

Use and perception of gerontechnology: differences in a group of Spanish older adults

Alicia Murciano-Hueso, Judith Martín-Lucas, Sara Serrate González and Patricia Torrijos Fincias

Abstract

Purpose – *The purpose of this paper is to understand the profile of use of gerontechnology in Spanish older adults considering their age group (60–70; 71–80 and over 80 years) and to discern whether groups of subjects with similar characteristics can be established to ascertain which factors are behind the profile of frequent gerontechnology use.*

Design/methodology/approach – *A quantitative study is presented to understand the profile of use of gerontechnology in Spanish older adults. The sample comprised 497 participants (aged between 60 and 94 years).*

Findings – *The results show that, even though most participants consider technology to be useful in their daily lives, there is still a lack of knowledge on how to use it, especially among older subjects. This highlights the importance of promoting technological cocreation initiatives such as senior living labs.*

Research limitations/implications – *Other researchers are encouraged to include the voices of older adults using gerontechnology in further studies.*

Practical implications – *If we want to increase the acceptance of technology by older adults, we must first let them take part in the design of the technologies they will use.*

Social implications – *This research provides promising data that should merit attention to contribute to the well-being and quality of life of older adults in a society where currently technology is a key part in every sphere of our daily life.*

Originality/value – *The value of this research lies in the implications of “aging in place” studies today.*

Keywords Gerontechnology, Older adults, Education, Technology, Digital inclusion, Technology acceptance

Paper type Research paper

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Introduction

Developments in science and technology in recent decades have led to significant progress in life expectancy; we live in a world that is increasingly populated and aging. According to estimates by the [United Nations \(2019\)](#) for the year 2050, 16% of the world population will be aged over 65, this report also estimates that the number of people aged 80 and over will rise from 143 million to 426 million in 2050.

As life expectancy and the world population grows, so does the use of technological devices. We are increasingly connected by digital devices ([Amilburu, 2022](#)). While until now the use of digital technologies was attributed to younger generations, in the early 21st century, technology became an inseparable part of the lives of older adults ([Wanka and Gallistl, 2021](#)). In Spain for example, 27.9% of people aged over 74 years old use the Internet, a 4.5% increase from 2019 ([INE, 2020](#)). Nevertheless, according to data obtained by [Eurostat \(2019\)](#), most people aged over 65 who use the Internet have a low level of

digital skills with just 6.5% of those in this age range classed as having the skills necessary to browse the Internet independently and safely. In other Western countries, such as the United States, 61% of the population of older adults have a smartphone and Internet use has also increased significantly in recent years (Anderson and Perrin, 2017; Perrin, 2021).

Technology allows us to play a more active role in society, reducing loneliness, isolation and even controlling health-related aspects (Rasi *et al.*, 2021). Therefore, if we want to continue to encourage an active and healthy elderly generation to participate in society, we must bear in mind that while the world is aging, older adults are demanding new technologies and new services that better suit their needs. In short, products and services that offer the support they need to improve their quality of life (Martín-García, 2018; Naor *et al.*, 2021).

Although studies on the use and adoption of digital technology by older adults have increased in recent years (Chen and Chan, 2014; Ma *et al.*, 2021; Martín-García *et al.*, 2021b; Murciano-Hueso *et al.*, 2022), most publications state that a more in-depth study of how older adults adopt, perceive and use digital technology is necessary (Bai *et al.*, 2020; Martín-García *et al.*, 2021b; Wanka and Gallistl, 2021).

Literature review

Gerontechnology (gerontology + technology) is an interdisciplinary research field applicable to gerontology and technology. It also includes the development and distribution of technology environments, products and services (Bouma and Graafmans, 1992; Martín-García *et al.*, 2021a, 2021b, 2021c) to improve the daily lives and aging of older people with technology developments). Based on a report entitled “Technology for Adaptive Aging” by the US National Research Council (2003), literature consistently points out (Chen and Chan, 2014; Pew and Van Hemel, 2004; Martín-García, 2021b) that these technology environments, products and services are divided into five areas of development called “life domains”: Living Environments; Communication; Personal mobility and transportation; Health; and Employment, Education, Recreation or self-fulfillment. As the goal of each of these fields is to prevent, compensate or improve accessibility and usability of these products to improve the daily life of the elderly, specialist literature simplifies these areas into different categories according to their use (Huang *et al.*, 2021; Sundgren *et al.*, 2020) like gathering continuous data; assisting older people cognitively and socially; providing care or monitoring of health from a distance; compensating for possible technology deficits in the home environment; or into different domains based on their similarities in terms of goals or context of use (Chen and Chan, 2014); home and daily living, communication, health care, education and recreation. In this study, gerontechnology is used as an umbrella term for all of the technologies mentioned in these five main areas.

