

Access, use and attitudes regarding information and communication technologies among older adults during the COVID-19 pandemic

Acceso, uso y actitudes de Tecnologías de la Información y Comunicación en personas mayores durante la pandemia de COVID-19

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Originales

Abstract

Introduction: The COVID-19 pandemic highlighted the digital divide among older adults. Their everyday needs and mobility constraints forced them to go online, challenging older adults with limited access to Information and Communication Technologies (ICTs) and scarce digital abilities. **Objective:** This study explores factors influencing older adults' use and perception of ICTs during the pandemic. **Methodology:** We conducted a survey of vulnerable elderly individuals in Santiago, Chile (N=251) and followed up with face-to-face interviews with 20 participants. **Results:** The findings indicate that frequent smartphone use among older adults is positively correlated with their perception of comfort, usefulness, control over the device, and willingness to use it. Active users exhibit higher confidence levels and engage in a broader range of online activities, while moderate users feel less inclined to bridge the digital gap, experiencing a sense of exclusion. **Conclusion:** The study highlights the importance of perceived control in shaping smartphone usage among older adults and underscores the interplay between attitudes and technology adoption. Despite some limitations, this research offers valuable insights into the perspectives of non-users and proxy users, as well as the barriers to internet access during a crisis.

Key words: Internet use and perception; smartphone; older adults; vulnerability; mixed methods.

Resumen

Introducción: La pandemia de COVID-19 resaltó la brecha digital entre las Personas Mayores (PM). Sus necesidades cotidianas y las limitaciones de movilidad los obligaron a conectarse en línea. Esto desafió a las PM con acceso limitado a las Tecnologías de la Información y Comunicación (TIC) y escasas habilidades digitales. **Objetivos:** Este trabajo explora factores asociados al uso y percepción de TIC entre las PM en tiempos de COVID-19. **Metodología:** Realizamos una encuesta a personas mayores vulnerables en Santiago, Chile (N=251) y seguimos con entrevistas en profundidad a 20 participantes. **Resultados:** Los hallazgos sugieren que el uso frecuente de Smartphones entre las personas mayores está positivamente correlacionado con su percepción de comodidad, utilidad, control sobre el dispositivo y disposición para usarlo. Los usuarios activos muestran niveles de confianza más altos y participan en una gama más amplia de actividades en línea, mientras que los usuarios moderados se sienten menos inclinados a cerrar la brecha digital, experimentando una sensación de exclusión. **Conclusión:** El estudio destaca la importancia del control percibido en la configuración de los patrones de uso de Smartphones entre las personas mayores, resaltando la interacción entre las actitudes y la adopción de tecnología. A pesar de sus limitaciones, esta investigación proporciona información valiosa sobre las perspectivas de los no usuarios y los usuarios por proxy, y las barreras al acceso a Internet durante situaciones de crisis.

Palabras claves: uso y percepción de Internet; Smartphone; personas mayores; vulnerabilidad; métodos mixtos.

Introduction

Digital inclusion of older people is a difficult task, and even more so in the wake of the COVID-19 pandemic, which poses disproportionate risk to this population in terms of prevalence, and consequent death if infected. Furthermore, public policies that urge lockdowns to require health permits and restrict opening hours have made daily tasks more challenging for senior adults. In this context, the availability and use of the Internet are critical for older adults because it provides remote access to medical and subsistence services and essential activities (Hargittai, Piper & Morris, 2019). Access to the Internet can impact socialization, health, and the connection with family and friends (Ellison, Steinfield & Lampe, 2011) since it allows older people to maintain social ties and enhance their psychological well-being by reducing the risks associated with isolation (Hunsaker & Hargittai, 2018). However, Information and Communication Technologies (ICTs), such as smartphones, can serve as both barriers and facilitators for older adults due to the need for access and digital abilities (Pavez & Correa, 2020). Evidence from this study indicates that older adults have severe disadvantages, including the lack of technical help (Lee, Chen & Hewitt, 2011), precarious digital skills (Barrantes & Cozzubo, 2017) and lack of interest (Haase, Cosco, Kervin, Riadi, & O'Connell, 2021). This became evident during the COVID-19 pandemic, which further exposed long-standing technology-related inequalities that were not receiving the necessary public interest and policy development (Beaunoyer, Dupéré, & Guitton, 2020). Moreover, once people retire, they start losing social ties, intensifying technological exclusion (Seifert, 2020). Hernandez, Jimenez, and Perez (2022) were able to demonstrate an ongoing concern about the health effects of social isolation during the pandemic and how the lack of communication generated effects on the mental health of older adults living alone. Therefore, this research explores access to and use of the Internet among older adults during the first year of the COVID-19 pandemic, as well as their attitudes toward the Internet and reported digital ability levels.

For older adults, Internet adoption can improve quality of life, increase cognitive abilities (Charness & Boot, 2009) and expand access to services vital for their safety and autonomy (Llorente-Barroso, Sánchez-Valle, & Viñarás-Abad, 2023). Digital communications also allow people to feel connected, break distance barriers, and promote instantaneous communication (Harley & Fitzpatrick, 2009; Jung, Walden, Johnson & Sundar, 2017; Pywell Vijaykumar, Dodd & Coventry, 2020). This way of communicating can also be extended to health issues, especially in the context of chronic diseases (Leist, 2013). Telehealth can be a beneficial form of care for an age segment that frequently uses medical services, and the spread of mobile telephones opens up opportunities in this regard (Zubatsky, Berg-Weger & Morley, 2020).

