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# Impact of the Use of the Internet on Quality of Life in Older Adults: review of literature

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| **Abstract:** | Aim: Given the paucity of data on the use of internet and quality of life, this literature review aimed to to identify the motivations and barriers for internet use and the impact on quality of life on older adults using the internet.<br>Background: Even though older adults are increasingly using information technology, the numbers remain quite small globally. Currently published research primarily focuses on the various ways and methods of information technology use by older adults and the factors influencing use rather than on the impact of information technology on quality of life of older adults.<br>Methods: The studies included in this literature review were searched in three databases: WEB of Science, GoogleScholar and PubMed. English language articles were searched using the terms “older”, “elderly” “senior” “well-being” “life satisfaction” “quality of life” “internet”, and “computer”.<br>Findings: The review demonstrated the association of internet use on quality of life in older adults. The majority of the studies substantiate the advantages of internet use by older adults including the ability to communicate with family and friends, maintain a wide social network, have access to information and participate in online leisure activities. There are some studies, though less in number, which did not find a relationship between wellbeing and use of internet by older adults. The policy implications of this review advocate a multi-dimensional strategy to support internet use by the older people incorporating internet training and education, financial issues, technical support and access needs to be developed. |

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# Impact of the Use of the Internet on Quality of Life in Older Adults: review of literature

## Abstract

Aim: Given the paucity of data on the use of internet and quality of life, this literature review aimed to to identify the motivations and barriers for internet use and the impact on quality of life on older adults using the internet.

Background: Even though older adults are increasingly using information technology, the numbers remain quite small globally. Currently published research primarily focuses on the various ways and methods of information technology use by older adults and the factors influencing use rather than on the impact of information technology on quality of life of older adults.

Methods: The studies included in this literature review were searched in three databases: WEB of Science, GoogleScholar and PubMed. English language articles were searched using the terms “older”, “elderly” “senior” “well-being” “life satisfaction” “quality of life” “internet”, and “computer”.

Findings: The review demonstrated the association of internet use on quality of life in older adults. The majority of the studies substantiate the advantages of internet use by older adults including the ability to communicate with family and friends, maintain a wide social network, have access to information and participate in online leisure activities. There are some studies, though less in number, which did not find a relationship between wellbeing and use of internet by older adults. The policy implications of this review advocate a multi-dimensional strategy to

support internet use by the older people incorporating internet training and education, financial issues, technical support and access needs to be developed.

**Keywords:** Internet; Quality of Life; Older adults; Elderly; Information Technology;

## Introduction

As the population is ageing, there has been an increasing focus on a better quality of life, and the concept of active ageing has started to generate interest amongst researchers, academicians and policy makers. The Madrid International Plan of Action on Ageing (2002) highlighted the role of technology use by older adults and indicated that having access to the internet and being able to use it could potentially help to decrease the feelings of loneliness, insignificance and the intergenerational disparity (MIPAA, United Nations, New York, 2002). The older adults globally have been resistant to adopt technology compared to the younger generations, but this trend is changing slowly. A growing number of older adults are overcoming the barriers to learn, use, and keep updated with the information and communication technologies like internet, and this has only been facilitated with the availability of personal computers, cell phones, laptops, tablets, and other devices. A growing number of older adults are overcoming the barriers to learn, use, and keep updated with information and communication technologies like the internet, and this has been facilitated by the availability of personal computers, cell phones, laptops, tablets, and other devices.

WHO defines Quality of Life (QoL) as "the 'individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (WHOQoL, 1998). The determinants of QoL for the older adults commonly include individual factors such as health, physical activity, socioeconomic stability and personal control, and network factors such as social life, relationship with family, a care network and support system (Walker & Mollenkopf, 2007). The role of technologies

including the internet in influencing QoL of the older adults has generally been a less explored theme globally, and specifically in developing countries. With the increasing use of technology in everyday life, understanding the role of the internet on the quality of life of the older population is important.

This literature review intends to explore the impact of the use of the internet on the quality of health of older adults and discusses the published evidence in relation to the impact of internet use on the older adults specifically in terms of quality of life and tries to point out the gaps in current literature.

