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Ageing in the right place – a prototype of a web-based housing counselling intervention for later life

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ABSTRACT

Background: Despite a strong desire among most older adults to age in place, there are few widely available services to support planning and preparing for one’s future housing needs.

Objective: To develop a prototype of a web-based housing counselling intervention for use in later life, by employing a user-centred design.

Material and Methods: As the first step in intervention development, we employed a development process based on research circle methodology. Nine older adults participated in three sessions. Findings from literature reviews, a meeting with a technology and design panel (n = 6) and interviews with representatives of nonprofit organizations, companies, and municipalities (n = 7) served as discussion points.

Result: An on-paper prototype was derived, composed of the THINK, LEARN and ACT module reflecting different stages of the decision-making process. Each module addressed preferences, health, home and social and financial resources. Key design features and theoretical underpinnings were included.

Conclusion and Significance: A user-centred design process can result in services that are aligned with older adults’ preferences for obtaining housing information. Services for planning and preparing future housing needs have the potential to increase older adults’ well-being at home as well as reduce costs for care and housing provision by the municipalities.

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Relocation; home modifications; decision-making; housing preferences; community-living; assisted living facilities; nursing home; user-centred; research circle methodology

Introduction

Ageing in place is a priority for many older adults and a political ambition in several Western countries and Scandinavia in particular [1]. However, research shows that many community-living older adults live in inaccessible dwellings with numerous environmental barriers and fall hazards in bathrooms, bedrooms and at entrances [2–4]. A dwelling that was supportive in one life stage can cause unnecessary dependence and need for help and support at a later life stage due to age-related functional decline. Environmental barriers and accessibility problems are associated with dependence in Activities of Daily Living (ADL), falls and poor quality of life [5]. Furthermore, inaccessible dwellings are associated with relocation to residential care facilities [6,7] and relocation within the community [8]. A Swedish study showed that adults over the age of 80 who moved within the community, moved to dwellings with fewer environmental barriers, but the dwellings were still not accessible enough to support ageing in place [9]. Thus, the question of housing in relation to ageing is complex, involving both the individuals’ current needs, resources and priorities as well as potential future needs.

To make sure that a home will be appropriate to age in, a range of intrinsic and extrinsic factors and their specific constellation for an older adult need to be considered. Extrinsic or environmental factors may include location, size of the dwelling and social support; whereas intrinsic or personal factors include health status, preferences, activity and participation, such as the pattern of occupations the person wishes to pursue or needs to engage. In addition, complex
issues such as emotional attachment to the home, financial restraints and legal consequences make the decision-making process complex [10]. Moving in later life is a significant life event, and good health is a requisite of feeling strong enough for any type of move. Housing decision-making processes are often extended over several years [11], and filled with ambivalent emotions. Often, decisions are pushed into the future and are sometimes precipitated by a sentinel event (e.g., a fall, hospitalization, change in functional status) or to a point in time where it may be too late to move [12].

In contrast, a more proactive approach to planning future housing could support older people in being more prepared and informed and help them to maintain control of their situation and the relocation process. In a study by Sorensen et al., older adults who actively planned and prepared their future care needs could more easily transition from one level of care to another, leading to better outcomes on health, overall adjustment, well-being, and fewer feelings of insecurity about the future compared to those who did not plan and prepare [13]. In contrast, lack of planning and preparation caused vital decisions to be made under crisis and time constraints [13]. Lindquist and coworkers showed that planning behavior increased for those who used the web-based portal Plan Your Life Span, focusing on planning and preparing for eventual health-related events during old age [14].