Nonetheless, older people's relationship with technology is not straightforward. The literature highlights that this relationship is crucial for understanding older adults' use, adoption, and knowledge of ICTs (Quan-Haase, Martin & Schreurs, 2016), particularly among those who are reluctant to adopt new digital tools (Rainie, 2015). Authors have long discussed various approaches to internet usage typologies, often finding them to be rigid and excessively reliant on data (see Blank & Groselj, 2014). However, one of the most practical approaches was proposed by Selwyn, Gorard and Furlong (2005). They segmented users based on their frequency of internet use and the variety of online applications or purposes they engage in, ranging from broad frequent users to those who rarely or never use the internet. These segments include broad frequent users (individuals who use the internet very often or fairly often and engage in three or more different online applications or purposes), narrow frequent users (users who frequently use the internet but limit themselves to one or two different online applications or purposes), occasional users (respondents who make occasional or rare use of the internet), and non-users (Selwyn, Gorard & Furlong, 2005). While older adults are more engaged with ICT, they use it less than younger generations (Quan-Haase, Williams and Wellman, 2018).

Evidence suggests that older adults carefully select the digital tools they considered helpful, yet are critical of certain uses of digital technologies (Tsatsou, 2021). For instance, feelings of privacy invasion were among the most significant obstacles. Thus, actions intended to teach digital tools increased older people's interest in their use (Xie et al., 2012). Braun (2013) studied 124 older adults' digital behavior and concluded that perceived usefulness and

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trust were the most significant predictors of more meaningful use. Evidence suggests that their main motivations for engaging in social media include keeping in touch, sharing photos, social surveillance, responding to family requests, convenient communication, and curiosity (He, Huang, Li, Zhou, & Li, 2020). Fear of new technologies is also an element found in research on this area (Heinz, et. al, 2013; Hill, Betts & Gardner, 2015; Peek et. al, 2016). A study by Nimrod (2020) showed that the only online functions that could improve well-being were those related to leisure. However, according to what was reported in that study, this function increased the least. On the other hand, the author did find significant positive associations between stress and increased use of the Internet for interpersonal communication and online errands. These were related to the lack of knowledge and use of digital tools, corroborating the need for more learning and use of digital tools for recreational purposes.

In the same vein, Seifert, Cotten & Xie (2021), who studied older adults from vulnerable populations, concluded that during COVID, those people who were not connected to the Internet had to combat a double exclusion: social and digital. Meanwhile, Hajek and König (2021) studied the behavior of more than three thousand older adults in Germany during the pandemic and found that users with lower Internet use to contact friends and family reported higher loneliness, lower life satisfaction, and more depressive symptoms. Conversely, those with a high frequency of contact reported better psychosocial factors.

Different studies (Jung et al., 2017; Gorenko, Moran, Flynn, Dobson & Konnert, 2021) have shown that the main motivations for not engaging include privacy, little appreciation of the content, preference for familiarity, the triviality of communication, time commitment, and frustration when using digital tools. The use of the Internet in older adults increased when living with minors or a household partner from whom to receive help (Barrantes & Cozzubo, 2017). This phenomenon was demonstrated during the pandemic in the study carried out by Diehl and colleagues (2022), who studied people between 70 and 77 years of age in Portugal. A large proportion of them reported relying on the help of family members to skillfully use different functions of technological devices to keep in touch with people outside their home.

One theoretical approach to this phenomenon comes from Katz, Blumler & Gurevitch's (1974) Uses and Gratifications Theory (UGT), which identifies audience needs and the relationship between a person's selection of a specific medium/platform and the gratification obtained. UGT also distinguishes people's main objectives when choosing a medium, including looking for information and advice on practical issues; confirmation of personal values; identification with role models and other people they appreciate; integration and social interaction; and looking for entertainment (Chou & Liu, 2016). The advent of computer-mediated communication revived the significance of UGT (Ruggiero, 2000). It has been used in studies that look at the initial stages of each new mass communications medium, such as newspaper, radio, television, and now the Internet and mobile technology—for instance, exploring elderly mobile users' adoption (Yang & Lin, 2019) and seniors' use of social networking sites (Jung et al., 2017; Kim, Lee, & Contractor, 2019).

Chile's population is currently aging due to a decrease in its birth rate and increase in life expectancy (INE, 2018). This demographic shift suggests that, by 2031, the proportion of older people will exceed that of people under 15 years old (INE, 2020), reflecting a bulge in the upper part of the population pyramid. Responsibly and effectively facing this shift requires implementing public policies in health, housing, economy, and work (Villalobos, 2017). Although 80% of the Chilean population has access to the Internet, digital inclusion of older adults dropped to 55% (SUBTEL, 2017). This reduction was even more severe among users older than 80, of whom only 9.8% use the Internet.

Although the literature on Internet access is limited, national evidence (Rodríguez, Cajamarca, Herskovic, Fuentes & Campos, 2017) and regional reports indicate that older people prefer using smartphones over computers (Sunkel & Ullmann, 2019; Pochintesta, & Múseres, 2022). This dovetails with international evidence, and corresponds to the fact that mobile phones present fewer access barriers relative to laptops based on lower prices and greater user ease (Napoli & Obar, 2014; Pearce & Rice, 2013). Nevertheless, Moreno & Fuentes (2016) argued that educational levels, work experiences, socioeconomic status, and difficulties derived from physical and cognitive deterioration due to aging can explain differences in the use of mobile devices.

Objectives

The objectives of this research were twofold:

- I. To investigate the patterns of access to and utilization of the Internet among older adults during the COVID-19 pandemic.
- II. To examine the attitudes of older adults toward the Internet and assess their reported levels of digital abilities.

Methods

Sampling and recruitment

Observational, cross-sectional study whose population corresponds to elderly residents of Santiago, Chile. The sample was selected by convenience and consisted of adults between 60 and 94 years old from an urban area of Santiago between January and June 2021. Inclusion criteria included (1) older adults that participate in the district Day Center, (2) without cognitive impairment, and (3) able to consent to participation in the study.

For recruitment, the research team requested a database of older people who participate in the district Day Center. 551 older people were contacted by telephone; 251 met the inclusion criteria.

