FinJeHeW Finnish Journal of eHealth and eWelfare

SCIENTIFIC PAPERS
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Health self-management of older employees: identifying critical peak experiences of a patient portal

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Abstract

Digitalization could provide efficient and cost-effective health and well-being services to the rapidly aging population. However, digital services do not always meet their needs. We investigated the experiences and service needs of older employees by collecting quantitative and qualitative data through a survey (n = 497). The results suggested a negative association between user satisfaction and age during retirement transition. Peak experiences were meaningful, explaining a 26% variation in the overall evaluation of the portal. The negative peak experiences concerned poorly functioning features, and the positive ones the ability to take care of one's health smoothly and easily. The respondents had high expectations for functionality, efficiency, and ease of use. They wanted more support for self-managing health: controlling weight, sleeping, recovery, and exercising.

Keywords: occupational health, patient portal, software design, survey, telemedicine, user-centered design

Introduction

By 2030, 1 in 6 people in the world will be aged 60 years or over [1]. The rapidly aging population has led to growing interest in understanding how design of digital services could better support their well-being [2–5]. There is a growing need for better digital health services for older adults [3,5]; chronic diseases such as diabetes and dementia will increase in the future, while many diseases are the result of aging or unhealthy lifestyles, such as poor diet and lack of exercise [6,7]. Digitalization could provide efficient and cost-effective care for older adults [8].

Digital health services, such as patient portals support patients by providing convenient access to their health information and offering functions such as patient–provider communication tools and appointment scheduling [9]. Widespread patient portals have the potential to increase patients' engagement in actively taking care of their health

[10], and patient activation also yields enduring health benefits [11].

Older adults are not a homogeneous entity [5,12]. Different age groups experience different barriers to using digital health services [13]. Older employees form a distinct subset of digital health service, and have elevated need for health services in comparison with younger and middle-aged working subsets [14]. While older employees are in a critical phase in life to secure healthy aging [15], few studies have previously addressed their needs of digitally provided health services. In line with LeRouge et al. [3], Durrant et al. [16] suggested developing services that would help older employees in their transition from working life to retirement and support their well-being.

Therefore, this study looks at those older adults, who are 56–70-year-old employees, and who are nearing retirement ("*older employees*"). Inspired by Kujala and Miron-Shatz [17] and Tuch and Hornbæk [18], we analyzed older employees' user experience with a patient portal, identifying their emotionally most intense positive and negative experiences that are called peak experiences [19]. We collected those peak experiences using the critical incident method [20], which focuses on the actual behavior or concrete experiences of participants, rather than generalized opinions. To identify whether the peak experiences are critical for good user experience, we also analyzed the relationship of the peak experiences with the older employees' overall evaluation of the patient portal use. Our research questions are:

1. What are the critical experiences of older employees using a patient portal?

2. What needs do older employees have for patient portals?

Older adults' experiences with patient portals: Design perspective

Patient portals have the potential to increase patients' engagement in actively taking care of their health [21], which yields enduring health benefits [11]. Portals support patients by providing convenient access to health information and offering functions such as patient–provider communication tools and appointment scheduling [9]. Yin et al. [22,23] examined preferred features of and barriers to using patient portals: reviewing laboratory results or appointments and paying bills are the most used functions, while real-time discussions with nursing staff are a rare but very valued and desired feature.

The older adults' attitudes towards patient portals have been identified as both enablers and barriers to use [24]. Positive expectations of the performance of patient portals, and older adults' level of education enable patient portal usage [25]. Security and privacy concerns [21,22,26], and the fear that physical appointments will be replaced are barriers to portal usage [26]. Some older adults are just not interested in using patient portals [26]. Others can see the general benefit of using them, yet they still need help and prefer human contact [21].

When designing digital health services for older adults, diversity should be considered, including i.a. age, gender, culture, ethnicity, socioeconomic status, education level, health literacy, physical health, and family situation [27]. With aging, the health situation of some older adults is bound to change [6,27]. The information offered via digital health services should be personalized to ensure its relevance [5].

