The perks and struggles of participatory approaches: Exploring older persons' experiences of participating in designing and developing an application

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Abstract

Background: Innovative multidisciplinary and person-centred initiatives are needed to promote well-being among older persons. In order to approach these goals, both health promotion and the field of innovation studies recognise the importance of the meaningful engagement of older persons in development processes. Participatory approaches are applied within technology development, but previous studies highlight a lack of knowledge about how they matter—especially for the persons who are participating in the co-creation process.
Objective: The study explores older persons' experiences of participating in an innovation project.
Method: The study is part of the @geing Online project. Semi-structured interviews were conducted at several intervals during and after the project in two regions in Finland and were analysed using thematic analysis. In total, 38 older individuals participated.
Results: The older persons perceived that participating in an innovation project can be an uplifting experience that increases their interest and confidence in digital technology use by combating stereotypes. Additionally, being able to make one's own and other older persons' voices heard regarding services targeting older persons in collaboration with local universities was also perceived as valuable. However, the participation did not fully live up to all the older participants' expectations. Feelings of disappointment emerged in relation to their own performance with the prototypes being developed, as well as the fear of failing the project team. Additional sources of disappointment were related to the fact that the participants did not increase their knowledge of new and familiar digital technology to the extent that they had hoped.
Conclusion: The findings of this study highlight experiences of taking part in an innovation project focusing on technology design with a participatory approach, depicting the benefits, motivators, and challenges. This kind of knowledge is important in order to improve future participatory practice in gerontechnology endeavours.

Keywords: older persons, technology, participatory approaches, user-centered design

INTRODUCTION

Participation is increasingly acknowledged within gerontechnology, where collaboration with older persons is being seen as a useful measure for creating and designing more need-based and easy-to-operate digital tools (Grates et al., 2019; Fischer, et al., 2020; Peine & Neven, 2019; Mannheim et al., 2019). Hence, the active participation of older persons in the design and development of technology is seen as having the potential to decrease the impact of stereotypical pictures of older persons on the creation of technological products and to alter the power relationship between the stakeholders and users (Köttl, et al., 2021; Fischer, et al., 2020; Peine & Neven, 2019; Frennert & Östlund, 2014). Furthermore, the active participation of potential older end users in the design and development process is expected to result in technological products that are more tailored to the needs and preferences of the users (Fisher et al., 2020). Involving potential users might also facilitate the uptake of the developed solution (Jarke, 2021) as tailored technology is argued to be of particular importance for persons with less experience in digital technology use (Venkatesh et al., 2003).

Involving older users in technology design might not only matter in terms of the technology being developed – there are other ways in which participatory approaches within technology design might matter. One of the identified outcomes in a systematic review study by Fisher et al. (2020) was mutual learning; thus, the developers

learned more about older persons, and the older persons acquired information about technology. The older participants additionally reported an increased sense of participation and belonging, which was expressed in terms of establishing relationships with other participants and experiencing a sense of being a part of the tech-savvy generation. This tech-savvy generation was not a group that they perceived themselves as belonging to before their participation (Fisher et al., 2020). Moreover, a review study by Merkel and Kucharski (2019) similarly reports benefits in terms of increased participation among older persons, as participatory approaches offer an opportunity to socialize with other older persons and to speak on behalf of the older population.

The means and methods used to involve the so-called end users in design and development are many (Kujala, 2003), and "participatory approaches" and "user involvement" can be seen as broad umbrella terms for describing such processes (not limited to technology design and older persons). In this study, the terms "participatory approaches" and "participants" are used to describe the working methods and the older persons involved in such processes. The different means and methods used to involve older persons can be placed on a continuum, depending on how actively the end users or participants are involved (Kujala, 2003). A low level of involvement means that the participants are, more or less, informants or consultants, providing the designers with information regarding their everyday lives and needs, whereas full involvement encompasses participants being involved in all the design stages as equal partners and decision-makers (Kujala, 2003; Merkel & Kucharski, 2018).