Procedures

This project followed a mixed-method approach with an explanatory sequential design (Subedi, 2016). This approach implies that findings from the first method (survey) informed the design and application of the second (interviews). This strategy addressed the collection and analysis of data from quantitative and qualitative perspectives, assuming the complexity of the social phenomenon, increasing its comprehension, and allowing for data triangulation (Samperi, 2018). Moreover, it helped map out Internet access and use at the device, platform, and content levels, and achieves greater generalization of the population studied from a systematic and replicable approach (Onwuegbuzie & Collins, 2007).

The second qualitative phase allowed us to explore the dynamic role of new technologies in different areas of older people's daily life, accounting for the singularities of various contexts and social moments. Face-to-face interviews served as a tool to analyze context-specific phenomena, focusing on the "how" rather than on the "what" (Berger, 1998; Esterberg, 2002). These interviews allowed participants to speak freely and resulted in findings that made it easier to understand the "what" and "how," providing nuance to decisions, trajectories, and degrees of participation in the world of new technologies (Silverstone, 2005). In this phase, we randomly selected 20 participants from the sample (16 users and four non-users), aiming to include participants of both genders, as well as ones with different types of access (mobile, laptop, or both), and varying frequency of use.

Measures

The first quantitative phase adapted an instrument that measures the perception of barriers and the frequency of ICT use, as implemented by Álvarez-Dardet, and Pérez-Padilla (2020), along with the Computer Attitudes Scale. The Computer Attitudes Scale (Selwyn, 1997; Villar, 2003), with 22 items, measures four attitudinal dimensions related to devices, including affective components (positive feelings associated with them, items 1-4), perceived usefulness (the extent to which they are perceived as practical tools for daily life, items 5-10), perceived control (subjective perception of control, items 11-17), and behavioral components (willingness to use them, items 18-22) (Selwyn, 1997; Villar, 2003).

Each of these attitudinal dimensions were measured on a 0-to-3 scale, with 3 being the highest level. Additionally, the first phase measured participants' baseline state with a 6-item cognitive screener (Callahan, Unverzagt, Hui, Perkins & Hendrie, 2002) and their perception of their current health status (Fernández-Ballesteros, 2008).

The second qualitative phase consisted of semi-structured interviews. The question guide was based on the typology proposed in the same study (Álvarez-Dardet et al., 2020) and aimed to characterize user types (greater frequency of use, variety of purposes and device used to access). It also included a series of questions for those who declared themselves non-users.

Analysis

This section describes the statistical analyses we performed with R-software, version 4.1.0. The variables considered in the analyses included the type of device participants reported having (nominal), frequency of use of each device

(ordinal), type of usage of each device (nominal), perceived barriers for not using each device (nominal), perceived usefulness of each device for daily life (ordinal), perceived control of each device (ordinal), highest educational level reached (ordinal), and age.

In the quantitative phase, we investigated whether data supports the hypotheses with (i) descriptive statistics reports, such as averages, standard deviations, and Pearson’s correlation coefficients (r), (ii) comparisons of attitudinal dimension scores for participant pairs with two-independent-sample t-tests, and (iii) estimated one-way ANOVA and MANOVA models to compare participants’ attitudinal scores according to how frequently they use each device.

In the qualitative phase, we recorded and transcribed all interviews. Next, we analyzed and obtained insights from this data with NVivo, following three stages: (1) coding, (2) condensation, and (3) interpretation (Kvale & Brinkmann, 2009). The coding stage included segments that extended across testimonies and labeling to create codes (Kvale & Brinkmann, 2009). Examination of the prior literature and results from the quantitative stage allowed us to determine the main topics, including access to the Internet, health needs like looking for information, permits and appointments, household composition, and help using technologies, among others. Later, it incorporated new elements and emerging topics that the participants provided (Flick, 2002), such as the ubiquity of social media and confidence levels when using smartphones, relative to other devices.

Results

Participant profile

Of the 251 participants, we excluded one who did not report whether he had a smartphone.

The average age of the remaining participants was 71, of which 218 were female and 32 males. Regarding their educational level, 97 did not complete primary education, 53 completed it, and 38 did not complete secondary education. Among the 250 participants, 77.2% reported working in a sector that does not require completion of a secondary education, such as housekeeping or gardening, whereas other participants reported that they were retired; 97.6% reported having a smartphone, 13.2% reported having a computer, and 7.2% reported having a tablet. Most of the participants who declared having none of the above stated they would use it if they had one. Among the 248 participants who declared using a smartphone, 80.2% use it daily, and 69.8% use it to browse social networks. In addition, 89.9% of the participants perceive a smartphone as useful for daily life, but more than 50% of the participants believe they do not have control over their smartphones.

The Computer Attitudes Scale was applied to all participants. Nevertheless, since the samples of the other two devices were too small, only the results related to smartphone perception were analyzed.

Below, we outline attitudinal dimension scores for all participants.

Table 1 reports valuations (increasing with score) for each attitudinal dimension.

The average age of the remaining participants was 71, of which 218 were female and 32 males

Table 1. Average score, standard deviation, and 95% confidence intervals for each attitudinal dimension.

Attitudinal dimension	Average	Standard deviation	95% confidence interval
Affective	1.57	.58	(1.50; 1.64)
Perc. usefulness	1.85	.49	(1.79; 1.92)
Perc. control	1.48	.42	(1.43; 1.53)
Behavioral	1.95	.46	(1.89; 2.01)

Table 2 compares scores for all pairs of attitudinal dimensions.

Table 2. Pearson's correlation coefficients (r) and t-statistics for difference of each pair of attitudinal dimensions (including p-values).

