustrated that technologies for AHA support that consider different health areas and involve older adults' social environment may facilitate the integration into daily lives of older adults and thus create opportunities for long-term use and sustainable health impacts. Finally, the applied methodological approach in this thesis may support sustainable implementation of

technologies for AHA support into healthcare systems by easing the uptake of research results for primary end-users and relevant secondary stakeholders.