Internet use for Active Aging:

A systematic literature review

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Abstract - ***Background:*** **The number of older adult Internet users has been rising worldwide. Information and communication technology, namely the internet, has been recognized to provide a great potential and new opportunities to society as a whole, and to active aging in particular.**
Objective: **The aim of this paper was to conduct a systematic literature review to determine the empirical literature produced since 2005 about the internet use applied to active aging.**
Method: **Throughout the application of a serious of inclusion and exclusion criteria, 30 papers were identified and analyzed of 646 potentially relevant ones.**
Results: **The study provides a comprehensive review of the main subject areas that research has focused, concerning the use of internet to promote active aging.**
Conclusions: **Although scarce, research directly suggests internet as an important promoter of social participation, health, attitude change and education for the elderly, and is differentiated according to different profiles of elder users.**

Keywords – active ageing; internet; systematic review

I. INTRODUCTION

Given the context of strong demographic changes arising from population aging, an active aging strategy has been identified as the integrated response to fundamental challenges that current social policies are faced with [1]. Under the auspices of a variety of conceptual labels – healthy [2], successful [3] [4], productive [5] [6] or active aging [7] [8] – the past few decades have in fact been witnessing the emergence of a new perspective of human aging. It has a more positive bias, which reflects well the importance that the new theory of aging proposals has gained, and sustains the viability of the optimization and responsiveness to the challenges of the aging process, in accordance with the individual and social context of each person and culture [7] [9] [48]. Indeed, and especially since 2002, when the World Health Organization advanced the concept of active aging, voices have been advocating, increasingly, a more comprehensive understanding of aging that, beyond health, is extended to socio-economic, psychological and environmental aspects. In this perspective, active aging is meant as "the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age" [8, p.12]. This new paradigm thus arises as a multidimensional model of aging, emphasizing the quality of life and health of elders, maintaining physical, psychological and social autonomy, in which older people are integrated in secure societies and assume a full citizenship. Constituting a broader interpretive framework, this new vision of human aging is thus contrary to the trend towards a reducing and negative view of this process, stressing on the search for the factors and conditions that help identify the aging potential and identifying means for positive promotion.

A major societal challenge is, therefore, to improve opportunities for active aging, focusing mainly on autonomous living, social participation, health and education. In this sense, Internet and Communication Technologies (ICT) have been increasingly recognized as an important tool to address active aging opportunities.

ICT usage has been informed by the debate on the digital divide, which assumes that chronological age is one of the main factors that determine ICT usage. Yet, this debate has been challenged by recent literature on older ICT users, which suggests that this life stage is very fruitful for its use and shows that older people are the fastest growing group of internet operators [10]. Indeed, digital technologies and computers have been seen as beneficial for older people and their active aging, and regarded as "desirable objects that provide older people with overwhelmingly positive experiences and outcomes" [11, p. 700]. Research has shown that ICT can have an impact on the well-being of the elderly, since it contributes to overcome loneliness and depression [12] [13], offers relevant opportunities for the improvement of psychological processes, social aspects and issues related to dependency [14].

The main of the present study is to provide a general overview, by means of a systematic literature review, of the empirical literature produced about internet use applied to active aging.

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II. METHOD

2.1. Data sources and search strategy

The goal was to locate academic research focusing on active aging and internet. For the search, the study used the electronic databases Web of Science and Scopus, using the terms "active aging" AND "internet" as keywords for the topic (WoS), and title and abstract (Scopus). To focus on very current research, the search centered in 2005–2016 texts. The article selection, data extraction and data synthesis followed the Preferred Reporting Items for Systematic Reviews (PRISMA statement) [15] as guideline. A serious of inclusion and exclusion criteria were considered.