## Search Methodology

The currently published literature on the use of the internet by the older adults explores many broad areas including health, social, educational, and psychological science. The studies included in this literature review were searched in three databases: WEB of Science, GoogleScholar and PubMed. English language articles were searched using the terms “older”, “elderly” “senior” “well-being” “life satisfaction” “quality of life” “internet”, and “computer” (Figure 1). Age ranges were not specified because of the wide variation of age ranges across studies. The date range was limited to a time period from 1st January 2000 – 30th December 2018 . In total, 45 full text articles were accessed, which examined the impact of internet use on the quality of life of older adults. The studies that investigated the health impact or use of assisted technologies in the healthcare domain, did not focus on well-being/ life satisfaction/ quality of life of older adults and those studies which focused on specific groups of older adults such as immigrants, those with physical disabilities were excluded from the review considering the differences associated

with using the internet compared with those without physical disabilities . Eventually 38 articles were reviewed for relevance to this particular article and 23 articles were included for discussion in the literature review (Table 1).

## Review of Literature

This review looks at published literature related to use of the internet by older people and the impact on their quality of life. The articles of relevance are discussed after grouping them into subsections entitled: Internet use: communication and social connectedness; Internet use: information and services; and Internet use: impact on well-being. There is a section on critical analysis and a table summarizing the reviewed studies. Finally, the literature review concludes with a critical analysis and summary of the literature review and gaps in the currently available literature.

The studies on older adults and the internet can be broadly segmented into exploring the motivations and barriers of older adults' use of computer technology, identifying differences in computer learning and usage across age groups, and the attitudes, benefits, and perceptions of using computers and the internet by older adults. There is no consensus in the currently published literature on the impact of use of information and communication technology on older adults. Many published studies highlight the positive effect of computer use on the psychological functioning and well-being of the older adults (Werner, Carlson, Jordan-Marsh, and Florence, 2011; Erickson and Johnson 2011; Shapira et al. 2007). The use of the internet by older adults has also been associated with decreased loneliness and depression, better social connectedness, self-esteem and cognitive functioning (Czaja & Lee, 2007; White, et al., 2002), improved self-efficacy, self-control, self-determination, social interaction, education and skills development in

older adults using the internet (Hendrix, 2000) in various studies. In contrast, there are other studies which did not find a correlation between use of the internet by the older adults and well-being or life satisfaction (Slegers, Van Boxtel, and Jolles 2008; Brown 2004)

Per published literature, the primary activities for which the older adults use the internet include - accessing e-mails (Koopman-Boyden, 2009), education, seeking information (Xie, 2009) and shopping (Hernandez-Encuentra, 2009). Kim (2008) in their review summarized the reasons for older adults to use the internet to be in contact with family and friends, to make new contacts and preserve social links, gather information related to current affairs, goods, services and healthcare, do online shopping, banking and leisure activities (Kim, 2008). The attitude and perception of older adults towards the use of the internet have been shown to be influenced by their education and socioeconomic status (Koopman-Boyden, 2009). The benefits of using information technology by older adults include personal and social development, and maintaining social relationships (Koopman-Boyden, 2009). This has given birth to the term ‘‘silver surfers’’, defining the older adults using information and communication technology to narrow the inter-generational gap. Despite this, perceived barriers to the use of the information and communication technology amongst older adults exist. This could be due to various factors including the difficulties in learning new skills, high costs, and lack of confidence in the use of technology (Goodall, 2010).

### 1.1. Internet use: communication and social connectedness

Two major themes emerged from the studies reviewed. The first was the impact of internet use by older adults is on communication with family, friends. The second was social connectedness including maintaining and building social support networks. Communication and social connectedness using the internet potentially impacts the quality of life of older adults. White et al. (2002), looked at the psychological and social impact of the use of the internet on older adults (n=100). Participants were randomized to two groups, the intervention group which received training on how to use the internet for five months and the control group. The intervention group had lower tendency of loneliness and depression, better communication and improved social interactions and a positive attitude towards the use of the internet in comparison to the group which did not receive training on using the internet. The findings were corroborated by the qualitative interview phase of the study (White et al, 2002). The study focused on impact of internet training in older adults and not on the use of internet in older adults, and this is important when looking at the results of the study.

Increasingly today there is a growing population of younger generations moving away from home for work or education and the numbers of nuclear families is increasing. Being able to communicate with family and friends living away is one of the benefits of using the internet for older adults. In another study, it has been found that the use of the internet promotes the interactions of the older adults with family and friends, and helps to expand their social network. Using the internet to communicate resulted in a positive impact on the loneliness and well-being of older adults. The authors found that in their study older adults using the internet had lower levels of loneliness specifically social loneliness and better wellbeing. (Sum, Mathews, Hughes, and Campbell 2008). The authors found that in their study older adults using the internet had

lower levels of loneliness (particularly social loneliness) and better well wellbeing. (Sum, Mathews, Hughes, and Campbell 2008).

