Digital, Smart and Robotic Ageism and the Bullying of Older Women

LEOPOLDINA **FORTUNATI**
Department of Mathematics, Computer Science and Physics, University of Udine.
E-mail: leopoldina.fortunati@uniud.it, Orcid: 0000-0001-9691-6870

MANUELA **FARINOSI**
Department of Mathematics, Computer Science and Physics, University of Udine.
E-mail: manuela.farinosi@uniud.it, Orcid: 0000-0001-8404-3187

FEDERICO **DE LUCA**
Department of Economics, Ca' Foscari University of Venice.
E-mail: federico.deluca@unive.it, Orcid: 0000-0003-3644-2954

ABSTRACT
Research on the relationship between older adults and digital, intelligent and robotic technologies has so far overlooked the gender dimension, an unjustifiable omission considering that 60% of individuals over the age of 75 are women. It is therefore essential to acknowledge the predominance of women within the older population when analyzing its interactions with digital, robotic or intelligent devices. In 2023, a study was conducted at the University of Udine to investigate the attitudes of older Italian women towards these technologies. The findings indicate that they experience a dual form of dissonance: firstly, they encounter the general dissonance common to all older adults toward such devices, which can be attributed to historical, cultural, socio-economic and generational factors; secondly, they suffer from a gender-specific dissonance, as these technologies have predominantly been designed for male users by hyper-masculine communities. The intersection of these two forms of dissonance exacerbates older women's relationship with the digital world itself and deepens the existing digital divide between them and their male peers.

Le ricerche sulla relazione tra persone anziane e tecnologie digitali, intelligenti e robotiche hanno finora trascurato la dimensione di genere, un'omissione ingiustificabile considerando che il 60% degli individui over 75 è costituito da donne. È pertanto essenziale riconoscere la predominanza femminile nella popolazione anziana quando si analizza l'interazione con dispositivi digitali, robotici o intelligenti. Nel 2023, all'Università di Udine è stato condotto uno studio volto a indagare gli atteggiamenti delle donne italiane anziane verso queste tecnologie. I risultati indicano che esse sperimentano una doppia dissonanza: in primo luogo, vivono la dissonanza generale sentita da tutte le persone anziane nei confronti di tali dispositivi, riconducibile a fattori storici, culturali, socio-economici e generazionali. In secondo luogo, soffrono di una dissonanza specifica legata al genere, poiché queste tecnologie sono state progettate prevalentemente per utenti maschili da comunità iper-maschili. Queste due dissonanze si intrecciano, aggravando il rapporto delle donne anziane con il mondo digitale in sé e accentuando il divario digitale esistente rispetto ai loro coetanei maschi.

KEYWORDS
older women, digital and intelligent technologies, older adults, usage practices, digital literacy

donne anziane, tecnologie digitali e intelligenti, persone anziane, pratiche d'uso, competenza digitale

Digital, Smart and Robotic Ageism and the Bullying of Older Women

LEOPOLDINA FORTUNATI, MANUELA FARINOSI, FEDERICO DE LUCA

1. *Introduction*

This paper explores the complexities of how older women interact with digital, smart, and robotic technologies in their daily lives. The discourse we develop here will hopefully elucidate the lived experiences of older women and men regarding these technologies. In order to gain a profound understanding of the attitudes of Italian older adults towards digital technologies, three studies were conducted with first-year students from the University of Udine, Italy. The first was conducted in 2012 with a sample of 23 students, while the second was carried out in 2016 with a sample of 76 students enrolled in the same undergraduate technical course at the University of Udine. In this latter study, essays written by students were analyzed (FORTUNATI 2017). Based on the findings of the aforementioned research projects, a comprehensive interview process was conducted in 2021, involving 344 older adults (53.6% of whom were women, with an average age of 76.3 years, SD=6.77).

These studies explored various aspects of older adults' adoption of digital technologies, including ownership, frequency of use, difficulties encountered, the quality of their relationship with digital, smart, and robotic technologies, and their perception of these tools as means to reduce loneliness and simplify daily routines. Similarly, the study investigated the respondents' preferences regarding indispensable technologies and those they would like to learn.