2.2. Inclusion criteria

1) Studies that directly addressed the research question, namely that focused on the internet use for active aging promotion;

2) Studies including participants aged 60 years or older;

3) Papers that used any type of study design or methodology, with positive or negative results;

2.3. Exclusion criteria

1) Studies not published in English;

2) Studies not available in full-text in peer-reviewed journals;

3) Studies published in books, book chapters, PhD or master thesis, conference proceedings;

4) Theoretical papers, literature reviews, narratives reviews, and other type of literature review;

5) Studies published before 2005;

6) Paper not providing enough information for categorizing the paper.

2.4. Data analysis

Two reviewers jointly screened all the 646 records, checking for consistency with the research question. In a second round, reviewers independently and systematically applied the exclusion criteria to half the eligible records, and synthetized the main findings. Finally, both reviewers jointly read and integrated the results and constructed the thematic categories, following a content analysis methodology [16].

III. RESULTS

A total of 646 papers were identified during the initial search phase. After removing duplicates and applying the inclusion and exclusion criteria, 30 papers were considered for final analysis (Figure 1).

The search only included publications from 2005 onwards. However, only studies published from 2009 onwards were retrieved. An important increase in publications was observed in 2012, being the great majority of studies (46.7%) published in 2015 and 2016, which indicates a very recent research topic. Furthermore, data shows that 83.3% of the analyzed papers were conducted in European countries, namely Spain (26.7%; [17] [18] [19] [20] [14] [23]), United Kingdom (16.7%; [24] [25] [26] [27] [28]), Netherlands (13.3%; [29] [30] [31] [32]), Sweden (6.7%; [13] [33]), Finland (6.7%; [34] [35]), Italy (3.3%; [36]) and Slovenia (3.3%; [37]). The remaining studies were conducted in USA (6.7%; [38] [39]), Israel (6.7%; [40] [41]), Australia (3.3%, [42]), Singapore (3.3%; [43]) and Canada (3.3%; [44]). The located studies included independent samples, ranging from 8 [39] to 47.001 participants [26]. Concerning methodology, the large majority of studies employed a quantitative approach (56.7%), although qualitative (33.3%) and mixed-method (10%) approaches were also used.

The content analysis of each article lead to the identification of a structure of themes about internet use for active aging. The main identified theoretical dimensions were the following:

A. *Social inclusion and participation:* this category generally includes studies focusing on social networks, social isolation prevention, overcoming loneliness, leisure and general well-being;

B. *Profile of elderly internet users:* this category integrates studies that emphasize the sociodemographic characteristics of elderly internet users, and how it influences internet use;

C. *Images and stereotypes:* focuses studies which describe attitudes, social images and stereotypes concerning age and aging, and how these images are related to internet use;

D. *Health:* comprehends studies focusing on health information seeking through the internet and its use as a promoter of healthy lifestyles and health self-management;

E. *Education:* focuses the Internet for adult/elderly educational purposes.

The studies within each category and the main study outcomes are presented in Table 1. Overall, most studies are focused on health issues (n = 11) and tracing the profile of elderly internet users (n = 7).

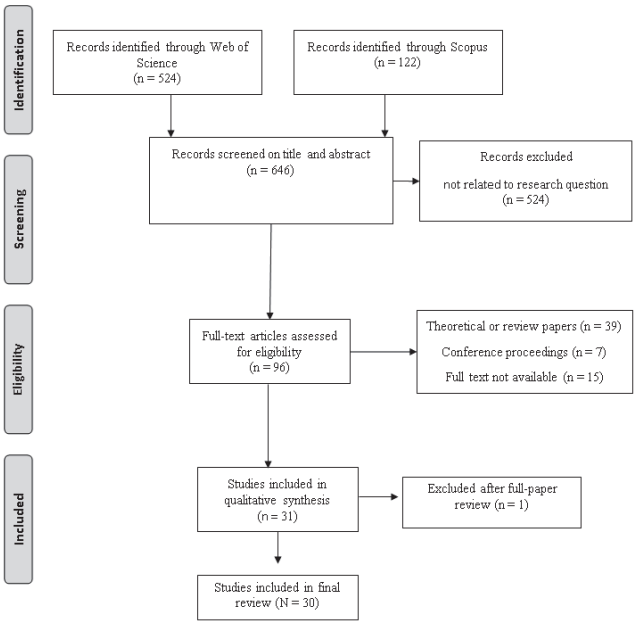

FIGURE 1. PAPER SELECTION PROCESS OF THE LITERATURE REVIEW

TABLE 1. CATEGORIES AND MAIN OUTCOMES OF STUDIES.