Research into gerontechnology has piqued the interest of researchers from different fields over the last few decades. So much so that progress in this field has enabled older adults to use technology to resolve certain problems and difficulties related to aging (Chen and Chan, 2014). Hence, more and more businesses and developers are launching technologies onto the market which target older adults (Wanka and Gallistl, 2021). However, there is still a gap between this older generation and regular use of this technology compared to the rest of the population (Eurostat, 2019). What are the real causes of this difference? This is a problem that leads us to ask if said group finds this technology useful, a question that does not have a clear solution and answer as research on these issues has been scarce to date and studies published yield contradictory results. On one hand, authors such as Martín and Marcos (2017), Sunkel and Ullman (2019) or Huang *et al.* (2021) argue that older adults perceive technology as increasingly positive. Meanwhile on the other hand, researchers such as González Oñate and Fanjul Peyró (2018) or Seifert *et al.* (2018) have observed that older adults state that these technologies do not appear to be adapted to their needs and demand, making them feel uncomfortable and ill prepared for its use. These results are endorsed by studies showing how adoption rates for these

technologies by older adults is much lower in this age range compared to other population groups (Anderson and Perrin, 2017; Vaportzis *et al.*, 2017). Older adults also seem to be unfamiliar with medical and health-care-related technologies (Ma *et al.*, 2021), a significant field for improving their quality of life. In terms of uses, research shows that social connection (staying in contact with friends and family) is one of the main reasons for using technology (Tsai *et al.*, 2015; Wilson *et al.*, 2021), even more so during the lockdowns in most Western countries caused by the COVID-19 pandemic (Burke, 2020; Tenforde *et al.*, 2021; Wilson *et al.*, 2021). Likewise, other authors point out that older adults are aware that not using this technology sometimes makes them feel excluded from society (Rasi *et al.*, 2021), with social pressure forcing them to make use of said technologies (Zhou *et al.*, 2012) without expressing a personal interest in doing so. These and other factors are the cause for a considerable number of older adults not benefiting from the help and advantages technology can offer them in their daily lives.

Although educational interventions in these aspects have proven to improve the adoption rate and positive view of older adults toward technology (Rasi *et al.*, 2021), it is worth noting that gerontechnology has barely been studied by education sector, an area in which technology can help, facilitate and improve educational actions targeting this group. Martín-García (2018) suggest that studying gerontechnology from an educational perspective should be approached from three areas:

1. understanding and identifying factors associated with the difficulty older adults find in using technology;
2. designing appliances, devices and programs adapted to this group from an educational approach; and
3. implementing digital skills training processes so that older adults can use these technologies independently.

In short, despite the digital environment offering older adults' new spaces for leisure and free time, health or lifelong learning (Martín-García, *et al.*, 2021c), literature clearly expresses the need to conduct studies to understand how older adults adopt and use technology (Rogers *et al.*, 2014; Martín-García, 2018). Therefore, the goal of this paper is to approach the first area proposed by Martín-García (2018) and to understand the use, reason and perception of older adults toward technologies. The results of the first phase of the (details withheld for anonymity) research project are presented below, which aims to analyze and develop open and inclusive ecosystems for research and innovation (R&D) within the framework of psychoeducational gerontechnology.

Method

This research aims to understand the profile of use of gerontechnology in Spanish older adults considering their age group (60–70; 71–80 and over 80 years) and to discern whether groups of subjects with similar characteristics can be established to ascertain which factors are behind the profile of frequent gerontechnology use. The following specific objectives are proposed:

- understand how older adults use everyday technologies;
- understand the main reasons and purposes for which older adults use everyday technologies;
- understand how older adults perceive the usefulness of everyday technologies in their daily lives; and
- determine whether profiles can be established or subject groups with similar characteristics so as to understand the factors behind frequent use of gerontechnology domains.

It is expected that:

- H1. There are differences in everyday technology use by older adults by age group ranging from 60–70 years, 71–80 years or over 80 years, especially between the youngest and oldest groups.
- H2. Older adults mainly use everyday technologies for different reasons based on their age group.
- H3. There are differences in the perceived usefulness (for making important decisions and managing daily life; to be more autonomous and independent; to increase the chances of achieving important things in daily life; and feeling part of society) based on age group, with the young age group (60–70 years) considering them to be more useful.
- H4. There is a significant correlation between perceived usefulness and the use of everyday digital technology domains in older adults.
- H5. There are differences in the profiles or subject groups that frequently use gerontechnology domains based on gender, level of education, living arrangements, area of residence, education program or center attendance and prior experience with digital devices in their working life.

