Aging in Online Communities: A Systematic Literature Review of Design Recommendations

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Abstract: The increase of computer-mediated communication use and the aging population has led to a renewed interest in online communities and social networks for active aging and social support in daily living. However, a systematic understanding of the design recommendations in Senior Online Communities is still lacking in scientific documentation. The aim of this paper is to identify the design recommendations used in online communities that support active aging. In addition, this paper highlights some of the benefits of using online communities by older adults. Twenty-three papers published between January 2015 and May 2020 in English-language, peer-reviewed publications, met inclusion criteria. The review

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presents a set of recommendations for designing online communities to enhance older adults' social interactions. A process that aims for "engagement" is suggested to strategically guide the design of Senior Online Communities: Interacting – Sense of Belonging (Role-playing, Storytelling, and Legacy) – Engaging.

Keywords: senior online communities, design recommendations, aging, systematic literature review, computer-mediated communication

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Vieillir dans les communautés en ligne : Une revue systématique de littérature portant sur les recommandations du design

Résumé: L'utilisation croissante des communications informatisées et le vieillissement de la population ont conduit à un regain d'intérêt pour les communautés en ligne et les réseaux sociaux quant au vieillissement actif et au soutien social dans la vie quotidienne. Cependant, une compréhension systématique des recommandations de conception dans les communautés en ligne seniors fait encore défaut. Le but de cet article est d'identifier les recommandations pour le design de communautés en ligne orientées vers le vieillissement actif. En outre, ce document couvre son utilisation et les avantages perçus par les personnes âgées. Vingt-trois articles publiés entre janvier 2015 et mai 2020 dans des publications de langue anglaise répondaient aux critères d'inclusion. La revue de la littérature présente un ensemble de recommandations pour la conception des communautés en ligne afin d'améliorer les interactions sociales des personnes âgées. Un parcours pour la conception des communautés en ligne senior est suggéré : Interaction - Sentiment d'appartenance (jeux de rôle, narration et héritage) - Engagement.

Mots-clés : communautés en ligne, senior, revue systématique, recommandations pour la conception des communautés

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Introduction

As we are living a challenging time of a COVID-19 outbreak, online social communities have been of utmost importance to maintain social interactions that have been compromised by physical distance, being a means to lower some of the risks associated with self-isolation and loneliness. Indeed, physical distancing and quarantine measures are also associated with some adverse psychological effects - *e.g,* Posttraumatic stress disorders and Depression (Hull, 2005; Razai et al., 2020; Taylor et al., 2008).

Older adults have been considered one of the risk groups of social isolation during the pandemics (Armitage & Nellums, 2020; Razai et al., 2020; Berg-Weger & Morley, 2020) and while digital platforms may play a cognitive behaviour therapy role (Hopps et al., 2003; Käll et al., 2020) for perceived sociability, digital exclusion in this age group continues to be a reality (Seifert, 2020).

Alongside the current demands for the use of Information and Communication Technologies in a locked-down society (*e.g.* Access to Health Information, Internet-based Social Support, Online Banking Services, and Shopping) (Seifert, 2020), there is an urgent need in the Human-Computer Interaction field to empower the interfaces for older adult's context of use and meet their own motivational needs.

The aim of this study is to identify the design recommendations used in online communities directed towards active aging, not directly related to technical requirements and interface design, but with participants' involvement with the development process, and engagement with people and technology. In brief, this paper proposes a three-stage design process for the design of Senior Online Communities: Interacting – Sense of Belonging (Role-playing, Storytelling, and Legacy) – Engaging.

1. Background

1.1. *Being on/off in a Community*

Humans are social beings and throughout history, they have had the necessity to interact (*i.e.* from cave paintings, written pictograms, ideograms, alphabet-language, encoded messages in telegraph, landline telephone, radio, television to the Internet). In these interactions, two or more agents are involved in communal action, influencing each other (Oxford dictionaries, 2015). The agents simultaneously attribute meaning to one's actions on particular occasions and there is interdependence between the self and the other.

According to Coley's looking glass self-concept (Cooley, 1992; Cooley & Mead, 2006), the self is a result of a three-step process: (1) Imagining how others see us; (2) Imagining how others are judging us; and (3) Reacting accordingly. For these interactions, the Human capacity to tell stories (*i.e. Pan narrans*) (Benade, 2011) and share a sense-making group fantasy (Bormann, 1985) are essential in media life (Deuze, 2011).