However, the implementation of participatory approaches is not an easy task. Early studies (Dickinson et al., 2007) report a wide range of barriers connected to health and functional ability, such as diminishing motoric skills, mobility, and hearing and vision impairments, which can challenge or hinder the participation of older persons in technology design. Health-related factors are argued to make the involvement of older persons more complex than working with younger age groups in similar processes (Zajicek, 2004). Participatory approaches are often time-extensive processes (Lindsey et al., 2012), which can challenge the participation of persons with more limited health statuses. Moreover, selected older co-designers are more frequently from younger age groups, have higher socioeconomic status levels, and are more often persons who are already more open-minded about technology (Künemund & Tanschus, 2014). Studies further suggest communication between developers and older persons is an additional challenge. For in-

stance, Lindsey et al. (2012) report that the lack of technical vocabulary can hinder older persons' ideas and recommendations from being considered in the design of technology, which, in turn, can result in diminished interest and enthusiasm regarding participation. Factors that in turn can facilitate engagement in participatory technology design and development processes are — apart from using include language reflecting the participants' lifeworld (Hakobyan et al. 2015)— flexibility regarding the time and duration of the project sessions (Dickinson et al., 2007; Johnson & Finn, 2017), as well as to tailor the activities to the participants (Hakobyan, et al., 2015).

Merkel and Kucharski (2019) conclude that none of the studies included in their review study had asked the older "co-designers" about their experiences regarding the initiatives' outcomes and processes. Still, best practice recommendations are often written from the perspective of the developers and/or researchers—not from the older person's point of view. However, among studies that in fact explore older participants' experiences, more attention is paid to the evaluation of the technological products developed, especially on collecting views related to usability aspects, and not on the participation in itself (Thangavel, et al., 2022). Undeniably, the users' understanding of the co-design process might not be equal to that of the researchers and developers (Adiemark et al., 2015). This study focuses on contributing to this knowledge gap by bringing to the fore older persons' own experiences of participating in developing an application using interview data from a Nordic innovation project,[project name omitted]. Therefore, the aim of this study was to gain a deeper understanding of the participants' experiences of being involved in the innovation project.

METHODS
Study setting and participants
The present study is based on the @geing Online project, an innovation project aimed at designing, developing, and evaluating an advanced prototype of a tailored application focused on promoting access to meaningful social activities for older adults in the Bothnia region (Sweden/Finland) (project period 1.9.2017–31.12.2020). A multidisciplinary team of researchers from Åbo Akademi University, Umeå University and Seinäjoki University of Applied Sciences collaborated throughout the project with community-dwelling older persons, stakeholders representing practitioners working with older persons within the social and healthcare sector, and regional small to middle-sized IT companies. In this particular study, the focal point is the experiences and views of the older participants. The advanced prototype designed and developed within the innovation project was an application that

Table 1. Information regarding the study participants

Background information	N (%)
Total	38 (100)
Gender	
Male	14 (36.8)
Female	24 (63.2)
Living situation	
Lived alone	19 (50)
Co – habited with partner	19 (50)
Age	
Mean	79.70
Range	58-90
Digital routines	
Used a mobile phone (not only smartphones) daily	31 (81)
Had never used a tablet computer	25 (66)
Had never used a computer	12 (32)
Used a computer every day	16 (42)

gathers information about activities and events in one's local area—those arranged by organizations, associations, and older persons themselves. The types of activities that were included in the prototype were, for example, physical activity groups, theatre visits, and game nights. The application included functions for signing up, canceling, and inviting peers to the activities. The final versions also included features related to the live streaming of events.

Study participants
The study uses interview data collected between 2017 and 2020 in Ostrobothina and Southern Ostrobothnia (Finland). The purposeful sampling of older participants paid particular attention to involving persons who represented different age groups and who had various levels of experiences and competencies with regard to using digital technologies, such as computers, tablets, and smartphones. Information about the study was distributed to the heads of organizations and associations providing services and activities for older persons in the study region. The eligibility criteria for involvement stated that the participants had to be community-dwelling and retired from gainful employment. The recruitment of participants was carried out continuously during the project period, and potential participants were contacted before every project activity. Four of the participants were involved in two or more of the design activities and interviews, whereas the majority of the participants were involved only once.

In total, 38 older persons participated in the innovation project and the interviews in conjunction with the project activities. Information related to the participants is displayed in *Table 1.*

User-centred design
User-centred design (UCD) is one of the approaches that cover different methods for focusing on users and their needs, wants, and limitations in each of the stages of an iterative design process (Sebe, 2010). Methods commonly used within UCD for involving end users are interviews, questionnaires, observational studies, and usability testing (Hakobyan, et al., 2015), and these can be applied at different stages of the design process. Usability testing is a format that invites end users to complete different tasks regarding the technology being tested, and a researcher or developer evaluates their performance in order to identify usability issues (Franz & Neves, 2019).