### 1.2. Internet use: information and services

Using the internet empowers older adults to be able to access information related to news and current affairs, health related updates, travel and leisure. Karavidas, Lim, and Katsikas (2005) found a positive impact on 222 older adults using the internet on life satisfaction due to various factors including feeling independent, being able to maintain their social networks, and having access to information including health related information. Using the internet for online shopping, banking, playing games and learning helped the older adults to manage even if they have impaired physical abilities (Shapira, Barak, and Gal, 2007). Participation in leisure activities and social networks using the internet can potentially increase the well being of older adults (Nimrod, 2009). Similar findings were also seen in another study, in which the use of internet by older adults was a leisure activity possibly leading to a sense of well being (Heo, Kim, and Won, 2011)

### 1.3. Internet use: Impact on well-being

Well-being can be defined as the presence of positive emotions and moods including contentment and happiness, the absence of negative emotions (such as depression and anxiety), satisfaction with life, fulfilment and positive functioning (Ryff, 1995). Wright (2000) found that in 136 older adults' participation in online support groups had a positive impact on their

psychological well-being, stronger social relations and better support networks in the older adults. It has been shown that use of technology is directly linked to a feeling of independence in older adults leading to a perception of better quality of life (Mynatt & Rogers, 2002). Similar findings were seen in another study, where older adults using the internet were found to have higher psychological well-being levels than those not using the internet (Chen and Persson 2002). The authors did note that the baseline scores in this study were high to begin with (Chen & Persson 2002). Fifty older adults who had received computer and internet training were interviewed about their attitudes and experiences towards the use of internet as a part of the Care OnLine project. Most of these older adults (82%) reported that the use of the internet had a positive impact on their quality of life. Using the internet decreased isolation and improved interactions socially in this study (Osman, Poulson, and Nicolle 2005). Thirty-three older adults interviewed in a study in China reported that using the internet was helpful in making their lives after retirement more meaningful and improving their self-evaluation. It was concluded by the author that using the internet resulted in a sense of well-being in these older adults (Xie, 2007). Koopman-Boyden and Reid (2009) also reported a positive correlation between the use of internet by older adults and their well-being. An analysis of a subset of the European Social Survey (ESS1) showed that older adults (n=11,000) using the internet regularly had decreased social isolation and better life satisfaction. The older adults in the study reported that communicating using the internet helped and was complementary to face-to-face interactions (Lelkes, 2012). Chaumon et al. (2014) found that in 17 older adults living in long-term care with a history of functional loss the use of computers improved the quality of life in general and additionally had a positive impact on their self-sufficiency, self-efficiency and psychological empowerment. In quantitative surveys (n=1780) in older adults (60 years and older) it was seen

that information and communication technology use contributes to their well-being (Ihm and Hsieh, 2015).

Some studies have found conflicting results – for example, in their study Firth and Mellor (2009) did not find a significant difference in the older adults who were using internet for the last twelve months in terms of quantitative scores compared with older adults who were not using the internet. Conversely, when interviewed the older adults using the internet reported a better social connectedness and had a better understanding of using the internet for new learning opportunities. Similarly, in another study, at the end of 12-month training on internet use, 20 older adults when interviewed reported positive experiences and attitudes associated with the use of the internet even though the reported well-being scores in the study did not show improvements (Mellor, Firth, and Moore 2008). That said, there are studies which did not show either a positive impact or any correlation between the use of internet by older adults and life satisfaction, quality of life or well-being. On analysis of the data from National Health and Aging Trends Study (N = 6,443), the authors did not find any correlation of information and communication technology use with well-being of older adults using the internet (Elliot, Mooney, Douthit, and Lynch 2013). Similarly, in another study life satisfaction was similar between older adults who were a part of an online training and those who were not (Dorin, 2007).

## Critical analysis summary of the studies

The studies looking at use of the internet in the older adults are seeing an increase in the last decade. More research is focused on the acceptance of internet technology, the barriers to use of internet technology and the uses of internet technology. Little research focuses on impact on quality of life. As is summarized in Table 1, only one of the studies used a validated QoL scale, the WHOQoL, and one used the SF-36 while none of the studies used the CASP-19. In the studies reviewed, there was a mix of studies looking at older adults who had never used the internet before and were given training during the course of the study, while other looked at older adults using the internet for some time. This could be one of the reasons for discordance between the results on impact of internet use on factors associated with well-being, life satisfaction and other parameters. Many of the studies did not use validated software like the SPSS for quantitative analysis or NVivo for qualitative analysis. Very few studies use a mixed methods approach, and the sample size for most studies was small. Research from developing countries is still lacking. All the studies reviewed here related to impact of internet use on older adults were done in developed countries except for one in China. The findings of this review point towards important policy and practice approaches including exploring investing in ICT training in pre-retirement courses in public and private sector organisations and subsidies for ICT purchase or one-to-one guidance on ICT use.

