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Article

Age-Based Digital Divide: Uses of the Internet in People Over 54 Years Old

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Abstract
The digitization process is widespread and unrelenting. Compared with other European countries, Spain has a good position in the latest data compiled in the Digital Economy and Society Index. Direct use of communication and information technologies is high among the regions in Spain, where the national average in the region of Valencia stands out. However, despite this context, differences between population groups continue to be observed in different dimensions of the digital divide. This article explores this multidimensional gap among the midlife and older adult population. The research design adopts a mixed-method sequential design (questionnaire-based survey, follow-up with semi-structured interviews) to explore social positions in relation to access and use of technologies and the meanings that people ascribe to such positions and actions. A telephone survey was conducted with 1,800 people over 54 years of age residing in Valencia in September 2021, followed by 67 in-depth interviews. The results suggest that demographic and socioeconomic characteristics (level of education, age, and gender) determine people's position in the digital divide. Qualitative discourses qualify these results by elucidating key aspects that could be acting as protectors of digital and social exclusion. They are related to the social and family context and the characteristics of digital service providers. The findings are useful to guide both public policies to promote digital inclusion and private market actors when designing their digital strategies.

Keywords
digital competence; digital divide; grey divide; internet access; logistic regression; social context

Issue
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1. Introduction

New technologies and digitization are essential for current European societies and have a greater relevance since Covid-19 (European Commission, 2021). Spain is ranked seventh in the Digital Economy and Society Index, showing a growing progression since the pre-pandemic years and standing out in terms of digital connectivity and public services (European Commission, 2022). However, it must improve in businesses and human capital. The latter should include having a population with at least basic levels of digital skills (European Commission, 2019).

According to the National Statistics Institute in Spain, 95% of the population between 16 and 74 years of age are internet users (Instituto Nacional de Estadística, [INE], 2022a), yet only 38% of the population have more than basic digital skills (European Commission, 2022). The survey from which these data are extracted follows the guidelines of the European Statistical Office (Eurostat), so this difference points to the existence of a digital divide, as a term that refers "to the distinction between those who have internet access and are able to make use of new services offered on the World Wide Web, and those who are excluded from these services" (European Statistical Office [Eurostat], 2019). This definition is complemented by other comments, among which the contributions of scholars of the second-level digital divide are recognized when they state that the

term "explicitly includes access to ICTs, as well as the related skills that are needed to take part in the information society" (Eurostat, 2019). Thus, since the beginning of this century, the specialized literature has been providing keys to understanding the processes by which digital divides are generated, identifying three levels of the divide that correspond to access, use, and utility (e.g., Hargittai, 2002; Ragnedda & Ruiu, 2017; Van-Deursen & Helsper, 2015a; Van-Deursen & Van-Dijk, 2019).

The first-level digital divide is produced by a lack of adequate facilities (Compaine, 2001; Organisation for Economic Co-operation and Development [OECD], 2021) but also by inequalities in access to technology and the internet caused by the difficulty of having the necessary and updated devices and programs. In fact, in countries with practically universal connection rates, first-level gaps caused by what Van-Deursen and Van-Dijk (2019) call "material access" continue to be detected, which "includes the means required to maintain the use of the internet over time, such as computer devices (e.g., desktops, tablets, Smart TVs), software (subscriptions), and peripheral equipment (e.g., printers, additional hard drives)" (Van-Deursen & Van-Dijk, 2019, p. 355).

Currently, some countries have access difficulties due to income, age, gender, and geography (OECD, 2021). Spain has a wide coverage of infrastructures, with 83% of homes having a fixed broadband internet connection (INE, 2022a), yet it has a worse score in the geographical criterion, with rural areas being below the European average (OECD, 2021). This information would support the relevance of focusing the analyses on specific areas, such as those administered by regional governments in Spain (the so-called *comunidades autónomas* or regions). Spain is a country whose territory is organized into a set of regions under its 1978 Constitution. A total of 17 communities are recognized, most formed by more than one province. The region of Valencia is located on the Mediterranean coast. With three provinces (Valencia, Alicante, and Castellón), this region is the eighth largest in terms of area. However, it also excels in tourism, industry (food, ceramics, chemicals, and technology), and agriculture (mainly citrus fruits). In fact, despite not being the largest, the Valencian Community contributes 9.4% to the national GDP, placing it fourth in terms of wealth generation (INE, 2020). It is also the fourth biggest region in the country, with over 5 million inhabitants. Its user population is similar to the average, but the divide is greater in recent generations (user population 75+ years: Spain = 36%, region Valencia = 27%; INE, 2022b).