Material and methods

We conducted a survey study with 497 older employees (occupational healthcare customers) to capture their experiences of a patient portal (Figure 1), which was offered by the largest private healthcare provider in Finland to occupational healthcare customers as non-billable part of the service agreement. The comprehensive patient portal offered both mobile and desktop access to one's health record as well as different functionalities: to book appointments; view appointment information, prescriptions, and vaccinations; view lab results; use chat and video appointment services; use services on behalf of one's child; send a message to one's occupational health team; and edit one's own user information [28].

To fully understand the potential and develop needs of the portal, research was needed especially among older employees, whose willingness and competence to use this service were unclear, and their needs not well understood [12,25,26]. Older employees transitioning to retirement are in the middle of a life change [34], but this phase is currently not utilized enough to support healthy routines [24]. Therefore, we focused on investigating the needs and user experiences of 56-70-year-old employees nearing retirement.

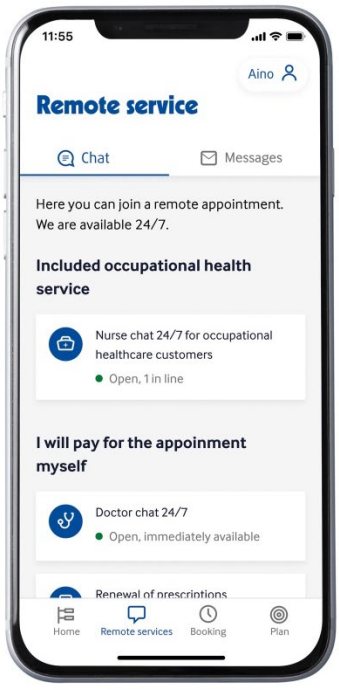

Figure 1. A layout example of the patient portal [28].

Participant recruitment

A total of 29,618 invitations were sent via email to occupational healthcare customers of a private healthcare provider. They were 56-70-year-olds and had granted authorization to receive marketing communications. The survey was open for answers from June 30th to August 11th, 2020, when the first wave of COVID-19 was subsiding in Finland. No compensation was given.

Survey design

First, the respondents were asked to rate the usefulness of the patient portal's individual digital services. Second, they were asked whether they had positive or negative peak experiences related to the digital services. In case they had peak experiences, they were asked to provide detailed descriptions of them. The overall evaluation of the patient portal use was measured with two questions: how likely they would be to recommend the patient portal to an interested friend, and how likely they would be to use the patient portal again [29], on a scale from 1 ("Very unlikely") to 9 ("Very likely"), as well as a 10th option ("I don't know"). The last part of the survey covered demographic questions including age, gender, educational level, and health situation. Finally, the respondents were asked if they wanted support for specific health or well-being issues and if they were interested in hearing more about the digital health plan. The survey (Appendix A.1.) and invitation letter were piloted in two phases with a total of three target group members. The questions were in Finnish. The study protocol was reviewed and approved by the Ethical Review Board of Aalto University.

We collected respondents' positive and negative peak experiences related to digital services using the "critical incident method" [20]. The critical incident method [20] is a widely adopted approach to collecting user experiences e.g. [30,31]: it focuses on the actual behavior or concrete experiences of participants, rather than generalized opinions.

We focused on positive and negative peak experiences as according to the well-established peak–end rule, people's overall evaluations of an event are strongly influenced by the peak and end experiences during the event [32]. These experiences seem to be also critical to the overall user experience [17,19,33] and there is evidence that even a single peak experience predicts the overall user experience [13]. The single experience can be a peak or end experience depending on which one is more memorable and meaningful to the user. Thus, in this study, we have focused on the participants' single positive and negative experiences to keep the questionnaire easy to respond.

Mixed methods analysis

In a quantitative analysis, we fitted linear regression models to test the associations between the overall evaluation of the patient portal use and the presence of critical positive and negative experiences. The analysis was conducted by the third author. Univariate models were fitted with the overall evaluation as the dependent variable and, first, the presence of a positive critical experience and, second, a negative critical experience as the independent variables. Age, gender, and education were added to the models as independent variables to test the sensitivity of the associations to the demographic factors. P values below .05 were considered statistically significant. Cronbach's alpha was calculated to test for the internal consistency of the two-item scale of the overall evaluation. Statistical analyses were performed using Stata version 15.0 (StataCorp LLC).