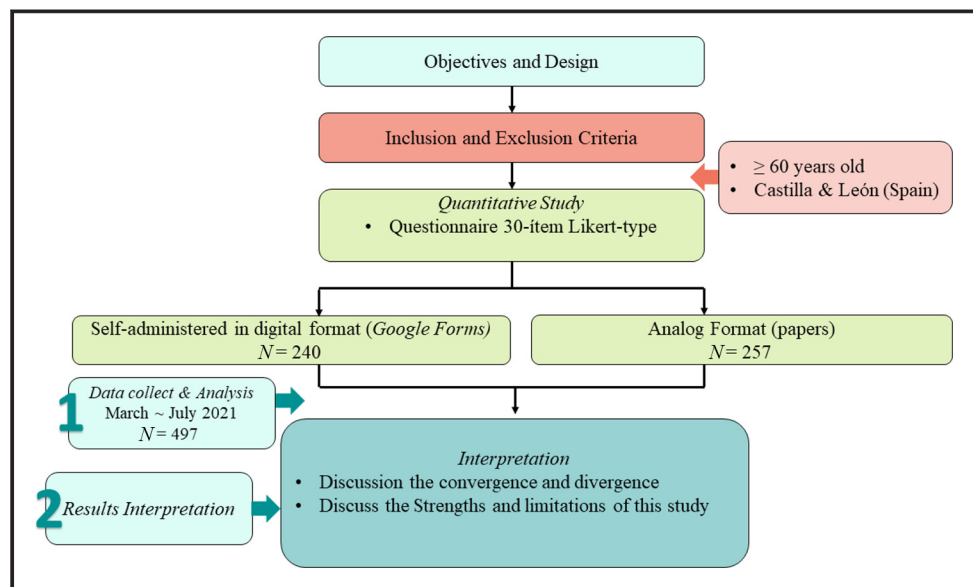
Study design

A quantitative design was employed. Because of the current situation caused by COVID-19, data were collected by applying the scales to the sample of participants with an anonymous questionnaire structure in digital and analog format. In both cases, the data collection process adapted to ethical criteria by requesting consent at the beginning of the questionnaire and participants filled it out in private. The flow diagram is shown in [Figure 1](#).

Participants

The sample useful for the study comprised 497 Spanish older adults from Castile and León (198 men and 299 women) aged between 60 and 94 ($M = 75.02$, $SD = 9.19$). This study considered people aged over 60 as older adults in line with World Health Organization

Figure 1 Flow diagram



(WHO) criteria. Delimitation of the territorial scope responds to purely pragmatic reasons of proximity and ease of access to the group. Participants were divided into three age groups to check if there were differences respect to their age: 173 older adults aged 60–70 ($M = 65.27$, $SD = 2.74$); 142 older adults aged 61–80 ($M = 74.92$, $SD = 3.22$); and 182 older adults aged over 80 ($M = 85.84$, $SD = 3.50$). Of these, 67.2% lived in an urban or city area and most of them cohabitation as a couple (38.7%) and have completed elementary studies (36.1%) or higher education (27.8%). Most of the sample of participants regularly attended an education, cultural or social center or program (56.4%) and had no prior experiences with digital devices during their working life (63.9%).

Instrument

This study included a standard informed consent form, an informative statement and a questionnaire created for the purpose of this research.

The instrument comprises a 30-item Likert-type scale to collect information on three main aspects:

1. the different domains of gerontechnology;
2. the most common reason for using gerontechnology; and
3. aspects of gerontechnology that are useful in daily life.

The questionnaire listed a total of 18 gerontological products and general services, classified in the four areas already mentioned according to their similarities in terms of objectives or context of use: home and daily living (support home and daily tasks), Communication (support communication with others), health care (manage health) and education and recreation (typically used on a voluntary basis in free time) (Chen and Chan, 2014). These gerontechnology products and services were selected because they were everyday technologies used by older adults for performing everyday tasks, including instrumental and enhanced activities of daily living (O'Brien *et al.*, 2012). They also varied in terms of levels of technological sophistication, ease of use or modernity, including (Chen and Chan, 2014). Studies have revealed that the breadth and depth of technology usage have been shown to be indicative of technological experience and knowledge as well as the degree to which the innovation is compatible with one's values, experiences and needs; the ability to use everyday technology is required as part of instrumental activities of daily living (Bartels *et al.*, 2020; Chen, 2020; Harte *et al.*, 2018; Malinowsky *et al.*, 2011).