Furthermore, the second-level digital divide refers to uses and skills (Hargittai, 2002; Van-Deursen & Van-Dijk, 2014). The information on the user population offers a first approach to access and use, even though at this level, observation of the activities is required. As a starting point, the main models derived from the Technology Acceptance Model introduce previous experience as a facilitating factor for use (Venkatesh & Bala, 2008) and the effects of sociodemographic characteristics (Venkatesh et al., 2003). This would be in line with other studies on the digital divide. Regarding the second-level digital divide, the appropriation theory (Van-Dijk, 2012) presents a model that includes previous mechanisms that act in the integration of technologies in daily life, such as resources (economic, social, and cultural capital), motivation, and skills. Van-Dijk (2012) proposes several types of digital skills (operational, formal, information, communication, content creation, and strategic skills) whose observation has also involved several kinds of measurement. The process of appropriation culminates in the usage of technology. In this process, the effect of socioeconomic characteristics is also observed. As well as age, authors delve into socioeconomic position, employment situation, and completed education (Van-Deursen & Van-Dijk, 2014, 2015; Wei & Hindman, 2011; Zillien & Hargittai, 2009). Gender acts in an ambivalent way, with a weak or indirect association in some research focused on uses or skills (Hargittai, 2002; Van-Deursen & Van-Dijk, 2015) and significant in others that try to explain the use of the internet (Castaño et al., 2011; Garín-Muñoz et al., 2022; Haight et al., 2014; Wasserman & Richmond-Abbott, 2005; Zillien & Hargittai, 2009).

The third-level digital divide is associated with usefulness (Ragnedda & Ruiu, 2017) and is understood as the population's ability to obtain a benefit in their lives by using ICTs (Calderón, 2021; Ragnedda, et al., 2022; Selwyn, 2004; Van-Deursen & Helsper, 2015b). Its consideration helps to understand the reproduction of social inequalities in the digital society (Helsper, 2021; Ragnedda, 2016). In operational terms, the Dutch study by Van-Deursen and Helsper (2015b) approaches this third-level divide by identifying a set of internet outcomes linked to five categories of uses, which reflect different types of benefits.

From this point of view, the aforementioned digital skills would act both in the second and third-level divide when dealing with knowledge and skills that transcend the mere concept of skill (Recomendación del consejo de 22 de mayo de 2018, 2018) to become instruments to correct social exclusion (European Court of Auditors, 2021). The DigComp model groups them into five domains according to the type of use. This framework also guides the Spanish proposal and that of the region of Valencia (Generalitat Valenciana [GVA], 2021a; Government of Spain, 2021; Vuorikari et al., 2022), although in Europe the Eurostat indicator (Eurostat, 2021) is used, which is based on a list of uses associated with four areas according to their nature: information, communication, problem-solving, and management of computer programs.

Age is a relevant variable at the different levels of the digital divide, especially when comparing middle-aged and older adults with other groups (Battersby et al., 2016; Fang et al., 2019). The recurring observation of the existence of such distances by age (Haight et al., 2014; Shultz et al., 2015; Van-Deursen & Helsper, 2015a; Van-Deursen & Van-Dijk, 2011; Van-Dijk, 2012) supports

the construction of the concept "grey digital divide" (Friemel, 2016; Morris & Brading, 2007) to refer to what occurs in older people when compared to young people. Age, on the other hand, is shown to be a determinant for the access and use of technologies, but not in a linear way (Fang et al., 2019), which would lead to it being taken into consideration as a first approach to the generational perspective applied to the processes of technological disruption, whose genesis should be sought in the concept "generation" of Mannheim's sociology (Leccardi & Feixa, 2011). The article also focuses on digital (Prensky, 2001) and technological generations (Loos & Ivan, 2022), endowing the observation of the age groups of these cohorts with meaning.

