What do we know about the relationship between internet-mediated interaction and social isolation and loneliness in later life?

Roser Beneito-Montagut, Nizaiá Cassián-Yde and Arantza Begueria

Abstract
Purpose – Social isolation and loneliness are recognised social, health and wellbeing problems that particularly affect later life. They have been the subject of many recent studies. Studies examining the role of the internet in addressing these problems have multiplied. However, it is still not known whether internet-mediated social interaction has any role in mitigating social isolation and or loneliness. To address this gap, the purpose of this paper is to review previous research that investigates the relationship between internet use for communication and social isolation and loneliness.

Design/methodology/approach – This paper reviews the empirical literature published since 2000 and expands on previous literature reviews by including a variety of research designs and disciplines.

Findings – Despite the recent increase in studies, there is still little evidence to show internet effects on social isolation and loneliness. It is concluded that future research programmes aimed at reducing them by the use of the internet should include more robust methodological and theoretical frameworks, employ longitudinal research designs and provide a more nuanced description of both the social phenomena (social isolation and loneliness) and internet-mediated social interaction.

Originality/value – Previous reviews are not restricted to internet-based studies and include several types of interventions aiming at reducing social isolation and/or loneliness. They do not attempt to disentangle the internet effects of social isolation and loneliness.

Keywords Loneliness, Social isolation, Internet, Later life, Mediated social interaction, Social relationships

Paper type Literature review

1. Introduction

Social isolation and loneliness are recognised as social and public health problems that particularly affect people in later life. Although the problems are not limited to this life stage, the specific conditions – both structural factors and life events – that contribute to them tend to increase as age advances. Lelkes (2013) reports that, in Europe, one out of six people over 65 are isolated, with this number increasing among those over 80, at which age one person out of five reports not having any friends, having very limited social interaction and feeling lonely. Previous studies provide strong evidence of social isolation and loneliness’ harmful effects on health and wellbeing. Yet, the relationship also works in the opposite direction; health and mental problems lead to an increased risk of suffering social isolation and loneliness (e.g. Fokkema and Knipscheer, 2007). The literature has clearly identified a relationship between loneliness and social isolation and health (e.g. Holt-Lunstad et al., 2015; Miyawaki, 2015). On the contrary, social interaction and social support are related to improvements in health and wellbeing (Berkman et al., 2000; Victor et al., 2000).

In western societies, there has been interest in studying the role of the internet in reducing this problem. The internet, with social media (SM) as the specific tool developed to sustain social relationships and communicate within social networks (SNs), plays an essential role in supporting daily life. It is logical, then, to think that they might provide opportunities for communication with kin and
others that can be of great value in later life. There have been optimistic claims about the potential of
technologies and the internet to enhance personal relationships and mitigate social isolation and
loneliness in later life. However, their actual effects (and affects) are still not fully recognised.

Since 2000, several reviews analysing the effectiveness of different types of interventions aiming to
mitigate social isolation or loneliness in later life have been published (Findlay, 2003; Cattan et al., 2005; Dickinson and Gregor, 2006; Dickens et al., 2011; Hagan et al., 2014). However, they have found contradictory results. One of the limits of these previous reviews is that they are not restricted to internet-based studies and included several types of interventions aiming at reducing social isolation and/or loneliness, and they do not disentangle social isolation and loneliness. Within these reviews, six interventions using the internet were found to have a positive effect on social isolation and/or loneliness (Ito et al., 1999; Swindell, 2001; Fokkema and Knipscheer, 2007; Tsai and Tsai, 2011; Sum et al., 2009; Wright, 2000). On the contrary, five were found to have no influence or no significant effect (Meyer et al., 2011; Slegers et al., 2008; Straka and Clark, 2000; White et al., 1999, 2002). These highlights that there is still the need to understand the internet’s effect on social isolation’s various dimensions of social isolation, such as social relationships and social support, as well as on loneliness. Also, these reviews did not include other research designs beyond those testing interventions, except for those reported by Sum et al., 2009; Meyer et al., 2011). Some of them did not include a mechanism to control whether the reduction in social isolation or loneliness was due to the intervention itself – which in most of the cases included training that involved personal contact with the trainer/carer – or to the use of the internet. Moreover, previous reviews have been generally limited to clinical (psychological, nursing, geriatric) research, disregarding all the research conducted in other social science areas, such as communication, community and social informatics and sociology. There is a growing body of literature that studies social isolation and loneliness from different research disciplines which also needs to be considered. The need to include other strands of research is also supported by previous reviews (Findlay, 2003; Cattan et al., 2005) highlighting the “dearth of evidence”.

Today, we are immersed in the digital society, the internet is embedded in our everyday lives and people in later life are increasingly using digital communication technology to interact with others. As society and technology develop, it is needed to explore more complex methods of communication, contact and support as both a response to social isolation and loneliness and as a way of gaining further knowledge about their role. This deserves a broader review focussed on internet technologies, serving as a starting point for creating more inclusive societies that engage and empower people in later life and that, in turn, promote wellbeing and health. This paper aims to start addressing this gap by reviewing recent literature to further understand the relationship between internet use as a communication means and social isolation and loneliness, including its effects on social relationships in later life.