In the @geing Online project, the iterative design and development process was inspired by UCD and was carried out in four steps. The first step was only carried out once, at the beginning of the project, whereas the other steps were repeated several times. The feedback generated from the design activities resulted in new or updated versions of the prototype, which were tested until a final version of the prototype was obtained. The participatory design and development process is described in *Table 2.*

The data consist of semi-structured interviews with 38 older participants. The interviews lasted from 30 minutes to 60 minutes and were conducted after the usability test sessions by one or two members of the project team, all with substantial previous experience in conducting various types of interviews. Semi-structured interviews gather systematic information regarding predefined topics, while also allowing room to explore new topics and issues raised by the informants (Wilson, 2014). They are suggested as effective means for gathering attitudes, opinions, views, and user goals in a UCD process (Wilson, 2014). The project team members jointly developed the interview guide based on previous research. The questions were chosen in order to capture the participants' experiences, views, feelings, and preferences related to the prototype, technology in general, the project activities, and the participatory approach of the project. The interviews were conducted at the universities, at activity centres for senior citizens, and at a hotel. Some of the interviews were conducted by phone due to the COVID-19 pandemic.

Thematic analysis
Thematic analysis, as described and exemplified by Braun and Clarke (2006;2022), guided the exploratory analysis of the transcribed data. Thematic analysis is described as a flexible and useful tool for identifying, analysing, and reporting patterns within data (Braun & Clarke, 2006). An inductive approach was chosen and the data was analysed at a manifest level. The thematic analysis comprises six steps, but in practice, it is not a linear process; rather, it involves constant movement

Table 2. The design and development process within the @geing online project

	Step 1	Step 2	Step 3	Step 4
Goals	Understanding the views and needs of older persons	Designing the application and the work approaches	Developing prototypes	Feedback
Activities	Group discussions regarding attitudes towards and use of digital technologies in everyday life as well as views and thoughts related to an early version of a prototype that had been developed in a previous regional project.	The multidisciplinary project team as well as regional IT companies defined the features and work approaches based on views, needs, and feedback collected from earlier steps. Based on the feedback, new versions (or updated versions) of the prototype was designed and developed.	One-to-one usability test sessions with older persons. During the test sessions, the participants were asked to complete different tasks within the prototype. The tasks were related to the different features and functions. While going about the tasks given by the project team members, the participants were encouraged to think aloud and were also simultaneously asked questions regarding the interface and the graphical design while navigating in the prototype. All of the usability testing sessions were audio recorded and some of the later sessions were additionally videotaped.	In conjunction with the task-focused test sessions, more general feedback regarding the prototype, the test sessions, and the participatory process was collected through a short survey as well as semi-structured interviews. The feedback step of the design and development process also included giving feedback to the participants regarding the testing sessions and giving updates regarding the next step of the process.

between the different steps. The first step concerns familiarising oneself with the data, which, in this case, first occurred during the transcription of the interviews and later when the data set was read several times. The first author processed the raw data by making notes in Word. The notes tried to capture the core of the different parts and sentences in the transcribed data about the participants' experiences. Based on the notes made about the data set and its content, codes were constructed. The list of codes became the basis for finding patterns— codes that reflected similar content were grouped together in searching for themes. The first author made a draft of potential codes, sub-themes, and main themes, which was critically reviewed by the other authors. Many different constellations were tried out. Several revisions were made to the initial organization of the themes, and when the authors agreed upon a structure, the names of the themes were defined. The last step of the process involves writing up the results, a step that was already initiated when reviewing the themes and that was finalized before the submission of the manuscript.

RESULTS

The thematic analysis resulted in two main themes related to the participant's experiences and views regarding taking part in designing an application for older persons as part of the innovation project. The main themes, sub-themes, and codes are displayed in *Table 3*.

An uplifting experience

The first main theme encompasses experiences of that participating in designing and developing an application targeting older persons was up-lifting. Two sub-themes were identified among the codes, which describe how the participation was found to be uplifting.