Studies focused on the last generations by detecting other factors that explain the differential exposure to technology, such as: completed education, income, or social resources, show the existence of heterogeneity among older adults (González-Oñate et al., 2015; Hargittai et al., 2019; Tirado-Morueta et al., 2018; Van-Deursen & Helsper, 2015a). Education stands out among them, being the main sociodemographic variable that predicts internet access and usage. However, it is important to note that this variable is related to others, such as income, and interacts, in turn, with age and gender (Fang et al., 2019). In contrast, many studies do not find differences by gender in internet access, although the differences found are located in the distribution of activities according to gender analysis (Cresci et al., 2010; Papí-Gálvez & Escandell-Poveda, 2019). Other studies have emphasized the influence of the social or family context (the latter is due to the presence of other generations) that may favor internet access and use (Abad-Alcalá, 2014; Huxhold et al., 2020; Llorente-Barroso et al., 2015; Llorente-Barroso, Kolotouchkina, et al., 2023; Rosales & Blanche-T, 2022).

This previous research confirms the multifactorial character of the generational digital divide. In this respect, along with the study of sociodemographic characteristics and other psychosocial or health factors (e.g., Llorente-Barroso, Anzanello-Carrascoza, et al., 2023; Peral-Peral et al., 2015; Urbina et al., 2022) in recent years, analyses have emerged that delve into the combined effect of different variables, to identify population profiles. From these proposals, for example, it can be seen that a large group of people over 60 years of age in Europe are consumers of traditional media, although there are also innovative users (Nimrod, 2017). In another study, they distinguish up to five categories of users over 65 years of age according to, among other variables, their stance on privacy (Elueze & Quan-Haase, 2018). In Spain, Llorente-Barroso, Sánchez-Valle, et al. (2023) propose a taxonomy composed of seven groups of people over 60 years of age, based on the use of new technologies, e-commerce, and public administration, which demonstrates both the intragroup heterogeneity and the increasing potential of such age groups as a target audience, with growing relevance given the aging population. In fact, in Spain, both groups of adults aged between 55 and 74 and those over 74 will increase by 3% in eight years. At the end of Europe's Digital Decade (European Commission, 2021) in 2030, they will represent 27% and 11%, respectively, of the population over 15 years of age (INE, 2022b). Identifying the main factors that act in digital divides can provide information to adopt prioritized actions in groups at risk of social exclusion.

This research aims to explore the phenomenon of the digital divide by age in the Valencian community. This is the Spanish region's first representative study at the provincial level. This article aims to describe the digital divide's effects on the population over 54 years of age (generational digital divide), gender, completed education, and rurality. The study also aims to explore the perception of the internet and other key factors of their social and family environment, considering other middle-aged groups.

In this regard, based on previous research into the Valencian community, it is also assumed that the older the person is, the lower the access and level of digital skills due to a generational effect (a population that during their education and work years did not have contact with the digital world and, therefore, has had less experience). It is understood that gender can be an important differentiating factor given that these are generations (people born in the 1960s or earlier) where educational, employment, and economic opportunities and, in general—gender roles crafted a much more favorable situation for men than for women. On the other hand, it is understood that, as access to information technologies entails putting into practice the skills developed during school years, completed education can show the difference in access and skills. The type of surroundings in which the population lives (rural or urban) can influence the availability of information technology resources. Finally, the presence of other younger generations is also a key element in older people's access to and use of technology.

2. Material and Method

2.1. Design

This study involved an exploratory cross-sectional study with primary sources combining quantitative and qualitative techniques sequentially. Quantitative data was collected through the telephone survey technique aimed at people over 54 years of age residing in the region of Valencia. A maximum age limit was not established; therefore, this variable finally oscillated between 55 and 94 years of age ($\bar{x}$ = 68, *SD* = 9). This survey was conducted to answer the objectives of this study.

