THEORY-INFORMED QUALITATIVE STUDY ON THE CO-DEVELOPMENT OF A DIGITAL NURSING INTERVENTION FOR HEALTHY AGEING

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ABSTRACT

Increased longevity should be seen as a societal benefit, bringing health, social, economic, and political gains. This study aims to explore the perspectives of key stakeholders — individuals over the age of 55, nurses, and policymakers — to develop a nursing intervention, supported by digital resources, that promotes active and healthy ageing. A descriptive exploratory study with a qualitative design was conducted. This theory-informed study applied Nola Pender's Health Promotion Model to guide both data collection and analysis, ensuring alignment with key behavioural constructs for health promotion in older adults. Data were collected through semi-structured interviews and focus groups held between January and March 2024. Data were analysed using Bardin's content analysis method and ATLAS.ti software. The analysis identified several categories and subcategories, highlighting the importance of biopsychosocial aspects in maintaining quality of life. Participants stressed the need for continuous involvement in activities and viewed ageing as a lifelong process. Key challenges included social isolation, limited access to services, and health conditions. They also highlighted the value of personalised nursing interventions supported by digital resources, noting their role in fostering health self-management and promoting healthy lifestyles. This study highlights the importance of developing multidimensional nursing interventions tailored to the specific needs of older adults. These interventions should consider older people's social, environmental, and cultural contexts. Digital resources can facilitate individualised monitoring, promote adherence to healthy behaviours, and ultimately improve the quality of life of older people. Incorporating the perspectives of different stakeholders during the development phase is essential to ensure the relevance and sustainability of these interventions.

Keywords
Healthy ageing; Health Promotion; Digital Health; Quality of Life; Stakeholders.

1. Introduction

Increased longevity should be seen as a benefit for modern societies, bringing health, social, economic, and political gains. According to the World Health Organization (WHO) and the Organisation for Economic Co-operation and Development (OECD), the number of people aged over 60 years is expected to reach two billion by 2050 (OECD/WHO, 2020). This demographic shift will pose major challenges for health systems and societies, particularly in promoting health and healthy lifestyles to prevent not only health crises but also social and economic crises (Swift & Steeden, 2020).

In this context, the development of interventions to promote active and healthy ageing is a key strategy to support health promotion and disease prevention throughout the life course, contributing to more inclusive and equitable societies (WHO, 2020).

In 2020, the WHO reaffirmed the importance of healthy ageing — a paradigm shaped by numerous concepts that have emerged in recent decades, including active ageing (WHO, 2002), successful ageing (Rowe and Kahn, 1997; Baltes & Baltes, 1990), positive ageing, and productive ageing (Baltes & Montana, 1996). Despite their differences, these concepts and approaches share a common understanding of ageing as a multidimensional, lifelong process (WHO, 2020). Equally important is the promotion of individual empowerment, enabling people to become active participants in their own health (Swift & Steeden, 2020; Ayoubi-Mahani et al., 2023).

Although these approaches to ageing have informed clinical practice and public policy development, they remain underutilised in practice, particularly in the design of interventions, potentially due to low levels of adherence and engagement of different stakeholders (Dev et al., 2020). Specifically, the lack of inclusion of the subjective views of older people, policymakers, and health professionals, such as nurses, can hinder their adoption (Wongsala, Anbäcken, & Rosendahl, 2021; Frishammar et al., 2023). From this perspective, exploring the views of different stakeholders on active and healthy ageing can provide valuable insights into how the concept is understood and support the development and implementation of interventions that better align with the needs, preferences, and capabilities of the older population.

In recent years, several digital health solutions have been developed to support the management of chronic health conditions (Ienca et al., 2021). Some of these digital resources are designed to assist individuals with cognitive or physical tasks (Tsai et al., 2024; Stuart et al., 2023). Research also suggests that interventions using digital resources can reduce loneliness and promote social interaction among older people (Lu et al., 2024; Costa et al., 2023).

However, several gaps remain, such as low adherence to and limited use of interventions, often related to the lack of stakeholder involvement and a lack of attention to the social context. In addition to addressing individual needs, factors such as socioeconomic inequalities play a significant role in the adherence to and sustainability of interventions (Moll et al., 2023; Pender et al., 2015). In other words, these interventions must be tailored not only to individual needs but also to the social, environmental, and cultural contexts in which people live.

According to Ayoubi-Mahani et al. (2023), meeting individual needs alone may be insufficient to address the complexity of older adults' health needs. It is therefore essential to consider their social, environmental, and cultural networks.

In response to this need, and using Nola Pender's Health Promotion Model (2015), the development of interventions should, whenever possible, take into account personal, social, and environmental factors to promote healthy behaviours and, in turn, healthier and more active ageing.