The questionnaire content validation process was divided into two clearly differentiated phases. The instrument was first subject to content validation by a group of 14 international experts. Second, Cronbach's alpha coefficient was used to assess internal consistency to analyze the reliability of the questionnaire, which indicated excellent consistency ($=0.97$). Following the general criterion established by George and Mallery (2003, p. 231), indexes >0.9 for the total questionnaire are considered excellent.

Analysis

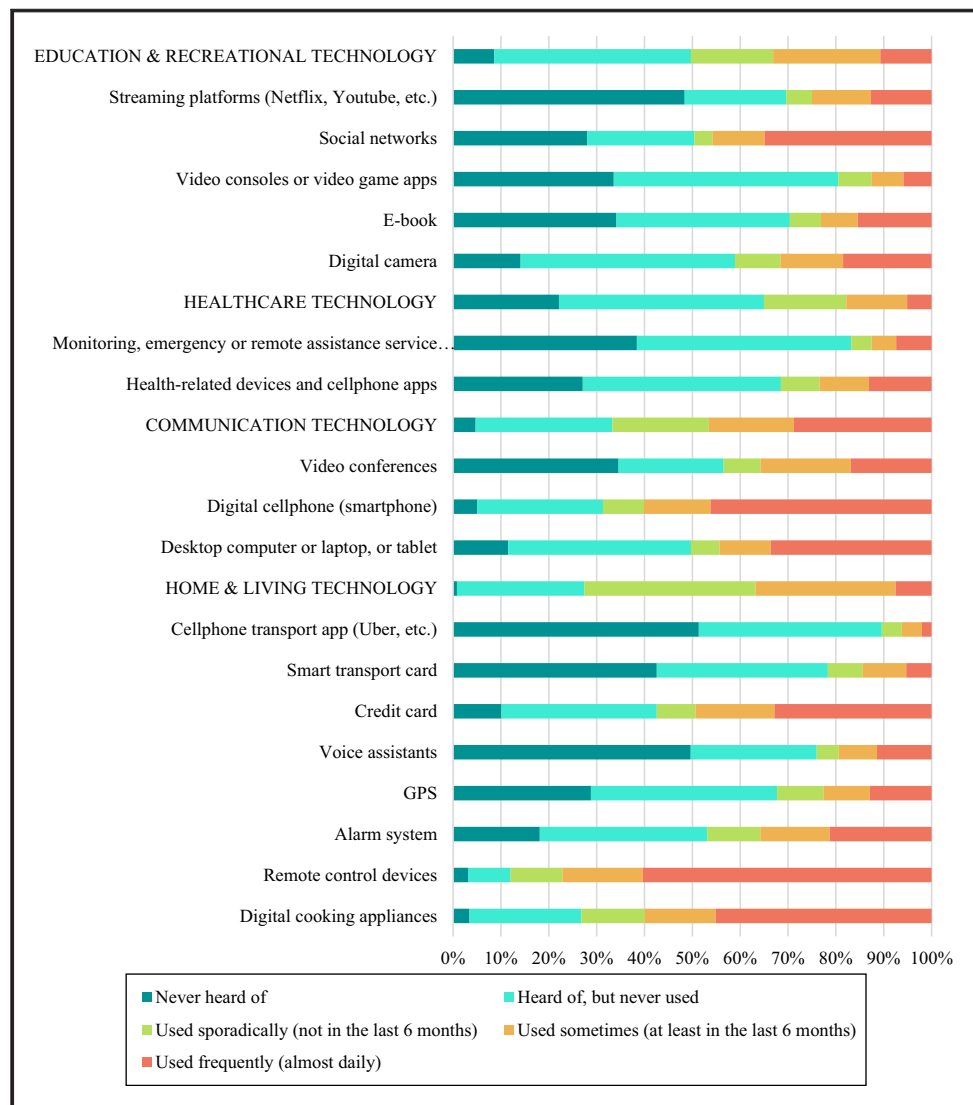
The questionnaire was self-administered in digital and analog format through friends, family and various professionals at day centers and programs for the elderly. "Snowball" sampling was started first, informing about the purpose of the research by telephone and then using Google Forms or delivering hard copy questionnaires by hand or by mail to spread the word about the research among all people aged over 60, asking for their collaboration. Data was obtained between March and July 2021. All data were analyzed using SPSS v. 20.0. Correlational studies were conducted mainly using Spearman's correlation coefficient to study the relationship between variables or the Chi-squared test when studying the relationship between categorical and nominal variables.

