



Can the internet mitigate the negative effect of widowhood on Quality of Life? A gender analysis

Patrícia Silva^{1,2} · Raquel Gonçalves^{2,3} · Ricardina Magalhães¹ · Alice Delerue Matos⁴

Received: 23 February 2022 / Accepted: 14 June 2022 / Published online: 9 September 2022
© The Author(s) 2022

Abstract

Widowhood often reduces the Quality of Life of individuals of advanced ages by negatively affecting their social network ties. Yet conversely, the Internet has also created new opportunities for communication and interaction, thus contributing to improved Quality of Life. This research analyses the role of the Internet in the relationship between widowhood and Quality of Life from a gender perspective.

This study focuses on 31,814 individuals aged 65 or over residing in 17 European countries who participated in Wave 6 of SHARE – the Survey of Health, Ageing and Retirement in Europe.

The linear regression analyses highlighted that the role of the Internet in the relationship between widowhood and Quality of Life varies according to gender. More specifically, in Europe, the Quality of Life for widowed women aged 65+ using the Internet is .414 higher (CI=.006 to .0822) than widows who do not use the Internet and married women or women in a de facto relationship whether or not they use the Internet. The results have relevant implications for the development of social policies and suggest a need to develop digital inclusion projects targeting older people, particularly widows, to help promote their Quality of Life.

Keywords widowhood, Quality of Life · Internet · gender · older adults

✉ Patrícia Silva
patriciasilva@ics.uminho.pt

¹ Communication and Society Research Centre, Institute of Social Sciences, University of Minho, Braga, Portugal

² Higher School of Education, Polytechnic Institute of Viana do Castelo, Viana do Castelo, Portugal

³ Institute of Social and Political Sciences, Centre for Public Administration and Public Policies, Universidade de Lisboa, Lisboa, Portugal

⁴ Department of Sociology and Communication and Society Research Centre, Institute of Social Sciences, University of Minho, Braga, Portugal

Introduction

Widowhood has been associated with several health problems. The literature indicates a greater likelihood of widowed people developing cardiovascular diseases and suffering from chronic pain (Ennis & Majid, 2019); having poorer mental health (Ennis & Majid, 2019; Holm et al., 2019; Schaan, 2013; Wilcox et al., 2003); displaying more cognitive problems (Barragán-garcía et al., 2021; Singham et al., 2021) and an even higher risk of mortality (Blanner et al., 2020; Ennis & Majid, 2019) compared to non-widowed people.

At the same time, widowhood has been associated with the restructuring of social network ties (Antonucci et al., 2002; Cornwell & Laumann, 2015; Gumà & Fernández-Carro, 2019; Ha, 2008), which may lead to less social support (Guiaux & Tilburg, 2007), or even greater loneliness (Carr et al., 2018; Savikko et al., 2005; Štípková, 2019).

Social support network ties can help to alleviate the loss of a spouse (Holm et al., 2019) by facilitating access to resources to meet everyday needs (Smith & Christakis, 2008; Wellman & Frank, 2001). These support network ties contribute to the social integration (Smith & Christakis, 2008). They are fundamental for preventing emotional problems and consolidating identity and individual and social skills (Sluzki, 2000). The importance of these networks for reinforcing self-esteem and promoting adaptive strategies in the second half of life has also been underlined (Pin et al., 2005).

The abovementioned factors associated with widowhood - health problems and weaker social support networks ties - contribute to the fact that widowed people have a lower level of Quality of Life (QoL) compared to married people (Gutiérrez-Vega et al., 2018; Peña-Longobardo et al., 2021; van Boekel et al., 2021; Zhou & Hearst, 2016).

The Internet has been identified as a way of maintaining and restructuring social network ties since, according to the theory of latent ties (Haythornthwaite, 2002, 2005), it allows individuals to activate latent ties, reformulate weak ties and reinforce strong ones. The impact of the ties established through the Internet on older adults' QoL may vary according to the nature of the ties: the close ones that the Internet may strengthen have a positive impact on the QoL (Silva et al., 2018), whereas weak ties relating to new relationships established by the Internet are associated with lower levels of well-being (Sum et al., 2008).

According to most of the literature, the use of the Internet is associated with higher levels of QoL (Aggarwal et al., 2020; Khalaila & Vitman-Schorr, 2018; Silva et al., 2018) and greater well-being in older adults (Van Velsen et al., 2020), as well as reducing loneliness (Silva et al., 2020) and social isolation (Silva et al., 2021b). Its positive impact on the QoL of older adults mainly relates to the possibilities for communicating with individuals with whom they have a significant emotional relationship (Antonucci et al., 2017), on the one hand and, on the other, the way that the Internet can boost the positive role of social networks ties (Silva et al., 2018). The Internet can be crucial for obtaining more social support (Utz et al., 2002), which is essential for the well-being of specific population groups

such as the widowed group (Gumà & Fernández-Carro, 2019; Utz et al., 2002; De Vries et al., 2014). According to Hong et al. (2021), Internet use contributes to successful ageing in widowed older adults when they have no one to interact with at home and don't want to interfere with their children's lives. They resort to online activities that help them feel emotionally supported (Hong et al., 2021). Also, through the Internet, they establish meaningful relationships with other people, receiving support that reduces loneliness (Silverman & Thomson, 2018).

While most studies identify advantages in Internet use by older adults, mainly due to the ability to communicate with close relationships, other research has found no association between well-being and Internet use (Aggarwal et al., 2020).

Despite the noted benefits of using the Internet, there are several obstacles to its use by older adults, notably in terms of access to and accessibility of the technology (Martinez-Pecino et al., 2013; Silva et al., 2017). Some studies have identified gender differences and inequalities in technology use at older ages, with women using the Internet less than men (Dias, 2012; König et al., 2018). However, other studies suggest that the number of women using the Internet tends to increase (Horrigan, 2000), moving toward a gender equality (Fox, 2004; Martinez-Pecino et al., 2013; Silva et al., 2017). The literature also shows that family network ties motivate women to use the Internet more than men (Silva et al., 2021a).

In addition, at older ages, men and women can use the Internet for different purposes. Although most older adults use the Internet to communicate (Aggarwal et al., 2020; Martinez-Pecino et al., 2013; Russell et al., 2008), women tend to use it more for social activities than men (Casado-Muñoz et al., 2015; Ihm & Hsieh, 2015).

On the other hand, the characteristics of social support network ties, which are very important for the QoL of widowed persons, also differ according to gender (Cornwell, 2011; Gurung et al., 2003; Hampton et al., 2009; Schwartz & Litwin, 2018). More specifically, women at advanced ages have social networks that are larger (Cornwell, 2011; Hampton et al., 2009; Schwartz & Litwin, 2018) and more diversified (Cornwell, 2011; Schwartz & Litwin, 2018) than those of men. The literature demonstrates that older men tend to receive support primarily from their wives. Women rely more often on family and friends (Gurung et al., 2003), and they maintain relationships outside the household more frequently (Cornwell, 2011) than men. The different characteristics of the social support network ties of men and women contribute to the fact that widowhood is not experienced in the same way by each gender (Streeter, 2020). Indeed, compared to men, widowed women are more dependent on their children financially, legally and for emotional or instrumental support (Ha et al., 2006). The experience of widowhood also differs according to gender due to the different social roles of each individual throughout life. This contributes to the fact that when they get widowed, men and women have distinct difficulties performing their daily life tasks (Fang et al., 2012; Utz et al., 2011).