2. Method

We conducted a literature review of studies on internet use in later life published between 2000 and
2015. To identify these studies, we searched on the databases Pubmed, PsychInfo, PsyArticles, IEEE Xplore, ISI Web of Knowledge, Wiley Online Library, International Communication Association and Google Scholar using a combination of the following keywords as search terms for the targeted population: aging, aged, ageing, elderly, elders, old, older adults, oldest-to-old, seniors and later life. For the content search, we used internet, SM, social platform, social networking sites and Web 2.0. We used the following terms for the conceptual issue: social isolation, isolation, loneliness, social support, social capital and social relationships. The search was conducted using the above-mentioned databases and search terms. We also identified studies found in reference lists in retrieved articles, unpublished dissertations and conference abstracts. After removing all duplicated papers, the remainder were reviewed by two researchers (NC and RBM). The final number of studies reviewed was 42. The final study selection criteria were all manuscripts about later life (in full or in part) and internet use for communication with others (broadly defined and including SM) and published in English. We selected any study regardless of its methods or its social science discipline. Those papers that did not meet all these criteria were excluded and we finally reviewed 25 papers. No further attempt to limit the number of studies on quality grounds was undertaken, given the number of papers was manageable.
After the studies were selected, they were categorised by two researchers according to the following factors:

1. Method

2. Measurement or focus:
   - loneliness; and
   - social relationships and social isolation.

3. Effect:
   - positive; and
   - no effect or negative.

When lack of consensus, it was resolved via discussion before the appraisal of each paper. The focus on loneliness or social relations and social isolation was a challenge due to its complexity. The distinction between social isolation and loneliness, although introduced is not explored in full here due to the complexity of the terms and the complexity of their relationship (De Jong Gierveld et al., 2006) – is used for the remainder of the paper. However, it is necessary to recognise that social isolation and loneliness, although different, are intertwined and closely related. This review uses this distinction as a way to disentangling the effects of the internet and includes studies examining its effect on both loneliness and social relationships in later life, their diminishment or enhancement in forms of social support and social relationships.

3. Social isolation, loneliness and social relationships

Loneliness and social isolation are very complex concepts which have been defined differently in studies about later life and have often been treated as synonymous. Recently, social isolation has been recognised as being different from loneliness, and several authors have called for the phenomena to be treated separately (e.g. Masi et al., 2011; Victor et al., 2009). It is recognised that somebody can feel loneliness even having lots of social relationships or the other way around. Consequently, social isolation and loneliness do not always go hand-in-hand. Social isolation relates to the lack of integration of individuals – and groups – into the wider social context and to the deprivation of social contacts or social relationships (Biordi and Nicholson, 2009). In this sense, social isolation is usually treated as a measurable variable that accounts for the social relationships (SNs) or perceived support somebody gets from social relationships (social support and social capital), or their lack thereof. While studying social isolation, four main concepts have been examined – living status, being alone, loneliness and social participation – and for each, there are related issues of theory, definition and measurement. There are also different types of isolation (related to living conditions and social engagement, involvement and participation). Social isolation broadly refers to having or not a network of kin and non-kin relationships and to the size and characteristics of this network –and is related to social capital too[1]. A commonality of much of this research is the understanding that social engagement is a key determinant of quality of life at any age, but especially relevant in later life due to the reduction of social space.

Although a causal relationship cannot be firmly established, social isolation is sometimes associated with the concept of loneliness. According to an already classic conceptualisation, loneliness is the “discrepancy between one’s desired and achieved levels of social relations” (Peplau and Perlman, 1982, p. 32). Loneliness is an unwelcome perceived feeling of social isolation in any of its types. It is an experienced discrepancy between the kind and the quality of personal relationships the individuals have and the kind of relationships they would like to have (Sermat, 1978). Loneliness, then, is understood as the subjective complement to social isolation or as the opposite of “social support”, a negatively perceived absence of company (Grenade and Boldy, 2008), and it is related to the quality of the person’s relationships. Loneliness is sometimes also conceptualised using the term “perceived social isolation” (Cacioppo et al., 2009), and also named emotional isolation (Ditommaso et al., 2004).
There are different types of loneliness as well, related to life course issues, the persistence of loneliness feelings and to the size and quality of the social network. Moreover, there are several determinant factors affecting loneliness, such as age. As one grows older the likelihood of loneliness increases (O’Luanaigh and Lawlor, 2008; Pinquart and Sörensen, 2001); gender (Dahlberg et al., 2015); education and income (De Jong Gierveld et al., 2006); demographics, such as country of birth (Dykstra, 2009; van Tilburg et al., 2004) or being an immigrant (Victor et al., 2012), health and personal characteristics.

As explained above, research literature sometimes treat social isolation and loneliness as synonyms. The next sections aim to unpack the effects of the internet on both separately as summarised in Table I.