	Affective	Perceived usefulness	Perceived control
Perceived usefulness	r: .39 (p < .001) t-stat: -5.62 (p < .001)		
Perceived control	r: .55 (p < .001) t-stat: 2.17 (p = .0303)	r: .45 (p < .001) t-stat: 8.73 (p < .001)	
Behavioral	r: .23 (p < .001) t-stat: -7.78 (p < .001)	r: .53 (p < .001) t-stat: -2.00 (p = .046)	r: .23 (p < .001) t-stat: -11.48 (p < .001)

In the second stage, given isolation indicators, interviews suggested that participants' mental health was at risk. This was especially acute among those who lived alone during the first year of the pandemic. In the same vein, communicating with family members and seeing them was crucial for their emotional well-being. On the contrary, exposure to television and the news were sources of anxiety. Therefore, participants tended to mainly define the Internet as a technology to communicate. They also recognized the need for ICT tools in their everyday life. However, most participants acknowledged that they did not have the digital skills or confidence to use these tools independently.

Gender differences were noteworthy. For instance, women showed more willingness to both learn and ask for help. In terms of activities, for entertainment and crafts, e.g., to learn how to cook or weave, women mainly searched YouTube. On the contrary, men were more reluctant to receive help and their searches were task-oriented (e.g., mobility permits, health information search). Other differences were found in terms of the devices used and the fact that those who lived with more technologically skilled relatives increased their range of activities. In contrast, those who lived alone and did not have help usually only accessed mobile phones for particular tasks mainly related to communication.

Typology according to access device and use

On the basis of frequency of smartphone use, we distinguished between "active" and "moderate" users. There were 223 "active" users, i.e., subjects who reported using their smartphones either "daily" or "twice weekly," and 25 "moderate" users, i.e., subjects who reported using their smartphones either "twice per month" or "sporadically."

Moderate users

"Moderate" users were mostly women (92%) with average age of 72. Among these users, 40% did not complete primary school, 52% completed primary school but did not complete secondary school, and 8% completed secondary school. Regarding perceived usefulness, 48% of "moderate" users perceived a smartphone as either quite or very useful in daily life. Regarding comfortability of use, 56% of "moderate" users felt barely comfortable with smartphones. All "moderate" users reviewed e-mail and read news on their smartphones, 40% used them for social media, and only 4% used them for banking or to look for information. Despite their limited use, 68% agreed or strongly agreed with the statement "I would like to use a smartphone more often" and 64% agreed or strongly agreed with the statement "Smartphones are enjoyable".

Below, we compare average scores among attitudinal components for "moderate" users only. Table 3 reports valuations (increasing with score) of each attitudinal dimension for "moderate" users.

In the interviews, moderate users described the Internet as a necessary technology, but they often expressed feelings of being outdated and were critical of their lack of experience. Some even declared themselves as non-Internet users. They perceived the Internet as being used for much more than what they personally needed, which primarily revolved around communicating with their loved ones during times of confinement and restrictions. While they recognized the advantages of technological advances in communication, they also harbored concerns about the associated risks.

Their knowledge of their devices was limited, and some could not distinguish between a mobile phone and a smartphone (i.e., Internet access). They reported using the free application WhatsApp extensively, primarily for video calls and receiving pictures from friends and family, helpful information, and copies of documents necessary for being outside their households during quarantine periods. They were aware of their limited digital skills and were open to receiving assistance from younger family members. However, it is worth noting that men appeared more reluctant and task-oriented in their approach to learning and smartphone use, primarily focusing on specific purposes such as communication and obtaining online permits..

Table 3. Average score, standard deviation, and 95% confidence intervals for each attitudinal dimension among “moderate” users.

Attitudinal dimension	Average	Standard deviation	95% confidence interval
Affective	1.25	.52	(1.05; 1.45)
Perc. usefulness	1.39	.35	(1.25; 1.53)
Perc. control	1.16	.40	(1.00; 1.32)
Behavioral	1.63	.45	(1.45; 1.81)

Active users

“Active” users were also mostly women (87%) with average age 71. Among these users, 38.6% did not complete primary school, 34.5% completed it but did not complete secondary school, 15.7% completed secondary school, and the remaining “active” users either started or completed higher education. Most “active” users reported using a smartphone daily, and 10.8% reported using it twice weekly. Regarding perceived usefulness, 94.2% saw a smartphone as either quite or very useful in daily life. Regarding comfortability of use, 79.8% felt quite or very comfortable when using it. Regarding potential command of the devices, 54.3% either agreed or strongly agreed with the statement “I could learn whatever I need about the use of a smartphone by myself if I wanted” whereas, regarding self-confidence, 65.9% either agreed or strongly agreed with the statement “When using a smartphone, I am afraid to make mistakes that I am unable to correct by myself”. Among “active” users, 73.1% used a smartphone for social media, 38.6% to look for online information, 21.1% to read news, 23.8% to review emails, and 13.5% for banking.

Below, we compare average scores among attitudinal components for “active” users.

Table 5 reports valuations (increasing with score) of each attitudinal dimension for “active” users.

In the qualitative stage, active users interpreted the Internet as a novel technology that can help them with multiple ends, in particular learning about different topics and communicating via video and telephone calls. Although active users did not report a higher level of digital skill, they did present more confidence and frequency of use. They were interested in and willing to continue learning and receiving training. They reported using their smartphones several times a day, as well as presented a broader range of online activities. However, as with moderate users, WhatsApp was the most common application used. Through the use of other applications like YouTube, they tended to see the device as a form of communication and entertainment. In some exceptional cases, participants also used a laptop as a complementary device, but it did not surpass the relevance of their smartphones for their main activities. They reported using both devices at a basic level and preferring to use their smartphone before a computer or tablet.

Table 4. Average score, standard deviation, and 95% confidence intervals for each attitudinal dimension among “active” users.