Results

Use of gerontechnology

Regarding the first objective, the results (Figure 2) indicate that the digital resources most widely used by older adults in their daily lives are remote control devices (60.3%); smartphones (46.2%); digital cooking appliances (45.1%); education and recreational technology such as social networks (33.9%); computers or tablets (33.6%); and credit cards (32.9%). Conversely, the digital resources least present in their daily lives, as they have not even heard of them, are cellphone transport apps (51.3%); voice assistants (49.6%); streaming platforms (48.4%); smart transport cards (42.6%); monitoring, emergency or remote assistance service devices (38.4%); video conferences (34.6%); e-books (34.1%); as well as video games consoles or applications (33.6%). Gerontechnology domain related to communication technology is the most used by older adults (28.8% state frequent use and 17.8% use it sometimes). Only 0.8% of older adults

Figure 2 Responses to general use of gerontechnology in different resources



have never heard of **home and daily living technology** domain, but more than 22% have never heard of the health-care technology domain.

A study of the relationship between age groups and use of gerontechnology (Chi-squared test) yields results in terms of the gerontechnology domains most present in their daily lives with respect to their age group (Figure 3). To do this, we analyzed the data using the statistical technique for non-normal samples (Kruskal–Wallis test). Significant differences were found between the frequency of use of gerontechnology domains and age groups ($\chi^2 = 156.714$, $df = 2$, $p < 0.000$). First, results confirm that users who claim to use gerontechnology domains in general most frequently (sometimes or almost daily) are younger (60–70 years) compared to the older group (>80 years), who hardly use them

Figure 3 Relationship between gerontechnology domains and user age groups



regularly or almost daily. The results also reveal that most users who state that they do not know gerontechnology domains are users aged over 80. Note that, although the percentage of users aged 60–70 who state that they do not know gerontechnology domains is very low compared to the other age groups (0% have no knowledge of communication technology, 2.4% of home and daily living technology and 1.2% of education and recreational domains), 12.3% admit that they do not know about domains related to health.

Second, the results show that the youngest users (<80years) use gerontechnology domains related to home and daily living technology more frequently (51.8% and 29.2% sometimes and 16.5% and 6.6% almost daily, respectively) and communication (17.9% and 31.7% sometimes and 53.3% and 31.7% almost daily, respectively). However, the results show that users aged over 80 use health-related domains more frequently (12.5% sometimes and 6.3% almost daily).

Purpose or reasons for which older adults use gerontechnology

Regarding the second objective (Table 1) we can see that activities related to communication (53.2%) are the most important in their everyday use of gerontechnology. However, controlling various health-related aspects is one of the least important reasons for using gerontechnology (37% state that they are not important at all and only 9.9% that they are very important). Note that the results highlight those older adults generally seem to consider that the use of gerontechnology is important in their lives to make their everyday lives more comfortable and easier (35.9% recognize that it is quite important and 23.6% very important), but also searching for information (28.5% as very important and 20% quite important); and learning (24.1% very and 23.9% quite important).

A study of the relationship between variables, according to age group and reasons or purposes for using gerontechnology (Table 1), highlights significant relationships regarding all of reasons. The results of Kruskal–Wallis test showed that there were significant differences between age groups with respect every motive to use gerontechnology: everyday comfort and ease ($\chi^2 = 59.249$, $df = 2$, $p < 0.000$); communication ($\chi^2 = 40.300$, $df = 2$, $p < 0.000$), entertainment

Table 1 Reasons or purposes for which older adults use gerontechnology (cross table)

