

Table 1. Literature review, research methods actively involving users in ageing research

Year	Authors	Title	Aim	Type of RQ	Data collection	Design
2012	Alaoui and Lewkowics	Struggling against social isolation of the elderly—The design of SmartTV applications	Design of smart TV applications	Creative	Semi-structured interview, personas, scenarios, storyboards	User-centered approach
2007	Ashby et al	Involving service users and their carers as equal partners in a project using electronic communication	To develop and evaluate electronic communication, with a focus on older people receiving intermediate care	Creative	Virtual steering group, web forum	Active learning approach
2016	Backhouse et al	Older care-home residents as collaborators in research: a systematic review	To conduct a systematic review to find out to what extent and how older care-home residents have been involved in research as collaborators or advisors	Descriptive	NA	Literature review
2014	Bindels et al	Older people as co-researchers: a collaborative journey	To identify the conditions required for equal collaboration	Explorative	Semi-structured interviews, reflection meetings	Qualitative approach
2018	Blusi et al	Older Adults Co-Creating Meaningful Individualized Social Activities Online for Healthy Ageing	To co-create meaningful individualized social activities online	Creative	Workshops	Participatory action research design
2015	Brereton et al	The messaging kettle	Test and demonstrate the concept of a device that should foster communication	Explorative	Focus groups, prototype testing	
2017	Brox et al	User-centered design of serious games for older adults following 3 years of experience with exergames for seniors: A study design	Design of serious games for older adults	Creative	Interviews, observations, group	User-centered approach

					discussions, prototype tests	
2018	Buffel et al	Social research and co-production with older people: Developing age-friendly communities	To provide insights into the process if co-producing a research project with older adults	Explorative	Workshops, interviews, reflection meetings, disseminating workshops	Co-productive approach
2013	Davidson and Jensen	Participatory design with older adults: An analysis of creativity in the design of mobile healthcare applications	The aim was to create novel design ideas	Creative	Focus group, critique and design sessions	Participatory design approach
2013	Domenech et al	Involving older people in the design of an innovative technological system promoting active aging: The Saapho project	Design of a platform for fixed tactile screen and mobile devices	Creative	Questionnaires, focus groups, testing sessions	User-centered design approach
2019	du Preez et al	Engaging Aging Individuals in the Design of Technologies and Services to Support Health and Well-Being	To understand the perceptions of an aging population regarding web-based services	Explorative	Individual interviews, participatory workshops, observations	Iterative and simultaneous collection and analysis of qualitative data
2016	Duh et al	Applications of paper and interactive prototypes in designing telecare services for older adults	Feedback on a prototype of a telecare service	Explorative	Prototype testing	Participatory design approach
2016	Eftring and Frennert	Designing a social and assistive robot for seniors	Development of a social robot that helps to prevent and detect falls	Creative	Workshops, questionnaire, qualitative interviews, mock-up study	Iterative innovation process where potential users were continuously involved from the start to the end

2007	Fudge et al	Involving older people in health research	To review studies which involved older people in research	Descriptive	NA	Literature review
2019	Gahan et al	Advancing methodologies to increase end-user engagement with complex interventions	To develop an effective and acceptable elder abuse screening instrument through a co-design process	Creative	World café, stakeholder advisory group	Qualitative co-design
2018	Gibney & Shannon	Developing indicators for the Age-Friendly Cities and Counties Programme in Ireland	To describe the development of a set of local age-friendly indicators	Descriptive	Public consultation sites, group feedback sessions, survey	Participatory approach
2018	Grates et al	New perspectives on user participation in technology design processes: An interdisciplinary approach	To develop a participatory approach in design processes that takes into account the requirements of older adults, in diverse life situations	Creative	Postal survey, semi-structured interviews	Sequential design
2015	Haak et al	Cross-national user priorities for housing provision and accessibility--findings from the European innovAge Project	To deepen the knowledge about needs and expectations about housing options as expressed and prioritized by older people	Explorative	Research circle	Participatory design
2015	Hakobyan et al	Participatory design: How to engage older adults in participatory design activities	Design of mobile assistive technology for people with age-related macular degeneration	Creative	Focus groups, observational studies, prototype testing	Participatory design approach
2018	Hales & Fossey	Caring For Me and You: the co-production of a computerised cognitive behavioural therapy	To design a cognitive behavioural therapy package for mental health difficulties	Creative	Literature review, semi-structured interviews, focus groups, pilot testing	Co-productive approach