The impact that widowhood has on health also varies with gender. In this regard, some studies point to a more significant impact of widowhood on mental health in women than in men (Chen et al., 2020). Other studies find no gender differences in mental health. Still, they conclude that women are disadvantaged as they are more likely to be widowed in less favourable conditions (Sasson & Umberson, 2014). On

the other hand, widowed older men tend to be more isolated and experience more loneliness (Isherwood et al., 2017).

Given the negative association between widowhood and QoL, on the one hand, and the positive association between Internet use and the QoL of older individuals, on the other, and gender differences in widowhood and Internet use, this article aims to analyse the role of the Internet in the relationship between widowhood and QoL from a gender perspective.

Methods

Design and study population

The study sample consists of 31,814 individuals aged 65 and over who were interviewed as part of the SHARE – Survey of Health, Ageing and Retirement in Europe (wave 6) in 17 countries: Portugal (N=883), Greece (N=2390), Italy (N=2675), Spain (N=3185), Denmark (N=1491), Sweden (N=2241), Austria (N=1711), Belgium (N=2413), France (N=1762), Germany (N=1938), Switzerland (N=1366), Luxembourg (N=605), Poland (N=839), Czech Republic (N=2483); Slovenia (N=2115), Estonia (N=2641), and Croatia (N=1076). Details on the SHARE study in Europe have been described elsewhere (Malter & Börsch-Supan, 2017).

Measures

Dependent variable

Quality of Life was evaluated using the CASP-12 scale (Hyde et al., 2003; Knesebeck et al., 2005; Wiggins et al., 2008). On a four-position Likert scale ranging from “often” to “never”, the participants indicated how often they experienced feelings and situations related to four dimensions: control, autonomy, self-realisation, and pleasure. Each of these dimensions comprises three items (e.g. *How often do you think your age prevents you from doing what you would like to do? How often do you feel that what happens to you is out of your control?*).

The CASP-12 scale ranges from 12 to 48 points, and the highest values relate to higher QoL levels. In this study, the scale confirmed good internal consistency with a Cronbach’s alpha of .825.

Variables of interest

Internet use is a dichotomous variable obtained from the answer to the following question: “During the past 7 days, have you used the Internet for e-mailing, searching for information, making purchases, or any other purpose at least once?”

The widowhood variable is dichotomous. On one side, we have widowed individuals who do not live with their new spouse or partner, and on the other side, married or in a de facto partnership, individuals who live with their spouse or partner.

Co-variables

The analysis includes a set of socio-demographic, economic and health variables identified in the literature as determinants of the QoL (Aroogh & Shahboulaghi, 2020; Conde-Sala et al., 2017; Datta et al., 2015; Huxhold et al., 2013; Litwin et al., 2014; Netuveli et al., 2006; Risal et al., 2020; Rodrigues et al., 2017; Silva et al., 2018; Webb et al., 2011).

Sociodemographic and economic variables *Age*; *Educational level* was assessed using the International Standard Classification of Education 1997 (ISCED-97), divided into three categories: i) primary education or less (ISCED-97 score = 0–2); ii) secondary education (ISCED-97 score = 3); and iii) post-secondary education (ISCED-97 score = 4–6); *Self-perception of financial stress*: 'great difficulty' or 'some difficulty' in coping with monthly expenses, 'easy' or 'very easy' to handle monthly expenses.

Social Network: The scale (Litwin et al., 2014) combines the five main characteristics of a social network: size; geographic proximity; contact frequency; emotional closeness; and type of relationship. The scale score is higher for respondents with (i) a larger network, (ii) more people in the network living within 25 kilometres, (iii) more people in the network contacted weekly or more often, (iv) more people in the network cited as very or extremely close emotionally, and (v) more diverse networks. The scale ranges from 0 to 4 values (Litwin & Levinson, 2018; Litwin & Stoeckel, 2014).

Welfare regime: Southern (Portugal; Greece; Italy and Spain), Northern (Denmark and Sweden); Central (Austria; Belgium; France; Germany; Switzerland and Luxemburg); and Eastern Europe (Poland; Czech Republic; Slovenia; Estonia and Croatia). In the regression analysis, the Southern is the reference category.

Health variables *Depressive symptoms* evaluated by the EURO-D scale (Prince et al., 1999), which ranges from 0 to 12 points, referring to the presence or absence of 12 symptoms of depression (depressed mood; pessimism; suicidal thoughts; guilt; sleep; interest; irritability; appetite; fatigue; concentration; enjoyment, and tearfulness). As in previous studies, this distinguishes between individuals with four or more symptoms and individuals with lower scores (Guerra et al., 2015). This variable was also included in other studies on the Quality of life of older adults (Conde-Sala et al., 2017; Silva et al., 2018)

ADLs- number of limitations in Activities of daily living that respondents reported having difficulty doing alone (scale range: 0 to 6), such as bathing, dressing, and toileting. Higher scores represented poorer function or greater dependence (Mehrbrodt et al., 2017). This scale was also included in other studies on the Quality of life of older adults (Conde-Sala et al., 2017; Silva et al., 2018)

Statistical analysis

Firstly, we conducted a descriptive analysis of sociodemographic, economic and health differences between married and widowed people by gender. We used the chi-square test to assess the interdependence between the two variables. The means of the continuous variables were also compared using Student t-tests for independent samples. The statistical results of the tests with $p < .05$ were considered significant. The results were also complemented by effect size measures (Cohen's d/Φ). The interpretation of these results was based on Cohen (1988). Calibrated individual weights were only used in descriptive analyses.

Secondly, a multiple linear regression was carried out for each gender to analyse the role of the Internet in the relationship between widowhood and the level of QoL. In Model 1, only the control variables were considered. In contrast, in Model 2, in addition to the control variables, the variables of interest (Internet and widowhood) and an interaction term (Internet \times widowhood) were introduced to analyse the role of the Internet in the relationship between widowhood and QoL.

Statistical analyses were performed using SPSS software, version 25.

Results

Table 1 displays the characteristics of widowed people and people who are married or in a de facto relationship, aged 65 or older, according to gender. It shows that widowed men and women have lower QoL levels (small effect size) and that they use the Internet less (small effect size) than their counterparts who are married or in a de facto relationship.

Regarding sociodemographic characteristics, both widows (large effect size) and widowers (medium effect size) are older than their married peers.

Widows have lower educational levels than married women (small effect size), report a worse financial situation (small effect size), and have smaller, less diversified and less close social networks in geographical and emotional terms (small effect size).

With regard to physical and mental health, widows aged 65 and older have more limitations in performing activities of daily living (small effect size). They more frequently present four or more depressive symptoms (small effect size) than married women in the same age group.

The importance of sociodemographic, economic and health variables for the level of QoL of European men and women aged 65 or older can be analysed in Table 2, Model 1. In this model, the more advanced ages, in addition to a negative perception of financial situation, are associated with lower levels of QoL. On the other hand, higher levels of education and broader, more diverse social networks with greater geographic and emotional proximity are associated with a higher level of QoL for both genders.