In this paper, we present only the finding related to ownership and frequency of use of these technologies by our respondents, due to space constraints. In other works, we put forth the concept of structural dissonance between contemporary digital, smart and robotic technologies and the lived experiences of older adults, with the aim of elucidating the relationship between older adults and these technologies (FORTUNATI et al. 2025; FORTUNATI et al. forthcoming). Developed in the 1990s by a cultural context dominated by young, predominantly masculine ICT designers, these technologies were designed for a demographic characterized by enthusiasm, knowledge-seeking, and adaptability, traits often attributed to young users. Conversely, older women and older men find themselves in a life stage where the pursuit of continuous learning is not a priority and may even be perceived as unwelcome. Rather than acknowledging the inappropriateness of these technologies for older adults, early studies reported the prevalent, social opinion that blamed older women and men for their limited proficiency in digital technologies.

Building on Fortunati and Edwards (2022) who argue that the advent of digital technologies represented an attack against women, this study explores whether digital, smart and robotic technologies represent an attack also or particularly against older women, potentially exacerbating men's power over communication. The first research question seeks to ascertain whether older women experience a distinctive dissonance in their relationship with these technologies, as compared to men.

Secondly, drawing upon Vincent's (2023) argument regarding the necessity of incorporating the demographic structuration of the third age into research on aging, the study aims to investigate whether distinct age groups of older women within this demographic exhibit varying relationships with digital, smart and robotic technologies. The second research question examines whether young older women (65-74 years), old-old women (75-84 years) and old-oldest women (85 years and older) display the same or a different level of dissonance towards these technologies.

The argument put forth in this paper is that, with respect to older adults, digital technologies show more their negative face rather than their positive one. Technologies themselves can embody forms of bullying, and particularly in the case of older women, they contribute to reinforce gender and intersectional hierarchies while contributing to civil discrimination.

2. *Older women within the debate on older adults and digital technologies*

The literature on older adults and digital technologies has developed in a number of different directions. The first aspect is the strong interdisciplinary nature that guides and inspires this literature. In essence, it has drawn on perspectives from a range of disciplines, including sociology, gerontology and communication studies. This, in principle, offers grounds for optimism. However, a second element that emerges from the current literature is that older women have been largely overlooked in these studies. A recent systematic review conducted by Zhang (2023) found that only 17 of the 83 research articles published over a 20-year period (2003–2022), mentioned gender differences. This review incorporated empirical studies published in English in academic journals and focusing on older people's attitudes and perceptions of digital technology from three key databases: SCOPUS, Web of Science and ProQuest. The third element is that oversight extends beyond older women to include older adults in general, as they are often overlooked in research across various disciplines. For example, in the fields of technology and marketing business research, there is a tendency to prioritize younger (and male) demographic groups on the assumption that these age groups are more likely to adopt new technologies and drive consumer spending (ENSMENGER 2015; LINGEL, CRAWFORD 2020; ROSALES, SVENSSON 2021). When older age groups are included, they are often aggregated into a single cohort and classified with generic labels such as "seniors" or "the elderly". However, the focus is typically on older individuals in the 50+ or 60+ age groups, thus excluding those in the 70+, 80+, and 90+ age groups (LI, LUXIMON 2016). This approach aligns with Oudshoorn and Pinch's (2003) assertion that technological devices are cultural artifacts that can be defined as battlegrounds where different social groups interact. As a result, older people—particularly older women—are underrepresented, despite their diverse social roles, varied economic circumstances, and unique health challenges. As early as the 1980s, feminist scholars had demonstrated that the majority of technologies were designed by men and with men in mind (HARAWAY, 1985). The underrepresentation of older women in the design process continues to this day, perpetuating ageist and gender biases. This leads to technology products and services that fail to meet the specific needs and preferences of older women. The third aspect is that current research, as might be expected in light of the aforementioned premises, demonstrates a persistent gender disparity in digital adoption. For example, globally, internet usage among men (70%) surpasses that of women (65%), resulting in a gap of 244 million more male users (ITU, 2023). A number of studies have documented a noteworthy disparity in the general adoption and utilization of advanced technology among older adults, with men exhibiting a greater proclivity for employing in particular automated vehicles, computers, and smartphones in comparison to women (KADYLAK et al. 2021; NAGLE, SCHMIDT 2012; PAN, JORDAN-MARSH 2010; RAHMAN et al. 2019; SEIFERT, SCHELLING 2015; WONG et al. 2014). This trend is further emphasized by the greater engagement experienced by men in ICTs use (MENENDEZ ALVAREZ-DARDET et al. 2020). Moreover, recent

studies reveal that within the age group 55 to 74 there is a lower rate of weekly internet use among women (65%) compared to men (70%) (UNECE 2023), with the disparity being more pronounced among older women of lower income and educational levels (KONDO et al. 2021; IÑIGUEZ BERROZPE et al. 2020). Conversely, the only technology towards which women seem to exhibit a greater reliance is the assistive devices (HONG 2016).