Given the goal of developing a nursing intervention that incorporates digital resources to promote active and healthy ageing among individuals over the age of 55, it is essential to explore stakeholder perspectives based on a solid theoretical foundation. To this end, the study is theory-informed by Nola Pender's Health Promotion Model (2015), which offers a multidimensional framework for understanding how individual characteristics, perceived benefits and barriers, interpersonal influences, and commitment to action affect health-promoting behaviors in older adults. This approach enables the creation of interventions that are not only responsive to the needs of the older population but also attentive to the social, environmental, and cultural contexts in which they live and that influence their ability to adopt and maintain healthy behaviors.

Therefore, this study aims to explore the perspectives of key stakeholders — individuals over the age of 55, nurses, and policymakers — to develop a nursing intervention, supported by digital resources, that promotes active and healthy ageing. Incorporating these perspectives enables the development of an intervention that not only addresses the physical and mental health needs of individuals but also recognises the significance of social support networks, community networks, and environmental factors that can impact active and healthy ageing. Co-developing an intervention with stakeholders is likely to improve quality of life and promote more meaningful experiences of active and healthy ageing among older people.

2. Methodology

This is a descriptive, exploratory study with a qualitative design that uses the Medical Research Council (MRC) framework for developing and evaluating complex interventions (Skivington et al., 2021). To reinforce its methodological rigour, the study integrates a theory-informed approach based on Nola Pender's Health Promotion Model. This model guided both the design and the analytical phases of the study, allowing for a structured interpretation of health behaviors in older adults. Its core constructs—such as perceived self-efficacy, interpersonal and situational influences, and commitment to health-promoting action—provided a conceptual foundation for exploring the views of key stakeholders and for structuring the data collection and analysis.

This study corresponds to Phase I – *Development* – of a broader project entitled *AtiVida*, which aims to design and implement a nursing intervention using digital resources to promote active and healthy ageing in people over 55 years of age.

The intervention is being developed in stages in accordance with MRC guidelines (Skivington et al., 2021), beginning with an exploratory phase that integrates stakeholder perspectives to ensure the contextual relevance, acceptability, and feasibility of the proposed intervention.

This study was approved by the Ethics Committee of the Health Sciences Research Unit: Nursing, based at the Nursing School of Coimbra (Opinion no. P975_10_2023), and was conducted in accordance with the Declaration of Helsinki (2013) and applicable data protection regulations. The Consolidated criteria for Reporting Qualitative research (COREQ) checklist was used for reporting purposes (Tong, Sainsbury, & Craig, 2007).

2.1 Participants

Given that this research design requires information from individuals with specialised knowledge on the subject and who agree to collaborate (Günther, 2006), a purposive sampling strategy was adopted to recruit participants. Specifically, policymakers (P) were selected based on their professional roles in health policies and the promotion of active and healthy ageing within three municipalities in the central region of Portugal and in the Centre Regional Coordination and Development Commission. Participants over the age of 55 were all enrolled in Senior Universities located in the Central region of Portugal (OH; T; AP). Nurses (N) worked in community settings in the Central region of Portugal.

2.2 Data collection

Data were collected through semi-structured interviews for the P and N groups. For the OH, T, and AP groups, three focus groups were carried out. The interviews and focus groups took place between January and March 2024, following a script developed for this purpose. The script was first reviewed by two experts with experience in qualitative research and tested in a pilot interview. Based on this pre-test, minor adjustments were made to improve the clarity of the questions and their alignment with the study's objectives. All interviews were recorded for later transcription, and data collection continued until data saturation was reached (Guest, Namey & Mitchell, 2013).

To ensure consistency and methodological rigor in the data collection process, distinct yet complementary strategies were adopted for conducting interviews and focus groups. Individual interviews were held with nurses and policymakers to facilitate a deeper, more reflective exploration of personal experiences and professional insights, offering both privacy and flexibility for expressing sensitive or context-specific information. On the other hand, focus groups were conducted with older adults to promote group interaction and collective reflection, fostering richer discussions based on shared experiences.

Each interview and focus groups followed a structured yet flexible interview guide based on Pender's Health Promotion Model. The same core questions were used across both techniques, with linguistic and contextual adaptations tailored to each group.

All sessions were conducted by trained researchers following standardised procedures: an initial introduction and informed consent, clarification of the study's purpose, audio recording, and debriefing. A field log was used in all sessions to register non-verbal cues and contextual information. After transcription, a cross-checking process was carried out to compare and triangulate the themes emerging from both data sources, enhancing the depth and credibility of the findings.

The data collection guide was divided into two parts: the first focused on sociodemographic characteristics, and the second on questions related to the study's objectives and based on Nola Pender's Health Promotion Model (Table 1).

Table 1. Semi-structured interview guide.

	Questions
1.	What does 'active and healthy ageing' mean to you?
2.	What challenges do individuals over the age of 55 face in maintaining an active and healthy life?
3.	What are the benefits of implementing a nursing intervention that uses a digital resource to promote active and healthy ageing among people over the age of 55?
4.	How can we ensure the sustainability of the intervention?