Regarding the qualitative approach, semi-structured interviews were applied by telephone with people over 39 years of age from the same geographical area. These interviews were conducted with people other than those

who responded to the survey. The ages were extended with respect to the quantitative by trying to detect key intergenerational aspects to contextualize the survey data. The information provided by this data collection technique served both to verify and understand the quantitative results.

The field research was conducted during September and the first week of October 2021. The survey began in the first week of September and ended in the third week of that month. The interviews began in September and ended in October. The fieldwork for the study was carried out by a company specialized in social research, which randomly contacted mobile and landline telephones through its own means.

2.2. Size of the Universe, Sampling, and Profile of Interviewees

According to the Municipal Register of Inhabitants, in the Valencia region, the population over 55 years of age stands at 1,653,910, (GVA, 2021b).

In order to have enough cases to be able to conclude results at the provincial level in the three provinces of the region of Valencia (Alicante, Castellón, and Valencia), a sample size of 1,800 interviews was established; 600 per province, following a stratified random sampling in each. The sample has a proportional distribution of the population according to the main variables to guarantee representativeness: sex (men, women), age (55–64, 65–74, and over 74), and municipality size (<10,000, 10,000–20,000, 20,000–50,000, 50,000–100,000, >100,000 inhabitants). With a confidence level of 95.5% (2σ) and maximum uncertainty (p = q = 50), this size provides an error for global data of ±2.35%. Due to the non-proportional allocation according to province, the data was weighted for the global estimates. The company in charge of the fieldwork committed to delivering the data matrix with all the cases requested, according to the sampling provided by the researchers. The distribution of the sample by the main variables of this study is shown in Table 2.

With a qualitative approach, 67 telephone interviews were conducted with people aged over 39 in the region of Valencia. The selection and collection of the qualitative sample were equally random, with quotas for sex, age (40–54, 54–74, and over 74 years), and province (Alicante, Castellón, and Valencia). Finally, the number of interviews by sex and age is shown in Table 1. The same age groupings as in the quantitative study are used to facilitate its analysis, with the addition of the youngest age group. The interviews were also transcribed for analysis by the social research firm that conducted the fieldwork.

2.3. Information Collection Instruments: Questionnaire and Interview Script

The questionnaire consisted of 26 questions grouped into five themes (including questions on access and skills) and a section that collected sociodemographic information, such as age, sex (self-identification), province, municipality, and completed education, among others. The expected duration to complete the questionnaire was 10 minutes.

The interview script consisted of five sections, plus an initial section with questions related to the established demographic criteria (sex, age, and place of residence), and the final one included a biographical framework. The main areas of focus of the interviews were: access to the internet (possibility of individual access, use, and frequency of use), approach to the internet (approach and use of internet in their lives, user-friendliness), perception of skills, and digital divide according to age. The average interview time was 17 minutes.

2.4. Analysis and Variables

Five logistic regression models were used to observe the relationship between the studied sociodemographic variables (sex, age, education, and municipality size) and the probability of having internet access or not, as well as the probability of being at the basic or "above basic" level in four types of skill (information use, communication, problem-solving, and management of computer programs).

The models include all four study variables in the form of categorical variables, using as reference values men, people between 55 and 64 years of age, people with tertiary education (university), and municipalities with more than 100,000 inhabitants, which gives the models a descriptive value, in other words, an informative value about which variables maintain a statistically significant association with the variables resulting from each model, rather than a predictive or classificatory value. The corresponding odds ratio (OR) and 95% confidence interval are estimated for each category using the weighted data sample.

The variable regarding internet access at home is derived from a question with a dichotomous response

Table 1. Interviews by sex and age groups.

		55–74			
	40–54	55–64	65–74	75+	Total
Men	11	9	4	10	34
Women	13	10	3	7	33
Total	24	19	7	17	67

included in the questionnaire: Do you have a home with internet access via any fixed or mobile device?

The different items on digital skills were extracted from the survey questionnaire on equipment and the use of information and communication technologies in homes (INE, 2020) to build the digital skills indicator used by the European Statistical Office (Eurostat, 2021). As an example, the cases in which a person knows how to copy or move files and search for information with a browser (information) are considered to be of a higher level rather than basic, also including making video calls and sending an email (communication), installing an application and online shopping (problem-solving), and using a word processor (management of computer programs).