## Conclusion

On review of the published studies there is an indication that the use of internet by older adults helps to improve life satisfaction and well-being. The majority of the studies substantiate the advantages of internet use by older adults including the ability to communicate with family and friends, maintain a wide social network, have access to information and participate in online leisure activities. There are some studies, though less in number, which did not find a

relationship between well-being and use of internet by older adults. This could possibly be attributed to a "ceiling effect" as the scores of the participants in some of these studies were already high at baseline – so the scope of improvement was attenuated (Chen & Persson, 2002; White et al., 2002) or possibly due to the bias in these studies of not separating the use of the internet from internet training (Slegers, Van Boxtel & Jolles 2008). It was also seen that studies with a qualitative methodology were more likely to elicit a positive impact of the use of internet than quantitative studies.

The gap areas identified from the literature review include the paucity of research in this area from developing countries, few studies with a mixed methods research methodology, the sample size in the studies is usually small, studies limited to older adults in 60 years and above and only a limited number of studies used a validated QoL score to study impact of internet use by older adults on QoL.

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**Ethical Standards:** The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional guidelines on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. Written informed consent was obtained from all subjects/patients

Table

**Table 1 Summary of studies discussed in the literature review***

| Reference | Country/ age group | Methodology | Outcomes |
|---|---|---|---|
| Brown, 2004 | Texas, USA/ 50 years of age and above | N=60; experimental and control group, quantitative | Life satisfaction and self esteem similar between the two groups |
| Chaumon, 2014 | France / mean age 87 years | N=17, longitudinal study, effect of training, qualitative approach | Improved QoL; better social connectedness and communication |
| Chen, 2002 | Ohio, USA/ 60 years and above | N=218; comparison between older internet users and non users and with younger adults; quantitative | Older internet users had better psychological well-being specifically personal growth and sense of life purpose |
| Dorin, 2007 | Kansas, USA/ 55 years of age and above | N=93;comparison of internet users and non users; quantitative | Life satisfaction similar between the two groups |
| Elliot, 2013 | USA/ 65 years and above | N=6443; cross-sectional survey; National Health | No effect of use of information and communication technology on well being or mental health |

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| | | and Ageing Trends study | |
| Erickson, 2011 | Canada/ 60 years and above | N=122; cross-sectional survey; quantitative | Use of the internet correlated with wellness (loneliness, life satisfaction) |
| Firth, 2009 | Australia/ 65 years and above | N=8, quantitative and qualitative | No difference in quantitative scores; qualitative interviews showed a sense of improved well being |
| Hendrix, 2000 | USA | Review; | Improved self-esteem and social interaction |
| Hernández-Encuentra, 2009 | Barcelona, Spain/ 65 years and above | N=7,13; qualitative and quantitative | Information and communication technology linked to its usefulness, maintenance of independence. |
| Ihm, 2015 | Chicago, USA/ 60 years and above | N=1780; quantitative | Information and communication technology linked to well-being |

| Reference | Country/ age group | Methodology | Outcomes |
|---|---|---|---|
| Karavidas, 2005 | Florida, USA/ 53 years and above | N=222; quantitative cross-sectional survey in older adults using computers | Increased self-efficacy and lower life satisfaction. |
| Koopman-Boyden, 2009 | New Zealand/ 65 years and above | N=1680, random sample, used WHO-QoL, quantitative survey | Positive relationship between internet use and wellbeing, higher self-reported health status, and increased satisfaction with, leisure and recreation activities. |
| Lelkes, 2012 | Europe/ 65 years and above | N=11,000; European Social Survey (ESS1); cross-sectional, quantitative | Better wellbeing, life satisfaction; less social isolation in older internet users |
| Mellor, 2008 | Australia/ 55 years and above | N=20; 12-month study; quantitative and qualitative | Quantitative showed a negative impact, while qualitative results showed positive impact on well being |