A Swedish report estimated that as few as 7% of people aged 65 and older had used services to get information or to make plans for future housing needs [15]. Many older adults do not know what is available or how to get access to home-based resources or housing options [14]. In some clinical practices, health and human service professionals, specifically, care managers and social workers, advise older adults on housing issues, but usually in relation to changing care needs. However, such types of clinical advice are not provided systematically, do not follow best practices and have not been evaluated [16]. In many Western countries, societal support in terms of home help services, home modification programs and housing options for older adults are available, but only sporadically and uncoordinated. Who provides the services and how they are financed differs between and even within countries. In most countries, it is a complex mix of tax-based, insurance-based and out-of-pocket financing. Fragmented information from different sources makes information gathering, comparisons and decision-making extremely complex for the individual user [17]. Thus, a counselling service for older adults and their families to plan and prepare for future housing may be beneficial.

Despite the acknowledged need [18], there is a lack of evidence-based counselling services [19]. One of the few is FirstStop in the United Kingdom. It supports economically vulnerable older adults in living independently longer in the community by assisting with planning, providing information, and helping to allocate funding for home services. The counselling is primarily provided over the telephone by a team of experts [19]. In New Zealand, as part of larger studies on housing in later life, web-based tools were developed to assist older adults in improving decisions around repairs, maintenance, location choices, and housing options. They used participatory research techniques, and a key finding was that the tools should provide checklists to identify problems and, crucially, solution suggestions [17]. Both services target primarily older adults actively seeking help, that is, people who have already decided to take action. Considering the need for a more proactive approach to support older people in making informed decisions and planning for the future, a counselling service should also target older adults who are at more preparatory stages of the decision-making process [20,21].

A good match between older adults’ capabilities and appropriate housing will enhance opportunities for active and healthy ageing. Potentially, over time, such services can reduce the costs for health and social care. Older adults who reflect upon and plan what kind of home and neighborhood features they need, want, and can afford in order to age in the right place, will lead to individual benefits as well as societal gains.

A web-based intervention has the potential to gather a wide range of information needed for decision-making in relation to housing and to provide tailored recommendations. Furthermore, web-based support can potentially make such information easily available, and at a lower cost than counselling services delivered primarily in person [22]. Considering the demographic development and the ageing of societies, innovative ways of efficiently delivering interventions and services need to be further tested. This study is part of a larger project with the objective of developing, testing and implementing a housing counselling intervention for later life in Swedish municipalities. As the first step, the aim of this study was to develop a prototype of a web-based housing counselling intervention for later life by employing a user-centred design.
Methods

The process

We report here the results of the first step in intervention development [23,24] and the design process. With a user-centred design inspired by research circle methodology [25], we conducted iterative cycles of information gathering, data collection and analytic meetings (see Figure 1). Three research circles with older adults were served with information gathered from a) a review of the scientific literature and current services on the market, b) a technology and design panel meeting and c) interviews with representatives of companies and nonprofit organizations with knowledge of housing needs in older adults (see Figure 1). The data collection took place between November 2017 and May 2018.

Participants

To assure a user-centred development process, we included different groups of participants representing potential future users, topic experts, or both [25]. Participants were 1) older adults for the research circles, 2) technology and design experts and 3) representatives of companies and nonprofit organizations with knowledge of housing needs in older adults.

For the recruitment of research circle participants, inclusion criteria were age 65 or older, community-living, sufficient Swedish language skills to participate in group discussions and experience of using computers. An exclusion criterion was that if the eligible participant knew beforehand, he/she would not be able to take part in at least three research circles. We initiated the recruitment by contacting members of a Senior Citizen Board in the municipality of Östersund. The Senior Citizen Board consists of residents over the age of 65 who volunteered to give feedback on political decisions impacting on older adults. The municipality of Östersund is located in the middle of Sweden, with 63,000 citizens living in urban and rural areas. The municipality of Östersund has launched a strategic plan called ‘A health-promoting municipality’, including a housing program and a range of other initiatives. The program focuses on the provision of accessible and affordable housing to counteract housing-related inequalities. One strategy is to develop and provide older citizens with housing counselling services. The Senior Citizen Board members were contacted about participating via telephone or email, and five participants were interested. The Senior Citizen board members were also asked to recommend additional older adults they thought would be interested in the study, and five older adults were contacted with the intention of obtaining a heterogeneous group of research circle participants in terms of sex, age, living situation, type of housing, level of care needs and being a caregiver.