Attitudinal dimension	Average	Standard deviation	95% confidence interval
Affective	1.61	.57	(1.54; 1.68)
Perc. usefulness	1.92	.47	(1.86; 1.98)
Perc. control	1.52	.41	(1.47; 1.57)
Behavioral	1.99	.44	(1.93; 2.05)

Table 5. Quotes from “moderate” users.

The need to be updated and self-criticism: “One connects with the world through the Internet, I do not want to stay in the past” (male, 74 years-old); “I am older, and I was raised in a different way of life, so these things are really difficult for me” (female, 78- years-old).
Limited digital skills: “Because technology is eating [us] up; this technology is currently out of my hands” (male, 74 years-old); “It is too late to learn, they have tried to teach me, but I do not practice, and I forget” (male, 78 years-old).
Help from others: “Yes, they have tried to teach me, yes, my daughters, but no, I do not really practice much; I only worry about receiving calls and being there if that happens” (male, 74 years-old).
Communication and entertainment: “No, I am not interested in social media or that kind of stuff. To make or receive a call, that is the kind of person I am” (male, 78 years-old); “I have stayed in the past, I am 69 years old, so I’m living in the past” (male, 69 years-old).

Now, we turn evaluating whether differences appear in attitudinal dimensions between “active” and “moderate” users. To attain this information, we estimated one-way ANOVA and MANOVA models. To compare both groups on each dimension separately, we estimated four one-way ANOVA models, one for each dimension. In each model, the response variable was the corresponding attitudinal score and the independent variable was the participant’s group, namely “active” or “moderate.” The p-value of the ANOVA model was (i) equal to .0028 when the dependent variable was the “affective” component and (ii) smaller than .001 when the dependent variable was any of the other attitudinal scores. To compare jointly scores across all attitudinal dimensions, we estimated a one-way MANOVA model, where the dependent variables were the four attitudinal scores and the independent variable was the participant’s group, namely “active” or “moderate” (p-values < .001). These results, along with Tables 3 and 5, suggest that more frequent use of smartphones among older adults is positively associated with subjects’ i) perception of comfortability with these devices, ii) perception of their usefulness, iii) perception of control over them, and iv) willingness to use them. These results were corroborated by the qualitative data. While both “active” and “moderate” users felt the Internet and technological devices are for a younger generation, “active” users were more willing to bridge the gap and felt they can learn new skills. Conversely, “moderate” users felt left behind.

Table 6. Quotes from “active” users.

The need to be updated and self-criticism: “You suddenly find out about many things that you had no idea about, with the Internet you learn many things... You can entertain yourself, play, work” (female, 74 years-old); “You educate yourself on the Internet” (female, 69 years-old).
Digital skills: “I use the Internet for work to print payments, print if I do a transfer, I use it for different things... something that my work asks me for, permission, I am always using it for that kind of thing” (female, 74 years-old).
Help from others: “Well, I ask my son for everything on WhatsApp, he requests food delivery service” (female, 74 years-old); “Yes, and the permits, my granddaughter fills them out and sends them to me by WhatsApp” (female, 72 years-old).
Communication and entertainment: “I make daily video calls with my children, and because of that the situation is a little less painful” (female, 73 years-old); “I love crafts, it is easy to look for [related material] on YouTube, you can find the dots in weaving, the filling for a cake, it is fabulous” (female, 72 years-old).

Discussion

The challenges of ensuring digital inclusion for older adults, especially in the context of the COVID-19 pandemic, are evident and supported by the existing scientific literature. The pandemic has exacerbated the digital divide, disproportionately affecting older adults who are not only at higher risk of severe illness but also face difficulties in accessing essential services and maintaining social connections due to lockdowns and restrictions. As highlighted in previous research (Hargittai et al., 2019; Ellison et al., 2011), the internet plays a critical role in the lives of older adults. It serves as a lifeline for accessing medical and subsistence services, staying connected with family and friends, and mitigating the psychological risks associated with isolation. However, the adoption and effective use of information and communication technologies (ICTs), such as smartphones, remain challenging for this demographic. Although this research sample was not representative, the results were consistent with the literature regarding the use of Internet-based and technological devices among older people (Alvarez-Dardet et al., 2020; Zhao et al., 2020). As mentioned by Hargittai et al. (2019), most older people think that smartphones are useful in their daily life. Our study showed that the more they use it, the greater their perception of utility and control. Older people reported that they mainly use smartphones to communicate, use social media and search for information.

This study's findings echo previous research indicating that older adults often face disadvantages related to digital skills, technical assistance, and interest in technology (Lee et al., 2011; Barrantes & Cozzubo, 2017; Haase et al., 2021). The pandemic has further exposed these long-standing technology-related inequalities, emphasizing the urgency of addressing these issues through public policies and interventions (Beaunoyer et al., 2020). Moreover, the study aligns with prior literature in emphasizing the importance of social ties and communication for older adults' mental health (Hernandez, Jimenez, & Perez, 2022). The lack of communication during the pandemic had adverse effects on the mental health of older adults, particularly those living alone. This underscores the need for accessible and user-friendly digital tools that facilitate communication and socialization.

Findings also recognize the potential benefits of digital adoption for older adults, such as improved cognitive abilities, access to vital services, and enhanced connectivity (Charness & Boot, 2009; Llorente-Barroso et al., 2023). Telehealth, in particular, has emerged as a valuable form of care for this demographic (Zubatsky et al., 2020). However, the relationship between older adults and technology is complex, with privacy concerns, perceived usefulness, and trust influencing their digital behavior (Braun, 2013; Tsatsou, 2021). Therefore, interventions must carefully consider these factors to encourage meaningful technology adoption.

Regarding motivations for technology use, such as keeping in touch, sharing photos, and convenient communication our results align with previous research (He et al., 2020). Moreover, fear of new technologies remains a significant barrier (Heinz et al., 2013; Hill et al., 2015; Peek et al., 2016), emphasizing the importance of providing older adults with the necessary training and support to alleviate these fears.