However, analyzing the reasons of why this disparity is generated and its meaning, Hwang (2021) suggested that these differences may be attributed to the prevailing social and cultural norms pertaining to gender. For example, the inclination towards autonomous living and the sustained identification with the role of the worker among older men may account for their heightened interest in technologies that facilitate lifestyle management. Conversely, the traditional roles of wife and mother may prompt older women to prioritize technologies that offer social and emotional support, as evidenced by their increased use of assistive devices (HWANG 2021). Feminist scholarship, for instance, has argued that the compounded disadvantages faced by older women due to their dual status as both women and older individuals are overlooked in academic literature (ZAIDI, HOWSE 2017). These disadvantages stem from deep-routed in both external work and reproductive labour as well as long-standing social inequalities faced by women, including unemployment, lower wages and pensions, and limited or absent economic independence, all of which pose unique challenges to the aging process (ESTES 2001). Building on Woodward's concept of "double" or "multiple" ageing (1999), Schwaiger (2006) emphasizes how the intersection of gender and age intensifies the barriers towards digital, smart and robotic technologies, resulting in a negative impact on women's aging experiences. The engagement of older women with these technologies reveals various barriers to access and skill development.

The disparity experienced by older women compared to their male peers is not limited to the ownership, access, and use of digital technologies but it also encompasses other dimensions, including technological competence, emotional attitudes toward digital technologies, and the type of use. Other scholars have consistently demonstrated that women also exhibit a notable discrepancy in their perceptions and attitudes towards technological competence when compared to men (DIMAGGIO, HARGITTAI 2001; KENNEDY et al. 2003; LI, KIRKUP 2007). More recent studies acknowledge the potential narrowing of the traditional gender gap in basic digital skills, in addition to the persistence of the gender gap in the advanced competencies required to take full advantage of ICT (HSIAO et al. 2012; TSAI, TSAI 2010). The data from Eurostat (2022) demonstrate that the proportion of women aged 55 to 74 with basic or above basic digital skills is significantly lower than that of both their male counterparts and younger demographics. These gender- and age-based barriers are particularly pronounced among individuals over 75, a demographic that is often underrepresented in both commercial and academic research (RATZENBÖCK 2016; ROSALES, FERNÁNDEZ-ARDÈVOL 2016). Furthermore, women display lower computer self-efficacy, higher computer-related anxiety, and a more passive attitude toward the Internet than men (BUSCH 1996; DURNDELL, HAAG 2002; POELMANS et al. 2012). However, Liff and Shepherd (2004) present evidence indicating that women frequently underestimate their ICT proficiency, which subsequently restricts their use of ICT and reduces their confidence in their technological abilities. Other research indicates that women tend to prioritize social interactions through ICT, using them primarily for relational purposes rather than for professional or productivity-related functions (BIMBER 2000; IMHOF et al. 2007; PRICE 2006).

All these studies are characterized by two limitations. The first is that they address the issue of the relationship between older women and technology by merely highlighting the differences between them and their male peers. The second is that they tend to read these differences as onces that automatically reinforce the power relationship between men and women, which is an unfounded assumption.

Our study aims to fill the gaps in the literature on older women and technologies identified above by attempting to grasp the real, social meaning of digital technologies for older women.

3. *Methodology*

3.1 *Participants and Procedure*

In 2021, we elaborated a questionnaire for this study, based on the previous research projects mentioned above and administered by our undergraduate students to their grandparents, great-uncles, neighbors, or family friends. Ultimately, 344 valid questionnaires have been collected.

The average completion time for the questionnaire was 30 minutes, with the sequence of questions maintained throughout. In terms of the overall convenience sample, a variety of socio-demographic variables were considered, including gender, age, education, marital status, place of residence, and the types of jobs respondents held prior to retirement. While existing discussions on the relationship between older adults and technologies often emphasize the importance of two key socio-demographic variables—gender and education—we chose to include additional variables such as place of residence, marital status and previous professions, in order to determine whether any of these have gained significance over time (FORTUNATI et al. 2025; FORTUNATI et al. forthcoming).

