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Technology use characteristics among older adults during the COVID-19 pandemic: A cross-cultural survey

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ABSTRACT

Personal computers, tablets, and smartphones may support older adults' engagement when people are required to stay home and opportunities to engage in meaningful activities are reduced during the COVID-19 period. This study aims to screen older adults' technology-use characteristics across social, leisure, and education domains during the COVID-19 pandemic from a crosscultural viewpoint. The sample included 576 participants aged 60 and older from France ($n = 62$), Spain ($n = 110$), and Israel ($n = 404$). Participants completed the technology-use survey, which consists of questions about their facilities, technology usability, need for adaptations to support technology use, and changes in technology use since COVID-19. Significant differences were found between countries in facilities, χ^2 (2) = 25.16, $p < .001$, and usability, χ^2 (2) = 64.14, $p < .001$, across the three domains. Furthermore, 34% of technological usability was predicted by country and facilities, F (4, 568) = 72.39, $p < .001$. Participants noted a willingness to use technology if it was adapted for social (61%–73%), leisure (51%–71%), or educational (67%–76%) activities and that they devoted substantially more time to technology across domains (>58%) due to COVID-19. These findings highlight culture and facilities as factors that play an imperative role in supporting and enhancing the usability of technology among older adults.

1. Introduction

The COVID-19 pandemic has affected the daily lives of people around the world [1]. This situation reduced opportunities for individuals to engage in social, leisure, and educational activities, resulting in social distance and loneliness [2,3]. Older adults suffer fundamental consequences of declining participation in activities and social distancing, including depression, cognitive disabilities, cardiovascular disease, and increasing mortality [4]. Several studies reported reduced physical and mental health among older adults during the pandemic [5–9].

According to the World Health Organization [10], the global population of adults aged 60 years or older is expected to double—from 12% to 22%—by 2050. Along with the growing rate of the older population, there have been dramatic technological developments [11,12]. Although studies have mentioned technology as a means that could assist reduce social isolation during the COVID-19 pandemic [13,14], there remains a contradictory correlation between age and technology use. This means that older people are less likely to use technology despite its benefits [15].

When examining technology-use characteristics among older adults, technology seemed to pose some challenges. Technology use requires a variety of aspects, such as knowledge about the available options, money to buy the technology, accessibility, and social support [12]. The

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lack of knowledge or skills to use technology may prevent a person from performing activities that require such abilities [16].

1.1. Theoretical framing

Venkatesh and colleagues developed the unified theory of acceptance and use of technology (UTAUT),[1] a well-evaluated model that applies to older adults and demonstrates the motivation to accept new technology [17–21]. According to this model, two elements directly determine technology use: (1) the *facilitating condition*, the degree to which users believe they have adequate infrastructure to support the technology use; and (2) *behavioral intention*, the intention and motivation to use the technology [19,21]. Three additional elements relate to behavioral intention to use technology: (a) *effort expectancy*, the degree of ease in using technology; (b) *performance expectancy*, the level at which the user believes the technology benefits the performance of activities; and (c) *social influence*, the degree to which relatives and friends believe the person should use new technology.

According to this model, sex, age, experience, and voluntariness are moderate variables influencing behavior intention. Consequently, this model does not account for factors such as age-related barriers and psychosocial factors that affect adult acceptance, adoption, and technology use [22,23].

1.2. Technology use during COVID-19

Previous studies that investigated changing technology use among older people during the COVID-19 pandemic referred to aspects mentioned in the UTAUT model. A crosssectional study conducted in Canada focused on online social activities. Those participants indicated they had the knowledge to use technology to keep in touch with others; more than half reported adopting new technology for this purpose. In addition, the participants noted both barriers, such as deficient access or motivation, and facilitators, such as knowledge, social support, and benefits of using technology since the pandemic [24].

Another crosscultural qualitative study investigated how smart technology affects older adults' meaning in life, defined as a person's perception, beliefs, and importance attributed to activities [25]. That study also described the diverse perceptions among cultures (Italy, Mexico, Portugal, and Spain). Italian participants frequently mentioned that they carry out physical activities using smart technology, and Mexican participants often outlined options for keeping in touch with family and friends. The Portuguese mentioned smart technology as allowing access to knowledge and activities, and the Spaniards raised the importance of spiritual and health-and-safety-related support [25]. These results implied varying technology-use characteristics among older adults across countries and cultures [24,25].