The qualitative content analysis [35,36] focused on the four open questions and was mainly conducted

by the first author and supported by second and fourth authors to increase its validity. The analysis was done in four phases: 1) The open answers were organized and sorted in Microsoft Excel (Microsoft® Excel® for Microsoft 365 MSO, version 2208) by removing empty answers and combining the answers to the specific service they commented on. The number of different types of answers was calculated (resulting in 230 positive experiences, 97 negative experiences, and 101 challenges and improvement suggestions). 2) The data was analyzed again using open coding in ATLAS.ti version 8.4.26.0 (ATLAS.ti Scientific Software Development GmbH) (resulting in a total of 40 codes). The most common and frequent answers were recognized. The analysis focused on discovering the positive and negative experiences, along with suggestions for improving usability and general comments. 3) Third analysis round in Microsoft Excel focused on the effect of human contact in the open answer (resulting in 39 codes in four groups: positive peak experiences, negative peak experiences, improvement suggestions, and comments). 4) The last analysis round focused on analyzing only the positive and negative peak experiences without a connection to the specified service area, and if anything had been left unnoticed. In vivo coding was applied in the analysis. Similar codes were grouped (resulting in eight codes for positive experiences and 16 codes for negative experiences).

Results

Respondents

A total of 497 respondents completed the survey, resulting in a 1.7% response rate. The respondents were 56 to 70 years old; 57.1% were female, 41.2% male and 1.6% other or not reported; and 57.4% had at least post-secondary level education. Appendix A.2. presents the participants in more detail. A majority (n=319, 64%) of respondents reported having a chronic condition diagnosed by a doctor, and even a greater proportion (n=365, 73.4%) used medication daily. This proportion is similar to this age-group in Finland [37]. In 2017, about 54% of 50-59-year-olds and 64% of 60-69-year-olds reported having a chronic condition [37]. Despite the rather high prevalence of health issues, only 20.9% (n=104) reported being burdened by taking care of their conditions, and a substantial majority (n=426, 85.7%) felt that they could take care of their health.

Associations of peak experiences with the overall evaluation

We tested whether the reported peak experiences had an association with the overall evaluation of the patient portal use. The univariate analyses show an association of both positive (β = 1.49, p <.001) and negative peak experiences (β = -1.73, p <.001) with the overall evaluation of the patient portal use. Patients with positive peak experiences were more satisfied with the services, whereas patients with negative peak experiences were less satisfied. The mean of the overall evaluation by the respondents was fairly high, at 7.6 (SD 1.97) on a scale of 1 to 9. Cronbach's alpha for this scale was .89, indicating good internal consistency.

The associations persisted when positive and negative peak experiences were fitted in the same model (Table 1, Model A), and when the control

variables of age, gender, and education were added (Table 1, Model B). Negative and positive peak experiences alone explained 26% of the variation in the overall evaluation. This explanatory power can be considered substantial, which suggests that peak experiences are essential in the formation of users' overall evaluation of the of the patient portal use.

The regression results showed a significant association with the eldest age group (66–70 years) compared to the youngest age group (56–60 years), suggesting a rather rapid decline in user satisfaction with digital services by age among those nearing retirement.

Positive peak experiences of the patient portals

The survey produced 230 qualitative narratives of positive peak experiences. The themes of the positive peak experiences varied from specific functions and smoothness of the patient portal use (Figure 2). Respondents were positive about it being easy to follow, providing information about end user's health situation and laboratory results, and having functions such as prescription renewal or appointment booking. They found chat functionality simple and useful. All information was clearly available in one place in the patient portal. The number of experiences of the patient portal being easy to use, fast, flexible, and smooth as a part of the overall service was notable (Figure 2).