With regard to the overall convenience sample, the majority of participants were women (185, 53.6%), with men making up the remainder (159, 46.1%). The age of the participants ranged from 65 to 95 with an average of 76.3 (*SD*=6.77). Drawing on Vincent's reflections (2023) and the WHO definition, the respondents were categorized into three age groups: young-old adults (65-74), consisting of 128 individuals (35.9%); old-old adults (75-84), comprising 147 respondents (41.2%); and oldest-old adults (85-99), with 49 individuals (13.7%). No significant differences were observed between the three groups with regard to gender. As for educational qualifications, it is noteworthy that 12 (3.4%) older individuals have no formal qualifications or are illiterate. Additionally, 118 (33.1%) individuals have completed primary school, 101 (28.3%) have a lower middle degree, 81 (22.7%) have a high school degree and 31 (8.7%) have a university degree or higher. As might be expected, there are notable differences in the educational attainments of men and women among this cohort of older adults (χ^2=15.37, *df*= 3, *p*<.01), with women more likely than men have a primary school diploma (46.5% vs 27.8%, Stand. Residuals 3.5) while men more than women have a high school diploma (30.4% vs 28.6%, Stand. Residuals 2.7). In respect to education, a considerable body of research has been conducted on digital technologies which highlights the importance of this variable in explaining the discrepancy between users and non-users of such technologies.

Another variable that we sought to explore is the place of residence, because in reality previous research has shown contrasting effects between this variable and the adoption and use of digital technologies (FORTUNATI, TAIPALE 2013). As for residence, a small part of respondents (13, representing 3.8% of the total sample) lives abroad, in countries such as the United States, Canada, the Netherlands, Slovenia and Romania. A greater proportion of respondents (85, 24.7%) reside in urban areas, especially in Northern Italy, while the rest live in towns and cities in the North-East. Consequently, the majority of interviewees (249, 69.7%) live in rural environments or semi-rural, while 95 respondents (26.6%) live in cities. No significant differences were observed between the genders with regard to this concern.

As for marital status, 201 (56.3%) respondents are married or cohabiting, 87 (24.4%) are widowed and 28 (7.8%) are single and the same number are divorced/separated. If we consider only women (*n*=185), among them, 13 are single, 92 are married or cohabitants, 16 are divorced or separated and 64 are widows. The cross with gender shows that as expected, among widows 73.8% are women (χ^2=19.62, *df*= 3, *p*<.0001, Stand. Res. 4.3) and that among the married/cohabitants men are more than women (68.6% vs 49.7%, Stand. Res. 3.5). Finally, in respect to the jobs they performed before retiring, our respondents were: crafts-persons 68 (19.7%), factory workers 54 (15.7%), personal service professions 54 (15.7%), employees 44 (12.8%), housewives 33 (9.6%),

professionals employed in commercial activities 26 (7.5), professionals 15 (4.3%), entrepreneurs/senior managers 12 (3.5%), belonging to armed forces 9 (2.6%), farmers 7 (2.0%), other or did not answer 22 (6.4%). Gender differences emerges in this concern (χ^2=81.15, *df*= 9, *p*<.0001): women are more than men among the caregivers (22.9% vs 9.5%, Stand. Res. 3.2) and the professionals employed in commercial activities (11.4% vs 4.1%, Stand. Res. 2.4), while men are more than women among the workers (23.8% vs 10.9%, Stand. Res. 3.1), professionals (9.5% vs 0.6%, Stand. Res. 3.8) and entrepreneurs/senior managers (6.1% vs 1.7%). Moreover, the entirety of those belonging to the armed forces are men, while the entirety of housewives are women.

3.2 *Measures and Data Analysis*

For the current study, we asked questions related specifically to ownership, frequency of use, and their relationship with digital, smart and robotic technologies. In order to understand the specific place occupied by the various devices inside the network of domestic technologies, we inserted them in a range of technologies that included old technologies such as radio, television and fixed telephone; new technologies such as mobile phone, laptop, internet, tablet, and more recent, advanced technologies such as voice assistant, home automation system, robot vacuum cleaner, multifunction kitchen robot and robot lawnmower. We analyzed our findings, firstly describing the overall sample, secondly comparing women's findings with those of their male peers and thirdly focusing on the differences within the older women group.