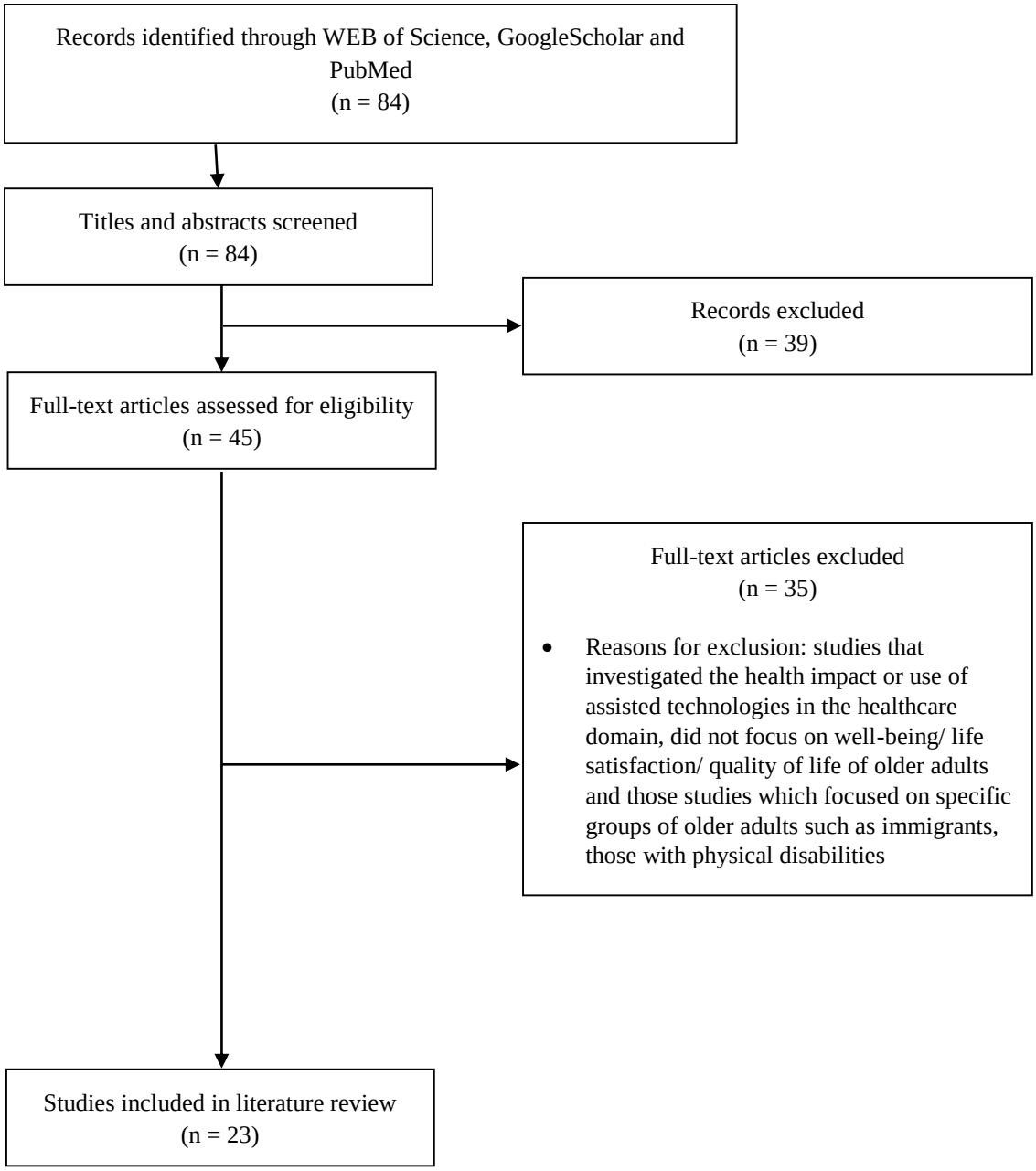
| | | | |
|---|---|---|---|
| Nimrod, 2009 | USA | 40 online communities, quantitative survey | Increased social support, self-preservation, leisure activity, social network |
| Osman, 2005 | UK/ mean age 61 years | N=50; CareOnline project; qualitative interviews | Positive impact of internet training and use |
| Shapira, 2007 | Israel/ 70 years and above | N=22; quantitative surveys | Older adults who began using the internet felt less depressed, more satisfied with life. |
| Slegers, 2008 | Netherlands/ 65 years and above | N=191; 12-month study; randomized control; SF-36 used; quantitative | Using computers and the internet did not influence daily functioning, well-being and social network of older adults. |
| Sum, 2008 | Australia/ 55 years and above | N=222; online survey; quantitative | Lower levels of loneliness with use of the internet |
| Werner, 2011 | USA/ 60 years and above | N=460; quantitative | Positive impact on well-being in older adults using the internet |
| White, 2002 | USA/ 60 years and above | N=103;5 months study; randomized control; | Internet use associated with less loneliness and depression, more positive attitudes |