Reasons Age	Everyday comfort and ease		Communication		Entertainment		Searching for information		Learning		Administrative formalities		Health aspects	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
1 60–70	9	5.3	2	1.2	15	8.8	9	5.3	8	4.8	20	11.7	29	17.1
2	11	6.4	5	3.6	26	18.6	39	28.1	34	24.5	42	29.8	45	32.4
3	24	14	9	5.3	34	19.9	22	12.9	17	10.2	25	14.6	48	28.2
4	60	35.1	38	22.2	52	30.4	40	23.4	53	31.9	35	20.5	34	20
5	60	39.2	115	67.3	45	26.3	91	53.2	75	45.2	77	45.6	25	14.7
1 70–80	18	12.9	5	3.6	26	18.6	39	28.1	34	24.5	42	29.8	45	32.4
2	9	6.4	10	7.1	23	16.4	15	10.8	17	12.2	25	17.7	20	14.4
3	21	15	13	9.3	28	20	11	7.9	12	8.6	10	7.1	25	18
4	65	46.4	33	23.6	41	29.3	36	25.9	46	33.1	31	22	40	28.8
5	27	19.3	79	56.4	22	15.7	38	27.3	30	21.6	33	23.4	9	6.5
1 <80	16	20	8	10	39	48.8	42	52.5	37	46.8	47	58.8	42	52.5
2	3	3.8	5	6.3	11	13.8	11	13.8	14	17.7	7	8.8	5	6.3
3	22	27.5	11	13.8	13	16.3	12	15	15	19	10	12.5	13	16.3
4	25	31.3	26	32.5	10	12.5	10	12.5	9	11.4	9	11.3	10	12.5
5	14	17.5	30	37.5	7	8.8	5	6.3	4	5.1	7	8.8	10	12.5
1 Total		16.3		5		27.8		30.9		28.4		7.3		37
2		6.3		7.3		14.1		9.3		12.3		10.7		14.8
3		17.9		10.7		17.3		11.3		11.2		23.8		20
4		35.8		23.8		24.6		20		23.9		53.2		18.2
5		23.6		53.2		16.1		28.5		24.1		7.3		9.9

Notes: *1 = nothing; 2 = little; 3 = some; 4 = quite a lot; 5 = a lot

($\chi^2 = 85.839$, $df = 2$, $p < 0.000$), searching for information ($\chi^2 = 156.546$, $df = 2$, $p < 0.000$), learning ($\chi^2 = 142.213$, $df = 2$, $p < 0.000$), administrative formalities ($\chi^2 = 133.355$, $df = 2$, $p < 0.000$) and health aspects ($\chi^2 = 57.735$, $df = 2$, $p < 0.000$).

The results show that users aged over 80 who generally consider the use of gerontechnology for this type of activity as least important in their everyday lives than users aged 60–70. Results reveal a larger percentage of people aged over 80 who consider gerontechnology in their everyday lives for entertainment and distraction as not important (48.8% of users aged over 80 compared to 8.8% of users aged 60–70); for learning (46.8% of users aged over 80 state that they are not important compared to 4.8% of users aged 60–70); to make everyday life more comfortable and easy (30% of older users consider that it is not important compared to 5.3% of younger users); to search for information (52.5% of users aged over 80 compared to 5.3% of those aged 60–70); and for administrative formalities (58.8% of those aged over 80 compared to 11.7% aged 60–70). Note that there are clear differences even for communication activities which are considered as the most important (10% of those aged over 80 deems they are not important and 37.5% very important compared to 1.2% and 67.3% of those aged 60–70, respectively).

Perceived usefulness of gerontechnology in older adults

Results for the third objective reveal that older adults generally agree with the usefulness of gerontechnology in their daily lives, especially helpful in being more independent and autonomous (18.9% totally agree) and feeling integrated in society (20.9% totally agree). A study of the relationship between variables, according to age group (Table 2), highlights significant relationships regarding the statement in which they consider the use of digital technology. The results of Kruskal–Wallis test showed that there were significant differences between age groups with respect every motive to consider useful gerontechnology: helps make important decisions and manage daily life ($\chi^2 = 52.708$, $df = 2$, $p < 0.000$); helps to be more autonomous and independent ($\chi^2 = 44.441$, $df = 2$, $p < 0.000$), increase of changes of achieving important things in daily life ($\chi^2 = 82.145$, $df = 2$, $p < 0.000$), feel integrated in society ($\chi^2 = 43.613$, $df = 2$, $p < 0.000$).

Data reveal how using digital technology is more useful in all cases for the 60–70 age group, followed by 71–80 and, finally the group aged over 80.

The correlational study between perceived usefulness of everyday digital technology and gerontechnology domains, using Spearman's correlation coefficient, yields significant results ($p > 0.01$), with values ranging from $\rho = 0.35$ to $\rho = 0.55$ (Table 3) and with a positive relationship between variables. Results show that using gerontechnology, older adults achieve different key objectives in their daily lives, including feeling integrated in society. There is an especially positive relationship between the digital technology domains of education and recreation and communication to increase the chances of achieving what is considered important in daily life, making important decisions and feeling integrated in society.

Profile of older adults compared to frequent use of gerontechnology domains

Finally, in terms of the fourth objective, results show (Figure 4) gerontechnology domains are most frequently used by men (57.07%), aged 60–70 (78.03%), with higher education (80.30%), living as a couple (67.93%), in urban areas or cities (55.65%), who attend an education center or program (73.97%), especially senior university programs (81.15%) and have prior experience with digital devices during their working life (81.39%).