In order to analyze the qualitative interviews, we proceeded to identify the responses generated around key topics of the quantitative part, specifically: internet access and use, and activities related to the observed domains. We also identified situations expressed within them that provided information on the social context (for instance, family support, perceptions, access to services, etc.) related to accessing information technologies. From an exploratory approach, a literal descriptive analysis of the text was carried out, comparing the age and sex of the interviewee. Therefore, fragments from the verbatim anonymized transcriptions are displayed.

3. Results

3.1. Sample Distribution

According to the interview, 84% of the interviewees stated they had access to the internet at home (*n* = 1,514), and 72% confirmed they had used it in the last three months, which corresponds with the user population (*n* = 1,299). Usage information to measure skills is extracted from the user population. Therefore, according to informative skills, 61% of the population has basic or higher than basic skills; 67% carry out communication activities; 71% responded that they had some use associated with problem-solving; and 58% confirmed they were able to perform tasks related to the management of programs. The distribution of populations and studied variables are included in Table 2.

3.2. Internet Access at Home

Internet access at home in the logistic regression models is associated with two fundamental variables: the age of the interviewee and completed education (Table 3). Both show an association in the form of a gradient: The older the person, the greater the probability of not having internet access at home, observing an OR of 3.96

Table 2. Distribution of the population of used variables in the models.

	Full sample (*n* = 1,800)			Questions addressed to the user group (*n* = 1,299)							
	Total[a]	Internet access[a]		Information[b]		Communication[c]		Problem-solving[d]		Software[e]	
		No	Yes	Basic	Higher	Basic	Higher	Basic	Higher	Basic	Higher
Sex											
Men	46%	6%	40%	9%	40%	11%	37%	17%	32%	30%	21%
Women	54%	9%	45%	11%	40%	9%	43%	21%	30%	31%	19%
	100%		100%		100%		100%		100%		100%
Age											
55–64	41%	1%	40%	8%	46%	6%	48%	17%	36%	35%	20%
65–74	31%	3%	28%	7%	26%	9%	24%	13%	21%	19%	12%
75+	28%	12%	16%	5%	8%	5%	8%	7%	6%	7%	7%
	100%		100%		100%		100%		100%		100%
Education											
University	13%	0%	13%	1%	19%	2%	17%	4%	15%	17%	6%
Secondary	54%	3%	51%	13%	50%	13%	51%	25%	39%	35%	26%
Primary or less	33%	13%	20%	6%	11%	6%	12%	9%	8%	9%	7%
	100%		100%		100%		100%		100%		100%
Municipality size											
>100,000	31%	5%	26%	7%	23%	6%	25%	12%	19%	22%	10%
50,000–100,000	15%	2%	12%	2%	13%	2%	13%	6%	9%	7%	7%
20,000–50,000	26%	4%	22%	5%	21%	6%	21%	10%	16%	17%	10%
10,000–20,000	10%	2%	8%	2%	7%	2%	7%	4%	6%	5%	3%
<10,000	18%	3%	16%	3%	16%	4%	14%	7%	12%	10%	9%
	100%		100%		100%		100%		100%		100%

Notes: [a] *n* total = 1,800; [b] *n* with informative skills = 1,216 (100%); [c] *n* communication = 1,211 (100%); [d] *n* problem solving = 1,283 (100%); [e] *n* software or management of programs = 1,050 (100%).

Table 3. Odds ratio of the five binary regression models.

Explanatory variables	Internet access (No)	Basic information skills	Basic communication skills	Basic problem-solving skills	Basic software skills (for content manipulation)
Sex					
Men	—	—	—	—	—
Women	0.994	1.213	0.593**	1.269*	0.889
Age					
55–64	—	—	—	—	—
65–74	3.962**	1.286	2.782**	1.194	1.096
75+	20.944**	3.241**	4.833**	2.272**	1.655*
Education					
University	—	—	—	—	—
Secondary	7.558**	9.703**	2.761**	2.493**	1.893**
Primary or less	42.314**	15.978**	4.108**	3.765**	1.890*
Municipality size					
>100,000	—	—	—	—	—
50,000–100,000	1.001	0.522*	0.510*	1.092	1.882**
20,000–50,000	1.011	0.738	1.169	0.963	1.229
10,000–20,000	1.059	0.767	1.062	1.093	1.182
<10,000	0.929	0.560*	1.145	0.969	1.793**
Constant	0.002**	0.026**	0.065**	0.194**	0.287**
Nagelk. R2	0.455	0.158	0.159	0.082	0.051

Note: * $p < 0.05$, ** $p < 0.01$.