To analyze our findings, we used SPSS 21 to perform χ^2 tests with standardized residuals, *t* test and Anova analyses. For parsimony, we report only the results of the statistical analyses, highlighting significant differences between the sociodemographic groups.

It is important to note that this study is not without limitations. Firstly, the participants in the study were part of a convenience sample, which may limit the generalizability of the findings. Secondly, this study is based on self-report data. Although this method is appropriate for understanding ownership and frequency of use among older adults, it is not free from memory bias, social desirability bias, response bias and self-selection bias and possible measurement error. Thirdly, the use of students as administrators of the questionnaire may have introduced some reliability issues with the data (e.g., potential errors in recording responses), despite their thorough training before administration and continuous monitoring throughout the data collection process.

4. *Results*

4.1 *Digital, smart and robotic technologies ownership by gender*

The overview of the possession of digital, smart and robotic technologies by gender is reported in Table 1.

Table 1. Ownership of the digital, smart and robotic technologies by gender

	Ownership (abs. numbers and %)		
	M	W	Tot.
Radio	124 (47.9)	135 (52.1)	259 (75.3)
Television	159 (46.4)	184 (53.6)	343 (99.7)
Tablet	41 (51.4)	38 (48.1)	79 (23.0)
Fixed telephone	107 (46.7)	122 (53.3)	229 (66.6)
Mobile phone	146 (46.9)	165 (53.1)	311 (90.4)
Desk Computer	50 (61.0)	32 (39.0)	82 (23.8)**

Laptop	58 (59.8)	39 (40.2)	97 (28.2)**
Internet	106 (52.0)	98 (48.0)	204 (59.3)*
Voice Assistant	23 (60.5)	15 (39.5)	38 (11.0)
Home automation	9 (64.3)	5 (35.7)	14 (4.1)
Robot vacuum cleaner (i.e., Roomba)	21 (43.8)	27 (56.3)	48 (14.0)
Multifunction kitchen robot (i.e. Bimby)	18 (47.4)	20 (52.6)	38 (11.0)
Robot lawnmower	10 (58.8)	7 (41.2)	17 (4.9)
Other	7 (53.8)	6 (46.2)	13 (3.8)
Total	879 (100.0)	893 (100.0)	1772 (100.0)

NB. This table reports only the positive answers and the percentages of the totals are calculated for the number of the total respondents.

* $p < .05$, ** $p < .01$, *** $p < .0001$.

This table reveals that the most prevalent technologies owned by older adults are traditional devices such as television, radio and fixed telephone. Mobile phones have achieved significant penetration, ranking second in ownership after television. Internet access, while less widespread, is nonetheless possessed by over half of the respondents. All other information and robotic technologies are almost a rarity. On average, these respondents own almost five technologies each. There is no significant difference in technology ownership between women and men, with the exception of information technology. A greater proportion of men than women (31.4% vs 17.3%) own a desktop computer ($\chi^2=9.43$, $df= 1$, $p<.01$, Stand. Res. 3.1), a laptop (36.5% vs 21.1%, $\chi^2=10.01$, $df= 1$, $p <.01$, Stand. Res. 3.2), and have an Internet connection (66.7% vs 53.0%, $\chi^2=6.64$, $df= 1$, $p<.05$, Stand. Res. 2.6). The overall lower rate of information technology ownership among older women is consistent with a growing body of research documenting a gender gap in this domain (e.g., LINGEL, CRAWFORD 2020; FORTUNATI, EDWARDS 2022).

If we focus only on the sample of women, we discover significant differences among them. Let us start with the age groups. We found out not unexpectedly that young-old women are the most equipped with technologies: for example, 15.4% of single women aged 64-74 own a tablet, the highest percentage recorded ($\chi^2=7.93$, $df= 2$, $p<.05$, Stand. Res. 2.6). 95.8% of women who own a mobile phone (and this is the highest percentage) are young-old. Furthermore, 55.3% of the women who have a laptop belong to the first age group ($\chi^2=6.72$, $df= 2$, $p <.05$, Stand. Res. 2.1). Finally, also 57.1% of the women who access to the Internet are young-old ($\chi^2=22.48$, $df= 2$, $p <.0001$, Stand. Res. 4.6).