MZ, who worked in the municipality, informed potential participants about the study on the phone and screened all individuals for eligibility. One declined to participate, and in all, 9 participants were included in the study. We considered the group size to be appropriate to get a variety of opinions but small enough to facilitate group discussions [26]. The sample is described in Table 1.

We recruited participants for the technology and design panel with convenience sampling based on recommendations by researchers at the Center for Ageing and Supportive Environments (CASE) at Lund University. CASE has over the years developed a large network of knowledge users for research collaborations. We defined ‘technology and design expert’ broadly with the aim being to reach people with diverse expertise in technological intervention development. Possible candidates were contacted via email and also asked to recommend other possible candidates. Eight people were invited, two declined to participate, so the final panel constituted 6 participants. The participants comprised three women and three men and represented expertise in software and
Table 1. Background characteristics of the older adults participating in the research circle (n = 9).

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>6</td>
</tr>
<tr>
<td>Men</td>
<td>3</td>
</tr>
<tr>
<td>Age, md (q1–q3)</td>
<td>75</td>
</tr>
<tr>
<td>Living alone</td>
<td>4</td>
</tr>
<tr>
<td>Computer and mobile device proficiency</td>
<td></td>
</tr>
<tr>
<td>Experienced usera</td>
<td>2</td>
</tr>
<tr>
<td>Daily user, expertb</td>
<td>7</td>
</tr>
<tr>
<td>Type of housing</td>
<td></td>
</tr>
<tr>
<td>Apartment</td>
<td>5</td>
</tr>
<tr>
<td>One-family house</td>
<td>4</td>
</tr>
<tr>
<td>Urbanity</td>
<td>7</td>
</tr>
<tr>
<td>Rural</td>
<td>2</td>
</tr>
<tr>
<td>Moved within the last 10 years</td>
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</tr>
<tr>
<td>Total number of moves</td>
<td></td>
</tr>
<tr>
<td>≤ 3 times</td>
<td>0</td>
</tr>
<tr>
<td>4-6 times</td>
<td>3</td>
</tr>
<tr>
<td>&gt;7 times</td>
<td>5</td>
</tr>
<tr>
<td>Help with daily life tasks during the last year</td>
<td></td>
</tr>
<tr>
<td>Is an informal caregiver</td>
<td>2</td>
</tr>
<tr>
<td>Receives informal care</td>
<td>0</td>
</tr>
<tr>
<td>Receives home care services</td>
<td>2</td>
</tr>
</tbody>
</table>

aRegular use of computer/smartphone/tablet to e-mail and visit social media.

bRegular use of computer/smartphone/tablet to e-mail, visit social media, pay bills and book trips.

computer game development, eHealth, accessibility, design, interface and usability issues. Two worked in county council health care, one had a private business, and three worked for private companies.

We recruited representatives of companies and nonprofit organizations with knowledge of housing needs in old age using purposeful sampling to obtain a wide representation of knowledge users, including both potential adopters and potential deliverers of the intervention. To do this we contacted ten potential candidates by email and asked them to pass the invitation on within their organization if they considered someone else more suitable to participate. Three declined or did not reply, so the final sample (n = 7) constituted three women and four men. Various organizations were represented: a medium-sized Swedish municipality; a housing provider agency, with knowledge of housing preferences and relocation patterns among older adults; the National Association of Municipalities and County councils with knowledge of how municipalities currently handle ageing in place services; two national organizations for retired citizens, and one national organization for family caregivers, all having members that could be potential users of housing counselling service; a national nonprofit homeowners’ organization which provided free support service to members on legal and financial issues for homeowners; and finally, a nonprofit organization for co-housing and cooperative living, with knowledge on housing for older adults that is accessed on the regular housing market.