2.3 Data analysis

Content analysis was conducted following Bardin's method (2020) and using the ATLAS.ti software.

Coding was performed by two independent researchers with experience in qualitative research. A deductive-inductive approach was used to identify categories and subcategories. Initially, a coding framework was developed based on the dimensions of Nola Pender's Health Promotion Model (2015), providing a theoretical foundation to organise the data.

As the analysis progressed, new subcategories and thematic elements that were not anticipated emerged from the data and were incorporated into the framework. This inductive component ensured that the full richness and diversity of the participants' perspectives were captured beyond the initial theoretical structure.

The two researchers independently coded a sample of transcripts and then met to compare and discuss their coding, reaching consensus on the final structure. A third researcher, external to the coding process, reviewed the framework to ensure clarity and coherence. This triangulation reinforced the reliability and confirmability of the findings.

To enhance credibility, member checking was conducted with two participants, who reviewed and validated the interpretation of the data. In line with the criteria of trustworthiness proposed by Lincoln and Guba (1985), the study ensured credibility, reliability, confirmability, and transferability. Detailed descriptions of the study context, participants, and methods contributed to reliability. Confirmability was supported by external validation of the results. Transferability was addressed through comparisons with other studies and the inclusion of participants from diverse municipalities. To minimise bias, the researchers had no prior relationships with participants, and all steps of the research process were documented to ensure transparency and promote reflexivity.

The analysis was structured around the main stakeholder groups—policymakers, nurses, and older adults—allowing the identification of both shared and group-specific perspectives on active and healthy ageing. The coding matrix in ATLAS.ti was organised to reflect these group distinctions, enabling cross-group analysis and interpretation. This approach allowed for a deeper understanding of each group's unique contribution to the development of the intervention and facilitated the identification of patterns that were either consistent or divergent across social roles. These analytical decisions were aligned with the overall aim of the *Ativida* project: to integrate multi-stakeholder perspectives from the early development phase of a complex, person-centred intervention.

3. Results

The sociodemographic characteristics of the study participants are shown in Table 2.

Table 2. Sociodemographic characteristics of participants

Characteristic	OH; T; AP (*N*=25)	P (*N*=8)	E (*N*=8)
Gender			
Female	20 (80%)	6 (75%)	4 (50%)
Male	5 (20%)	2 (25%)	4 (50%)
Age			
30-49	-	5 (62.5%)	4 (50%)
50-59	-	2 (25%)	2 (25%)
60-79	25 (100%)	1 (12.5%)	2 (25%)
Education level			
Up to Elementary School	10 (40%)	-	-
High School	3 (12%)	-	-
Technical/Vocational Education	2 (8%)	-	-
Bachelor's Degree	12 (48%)	7 (87.5%)	3 (37.5%)
Master's/Doctorate Degree	-	1 (12.5%)	5 (62.5%)
Current Occupation			
Retired	24 (96%)	-	-
Doctor	1 (4%)	-	-
Service Coordinator/Councilman/Vice President	-	8 (100%)	-
Internet Access and Use			
Regular Internet access (Yes)	23 (92%)	-	-
Frequency of use (Daily)	11 (44%)	-	-
Frequency of use (Weekly)	7 (28%)	-	-
Frequency of use (Rarely/Never)	7 (28%)	-	-
Ability to use digital resources (Sufficient or higher)	23 (92%)	-	-
Participation in Active and Healthy Ageing interventions			
Participation (Yes)	11 (44%)	-	-
The employer develops initiatives (Yes)	-	8 (100%)	7 (87.5%)

Based on the analysis of the focus group data, categories and subcategories were identified, as illustrated in Figure 1.

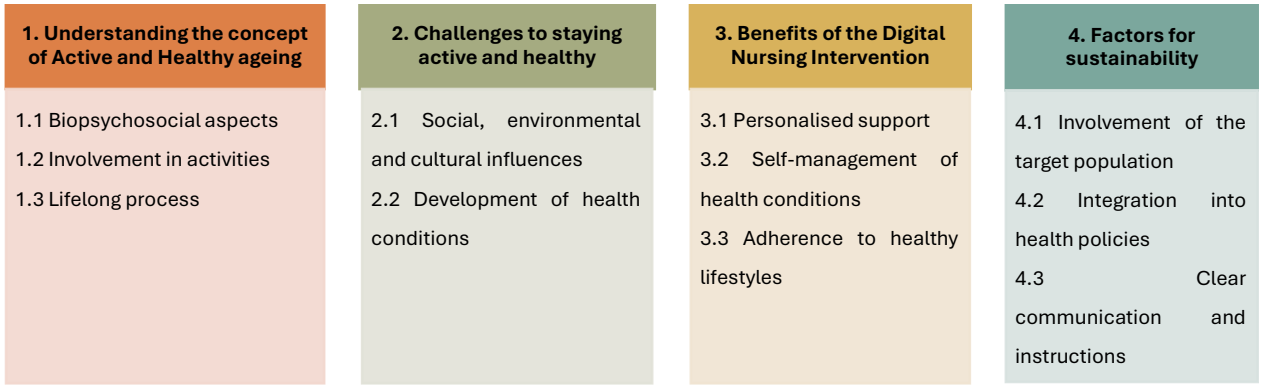

Figure 1. Categories and subcategories of interviews/focus groups.