3.1 Loneliness and internet

When observing the relationship between loneliness and internet use, literature has found that frequency of internet use has been associated with loneliness (e.g. Kraut et al., 1998). An alternative association has been sustained as well, proposing that those who are already lonely tend to use the internet more frequently (Tokunaga and Rains, 2010). Research focusing on the internet effects in later life loneliness is scarcer.

There is a group of studies employing cross-sectional research designs which found internet use beneficial in reducing loneliness (Sum et al., 2008; Leikes, 2013; Heo et al., 2015; Tsai and Tsai, 2011; Blažun et al., 2012). With a clearer conceptualisation of loneliness, Leikes (2013) reported a positive relationship between internet use and loneliness. Loneliness was less frequently reported among those (aged 65 or over) using the internet. Moreover, people who regularly used the internet for personal use were less likely to feel lonely. Heo et al. (2015) study pointed to the importance of social support as a mediator of the relationship between internet use and loneliness. When social support and loneliness were incorporated into the model, the relationship between the two decreased by mitigating the negative effect of loneliness on wellbeing. Hence, the findings of this study suggest that loneliness and social support/social relationships could not be disentangled and investigated separately, as one impacts the other. However, both Leikes (2013) and Heo et al. (2015) utilised a single measure of internet usage, based on frequency instead of kinds of activity, and we already know that using the internet for communicating and using it for browsing are different kinds of activities which may have different effects on loneliness.