Acting in order to improve the daily lives of different older persons – an important assignment
The narratives contained descriptions of how older people should be seen as a diverse group. The participants described how all older persons are unique, due to being born and raised within various contexts and facing different experiences during the course of their lives. The experiences gathered throughout one's life forms a person's opinions and views, and therefore, the participants perceived that everyone is able to contribute from their own unique perspective. Hence, the participants perceived that they could contribute to the project even if they did not have any former experiences in innovation development or using tablet computers:
"We are so different. We are individuals. It is clear that science need to move forward and someone has to participate. I think that is important."

The participants also highlighted the importance of including the perspectives of different older persons in the innovation project. For instance, the importance of considering the views of persons with no or limited experience of technology use—as well as those of persons facing cognitive challenges—was continuously addressed during the interviews. The participants pointed out how persons with these kinds of experiences may have other perspectives to share:
"For me, the prototype was clear, but I wonder how it was perceived by persons who are not as experienced with technology. How will that go?

Table 3. Illustration of the themes generated from the analysis regarding the older persons' experiences of participation.

Overall theme: Participating in design practice – an uncertain and dynamic process evoking various experiences		
Main themes	**Sub-themes**	**Codes**
An uplifting experience	Acting to improve daily life for various older persons – an important assignment	➢ Contributing with my own unique perspective ➢ Acting on the behalf of other older persons
	Widening my perspective and repertoire – an opportunity to develop	➢ Collaborating with the university ➢ An opportunity to challenge myself ➢ New insights regarding technology ➢ Reconsidering oneself and older persons as technology users
Not quite as expected	Dealing with feelings related to disappointment – an undesired aftermath	➢ "I am dumber than I expected" ➢ Disappointing others – not being good enough ➢ The project activities not fully living up to the expectations
	Handling changed circumstances – an inevitable element of a long project period	➢ My own and family members' fluctuating health status ➢ Changes in daily life ➢ Participation on my own terms

You know, there are so many different people."

Acting as a voice for other older persons, who had perhaps not been given the opportunity to participate, was also perceived to contribute to their participation being an uplifting experience. For example, the lack of or limited experience in using smart technology was seen as something that the participants had in common with many persons within the general older population. Therefore, their shared views and experiences could represent those of other older persons and could perhaps lead to the application being easier for a person with limited digital experience to use than existing technology:
"The application would only be useful for the persons who know how to use digital technology if we, the less experienced, were not involved. It would have become too monotonous and not suited to our diversity. My experience is that the smart developers do not notice the level of difficulty in the same way as we do."

Another example of how raising concerns as a group of older persons functioned as a strong motive for participating in the project is related to a participant with visual limitations. For some of the participants, being able to design more user-friendly products for the future and to raise awareness of everyday life challenges tied to specific groups were key motivators for participating—not (just) an interest in the application or digital technology:
"I represent a quite small group of people, but I do my best to spread knowledge regarding our situation. Because it's such small things that you [researchers, designers] should think about that could help us a lot. Small details only. Details

you don't reflect on and which I didn't think about at all before my vision became damaged, but which are essential today."

Widening my perspective and repertoire – an opportunity to develop
Being part of an innovation project to develop an application for older persons was seen as a brand new experience to include in one's repertoire and life story—an opportunity to learn new things. When entering the project, most of the participants were not familiar with using touchscreen technologies, such as smartphones and, especially, tablet computers. However, among the participants, curiosity about and interest in these kinds of technologies were identified, and participating in the project was seen as an opportunity to familiarize oneself with the digital tool of interest:
"I have thought about buying one of those [a tablet]. But I haven't because I've had so much else to do. […]. I wanted to come here today and try it out if I will buy one [a tablet] in the future."

Curiosity seemed to exist regarding digital technology, even though many of the participants presumed that technology was complicated and difficult to use, especially for older persons. Their encounters with the tablet computer and the versions of the prototype during the usability tests, however, challenged this presumption. Many of the older persons stated that the technology was much easier to use than expected, and a new interest in technology was thereby evoked in them:
"This was a positive experience. I had expected tables and things like that. Something must have happened with the computers of today; they have been developed. They have gotten away from being complex and one-sided […]. I worked with computers in my former workplace. I used different programs for placing orders and stuff like that. This was something completely different. Those programs [in my former workplace] had nothing to do with your everyday life."

Not only did the participants make presumptions regarding digital technology, but the interviews also contained prejudices regarding the idea that modern technology is not for older persons in general and not for them in particular. One of the participants described such prejudices regarding older persons and what kinds of activities are suit-

Table 4. Illustration of the data analysis process.