Many positive peak experiences were related to ease and convenience of renewing prescriptions using the chat function: "*The prescription renewal went quickly and conveniently via chat.*" The laboratory results were clearly reported in the service and getting them digitally was considered quick and easy: "*The information I needed came immediately and in an understandable form.*"

Table 1. Regression model results on the association of positive and negative peak experiences with the overall evaluation of the patient portal use.

	Model A		Model B	
	ß (SE)	p value	ß (SE)	p value
Positive experience (Category reference: "No")	1.45 (.16)	<.001	1.46 (.16)	<.001
Negative experience (Category reference: "No")	-1.68 (.19)	<.001	-1.52 (.19)	<.001
Age (Category reference: 56–60 years)				
61–65 years			-.30 (.18)	.093
66–70 years			-.66 (.32)	.037
Gender (Category reference: Woman)				
Man			.13 (.16)	.42
Other			.59 (1.63)	.72
Education (Category reference: Elementary school)				
Upper secondary education			-.07 (.31)	.82
Post-secondary level			.05 (.30)	.87
Higher education			-.10 (.31)	.76
Other or not reported			-.19 (.46)	.67
R squared	.26		.28	

The prescription renewal function was considered fast, easy, and flexible, and the electronic appointment booking fast and easy. The respondents felt that it was a pleasure to be able to look for a suitable appointment and a doctor undisturbed and at their own pace. Once, when the electronic appointment did not work, a respondent received assistance through a customer service chat. The video appointment felt like making an appointment at home, and it was a pleasure, especially when patients did not want to travel or were unable to do so (e.g., due the pandemic): *"Remote appointment with the doctor was easier and more convenient during the coronavirus pandemic, especially as I am recovering from a surgery."*

Negative peak experiences of patient portals

The survey produced 97 negative peak experience narratives of the patient portal (Figure 3). Challenges with the appointment booking function, such as difficulties finding a suitable time slot or a familiar doctor, or connection problems, received most of the negative feedback. In addition, the service provider's website was confusing, or had poor usability: *"The information is visually difficult to read."* One respondent found it hard to access the laboratory results, mostly because of the patient portal's challenging structure: *"If I want to view only lab results or doctor visits, all events will now be listed in chronological order*." It was difficult to find the content, and the slowness of the webpages was annoying. Video appointments were marked by technical challenges related to audio or video connection performance.

The service process could be cumbersome or messy: e-mails were not answered, agreed appointments were not realized, or the service did not otherwise meet the expectations. Negative peak experiences of service processes included potential information system problems and registry errors. In the service received via chat, the doctor did not make a diagnosis or made a faulty diagnosis, or the renewal of a prescription failed through chat. Renewing a prescription was difficult or unsuccessful in a couple of negative experiences. One notable fact is that the role of human contact was seen in both positive and negative peak experiences (see Figures 2 and 3).

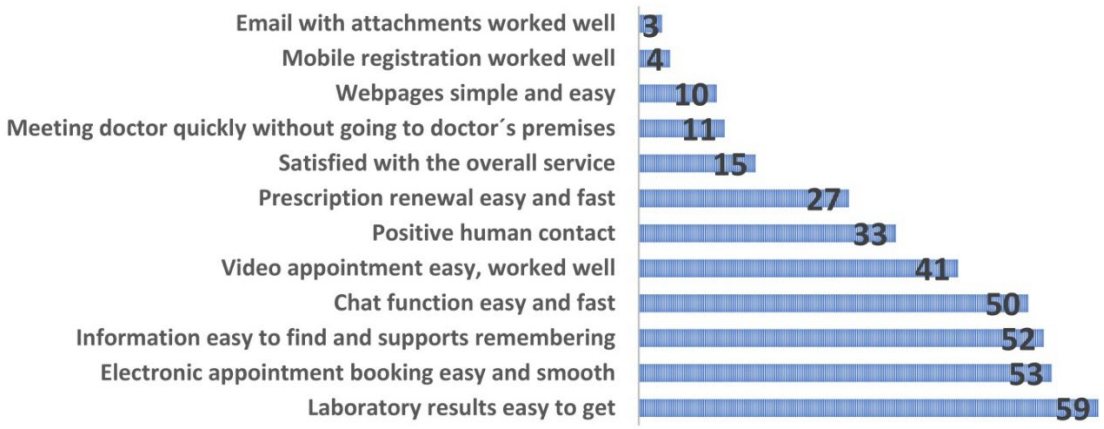

Figure 2. Most common topics and number of mentions of positive peak experiences.