(CI 95% = 2.05; 7.64) in people between 65 to 74 and of 20.94 (CI 95% = 11.27; 38.92) in people 75 and over. This gradient is even stronger among people who have completed fewer years of education, with an OR of 7.55 (CI 95% = 1.47; 38.71) among people with secondary education and an OR of 42.31 (CI 95% = 8.38; 213.47) among people with primary or no education. However, the other two variables in the model (sex of respondents and municipality size) do not show significant results.

3.3. Skills in the Use of the Internet and Information Technologies

Regarding the skills related to the use of information, no differences are observed between men and women, while there are significant differences according to the level of education (Table 3). People with secondary education show an OR of 9.70 (CI 95% = 4.39; 21.43), and those without an education or with only primary education reach an OR of 15.97 (CI 95% = 6.97; 36.61). Differences are observed according to age, but only for those aged 75 years or over (OR 3.24 CI 95% = 2.13, 4.92). At the same time, there is no clear pattern regarding municipality size, as only municipalities with 50,000 to 100,000 inhabitants and those with less than 10,000 inhabitants have an OR less than 1 that is statistically significant; therefore, the inhabitants from these towns have a higher probability of having basic skills in this sense than those living in cities with over 100,000 inhabitants.

In relation to communication skills, differences are perceived according to the sex of the user group. Women users are less likely to have basic skills than men (OR = 0.59, CI 95% = 0.43; 0.80), so they are above the basic level. The interpretation is the same in municipalities with 50,000 to 100,000 inhabitants compared to those with over 100,000 inhabitants (OR = 0.51, CI 95% = 0.30; 0.86). Similarly, there is a gradient according to age (people from 65 to 74 years with OR = 2.78, CI 95% = 1.98; 3.90 compared to those over 75 with OR = 4.83, CI 95% = 3.18; 7.33) and according to completed education, with an OR of 2.76 (CI 95% = 1.65; 4.59) for people with secondary education, those without an education or with primary education; an OR of 4.10 (CI 95% = 2.32; 7.24).

The model on skills related to problem-solving shows an association in the opposite direction to that described in the previous model regarding sex, with it being more frequent for women than men to have this skill at a basic level with an OR of 1.26 (CI 95% = 1; 1.60). As in the previous model, there is an effect by age only for those over 75 years of age with an OR of 2.27 (CI 95% = 1.58; 3.25) and a gradient according to the level of education: OR of 2.49 (CI 95% = 1.75; 3.53) for people with secondary education and OR of 3.76 (CI 95% = 2.47; 5.73) for people with primary or no education. There are no significant results for the case of municipality size.

Finally, the model related to the skills in managing computer programs does not show differences

concerning gender, although there are slight differences according to age (for those over 75, the OR = 1.65, CI 95% = 1.05; 2.59). These values are almost identical for people with secondary education and those with primary or no education: OR of 1.89 (CI 95% = 1.28; 2.78) and OR of 1.89 (CI 95% = 1.13; 3.13). Regarding municipality size, there is a higher probability of having basic levels in this skill (software skills) in municipalities with 50,000 to 100,000 inhabitants (OR = 1.88, CI 95% = 1.16; 3.03) and those with less than 10,000 inhabitants (OR = 1.79 CI 95% = 1.15; 2.77).