Data collection

The research circle participants met three times. We developed discussion guides for the research circles with themes and open-ended questions, based on hitherto collected data and emerging results. In the first research circle, we focused on our results from our review of the scientific literature and services on the market (see Figure 1). Thus, the discussion guide included themes on the need for housing counselling services, how to reach older adults who are unaware of the need for planning, meaningful content and forms for delivery. MZ started by restating the aim of the study, and the participants answered a short survey on demographics and housing. Then, the discussion of the different themes began. Throughout the discussion, we gave examples from related types of services and conclusions from empirical and theoretical research as food for thought. After the first research circle, the participants got homework to test a set of question that we had developed inspired by international housing services.

At the second research circle the homework was discussed along with themes that had emerged from previous data collections and the technology and design panel in particular. At the third research circle, the discussion was focused on the emerging findings in terms of a preliminary on-paper prototype based on previous data collections and analyses. The discussion at the third research circle thus concerned usability and content relevance. Delivery of the intervention was discussed as well, as whether a housing counselling service could be efficient as an online tool for older individuals to use on their own, or if not, what other kinds of complementing support that might be needed.

The research circles were held at a local senior center. MZ facilitated the research circles and UP served as observer and note taker. The sessions were audio recorded and lasted between 111 and 121 minutes.

The technology and design panel met once for a group discussion between the first and second research circles (see Figure 1). We developed a discussion guide with themes and open-ended questions based on a) the results from the first research circle and b) the interface of a potential web application, design and technological features to support the meaning and content of the intervention. We aimed
for a creative and inclusive discussion. We did not aim to solve how to develop a web application in technical terms rather to discuss how concepts such as visualization, gamification, and AI could be used to make an application attractive, interesting and meaningful. The technology and design panel met on one occasion at Lund University, and MG facilitated the meeting. The meeting was recorded and lasted 120 minutes.

Each of the seven representatives of companies and nonprofit organizations was interviewed once between the second and third research circle (see Figure 1). We used information from previous data collection steps and preliminary analysis to develop a semi-structured interview guide. At this point, we had gathered all the ideas we had obtained so far on content and delivery in a draft of a housing counselling service in a PowerPoint presentation. Accordingly, the themes of the interview guide concerned different aspects of the draft and also how housing decision-making for older adults was discussed and approached by their organization and the usefulness of a housing counselling service for their organization. The participants were located in different parts of Sweden, so MG carried out the interviews remotely using an online video conference software. MG started the interview by explaining the study and describing the preliminary findings by sharing the PowerPoint presentation on the screen. The interviews were audio recorded except on two occasions where field notes had to be used due to technical errors. The interviews lasted between 50 and 70 minutes.

**Data analysis**

The data analysis process was intertwined with the data collection and started immediately after the first research circle and continued throughout the data collection. It resulted in an on-paper prototype based on a) key content features, b) key delivery features, and c) theoretical underpinning. We used transcriptions, audio recordings and field notes in an iterative process. The data analysis process was inspired by qualitative content analysis [27] and intervention mapping technique [28]. Briefly, key features were developed by gathering and synthesizing all data on content and delivery in tables. The features were discussed throughout the process by the study team which led to constant and gradual refinement. Based on the synthesized findings in the tables, we modeled preliminary versions of the on-paper prototype in PowerPoint presentations to make it easy to convey. Due to the iterative and cumulative process of data collection, data analysis and on-paper prototype development, the participants were actively involved in the data analysis. At the third research circle, the participants used and discussed a printed version of the PowerPoint as well as a prototype projected on a large screen. Based on input from the third research circle, we revised and finalized the on-paper prototype (see Figure 1).

**Ethics approval**

Participants in the study were given written and verbal information about the study, and they were informed of their right to decline participation at any time without consequences to their right and access to other social services. Written informed consent was retrieved before data collection started and the Regional Ethical Review Board in Lund approved the study (RF: 2017/658).

**Results**

The analysis resulted in an on-paper prototype of an intervention we call ‘Ageing in the Right Place’. We present ‘Ageing in the Right Place’ by focusing on our description of the core content, important design features and theoretical underpinning. The description follows the Template for Intervention Description and Replication (the TIDieR checklist) [29].