Category	*No. of papers*	*Study*	*Main outcome(s)*
Social inclusion and participation	6 (20%)	[19]	Reported benefits in relation to autonomy, motivation, social dimension, social participation, and others
		[14]	Results indicate that the Internet is a source of opportunities for the elderly, in what concerns: information, communication, transactions and administration, leisure and entertainment
		[21]	It was noticed an increase in the use of the Internet caused by elderly people's desire to keep active, up-to-date and communicated
		[35]	Active Internet use has a strong positive correlation with a number of different leisure activities amongst the elderly
		[40]	Senior online communities provide a unique form of 'casual leisure' that involves play, active entertainment, and sociable conversation, which may have positive impact on seniors' well-being and successful aging
		[41]	Senior online communities offer both leisure activity and an expanded social network. This active participation in the communities may contribute to the well-being of older adults
Profile of elderly internet users	7 (23.3%)	[20]	A linear navigation web design system is more suitable for elderly internet users than hypertextual navigation
		[36]	Results show a strong digital divide amongst the elderly, which is influenced by differences in economic, social and cultural capital
		[23]	The ICT resources most widely used by the elderly are computers and the Internet, which are used for education, information, communication and entertainment purposes
		[17]	Besides the influence of macro-social/economic factors, the individual characteristics and the immediate environment of seniors play an important role on the level of digital activity in the elderly
		[37]	Results showed that age, gender and education seem to be important factors impacting the use of online social networks by active older Internet users
		[25]	Compared with the pace of change in ownership of other household technologies, the take up of mobile phones amongst those aged 50 and over has followed a much sharper rise
		[38]	Age, greater level of education, ethnicity, behaviorally active coping style, general physical health, and role related emotional health each independently predicted computer usage
Images and stereotypes	5 (16.7%)	[13]	The social position of old age is used by older active ICT users in order to make sense of how and why they engage with these technologies
		[22]	The participants' involvement in the activities (learning and using new technologies) generates more positive attitudes toward its learning and utility as well as more self-confidence and they enrolled in different activities to learn and to keep their minds active
		[39]	Older adults' ideas about aging are influenced by their definitions of health, health information seeking, and what they considered to be health information
		[44]	Information suggested that older adults should explore new techniques to boost sexual pleasure, challenged the stereotype of older adults as non-sexual, and claimed that sexual engagement in later life was valuable as it contributed to successful aging
		[27]	Although the representation of older people as passive and inert was most evident, the image of empowered decision makers was most likely to engage older people in preventing falls

Health	11 (36.7%)	[29]	Printed and Web-based tailoring interventions to promote physical activity behavior in adults aged over fifty can contribute to individual health
		[34]	Findings support the notion that use of information and the media can motivate older adults to stay healthy and active in life
		[33]	Internet-based programs could be a promising and attractive option for older adults requiring assistance in health, namely for losing weight
		[30]	Lifestyle changes in behavioral risk factors associated with cognitive decline (e.g., weight, physical activity, nutrition, alcohol consumption…) were observed, which lasted over the period of 1 year
		[24]	Older people use the Internet as a source of health information, but have concerns about safe use and quality of information
		[18]	Online healthcare information gives older people the chance to take more responsibility for their own health and can act as part of a safety net that complements the work of healthcare professionals
		[42]	Improvements among the users of the My Joint Pain website for self-management, lifestyle, and physical activity were observed, with no significant improvements for the nonusers
		[43]	Participants reported no use of new technology to access health information
		[31]	The Web-based physical activity intervention resulted in improved levels of physical activity, physical function, and self-perceived effect, compared with a waiting list control group
		[32]	The use of a printed-version intervention for physical activity was better appreciated than the web-based intervention
		[28]	The findings present in-depth qualitative evidence of the impact of telephone befriending on older people's well-being
Education	1 (3.3%)	[26]	Educational Internet use was structured by age, occupational class and educational engagement