3.4. Qualitative Interviews

With regard to the key issues addressed in the quantitative part, the possibilities of accessing and using the internet are observed. Among the interviewees with internet access, living in urban areas is mentioned as one of the determining factors for having a quality service. Quality decreases in rural areas and outside the home. As some interviewees indicate, "Well, sometimes it [the internet] doesn't work. I live in the countryside, and there's not much signal" (woman, 55–64 years of age); "the internet connection on my phone is awful so I hardly connect to it outside my house" (man, 75+). The younger groups convey a more critical approach to the quality of service: "Well, it could be improved on some occasions, especially in certain areas. Because ours is a rural area, but even in a rural area, as there are already houses, they should improve it a little more" (woman, 40–55). As a consequence, internet-related activities are carried out, in these cases, at home, although the older group does not consider it essential to have this connection outside the home, showing less technology adoption in their daily lives: "Outside the home, I don't use it; I don't see it useful" (man, 75+). This connection outside the home is made through cell phone data, a device commonly used by all interviewees outside the home. On the other hand, the interviewees with a higher knowledge manage to not depend on where they connect: "I don't have normal internet, I use my phone with my laptop" (man, 65–74).

Closely related to the location of internet access, the interviews also report on dynamics of use that go beyond the individual scope and involve the whole family. Among the eldest in the group, some stated that they had internet access installed for their family to use, which would also confirm the relationship between access and the presence of younger generations in their immediate surroundings. The perception of service suitability will depend, in these cases, on the opinion of their children or grandchildren: "Yes, I have a mobile, tablet, and computer, but I don't really use them; I have them for when my grandchildren come" (woman, 75+), "[if you have internet access at home] Well, yes, but that's my children's thing, I have things that they plug, some of them I don't even know" (man, 75+).

The relationship with the family also confers a sense of the internet being useful, which is closely linked to the possibility and variety of uses of the technology. Although the older ones also mention activities related to information and entertainment carried out over the internet (for instance: "If you check trips or trains or anything else, well you have it straight away….It's a really efficient and quick tool" [man, 75+]), the instant messaging is sometimes only used to keep in touch with family: "Well I think it's really useful, as I say, I live alone and when I speak to my grandchildren who live abroad, well for me it's amazing to see them on my phone" (woman, 75+), "I use it to talk to my children, to my grandchildren….To talk to other people in an affectionate way" (man, 65–74). In fact, the mobile is the key access device among the older interviewees. For younger people, paid work is a necessity that requires the use of both cell phones and computers.

Regarding the concept of the internet, it seems to be associated with its contexts, which favor certain uses, and with people's perception of their skills. In fact, having had previous experience with ICTs, for example, through paid work, influences people's perception of their own abilities. This has a main role in people's internet use and, specifically, being confident in the face of perceived inconveniences, such as the possibility of scams. Those who are most negative about it consider that the internet is useless in their lives and that they should not be obliged to use it for economic or administrative formalities.

In all cases, when necessary, family is the main source of help. "I don't find it difficult because it's something I use every day….Maybe when I have to do other things like move folders, I find it more difficult….So I ask my daughter when I don't know how to do something" (woman, 75+). However, the context must be favorable: "So, if they [children and grandchildren] were here all the time, well maybe I would dare to use the internet a bit. But you hear so many bad things about it" (man, 55–64). In this sense, the younger people usually help family members: "My father-in-law, my parents…people over 70, obviously they need to use the Health Department app or any other app, and it's difficult for them, so they ask me" (man, 40–54). Interviews with the younger generation show the relevance of the family when parents need help.

In short, in order to understand the diversity among older adults, as well as service quality, previous experience, and training, other key aspects emerge, such as the presence of other generations.

4. Discussion and Conclusion

The results obtained confirm a generational divide concerning access and skills related to information technologies. However, the most decisive aspect is completed education, both due to the size of the effect and because the gradient was found for all the categories studied in all the models, as other authors affirm (e.g., Fang et al., 2019). Indeed, the gradient was found to such an extent that, for gender, significant results are hardly found; when they

are, they are ambivalent according to the value of the Odds Ratio, in which it can be seen that this variable acts in two competency dimensions but in the opposite direction by sex (women would more frequently have above basic skills in communication and men in problem-solving). There are, nonetheless, differences according to the municipality size in the explored models.