1.3. Significance and purpose

Overall, older adults appeared to consistently discuss the technology's value in their daily lives during COVID-19 [24,25]. Indeed, technology becomes vital for older persons during crisis periods such as the COVID-19 pandemic [26,27]. More than ever, technology enables considerable connectedness with people and knowledge [25,28]. Several studies indicated that older adults were more likely to use technology, especially for social activities such as video calls, social media, and emails, due to COVID-19 [23,27,29,30].

Through technology, people can perform countless activities in different domains, such as social (e.g., communicating by email, online video, and phone calls; chatting on social networking sites), leisure (e.g., social games, watching movies, listening to music or a podcast), and educational (e.g., reading, writing, cooking classes) activities [25,28]. Such domains are meaningful for older adults and promote their mental and physical health and well-being [28,31–35]. On the other hand, a decrease in participation in these domains may lead to poor health [36–38].

This study examines technology in the context of activity in the social, leisure, and education domains. Thus, the term *technology* herein includes devices adults already have at home (computers, mobile phones, and tablets) and use to conduct these activities [27,39].

There has been growing evidence that technology can be used effectively during an epidemic, as well as to deal with the damage epidemics cause. While the COVID-19 epidemic is underway, it seems that a deeper understanding of how adults use technology is needed, especially in social, leisure, and education domains. Therefore, based on the UTAUT model and previous research that depicted technology-use factors among older adults [12,16,40], this study analyzes and compares cultural factors regarding facilities, technological usability (ease-of-use and daily-life-benefit levels), whether an adaptation would support technology-use enhancement, and changes in technology use since COVID-19.

2. Methods

2.1. Recruitment

Survey data were collected from participants in France, Spain, and Israel, where the study funder conducted projects. Inclusion criteria were adults aged 60 years and older who indicated they lived independently at home and had the necessary skills to complete an online questionnaire using a computer, tablet, or smartphone. The data were collected between February and April 2021, when those countries implemented a COVID-19 lockdown policy. Thus, participants in each country were recruited according to their availability. There were no incentives provided to the participants from Spain and France as part of this study. In an effort to reach as many participants as possible during this period of great challenge (COVID-19 lockdown), participants in Israel received vouchers for their participation through an online survey company. Although participants within each country were recruited according to a different strategy, all participants signed informed consent to participate and anonymously and independently answered an online (Google Forms or Qualtrics platforms) survey of sociodemographic and technology usage questions.

In France, E-Seniors—which has access to a senior volunteer mailing list and can communicate through several other channels, such as the E-Seniors newsletter and social networks—conducted the recruitment. The 62 participants who responded to the E-Seniors call met the inclusion criteria and completed the survey online via the Google Form platform.

In Spain, the questionnaires were distributed to members of the Professional Association of Neuropsychologists of Spain (CNC) via direct emails, the CNC newsletter, and communications on the Foundation for Research and Training of Health Professionals of Extremadura, Spain (FundeSalud) social networks. In total, 110 participants completed the survey.

Panel4, an Israeli survey company with access to thousands of panel members recruited by online advertisements (such as on Facebook or Google), collected the data in Israel. The panelists represent the adult population in Israel for web-based research. Of the 437 participants who responded to the Panel4 call, 404 met the inclusion criteria and completed the survey.

2.2. Instruments

The sociodemographic questionnaire included issues such as age,

[1] Abbreviations: CNC = Professional Association of Neuropsychologists of Spain; FundeSalud = Foundation for Research and Training of Health Professionals of Extremadura, Spain; GDS = Geriatric Depression Scale; UTAUT = unified theory of acceptance and use of technology.

education, and sex. In addition, the Geriatric Depression Scale (GDS) [41] was used to assess depression among participants [42,43]. The GDS includes 15 self-report questions that measure depression among older adults. Scores greater than 5 suggest depression, whereas scores between 0 and 5 are considered normal.

Professionals from the three countries developed the self-reported technology-usage survey to assess technology's roles and positive effects in older adults' daily lives during the COVID-19 pandemic. The questions, based on core elements of the UTAUT model, were chosen following a discussion among these professionals. These include questions about the digital equipment participants use (whether they had a smartphone, computer, or tablet) and consist of two components: *facilitating conditions* and *technology usability characteristics* that refer to technology generally.