We explored also if the education is associated to the ownership of these technologies and a pattern emerges: the women with a degree are more likely than women with a primary school diploma to possess these technologies. In particular, 46.2% of the graduates (and this is the highest percentage) own a tablet ($\chi^2=13.02$, $df= 3$, $p <.01$, Stand. Res. 2.4). Moreover, among the women who do not possess a mobile phone, 80.0% of them are made of women with the elementary school diploma ($\chi^2=10.52$, $df= 3$, $p <.05$, Stand. Res. 3.2). Regarding the computer, 46.2% of the graduates and 30.3% of those with a high school diploma own one ($\chi^2=16.52$, $df= 3$, $p<.01$, Stand. Res. 2.1). In respect to the Internet, 84.6% of graduates and 75.8% of those with a high school diploma have access to it, while 66.3% of women with the primary school diploma do not ($\chi^2=26.73$, $df= 3$, $p<.0001$, Stand. Res.2.4, 2.9 and 4.9). Finally, 30.8% of the graduates have a Bimby, while 96.5% of the women with a primary school diploma do not have it ($\chi^2=12.33$, $df= 3$, $p<.01$, Stand. Res. 2.4 and 3.0).

Also, the variable of the place of residence highlights some differences. It emerged that 92.6% of the women who live in a rural environment own the mobile phone in respect to 79.6% of those who live in an urban context ($\chi^2=6.37$, $df= 1$, $p<.05$, Stand. Res. 2.5).

Continuing with the marital status, we notice that there are few differences in this concern, but in the few cases in which they emerge they reward single women and disadvantage widows. In fact, single women are more likely than the others (38.5%) to have the tablet, while 90.6% of widows are not (χ^2=8.76, *df*= 3, *p* <.05, Stand. Res. 2.7). In respect to the computer, again 38.5% of single women have it, while 92.2% of widows do not own it (χ^2=8.84, *df*= 3, *p* <.05, Stand. Res. 2.1 and 2.5). The same situation presents also with the home information system: 15.4% of the single women (and this is the highest percentage) has it (χ^2=10.28, *df*= 3, *p* <.05, Stand. Res. 2.9).

Additionally, women lose the ownership of the fixed telephone when they separate or divorce from their partners. In fact, 62.5% of divorced or separated women do not have it (χ^2=9.49, *df*= 3, *p* <.05, Stand. Res. 2.5).

Concluding with the former profession performed by these women, 75.0% of women who have worked in agriculture do not have the mobile phone (χ^2=21.25, *df*= 8, *p* <.01, Stand. Res. 4.2). The totality of women who were professionals and 32.0% of the former employees have a computer (χ^2=16.72, *df*= 8, *p* <.05, Stand. Res. 2.2 and 2.0). As to the laptop, 61.5% of graduates own one, while 90.9% of the houseworkers do not have one (χ^2=23.13, *df*= 8, *p*<.01, Stand. Res. 4.0 and 2.0). Finally, the totality of the former professionals has a home information system (χ^2=37.11, *df*= 8, *p*< .0001, Stand. Res. 5.8).

4.2. *Digital, smart and robotic technologies frequency of use by gender*

4.2.1. *Frequency of use of digital, smart and robotic technologies*

We report in Table 2 the frequency of use of these technologies, distinct by gender.

Table 2. Frequency of use of the digital, smart and robotic technologies by gender

	Frequency of use (Means, *SD*)		
	M	W	Tot.
Radio	2.77 (1.25)	2.49 (1.35)	2.62 (1.31)
Television	4.37 (.72)	4.25 (.90)	4.31 (.82)
Tablet	1.58 (1.11)	1.55 (1.11)	1.56 (1.11)
Fixed telephone	2.37 (1.26)	2.52 (1.39)	2.45 (1.33)
Mobile phone	3.50 (1.27)	3.44 (1.42)	3.47 (1.35)
Desk Computer	1.78 (1.33)	1.41 (1.02)	1.58 (1.19)**
Laptop	1.90 (1.33)	1.44 (.99)	1.65 (1.18)***
Internet	2.98 (1.72)	2.41 (1.60)	2.67 (1.68)**
Voice Assistant	1.24 (.71)	1.18 (.62)	1.21 (.66)
Home automation	1.14 (.66)	1.07 (.42)	1.10 (.54)
Robot vacuum cleaner (i.e., Roomba)	1.23 (.77)	1.39 (1.02)	1.32 (.91)
Multifunction kitchen robot (i.e. Bimby)	1.16 (.59)	1.24 (.72)	1.21 (.67)
Robot lawnmower	1.06 (.26)	1.04 (.24)	1.05 (.25)

NB. The five point-scale for frequency of use was: 1= *never*, 2= *rarely*, 3= *sometimes*, 4= *often*, 5=*always*.