| | | | |
|---|---|---|---|
| | | quantitative and qualitative | |
| **Reference** | **Country/ age group** | **Methodology** | **Outcomes** |
| Wright, 2000 | USA/ 62 years and above | N=136; online questionnaire; quantitative | Higher feeling of social support and satisfaction with internet use |
| Xie, 2007 | China/ 60 years and above | N=33; interview; grounded theory methodology; qualitative | Internet use made the post-retirement period more meaningful, improved self-evaluation and positively impacted with the well-being |

*In the quantitative studies non-validated measures were used such as researcher-selected questions or Likert scales.

Figure

**Figure 1.** Flow diagram of the selection of studies.



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# Impact of the Use of the Internet on Quality of Life in Older Adults: review of literature

## Abstract

Aim: Given the paucity of data on the use of internet and quality of life, this literature review aimed to to identify the motivations and barriers for internet use and the impact on quality of life on older adults using the internet.

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**Keywords:** Internet; Quality of Life; Older adults; Elderly; Information Technology;

## Introduction

As the population is ageing, there has been an increasing focus on a better quality of life, and the concept of active ageing has started to generate interest amongst researchers, academicians and policy makers. The Madrid International Plan of Action on Ageing (2002) highlighted the role of technology use by older adults and indicated that having access to the internet and being able to use it could potentially help to decrease the feelings of loneliness, insignificance and the intergenerational disparity (MIPAA, United Nations, New York, 2002). The older adults globally have been resistant to adopt technology compared to the younger generations, but this trend is changing slowly. A growing number of older adults are overcoming the barriers to learn, use, and keep updated with information and communication technologies like the internet, and this has been facilitated by the availability of personal computers, cell phones, laptops, tablets, and other devices.

WHO defines Quality of Life (QoL) as "the 'individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (WHOQoL, 1998). The determinants of QoL for the older adults commonly include individual factors such as health, physical activity, socioeconomic stability and personal control, and network factors such as social life, relationship with family, a care network and support system (Walker & Mollenkopf, 2007). The role of technologies including the internet in influencing QoL of the older adults has generally been a less explored theme globally, and specifically in developing countries. With the increasing use of technology

in everyday life, understanding the role of the internet on the quality of life of the older population is important.

This literature review intends to explore the impact of the use of the internet on the quality of health of older adults and discusses the published evidence in relation to the impact of internet use on the older adults specifically in terms of quality of life and tries to point out the gaps in current literature.

## Search Methodology

The currently published literature on the use of the internet by the older adults explores many broad areas including health, social, educational, and psychological science. The studies included in this literature review were searched in three databases: WEB of Science, GoogleScholar and PubMed. English language articles were searched using the terms “older”, “elderly” “senior” “well-being” “life satisfaction” “quality of life” “internet”, and “computer” (Figure 1). Age ranges were not specified because of the wide variation of age ranges across studies. The date range was limited to a time period from 1st January 2000 – 30th December 2018. In total, 45 full text articles were accessed, which examined the impact of internet use on the quality of life of older adults. The studies that investigated the health impact or use of assisted technologies in the healthcare domain, did not focus on well-being/ life satisfaction/ quality of life of older adults and those studies which focused on specific groups of older adults such as immigrants, those with physical disabilities were excluded from the review considering the differences associated with using the internet compared with those without physical disabilities . Eventually 38 articles

were reviewed for relevance to this particular article and 23 articles were included for discussion in the literature review (Table 1).

## Review of Literature

This review looks at published literature related to use of the internet by older people and the impact on their quality of life. The articles of relevance are discussed after grouping them into subsections entitled: Internet use: communication and social connectedness; Internet use: information and services; and Internet use: impact on well-being. There is a section on critical analysis and a table summarizing the reviewed studies. Finally, the literature review concludes with a critical analysis and summary of the literature review and gaps in the currently available literature.