Health problems, specifically, the existence of four or more depressive symptoms, and a greater number of limitations in basic activities of daily living, contribute negatively to the level of QoL of both male and female individuals. Finally, it can also

Table 1 Sociodemographic, economic and health characteristics of adults aged 65 and older, widowed and married, according to gender

Variables	Female				Male			
	Widowers (N=6918)	Married (N=10334)	2.0<g id="1"></g>	Cohen's d/Phi	Widowers (N=1574)	Married (N=12988)	χ^2/t	Cohen's d/Phi
Widowhood (%)	50.1%	49.9%			16.1%	83.9%		
CASP (sd)	34.32 (6.8269)	36.78 (6.4089)	-22.669***	-.370*	36.24 (6.7629)	37.53 (6.1489)	-7.703***	-.216*
Internet								
Internet use	12.1%	29.1%	767.126***	-.211*	21.1%	40.1%	165.093***	-.107*
Internet non-user	87.9%	70.9%			78.9%	59.9%		
Sociodemographic and economic characteristics								
Average age (sd)	79.8(7.611)	73.24(6.065)	59.366***	.922***	79.77(7.548)	74.05(6.511)	28.775***	.768**
Education								
Low (%)	68.9%	53.0%	385.038***	.150*	51.6%	43.5%	65.618	.068
Medium (%)	22.5%	30.6%			27.7%	31.4%		
High (%)	8.5%	16.4%			20.7%	25.0%		
Positive financial situation (%)	54.6%	69.1%	334.603***	.143*	69.4%	68.1%	3.596***	-.016
Negative financial situation (%)	45.4%	30.9%			30.6%	31.9%		
Social Network Scale (0-4)	1.86 (.820)	2.17 (.825)	-16.740**	-.265*	1.74 (.828)	1.94 (.837)	-5.712***	-.160
Health								

Table 1 (continued)

Variables	Female				Male			
	Widowers (N=6918)	Married (N=10334)	2.0<g id="1"></ g>	Cohen's d/Phi	Widowers (N=1574)	Married (N= 12988)	χ^2/t	Cohen's d/Phi
With depressive symptoms (≥ 4)	48.4%	36.1%	190.557***	.109*	33.5%	20.8%	120.667***	.094
Without depressive symptoms	51.6%	63.9%			66.5%	79.2%		
Number Adl limitations (sd)	.820 (1.58)	.310 (.988)	20.786***	.323*	.520 (1.272)	.310 (.996)	5.569***	.149
Welfare regime								
Southern	37.4%	37%			34%	38%		
Northern	2.9%	4%			4%	4%		
Central	41.8%	48%			45%	46%		
Eastern	17.9%	11%			17%	11%		

Source: Source: SHARE wave 6, version 7.1.0 weighted data.

N = 31814 (N unweighted).

Notes: $\chi^2/t = *p < .05$ ** $p < .01$; *** $p < .001$

Cohen's d/Phi: small effect size*; medium effect size**; large or very large effect size***

Table 2 The role of the Internet on the relationship between widowhood and QoL by gender

	Female						Male					
	Model 1			Model 2			Model 1			Model 2		
	B	se	95%IC	B	se	95%IC	B	se	95%IC	B	se	95%IC
Constant	44.304395	.508	43.309; 45.299	43.092	.551	42.011; 44.172	44.640	.538	43.585; 45.696	43.573	.568	42.458; 44.687
Age	-.117***	.006	-.129; -.104	-.099***	.007	-.114; -.085	-.110***	.007	-.123; -.096	-.097***	.007	-.111; -.083
Education (Ref. Primary or less):												
Secondary	.693***	.106	.485; .900	.586***	.107	.376; .796	.700***	.114	.476; .924	.606***	.115	.38; .832
Post-secondary	.564***	.120	.329; .799	.342**	.125	.097; .587	.713***	.119	.479; .947	.467***	.125	.221; .712
Negative financial situation	-3.143***	.096	-3.331; -2.955	-3.084***	.097	-3.273; -2.895	-3.176***	.105	-3.383; -2.97	-3.091***	.106	-3.299; -2.883
Social Network Scale	.532***	.051	.432; .632	.506***	.051	.406; .605	.403***	.053	.299; .507	.389***	.053	.285; .493
Euro-D (≤ 4 symptoms of depression)	-4.596***	.091	-4.775; -4.417	-4.567***	.091	-4.746; -4.388	-4.826***	.116	-5.054; -4.598	-4.797***	.116	-5.025; -4.569
ADL	-1.134***	.050	-1.233; -1.035	-1.121***	.050	-1.22; -1.023	-1.229***	.065	-1.356; -1.102	-1.213***	.065	-1.34; -1.086
Welfare regime (Ref. Southern);												
Northern	4.478***	.157	4.169; 4.786	4.237***	.164	3.916; 4.559	3.606***	.159	3.295; 3.918	3.337***	.165	3.014; 3.66
Central	3.977***	.122	3.737; 4.216	3.903***	.124	3.661; 4.146	3.418***	.130	3.163; 3.674	3.294***	.132	3.036; 3.553
Eastern	1.705***	.117	1.476; 1.933	1.723***	.118	1.493; 1.953	1.111***	.128	.860; 1.362	1.100***	.128	.849; 1.351
Widowhood												
Internet use												
Internet* Widowhood												
	R ² = .462			R ² = .464			R ² = .411			R ² = .413		

Source: SHARE wave 6, version 7.1.0 N unweighted data.

N Female= 13738; N Male= 1176 (N unweighted)

*p < .05 ***p < .01; ****p < .001

be noted that the level of QoL in the northern, central and eastern European countries is higher than the level of QoL in the countries of southern Europe.

In Model 2, the two variables of interest for this research – Internet and widowhood – and also a term of interaction between them were introduced. It is possible to observe that, even considering all the control variables (which maintained a similar relationship with QoL as previously reported), widowhood is associated with a lower level of QoL in the case of women. More specifically, widows have a level of QoL $-.302$ lower (CI= $.006$ to $.822$) than married women or women in a de facto relationship

In the case of males, no statistically significant differences were found between widowers and individuals who were married or in a de facto relationship.

The use of the Internet showed a positive relationship with QoL level in men and women. More specifically, women who use the Internet have a higher QoL level $.530$ (CI= $.282$ to $.779$) - compared to their counterparts who do not use the Internet. In the same vein, male Internet users report a higher level of QoL than their non-user peers - $.705$ (CI= $.483$ to $.927$).

The term of interaction between Internet use and widowhood, also introduced into the model, makes it possible to conclude that widows who use the Internet have a higher level of QoL than other women: widows who do not use the Internet and married women or women in a de facto relationship whether or not they use the Internet (Fig. 1). The term of interaction is not significant in the case of men; that is, Internet use is not associated with differences in the level of QoL between widowers and other men.