DISCUSSION AND CONCLUSION

The present study aimed at collecting, organizing, and analyzing research about the internet usage by elders for their active aging. To this end, we included 30 studies (out of 646) from January 2005 to December 2016. Specifically, we wanted to identify and characterize the best available evidence on how empirical research has dealt with internet use by older individuals, responding to the research question: (1) how is internet used by elders to promote their active aging?

To answer the research question, a content analysis was performed which identified five main dimensions. The evidence suggests that elderly internet usage is mainly related to *health* issues (36.7%), supporting previous findings that suggest that internet is often viewed as a source of health information, due to its ability to provide current information, being seen as a way to empower consumer to make informed health decisions and promote healthy lifestyles and rehabilitation [39] [45]. We found in our literature review a considerable number of studies dedicated to understanding the *profiles of elderly internet users* and how they are influenced by its sociodemographic features (23.3%). Scholars have proposed several complexities in internet usage amongst the elders themselves, proposing that we are facing a "second order digital divide" or a "grey digital divide" [13] [46], which are terms that have been introduced to refer to the unequal distribution of ICT skills and knowledge, mainly related to sociodemographic characteristics such as education, gender, ethnicity, general health and lifestyles. Also *social inclusion and participation* was identified as a major subject in the most current research on elderly internet use (20%), generally describing that ICT are used in the context of communication with social networks, new options for leisure and fun, and encouragement for autonomy and independence [39]. Some studies were also identified to focus on the *social images and stereotypes* about internet use by elders (16.7%), generally showing that old age *per se* cannot be seen as a source of explanation for the so called digital exclusion that some older people face. Indeed, the social position, engagement in activities and positive images of aging are variables which influence active aging, suggesting that old age is a form of capital that gives elders advantages, for instance, in relation to skills, knowledge and experience they have obtained in life [13]. In our literature review, we observed that only 3.3% of the

included papers incorporated an *educational dimension* on elderly internet use, emphasizing opportunities for ongoing learning according to particular life pathways of elders (e.g., occupational class, educational engagement).

Our literature review shows that science is producing relevant results in the European context (83.3%). This empirical achievement may reflect a major concern of most European countries – the "grey continent" – dealing with strong population aging. Indeed, such issue has become a central focus of the European policy agenda, highlighting discourses about the active ageing framework, becoming this the leading governmental response to these challenges in recent years. Also, the recent increase on empirical research on elderly internet use for active ageing may translate a stronger receptivity of academia to the matters promoted in the 2012 European Year for Active Ageing and Solidarity between Generations.

Overall, our results suggest that research on elderly internet use focus several aging determinants, as suggested by WHO [8], namely the individual, behavioural, social and health domains. Yet, results present scarce findings addressing economic and/or physical environment determinants to elderly internet use for active aging. Considering these gaps, our findings suggest the need to enhance research, highlighting: 1) the articulation between individuals' economic resources and their opportunities for social participation and 2) how ICT technologies might minimize environmental risks for the elderly and their active ageing (for instance, as related to accessibilities, home safety and food safety). Indeed, as "global aging will become not just the transcendent economic issue of the 21st century, but the transcendent political issue as well" [47], active ageing will dominate and daunt public-policy agendas of developed countries and force the renegotiation of their social contracts. Therefore, a gray dawn [47] fast approaches, which implies to ponder further research on active ageing strategies, where ICT and internet are particularly included.

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