This information points to the fact that a generational divide is relevant to analyze inequality in accessing information technologies. However, as other studies show (e.g., Tirado-Morueta et al., 2018), when age groups are observed, it is not the most significant factor in these groups—education is more relevant. This has implications for the design of public policies, as the support aimed at certain age segments would be insufficient (by excluding younger people with the same or greater problems due to their education) and also because they indicate a situation that would not be corrected with generation substitution.

The practical absence of differences according to gender is counter-intuitive given the significant gender gap in areas such as paid employment, level of education, purchasing power, carrying out housework, and presence in public spaces, especially for people born before the 1960s. The only aspects in which significant differences are observed (communication skills in favor of women and problem-solving in favor of men) can be interpreted based on traditional gender roles, such as the greater role of communicating with family in women, linked to care, which is in line with other research that addresses the family context (Huxhold et al., 2020; Rosales & Blanche-T., 2022). In the same way, men may be trying to conform to role expectations. In fact, it is common for men to consider that their role is problem-solving in opinion polls. Nonetheless, the relevant fact is that these results are exceptional and show reduced effects, as other studies point out (e.g., Van-Deursen & Van-Dijk, 2015). Therefore, the hypothesis of the digital divide regarding gender should be reviewed so that regarding the level of education and age, men and women have very similar capacities with respect to information technology skills.

Finally, the practical absence of significant results on environment size dilutes the hypothesis about the effect of rurality on the digital divide. This result could be specific for the studied population, i.e., the region of Valencia, a Spanish region characterized by its high demographic density, significant industrial-economic development, good communication, and information infrastructures, and important levels of urban continuity amongst different-sized municipalities. There could also be a statistical artifact problem as, precisely for these reasons, the size of the municipality does not adequately describe the degree of rurality, the distance, or the absence of basic services in the area, as it is perceived as a relevant factor in the interviews.

Other limitations in the study design refer to the simplicity of the models used for the analysis, as the most complete multivariable models are desirable that include variables related to income level (although these pose measurement problems when they are not related to family budget surveys specifically designed for this purpose); the type of work activity carried out (that requires a high coding effort and extensive sample bases); gender roles (household chores, care, social support, family integration, etc.); and attitudes, among others, as other regression studies (e.g., Van-Deursen & Van-Dijk, 2019) or population profiling studies have further explored (e.g., Llorente-Barros, Sánchez-Valle, et al., 2023; Quan-Haase et al., 2018).

Likewise, regarding studying generational phenomena, it is advisable to develop surveys with a longitudinal methodology or, at least, periodic surveys that make it possible to distinguish between generational (or cohort) effects, life cycle effects (age itself), and time-related effects (cyclical elements such as confinement may have stimulated the skills studied). In any case, the methodology used makes it possible to relate the generational hypothesis to the formative one and significantly clarifies the hypotheses related to gender and rurality.

Among the potentialities of this study, the type of survey is outlined, as it uses a practically universal channel, the telephone, as opposed to the increasingly common approach of using online surveys that would be disregarded in this case. In the same sense, the sampling strategy guarantees a broad level of randomization in the sample, reinforced by the use of quotas for age, sex, and municipality size for each of the provinces studied. This process reduces the possible risk of having sample selection biases. Thus, the findings provide sufficient information to know the effect of basic sociodemographic characteristics on the digital divides of the elderly Valencian population. The qualitative approach addresses other aspects to delve into understanding the situation of this group of older adults, particularly those perceived as lacking in skills, such as the effect of the presence of other generations on the data on internet access and use provided by the surveys.

To conclude, the results of this analysis indicate that within the generational digital divide that dominates the public discourse, there is a significant digital divide due to educational reasons that are much less explicit in the discourses and that has marked the transgenerational component (people with few educational resources in different age groups). Nonetheless, the generational effect is mainly observed in people over 75 years of age; therefore, other factors related to the possible loss of autonomy due to aging should be considered (the life cycle effect, more than generational). Public policies should consider training-related barriers so as to guarantee equal access to the digital world. In addition to training strategies, advances are needed in regulating the digital space to promote the design of applications and services that are easily accessible and which protect the user population.

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Conflict of Interests

The authors declared no conflicts of interest.

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