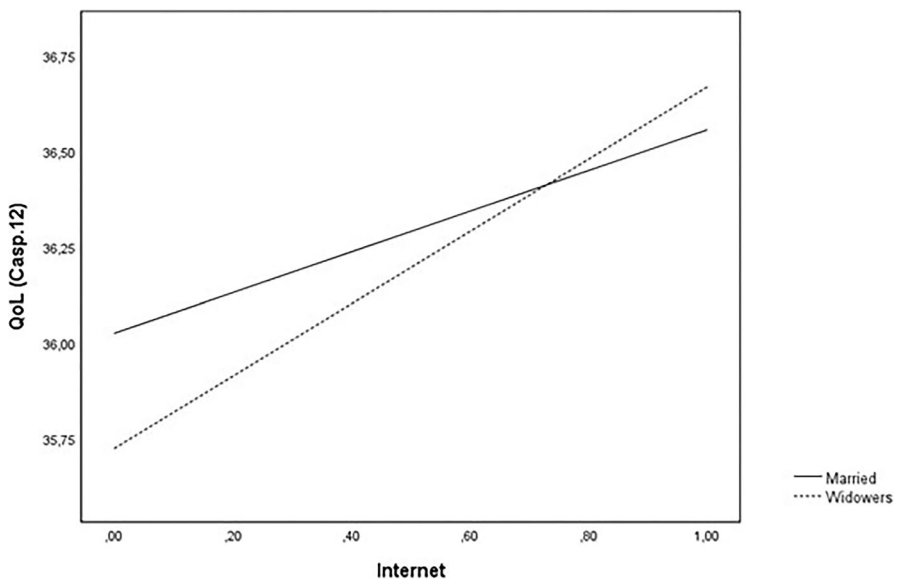


Fig. 1 Relationship between widowhood and the level of QoL, according to Internet use by women aged 65 and over. Source: SHARE wave 6, version 7.1.0 N unweighted data controlling for covariates: age, education; self-perception of financial stress, social network, Euro-D, ADL, and Welfare regime

Discussion

This study analyses the role of the Internet in the relationship between widowhood and QoL from a gender perspective.

The analyses allowed us to conclude that widowhood is associated with a lower level of QoL in the case of women. This corroborates other studies indicating that widows accumulate multiple disadvantages in terms of health (Zhou & Hearst, 2016) and in the economic sphere (Angel et al., 2007), which have repercussions on QoL. Hafford-Letchfield et al. (2017) also note that the situation of women is particularly difficult given that, despite living longer than men, they have a lower level of QoL at more advanced ages. This contributes to the fact that the most common pathologies in women can be more disabling and, consequently, increase the need for more health care and/or social support (Blondeel et al., 2018; Digi-como et al., 2013; WHO, 2007).

The impact of the Internet depends on the type of use (Castellacci & Tveito, 2018; Silva, 2019). Although there may be some disadvantages related to Internet use, most studies report the positive impact of the Internet on older people's QoL, given its use to communicate with family and friends, maintain a social network, access information, and participate in online leisure activities (Aggarwal et al., 2020). Our results corroborate previous studies that found a positive relationship between QoL and Internet use (Khalaila & Vitman-Schorr, 2018; Silva et al., 2018).

The main conclusion of this study relates to the moderating role of the Internet in the relationship between widowhood and level of QoL in women aged 65 and older. More specifically, it highlights that the Internet mitigates some of the negative consequences of widowhood on the QoL level of older women. One possible explanation is that the Internet helps to preserve social network ties and obtain social support, which are essential for the well-being of widowed individuals (Utz et al., 2002). These results, therefore, highlight the potential importance of the Internet as a means of communication and obtaining support (Chopik, 2016; Heo et al., 2015; Russell et al., 2008). This is the case even in challenging contexts, such as the loss of a spouse, which requires the restructuring of social network ties (Antonucci et al., 2002; Cornwell & Laumann, 2015; Gumà & Fernández-Carro, 2019; Ha, 2008), and may lead to a decrease in social support (Guiaux & Tilburg, 2007).

The fact that older women consider social relationships to be one of the most important dimensions of their lives may contribute to the fact that, when they lose their spouse (Cheng & Chan, 2006), they resort to the Internet to maintain or expand their social networks ties. This hypothesis would explain the greater impact of the Internet on the level of QoL of widows in comparison to their male peers.

In fact, women attach greater importance to social relations outside the family nucleus and, therefore, at advanced ages, their social networks are larger (Cornwell, 2011; Hampton et al., 2009; Schwartz & Litwin, 2018) and more diversified than those of men (Cornwell, 2011; Schwartz & Litwin, 2018). Older men tend

to receive support primarily from their wives, while women more often rely on family and friends (Gurung et al., 2003) and more frequently maintain relationships outside the household (Cornwell, 2011). Furthermore, according to some researches, women are more likely than men to use technology for social purposes (Ihm & Hsieh, 2015). In the same vein, studies on older individuals have concluded that women use technology more than men to maintain and promote social relationships with family members (Casado-Muñoz et al., 2015). Some studies have shown that the relationship with their children is an incentive for older women to use this technology, but not for men (Silva et al., 2021a).

In this research, we were also able to confirm that more advanced ages (Conde-Sala et al., 2017), low levels of education, negative perception of financial situation (Silva et al., 2018; Webb et al., 2011), as well as the existence of physical and mental health problems (Conde-Sala et al., 2017; Netuveli et al., 2006; Risal et al., 2020; Silva et al., 2018; Webb et al., 2011) are associated with lower levels of QoL. Also, in line with previous studies (Huxhold et al., 2013; Litwin et al., 2014; Silva et al., 2018; Webb et al., 2011), social network ties were associated with a higher level of QoL. On the other hand, living in southern Europe is related to lower levels of QoL, as indicated in the literature (Conde-Sala et al., 2017; Niedzwiedz et al., 2014). Considering the importance of family in Southern Europe countries, characterised as countries with strong family ties (de Belvis et al., 2008; Kohli et al., 2005, 2008), widowhood may have a greater impact on QoL. At the same time, it is also in Southern Europe where the lowest rates of technology use by older adults are found (König et al., 2018; Silva et al., 2017)

Conclusions

The main result of this research suggests that Internet use can be a very important resource for older people, particularly widows, since it can attenuate the negative relationship between widowhood and QoL level. In the case of men, the Internet does not play this role. A more in-depth analysis of this gender difference should be considered in future studies.

This study has some limitations: one of the main ones being the limited information about the use of the Internet. There is only one question about regular Internet use in the SHARE project, obtained through yes/no answers. Information about the type of activities carried out online and their frequency would make it possible to understand better how each of these dimensions relates to the QoL level of widowed individuals and the gender differences found. However, several other studies (Hogeboom et al., 2010; König et al., 2018; Silva et al., 2017, 2020) relating to Internet use by older adults also use the variable available in SHARE. Another limitation of this study is the cross-sectional perspective of the analysis, which does not enable us to infer a causal relationship. Future research should also include younger people in the sample, as widowhood can also occur in younger age groups. Lastly, in this study, we do not consider the length of widowhood. Future research should consider this issue.

Despite the above limitations, this study allows us to present important recommendations for social policies. The first concerns the need to develop digital inclusion projects that contribute to the greater use of the Internet as a resource for promoting well-being and QoL in the older population. However, these large-scale interventions should specifically target the population groups most at risk of social vulnerability and/or of accumulating disadvantages throughout their lives, i.e. older widows.