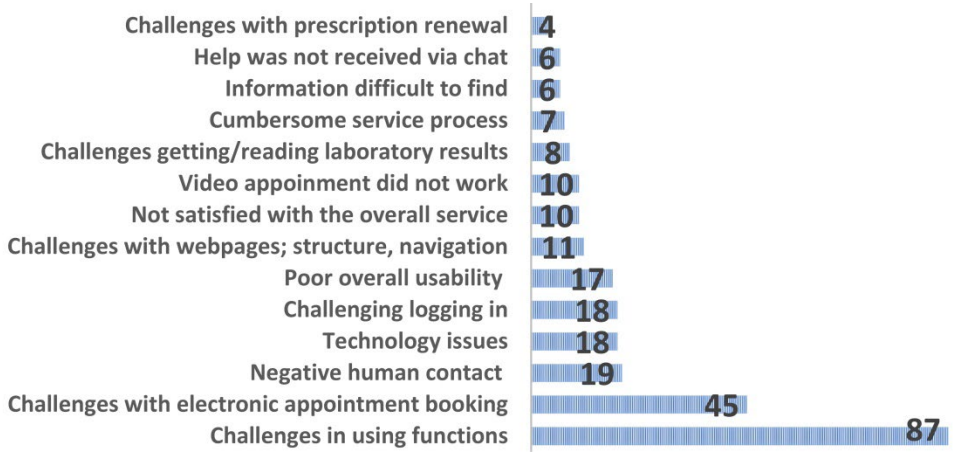

Figure 3. Most common topics and number of mentions of negative peak experiences.

Older employees' needs for support in health and well-being

We asked the respondents about their needs for support in health and well-being. Over half of the respondents (n = 256) wished support for one or more issues: 144 respondents were interested in receiving support for weight management through a patient portal, 89 for sleeping, 57 for exercise and 56 for recovery, 5 for musculoskeletal rehabilitation, 4 for nutrition, 5 for health screening, 4 for pain, 3 for body maintenance, 3 for mental health, and 2 for treatment of a disease and stress. Other mentions included sleep apnea, personal doctor service, coping at work, getting a diagnosis, ergonomics improvement, fatigue, gambling addiction, general coping, and monitoring of vaccination protection.

Discussion

Our research questions were: 1. What are the critical experiences of older employees using a patient portal? and 2. What needs do older employees have for patient portals? Based on the quantitative analysis, positive and negative peak experiences substantially explained the overall evaluation of the patient portal use. Thus, *peak experiences provide meaningful and significant memorable moments to users and are critical to consider in design.* In the qualitative analysis, we found that older employees value *fast, smoothly functioning patient portals*, while the negative peak experiences are generally associated with *poorly functioning features*. Older employees are willing to interact with healthcare professionals *through different channels*, with chat functionality being the most popular.

Based on the peak experience narratives, *older employees are willing to use patient portals* to support their health and well-being. The positive peak experiences told a story whereby their enthusiasm was mostly like in the interview study on the recently retired people´s online activity [16]. The participants in that study also reported that they were *"interested in trying new things, adopting new devices, meeting new people, organizing their life in a new way, and trying to achieve a balanced and healthy lifestyle"* [16].

The patient portal had functionalities for reserving appointments and taking care of existing diseases. Over half of the respondents expressed *the need to have more support for their well-being*, in line with Durrant et al. [16]. As our respondents were near

retirement age facing their first health issues, many seemed to be eager to actively improve their lifestyles and prevent future health issues like in the study by Biggs et al. [38]. Health professionals often advise this group to lose weight etc., but *patient portals could provide more information and long-term support* for doing so in real life.