The first component (five items), *facilitating conditions*, includes questions about knowledge, necessary money, and others' assistance or urging to use technology. For each item, participants indicate their level of agreement on a 5-point scale of 1 (*strongly disagree*), 2 (*disagree*), 3 (*neutral*), 4 (*agree*), or 5 (*strongly agree*). The internal consistency of these five components is good (Cronbach alpha = .64). The *facilitating conditions* variable was calculated by the mean score of these five items.

The second component (four items), *technological usability* characteristics, includes questions about technology use across three domains: social (keeping in touch with family and friends), leisure, and educational activities. For each domain, participants rate their level of agreement about ease of use and benefits for everyday life on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The ease-of-use and benefits levels were found to be related in this study (Cronbach alpha = .86). The *technological usability* variable was calculated by the mean ease-of-use and everyday benefit scores across the three domains (social, leisure, and educational activities). Higher scores indicate better technological usability, as the participant reported. Two additional items refer to whether (a) an adaptation would enhance the technology use (yes/no) and (b) technology use increased due to COVID-19 (yes/no).

2.3. Data analysis

The demographic characteristics and technology-use survey results are described according to the variable type. Means and standard deviations were used to describe scale variables, whereas frequencies and percentages described nominal or ordinal variables. Spearman tests were used to analyze correlations between demographic characteristics and the main technology-use variables. Depending on the variable type, between-country differences in demographic characteristics and technology use were analyzed using Kruskal-Wallis or chi-square tests. Mann-Whitney tests were used for post hoc analyses.

Hierarchical regression was used to examine the prediction of technological usability. In the first step, the country was entered as an *s* dummy variable (Israel = 1, other = 0; Spain = 1, other = 0). In the second step, the age was entered following facilitating conditions.

3. Results

3.1. Demographic characteristics

The sample totaled 576 participants from France ($n = 62$), Spain ($n = 110$), and Israel ($n = 404$) who indicated they live independently at home. The results of the GDS questionnaire showed that most participants in each country scored between 0 and 5 (France 79%, Spain 81.9%, Israel 79%), within the normal range. No differences were found between countries in the GDS questionnaire results. Table 1 presents between-country differences in demographic characteristics.

As shown in Table 1, significant differences were found between the countries for age, education years, and Sex. However, correlation analysis between those demographic variables and the main study variables of technology use (*facilities*, *change since COVID-19*, and *technological usability*) indicated low significant correlations ($r = 0.02–0.13$). These correlations suggest no influence of those variables on the group comparisons related to the study's main technology-use variables.

Table 1
Demographic characteristics of French, Spanish, and Israeli participants.

Characteristic	*Mdn* (range) M (SD)			χ^2 (*df* = 2)	*p*
	France (*n* = 62)	Spain (*n* = 110)	Israel (*n* = 404)		
Age (yr)	71.00 (62–99) 72.73 (7.70)	64.00 (60–87) 65.03 (4.90)	69.00 (63–88) 70.28 (4.40)	116.45	<.001
Education (yr)	16.00 (10–24) 16.00 (2.87)	16.50 (8–25) 17.00 (4.95)	15.00 (8–25) 15.35 (2.73)	7.91	.019
Sex, *n* (%)					
Female	44 (70.0)	65 (59.1)	203 (50.2)	11.23[a]	.001
Male	18 (30.0)	45 (40.9)	201 (49.8)		

Note. [a]Chi-square test.Ranking ranged from 1 (*strongly disagree*) to 5 (*strongly agree*).

3.2. Technology usage survey

3.2.1. Facilitating conditions

When asked about the digital equipment they used, most participants indicated they had a smartphone (<97%) and a computer (<95.8%). Fewer participants indicated they had a tablet (44.8%–71.0%). Table 2 presents the results of the questions regarding facilities linked to technology use. Differences between the countries were found in having a computer (Israel 95.8%, France 91.9%, Spain 85.5%) and tablet (Spain 71%, France 66.1%, Israel 44.8%).

Table 2 shows that 75%–81% of the participants in Spain, 55%–66% in France, and 52%–54% in Israel agreed they had the knowledge and money necessary to use the technology. Statistical analysis of facility-related technology used revealed significant differences between the countries, χ^2 (2) = 25.16, $p < .001$. Following post hoc analysis, there were significant differences between Spain and Israel ($Z = -5.02$, $p < .00$), and between Spain and France ($Z = -2.43$, $p = .015$). Spain's results were higher than Israel's and France's, indicating the Spaniards reported having better facilities than the Israelis and French.