Digital inclusion is not restricted to issues of access to technology but also to the possibility of older adults being able to influence the very goals of the digital technology (Dias, 2012). As in other studies (Weil et al., 2021), we suggest that policies or programs aimed at digital inclusion consider the need to eliminate some myths regarding technology adoption. Education programs should be age-based.

It is also essential to invest in innovative and inclusive designs that take into account the physical and cognitive characteristics of older adults (Charness & Boot, 2009; Farage et al., 2012; Xie et al., 2012).

Digital inclusion policies should be developed throughout life since adults who use ICT and develop technology skills in earlier stages of life are better positioned to take advantage of the technology (Chesley & Johnson, 2014).

Authors' contribution All authors contributed to the study conception and design.

Funding The SHARE data collection has been funded by the European Commission through FP5 (QLK6-CT-2001-00360), FP6 (SHARE-I3: RII-CT-2006-062193, COMPARE: CIT5-CT-2005-028857, SHARELIFE: CIT4-CT-2006-028812), FP7 (SHARE-PREP: GA N°211909, SHARE-LEAP: GA N°227822, SHARE M4: GA N°261982, DASISH: GA N°283646) and Horizon 2020 (SHARE-DEV3: GA N°676536, SHARE-COHESION: GA N°870628, SERISS: GA N°654221, SSHOC: GA N°823782) and by DG Employment, Social Affairs & Inclusion. Additional funding from the German Ministry of Education and Research, the Max Planck Society for the Advancement of Science, the U.S. National Institute on Aging (U01_AG09740-13S2, P01_AG005842, P01_AG08291, P30_AG12815, R21_AG025169, Y1-AG-4553-01, IAG_BSR06-11, OGH_A_04-064, HHSN271201300071C) and from various national funding sources (see www.share-project.org).

This work was supported by Calouste Gulbenkian Foundation and by Foundation for Science and Technology / MCTES through national funds (PIDDAC) and co-financed by the European Regional Development Fund, through the Operational Program PORNorte and PORLisboa, [AACN° 01 / SAICT / 2016, Application n° 022209 - DATALAB] to 'PS'.

Financial sponsors played no role in the design, execution, analysis and interpretation of data, or writing of the study

Declarations

Non-financial interests none.

Competing interests none

Ethics approval The SHARE project, coordinated internationally by the Max Planck Institute for Social Law and Social Policy (Germany), has been approved by the Ethics Council of the Max-Planck-Society for the Advancement of Science, and by the ethics committees of the institutions responsible for the study in the participating countries

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Aggarwal, B., Xiong, Q., & Schroeder-Butterfill, E. (2020). Impact of the use of the internet on quality of life in older adults: Review of literature. *Primary Health Care Research and Development*. <https://doi.org/10.1017/S1463423620000584>
- Angel, J. L., Jime, M. A., & Angel, R. J. (2007). The Economic Consequences of Widowhood for Older Minority Women. *The Gerontologist*, 47(2), 224–234.
- Antonucci, T. C., Lansford, J. E., & Akiyama, H. (2002). Differences Between Men and Women in Social Relations, Resource Deficity, and Depressive Symptomatology During Later Life in Four Nations. *Journal of Social Issues*, 58(4), 767–783.
- Antonucci, T. C., Ajrouch, K. J., & Manalel, J. A. (2017). Social Relations and Technology : Continuity , Context , and Change. *Innovation in Aging*, 1(3), 1–9. <https://doi.org/10.1093/geroni/igx029>
- Aroogh, M. D., & Shahboulaghi, F. M. (2020). Social participation of older adults: A concept analysis. *International Journal of Community Based Nursing and Midwifery*, 8(1), 55–72. <https://doi.org/10.30476/IJCBNM.2019.82222.1055>
- Barragán-garcía, M., Ramírez-aldana, R., & López-ortega, M. (2021). Widowhood Status and Cognitive Function in Community-Dwelling Older Adults from the Mexican Health and Aging Study (MHAS). *Journal of Popul.* <https://doi.org/10.1007/s12062-020-09322-2Widowhood>
- de Belvis, A. G., Avolio, M., Spagnolo, A., Damiani, G., Sicuro, L., Cicchetti, A., Ricciardi, W., & Rosano, A. (2008). Factors associated with health-related quality of life: the role of social relationships among the elderly in an Italian region. *Public Health*, 122(8), 784–793. <https://doi.org/10.1016/j.puhe.2007.08.018>
- Blanner, C., Mejlidal, A., Prina, A. M., Munk-Jørgensen, P., Ersbøll, A. K., & Andersen, K. (2020). Widowhood and mortality: A Danish nationwide register-based cohort study. *Epidemiology and Psychiatric Sciences*, 29. <https://doi.org/10.1017/S2045796020000591>
- Blondeel, K., de Vasconcelos, S., García-Moreno, C., Stephenson, R., Temmerman, M., & Toskin, I. (2018). Violence motivated by perception of sexual orientation and gender identity: a systematic review. *Bulletin of the World Health Organization*, 96(1), 29–41L. <https://doi.org/10.2471/BLT.17.197251>
- van Boekel, L. C., Cloin, J. C. M., & Luijckx, K. G. (2021). Community-Dwelling and Recently Widowed Older Adults: Effects of Spousal Loss on Psychological Well-Being, Perceived Quality of Life, and Health-Care Costs. *International Journal of Aging and Human Development*, 92(1), 65–82. <https://doi.org/10.1177/0091415019871204>
- Carr, D. C., Kail, B. L., Matz-costa, C., & Shavit, Y. Z. (2018). Does Becoming A Volunteer Attenuate Loneliness Among Recently Widowed Older Adults ? *Urnales of Gerontology: Social Sciences*, 73(3), 501–510. <https://doi.org/10.1093/geronb/gbx092>
- Casado-Muñoz, R., Lezcano, F., & Rodríguez-Conde, J. (2015). Active Ageing and Access to Technology : An Evolving Empirical Study. *Comunicar*, 45, 37–46. <https://doi.org/10.3916/C45-2015-04>
- Castellacci, F., & Tveito, V. (2018). Internet use and well-being: A survey and a theoretical framework. *Research Policy*, 47(1), 308–325. <https://doi.org/10.1016/j.respol.2017.11.007>
- Charness, N., & Boot, W. R. (2009). Aging and Information Technology Use. *Association for Psychological Science*, 18(5), 253–258. <https://doi.org/10.1111/j.1467-8721.2009.01647.x>
- Chen, Z., Ying, J., Ingles, J., Zhang, D., Rajbhandari-Thapa, J., Wang, R., Emerson, K. G., & Feng, Z. (2020). Gender differential impact of bereavement on health outcomes: evidence from the China