Raw data	Codes	Sub-themes	Main-themes
TP7:You have a few preconceived notions of what you as an older person are able to do. But then I think of Dagny. She's a genius. I: Do you follow her blog? TP7: Not regularly. But I have watched her on TV a few times. So vibrant. And I can be that too. I think I did great here today with the tablet. I: Yes – you did great!	Reconsidering oneself and older persons as technology users	Widening my perspective and repertoire - an opportunity to develop	An uplifting experience
I: Why did you choose to participate in the project in the first place? TP1: You feel uplifted in some way. Maybe because university studies have always been a dream of mine. I never got the chance. You did not think about it back then when you were in working life, it was all about daily life and work. I learned much from working life. Various experiences that evoked my interest. But time flies you know.	Collaborating with the university	Widening my perspective and repertoire - an opportunity to develop	An uplifting experience

able when entering old age. However, counter-images circulating in the media made her reconsider her view of older persons, including herself:
"You have a few preconceived notions of what you as an older person are able to do. But then I think of Dagny [A Swedish 100+ year-old influencer and blogger]. She's a genius. [...]. And so vibrant. And I can be that too. I think I did great here today with the tablet."

Thus, the interview data contained expressions of how the participants themselves thought that they had done great during the test sessions and how they and the technology had exceeded their own expectations, illustrated at the end of the quotation above. This positive experience contributed to my feeling uplifted and more confident:
"Being part of this gave me a boost in terms of my self-esteem. And when your knowledge increases, then you want to learn even more."

For the participants who had the former experience of using touchscreen technologies, participation in the project was not only seen as an opportunity to challenge oneself. The test sessions, which were intended to be for the usability testing of the application, were viewed by some of the participants as opportunities to try out one's own abilities, both in terms of digital competence and in relation to cognition and intellect.
"Interviewer: What was interesting about participating? IP: Perhaps … How should I put it? That you, in a way, are putting yourself through a test. What are you able to handle?"

Additionally, collaborating and getting insight into universities' activities and research also captured the participants' interest. This was especially true for those individuals who had not had the opportunity to conduct university studies when they were young, despite possessing an interest in doing so, and they perceived the invitation to participate in the innovation project as an opportunity to get involved in an academic milieu,

which made them feel enriched and elevated:
"You feel uplifted in some way. Maybe because university studies have always been a dream of mine. I never got the chance."

Not quite as expected
The second main theme identified from the data analysis represents experiences when participation did not live up to the older persons' expectations or when the project did not go as expected. The two identified sub-themes describe the various feelings of not living up to expectations that the participation rise.

Dealing with feelings related to disappointment – an undesired aftermath
The technology and one's own performance did not manage to meet the expectations of all the participants involved. Moreover, participation also evoked feelings of disappointment in oneself when not managing the technology as well as expected. Some of the participants seemed to relate the difficulties experienced with regard to the technology to themselves and their lack of skills, instead of associating them with the technology, which seemed to leave the participants with a feeling of being a laggard.
"I don't really know how they, or how you, should develop it [the application] for it to be usable by me. I think there are actually … How can I say it …? Those who cannot take it in."

The participants also appeared to feel unsure about whether their participation had provided the project with anything of substance. They seemed to have trouble picturing how their views could really contribute to designing and developing an application. Expressions connected to feeling inadequate and being afraid of disappointing the project team members were generated from the data:
"I do not remember how it was [a former version of the prototype]. Unfortunately … I might disappoint you now."

The narratives also contained descriptions of how their participation did not fully live up to their expectations. For instance, some of the participants expressed how they expected the project to be more of a course to test different features of tablet computers and different types of applications, resulting in their participation in improving digital competence in general.

"I expected that you perhaps would teach us more about the tablet here. I don't know. I perceive that there are some things I still cannot manage to do on it [the tablet]."

Handling changing circumstances – an inevitable element of a long project period
Among the participants, changing needs and interest levels due to personal factors, such as fluctuations in their health statuses as well as in their family lives, became apparent, which challenged the level of participation. The interviews revealed that some of the participants would have liked to be able to participate more continuously during the different phases of the design and development process, but their rapidly changing circumstances at home did not allow for it. For instance, being a caregiver for a spouse constituted such a circumstance and challenged their participation:
"I was given the opportunity, and I really wanted to participate again, but I had to realize that it would have been impossible for me due to the circumstances at home at that time."