3.2.2. 2 technology-use characteristics

Participants were asked about ease-of-use and benefits-for-everyday-life levels for each domain of social, leisure, and educational activities. They further indicated whether an adaptation would enhance technology use and whether they increased technology use due to COVID-19. The results are described first, followed by statistical between-country differences in each domain.

3.2.3. Ease of use and benefits for everyday life across domains

Fig. 1 presents the descriptive ease-of-use and benefits-to-everyday-life results in the three domains.

As depicted in Fig. 1, participants in the three countries indicated they had a positive view of using technology for these domains. Consistently, most participants noted that compared to other domains, social activity technologies were easier to use (<79%) and more beneficial to everyday lives (<83%).

3.2.4. Technology usability across domains

Table 4 presents the country comparison of means and standard deviations of technology usability in each of the three domains. Significant differences were found between the countries in technological usability across all domains (social, leisure, and educational activities)

Table 2
Facility-related technology use.

Facility	Agreement	(A) France (*N* = 62)	(B) Spain (*N* = 110)	Israel (C) (*N* = 404)	Post hoc
		n (%)			
1. Had necessary knowledge to use technology in general	Strongly disagree	1 (1.6)	4 (3.6)	18 (4.5)	
	Disagree	6 (9.7)	18 (16.4)	83 (20.5)	
	Neutral	21 (33.9)	17 (15.5)	94 (23.3)	
	Agree	30 (48.4)	60 (65.4)	30 (32.2)	
	Strongly agree	4 (6.4)	11 (10.0)	79 (19.6)	
2. Had necessary money to use technology	Strongly disagree	1 (1.6)	0 (0)	19 (4.7)	
	Disagree	8 (12.9)	6 (5.5)	86 (21.3)	
	Neutral	16 (25.8)	17 (15.5)	77 (19.1)	
	Agree	25 (40.3)	71 (65.5)	135 (33.4)	
	Strongly agree	12 (19.4)	16 (14.5)	87 (21.5)	
3. Specific person/ group gave assistance	Strongly disagree	6 (9.7)	4 (3.6)	57 (14.1)	
	Disagree	8 (12.9)	14 (12.7)	86 (21.3)	
	Neutral	11 (17.7)	20 (18.2)	124 (30.7)	
	Agree	30 (48.4)	54 (49.1)	105 (26.0)	
	Strongly agree	7 (11.3)	18 (16.4)	32 (7.9)	
4. Urged by specific person/group to use technology	Strongly disagree	10 (16.1)	9 (8.2)	98 (24.3)	
	Disagree	7 (11.3)	18 (16.4)	71 (17.6)	
	Neutral	17 (27.4)	30 (27.3)	115 (28.5)	
	Agree	19 (30.7)	39 (35.5)	81 (20.0)	
	Strongly agree	9 (14.5)	14 (12.7)	39 (9.7)	
Facility-related technology use (range 1–5)	*Mdn* M (*SD*)	3.5 3.18 (.78)	3.5 3.57 (.62)	3.0 3.13 (.84)	B > A,C

together, χ^2 (2) = 64.14, $p < .001$. The post hoc analysis yielded significant differences between results of participants from Spain and France ($Z = -2.43$, $p = .015$), Spain and Israel ($Z = -2.11$, $p = .034$), and Israel and France ($Z = -7.03$, $p < .001$). Spain's results were higher than Israel's and France's, indicating the Spaniards reported more technology usability across all domains than did the Israelis and French.

3.2.5. Social technology usability

Post hoc analysis yielded significant differences in technological usability results between participants from Spain and France ($Z = -7.76$, $p < .001$) and between France and Israel ($Z = -8.62$, $p < .001$). Spain's results were higher than France's, indicating the Spaniards reported more technology usability than the French. Moreover, Israel's results were higher than France's, indicating the Israelis reported more technology usability than the French.

3.2.6. Leisure technology usability

Like results in the social domain, post hoc analysis yielded significant differences in technological usability across the leisure domain between participants from Spain and France ($Z = -5.57$, $p < .001$) and between Israel and France ($Z = -3.55$, $p < .001$). Spain's results were higher than France's, indicating the Spaniards reported more technology usability than the French. Moreover, Israel's results were higher than France's, indicating the Israelis reported more technology usability than the French.