Conversely, there are five survey studies that did not find any positive relationship between internet usage and loneliness (White et al., 2002; Carpenter and Buday, 2007; Sum et al., 2008; Bell et al., 2013; Hutto et al., 2015). Within this group, Sum et al. (2008) conducted a survey studying the use of the internet in later life. They measured loneliness using the Social and Emotional Loneliness Scale, which implies the conceptualisation of emotional loneliness as social and emotional loneliness[2] and includes three subscales: family, romantic and social loneliness. The research also analysed different types of activities carried out over the internet – as a communication tool, for information, entertainment, commercial purposes and for finding new people – and found interesting relationships that point towards the need for a more nuanced approach in the conceptualisation of internet usage. Participants in this research reported low levels of loneliness overall. Yet, greater use of the internet to make new contacts was associated with a higher level of emotional loneliness. This study started to delve into the different activities carried out on the internet and their effect on different forms of loneliness. However, in the study, the different forms of loneliness were not clearly conceptualised distinguishing loneliness and social isolation. Bell et al. and Hutto et al. research projects employed the revised UCLA Loneliness Scale (Russell et al., 1980). Bell et al. (2013) specifically investigated the effect of Facebook use on loneliness. The relationship between Facebook use and loneliness in a highly functional sample was not significant. This sample was small (n = 141) for a quantitative study and appeared, on the whole, not to be very lonely. Hutto et al. (2015) also focussed their study on Facebook’s impact on loneliness. This study used the same data as the previous one but with more detailed analyses (Bell et al., 2013). They also found no significant difference in loneliness scores between Facebook users and non-users. But, interestingly, they found that perceived loneliness decreased with age and this association was stronger for Facebook users.
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<tr>
<td>Wright (2000)</td>
<td>To study the ways in which individuals use CMC for social support</td>
<td>Online questionnaire Sample: users of SeniorNet (n=136) Age (M=61, SD=6.5) from 55 to 87 84 female, 52 male</td>
<td>Social support questionnaire (Sarason et al., 1987) comparing internet and non-internet relationships: number of supportive relationships support network satisfaction number of companionship (Rook, 1987) companionship scale satisfaction (Rook, 1987)</td>
<td>Internet, OMC</td>
<td>Older adults engage in companionship relationships on the internet significantly more than supportive relationships Satisfying supportive relationships online are associated with frequency of use For those individuals who spend a great deal of time on the internet, there is potential for relatively strong relationships to form</td>
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<td>White et al. (2002)</td>
<td>To assess the psychosocial (loneliness) impact of providing internet access to older adults over a five-month period</td>
<td>Intervention: Randomized-controlled trial. internet training Intervention group: 48 (71% females) Control=45 (82% females) Congregate housing and nursing facilities Questionnaire: pre- and post-test</td>
<td>UCLA (Hughes et al., 2004) Number of confidants</td>
<td>Internet</td>
<td>Although there was a trend towards decreased loneliness and depression in intervention subjects compared to controls, there were no statistically significant changes from baseline to the end of trial between groups Among internet users (n=29) in the intervention group there were trends towards less loneliness and more confidants than among intervention recipients who were not regular users (n=19) of this technology. However, this is not statistically supported</td>
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<td>Bradley and Poppen (2003)</td>
<td>To assess the decrease isolation among older people who were home-bounded</td>
<td>Intervention: install computer and the internet, training and support with volunteers Questionnaire (pre- and post-test – a year after) Self-progress reports Sample: home-bounded people and caregivers n= 20 (only 8 + 60) No information about gender</td>
<td>Questions relating to amount of contact with others Level of communication and participant satisfaction with the amount of contact they had with others</td>
<td>Internet, e-mail CHIPS online community</td>
<td>Significant positive differences between baseline measurement and post-internet installation, especially regarding contact with others and their satisfaction with contacts</td>
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<td>Blit-Cohen and Litwin (2004)</td>
<td>The study the degree to which computer-mediated communication increases the social capital of older adults</td>
<td>Interviews Sample: 10 computer users and 10 non-users Low to moderate income Israeli adults Mainly females (lack of specific data). No details of exact age</td>
<td>Social capital</td>
<td>Computer-mediated communication</td>
<td>Participants enhanced connections with their group and with their social network</td>
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<td>Zaphiris and Sarwar (2006)</td>
<td>To establish similarities and differences in the ways of interacting among the participants of two newsgroups (teenagers and seniors)</td>
<td>Social network analysis (SNA) comparing a teenagers group and a senior group</td>
<td>SNA measures (nodes, ties, range, centrality, degree, closeness, etc.)</td>
<td>They found that the SN of older users in a Usenet newsgroup was smaller and less connected than that of younger users and also contained a higher number of isolated actors</td>
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<tr>
<td>Carpenter and Buday (2007)</td>
<td>To study patterns of computer use among older people</td>
<td>Questionnaire</td>
<td>Geriatric Depression Scale</td>
<td>OARS Social Resources Rating Scale</td>
<td>Internet and computer</td>
<td>No significant differences between computer users and non-users in terms of loneliness Computer users have more extensive social networks, with more access to assistance, and are more satisfied with their social circumstances. But the direction of causality cannot be determined with this cross-sectional data. Both the participants and the control persons experienced a reduction in loneliness (both measurements) over time. The reduction was only significant for the intervention participants. The changes in loneliness were significantly greater among the participants compared to the control persons. The effect of the experiment was only significant regarding emotional loneliness and among the highest educated. No significant effect in social loneliness. Qualitative findings: the intervention was found to alleviate feelings of loneliness by offering people a network of contacts. E-mail was found to facilitate social contact. Improvement in UCLALS score from pre to post (statistically significant). Lower levels of loneliness. Quality benefits: using online communication; they experienced the social benefits of enhanced interpersonal communication.</td>
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<td>Fokkema and Knipscheer (2007)</td>
<td>To decrease loneliness among chronically ill and physically handicapped older adults through introducing them to the use of an electronic communication facility</td>
<td>Intervention: 3 years of PC and internet connection, training at the beginning Sample Intervention group: 12 (11 women), living alone, few possibilities to leave home, no pre-internet experience, &gt; 60 Control group: virtual Age, M = 66 Questionnaires (pre-, post- and post-test – two years after) In-depth interviews with four participants</td>
<td>Emotional loneliness – six negatively formulated items express feelings of isolation and of missing an attachment relationship (de Jong Gierveld and Kamphuis, 1985)</td>
<td>Social loneliness – five positively formulated items express feelings of social embeddedness (de Jong Gierveld and Kamphuis, 1985)</td>
<td>Internet and computer</td>
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<td>Shapira et al. (2007)</td>
<td>To test the psychological impact of learning how to use computers and the internet in old age, hypothesising that such activities would contribute to seniors’ wellbeing and personal sense of empowerment</td>
<td>Intervention: course in day-care centres for the elderly or resident in nursing homes Experimental group (n=22) Control group (n=26) Measures (pre- and post-intervention four months later) Individual semi-structured interviews Age=70-90 Males=9 (E)-9 (C) Females=13 (E)-17 (C)</td>
<td>Revised UCLA Loneliness Scale (UCLA) (Russell et al., 1980)</td>
<td>Emerging in the qualitative interviews Internet browsing, e-mail, participating in forums and virtual communities</td>
<td>Internet and computer</td>
<td>Improvements in UCLALS score from pre to post (statistically significant). Lower levels of loneliness. Quality benefits: using online communication; they experienced the social benefits of enhanced interpersonal communication.</td>
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<td>Slegers et al. (2008)</td>
<td>To study the improvement of quality of life</td>
<td>Intervention: one control group (n=45 – non-interest in learning computers and internet); experimental (n=191 – interested to learn internet; from those n=123 received computer and training, n= 68 did not receive training) Age= 64-75 Male-females=not specified</td>
<td>Loneliness questionnaire (de Jong Gierveld and Kamphuis, 1985)</td>
<td>Nature and frequency of participants’ social networks: 1. Number of people the participants can rely on for help and with whom they share private matters (Stevens et al., 1999). 2. Number of people the participants can rely on for help but with whom they do not discuss private matters. 3 and 4 frequency of contact with 1 and 2</td>
<td>Computers and the internet</td>
<td>More complex and robust research design trying to avoid/test training and interest effects. No positive effects in any of both measures.</td>
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Table I