Additionally, changes in their functional ability limited some of the participants' capacity to participate in activities outside their homes. Despite challenging their actual participation, these changes also led to a decrease in their interest in designing, developing, and, later, using an application for social and leisure activities:
"I must say I find that I can't handle things as I used to nowadays. My eyes and my memory are not what they used to be ... But for younger people, those who have just retired, like my daughter who is almost 70, for them, the application and the project are positive. They have the future ahead of them."

The participants also associated the global COVID-19 pandemic, which broke out at the end of the project period, with changes in their interests and everyday lives. The virus mitigation recommendations related to physical or social distancing hindered their physical participation in the project activities. Additionally, the pandemic also seemed to influence the participants' perspectives of everyday activities and the relevance of the project, which influenced their interest in participating:
"I think that the pandemic has taken a lot of resources and energy from me, and I cannot really concentrate on anything else. The situation is crazy, and I just hope for a solution. I think that older persons, in particular, are scared and worried."

However, being able to participate on their own terms was highlighted as an important facilitator. The importance of being able to choose when and where to participate was frequently highlighted in the data. Many of the participants did not want to commit to participating for the whole project period; they wanted to be able to decide whether to participate or not according to their daily conditions, schedules, and interest levels:
"I just want to do what I like and what I feel that I have time for. But if someone comes and says that I should do this or that, it becomes a must, and there should not be anymore "musts" at my age. Everything I do must be voluntary."

DISCUSSION
The findings from the thematic analysis of the semi-structured interviews highlight the participants' experiences of being part of designing and developing an application targeting older persons. The present study contributes to the previously identified gap in studies about participatory approaches (Kylberg, et al., 2018) as well as studies exploring older participants' perspectives regarding the outcomes and processes of gerontechnology initiatives (Merkel & Kuscharski, 2019), by describing older persons own experiences of participating in an innovation project.

Alternating or recreating stereotypical views of technology and older persons as technology users?
From the interviews it appeared that the brand-new experience of participating in an innovation project was both an opportunity to develop new interests and to gain confidence in technology use as well as an experience that evoked feelings related to disappointment. The findings suggest that some of the participants gained an interest in digital technologies and learned more about them through their participation. The findings illustrate how the participants' previous opinions of technology as difficult and complicated (formed by previous experiences, for instance, at their former workplaces) were revised due to the positive experiences gained from participating in the project. Additionally, positive experiences regarding their own performance with the technology during the testing sessions also alternated the picture of technology users. Hence, the analysis also generated signs of the fact that participation in innovation projects has the potential to change stereotypical views of digital technology and older persons as digital technology users – which in turn may increase technology use. Previous studies suggest a link between prejudices regarding older persons' technology use and the actual use of technology. For instance, Mariano et al. (2021) suggest that older persons may avoid using technology because of the fear that the widely held view that older persons face challenges when using technology will be confirmed by their own usage of the same. In addition, self-internalized ageing stereotypes and self-directed ageism can be barriers to technology use and deepen the

digital divide (Choi et al., 2020; Köttl et al., 2021).

On the other hand, not all the participants' opinions regarding technology and themselves as potential technology users were changed during the study. The data also contained descriptions related to being disappointed in one's performance with the technology and feeling incompetent. Feelings related to inadequacy were also experienced by older persons while taking part in developing an app to enhance social connectedness among frail older adults living in a retirement home (Barbosa Neves et al., 2019). The participation in developing the app seemed to evoke an awareness of frailty among the participants. Technology, especially that which is new, is often stereotypically associated with younger persons, and therefore, technology may evoke a stereotypical threat among older persons, making them feel older and less competent (Caspi, et al., 2019). The experiences related to disappointment in one's own performance could perhaps alternatively be related to the usability testing sessions used as part of the project in order to evaluate and improve the prototypes of the application. Previous studies have highlighted that it is common that persons participating in usability tests to feel evaluated (Franz & Neves, 2019) and blame themselves, instead of the technology, for the "mistakes" made (Komninos et al., 2014), which also could have been the case in the present study.

Contributing – but to what extent?