* *p* <.05, ** *p* <.01, *** *p* <.0001.

Table 2 tells us that the frequency of use also reflects the patterns of ownership. In general, the most used technology by older adults turned out to be television, followed by the mobile phone. By contrast, Internet, radio, and fixed telephone are used with a frequency ranging between rarely and occasionally.

If we compare women and men regarding the frequency of use of these technologies, the *t* test highlights that there are three significant differences and all of them concern the information world. In particular, men more than women use more frequently the computer ($M=1.78$ vs $M=1.41$) ($t_{342}=2.91$, $p<.01$) the laptop ($M=1.90$ vs $M=1.44$) ($t_{342}=3.68$, $p<.0001$) and the internet ($M=2.98$ vs $M=2.41$) ($t_{342}=3.22$, $p<.01$).

However, which differences do we find if we investigate women only? According to the analysis of variance ANOVA, age produces significant differences regarding the fixed telephone ($F_{2,174}=4.54$, $p<.05$), the mobile phone ($F_{2,174}=12.33$, $p<.0001$), the desk computer ($F_{2,174}=3.22$, $p<.05$) and the Internet ($F_{2,174}=8.54$, $p<.0001$). Starting with the fixed telephone, the frequency of its use increases with age, showing a significant difference between the young-old and the oldest-old ($p<.01$). In contrast, for other devices, the opposite occurs: as age increases, the frequency of use of mobile phones, computers, and the internet decreases. The Bonferroni post hoc test shows in particular that the significant difference regarding the frequency of use of the mobile phone and the internet is between the young-old and both the old-old and the oldest-old ($p<.01$). As for the computer, no specific differences emerge among these three age groups. Education, as the analyses of variance ANOVA illustrate, generates also significant differences regarding the frequency of use of the tablet ($F_{3,181}=6.77$, $p<.0001$), the mobile phone ($F_{3,181}=5.31$, $p<.01$), the computer ($F_{3,181}=7.52$, $p<.0001$), the laptop ($F_{3,181}=8.47$, $p<.0001$), the internet ($F_{3,181}=8.28$, $p<.0001$) and the Multifunction kitchen robot (i.e., Bimby) ($F_{3,181}=5.84$, $p<.01$). The general pattern is that the women with low education levels use significantly less frequently these devices than those with medium or high education. The Bonferroni post hoc test indicates that regarding the tablet the graduates use it more frequently than women both with elementary schools ($p<.0001$) and secondary schools ($p<.05$); regarding the mobile phone women with elementary school diploma use it more frequently than those with high school diploma ($p<.01$); regarding the computer, women with elementary school diploma use it less frequently than those with a high school diploma ($p<.05$) or with a degree ($p<.05$) and women with a secondary school diploma use it less frequently than the graduates ($p<.05$); as to the laptop, women with an elementary school diploma use it less frequently than those with a high school diploma ($p<.05$) or with a degree ($p<.0001$); in respect to the Internet, women with elementary school diploma use it less frequently than those with a secondary school diploma ($p<.05$), a high school diploma ($p<.01$) or with a degree ($p<.01$). There is no significant difference in the frequency of use of the Internet between women with a high school diploma and graduates; regarding the multifunction kitchen robot (i.e., Bimby), women with an elementary school diploma use it less frequently than those with a high school diploma ($p<.01$) or with a degree ($p<.05$).