3.2.7. Educational activities technology usability

Post hoc analysis yielded significant differences in technological

Table 4
Country comparison of technological usability in each domain, median, mean, and standard deviation.

Domain (range 1–5)	*Mdn*, *M* (*SD*)			χ^2 (*df* = 2)	*p*	Post hoc
	(A) France	(B) Spain	(C) Israel			
Social	(*n* = 59)	(*n* = 109)	(*n* = 396)			
Ease of use	4, 2.97 (1.29)	4, 4.14 (0.79)	4, 4.18 (0.77)	57.11		
Benefit everyday life	4, 2.80 (1.37)	4, 4.31 (0.63)	4, 4.22 (0.71)	71.74		
Mean technological usability	3.5, 4.22 (0.63)	4, 2.88 (1.70)	4, 4.19 (0.65)	78.31	<.001	B > A C > A
Leisure	(*n* = 54)	(*n* = 99)	(*n* = 347)			
Ease of use	4, 3.15 (1.12)	4, 3.95 (0.72)	4, 3.85 (1.07)	21.15		
Benefit everyday life	4, 3.37 (0.96)	4, 4.03 (0.59)	4, 3.61 (1.12)	14.31		
Mean technological usability	3.5, 3.26 (0.83)	4, 3.99 (0.58)	4, 3.73 (1.01)	20.99	<.001	B > A C > A
Educational	(*n* = 43)	(*n* = 91)	(*n* = 278)			
Ease of use	4, 3.19 (1.05)	4, 3.93 (0.77)	4, 3.76 (1.04)	14.33		
Benefit everyday life	3, 2.95 (1.13)	4, 4.01 (0.75)	4, 3.46 (1.07)	30.38		
Mean technological usability	3, 3.07 (0.93)	4, 3.98 (0.71)	4, 6.61 (0.96)	25.84	<.001	B > C > A

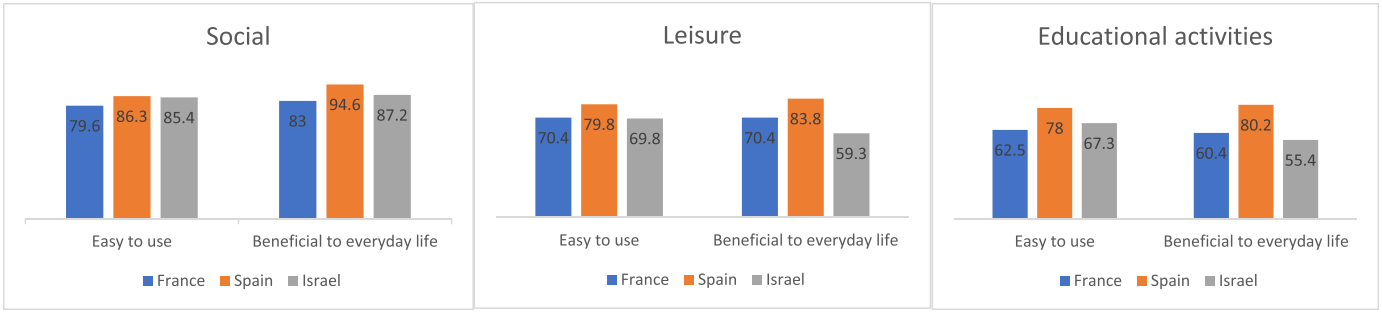

Fig. 1. Ease-of-use and benefit-everyday-life: Percentages of participants who agreed/strongly agreed by activity domain and country.

usability between participants from Spain and France ($Z = -5.53$, $p < .001$), Spain and Israel ($Z = -2.83$, $p = .005$), and France and Israel ($Z = -3.30$, $p = 001$). Spain's results were higher than Israel's and France's, indicating the Spaniards reported more technology usability across educational activities than the Israelis and French.

3.2.8. Need for adaptions to support technology use across domains

Participants from the three countries reported a willingness to increase their technology use across domains (social 61%–73%, leisure 51%–71%, and educational 67%–76% activities) if adapted to their needs. However, there were significant between-country differences in the leisure domain. More Israeli than French or Spanish participants (71.5%, 55.6%, 51.5%, respectively) reported they would use technology if adapted to their needs.