As Ernest G. Bormann (1985, p.128) puts it:

> "Shared fantasies provide group members with comprehensible forms for explaining their past and thinking about their future – a basis for communication and group consciousness."

In this sense, online communities have transitioned from being 'Third Places' (a social environment that is separated from the 1st place – Home and 2nd place – Workplace) (Oldenburg & Brisset, 1982) to be omnipresent either in domestic places, workplaces, or mobile spaces. Indeed, the need for (re)connection and intergroup communication (Li & Zhang, 2018) has led to a renewed interest in community formation and online sociability.

Preece (2001) highlights the three key components that contribute to the online sociability of participants on online communities: purpose, people, and policies (p. 349). In the same vein, the 'I-intention' has become 'We-intention' (Wang & Sun, 2016) and by anchoring social integration and collective communication, a sense of community, trust, and belonging may be fostered.

Online and offline contexts are, therefore, often merged in social networks and most of the offline practices, roles and rules tend to be transferred to an online context (Preece & Maloney-Krichmar, 2003). In addition, this interrelatedness between online activities and everydayness is very omnipresent, being very likely to persist in users' minds (e.g. Kanai et al., 2012), and subsequently interfere with society and the environment.

1.2. *Online Communities and Active Ageing*

In the light of the demographic and biopsychosocial changes observed over the years in society – *e.g.* the aging population, decrease in multigenerational households (Tomassini et al., 2004), entry of women in the labour market (Clark & Anker, 1993) or prevalence of chronic diseases and overly dependence in health services (Joyce et al., 2005; Pomerleau et al., 2008), there has been a renewed interest in the use of online communities and social networks for active aging and social support in daily living (Pfeil et al., 2009).

As aforementioned in the introduction, there has been a rapid growth in the use of online communities and more recently, a high dependency on its use to overpass the boundaries of social distancing measures during pandemic influenza. As a consequence, great challenges have been posed to Communication Sciences and Social computing, such as Human communication, co-production of content and connectivity between users (Ala-Mutka et al., 2009). Indeed, the development of products directed towards an aging population has been subject of interest considering that they may help to overcome geographic and temporal boundaries, bringing such psychological benefits as 'Joyfulness', 'Stimulation', and 'Companionship' (Nimrod, 2012).

Furthermore, a number of studies (e.g. Shaw et al., 2011) highlight that social support and older adults' friends contact decreases with age, and for this reason, online social support and its use may be beneficial. For example, it may decrease the feeling of loneliness (Cotten et al., 2013); reinforce connection and communication (Xie, 2008); enhance the quality of life (Costa et al., 2018; Ferreira et al., 2015); be cognitively engaged (Myhre et al., 2016) and enable knowledge sharing (Hendriks, 1999). The Walther's Social Information Processing Theory (Walther, 1996) also postulates that computer-mediated communication can equally strengthen relationships whether prolonged in time and therefore, defining strategies that can intertwine the five stages of an online community – inception, creation, growth, maturity, and/or death (Iriberri & Leroy, 2009).

However, online communities slightly differ from Social Network Sites (Boyd & Ellison, 2007). Whereas the first concept refers to the use of computer-mediated communication towards common interests and purpose among the end-users (Preece & Maloney-Krichmar, 2003), Social Network Sites are more organized around people, having the extension of offline relationships as a purpose (Ellison et al., 2007).

Although there have been a number of communities addressing active aging – *e.g.* Stitch (https://www.stitch.net), Older is wiser (https://www.olderiswiser.com), Buzz50 (https://www.buzz50.com/), most of them seem to not take all the active aging domains into account -*i.e.* health, sense of security and participation in society (World Health Organisation - WHO, 2002). Hence, a profound knowledge in which online communities can be designed to fit within the WHO framework for active aging is needed.

Having provided a brief overview of the definition of online communities, its relevancy for sociability and active aging, the following sections present some considerations in the design for active aging, the procedures that were undertaken in the literature review about aging and online communities or social networks and propose a set of guidelines and a 3 phase process for designing Senior Online Communities.