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<tr>
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<td>Sum et al. (2008, 2009)</td>
<td>To survey changes in older adults’ social relationships and explore how internet affects their sense of community</td>
<td>Survey in Australia n= 222 (62% female) Over 55</td>
<td>Loneliness was measured by a 15-item Social and Emotional Loneliness Scale (SELSA) (Ditommaso et al., 2004) with social, family, and romantic loneliness subscales</td>
<td>Shkolnovski and Krautz’13 Internet Breadth Scale with five subscales: including finding new people and communication Impact of the internet on social activities Contact with family and friends</td>
<td>Internet</td>
<td>Using the internet for communication with relatives and friends was specifically associated with lower levels social loneliness Using the internet for communication with unknown people was associated with greater levels of family loneliness Time spent on the internet was a predictor for social loneliness. The more hours spent on the internet, the higher degree of social loneliness Second study (2009) also confirmed that internet use was associated with higher satisfaction with contacts with family and friends The social capital of older people on MySpace is smaller in size but more heterogeneous concerning the age distribution of friends. The fact that older people have a much smaller size of friends suggests that they miss out on the benefits of a great social capital (online). Older people seem to lack the basis of a large pool of friends and also do not engage much in further activities (comment on others profiles) in order to maintain their social capital. Older women receive significantly more comments than older men The utilisation of a SNS has the potential to reduce loneliness in older people. Positive effects of SNS on temporal loneliness (especially in the evening) and connectedness</td>
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| Woodward et al.  | To examine whether training provided to adults age 60+ would increase the use of information and communication technologies (ICTs), such as e-mail and SNS and the internet, and influence participants’ social support and mental health | Intervention Experimental group (n=45), control group (n=38)  
Six month-training programme  
Data were collected from both groups at baseline, 3 months, 6 months and 9 months (3 months after the end of the training)  
Age >60  
72% female  
32% lived alone | Loneliness questionnaire (de Jong Gierveld and Kamphuis, 1985)  
Perceived social support from friends Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet et al., 1988) |         | E-mail, instant message and Skype | No significant difference in the use of IM, e-mail and Skype  
In terms of social support outcomes, there was no significant difference between the experimental and control groups in the number of people in their social network or in frequency of contact with their network  
Perceived greater social support from friends. This was driven by a difference in perceived support from friends; however, there was no significant difference in this variable over time (may be due to the programme itself) | No significant difference between experimental and control in terms of loneliness |
| Tsai and Tsai    | To evaluate the long-term effectiveness of a videoconference intervention in improving nursing home residents’ social support, loneliness, and depressive status over 1 year | Intervention: 5 minutes/week teleconference guided in nursing homes. Access to the internet  
Sample (n=90)  
Experimental (n=40; females=22)  
Control (n=50; females=30)  
Questionnaires at baseline, 3, 6, 9 and 12 months | Revised UCLA (Russell et al., 1980) |       | Windows Live Messenger or Skype | This study demonstrated that the videoconference intervention alleviated elderly nursing home residents’ perceived loneliness at 3, 6, and 12 months after the intervention. Positive effects of support over time  
No significant differences between experimental and control group regarding informational social support | No significant difference between experimental and control in terms of loneliness |
| Blažun et al.    | To study how an ICT learning intervention supported the development of their ICT skills and how it affected their behaviour regarding social interaction. To explore the extent to which, after a computer intervention, older people were able to exploit ICT to improve their social inclusion, and consequently reduce their loneliness | Intervention: 3-week computer training courses  
Sample (n=58; Finland and Slovenia; 22.42% drop off; 30.3% male + 57 Pre- and post-test – questionnaire (3 weeks after the training) | Self-reported feeling of loneliness (the operationalization of this variable is not clearly explained) |       | Skype | Level of loneliness decreased significantly after ICT course. However, the design is too weak to report significant positive effects (correlation analysis and unclear conceptualisation of variables)  
No significant differences between experimental and control group regarding informational social support | No significant difference between experimental and control in terms of loneliness |
| Lelkes          | To explore the impact of internet use in old age on social isolation | European Social Survey (ESS2010)  
11,000 people over 65 | Feeling lonely  
Lack of a close friend  
Meeting socially less than once a month |       | Internet | Social isolation is lower among internet users aged 65 or over in the three dimensions explored: loneliness, lack of close friend and meeting socially  
Those who use the internet regularly have a lower chance of being isolated, more so for those who use the internet everyday, controlling for personal characteristics, such as income, marital status, gender and health condition | No significant difference between experimental and control in terms of loneliness |
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<tr>
<td>Prieto and Leahy (2012)</td>
<td>To examine how older people use online social networks and the factors which influence this use</td>
<td>Online survey Sample: 28 people &gt; 61 (17 out of 28 using SNS) No background data Weak design, small sample, weak descriptive analysis</td>
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<td></td>
<td>Perceived benefits of using SNS and negative impacts</td>
<td>SNS</td>
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<td>Siriaraya and Ang (2012)</td>
<td>To investigate the characteristics and activity patterns (social networks and gift-giving behaviour) of older users within a 3D online multi-user virtual environment (IMVU)</td>
<td>Content analysis Web crawler to collect information from profiles Sample: pre-senior (55-64), senior (65-75) Total 2,551 profiles older users (after filtering and cleaning) M = 61.15 (SD = 5.02) 59% female 2,445 younger users (18-22) to allow comparison. M = 19.3 (SD = 1.04) 64.8% female</td>