3.2.9. Increased technology use since COVID-19 across domains

Fig. 2 shows the results of the three countries regarding increased technology use during COVID-19. Participants from all three countries reported that, since the COVID-19 pandemic began, they devoted additional time to using technology in all domains (>58%). Further, the chi-square test yielded significant differences between the countries in the social domain. During COVID-19, more Spanish than French or Israeli participants reported spending more time using technology for social activity (80.9%, 74.6%, 58.1%, respectively).

3.3. Predictors of technological usability across domains

Tables 5 and 6 present the hierarchical *regression* analysis results predicting technological usability variables across all (social, leisure, and educational activities) domains. The hierarchical regression demonstrates that *country* contributed 14% to the explained variance of technological usability prediction. Facility-related technology use accounted for an additional 20%. Therefore, 34% of technological usability was predicted by country and facilities, F (4, 568) = 72.39, $p < .001$.

Table 5
Predicting technological usability by country, age, and facility Variable.

	Model 1		Model 2		Model 3	
	B (*SE*)	β	B (*SE*)	β	B (*SE*)	β
Country						
Israel	.82 (.09) .51***	.51	.81 (.09) ***	.50	.83 (.08) ***	.52
Spain	.99 (.11) .53***	.53	.96 (.12) ***	.52	.80 (.10) ***	.43
Age			−.01 (.00)	−.03	−.01 (.00)	.03
Facility-related technology use					.41 (.03) ***	.45

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

Table 6
Predicting technological usability from the country, age, and facility: F and R values of statistical analysis.

Value	Model 1	Model 2	Model 3
F change	46.05***	.50	169.43***
R^2 (adjusted R^2)	.14 (.68)	.14 (.68)	.34 (.60)
R^2 change	.14	.00	.20

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

4. Discussion

This study aimed to depict technology-use characteristics among older adults and compare these characteristics between Spain, France, and Israel. The study was conducted during the COVID-19 epidemic, a crisis period that imposed adverse mental health effects, such as depression [8]. Requiring older adults to stay home and limit meetings with others puts them at greater risk of developing depressive symptoms [13]. Therefore, it is important to note the depressive symptoms among this study's participants. Overall, most participants (from all countries) indicated in the GDS questionnaire that they did not experience depressive symptoms, but about 20% reported depression.

Studies conducted in Iran and Bangladesh at the beginning of the COVID-19 virus outbreak (March–October 2020) among older adults aged 60 years and older reported even higher percentages (about 40%) of depressive symptoms according to the GDS [44,45]. At the time of these studies, information about the virus was limited. Older adults were required to deal with new, challenging routines that included stay-at-home orders and social distancing, which may have affected the percentages of depressive symptoms reported and explain the differences with the current results.

However, depressive symptoms reported in this study are consistent with COVID-19 mental health consequences previously reported among older adults [8]. Thus, these findings raise concerns about the older population. Undoubtedly, technology's opportunities for daily contact with family and close friends could contribute to coping with loneliness and depressive symptoms [46]. For this reason, technology seems crucial for the population of older adults during a crisis period [26].

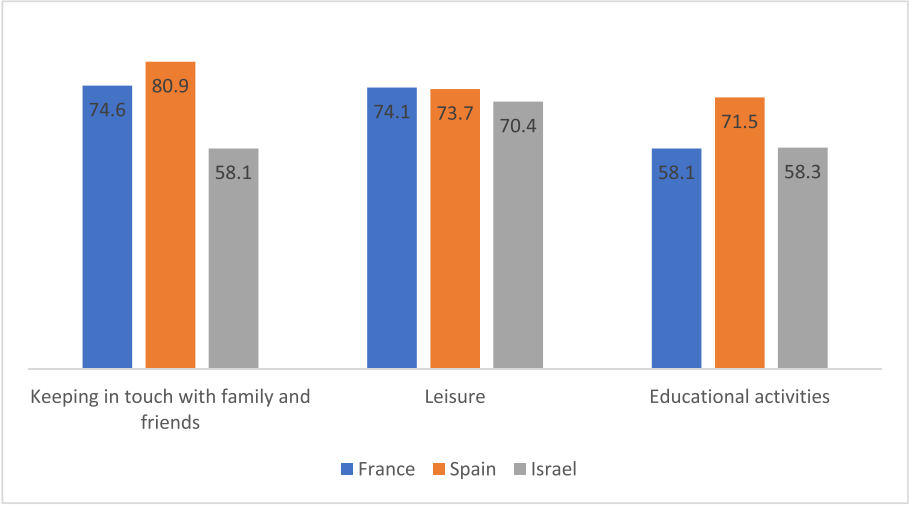

Fig. 2. of participants indicating increased technology use due to COVID-19, by country.