The analysis of categories and subcategories revealed that participants understand active and healthy ageing as the promotion of biopsychosocial aspects—physical, mental, and social—which they consider essential to maintaining quality of life (1.1 Biopsychosocial aspects*): "Promoting well-being from a biopsychosocial perspective, across all aspects of the human being."* **P1**; *"I think it's about ageing in a healthy way, maintaining our cognitive and physical abilities and continuing to socialise."* **OH4.**

Promoting active participation in society, particularly through the involvement in recreational and civic activities, was also identified as a fundamental aspect (1.2 Involvement in activities): *"It means giving people equal rights and responsibilities, regardless of age, to participate in society."* **P2**; *"It involves the active participation of older people, valuing their knowledge and skills."* **N4**; *"I think that after retirement we need to stay active. Of course, it won't be professionally, but it can still be intellectually, for example."* **OH5.**

They also emphasized that living healthily involves staying active and continually seeking to develop new skills and knowledge throughout life (1.3 lifelong process): *"Active ageing really starts from birth, in a way. But we also need to prepare for ageing throughout our entire lives."* **P7**; *"It's about accepting that ageing is a privilege that we get to experience over time while enjoying life, making the most of what we love, and put it into practice."* **OH4.**

Regarding the challenges to staying active and healthy, participants highlighted the influence of social, environmental, and cultural factors, particularly isolation, which they identified as one of the most significant challenges (2.1 Social, environmental and cultural influences): *"Isolation is real, it exists in the city centre, and one thing I've really tried to fight against is the issue of invisibility."* **P2**.

This isolation is often linked to the lack of family and community support, with a negative impact on quality of life: *"Sons might stop by once a day, for maybe an hour, because they simply can't do more... and they don't always prioritize being present with their parents, if they just dedicated that time to truly being with them."* **N1.**

They also point to demographic challenges and limited access to adequate services as factors affecting healthy ageing, noting that in some areas, difficult accessibility and limited resources further exacerbate these issues: *"The central region, like the rest of the country, is facing serious demographic challenges in terms of ageing; we have an increasingly ageing population."* **P3**.

They also mentioned the stigma surrounding the civic participation of women and retired individuals, who are often perceived as less useful or capable: *"It's like this: when we retire, it hits hard. You feel lost, like you're no longer useful. We're pushed aside, we're no longer needed professionally."* **OH8.**

The development of health conditions was also mentioned as a challenge (2.2 Development of health conditions), with participants recognising the importance of maintaining healthy habits to prevent health deterioration and dependence: *"As for health, we know perfectly well that just because we live longer doesn't mean we live well."* **P1**; *"I don't have any illnesses, I'm healthy, but I also take care of myself. I always avoid the sofa and being idle."* **AP7**.

Regarding the benefits of digital nursing interventions, they mentioned that the use of digital resources could be beneficial if adapted to individual needs through personalised monitoring (3.1 Personalised support): *"It's essential to incorporate the needs of older people into the tool. These interventions can also help to better monitor older people and respond to their needs."* **P3**; *"Digital interventions adapted to the needs of older people are an excellent added value."* **N4**; *"...aligned with the preferences and desires of the person using it."* **OH4**.

Moreover, they noted that digital interventions can facilitate access to information and services, as well as support more effective health monitoring and management (3.2 self-management of health conditions).

"It is a response not only to health itself, but also to managing and controlling health conditions." **P1**; *"For example, it can help monitoring health."* **AP5**.

Finally, in terms of benefits, they mentioned that these interventions can contribute to a healthier and more active life (3.3 Adherence to healthy lifestyles): *"It seems like a good way to promote physical activity and cognitive stimulation exercises."* **N1**; *"I think it can also help us stay healthier and create healthier habits...."* **OH7.**

With respect to sustainability, participants believe the importance of incorporating the perspectives and needs of the target population during the development of these interventions to ensure their effectiveness and adherence (4.1 Involvement of the target population): *"Digital interventions can be very helpful if caregivers, who are often younger and more tech-savvy, are included in the process."* **N6**; *"Maybe if I was more involved in the process, that is, if the person doing it actually came to me, like you're doing now."* **T4**.

They also emphasized that digital interventions integrated with parish councils could help keep individuals active and improve accessibility for more isolated people (4.2 Integration into health policies): *"It could be a great tool for everyone to access and use in their own home, which is very much in line with public policies that promote active ageing."* **P4**

Moreover, simple and accessible digital resources are essential to ensure that older adults can fully benefit from these resources (4.3 Clear communication and instructions): "*They need to be user-friendly, with simple features that support learning and monitoring. I believe that it can help."* **P7**; *"But I think they benefit us if they are easy to use and not too complicated."* **OH4**.