- Health and Retirement Longitudinal Study, 2011–2015. *BMC Psychiatry*, 20(1), 1–11. <https://doi.org/10.1186/s12888-020-02916-2>
- Cheng, S.-T., & Chan, A. C. M. (2006). Relationship with others and life satisfaction in later life: do gender and widowhood make a difference? *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 61(1), P46–P53.
- Chesley, N., & Johnson, B. (2014). Information and Communication Technology Use and Social Connectedness over the Life Course. *Sociology Compass*, 8(6), 589–602. <https://doi.org/10.1111/soc4.12170>
- Chopik, W. J. (2016). The Benefits of Social Technology Use Among Older Adults Are Mediated by Reduced Loneliness. *Cyberpsychology, Behavior, and Social Networking*, 00(00), 1–6. <https://doi.org/10.1089/cyber.2016.0151>
- Cohen, J. (1988). The t test for means. In *Statistical Power Analysis for the Behavioral Sciences* (2nd ed., pp. 19–74). Routledge. <https://doi.org/10.1016/B978-0-12-179060-8.50007-4>
- Conde-Sala, J. L., Portellano-Ortiz, C., Calvó-Perxas, L., & Garre-Olmo, J. (2017). Quality of life in people aged 65+ in Europe: associated factors and models of social welfare—analysis of data from the SHARE project (Wave 5). *Quality of Life Research*, 26(4), 1059–1070. <https://doi.org/10.1007/s11136-016-1436-x>
- Cornwell, B. (2011). Independence through social networks: Bridging potential among older women and men. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, 66B(6), 782–794. <https://doi.org/10.1093/geronb/gbr111>
- Cornwell, B., & Laumann, E. (2015). The health benefits of network growth: New evidence from a national survey of older adults. *Social Science & Medicine*, 125, 1–13. <https://doi.org/10.1016/j.socscimed.2013.09.011>
- Datta, D., Datta, P., & Majumdar, K. (2015). Association of quality of life of urban elderly with socio-demographic factors. *International Journal of Medicine and Public Health*, 5(4), 274. <https://doi.org/10.4103/2230-8598.165944>
- De Vries, B., Utz, R., Caserta, M., & Lund, D. (2014). Friend and Family Contact and Support in Early Widowhood. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 69, 75–84. <https://doi.org/10.1093/geronb/gbt078>
- Dias, I. (2012). O uso das tecnologias digitais entre os seniores : Motivações e interesses. *Sociologia, Problemas e Práticas*, 68, 51–77. <https://doi.org/10.7458/SPP201268693>
- Digiacomio, M., Lewis, J., Nolan, M. T., Phillips, J., & Davidson, P. M. (2013). Health transitions in recently widowed older women: A mixed methods study. *BMC Health Services Research*, 13(1), 1–10. <https://doi.org/10.1186/1472-6963-13-143>
- Ennis, J., & Majid, U. (2019). “Death from a broken heart”: A systematic review of the relationship between spousal bereavement and physical and physiological health outcomes. *Death Studies*, 0(0), 1–14. <https://doi.org/10.1080/07481187.2019.1661884>
- Fang, S. Y., Huang, N., Chen, K. H., Yeh, H. H., Lin, K. M., & Chen, C. Y. (2012). Gender Differences in Widowhood Effects Among Community-Dwelling Elders by Causes of Death in Taiwan. *Annals of Epidemiology*, 22(7), 457–465. <https://doi.org/10.1016/j.annepidem.2012.04.008>
- Farage, M. A., Miller, K. W., Ajayi, F., & Hutchins, D. (2012). Design Principles to Accommodate Older Adults. *Global Journal of Health Science*, 4(2), 2–25. <https://doi.org/10.5539/gjhs.v4n2p2>
- Fox, S. (2004). *Older Americans and the internet. Pew Internet and American Life Project* (pp. 1–16). Pew Internet and American Life Project.
- Guerra, M., Ferri, C., Llibre, J., Prina, A. M., & Prince, M. (2015). Psychometric properties of EURO-D , a geriatric depression scale : a cross-cultural validation study. *BMC Psychiatry*, 15(12). <https://doi.org/10.1186/s12888-015-0390-4>
- Guiaux, M., & Tilburg, T. V. A. N. (2007). Changes in contact and support exchange in personal networks after widowhood. *Personal Relationships*, 14, 457–473.
- Gumà, J., & Fernández-Carro, C. (2019). Life goes on: The influence of the perceived quality of social relations on older women’s mental health after the loss of a partner in Europe. *Aging and Mental Health*, 0(0), 1–8. <https://doi.org/10.1080/13607863.2019.1675141>
- Gurung, R. A. R., Taylor, S. E., & Seeman, T. E. (2003). Accounting for changes in social support among married older adults: Insights from the MacArthur Studies of Successful Aging. *Psychology and Aging*, 18(3), 487–496. <https://doi.org/10.1037/0882-7974.18.3.487>
- Gutiérrez-Vega, M., Esparza-Del Villar, O. A., Carrillo-Saucedo, I. C., & Montañez-Alvarado, P. (2018). The Possible Protective Effect of Marital Status in Quality of Life Among Elders in a U.S.-Mexico