It is worth noting that the recommendations for designing online communities rely on a set of Human Interaction principles that aim to enrich the user experience, embodying such aspects as information design, interaction, and visual design.

1.3. *Designing for Active Aging*

Designing products or services catering to the older adults' needs and motivations is more and more in demand in today's society given the aging of population. Indeed, the Human-computer interaction field has been challenged with corresponding interface design to the biopsychosocial changes associated with the aging process and main implications on the interface.

There are a number of recommendations for designing online communities and/or other digitally mediated applications addressed to older adults in terms of usability and accessibility based on the biopsychosocial characteristics of aging (Czaja & Sharit, 2012; Czaja et al., 2019; Haegerstrom-Portnoy et al., 1999; Sales & Cybis, 2003; Preece et al., 2015). However, much more is implied in building empathic interactions within the context of online communities and social interactions in later life.

Hence, this research aims to identify the design recommendations that should be used in online communities for fostering senior citizens' engagement within the context of an online community.

2. Method

2.1. *Purpose and Scope of the Review*

The results of this study augment on the potential use of online communities to enhance older adults' social interactions. The specific goal is to identify a set of recommendations for designing online communities to enhance older adults' social interactions and guarantee in some sense technology-mediated social engagement.

The literature review relied on the terms related to online communities and/or social networks and age-related changes in the search for "use of online communities by older adults." The patterns found in the publications were relative to the design of the Senior Communities, as later described in 2.3 - Paper coding and review.

2.2. *Search Strategy*

We searched on May 26, 2020, Web of Science and Scopus for peer-reviewed papers written in English. We used the search terms ("online communities" OR "online community" OR ""social network") AND ("aging" OR "older adult" OR "senior citizen" OR "ageing" OR "elder" OR "older people"). This search yielded 1,490 potentially eligible results. We excluded those that were not related to an online context or that did not address the target group. From these papers, we removed duplicates or papers with no full access, which yielded a sample of twenty-three papers. Figure 1 shows the PRISMA model that summarizes the criteria using the review process.

The inclusion criteria used to select the candidate papers were: (a) being published from 2015 to 2020; (b) discussing the use of online communities by older adults; or (c) discussing the design recommendations and elements for a Senior Online Community. Exclusion criteria were any of the following: (a) duplicate publications; (b) lack of comparative data; and (c) not meeting any of the inclusion criteria.

2.3. *Paper Coding and Review*

We coded the papers, extracting the guidelines that Human-computer Interaction designers should take into account when directing products to the older adult target group. By re-reading and using open coding (Given, 2008), the guidelines for designing Senior Online Communities started to emerge and some examples of these inspiring transcriptions are represented in Table 1.