After analyzing the specific profile of frequent use ($M = 67.71$ years), data show that the gerontechnology domain most present in life is communication digital technology (85.7%). They primarily use computers or tablets (85.7%), digital cooking appliances

Table 2 Study of the relationship between perceived usefulness of everyday digital technology and age group (cross table)

Age group		1	2	3	4	5	Total
<i>Using digital technology helps make important decisions and manage daily life (for example, activities at home, in shops, at the bank, etc.)</i>							
60–70	Count	15	18	41	70	27	171
	%	25.0	28.1	45.1	56.0	52.9	43.7
71–80	Count	22	32	31	40	15	140
	%	36.7	50.0	34.1	32.0	29.4	35.8
> 80	Count	23	14	19	15	9	80
	%	38.3	21.9	20.9	12.0	17.6	20.5
	N	60	64	91	125	51	391
<i>Using digital technology helps to be more autonomous and independent</i>							
60–70 years	Count	12	15	35	67	43	172
	%	27.3	39.5	38.5	48.2	54.4	44.0
71–80 years	Count	13	17	39	46	24	139
	%	29.5	44.7	42.9	33.1	30.4	35.5
> 80 years	Count	19	6	17	26	12	80
	%	43.2	15.8	18.7	18.7	15.2	20.5
	N	44	38	91	139	79	391
<i>Using digital technology increases your chances of achieving things you consider important in daily life</i>							
60–70	Count	12	16	46	60	37	171
	%	25.0	36.4	43.4	47.6	56.1	43.8
71–80	Count	17	15	33	53	21	139
	%	35.4	34.1	31.1	42.1	31.8	35.6
> 80	Count	19	13	27	13	8	80
	%	39.6	29.5	25.5	10.3	12.1	20.5
	N	48	44	106	126	66	390
<i>Using digital technology is essential nowadays for feeling integrated in society</i>							
60–70	Count	12	15	35	67	43	172
	%	27.3	39.5	38.5	48.2	54.4%	44.0
71–80	Count	13	17	39	46	24	139
	%	29.5	44.7	42.9	33.1	30.4%	35.5
> 80	Count	19	6	17	26	12	80
	%	43.2	15.8	18.7	18.7	15.2%	20.5
	N	44	38	91	139	79	391

Notes: *1 = totally disagree; 2 = disagree; 3 = some agreement; 4 = quite agree; 5 = totally agree

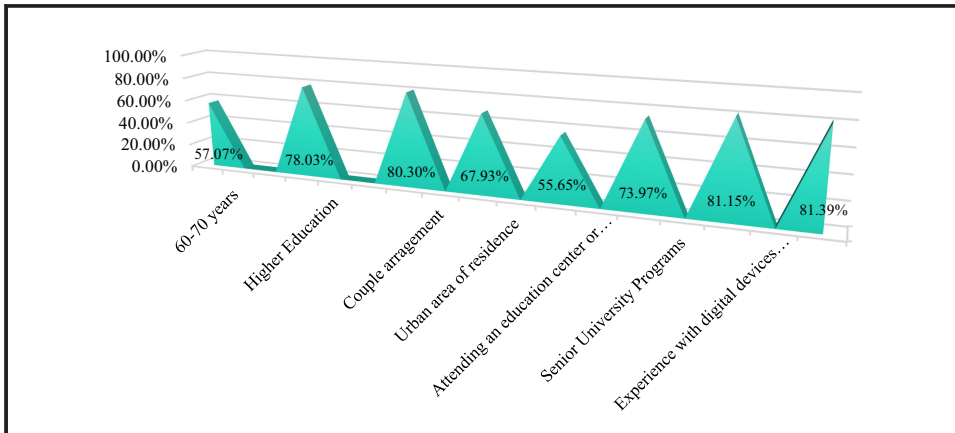
Table 3 Correlations between perceived usefulness of everyday digital technology and gerontechnology domains

Gerontechnology domains	<i>Make important decisions and manage daily life</i>	<i>Be more autonomous and independent</i>	<i>Increase chances of achieving things that are important in daily life</i>	<i>Feel integrated in society</i>
General everyday digital technology	0.452**	0.387**	0.486**	0.489**
Everyday life digital technology domain	0.491**	0.429**	0.474**	0.467**
Communication digital technology domain	0.503**	0.455**	0.561**	0.552**
Health-care technology domain	0.358**	0.340**	0.365**	0.355**
Education and recreation digital technology domain	0.515**	0.436**	0.552**	0.485**

Note: **Correlation is significant at 0.01(bilateral)

(85.7%), smartphones (71.4%), credit cards (71.4%), remote control devices (71.4%), streaming platforms such as Netflix, YouTube (71.4%) and social networks (71.4%). The main reason for their use is communication and searching for information (57.1%); and they consider that the greatest use of everyday technologies in feeling integrated in society (57.1%).