**Ageing in the right place – the content**

The research circle participants identified topics likely to be relevant to most older adults to consider when planning and deciding on housing issues. These topics were the home, the neighborhood, my health (and health of spouse), social network and support, the financial situation, the future, and options for help, support and housing. The participants in the research circles also emphasized that the intervention should be tailored to each individual’s needs and that it should accommodate future users in differing stages of the decision-making process. Thus, we decided to develop three modules reflecting different stages of the decision-making process. The first module -THINK- meet the needs of an older individual who, at the present time, does not wish to make any immediate decisions. The aim of the module is to raise awareness and give the user the possibility to think and reflect on the home and living situation now and in the years to come. The second module – LEARN- meet the needs
of an older individual who has started to think about making changes in the home or started thinking about changing place of living but who lacks sufficient knowledge to make a decision. Thus, the module provides the user with information and knowledge. The third module – ACT - is intended for an older individual who is aware that a change has to be made, has enough information and has decided what to. Via the third module, the users can act on their decisions by getting connected to local construction companies, services companies, retirement organizations, nonprofit organizations, municipal health and social care services, municipal housing options, and governmental recourses.

Each module includes content that is related to the general topics described previously but with different perspectives. We will use the topic ‘the home’ as an example. In the THINK module, the user answers a set of questions to make them think about how well the home suits them now and in the future. In the LEARN module, the user can access knowledge and information on fall hazards, housing adaptations and housing options. The ACT module contains links to help the user get in touch with municipal fall prevention programs, how to apply for a housing adaptation, links to local real estate offices and municipal residential care facilities. See Table 2.

**Ageing in the right Place - Design**

Based on the analysis of early literature reviews and discussions in the research circles, the intervention will be designed as a web application to be used on any device with internet access. A set of core features was decided on. To facilitate reasoning and planning over time, the intervention should include an individual password-protected profile where the user’s data is saved and can be accessed over time. The information in the profile should be possible to print so the user can show their housing data and discuss it with other people (e.g. a real estate agent). It should also be possible to invite trusted individuals (e.g., a friend or family member) to read or get access to the profile remotely.

**Ageing in the right Place - Theoretical underpinning**

We identified a set of theoretical frameworks based on the literature review. The following frameworks guided the development process. First, the Model of Human Occupation which stresses how the individual (e.g., health conditions, habits, values and beliefs), the environment (e.g., the home, neighborhood, social context) and the occupations that are to be performed, all influence the actual occupational performance (doing of tasks) and the satisfaction of the individual. Each domain could be the source of disablement or dissatisfaction, and each domain is potentially modifiable [30]. Adding to that, the Residential Normalcy Model explains that for older adults decision-making on housing could be either a proactive or a reactive coping strategy when...
undesirable changes in health and the social network make it harder to fulfill needs and goals in the home [31]. In addition, the Transtheoretical Model of Health Behavior Change explains decision-making as a process containing stages of raising awareness, gathering information, making decisions and acting on them. The readiness to make a balanced and informed choice grows with each step in the process, each demanding a different kind of information and support [20,21].

**Discussion**

The intervention we have developed will target older adults in all stages of the decision-making process, and it is unique in that it includes those who are not actively intending to take action at the present time. Older adults in pre-contemplation and contemplation stages when it comes to preparing for later life are the most difficult to reach but they may also benefit the most from the intervention [14,20,21]. Raising awareness is a vital step towards actively planning and preparing. Considering the long timespans involved, and the complexity of housing decision-making in later life [11,32], it is crucial that older adults become aware well before ageing in place becomes difficult. On this point, the participants emphasized the need to target younger older adults. Questions on potential future scenarios were considered particularly illuminating, and they were added to the THINK module.