2011	Hennessy & Walker	Promoting multi-disciplinary and inter-disciplinary ageing research in the United Kingdom	To review key developments in the promotion of multi-disciplinary science on ageing in the UK	Descriptive	NA	Literature review
2014	Iacano and Marti	Engaging older people with participatory design	Development of a graphical user interface for controlling a robotic system in a smart home environment	Creative	Workshops	Participatory design approach
2010	Iliff et al	User involvement in the development of a health promotion technology for older people: Findings from the SWISH project	To identify the key aspects of social situations that affect health and well-being, from the perspectives of older people and professionals, to enrich and expand an existing health risk appraisal tool	Explorative	Individual interviews, focus groups	Qualitative approach
2019	Iwarsson et al	Understanding User Involvement in Research in Aging and Health	To identify potentials, problems and challenges related to user involvement in research	Descriptive	NA	Research programme description
2013	Jacelon	Older adults' participation in the development of smart environments: An integrated review of the literature	To determine how older adults ideas are being incorporated into the design of smart homes	Descriptive	NA	Literature review
2019	Jokstad et al	Ideal and reality; Community healthcare professionals' experiences of user-involvement in reablement	To explore healthcare professionals experiences of user involvement in reablement	Explorative	Focus groups	Explorative, descriptive qualitative approach
2016	Joshi and Bratteteig	Designing for prolonged mastery. On involving old people in participatory design	Design of four different devices/projects	Creative	Interviews, home visit, workshops, focus groups, usability testing	Participatory design approach

2018	Kylberg et al	Research with and about user participation	To describe potentials and challenges of user participation	Descriptive	NA	
2012	Lansley	Multi-disciplinarity, user engagement and the design of special programmes of ageing research in the United Kingdom	To compare top-down and bottom-up approaches to user-focused research	Descriptive	NA	Research programmes description
2015	Littlechild	Co-research with older people: Perspectives on impact	To offer a critical account of the impact of a participatory approach at different stages of a research project	Explorative	NA	Qualitative approach
2014	Lucero et al	Identifying consumer's needs of health information technology through an innovative participatory design approach among English- and Spanish-speaking urban older adults	Development of a web-based fall detection system	Creative	Focus groups, participatory design sessions	Participatory design approach
2012	McGee-Lennon, Smeating and Brewster	Designing home care reminder systems: Lessons learned through co-design with older users	Design of a multimodal reminder system for the home deployed	Creative	Co-design sessions using sketches and prototypes	Co-design approach
2019	Merkel et al	Participatory Design in Gerontechnology: A Systematic Literature Review	To examine different forms of participatory design in gerontechnology	Descriptive	NA	Literature review
2012	Müller, Neufeldt, Randall and Wulf	ICT Development in residential care settings: Sensitizing design to the life circumstances of the residents of a care home	Development of a large-screen display for a residential care home	Creative	Semi-standardized interviews, participant observations, diary study	
2018	O'Sullivan	Research partnerships – embracing user involvement: practical considerations and reflections.	To set out how to bring forward effective research partnerships involving users	Explorative	NA	Reflective approach

2017	Panek et al	On the prototyping of an ICT-enhanced toilet system for assisting older persons living independently and safely at home	Development of an intelligent toilet	Creative	Questionnaires, interviews, focus groups	User-centered design approach
2014	Rogers et al	Never too old: Engaging retired people inventing the future with MaKey	User were introduced to the MaKey MaKey inventor's toolkit and asked to suggest ideas for new technologies in residential care home	Explorative	Workshops	
2015	Sabanovic et al	A robot of my own: Participatory design of socially assistive robots for independently living older adults diagnosed with depression	Development of socially assistive robots	Creative	Interviews, workshops	Participatory design approach
2015	Sandlund, Lindgren and Paul	Towards a mobile exercise application to prevent falls: A participatory design process	Development of a mobile exercise application to prevent falls	Creative	Workshops	Participatory design approach
2013	Scandurra and Sjölander	Participatory design with seniors: Design of future services and iterative refinements of interactive eHealth services for old citizens	Using a mobile communication device to identify demands and preferences regarding existing and new eHealth services	Explorative	Workshops	Participatory design approach
2018	Schiau et al	Involving Older People in Participatory Action Research: An Example of Participatory Action Design	To reveal the way older people depict their experience with Facebook as an interaction tool	Explorative	Semi-structured interviews, open group discussions with observational notes, observational video recordings of facebook interaction, photo voice	Participatory action research design
2019	Srinivas et al	Context-Sensitive Ecological Momentary Assessment: Application of User-Centered	To report a case study involving design and evaluation of a mibile tool	Descriptive	Focus group, 1-on-1 think-aloud usability	Iterative, user-centered design process