The critical role of social support in facilitating technology use, especially when living with family members who can help (Barrantes & Cozzubo, 2017; Diehl et al., 2022), underscores the importance of involving younger generations in bridging the digital divide among older adults.

Finally, the study's findings are consistent with previous research demonstrating that older adults who do not have internet access experience a double exclusion—social and digital (Seifert, Cotten & Xie, 2021). Loneliness and reduced life satisfaction were associated with lower internet use for social connections (Hajek and König, 2021).

Conclusion

This study provides valuable insights into the digital behavior, attitudes, and challenges faced by vulnerable older adults in an urban district of Santiago, Chile, during the initial year of the pandemic. Employing a mixed-methods approach, the research explores various forms of internet access and use among this demographic, ranging from non-users to hybrid users, and includes perspectives from both men and women.

One of the central findings is the significant role played by the perception of control in shaping how older adults utilize smartphones and the frequency with which they do so. It is evident that a higher perception of control is associated with more positive feelings when using smartphones. Furthermore, reduced feelings of fear in smartphone

Older people reported that they mainly use smartphones to communicate, use social media and search for information

usage are linked to a greater willingness to use these devices, a heightened perception of their usefulness, and an increased sense of control. This highlights the intricate relationship between attitudes and technology adoption among older adults, emphasizing the need to consider these perceptions when developing digital literacy programs aimed at promoting digital inclusion within this age group.

While the study's non-representative sample and its conduction during the COVID pandemic present limitations, the insights garnered are nonetheless invaluable. Future research directions should delve deeper into the role of social media for older adults, as it emerges as a significant activity regardless of demographic factors. Moreover, understanding the perspectives and challenges faced by non-users and proxy users remains crucial, as internet access barriers continue to be a significant concern, especially during crisis situations like a pandemic. This knowledge is fundamental for the development of relevant and effective public policies that can enhance the digital inclusion of older adults.

In conclusion, this research offers a comprehensive view of technology adoption and attitudes among older adults, particularly concerning smartphone usage. The study paints a nuanced picture of a generation that is increasingly embracing smartphones but still grapples with issues related to confidence and control. By recognizing the pivotal role of perceived control and addressing the specific needs and apprehensions of older adults, we can pave the way for digital empowerment and social inclusion in an ever-evolving digital landscape. Ultimately, bridging the digital divide among older adults is not just a matter of access but also hinges on fostering positive attitudes and enhancing digital skills, thereby enriching their quality of life and connectivity in today's digital world.

Authors' contributions

The authors equally contributed to the manuscript preparation and approved the final version submitted.

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Data availability statement

The data presented in this study can be requested from the corresponding author.

Conflict of interest

The authors declare no conflict of interest.

References

- Álvarez-Dardet, S. M., Lara, B. L., & Pérez-Padilla, J. (2020). Older adults and ICT adoption: Analysis of the use and attitudes toward computers in elderly Spanish people. *Computers in Human Behavior*, 110, 106377. DOI: 10.1016/j.chb.2020.106377
- Barrantes Cáceres, R., & Cozzubo Chaparro, A. (2017). Age for learning, age for teaching: the role of inter-generational, intra-household learning in Internet use by older adults in Latin America. *Information, Communication & Society*, 1–17. DOI: 10.1080/1369118X.2017.1371785
- Beaunoyer, E., Dupéré, S., & Guitton, M. J. (2020). COVID-19 and digital inequalities: Reciprocal impacts and mitigation strategies. *Computers in human behavior*, 111. DOI: 10.1016/j.chb.2020.106424
- Berger, A. A. (2018). *Media and communication research methods: An introduction to qualitative and quantitative approaches*. California: Sage Publications.
- Blank, G. & Groselj, D. (2014) Dimensions of Internet use: amount, variety, and types, *Information, Communication & Society*, 17(4) 417-435, DOI: 10.1080/1369118X.2014.889189
- Braun, M. T. (2013). Obstacles to social networking website use among older adults. *Computers in human behavior*, 29(3), 673-680. DOI: 10.1016/j.chb.2012.12.004
- Callahan, C. M., Unverzagt, F. W., Hui, S. L., Perkins, A. J., & Hendrie, H. C. (2002). Six-item screener to identify

cognitive impairment among potential subjects for clinical research. *Medical care*, 771-781. <http://www.jstor.org/stable/3768143>

Charness, N., & Boot, W. R. (2009). Aging and information technology use: Potential and barriers. *Current Directions in Psychological Science*, 18(5), 253-258. DOI: 10.1111/j.1467-8721.2009.01647.x

Chou, M. C., & Liu, C. H. (2016). Mobile instant messengers and middle-aged and elderly adults in Taiwan: Uses and gratifications. *International Journal of Human-Computer Interaction*, 32(11), 835-846. DOI: 10.1080/10447318.2016.1201892

Ellison, N. B., Steinfield, C., & Lampe, C. (2011). Connection strategies: Social capital implications of Facebook-enabled communication practices. *New Media & Society*, 13(6), 873-892. DOI: 10.1177/1461444810385389

Esterberg, K. (2002). *Qualitative methods in social research*. Boston: McGraw-Hill.

Diehl, C., Tavares, R., Abreu, T., Almeida, A. M. P., Silva, T. E., Santinha, G., ... & Ribeiro, O. (2022). Perceptions on extending the use of technology after the COVID-19 pandemic resolves: A Qualitative study with older adults. *International Journal of Environmental Research and Public Health*, 19(21), 14152. DOI: 10.3390/ijerph192114152.

Fernández-Ballesteros R. (2008). *Active Aging. Contributions from psychology* Toronto: Hogrefe & Huber Publisher.

Flick, U. (2022). *An introduction to qualitative research*. Sage.