The participants appreciated that the housing counselling included both ageing in place and relocation issues. To only provide relocation services would narrow the focus and may not garner the interest of older adults who are not ready to consider relocation. For older adults who want to stay in their current dwelling, the counselling intervention could provide knowledge and tools to prepare and adjust the home and making it as age-friendly as possible. Even if several ageing-in-place services such as technical aids, housing adaptations and preventive home visits are provided by Swedish municipalities, the participants of the study stated that it was challenging to obtain relevant information and an overview of existing services. They also indicated they lacked knowledge on how to make minor adaptions on their own, as part of home renovation or remodeling. For example, avoiding fall hazards can be done at a low cost by improving lightning, rearranging furniture or by installing grab bars [33], but the knowhow is lacking.

A housing counselling intervention that improves the fit between the older adult and the living environment can potentially improve the individuals’ situation in a range of ways. Improved capacity to perform ADL, reduced loneliness and risk of falls, improved agency and quality of life. Furthermore, supporting ageing in place, i.e. a self-chosen dwelling on the regular housing market could reduce or postpone the need for skilled nursing facilities [17,19]. Thus, in order to evaluate the effects of a counselling intervention, the outcomes that best capture effects need to be further elaborated and tested.

The relative cost of a web-based intervention, once it has been developed, is likely to be relatively low compared to interventions delivered by staff. However, the exact mode of delivery will be subject to future research. The participants expressed doubt about a stand-alone web-based intervention. Even if the percentage of older adults in Sweden with internet access and smartphones is increasing rapidly, 42% of adults 76 years and older are still non-users [34]. The participants discussed both individual use, housing counselling in groups, and individual counselling by a municipal employee. Therefore, the question of how to deliver the intervention needs to be further elaborated and tested.

User involvement is common and instrumental in web application development, especially for usability testing. Recently, user involvement in early phases of the design and research process has gained increased attention (see, e.g., [www.create-center.org](http://www.create-center.org)). The research circle methodology has previously been described by Härnsten et al. [25] and used in housing studies for later life [26]. The methodology was central to the development of the prototype. The methods used formed an iterative process during which the knowledge base could be expanded from the initial review of the scientific literature and existing services over the research circles, technology and design panels and the dialog with representatives of companies and nonprofit organizations. Discussion guides were not predefined but developed subsequently based on the new knowledge gained over time and the emerging results, thus ensuring that the prototype was developed in co-creation between potential users, expert representatives and researchers. It is likely that obtaining feedback from potential end-users as well as user experience directly during the sessions helped us speed up the process of making the intervention relevant and meaningful for potential end-users. That
older adults are usually eager to share and contribute to research in this format [35] was evident in our study too. The participants shared personal experiences, thoughts and emotions about the topic and their living situation. They also represented older adults in general by sharing opinions they had heard from other older adults. Even if we did not ask for it, the participants discussed the topic with other older adults and asked for input that they brought to the following session. They also brought valuable input from senior citizen meetings that they attended and from previous work experience.

The next step of intervention development will be to convert the on-paper prototype to a web-based version and continue with usability tests. Then a feasibility test will be carried out, including tests of different forms of delivery. The participants of the research circle can, if they want, remain as an advisory group. It is likely that the feasibility tests will result in changes to the content, design and mode of delivery [23,36].

The study has some limitations. First, the participants of the research circle all came from the same municipality. Starting with a single test-municipality was a deliberate decision, but the input from the group does not represent older adults in general. Further, to be included, the participants needed to have internet and computer experience. For future development, input from older adults with minimal computer and smartphone experience is needed, as well as considerations on how to make the intervention accessible to older adults who do not have access to the internet.

Services for planning and preparing future housing needs have the potential to increase older adults’ well-being at home as well as reduce costs for care and housing provision by the municipalities. This study is a first step towards developing an evidence-based intervention relevant to older adults at varying age and in all stages of readiness to plan and prepare for later life.

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Disclosure statement

All authors declare that they have no competing interests.

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Data availability

The data supporting the findings can be accessed by contacting the first author.

References