The studies on older adults and the internet can be broadly segmented into exploring the motivations and barriers of older adults' use of computer technology, identifying differences in computer learning and usage across age groups, and the attitudes, benefits, and perceptions of using computers and the internet by older adults. There is no consensus in the currently published literature on the impact of use of information and communication technology on older adults. Many published studies highlight the positive effect of computer use on the psychological functioning and well-being of the older adults (Werner, Carlson, Jordan-Marsh, and Florence, 2011; Erickson and Johnson 2011; Shapira et al. 2007). The use of the internet by older adults has also been associated with decreased loneliness and depression, better social connectedness, self-esteem and cognitive functioning (Czaja & Lee, 2007; White, et al., 2002), improved self-efficacy, self-control, self-determination, social interaction, education and skills development in older adults using the internet (Hendrix, 2000) in various studies. In contrast, there are other

studies which did not find a correlation between use of the internet by the older adults and well-being or life satisfaction (Slegers, Van Boxtel, and Jolles 2008; Brown 2004)

Per published literature, the primary activities for which the older adults use the internet include - accessing e-mails (Koopman-Boyden, 2009), education, seeking information (Xie, 2009) and shopping (Hernandez-Encuentra, 2009). Kim (2008) in their review summarized the reasons for older adults to use the internet to be in contact with family and friends, to make new contacts and preserve social links, gather information related to current affairs, goods, services and healthcare, do online shopping, banking and leisure activities (Kim, 2008). The attitude and perception of older adults towards the use of the internet have been shown to be influenced by their education and socioeconomic status (Koopman-Boyden, 2009). The benefits of using information technology by older adults include personal and social development, and maintaining social relationships (Koopman-Boyden, 2009). This has given birth to the term ‘‘silver surfers’’, defining the older adults using information and communication technology to narrow the inter-generational gap. Despite this, perceived barriers to the use of the information and communication technology amongst older adults exist. This could be due to various factors including the difficulties in learning new skills, high costs, and lack of confidence in the use of technology (Goodall, 2010).

### 1.1. Internet use: communication and social connectedness

Two major themes emerged from the studies reviewed. The first was the impact of internet use by older adults is on communication with family, friends. The second was social connectedness

including maintaining and building social support networks. Communication and social connectedness using the internet potentially impacts the quality of life of older adults. White et al. (2002), looked at the psychological and social impact of the use of the internet on older adults (n=100). Participants were randomized to two groups, the intervention group which received training on how to use the internet for five months and the control group. The intervention group had lower tendency of loneliness and depression, better communication and improved social interactions and a positive attitude towards the use of the internet in comparison to the group which did not receive training on using the internet. The findings were corroborated by the qualitative interview phase of the study (White et al, 2002). The study focused on impact of internet training in older adults and not on the use of internet in older adults, and this is important when looking at the results of the study.

Increasingly today there is a growing population of younger generations moving away from home for work or education and the numbers of nuclear families is increasing. Being able to communicate with family and friends living away is one of the benefits of using the internet for older adults. In another study, it has been found that the use of the internet promotes the interactions of the older adults with family and friends, and helps to expand their social network. Using the internet to communicate resulted in a positive impact on the loneliness and well-being of older adults. The authors found that in their study older adults using the internet had lower levels of loneliness (particularly social loneliness) and better well wellbeing. (Sum, Mathews, Hughes, and Campbell 2008).

### 1.2. Internet use: information and services

Using the internet empowers older adults to be able to access information related to news and current affairs, health related updates, travel and leisure. Karavidas, Lim, and Katsikas (2005) found a positive impact on 222 older adults using the internet on life satisfaction due to various factors including feeling independent, being able to maintain their social networks, and having access to information including health related information. Using the internet for online shopping, banking, playing games and learning helped the older adults to manage even if they have impaired physical abilities (Shapira, Barak, and Gal, 2007). Participation in leisure activities and social networks using the internet can potentially increase the well being of older adults (Nimrod, 2009). Similar findings were also seen in another study, in which the use of internet by older adults was a leisure activity possibly leading to a sense of well being (Heo, Kim, and Won, 2011)

### 1.3. Internet use: Impact on well-being

Well-being can be defined as the presence of positive emotions and moods including contentment and happiness, the absence of negative emotions (such as depression and anxiety), satisfaction with life, fulfilment and positive functioning (Ryff, 1995). Wright (2000) found that in 136 older adults' participation in online support groups had a positive impact on their psychological well-being, stronger social relations and better support networks in the older adults. It has been shown that use of technology is directly linked to a feeling of independence in older adults leading to a perception of better quality of life (Mynatt & Rogers, 2002). Similar findings were seen in another study, where older adults using the internet were found to have