The full structure of categories and subcategories, along with Coding units, is presented in Appendix A.

The data reveal how stakeholders conceptualise active and healthy ageing through a multidimensional lens that includes individual, interpersonal, and structural dimensions. Participants emphasized the importance of autonomy, continuity of purpose, and social connectedness, suggesting that ageing is not perceived as a passive stage of decline but rather as an ongoing process of adaptation, learning, and identity redefinition.

Interpreting these narratives through Nola Pender's Health Promotion Model offers valuable insights into how key behavioural determinants—such as perceived self-efficacy, interpersonal influences, situational factors, and perceived barriers and benefits—influence stakeholders' engagement in health-promoting behaviours.

For example, the recognition of ageing as a lifelong process and the focus on participation in meaningful activities reflect a commitment to a plan of action and a positive affect toward behaviour, both central constructs in Pender's model. Simultaneously, references to stigma, lack of services, and digital exclusion highlight situational influences that may hinder engagement, particularly among older adults.

These findings support the need for a theory-informed, stakeholder-driven intervention that considers not only individual motivation but also the social and environmental enablers of behavioural change.

Table 3 shows the frequency with which each subcategory was identified in the corpus of each group of participants.

Table 3. Frequency of subcategories.

	P	E	OH; T; AP	Score
1.1 Biopsychosocial aspects	3	6	16	25
1.2 Involvement in activities	8	7	**23**	38
1.3 Lifelong process	9	6	16	31
2.1 Social, environmental, and cultural influences	**17**	**20**	15	52
2.2 Development of health conditions	13	6	12	31
3.1 Personalised support	13	10	15	38
3.2 Self-management of health conditions	4	5	10	19
3.3 Adherence to healthy lifestyles	7	5	11	23
4.1 Involvement of the target population	4	5	10	19
4.2 Integration into health policies	4		12	16
4.3 Clear communication and instructions	4			4
Score	86	70	140	296

Policymakers recognised active and healthy ageing as a lifelong process, placing particular emphasis on the importance of continuous learning and actively participation in the community, regardless of age. In relation to individuals over the age of 55, there was a significant emphasis on the involvement in activities as a key factor in staying active and healthy.

Nurses addressed the three subcategories equally, highlighting that active and healthy ageing is a lifelong process grounded in physical, mental, and social dimensions, and supported by an active involvement in community activities. Regarding the challenges faced by individuals over the age of 55 to stay active and healthy, all three participant groups consistently highlighted social, environmental, and cultural influences. Participants mentioned isolation, accessibility, and ageism, as well as the onset of conditions commonly associated with ageing.

Regarding the benefits of digital interventions, participants mentioned the advantage of personalised support. As factors for sustainability, they stressed the importance of involving the target population in the development process and ensuring that the interventions are designed with clear communication and instructions.

4. Discussion

Participants approached active and healthy ageing as a multidimensional concept, integrating physical, mental, and social aspects. Nola Pender's Health Promotion Model (2015) also highlights the need to address these multiple aspects. Physical health can be maintained through regular activities, while mental health is promoted through cognitive stimulation (Delle Fave et al., 2018). Social interactions, in turn, are essential to reduce isolation and promote a sense of community and belonging (Wongsala, Anbäcken, & Rosendahl, 2021).

These findings are in line with Nola Pender's Health Promotion Model, which conceptualises health-promoting behaviour as the result of a complex interplay between individual characteristics, prior behaviour, perceived benefits and barriers, and both interpersonal and situational influences. The participants' emphasis on social interaction, autonomy, and mental stimulation reflects core constructs of the model, such as perceived self-efficacy, positive affect toward a behaviour, and interpersonal influences.

Engaging in activities plays an essential role in promoting the health and well-being of older adults. This view was strongly emphasized by participants, who considered participation in several activities to be fundamental to active and healthy ageing. Empirical research reinforces this perspective, emphasising the importance of activity involvement for health promotion among older adults. Studies by Niechcial et al. (2023) and Dare et al. (2018) report that older people who regularly participate in physical and social activities have better physical and mental health compared to those who are less active.

Participants viewed ageing as an ongoing process, which aligns with the literature that emphasizes the importance of lifelong learning and active participation. Research by Thang, Lim, and Tan (2019) and Pinzón-Pulido et al. (2019) indicate that continuous learning and participation in community activities are essential to maintaining older adults' mental health and social well-being. This perspective reinforces the idea that ageing should not be seen as a period of decline, but rather as a phase for continued development and acquisition of new skills. The idea that ageing involves continuous learning and meaningful engagement reflects participants' internal motivation and planning, corresponding to what Pender defines as a *commitment to a plan of action*. This view toward future-oriented behaviours indicates that participants see themselves as active agents in their own ageing process, rather than passive recipients of care.