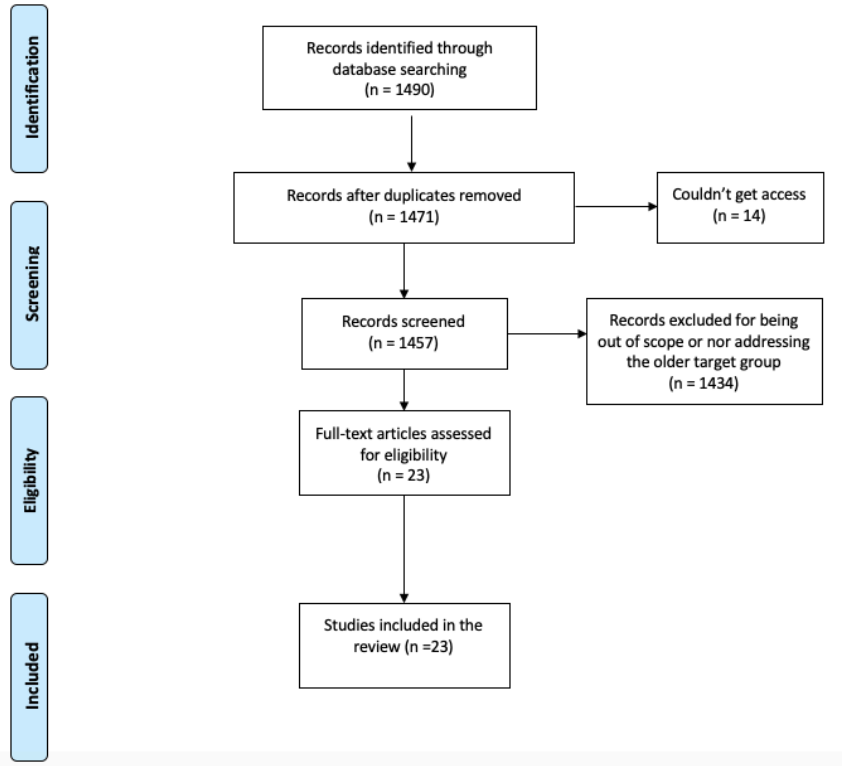

Figure 1. *PRISMA Flow Model adapted from Moher, Liberati, Tezlaff and Altman (2009)*

Table 1. Example of coded suggested guidelines (Total Suggested Guidelines N=21, Total Inspiring transcriptions N=24)

Suggested Guidelines	N. of related papers	Inspiring transcriptions
Support users' interaction with whom they have closed ties	4	"Rural older adults in the study mainly used SNSs to stay in touch with family and friends." (Findlay & Nies, 2017, p.4)
Enable a legacy of caring and advice for the end-users who share similar experiences	3	**"**User-generated content creation and exchange: social media enriches social networks. These may include (i) life testimonies, such as the experience of going through and overcoming an illness [...] " (Marcelino, Laza & Pereira, 2016, p.2)

Assess the end-users' perceived usefulness (PU), Perceived Ease of Use as Technology Adoption Key Performance Indicator (KPI)	2	"ICT use among our group is jointly determined by perceived usefulness (PU), and perceived ease of use (PEU)" (Blok, van Ingen, de Boer, Slootman, 2020, p.1)

As shown in this table, a set of n = 21 recommendations were extracted from the selected publications during the literature review. Then, the suggested guidelines of the recommendations were coded into a three-phase process for designing Senior Online Communities, aiming the ultimate goal of social engagement (Table 2).

In specific, the coding process took place in the content of the papers included in the literature review, in which a set of patterns were emerged using the inductive grounded theory approach – *i.e.* guidelines for developing Senior Online Communities. The data corpus was read, re-read, and analyzed in terms of the study aim/context, sample, method, research techniques used and results.

From the corpus data, a set of design guidelines have emerged. Design guidelines are a set of recommendations, with the purpose of facilitating the user experience. These rely on a set of principles that may be relative to information design - *e.g.* organization scheme, textual labels, navigation (Morville et al., 2015); interaction – *e.g.* control use, representations (Nielsen, 1994; Preece et al., 2015); and visual – *e.g.* color, size, orientation (Hashimoto & Clayton, 2009). Therefore, the guidelines were extracted, and coded and then peer debriefing was used to ensure the coding validation.

The guidelines were then coded and the following relationships between the categories (1) Interacting – (2) Sense of Belonging (Role-playing, Storytelling, and Legacy) – (3) Engaging were established.

Table 2 shows the stages that emerged as a result of the coded paper transcriptions and suggested by the authors as guidelines.

Table 2. Coded recommendations into suggested guidelines (Process stage = 3, Total Suggested Guidelines N=17)

Design process stages	N. of related papers	Suggested guidelines
Interacting	8	1. Support users' interaction with whom they have close ties; 2. Reinforce both local and distant networks that are established in online and offline spaces;

		3. Be user-friendly and meet certain interface requirements - *e.g.* adopt metaphors that are familiar to the end-user, ensure visibility and portability, flexible interaction; 4. Enable the communication between end-users (*e.g.* Video Calling Services; Chat Room; SMS), prioritizing video call services with close ties – *e.g.* "older adults preferred communicating via video, over communication by telephone." (Willard et al., 2018, p.6); 5. Assist the end-users' interaction with the platform and facilitate digital literacy programs; 6. Augment the information/news on the "outside" world in order to encourage individual enrichment;

Table 2. Coded recommendations into suggested guidelines (Process stage = 3, Total Suggested Guidelines N=17) (cont.)