Role of peak experiences in overall evaluation

Our results provide quantitative evidence for the proposition that users' *peak experiences are relevant to the overall evaluation of a product*, as predicted by the "peak–end" rule theory [32]. This finding confirms early empirical results [13] and the assumptions of HCI researchers [17,18,34,39–41]. Peak experiences may play an important role because people tend to remember the strongest and most recent experiences.

While investigating all memorable experiences would provide the most comprehensive picture of the overall user experience and preference, our study shows that collecting only the narratives of single positive and negative peak experiences is *an effective strategy for identifying essential information for design purposes*. This approach enables reaching a large and more representative user group when it is not too laborious to report the experiences. Still, the narratives of peak experiences provide a rich description of actual experience episodes similar to the critical incident method [20]. Our findings suggest that it is *useful to collect both positive and negative peak experiences*. This is in line with earlier findings predicting that positive and negative experiences have their own role in forming the overall user experience and behavioral intentions; positive experiences represent emotionally rewarding user experiences and negative ones are often related to usability problems [17].

Implications for design

As an answer to our second research question on what should be considered when designing digital health services to older employees, we found that the *basic functions of the service* (e.g., making appointments, logging in, reviewing laboratory results) *must be easy and smooth to use*. Reservations should be available for all services through the patient portal, and options of different service channels (e.g., chat or video appointments) should be offered. *Support for self-managing health* (e.g., controlling weight, sleeping, recovery, and exercising) should be offered: over half of the respondents wished such support. When ensuring the optimal experience to older employees, *the whole customer journey, including different service channels, should be considered.* A patient portal is just one part of a multichannel service.

Gaining contact and *smooth communication with healthcare professionals* via a patient portal is important for older employees. Communication and the quality of human contact seemed to influence the overall experience. All in all, older employees are willing to take care of their health and well-being remotely using several channels. Therefore, patient portals should be designed with attention paid to the *usability* of channels and making sure that the *transition between channels is done smoothly. The content should be useful and interesting,* it should be *very easy to find*, and *navigation should be very smooth*. Older employees need to be *given a choice* so that they can influence their care and make their health decisions *smoothly as part of their daily routine* during work and free time. A *need to choose independently* repeated both in the positive and negative peak experiences: older employees value the opportunities to decide appointments that fit well in their everyday life schedules at home and work.

Information such as laboratory *results should be easy to access and understand*. In line with Huvila et al. [5], the *situation awareness of the health* can also be supported with user interface design solutions. For example, the reference values for laboratory tests were visible and easy to interpret.

Technical problems are an obstacle to getting full benefit from the service. Therefore, it is worth investing in constantly *collecting feedback* about the patient portal and *immediately correcting any technical problems*. By doing so, older employees will feel like they are being listened to.

Limitations and future research

Our study covered older employees who used the occupational healthcare services of a Finnish private healthcare provider, had earlier experience of computer and patient portal use, and answered an online survey. Thus, our sample did not represent the entire age group even in Finland. We do not have comparative data on how much the responses were influenced by the fact that older adults were instructed to stay at home due to COVID-19 during the study. Patient portal made it possible to manage their health and well-being safely from home, which could affect the results.

Regarding the peak experiences, some functions received both negative and positive mentions in the open answers (e.g., appointment booking). There were periodical technical challenges in the portal, particularly in appointment bookings, which may have affected the responses of the respondents experiencing these disturbances.

The response rate of the survey was low possibly due to the summer holiday time in Finland: The respondents were occupational healthcare customers, which might be affected by the answering activity for the survey during their holiday. In the future, it would be worth looking at experiences over a longer time period, as well as the experiences and design needs of over 70-year-olds.

Conclusions

We investigated the patient portal needs of older employees. Our quantitative analysis showed that single peak experiences are meaningful for explaining the overall evaluations of patient portals use. The results suggested a negative association between user satisfaction and age during retirement transition. The qualitative analysis identified multiple design implications of patient portals for older employees. Older employees are willing to use patient portals and open to receiving services across several channels, if the information is easy to find and the functions work smoothly. Moreover, our respondents wished to receive support for well-being, such as controlling their weight. The results of this study help understand how patient portals should be designed from the perspective of older employees.