The promotion of active and healthy ageing must be a lifelong approach, which begins early in life and is shaped by multiple determinants, including access to health services, socioeconomic factors, the physical environment (place of residence and living conditions), and the social environment (formal and informal support networks), all within the cultural context of individuals (Ayoubi-Mahani et al., 2023; Rodrigues et al., 2023). These aspects were mentioned by the participants in this study, who expressed concerns about social, environmental, and cultural influences. This finding aligns with the literature, which highlights the impact of isolation and accessibility on the health of older adults.

In this context, social isolation is recognised as a significant risk factor for both cognitive and physical decline (O'Rourke, Collins, & Sidani, 2018). Therefore, interventions that encourage social interaction can help mitigate these negative effects (Lu et al., 2024).

Another important aspect mentioned by the participants is the lack of accessibility to services and activities, which can prevent older adults from fully participating in community life. Improving accessibility is central to promoting social inclusion and well-being (Rodrigues et al., 2023; O'Rourke, Collins, & Sidani, 2018; Hong et al., 2021). These contextual factors reflect what Pender identifies as *situational influences*—conditions that can either facilitate or hinder the adoption of health-promoting behaviours. In this study, barriers such as digital exclusion, limited transport, and lack of adapted services were seen as obstacles that can reduce the perceived feasibility of acting on personal motivation, reinforcing the importance of addressing structural conditions in intervention design.

The results of this study suggest the need for personalised interventions that respond to the different needs and contexts of older adults. Participants emphasized the value of personalised monitoring, which can be efficiently implemented through digital resources. Technologies such as health apps and telemedicine platforms can provide continuous monitoring and individualised support, adapting to each older person's specific needs (Stuart et al., 2023; Hong et al., 2021). These resources allow for closer monitoring and timely intervention when necessary, improving the quality of care and increasing older adults' satisfaction with the services they receive (Lu et al., 2024; Ienca et al., 2021; Hong et al., 2021). According to the study participants, personalised interventions, especially those supported by digital resources, are fundamental strategies to meet the diverse needs of this population.

Empowering older adults and actively involving them in the development of nursing interventions can significantly improve adherence to these interventions. When older people are provided with training, they acquire the skills and abilities necessary to self-manage their health and well-being, which increases adherence to healthy behaviours (Moll et al., 2023; Pender et al., 2015). Furthermore, their active involvement in the design and implementation of interventions ensures that their specific needs and preferences are met, making interventions more relevant and acceptable (Ayoubi-Mahani et al., 2023; Ienca et al., 2021; Pinzón-Pulido et al., 2019). Empowerment is closely linked to perceived self-efficacy, a core concept in Pender's model, which posits that individuals are more likely to adopt and maintain health-promoting behaviours when they believe in their own capacity to act effectively. The participants' emphasis on being heard and involved suggests that interventions grounded in empowerment principles are likely to achieve greater adherence and relevance.

The results of this study demonstrate that involvement in physical, cognitive, and social activities; viewing ageing as a continuous process; and acknowledging social, environmental, and cultural influences are fundamental to promoting the health and well-being of older adults. A multidimensional approach to ageing, combined with the empowerment of older people to actively participate in the development of interventions, emerge as relevant strategies.

The needs of older people can vary significantly across different contexts due to specific social, economic, and environmental factors. Therefore, incorporating different perspectives is essential to understand how these social, environmental, and cultural variables influence active and healthy ageing. Studies that consider these variables can provide a more comprehensive and inclusive view, supporting the development of nursing interventions that are sustainable across different contexts.

The exploration of the use of digital resources in promoting the health of older adults is a research area that warrants ongoing analysis. Future studies should focus on long-term evaluations and adopt multicultural approaches to support the development of more sustainable and inclusive interventions for active and healthy ageing. These recommendations aim to ensure that interventions not only respond to the current needs of older people but are also adaptable to future demographic and technological changes, thus promoting active and healthy ageing for all populations.

The relatively small sample size and the use of purposive sampling are potential limitations of this study. However, the primary aim of qualitative research is to explore meaning rather than to generalise findings. Thus, a small sample size is appropriate, provided that the sampling strategy captures a variety of perspectives (Liamputtong, 2009). In this study, efforts were made to include participants from different municipalities in Portugal.

5. Final considerations

The participants identified the promotion of biopsychosocial aspects as essential to maintain quality of life. The involvement in activities and the view of ageing as a continuous process were other aspects considered to be essential for promoting active and healthy ageing. Regarding the challenges experienced throughout the life cycle, they mentioned social isolation, limited access to services, and the onset of health conditions.

To overcome these challenges and promote healthier longevity, the development of personalised nursing interventions that respond to the specific needs of older people is essential, taking into account their social, environmental, and cultural contexts. Digital resources, in particular, provide more opportunities for individualised monitoring and continuous follow-up, facilitating adherence to healthier behaviours and improving older people's quality of life.