Interacting	8	7. Incorporate better mechanisms to enable older adults to receive 'friends' suggestions and social encounters: "Social Tracking Distance (STD)" - Technology mediated Infocommunication devices supported by GPS technology (outdoors) and beacons/Bluetooth (indoors), (Yucel & Bulut, 2018); 8. Provide functional/ technically usable and intuitive interfaces – *e.g.* "Functions and the sub-functions should not give too much information (too many choices for the selections, too many actions required)." (Willard et al., 2018, p.6);
Sense of Belonging	4	1. Accommodate the end-users' motivational relationships, hobbies or daily activities; 2. Enable end-users to be connected with whom they have close relationships; 3. Enable a legacy of caring and advice for the end-users who share similar experiences – *e.g.* "individuals may turn to their online social networks and discuss their problems, ask for advice, or try to find someone who has experienced similar problems" (Van Ingen et al., 2017, p.172); 4. Take into account older adults' emotions and cognition factors – *e.g.* memory impairment (Kamoun et al., 2018) and socioemotional selectivity theory that postulates that as time is shorter, emotional-driven goals predominate to instrumental ones (Carstensen et al., 2003).

Table 2. Coded recommendations into suggested guidelines (Process stage = 3, Total Suggested Guidelines N=17) (cont.)

Engaging	5	1. Assess the end-users' perceived usefulness (PU) and Perceived Ease of Use as Technology Adoption KPI; 2. Provide engaging activities that meet the online behaviour of this target group and consider stress-coping entertainment products for informal caregivers; 3. Provide a sense of "control and ownership" towards the platform, through, for example, customization and co-design or co-creation (Willard et al., 2018, p.8) and a safe environment by ensuring trust in privacy policies;

Table 2. Coded recommendations into suggested guidelines (Process stage = 3, Total Suggested Guidelines N=17) (cont.)

Engaging	5	4. Facilitate different types of social support: "Informational support, Network support, Emotional support, Tangible support, and Resource exchange" (Kamalpour et al., 2020, p.3); 5. Consider a set of metrics to assess Social Network use and experience, *e.g.* network size (number of people following & followers), frequency of contact (frequency of interactions), network similarity (homophily), network intimacy (share of personal info), and network reciprocity (mentorship, time to answer to a request) (Pan, 2017).

As shown in Table 2, there were a total of 17 suggested guidelines (N=17) that emerged from the literature and were categorized into the following three stages: i) Interacting (N=8); ii) Sense of belonging (N=4), and iii) Engaging (N=5). The interrelatedness between the design guidelines and each stage of the design process will be described in section 3. A three-stage design process for designing Senior Online Communities.

2.3. *Paper Analysis*

Analysis of twenty-three papers published between January 2015 and May 2020 in English-language peer-reviewed publications has revealed a set of recommendations for designing online communities to enhance older adults' social interactions.

The papers were read, and the identified recommendations were highlighted. Then, each recommendation was grouped into a 3-step design process to

strategically guide the design of Senior Online Communities: Interacting – Sense of Belonging (Role-playing, Storytelling, and Legacy) – Engaging. This 3-step design process was determined by analysing the guidelines suggested in Table 2 and emergent purposes in which these fit within, being in line with previous research in the field – interaction needs (*e.g.* Wilson et al., 2009), sense of belongingness (*e.g.* Gao et al., 2017) that involves storytelling (self-expression), role-playing (identity) and legacy (knowledge exchange), and engaging – experience (*e.g.* Sigerson & Cheng, 2018). This 3-phase design process will be the basis of the research work that is currently being carried out to apply and validate for (re)assessing of an online community for active ageing.

3. A Three-stage Design Process for Designing Senior Online Communities

A three-stage design process that aims for "engagement" is suggested to strategically guide the design of Senior Online Communities: (1) Interacting – (2) Sense of Belonging (Role-playing, Storytelling, and Legacy) – (3) Engaging. The following is a description of each stage:

1. *Interacting* is the most basic action to understand the self and the other, in which the process of sensation, perception, expectation, dialogue. and feedback is likely to occur. In this whole process, the meaning associated with mutual and reciprocal (re)actions and influence are likely to be fostered in a community and within the environment (affordances) by following the guidelines*:*