- Border City. *Community Mental Health Journal*, 54(4), 480–484. <https://doi.org/10.1007/s10597-017-0166-z>
- Ha, J. H. (2008). Changes in support from confidants, children, and friends following widowhood. *Journal of Marriage and Family*, 70(2), 306–318. <https://doi.org/10.1111/j.1741-3737.2008.00483.x>
- Ha, J. H., Carr, D., Utz, R., & Nesse, R. (2006). Older Adults' Perceptions of Intergenerational Support after Widowhood. *Journal of Family Issues*, 27(1), 3–30.
- Hafford-Letchfield, T., Lambert, N., Long, E., & Brady, D. (2017). Going solo: Findings from a survey of women aging without a partner and who do not have children. *Journal of Women and Aging*, 29(4), 321–333. <https://doi.org/10.1080/08952841.2016.1187544>
- Hampton, K., Her, E., & Rainie, L. (2009). Social Isolation and New Technology How the internet and mobile phones impact Americans' social networks. In *Pew Internet & American Life Project*. Retrieved November 25, 2021, <http://www.site.uottawa.ca/~stan/csi2911/Pew.pdf>
- Haythornthwaite, C. (2002). Strong, Weak, and Latent Ties and the Impact of New Media. *The Information Society*, 18(5), 385–401. <https://doi.org/10.1080/01972240290108195>
- Haythornthwaite, C. (2005). Social networks and Internet connectivity effects. *Information, Communication & Society*, 8(2), 125–147. <https://doi.org/10.1080/13691180500146185>
- Heo, J., Chun, S., Lee, S., Lee, K. H., & Kim, J. (2015). Internet Use and Well-Being in Older Adults. *Cyberpsychology, Behavior, and Social Networking*, 18(5), 268–272. <https://doi.org/10.1089/cyber.2014.0549>
- Hogeboom, D. L., McDermott, R. J., Perrin, K. M., Osman, H., Bell-Ellison, B., & a. (2010). Internet Use and Social Networking Among Middle Aged and Older Adults. *Educational Gerontology*, 36(2), 93–111. <https://doi.org/10.1080/03601270903058507>
- Holm, A. L., Berland, A. K., & Severinsson, E. (2019). Factors that influence the health of older widows and widowers—A systematic review of quantitative research. *Nursing Open*, 6(2), 591–611. <https://doi.org/10.1002/nop2.243>
- Hong, Y., Fu, J., Kong, D., Liu, S., Zhong, Z., Tan, J., & Luo, Y. (2021). Benefits and barriers: a qualitative study on online social participation among widowed older adults in Southwest China. *BMC Geriatrics*, 21(1), 1–10. <https://doi.org/10.1186/s12877-021-02381-w>
- Horrigan, J. B. (2000). *New Internet Users: What They Do Online, What They Don't, and Implications for the 'Net's Future* (pp. 1–27). *Pew Internet and American Life Project*.
- Huxhold, O., Fiori, K. L., & Windsor, T. D. (2013). The dynamic interplay of social network characteristics, subjective well-being, and health: the costs and benefits of socio-emotional selectivity. *Psychology and Aging*, 28(1), 3–16. <https://doi.org/10.1037/a0030170>
- Hyde, M., Wiggins, R., Higgs, P., & Blane, D. (2003). A measure of quality of life in early old age: the theory, development and properties of a needs satisfaction model (CASP-19). *Ageing & Mental Health*, 7(3), 186–194. <https://doi.org/10.1080/1360786031000101157>
- Ihm, J., & Hsieh, Y. P. (2015). The implications of information and communication technology use for the social well-being of older adults. *Information Communication and Society*, 18(10), 1123–1138. <https://doi.org/10.1080/1369118X.2015.1019912>
- Isherwood, L. M., King, D. S., & Luszcz, M. A. (2017). Widowhood in the fourth age: Support exchange, relationships and social participation. *Ageing and Society*, 37(1), 188–212. <https://doi.org/10.1017/S0144686X15001166>
- Khalaila, R., & Vitman-Schorr, A. (2018). Internet use, social networks, loneliness, and quality of life among adults aged 50 and older: mediating and moderating effects. *Quality of Life Research*, 27(2), 479–489. <https://doi.org/10.1007/s11136-017-1749-4>
- Knesebeck, O., Hyde, M., Higgs, P., Kupfer, A., & Siegrist, J. (2005). Quality of Life and Well-Being. In *Health, Ageing and Retirement in Europe: First Results from the Survey of Health, Ageing and Retirement in Europe* (pp. 199–204). Mannheim Research Institute for the Economics of Aging (MEA).
- Kohli, M., Künemund, H., & Ludicke, J. (2005). Family structure, proximity and contact. In *Health, Ageing and Retirement in Europe (Issue April)* (pp. 163–171). Research Institute for the Economics of Aging (MEA).
- Kohli, M., Kiinemund, H., & Vogel, C. (2008). Shrinking Families? Marital Status, Childlessness, and Intergenerational Relationships. In A. Börsch-Supan et al. (Eds.), *Health, Ageing and Retirement in Europe (2004-2007) - Starting the longitudinal dimension* (pp. 166–172). MEA.
- König, R., Seifert, A., & Doh, M. (2018). Internet use among older Europeans : an analysis based on SHARE data. *Universal Access in the Information Society*. <https://doi.org/10.1007/s10209-018-0609-5>

- Litwin, H., & Levinson, M. (2018). The association of mobility limitation and social networks in relation to late-life activity. *Ageing & Society*, 38(9), 1771–1790. <https://doi.org/10.1017/S0144686X1700023X>
- Litwin, H., & Stoeckel, K. (2014). Engagement and social as elements of active ageing: an analysis of older Europeans. *Sociologia e Politiche Sociali*, 17, 9–31. <https://doi.org/10.3280/SP2014-003002>
- Litwin, H., Kimberly, J., & Stoeckel, K. (2014). Confidant Network Types and Well-Being Among Older Europeans. *The Gerontologist*, 54, 1–11. <https://doi.org/10.1093/geront/gnt056>
- Malter, F., & Börsch-Supan, A. (2017). *SHARE Wave 6 : Panel Innovations and collecting Dried Blood Spots*. Munich Center for the Economics of Aging (MEA).
- Martinez-Pecino, R., Delerue Matos, A., & Silva, P. (2013). Portuguese older people and the Internet: Interaction, uses, motivations, and obstacles. *Communications*, 38(4), 331–346. <https://doi.org/10.1515/commun-2013-0020>
- Mehrbrodt, T., Gruber, S., & Wagner, M. (2017). *Scales and Multi-Item Indicators*. Retrieved December 13, 2021, http://www.share-project.org/fileadmin/pdf_documentation/SHARE_Scales_and_Multi-Item_Indicators.pdf
- Netuveli, G., Wiggins, R., Hildon, Z., Montgomery, S., & Blane, D. (2006). Quality of life at older ages: evidence from the English longitudinal study of aging (wave 1). *Journal of Epidemiology and Community Health*, 60(4), 357–363. <https://doi.org/10.1136/jech.2005.040071>
- Niedzwiedz, C. L., Katikireddi, S. V., Pell, J. P., & Mitchell, R. (2014). Socioeconomic inequalities in the quality of life of older Europeans in different welfare regimes. *European Journal of Public Health*, 24(3), 364–370. <https://doi.org/10.1093/eurpub/cku017>
- Peña-Longobardo, L. M., Rodríguez-Sánchez, B., & Oliva-Moreno, J. (2021). The impact of widowhood on wellbeing, health, and care use: A longitudinal analysis across Europe. *Economics and Human Biology*, 43. <https://doi.org/10.1016/j.ehb.2021.101049>
- Pin, S., Guilley, E., Spini, D., & Lalive d'Epinay, C. (2005). The impact of social relationships on the maintenance of independence in advanced old age: findings of a Swiss longitudinal study. *Zeitschrift für Gerontologie und Geriatrie*, 38(3), 203–209.
- Prince, M. J., Reischies, F., Beekman, A. T. F., Fuhrer, R., Jonker, C., Kivela, S. L., Lawlor, B. A., Lobo, A., Magnusson, H., Fichter, M., Van Oyen, H., Roelands, M., Skoog, I., Turrina, C., & Copeland, J. R. M. (1999). Development of the EURO-D scale - A European Union initiative to compare symptoms of depression in 14 European centres. *British Journal of Psychiatry*, 174(APR.), 330–338. <https://doi.org/10.1192/bjp.174.4.330>
- Risal, A., Manandhar, S., Manandhar, K., Manandhar, N., Kunwar, D., & Holen, A. (2020). Quality of life and its predictors among aging people in urban and rural Nepal. *Quality of Life Research*, 0123456789. <https://doi.org/10.1007/s11136-020-02593-4>
- Rodrigues, L. R., Tavares, D. S., Dias, F. A., Pegorari, M. S., Marchiori, G. F., & dos S Tavares, D. M. (2017). Quality of life of elderly people of the community and associated factors. *Rev. Enferm. UFPE on Line*, 11(supl.3), 1430–1438. <https://doi.org/10.5205/reuol.10263-91568-1-RV.1103s up201715>
- Russell, C., Campbell, A., & Hughes, I. (2008). Ageing, social capital and the Internet: Findings from an exploratory study of Australian “silver surfers”. *Australasian Journal on Ageing*, 27(2), 78–82. <https://doi.org/10.1111/j.1741-6612.2008.00284.x>
- Sasson, I., & Umberson, D. J. (2014). Widowhood and depression: New light on gender differences, selection, and psychological adjustment. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, 69(1), 135–145. <https://doi.org/10.1093/geronb/gbt058>
- Savikko, N., Routasalo, P., Tilvis, R. S., Strandbeg, T., & Pikala, K. (2005). Predictors and subjective causes of loneliness in an aged population. *Archives of Gerontology and Geriatrics*, 41, 223–233. <https://doi.org/10.1016/j.archger.2005.03.002>
- Schaan, B. (2013). Widowhood and depression among older Europeans-The role of gender, caregiving, marital quality, and regional context. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, 68(3), 431–442. <https://doi.org/10.1093/geronb/gbt015>
- Schwartz, E., & Litwin, H. (2018). Social network changes among older Europeans: the role of gender. *European Journal of Ageing*, 15(4), 359–367. <https://doi.org/10.1007/s10433-017-0454-z>
- Silva, P. (2019). *Velhas Redes Sociais , Novos Meios de Comunicação : a importância das Redes Sociais e da utilização da Internet para a Qualidade de Vida de indivíduos de 50 + anos*. Universidade do Minho.
- Silva, P., Delerue, M. A., & Martinez-Pecino, R. (2017). E-inclusion: Beyond individual socio- demographic characteristics. *Plos One*, 12(9), 1–10. <https://doi.org/10.1371/journal.pone.0184545>