This study highlights the importance of personalised and multidimensional approaches in developing interventions that promote active and healthy ageing. Incorporating the perspectives of different stakeholders in the development of these interventions is essential to ensure their relevance and sustainability.

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Ethical Approval: Ethical approval was obtained from Ethics Committee of the Health Sciences Research Unit: Nursing, based at the Nursing School of Coimbra (Opinion no. P975_10_2023).

Informed Consent: Informed consent was obtained from all participants involved in the study, ensuring respect for confidentiality and voluntariness principles.

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Appendix A. Coding units corresponding to each subcategory and participant group

Category	Subcategory	Stakeholders		
		Policymakers (P)	**Nurses (N)**	**Senior Universities (OH; T; AP)**
Understanding the concept of Active and Healthy Ageing	**Biopsychosocial aspects**	Promoting well-being from a biopsychosocial perspective, across all aspects of the human being. **P1** It means ageing with the best possible quality of life, both cognitively and physically, while preserving each person's abilities... **P8**	It's important to make the most of all their abilities, both physical and intellectual. **N4** Maintaining good physical, mental, and social condition. **N7** It involves a holistic approach that considers physical, mental, and social well-being. **N8**	I think it's about ageing in a healthy way, maintaining our cognitive and physical abilities and continuing to socialise. **OH4** We need to stay active, not just physically, but mentally and socially too. **AP5** Keeping ourselves engaged — physically, mentally and socially. **T3**
	Involvement in activities	It's about people participating in society in a more active way, for example, through civic actions, senior employment, and anything that helps foster a stronger sense of belonging to society. **P1** It means giving people equal rights and responsibilities, regardless of age, to participate in society. **P2** The person is able to carry out activities that are ultimately healthy. **P3**	It involves the active participation of older people, valuing their knowledge and skills. **N4** It is a state where older people can maintain their independence and autonomy, while feeling valued and integrated into the community. **N6** It's about creating opportunities for older adults to keep contributing to the community and to enjoy a good quality of life. **N8**	Reading, writing, participating, traveling. **OH1** I think that after retirement we need to stay active. Of course, it won't be professionally, but it can still be intellectually, for example. **OH5** For me, it's about always staying active, even if sometimes that's not physically possible. But we push through that: we participate, go to the gym, take walks, discover new things. **OH7** It's about being active, always on the move, always looking for the bright side of life. **T4** I'm involved in several activities, and I feel that they motivate me to get out of the house. It's not a strict obligation, but more of a moral commitment to maintain them. That way, I stay physically active and avoid being alone. **AP6**
	Lifelong process	It's important that we al, particularly younger people reflect, about how they want to age and put these strategies in place for today's older people. **P5** Active ageing really starts from birth, in a way. But we also need to prepare for ageing throughout our entire lives. **P7**	The involvement of older people is very important, because they have a lot of knowledge and skills that must be shared with everyone, including younger generations. This helps build awareness that we must prepare for ageing from an early age. **N2** It involves a personalised approach that recognises and values older people's life experiences as something continuous and constant. **N5**	It's about accepting that ageing is a privilege that we get to experience over time while enjoying life, making the most of what we love, and put it into practice. **OH4** Age is a just number. Some people turn 60,70, or 80 and think they don't have much time left. I think we shouldn't see it that way. **T4** There's a culture out there that goes against a Chinese proverb I really believe in: Give a man a fish and you feed him for a day. Teach a man to fish and you feed him for a lifetime. I think we shouldn't do everything for people; we should encourage them to do things for themselves and keep learning, regardless of age, because learning never ends... **AP5**