(a) Support users' interactions with whom they have close ties. In fact, friendship networks tend to dwindle with aging (Kalmjin, 2003) and older adults tend to prioritize close strong ties (i.e. family and close friends) instead of distant weak ones (Blok et al., 2020; Findlay & Nies, 2017; Kim & Shen, 2020; Neves, 2015);

(b) Reinforce both local and distant networks established in online and offline spaces. This way, a sense of purpose and relatedness with everyday life is created through the use of shared spaces, artefacts and interaction within both physical and digital (phygital) spaces (Millard et al., 2018; Pan, 2017);

(c) Be user-friendly and meet certain interface requirements - e.g. adopt metaphors that are familiar to the end-user, ensure visibility and portability and a flexible interaction (Marcelino et al., 2016; Willard et al., 2018);

(d) Enable the communication between end-users (e.g. Video Calling Services; Chat Room; SMS), prioritizing video call services with close ties (Banbury et al., 2017; Kim, & Shen, 2020) – e.g. "older adults preferred communicating via video, over communication by telephone." (Willard et al., 2018, p.6);

(e) Assist the user's interaction with the platform and facilitate digital literacy programs (e.g. virtual lectures, tutorials) (Leonard & Hebblethwaite, 2017);

(f) Augment the information/news on the "outside" world in order to encourage individual enrichment – e.g. keeping up to date with the outside world (Berg et al., 2017, p.315);

(g) Incorporate better mechanisms to enable older adults to receive 'friends' suggestions and social encounters – i.e. allow the end-users to recall, reconnect with the past, keep in touch with positive memories (Kamoun et al., 2018; Kim, & Shen, 2020) and Social Tracking Distance (STD) – i.e. metric to measure to the relation among self-other-"each other's' objects" (Yucel, 2018);

(h) Provide functional/ technically usable and intuitive interfaces – i.e. consistency, limiting a number of options (Willard et al., 2018), avoidance in scrollbars and double-clicking, and clarity in language used (Luna-García et al., 2015). In addition, users' abilities and disabilities should be emphasized in terms of the message (Jaschinski & Allouch, 2015) and friends' social status should be visible and reminded (Tsai et al., 2017). Different types of endorsements may also precede these (para) social interactions, i.e. before interacting with the other, the following characteristics are usually endorsed and assessed: (a) Attractiveness; (b) Trustworthiness and (c) Expertise (Chen & Lin, 2018);

1. *Sense of belonging* embodies a process of identity, role-playing, and storytelling in time and space and its association to a sense of place, and a past-present shift either in individual or collective memories may be formed and recalled anytime within an online community. A sense of belonging may be strengthened by following the suggested guidelines:

(a) Accommodate the user's motivational relationships, hobbies, or daily activities (Blok et al., 2020; Hodge et al., 2017; Marcelino et al., 2016) – e.g. daily services, news, and entertainment, games, interactive map, online shopping (Van Ingen et al., 2017) and banking (Neves, 2015), health advice counseling (Berg et al., 2017; Kamalpour et al., 2020; Willard et al., 2018, Zhou, 2018), self-care (Litchman et al., 2018), among others;

(b) Enable the end-users to maintain a connection with whom they have close relationships (Blok et al., 2020;) and establish past-present passions and daily lives within an economic, linguistic and sociocultural context (Hodge et al, 2017; Michailidou et al., 2014);

(c) Enable a legacy of caring and advice for the end-users who share similar experiences – i.e. the role of Social Network Sites to share advice (Van Igen et al., 2017), previous experiences, traditional know-how, and biographies through media evocation, life testimonials (Marcelino, Laza, & Pereira, 2016) and tacit knowledge. Older adults' social support is very likely to alleviate loneliness and have "fun or help from their age peers or relatives" (Zhou, 2018, p.27);

(d) Take into account older adults' emotions and cognition factors – e.g. memory impairment (Kamoun et al., 2018) and socioemotional selectivity theory that postulates that as time is shorter emotional-driven goals predominate to instrumental ones (Carstensen et al., 2003).