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<td>Online gift-giving behaviour (based on the number of virtual gifts each user gave and received) and the nature of user’s social networks (focusing on the number of buddies and visitors)</td>
<td>IMVU</td>
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<td>Winstead et al. (2012)</td>
<td>To study whether ICTs can mitigate the effects of social and spatial barriers</td>
<td>Intervention. Training to use ICT. Qualitative study. Sample: 43 (79.1% females) Age: M = 88 (SD = 1.4) Living in assisted and independent communities</td>
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<td>Social interactions and social ties</td>
<td>E-mail, web searches, SNSs, Youtube and Hulu</td>
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<td>Cornejo et al. (2012, 2013)</td>
<td>To explore how the use of an ubiquitous system, Tlatoque, is able to adapt and move the SNS’s social capital outside the desktop into a domestic setting to support older adults’ offline interactions with their family</td>
<td>Intervention: 21 weeks of using customised Tlatoque Sample: two households (n = 30 including extended family members, older people, 2 females, over 85, living with their families. Extended family members living in Mexico but also abroad) Digital footprints, interviews and focus group</td>
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<td>Offline social interactions (2013)</td>
<td>Tlatoque (Facebook)</td>
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<td>Cotten, et al. (2013)</td>
<td>To study how internet use affects perceived social isolation and loneliness of older adults in assisted and independent living communities</td>
<td>Intervention (8 weeks of training) Experimental (n = 79) (two control groups – placebo (72) and no treatment (54)) This study only one wave of data (n = 205; female 82.4%) age M = 82.8, SD = 7.7 Independent (103) and assisted (102) living</td>
<td>3 items – UCLA Loneliness Scale (Hughes et al., 2004) Social isolation: not having a close companion, not having enough friends not seeing enough of the people you feel close to</td>
<td></td>
<td>E-mail and Facebook</td>
<td>An increase in the frequency of going online was associated with a significant decrease in loneliness scores Using the internet was not associated with perceived social isolation Going online was associated with an increase in agreement with internet social interaction indicators</td>
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(continued)
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<th>Authors</th>
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<td>Bell et al. (2013)</td>
<td>To study how and why older adults use (or not) Facebook</td>
<td>Online survey Sample = 142 Age (M=72, SD=11, range 52-92 of those 59 Facebook users) Female = 66.9%</td>
<td>Revised UCLA Loneliness Scale (Russell et al., 1980)</td>
<td>Social Satisfaction Scale PROMIS (Bode et al., 2010)</td>
<td>Facebook</td>
<td>There was not a significant difference in loneliness between Facebook users and non-users for this sample. Older adult Facebook users scored higher on measures of social satisfaction than non-users. FB is primary used to stay connected with family.</td>
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<td>Hutto et al. (2015)</td>
<td>To understand the foundations underlying social media technology usage by older adults</td>
<td>Online survey Sample = 141 respondents living in their own homes &gt;50 – M=71.17 years (SD =10.69; range =51–91) Female 95; male 46 The mean age of Facebook (FB) users was 66.09 years (SD = 9.03) and that of non-Facebook users was 74.72 years (SD=10.36). *Same data than Bell et al. (2013)</td>
<td>Revised UCLA Loneliness Scale (Russell et al., 1980)</td>
<td>Social role satisfaction Social roles and activities (PROMIS)</td>
<td>Facebook</td>
<td>No significant difference in loneliness between users and non-users. Older old users have smaller social networks in FB (significant) Frequency of direct communication on FB and frequency of passive consumption on FB are related with lower loneliness levels (significant).</td>
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<tr>
<td>Heo et al. (2015)</td>
<td>To develop an integrative research model in order to determine the nature of the relationships among internet use, loneliness, social support, life satisfaction, and psychological wellbeing</td>
<td>Survey data (from 2008 US Health and Retirement Study – HRS) Sample=5,203 respondents Age range=65-105 (M=77.87, SD=8.6); 59% female</td>
<td>Loneliness Scale (Hughes et al., 2004)</td>
<td>Social support (Schuster et al., 1990)</td>
<td>Internet use</td>
<td>Internet use can positively influence the lives of older adults by providing social support. This study demonstrates the importance of social support as a mediator of the relationship among internet use and loneliness.</td>
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These studies still fail to provide strong evidence about the specificities of the relationship between loneliness and internet usage. In addition, they still leave unanswered the question of whether the effects of internet usage on the different perceptions of loneliness are due to the use of the internet itself or whether, on the contrary, how lonely one feels affects the use they make of the internet. Causality cannot be determined. Indeed, the contribution of these studies lies in the fact that they have started to reveal that there is a complex relationship between the internet and loneliness in later life. The complexity of studying loneliness is compounded by the complexity of studying the use of the internet. A series of quasi-experimental designs attend to the issue of causality. There are a series of studies which found a significant reduction in loneliness (Shapira et al., 2007; Fokkema and Knipscheer, 2007). Cotten et al. (2013) used the revised UCLA Loneliness Scale in an intervention designed to investigate the effects of the internet on perceived loneliness among seniors living in assisted and independent living communities. They reported that an increase in the frequency of going online was associated with a significant decrease in loneliness scores. Ballantyne et al. (2010) also reported a decrease in feelings of temporal loneliness through the use of SM sites. The sample was very small to generalise results and the positive claims seem too optimistic and technologically determined; furthermore, they did not account for the intervention effect, which might be large as the intervention implied one-to-one sessions. However, this study starts to pay attention to how loneliness is understood in relation to internet connectivity.