higher psychological well-being levels than those not using the internet (Chen and Persson 2002). The authors did note that the baseline scores in this study were high to begin with (Chen & Persson 2002). Fifty older adults who had received computer and internet training were interviewed about their attitudes and experiences towards the use of internet as a part of the Care OnLine project. Most of these older adults (82%) reported that the use of the internet had a positive impact on their quality of life. Using the internet decreased isolation and improved interactions socially in this study (Osman, Poulson, and Nicolle 2005). Thirty-three older adults interviewed in a study in China reported that using the internet was helpful in making their lives after retirement more meaningful and improving their self-evaluation. It was concluded by the author that using the internet resulted in a sense of well-being in these older adults (Xie, 2007). Koopman-Boyden and Reid (2009) also reported a positive correlation between the use of internet by older adults and their well-being. An analysis of a subset of the European Social Survey (ESS1) showed that older adults (n=11,000) using the internet regularly had decreased social isolation and better life satisfaction. The older adults in the study reported that communicating using the internet helped and was complementary to face-to-face interactions (Lelkes, 2012). Chaumon et al. (2014) found that in 17 older adults living in long-term care with a history of functional loss the use of computers improved the quality of life in general and additionally had a positive impact on their self-sufficiency, self-efficiency and psychological empowerment. In quantitative surveys (n=1780) in older adults (60 years and older) it was seen that information and communication technology use contributes to their well-being (Ihm and Hsieh, 2015).

Some studies have found conflicting results – for example, in their study Firth and Mellor (2009) did not find a significant difference in the older adults who were using internet for the last twelve

months in terms of quantitative scores compared with older adults who were not using the internet. Conversely, when interviewed the older adults using the internet reported a better social connectedness and had a better understanding of using the internet for new learning opportunities. Similarly, in another study, at the end of 12-month training on internet use, 20 older adults when interviewed reported positive experiences and attitudes associated with the use of the internet even though the reported well-being scores in the study did not show improvements (Mellor, Firth, and Moore 2008). That said, there are studies which did not show either a positive impact or any correlation between the use of internet by older adults and life satisfaction, quality of life or well-being. On analysis of the data from National Health and Aging Trends Study (N = 6,443), the authors did not find any correlation of information and communication technology use with well-being of older adults using the internet (Elliot, Mooney, Douthit, and Lynch 2013). Similarly, in another study life satisfaction was similar between older adults who were a part of an online training and those who were not (Dorin, 2007).

## Critical analysis summary of the studies

The studies looking at use of the internet in the older adults are seeing an increase in the last decade. More research is focused on the acceptance of internet technology, the barriers to use of internet technology and the uses of internet technology. Little research focuses on impact on quality of life. As is summarized in Table 1, only one of the studies used a validated QoL scale, the WHOQoL, and one used the SF-36 while none of the studies used the CASP-19. In the

studies reviewed, there was a mix of studies looking at older adults who had never used the internet before and were given training during the course of the study, while other looked at older adults using the internet for some time. This could be one of the reasons for discordance between the results on impact of internet use on factors associated with well-being, life satisfaction and other parameters. Many of the studies did not use validated software like the SPSS for quantitative analysis or NVivo for qualitative analysis. Very few studies use a mixed methods approach, and the sample size for most studies was small. Research from developing countries is still lacking. All the studies reviewed here related to impact of internet use on older adults were done in developed countries except for one in China. The findings of this review point towards important policy and practice approaches including exploring investing in ICT training in pre-retirement courses in public and private sector organisations and subsidies for ICT purchase or one-to-one guidance on ICT use.

## Conclusion

On review of the published studies there is an indication that the use of internet by older adults helps to improve life satisfaction and well-being. The majority of the studies substantiate the advantages of internet use by older adults including the ability to communicate with family and friends, maintain a wide social network, have access to information and participate in online leisure activities. There are some studies, though less in number, which did not find a relationship between well-being and use of internet by older adults. This could possibly be attributed to a "ceiling effect" as the scores of the participants in some of these studies were already high at baseline – so the scope of improvement was attenuated (Chen & Persson, 2002; White et al., 2002) or possibly due to the bias in these studies of not separating the use of the internet from internet training (Slegers, Van Boxtel & Jolles 2008). It was also seen that studies

with a qualitative methodology were more likely to elicit a positive impact of the use of internet than quantitative studies.

The gap areas identified from the literature review include the paucity of research in this area from developing countries, few studies with a mixed methods research methodology, the sample size in the studies is usually small, studies limited to older adults in 60 years and above and only a limited number of studies used a validated QoL score to study impact of internet use by older adults on QoL.

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