Interestingly, our findings indicated significant between-country differences in technology-use characteristics despite the shared importance. This diversity, which von Humboldt and colleagues [25] also described, suggests the substantial importance of a cultural perspective in examining technology-use characteristics among older adults.

Overall, the Spanish participants reported better facilities and usability across the social, leisure, and educational technology domains than the Israelis and French. In this study, facility variables included knowledge, necessary money, and others' assistance or urging for technology use. The literature mentioned these components as factors that may influence technology use [12,15]. The Spaniards' reports of better facilities may explain why they reported better usability than the Israelis and French.

Alongside these differences, most participants mentioned they would use the technology more for social, leisure, and educational purposes if it was adapted to their needs. This finding highlights that customizing technology to meet individual needs supports its use [19,47]. Participants' willingness to use adapted technology is consistent with other studies that indicated positive perceptions and increased use of technology during routine periods [12,15].

Participants in this study indicated that, due to COVID-19, they devoted additional time to technology use. As in this study, Haase and colleagues mentioned increased technology use among older during COVID-19 [24]. These findings appear to converge on the need to integrate technology use into older adults' daily lives. Participants mentioned the social domain as one in which they devoted more time during COVID-19. This emphasizes both the need for older adults to keep in touch with relatives and the solution to the social distancing technology provides. Indeed, research showed that being connected with others is meaningful for older adults and improves their well-being and health during COVID-19 [25].

This study's finding further demonstrates that the country contributed 14% to the explained variance of technological usability prediction, and facility-related technology use accounted for an additional 20%. Therefore, 34% of technological usability was predicted by country and facilities. *Usability* in this study refers to both easy to use and benefits to everyday lives; individuals frequently adopt new technology when they perceive it as easy to use and beneficial [19]. Differences in individual perceptions of [25] and influences on technology use, such as the facilities of knowledge, cost, and social support, clarify this finding.

4.1. Theoretical and practical implications

In a crisis such as COVID-19, which increases loneliness and threatens the older population's health, it is crucial to explore means that aid their coping. One suggested solution is technology use [13]. Through technology, older adults can perform countless activities and inter alia dispel loneliness. Moreover, health disparities can be reduced through the use of technology for social activities [48]. At the theoretical level, this study demonstrated how the UTAUT model's core components contributed to understanding the technology-use characteristics among older adults during the COVID-19 pandemic. Based on this model, facility condition directly relates to technology use, and ease-of-use and benefits level relate to the behavioral intention to use the technology [19,21]. These concepts align with our findings and thus substantiate the UTAUT model.

Our findings provide insights into older adults' unique cultural needs in using technology on a practical level. That results from each nation differed points to the need for adaptation. Moreover, it is essential to consider individual facilities to support technology use. National and global policymakers and technological innovation developers should consider cultural needs and facilities while developing adequate interventions to support technology use among the older population.

4.2. Limitations and conclusion

This study had several limitations. First, a Rasch analysis was not performed because the survey had to be developed quickly during COVID-19. Second, the uneven number of participants between nations and the significant differences in demographic characteristics limited comparability. As data collection had to be done within a very challenging timeframe, some participants received incentives, while others did not. Future studies focusing on cultural differences should include larger sample sizes, equivalent participants, and balanced demographic characteristics to enhance generalization [49]. In addition, the data from Spain were recruited inter alia from the CNC and FundeSalud, whose user experience and educational years were significantly higher than those of the French and Israel participants. Despite this study's very low correlations between education years and the main study variables, future studies should consider these issues because user experience and educational years may affect technology use [12,50].

This study aimed to analyze and compare cultural characteristics of technology use among older adults across three countries and three domains: social, leisure, and educational. Our findings emphasize the cultural diversity in the technology-use characteristics among older adults and support previous studies indicating essential facilities for technology use among this population [12,15]. Consequently, both culture and facilities play crucial roles in supporting and enhancing technology usability. Participants were willing to enhance their technology use if it was adapted to their needs. This finding may provide policymakers and technology developers insight into better technology usability across domains during crises and even routine periods.

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Author statement file

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Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.techsoc.2022.102080.

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