- Silva, P., Delerue Matos, A., & Martinez-Pecino, R. (2018). Confidant Network and Quality of Life of Individuals Aged 50+: The Positive Role of Internet Use. *Cyberpsychology, Behavior, and Social Networking*, 21(11), 694–702. <https://doi.org/10.1089/cyber.2018.0170>
- Silva, P., Delerue Matos, A., & Martinez-pecino, R. (2020). Can the internet reduce the loneliness of 50 + living alone? *Information, Communication & Society*, 1–17. <https://doi.org/10.1080/1369118X.2020.1760917>
- Silva, P., Delerue Matos, A., & Martinez-Pecino, R. (2021a). O papel da família na utilização da Internet por portugueses de 50 e mais anos : uma análise de género. *Análise Social*, 239, 322–341. 10.31447/as00032573.2021239.06
- Silva, P., Delerue Matos, A., & Martinez-Pecino, R. (2021b). The Contribution of the Internet to Reducing Social Isolation in Individuals Aged 50 Years and Older: Quantitative Study of Data From the Survey of Health, Ageing and Retirement in Europe. *Journal of Medical Internet Research*. <https://doi.org/10.2196/20466>
- Silverman, P. R., & Thomson, S. (2018). When Men Grieve: Widowers' Stories of Coping With Their Wives' Deaths. *Omega —Journal of Death and Dying*, 77(2), 133–153. <https://doi.org/10.1177/0030222817695178>
- Singham, T., Bell, G., Saunders, R., & Stott, J. (2021). Widowhood and cognitive decline in adults aged 50 and over: A systematic review and meta-analysis. *Ageing Research Reviews*, 71(September), 101461. <https://doi.org/10.1016/j.arr.2021.101461>
- Sluzki, C. (2000). Social Network and the elderly: Conceptual and Clinical Issues, and a Family Consultation. *Family Process*, 39(3), 271–284.
- Smith, K. P., & Christakis, N. A. (2008). Social networks and health. *Annual Review of Sociology*, 34, 405–429. <https://doi.org/10.1146/annurev.soc.34.040507.134601>
- Štípková, M. (2019). Marital status, close social network and loneliness of older adults in the Czech Republic. *Ageing and Society*, 1–15. <https://doi.org/10.1017/S0144686X19001442>
- Streeter, J. L. (2020). Gender differences in widowhood in the short-run and long-run: Financial, emotional, and mental wellbeing. *Journal of the Economics of Ageing*, 17(April), 100258. <https://doi.org/10.1016/j.jeoa.2020.100258>
- Sum, S., Mathews, M. R., Pourghasem, M., & Hughes, I. (2008). Internet technology and social capital: How the internet affects seniors' social capital and wellbeing. *Journal of Computer-Mediated Communication*, 14(1), 202–220. <https://doi.org/10.1111/j.1083-6101.2008.01437.x>
- Utz, R. L., Carr, D., Nesse, R., & Wortman, C. B. (2002). The effect of widowhood on older adults' social participation: An evaluation of activity, disengagement, and continuity theories. *Gerontologist*, 42(4), 522–533. <https://doi.org/10.1093/geront/42.4.522>
- Utz, R. L., Lund, D., Caserta, M., & DeVries, B. (2011). Perceived Self-Competency Among the Recently Bereaved. *J Soc Work End Life Palliat Care.*, 7, 173–194. <https://doi.org/10.1080/15524256.2011.593154>
- Van Velsen, L., Cabrita, M., Den Akker, H., Brandl, L., & Isaac, J. (2020). LEAVES (optimizing the mental health and resilience of older Adults that have lost their spouse via blended , online therapy): Proposal for an Online Service Development and Evaluation. *JMIR Research Protocols*, 9, 1–10. <https://doi.org/10.2196/19344>
- Webb, E., Blane, D., McMunn, A., & Netuveli, G. (2011). Proximal predictors of change in quality of life at older ages. *Journal of Epidemiology and Community Health*, 65(6), 542–547. <https://doi.org/10.1136/jech.2009.101758>
- Weil, J., Kamber, T., Glazebrook, A., Giorgi, M., & Ziegler, K. (2021). Digital Inclusion of Older Adults during COVID-19: Lessons from a Case Study of Older Adults Technology Services (OATS). *Journal of Gerontological Social Work*, 64(6), 643–655. <https://doi.org/10.1080/01634372.2021.1919274>
- Wellman, B., & Frank, K. (2001). Network Capital in a Multi-Level World : Getting Support from Personal Communities. In K. Lin, R. Burt, & K. Cook (Eds.), *Social Capital: Theory and Research*. Aldine Issue 1998.
- WHO. (2007). Women, ageing and health : A framework for action focus on gender women, ageing and health : A framework for action focus on gender. *WHO Library Cataloguing*.
- Wiggins, R., Netuveli, G., Hyde, M., Higgs, P., & Blane, D. (2008). The evaluation of a self-enumerated scale of quality of life (CASP-19) in the context of research on ageing: A combination of exploratory and confirmatory approaches. *Social Indicators Research*, 89(1), 61–77. <https://doi.org/10.1007/s11205-007-9220-5>

- Wilcox, S., Aragaki, A., Mouton, C. P., Evenson, K. R., Wassertheil-Smoller, S., & Loevinger, B. L. (2003). The effects of widowhood on physical and mental health, health behaviors, and health outcomes: The women's health initiative. *Health Psychology, 22*(5), 513–522. <https://doi.org/10.1037/0278-6133.22.5.513>
- Xie, B., Huang, M., & Watkins, I. (2012). Technology and retirement life: A systematic review of the literature on older adults and social media. In *The Oxford handbook of retirement*. (pp. 493–509). Retrieved January 15, 2022, <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=psyc10&NEWS=N&AN=2012-25566-031>
- Zhou, J., & Hearst, N. (2016). Health-related quality of life of among elders in rural China: the effect of widowhood. *Quality of Life Research, 25*(12), 3087–3095. <https://doi.org/10.1007/s11136-016-1338-y>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.