Interventions reporting no effects can also be found in the recent literature (Carpenter and Buday, 2007; Slegers et al., 2008; Woodward et al., 2011). These studies compared the loneliness reported by computer and internet users and non-users, and they found that the differences were not significant.

One of the major problems we have found in this strand of research on loneliness is that it does not include any in-depth qualitative analysis (except for Ballantyne et al., 2010) that provides an understanding of the mechanism of loneliness and internet use in later life. Another problem relates to the variety in the conceptualisation of loneliness which makes the studies no comparable. Furthermore, overall research results are still conflicting.

3.2 Social relationships online

When exploring the deprivation of social contacts or social relationships, a logical step is to look at its positive side as well (Anderson, 1998) and pay attention at whether the internet can be a means of forming social relationships in later life – the formation of SNs and social support – as a way to look for further evidence. Concepts, such as SNs, social support and social capital appear frequently in recent literature on the internet and later life. Previous studies found that people in later life are more likely to use the internet to sustain or strengthen existing social relationships – mainly with family and friends, and to enhance social support (e.g. Xie, 2007; Cotten et al., 2012). “Social relationships online” refers to literature tackling any form of social relationships online, including social support, social capital or SN formation. These three aspects of social relationships appear to be interwoven in many cases.

Several studies have highlighted that the prospect of sustaining social relationships with family members is one of the main motivators for starting to use the internet in later life (Harley et al., 2009; Prieto and Leahy, 2012). Indeed, its most common use in later life is for staying in touch with others (Carpenter and Buday, 2007; Sum et al., 2008; Nahm and Resnick, 2001; Climo, 2001), mainly with family and friends (Bell et al., 2013) and to a lesser extent with community groups or exclusively-online friends.

When looking at SNs and the internet, one of the main issues emerging is the connectivity effect on the size of the network of friends and contacts. Strong associations have been found between age and online SN size. When comparing older (above 60) with younger (13-19) people, older people were found to have fewer friends or online contacts on MySpace than younger users (Pfeil et al., 2009). Siriaraya and Ang (2012) also found similar results when comparing the online SNs of people between 55 and 74 and people between 18 and 22 in a multi-user virtual environment. Similar studies have been carried out regarding Facebook SN size (Hutto et al., 2015). These studies concluded that, despite having a smaller number of social ties than younger users, older users have higher levels of interaction and reciprocity between each of their ties, which seems to
indicate stronger relationships. Zaphiris and Sarwar (2006) found that the SN of older users in a Usenet newsgroup was smaller and less connected than that of younger users and also contained a higher number of isolated actors. However, the senior newsgroup was more interactive than the younger one and displayed a stable and consistent environment with a high level of activity.

So far, it seems that older people are more interested in developing strong online relationships than displaying large SNs mainly formed by weak ties. This also seems to suggest that they are more interested in the quality of the relationships than the quantity, which, in turn, is one of the distinguishing factors between loneliness and social isolation.

Although these studies suggest that the internet allows for the formation of satisfactory SNs and describe their characteristics, they do not offer many insights into what it means for social relationships and eventually for social support and social capital. To further explore its impact on social relationships more broadly, we need to look at the online relationships’ effect on social support.

Internet use has been associated with higher levels of satisfaction with the amount of contact with family and friends (Bradley and Poppen, 2003; Sum et al., 2009; Cotten et al., 2013; Bell et al., 2013). Computer users have more extensive SNs, with better access to assistance, and they report being more satisfied with their social circumstances (Carpenter and Buday, 2007; Heo et al., 2015). Results revealed that more frequent use of the internet as a communication tool was associated with a lower level of social isolation (Sum et al., 2008). Leikes (2013) found that those who use the internet regularly (but not everyday) have a greater chance of having a close friend and meeting up with someone regularly, and this effect is greater for those who use the internet everyday. Again, the causal direction cannot be determined, neither the specific effects of the internet. With the data offered, it is not possible to know whether having larger SNs fosters internet use for communication or if it is the internet use that sustains the development of larger SNs.