The findings of this study highlight that participating in designing and developing an application for older people can be an uplifting experience— not only in terms of gained interest and confidence in technology use. The fact that there were persons who expressed no personal interest in technology in general but who still wanted to participate in the project highlights the participants' genuine engagement. Thus, their participation encompassed more than just the technological tool being designed, which is in line with what previous studies about participatory technology development with older person report (Andréasson et al. 2019; Hanson, et al., 2007). According to the participants in the studies by Andréasson et al. (2019) and Hanson et al., (2007) the utmost interest in participating was meeting and sharing experiences with others in similar situations. Additionally, visiting the university was also perceived to boost the participants' self-esteem (Hanson et al., 2007), which was also captured among the participants in the present study. Furthermore, in the present study, the participation was also about giving a voice to groups of older persons and older individuals in the societal development related to the digitalization of services. Similar experiences— that older persons enjoy and appreciate participating

in technology design because of the opportunity to raise their voices and perspectives¬— are described in previous gerontechnological studies (Fisher, Peine & Östlund, 2020; Mannheim et al., 2021) as well as in studies capturing older persons' views on being involved in research projects as respondents (Dahlin-Ivanoff et al., 2019) and as co-researchers (Berge et al., 2020; Malm et al., 2021). However, the participants' urge to share experiences and views can also be a challenge from the researchers' and developers' perspective, as the sometimes far-reaching stories can be difficult to know how to integrate all the information received into the design of e-based solutions (Aidemark et al., 2015).

However, even though the participants expressed that all older persons' views are valuable—despite former experiences of technology development and digital competence levels— the participants also expressed fears of not being good enough and disappointing the researchers. Hence, the participants also seemed to doubt their competence in their role as co-designers. It is worth noticing that level of involvement of the older persons did vary between the different phases in the iterative design process. For instance, the older participants were not involved at all in the actual design work (making of the prototypes). It might be that the older persons who participated in several activities did not feel fully involved and that they did not recognize their suggestions in developed prototypes, which can diminish their interest in participating (Lindsey et al.. 2012). However, older persons participating in research studies by Berge et al. (2020) and Haak et al. (2021) also doubted their own competence, which is related to the power imbalance between the participants and the researchers by the study authors. This could also be the case in the study at hand, since there evidently was a difference in terms of competence and experience in technology development and technology use between the developers, researchers, and the older persons participating.

The complexity of participatory approaches

In line with what has previously been raised by both Andréasson et al. (2019) and Wanka and Urbaniak (2022), the present study also recognizes that participatory approaches are "messy processes" that call for flexibility and reflexivity. Participatory approaches are often lengthy processes (von Heimburg & Cluley, 2021), which was also the case for the innovation project under study as it took place over a period of three years. Only a handful of the participants took part in more than one project activity, which highlights the challenges of participating in longitudinal projects. Research projects overall do not take place in a vacuum— they take place

in a world and lives that already happen. Thus, the different participant groups and society constantly change, which influences their participation in various ways. In this study, fluctuations in health statuses, functional ability, and family life as well as changes in interest levels were identified to challenge participation. However, flexibility and considering the participants' situations when planning project activities were suggested to be facilitators of participation. Flexibility has likewise been addressed as an important facilitator by Hakobyan et al. (2015), and Berge et al. (2020) highlighted person-centred and tailored approaches as keys for enabling the participation of frail older persons in a research project. However, such approaches require a high level of flexibility from the other stakeholders involved (Waycott & Vines, 2019), which at the same time also can be a challenge to realize in practice. Innovation and development projects have their own timetables and specific goals stipulated in the project plans and funding applications, which may not allow for extensive amounts of flexibility. Hence, finding a balance between meeting the participants' needs, enabling their participation, and meeting the goals of the project is key (Andréasson et al., 2019).

Taken together, the participation and engagement of older persons themselves are suggested as being critical to building a world where "older people can fulfil their potential in dignity and equality and a healthy environment" (United Nations, UN, 2002). Hence, older persons' own voices are seen as an important basis for future development (UN, 2002). In an increasingly digital everyday life, participation should also encompass taking part in the development and design of technology-based services targeting older persons. However, participatory approaches are extensive and challenging processes, and all the different groups involved have their own expectations of what participating in an innovation process entails and what the outcomes will be. Overall, participatory approaches require flexibility and resources from the participants and stakeholders involved and the methods for participatory technology design among older persons need to be advanced more studies exploring participatory approaches with diverse groups of older persons (especially more vulnerable groups) are needed.