Design for Improving User Satisfaction and Engagement During Self-Report.

evaluation, field trial feasibility tests

2006	Taylor	A New Approach to Empowering Older People's Forums: Identifying Barriers to Encourage Participation	To identify the research training, support and information needs of ten UK-based Older People's Forums and groups	Explorative	Semi-structured interviews	Qualitative approach
2017	Thilo et al	Involvement of the end user: Exploration of older people's needs and preferences for a wearable fall detection device—A qualitative descriptive study	Involve users in the device design and mockup development stage of a fall detection device	Creative	Focus groups	User-centered design approach
2014	Tullo et al	Comparing the perceptions of academics and members of the public about patient and public involvement in ageing research	To compare the perceptions of academics and public about patient involvement in ageing research	Descriptive	Targeted online surveys	Exploratory qualitative design
2019	Turcotte	Community-based participatory research remodelling occupational therapy to foster older adults' social participation	To remodel community occupational services	Creative	Focus groups	Participatory approach
2012	Uzor et al	Senior designers: Empowering seniors to design enjoyable falls rehabilitation tools	Design of games for falls rehabilitation	Creative	Workshops with personas, scenarios, prototype testing	User-centered design approach
2012	Waycott et al	Actively engaging older adults in the development and evaluation of tablet technology	Design and evaluation of a tablet application	Creative	Prototype testing, interviews	User-centered design approach
2015	Wherton et al	Co-production in practice: How people with assisted living needs can help design and evolve technologies and services	Facilitate co-production of new care solutions	Explorative	Co-design workshops using vignettes	Co-production approach

2012	Vines et al	Cheque mates: Participatory design of digital payments with eighty somethings	Design of digital payment services	Creative	Workshops	Participatory design approach
2018	Withall et al	Participant and Public Involvement in Refining a Peer-Volunteering Active Aging Intervention	To refine a peer volunteering active aging intervention	Creative	Focus groups, semi-structured interviews	Qualitative approach
2012	Xie et al	Co-designing an e-health tutorial for older adults	Design of an integrated e-tutorial	Creative	Workshops	Co-design approach
2017	Åberg et al	A study protocol for applying user participation and co-learning-lessons learned from the eBalance project	Fall-prevention exergames	Creative	Workshops	Participatory and appreciative action and reflection approach

Table 2. Research methods actively involving users in ageing research

Method	Frequency
1-ON-1 THINK-ALoud USABILITY EVALUATION	1
CO-DESIGN SESSIONS USING SKETCHES AND PROTOTYPES	1
CO-DESIGN WORKSHOPS USING VIGNETTES	1
CRITIQUE AND DESIGN SESSIONS	1
DIARY STUDY	1
DISSEMINATING WORKSHOPS	1
FIELD TRIAL FEASIBILITY TESTS	1
FOCUS GROUPS	14
GROUP FEEDBACK SESSIONS	1
HOME VISIT	1
LITERATURE REVIEW	1
MOCK-UP STUDY	1
OBSERVATIONAL STUDIES	4
OBSERVATIONAL VIDEO RECORDINGS OF FACEBOOK INTERACTION	1
OPEN GROUP DISCUSSIONS WITH OBSERVATIONAL NOTES	1
PARTICIPATORY DESIGN SESSIONS	1
PARTICIPATORY WORKSHOPS	1
PERSONAS	2
PHOTO VOICE	1
PILOT TESTING	1
POSTAL SURVEY	1
PROTOTYPE TESTS	6
PUBLIC CONSULTATION SITES	1
QUESTIONNAIRES	3
REFLECTION MEETINGS	2
RESEARCH CIRCLE	1
SCENARIOS	2

SEMI-STRUCTURED INTERVIEWS	17
STAKEHOLDER ADVISORY GROUP	1
STORYBOARDS	1
SURVEY	1
TARGETED ONLINE SURVEYS	1
TESTING SESSIONS	1
USABILITY TESTING	1
VIRTUAL STEERING GROUP	1
WEB FORUM	1
WORKSHOPS	12
WORLD CAFÉ	1