2. *Engaging* is the ultimate step in the process with the goal of ensuring the sustainability of a community through the use and measure of such aspects: novelty, activity ratio, user's experience, and subsequent social capital value. Community engagement may be sustained by following the suggested guidelines:

(a) Assess the end-users' Perceived Usefulness (PU) and Perceived Ease of Use as technology adoption Key Performance Indicator (KPI) (Blok et al., 2020) that is very likely to affect the older adult's behavioural intention through perceived use of the interface and navigation (Tsai et al., 2017);

(b) Meet the online behaviour of this target group (e.g. Read online news and magazines, Information search and Purchase) and consider stress-coping entertainment products for informal caregivers (Reinwand, et al., 2018);

(c) Provide a sense of control and ownership towards the platform, through for example, customization, co-design or co-creation (Willard et al., 2018) and a safe environment by ensuring trust in privacy policies (Findlay & Nies, 2017);

(d) Facilitate different types of social support within a community, i.e. Informational Support, Network Support, Emotional Support, Tangible Support and Resource Exchange (Kamalpour, Watson, & Buys, 2020);

(e) Consider a set of metrics to assess Social Network use and experience, i.e. network size (number of people following & followers), frequency of contact (frequency of interactions), network similarity (homophily), network intimacy (share of personal info), and network reciprocity (mentorship, time to answer to a request) (Pan, 2017).

Overall, the studies reviewed highlight the need for designing inclusive communities not only in terms of the design decisions undertaken to meet age-related changes but also relative to the user's sociocultural backgrounds, intertwining "on- and off- contexts" and digital literacy levels. The 3-stage process proposed in this paper draws the attention of community builders and designers to subdivide the inclusive strategies to undertake into a goal-oriented experience of Interacting, Sense of belonging, and Engaging. That way, older adults are expected to benefit from social participation and a sense of autonomy (Millard *et al*., 2018), engagement with daily activities, and individual and collective interests (Blok *et al*., 2020), shortening physical distances and addressing loneliness and social isolation.

3. Discussion

This literature review identified 23 papers published between January 2015 and May 2020 in English-language peer-reviewed publications, related to the use of recommendations for designing Senior Online Communities.

Recommendations for designing these online communities were divided into a three-stage design process: (1) Interacting – (2) Sense of Belonging (Role-playing, Storytelling, and Legacy) – (3) Engaging.

In (1) Interacting, the reported recommendations included: Support users' interactions with whom they have close ties; Reinforce both local and distant

networks established in online and offline spaces; Be user-friendly and meet certain interface requirements; Enable the communication between end-users (*e.g.* Video Calling Services; Chat Room; SMS), prioritizing video call services with close ties; Assist the user's interaction with the platform and facilitate digital literacy programs; Augment the information/news on the "outside" world to encourage individual enrichment – *e.g.* keeping up to date with outside; Incorporate better mechanisms to enable older adults to receive 'friends' suggestions and social encounters, and Provide functional/ technically usable and intuitive interfaces.

During the stage (2) Sense of belonging, the recommendations are: Accommodate the user's motivational relationships, hobbies, or daily activities; Enable the end-users to maintain a connection with whom they have close relationships; Enable a legacy of caring and advice for the end-users who share similar experiences; and Take into account older adults' emotions and cognition factors.

Finally, the third stage (3) "Engaging" embodied the following recommendations: Assess the end-users' perceived usefulness (PU) and Perceived Ease of Use as Technology Adoption Key Performance Indicator (KPI); Provide engaging activities that meet the online behavior of this target group; Provide a sense of control and ownership towards the platform; Facilitate different types of social support within a community, and Consider a set of metrics to assess Social Network use and experience.

Although the technical requirements and interface design relative to the development of Senior Online Communities have been widely covered, the considerations in engaging the senior citizens within the context of an online community are relatively unexplored. The three-stage process for designing these communities proposed in this paper can be transversal to different age groups, but there are some particularities of online communities in the case of older adults, including the focus on close ties; assistance in the user's interaction with the platform and access to digital literacy programs; and Assess Technology Adoption from the senior citizens. With this in mind, online communities are expected to meet the senior citizens' context by involving them in the process.

A limitation of this review is that most of the papers have very little or no empirical evidence at all and mainly rely on theoretical background. However, this review, and its consolidation as a body of "guideline-based knowledge", builds on the experience of the reviewers who have more than seven years of experience conducting field studies with older adults within the context of digitally mediated platforms. Empirical work is being carried out by our research team to apply and validate this 3-phase design process and guidelines in the development of an online community for active aging.

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