Gorenko, J.A., Moran, C., Flynn, M., Dobson, K. & Konnert, C. (2021). Social Isolation and Psychological Distress Among Older Adults Related to COVID-19: A Narrative Review of Remotely-Delivered Interventions and Recommendations. *J Appl Gerontol*, 40(1):3-13. DOI: 10.1177/0733464820958550.

Hargittai, E., Piper, A. M., & Morris, M. R. (2019). From internet access to internet skills: digital inequality among older adults. *Universal Access in the Information Society*, 18(4), 881-890. DOI: 10.1007/s10209-018-0617-5

Harley, D., & Fitzpatrick, G. (2009). YouTube and intergenerational communication: the case of Geriatric1927. *Universal access in the information society*, 8(1), 5-20. DOI: 10.1007/s10209-008-0127-y

Haase, K. R., Cosco, T., Kervin, L., Riadi, I., & O'Connell, M. E. (2021). Older adults' experiences with using technology for socialization during the COVID-19 pandemic: Cross-sectional survey study. *JMIR aging*, 4(2), e28010. DOI: 10.2196/28010

Hajek, A. & König, H-H. (2021). Frequency of contact with friends and relatives via internet and psychosocial factors in middle-aged and older adults during the COVID-19 pandemic. Findings from the German Ageing Survey. *Int J Geriatr Psychiatry*. 2021; 1–10. DOI: 10.1002/gps.5623

He, T., Huang, C., Li, M., Zhou, Y., & Li, S. (2020). Social participation of the elderly in China: The roles of conventional media, digital access and social media engagement. *Telematics and Informatics*, 48, 101347. DOI: 10.1016/j.tele.2020.101347

Heinz, M., Martin, P., Margrett, J. A., Years, M., Franke, W., Yang, H. I., ... & Chang, C. K. (2013). Perceptions of technology among older adults. *Journal of gerontological nursing*, 39(1), 42-51. DOI: 10.3928/00989134-20121204-04

Hernández Falcón, J., Jiménez Mendoza, A. y Pérez Cabrera, I. (2022). Trascendencia de la comunicación en la calidad de vida del adulto mayor en el distanciamiento social por COVID-19. *Revista de Comunicación y Salud, Revista de Comunicación y Salud*, 12, 45-58. DOI: 10.35669/rcys.2022.12.e288

Hill, R., Betts, L. R., & Gardner, S. E. (2015). Older adults' experiences and perceptions of digital technology: (Dis)empowerment, wellbeing, and inclusion. *Computers in Human Behavior*, 48, 415-423. DOI: 10.1016/j.chb.2015.01.062

- Hunsaker, A., & Hargittai, E. (2018). A review of Internet use among older adults. *New Media & Society*, 20(10), 3937–3954. DOI: 10.1177/1461444818787348
- INE (2018). *Adultos mayores presentan mayor dependencia y participación en el mercado laboral informal*.
<https://www.ine.cl/prensa/2020/04/15/adultos-mayores-en-chile-cuántos-hay-dónde-viven-y-en-qué-trabajan>
- INE (2020). *Adultos mayores en Chile: ¿Cuántos hay? ¿Dónde viven? ¿Y en qué trabajan?*
<https://www.ine.cl/prensa/2020/04/15/adultos-mayores-en-chile-cuántos-hay-dónde-viven-y-en-qué-trabajan>
- Jung, E. H., Walden, J., Johnson, A. C., & Sundar, S. S. (2017). Social networking in the aging context: Why older adults use or avoid Facebook. *Telematics and Informatics*, 34(7), 1071-1080. DOI: 10.1016/j.tele.2017.04.015
- Katz, E., Blumler, J. G., & Gurevitch, M. (1974). *The uses and gratifications approach to mass communication*. Beverly Hills, California: Sage Publications.
- Kim, M. J., Lee, C. K., & Contractor, N. S. (2019). Seniors' usage of mobile social network sites: Applying theories of innovation diffusion and uses and gratifications. *Computers in Human Behavior*, 90, 60-73. DOI: 10.1016/j.chb.2018.08.046
- Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research interviewing*. Sage.
- Lee, B., Chen, Y., & Hewitt, L. (2011). Age differences in constraints encountered by seniors in their use of computers and the internet. *Computers in Human Behavior*, 27(3), 1231-1237. DOI: 10.1016/j.chb.2011.01.003
- Leist, A. K. (2013). Social media use of older adults: a mini-review. *Gerontology*, 59(4), 378-384. <https://doi.org/10.1159/000346818>
- Llorente-Barroso, C., Sánchez-Valle, M. & Viñarás-Abad, M. (2023). The role of the Internet in later life autonomy: Silver surfers in Spain. *Humanit Soc Sci Commun* 10, (56). DOI: 10.1057/s41599-023-01536-x
- Moreno T. & Fuentes, M. (2016). Mobile communication and elderly people: Exclusion and differential use of mobile devices. *Perspectivas de la Comunicación*, 9(2), 7-29.
- Napoli, P. M., & Obar, J. A. (2014). The emerging mobile Internet underclass: A critique of mobile Internet access. *The Information Society*, 30(5), 323-334. DOI: 10.1080/01972243.2014.944726
- Nimrod, G. (2020). Changes in internet use when coping with stress: older adults during the COVID-19 pandemic. *The American journal of geriatric psychiatry*, 28(10), 1020-1024. DOI: 10.1016/j.jagp.2020.07.010
- Onwuegbuzie, A. J., & Collins, K. M. (2007). A typology of mixed methods sampling designs in social science research. *Qualitative Report*, 12(2), 281-316. DOI: 10.46743/2160-3715/2007.1638
- Pavez, I., & Correa, T. (2020). "I Don't Use the Internet": Exploring Perceptions and Practices Among Mobile-Only and Hybrid Internet Users. *International Journal of Communication*, 14, 2208-2226.
- Pearce, K. E., & Rice, R. E. (2013). Digital divides from access to activities: Comparing mobile and personal computer Internet users. *Journal of Communication*, 63(4), 721-744. DOI: 10.1111/jcom.12045
- Peek, S. T., Luijkx, K. G., Rijnaard, M. D., Nieboer, M. E., van der Voort, C. S., Aarts, S., ... & Wouters, E. J. (2016). Older adults' reasons for using technology while aging in place. *Gerontology*, 62(2), 226-237. DOI: 10.1159/000430949
- Pochintesta, P. & Múseres, N. (2022). About the Uses, Perceptions, and Appraisals of ICTs among Older People. A Case Study in Northwest Greater Buenos Aires, Argentina. *Research on Ageing and Social Policy*, 10(2), 159-183. DOI: 10.4471/rasp.9652
- Pywell J., Vijaykumar, S., Dodd, A., & Coventry, L. (2020). Barriers to older adults' uptake of mobile-based mental health interventions. *Digital Health*, 6. DOI: 10.1177/2055207620905422