Figure 4 Profile of frequent everyday digital technology users (adults aged over 60)



Discussion

The results obtained in this study have confirmed the five hypotheses linked to the four operational objectives set. Generally, older adults essentially use technological services and products that facilitate communication and social relationships, particularly smartphones (42.2%); education and searching for information using education and recreation technology (33.9%); and completing routine tasks that afford a better quality of life [remote control devices (60.3%); digital cooking appliances (45.1%)]. Results related to the presence of gerontechnology in their lives are in line with those obtained in prior studies such as [Tsai et al. \(2015\)](#), [Wilson et al. \(2021\)](#) or [Lozoya et al. \(2022\)](#), which mainly emphasize that older adults use communication technology most. In terms of presence of gerontechnology domains in everyday life according to age group, the older the subject (80 years or more), the more they use health-related domains; and the younger the subject (60–80 years), the more frequently they use domains related to home and daily living and communication. Results in line with prior studies such as [Halicka and Surel \(2021\)](#). However, health-care technology appears to be the most unknown among this age group, with the 60–70 years group claiming they have greater knowledge in this domain; these results match those obtained by [Ma et al. \(2021\)](#).

This study also confirms differences related to the reasons for older adults using everyday technologies. Participants generally express that the main reason for using technologies is communication (77%), followed by making everyday life more comfortable and easier (59.5%), but also searching for information (48.5%) and learning (48%); the least important reason is the need to control health-related aspects (28.1%). The over 80 years age group considers that the use of gerontechnology for entertainment and distraction, learning, making everyday life more comfortable and easier, searching for information or administrative formalities are less important than others, compared to adults aged 60 to 70. Differences can also be found in the case of technology related to communication, with 10% of subjects aged over 80 considering that this is not important at all. These results back up prior research studies that identify the importance of the role of age as a decisive factor in real behavior and attitude to technology ([Anderson and Perrin, 2017](#); [Chen and Chan, 2014](#)). Many research projects show that technology is more widely used and valued by older adults in the younger age group, highlighting that chronological age in this group leads to differences in their behavior ([Almenara and Cejudo, 2020](#); [Alsswey and Al-Samarraie, 2020](#)).

Regarding the perception of usefulness most older adults consider technology to be especially helpful for being independent and autonomous and to feel integrated in society.

Therefore, using education and recreation digital technology, as well as communication technology, is a key tool. Once again there are differences by age, so using digital technology is more useful for the group aged 60–70. Along this line, some studies have highlighted those older adults perceive this technology as increasingly more positive and their interest in learning to use it enables them to feel more integrated in their environment and increases self-confidence (Álvarez-Álvarez, 2019). However, there still appears to be a lot of misinformation on applications dedicated to older adults and how to use them. This prevents older subjects from understanding all the advantages offered by new technologies (González Oñate and Fanjul Peyró, 2018).

Based on the results, we have established a user profile of subjects who frequently use gerontechnology domains, namely male, aged 60–70, with higher education and prior experience with digital devices, living in urban areas and linked to senior education programs. This shows that demographic and socio-economic barriers are still in place that prevent the use of technologies. In this sense, the findings agree with Rasi *et al.* (2021) in that educational interventions in these aspects improve how older adults view and adopt these technology and can even reduce inequality between urban and rural areas, to which we add the necessary action to also reduce inequality based on economic grounds, an aspect highlighted in studies such as Ho and Tseng (2006) and especially also based on gender, an aspect emphasized by organization such as UNICEF (2021) and in studies such as Davaki (2018) or Mariscal *et al.* (2019).

Conclusions

Technological developments can help to improve the quality of life of older adults, but although the results of ongoing research are presented here, more data and results are needed to allow for an integral examination of the “technological senior.” To increase acceptance of these technologies, it is important and necessary for older adults to take in part in their design to show designers other purposes that were not planned (Fischer *et al.*, 2021; Wanka and Gallistl, 2021; Naor *et al.*, 2021). One resource that may allow for achievement of this objective is senior living labs, initiatives that are yielding highly positive results (Martín-García *et al.*, 2021a). A senior living lab, enable older adults to take part in a co-creation process for devices and appliances adapted to their needs.

The limitations of this paper include the small sample size, given that the information was collected from only one autonomous region. Therefore, it is considered necessary that this type of study is replicated to confirm these results.

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Further reading

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