Category	Subcategory	Stakeholders		
		Policymakers (P)	**Nurses (N)**	**Senior Universities (OH; T; AP)**
Challenges to staying active and healthy	**Social, environmental, and cultural influences**	This cultural issue is still marked by the experience of widowhood. For example, I believe that, even in more civic space, women still face a degree of stigma. Typically, civic participation at older ages is more associated with men. **P1** Isolation is real, it exists in the city centre, and one thing I've really tried to fight against is the issue of invisibility. **P2** The central region, like the rest of the country, is facing serious demographic challenges in terms of ageing; we have an increasingly ageing population. **P3** Out here in the countryside, despite everything, some tools are actually easier to access than in a larger city. **P8**	Sons might stop by once a day, for maybe an hour, because they simply can't do more... and they don't always prioritize being present with their parents, if they just dedicated that time to truly being with them. **N1** If the caregiver is available, but there are many people who live in solitude. **N2** The lack of community-based interventions and initiatives that promote active ageing is a challenge. **N7**	It's like this: when we retire, it hits hard. You feel lost, like you're no longer useful. We're pushed aside, we're no longer needed professionally. **OH8** In my generation, a lot of people live isolated. They have no one. **T4** When we retire, there's a tendency to isolate ourselves, and our active life ends. I stopped working at 60 and suddenly had two companions: the sofa and the television. I'd watch movies late into the night, sleep in until lunchtime, start drink, and eat lunch and dinner together. Until one day I decided to stop and had help from some friends... **AP5**
	Development of health conditions	As for health, we know perfectly well that just because we live longer doesn't mean we live well. **P1** There's a gap in health conditions, both physical and cognitive, because we're already seeing cases of people showing early signs of cognitive ageing. **P2**		Therefore, it's about growing old without getting sick, with better health and more comfort. **T1** I unfortunately have some health problems, and that's something I struggle with... **T3** I don't have any illnesses, I'm healthy, but I also take care of myself. I always avoid the sofa and being idle. **AP7**
	Personalised support	For older people who mostly live alone or lack enough support, they can provide a lot of support, depending on their needs. **P1** For people who don't have easy access and are unable to travel, having these resources at home is a real advantage. **P2** It's essential to incorporate the needs of older people into the tool. These interventions can also help to better monitor older people and respond to their needs. **P3**	Digital interventions adapted to the needs of older people are an excellent added value. **N4** They can create an effective link, ensuring that older people do not become isolated. **N6** They can offer a variety of activities and resources that older adults can use at their own pace. **N8**	The great advantage of new technologies is that they offer resources tailored to our interests and help us, unlike television, for example**. OH5** ...aligned with the preferences and desires of the person using it. **OH4** I think it has benefits and is quite useful. **T1** Regarding technologies, I really appreciate one feature: they allow me to choose what I want to do. **AP5**

Category	Subcategory	Stakeholders		
		Policymakers (P)	**Nurses (N)**	**Senior Universities (OH; T; AP)**
Benefits of the Digital Nursing Intervention	**Self-management of health conditions**	It is a response not only to health itself, but also to managing and controlling health conditions. **P1** These interventions may also allow for better monitoring of individuals and the identification of potential health needs and conditions**. P2**	I remember, for example, that it can be used to support the monitoring and control of some health conditions, for example, everything is recorded, which can help manage things more easily. **N2** With support from younger family members and improved digital literacy, these interventions can be extremely beneficial, especially for monitoring and self-managing health conditions. **N5** It encompasses the idea of healthy ageing. **N7**	I think that digital resources help overcome obstacles and difficulties more easily. For example, in terms of health, it can help us if we have a chronic condition. **OH7** Older people adapt very well to these new resources, which can be helpful, especially for health monitoring. **T4** For example, it can help monitoring health. **AP5**
	Adherence to healthy lifestyles	It promotes participation —not just physical participation, but also social interaction and civic participation. **P4** It helps improve living conditions to promote active and healthy ageing. **P6** For this population, it can be a complement to staying active and healthy, providing them with these tools. **P8**	It seems like a good way to promote physical activity and cognitive stimulation exercises. **N1** It can also encourage people to adopt healthier habits, because they will have a better understanding of what they should and should not do. **N2** Digital interventions can be a valuable tool to promote activities and encourage participation among older adults. **N6**	I think it can also help us stay healthier and create healthier habits…. **OH7** It could help, for example, by supporting healthier habits in our lives. **T1** It's very important for people to stay in touch, without being isolated. It makes social interaction and daily coexistence easier. **AP1**
	Involvement of the target population	It's essential to consider the design of the tool itself and, in this case, the digital resources that will be used later on. From what we've seen in this field, when older people are involved in the design process, everything works better in the end. **P5** If we think we're doing something spectacular —just because it has big buttons and is very simple —and then we get there and have difficulties in the field, I consider that to be a bad practice. Good practice means interacting with older people and understanding how they react and what their perspective is. **P6**	If there were some personalised support, I think it would be helpful. **N1** Digital interventions can be very helpful if caregivers, who are often younger and more tech-savvy, are included in the process. **N6**	I think that those who develop these resources are increasingly concerned with finding out what we need. **OH8** Maybe if I was more involved in the process, that is, if the person doing it actually came to me, like you're doing now. **T4** I think they should pay more attention to these aspects. For example, before doing things, they should ask us. That way, we will end up using what is best for us. **T1**

Category	Subcategory	Stakeholders		
		Policymakers (P)	Nurses (N)	Senior Universities (OH; T; AP)
Factors for sustainability	Clear communication and instructions	Obviously, they need to be simple resources that are visually oriented and specifically adapted to older people. **P6** They need to be user-friendly, with simple features that support learning and monitoring. I believe that it can help. **P7**		But I think they benefit us if they are easy to use and not too complicated. **OH4** And another aspect is that it has to be practical and easy to use. **T4** I think these resources are very good, and more and more, I feel that those who are developing them are paying attention to the language and making them as simple to use as possible. **AP2**
	Integration into health policies	It could be a great tool for everyone to access and use in their own home, which is very much in line with public policies that promote active ageing. **P4** Therefore, supporting and implementing integrated interventions like this here, with parish councils as partners, seems to make a lot of sense. **P8**		