Strengths and limitations

Thematic analysis is not performed in an "epistemological vacuum"; thus, it is not free from influences of the time and context in which the study was conducted nor the theoretical underpinnings and the experiences of the persons conducting the analysis (Braun & Clarke, 2006). The fact that the authors have research interests and experience with other studies focusing on ageing, health, and technology probably affected the interview guide, the interviews, and the analysis of the data and constitutes a potential bias regarding the present study. One of the main limitations of semi-structured interviews is the predetermined questions (Wilson, 2014) that the interview guide consists of, which might steer the participants towards discussing topics and bringing up factors that they would not otherwise have mentioned. On the other hand, the interview guide also ensures that the same topics are covered in each of the interviews (Wilson, 2014), contributing to more coherent data. Additionally, the authors all have different educational backgrounds, and the multidisciplinary collaboration might counterbalance the potential biases related to the preunderstandings.

The power imbalance between the participants and the researchers is also important to address and may constitute an additional bias by influencing and restricting the content of the data. The power asymmetry between an interviewer and a participant may encourage the participant to raise and discuss issues that he or she thinks the researcher wants to hear, rather than his or her actual thoughts and views (Miller et al., 2012). Such power asymmetry can be seen within the data in the present study, as the participants expressed being afraid of disappointing the researchers.

Moreover, the study findings should also be interpreted in light of the study design and sample. The broad recruitment strategy – anyone identifying oneself as being retired from gainful employment, community-dwelling – resulted in a fairly diverse group of participants in terms of age group and their experience of using digital technology, but perhaps not in terms of socio-economic position, health status, activity level, and gender. Overall, there was a larger interest in participating among the organizations and associations arranging social and leisure activities compared to the social care services, which resulted in older persons that actively participated in social activities and those without substantial care needs being more highly represented among the study participants. Thus, it might be that other types of experiences, especially in regard to challenges and facilitators, would have been raised if more representation of older persons with more substantial care needs had been included. The trustworthiness of qualitative studies can be evaluated based on credibility, dependability, confirmability, authenticity, and transferability (Kyngäs, et al., 2020) and the authors made an effort to carefully describe the sample, the data, and the study procedure in the text. Additionally, the study includes quotations from the raw interview data as well as tables describing the steps of the data analysis in order to add transparency.

Finally, research ethics is an additional factor that needs to be touched upon in relation to participatory approaches. For instance, informed consent might be challenged by a high level of flexibility and responding to issues as they come along, as it is impossible to give information about such activities beforehand (see Waycott & Vines, 2019, Berge et al.., 2020). In the present study, the challenges related to informed consent were managed by asking the participants to express their agreement before each of the project activities they participated in. Thus, the participants who took part on several occasions gave their informed consent several times and thereby only signed up for one activity at a time. Johnson and Finn (2017) also address the importance of having an ethical exit strategy, when ending lengthy participatory projects, e.g. by providing additional technology classes to the participants. The findings of the present study revealed that some of the participants expected and would have liked to gain more knowledge about different applications and features of the tablet computer and therefore this kind of initiative could enrichen the participation even further.

CONCLUSIONS

The findings highlight older participants' experiences of participating in an innovation project to design and develop an application targeting older persons. Participating in an innovation project can be an uplifting experience because of being able to contribute to research and development and expand perspectives and repertoires. However, participating can also evoke feelings related to disappointment in terms of not fully living up to one's own expectations of oneself, being afraid of disappointing project team members, and not gaining the kind of competencies expected as a result of their participation. Additionally, the perquisites and interest in participating might also change due to various circumstances. The study findings contribute to the gerontechnology field of research by highlighting the perceived benefits, motivators, and challenges from the perspective of a group whose experiences rarely are studied in this context. The findings could be helpful when planning future gerontechnology initiatives focusing on participatory approaches to technology design and development among older persons.

Ethical considerations

The ethical principles of the Helsinki Declaration (World Medical Association, 2013) were carefully followed throughout the study and drafting of the article. Written informed consent was obtained from the participants, who were informed about their right to withdraw from the study at any time, and that their information would be kept strictly confidential. The study did, however, not require formal ethical assessment according to the national boards of research integrity and ethics, as the study focused on the participants' experiences and views of being involved in the project and the study did not pose a threat to their health, physical integrity or safety.

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