- Quan-Haase, A., Martin, K., & Schreurs, K. (2016). Interviews with digital seniors: ICT use in the context of everyday life. *Information, Communication & Society*, 19(5), 691-707. DOI: 10.1080/1369118X.2016.1140217
- Quan-Haase, A., Williams, C., Kicevski, M., Elueze, I., & Wellman, B. (2018). Dividing the Grey Divide: Deconstructing Myths About Older Adults' Online Activities, Skills, and Attitudes. *American Behavioral Scientist*, 62(9), 1207–1228. DOI: 10.1177/0002764218777572
- Rainie, L. (2015). *Digital Divides 2015*. Pew Research Center: Internet. *Science & Tech*.
- Rodríguez, I., Cajamarca, G., Herskovic, V., Fuentes, C., & Campos, M. (2017). Helping elderly users report pain levels: A study of user experience with mobile and wearable interfaces. *Mobile Information Systems*, 2017. DOI: 10.1155/2017/9302328
- Ruggiero, T. E. (2000). Uses and gratifications theory in the 21st century. *Mass communication & society*, 3(1), 3-37. DOI: 10.1207/S15327825MCS0301_02
- Sampieri, R. H. (2018). *Metodología de la investigación: las rutas cuantitativa, cualitativa y mixta*. McGraw Hill México.
- Selwyn, N. (1997). Students' attitudes toward computers: Validation of a computer attitude scale for 16–19 education. *Computers & Education*, 28(1), 35-41. DOI: 10.1016/S0360-1315(96)00035-8
- Selwyn, N., Gorard, S., & Furlong, J. (2005). Whose Internet is it anyway? Exploring adults'(non) use of the Internet in everyday life. *European journal of communication*, 20(1), 5-26. DOI: 10.1177/0267323105049631
- Siefert, A. (2020). The Digital Exclusion of Older Adults during the COVID-19 Pandemic. *Journal of Gerontological Social Work*, 63(6-7), 674-676. DOI: 10.1080/01634372.2020.1764687
- Seifert, A., Cotten, S. R., & Xie, B. (2021). A double burden of exclusion? Digital and social exclusion of older adults in times of COVID-19. *The Journals of Gerontology: Series B*, 76(3), e99-e103. DOI: 10.1093/geronb/gbaa098
- Silverstone, R. (Ed.). (2005). *Media, technology and everyday life in Europe: from information to communication*. Aldershot, England: Ashgate.
- Subedi, D. (2016). Explanatory sequential mixed method design as the third research community of knowledge claim. *American Journal of Educational Research*, 4(7), 570-577.
- Subtel. (2017). *Novena encuesta accesos y usos de Internet*. https://www.subtel.gob.cl/wpcontent/uploads/2018/07/Informe_Final_IX_Encuesta_Acceso_y_Usos_Internet_2017.pdf
- Sunkel, G., & Ullmann, H. (2019). Las personas mayores de América Latina en la era digital: superación de la brecha digital. *Revista CEPAL*, 127. <https://hdl.handle.net/11362/44580>
- Tsatsou, P. (2021). Aging: The Two Faces of Janus in Digital Inclusion? *International Journal of Communication*, 15, 21.
- Villalobos, P. (2017). Envejecimiento y cuidados a largo plazo en Chile: desafíos en el contexto de la OCDE. *Revista Panamericana de Salud Pública*, 41, 86. DOI: 10.26633/RPSP.2017.86
- Villar, F. (2003). Personas mayores y ordenadores: valoración de una experiencia de formación. *Revista española de geriatría y gerontología*, 38(2), 86-94. DOI: 10.1016/S0211-139X(03)74862-8
- Xie, C., Bai, F., Yu, H., Shi, Y., Yuan, Y., Chen, G., Li, W., Chen, G., Zhang, Z., & Li, S. J. (2012). Abnormal insula functional network is associated with episodic memory decline in amnesic mild cognitive impairment. *Neuroimage*, 63(1), 320-327. DOI: 10.1016/j.neuroimage.2012.06.062
- Yang, H. L., & Lin, S. L. (2019). The reasons why elderly mobile users adopt ubiquitous mobile social service. *Computers in Human Behavior*, 93, 62-75. DOI: 10.1016/j.chb.2018.12.005

Zhao, X., Wang, L., Ge, C., Zhen, X., Chen, Z., Wang, J., & Zhou, Y. (2020). Smartphone application training program improves Smartphone usage competency and quality of life among the elderly in an elder university in China: A randomized controlled trial. *International journal of medical informatics*, 133, 104010. DOI: 10.1016/j.ijmedinf.2019.104010

Zubatsky, M., Berg-Weger, M., & Morley, J. (2020). Using telehealth groups to combat loneliness in older adults through COVID-19. *Journal of the American Geriatrics Society*. DOI: 10.1111/jgs.16553