Intervention studies deal with the directionality issue. An intervention for housebound people over 60 found a significant increase in communication with family and friends and better communication with community services and governmental agencies after introducing the internet (Bradley and Poppen, 2003). Caution in interpreting these results is needed because the sample was small (8 out of 20 were over 60) for a quantitative study and the research design weak (lack of theoretical framework and lack of control by intervention effect). Although also employing a weak research design, the study conducted by Blažun et al. (2012), which pointed towards the internet’s positive effects in terms of social support, was interesting in that it suggested that sociocultural background could impact on the effectiveness of the internet in social support.

Similarly, several qualitative studies (Shapira et al., 2007; Fokkema and Knipscheer 2007; Winstead et al., 2012) found that participants reported an enhanced connection with their SN and consequently seemed to benefit from social capital to a greater degree. Blit-Cohen and Litwin’s (2004) non-intervention study also achieved similar findings. Ballantyne et al. (2010) went even further, suggesting that using the internet not only facilitates maintaining and strengthening social relationships but also fosters regular face-to-face meetings. An intervention study (Cornejo et al., 2013) that analysed two whole families’ social interactions on a specifically designed SM also suggests that this site benefit older people by enriching their offline interactions.

Another study (Siegers et al., 2008), employing a larger sample and a quasi-experimental research design, did not report any significant differences in the level of social support after the internet intervention. Along the same lines, Woodward et al. (2011) did not find any significant differences in the size of the SN, the frequency of contact and the perceived social support when comparing internet users and non-users. Tsai and Tsai (2011) also did not find any significant differences in terms of social support, and neither did Cotten et al. (2013) find any significant effect on the perceived levels of social isolation but did detect positive effects on social relationships. These contradictory findings could be due to a weak conceptualisation of social isolation or misleading survey questions.

To date, the results appear contradictory. On the one hand, it seems that older people miss out on the benefits of having great online social capital due to having a smaller group of friends or other contacts, then being affected by social isolation, but, on the other hand, greater
interaction and higher reciprocity are suggestive of more and better quality social capital and this affects loneliness. The quality of their SNs and social relationships seems to be more strongly associated with loneliness than quantity indicating social isolation. Some evidence also suggests that internet use might provide elements of social support, but, at the same time, the frequency of use is associated with weak relationships or a lack of any relationships. The online social capital theory assumes that more social capital is always better for individuals and for society, but this may not be the case in later life.

4. Conclusions

Results from previous studies are still inconclusive regarding the internet’s effect on loneliness and social isolation – including social relationships and its different dimensions. Although the literature on social relationships has shed some light on disentangling the effects of the internet on social isolation, there is not enough understanding of the processes and mechanism through which mediated social interaction is effective.

The limits of current research come from several foundations. First, research needs to employ more rigorous research designs. In quasi-experimental research designs, training effects must be disentangled from internet effects. There is need of pragmatic and pluralist methodological approaches combining qualitative and quantitative methods. There is also lack of longitudinal qualitative studies (such as ethnographies) able to provide a more nuanced account of the internet’s effects – and affects – and account for life events. Second, more finely graded and coherent measurements are needed, not only in relation to social isolation and loneliness but also regarding internet use. In this sense, the tendency, for example, is to treat time on the internet as a unique dimension, but time spent on the internet currently varies greatly and one can spend large amounts of time online not engaging in any social activity.

On the one hand, the studies reviewed used a variety of measurements to account for loneliness and social isolation, making them difficult to compare and thus build upon research findings. Some studies ignore the relationship between loneliness and life events and consider loneliness as a variable that can be easily controlled. There is not much research being done regarding social backgrounds (including living conditions), neither considering other social, cultural and economic factors, and how these factors affect internet-mediated social relationships. On the other hand, the majority of the studies reviewed treat the internet and the services available for personal communication as neutral, when they are not, indeed their meanings are socially constructed as well. Technologies are collectively produced, interacted and "co-shaped" and without knowing more about these co-shaping processes is difficult to draw meaningful conclusions.

Finally, the lack of theoretical frameworks is also an issue for most of the studies reviewed.

As stated previously, the context of relationships situation has changed considerably in recent years due to the increase in digital technology adoption in later life. Internet use is most of the times studied from the adoption perspective or with ageist stereotypical assumptions, but nowadays increasing numbers of people are already using the internet in later life and can no longer be considered non-adopters or as behind the trend.

Research on social isolation, loneliness and later life also needs to start using digital data from SM and to engage in digital sociology research and STS studies. Our review found, few studies making use of digital social science approaches and taking advantage of the availability of digital data to examine these pressing challenges.

Notes

1. Social capital does not have a clear, uncontested meaning (Adler and Kwon, 2002), however, most of the definitions agree on defining social capital as the potential benefits derived from social relationships.

2. Emotional loneliness would be what we define here as loneliness and social loneliness would be equivalent to social isolation.

3. Defined as loneliness perceived in a specific moment, i.e. in the evening.
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Further reading


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