Conflict of interest statement

Fifth and sixth authors represented the organization which provides the patient portal when the study was conducted. Neither of them was responsible for the patient portal development.

Acknowledgments

This work was supported by the Strategic Research Council at the Academy of Finland (grants 352501 and 352503) and NordForsk (project 100477). The study protocol was reviewed and approved by the Ethical Review Board of Aalto University. We would like to thank the study participants and internal collaborators at Terveystalo for their help with the research arrangements.

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Appendices

A.1. Survey structure

The survey structure is translated from Finnish.

Which of the following eHealth services have you used and how useful do you evaluate them to be for you? (Scale 1-6, where 1= I haven't used, 2= completely useless and 6= very useful)

- Healthcare service provider's web page
- Electronic appointment booking
- Own health records/laboratory results
- Video appointment
- Chat
- Prescription renewal
- Digital health plan
- Something else, what [open answer field]

Have you had a positive, pleasant experience related to the healthcare service provider´s eHealth services? (yes/no)

Which digital service the (positive) experience was related to? (yes/no)

- Healthcare service provider's web page
- Electronic appointment booking
- Own health records/laboratory results
- Video appointment
- Chat
- Prescription renewal
- Digital health plan
- Something else, what [open answer field]

Describe the positive, pleasant event you experienced here. Try to describe it so that someone outside of the study can understand it. [open answer field]

Have you had a negative, unpleasant experience related to the healthcare service provider´s eHealth services, describe the experience? (yes/no)

Which digital service the (negative) experience was related to?

- Healthcare service provider's web page
- Electronic appointment booking

- Own health records/laboratory results
- Video appointment
- Chat
- Prescription renewal
- Digital health plan
- Something else, what [open answer field]

Describe the negative, unpleasant event you experienced here. Try to describe it so that that someone outside of the study can understand it. [open answer field]

Evaluate the healthcare service provider´s digital services based on your experience [37,47]. (a scale ranging from 1 (very unlikely) to 9 (very likely)

- How likely is it that you would recommend the service to a friend who is interested in it?
- How likely would you use the service in the future?

If you want, tell us about the challenges of using digital services or how they could be improved. [open answer field]

What is your age? (Age categories 51–55 years, 56–60 years, 61–65 years, 66–70 years)

What is your gender? (options: man, woman, other or I don't want to tell)

What is your highest level of education? (Options: Upper secondary education, Post-secondary level, Higher education, Other [open answer field])

Assess your health by commenting on the following statements. (Scale 1-5, where 1=Fully disagree and 5=fully agree)

- I have a long-term illness diagnosed by a doctor
- I use medication daily

Would you like support for a health issue or well-being [via digital services]?

- For the treatment of a disease such as diabetes
- For adding exercise
- For weight control
- For sleeping
- Recovery
- Not at the moment
- Anything else, for what? [open answer field]

Warm thanks for your answers! If you wish, you can comment on the survey or the healthcare service provider´s eHealth services here [open answer field]

A.2. Participant descriptives

Table A2. Participant descriptives (n=497).

Characteristic		Value
Age category, n (%)		
	56–60 years	118 (23.7)
	61–65 years	329 (66.2)
	66–70 years	37 (7.4)
	Not reported	13 (2.6)
Gender, n (%)		
	Woman	284 (57.1)
	Man	205 (41.2)
	Other or not reported	8 (1.6)
Education, n (%)		
	Elementary school	38 (7.6)
	Upper secondary education	145 (29.2)
	Post-secondary level	144 (28.8)
	Higher education	142 (28.6)
	Other or not reported	28 (5.6)
Chronic condition diagnosed, n (%)		
	Yes	319 (64.2)
	No	178 (35.8)
Positive experience, n (%)		
	Yes	285 (57.3)
	No	212 (42.7)
Negative experience, n (%)		
	Yes	108 (21.7)
	No	389 (78.3)