The marital status generates few significant differences among women. The analyses of variance ANOVA show that it is associated with the frequency of use of the mobile phone ($F_{3,181}=3.14$, $p<.05$) and the home information system ($F_{3,181}=3.39$, $p<.05$). However, the Bonferroni post-hoc test reveals that, regarding the mobile phone, no significant differences emerge among the various marital statuses. In contrast, regarding the home information system, widows use it less frequently than single women ($p<.05$). Finally, also the former profession is associated to the frequency of use of these devices: the analyses of variance ANOVA show that this association involves television ($F_{8,166}=2.23$, $p<.05$), computer ($F_{8,166}=5.01$, $p<.0001$), laptop ($F_{8,166}=3.30$, $p<.01$) and home information system ($F_{8,166}=20.39$, $p<.0001$). In the case of television, former employees and farmers watch it less than others, while regarding the computer and home information system, it is primarily former professionals who use these more frequently.

We conducted a detailed investigation into the use of mobile phones by asking our respondents how frequently they use its most common applications, and we present the results in the following section.

4.2.2 *Frequency of use of the most common applications*

Table 3. Frequency of use of a series of most common applications (Means and *SD*) by gender

	M	W	Tot.
Whatsapp	2.97 (1.63)	3.33 (1.49)	3.16 (1.56)
Weather forecast app	2.50 (1.46)	2.28 (1.32)	2.38 (1.39)
Facebook	2.03 (1.38)	1.98 (1.37)	2.01 (1.37)
App for SPID, the public digital identity system	1.99 (1.26)	1.73 (1.10)	1.86 (1.18)
YouTube	1.89 (1.18)	1.79 (1.07)	1.84 (1.12)
Google Maps	2.07 (1.31)	1.58 (.96)	1.81 (1.16)
Messenger	1.55 (1.03)	1.47 (.98)	1.50 (1.00)
IO (the public services app)	1.56 (1.01)	1.44 (.84)	1.50 (.92)
Instagram	1.30 (.83)	1.41 (.90)	1.36 (.87)
App to consult the train timetable	1.39 (.97)	1.26 (.65)	1.32 (.82)
Booking	1.40 (.87)	1.21 (.70)	1.30 (.79)
Skype	1.32 (.77)	1.15 (.48)	1.23 (.63)

NB. The five-point scale was: *never, rarely, sometimes, often, always*.

Table 3 tells us that these older adults in general use Whatsapp between some times and often. Between rarely and sometimes they use the weather forecast applications and they use rarely Facebook. They use all the other applications, including IO and SPID, which serve to connect to the services of Public Administration, between never and rarely.

Comparing men and women in terms of usage patterns, the *t* test revealed only a few significant differences. Women demonstrated statistically significant higher usage of WhatsApp (t_{311}= -2.049, *p*<.05), whereas men exhibited statistically significant higher usage of Facebook (t_{311}= 2.33, *p*<.05), Messenger (t_{311}= 3.88, *p*<.0001) and Booking (t_{311}= 2.10, *p*<.05). The analyses of variance, Anova, indicated that age is significantly associated with the usage of almost these applications.[1]

However, if we analyze women only, we observe that, in general, with age the frequency of use of all the considered application decreases. However, according to the analyses of variance ANOVA, age produces significant differences among women only regarding Whatsapp ($F_{2,154}$= 22.12, *p*<.0001), YouTube ($F_{2,154}$= 11.75, *p*<.0001), Instagram ($F_{2,154}$= 3.18, *p*<.05), Google Maps ($F_{2,154}$= 9.57, *p*<.0001), the app to consult the train timetable ($F_{2,154}$= 3.63, *p*<.05), and the weather forecast app ($F_{2,154}$= 14.1, *p*<.0001).

The Bonferroni post-hoc test shows that regarding Instagram and the app to consult the train timetable, although there is a significant difference, this relation is so weak that it does not generate specific differences in the frequency of use among the various age groups of women. In respect to the other applications, this test highlights always the same pattern: women 64-74 years old use Whatsapp, YouTube, Google Maps, and Weather forecast app more frequently than old-old women (*ps* < from .01 to .0001) and oldest-old women (*ps* < from .05 to .0001). By contrast the old-old women and the oldest-old ones do not differ from each other.

Education by contrast does not show a linear trend as age, because women with a degree for example express less interest towards social media than women with a medium education.

---

[1] Facebook ($F_{2,290}$= 6.26, *p*<.01), Whatsapp ($F_{2,290}$= 26.15, *p*<.0001), Youtube ($F_{2,290}$= 14.70, *p*<.0001), Instagram ($F_{2,290}$= 4.14, *p*<.05), Google Maps ($F_{2,290}$= 16.09, *p*<.0001), App to consult the train table ($F_{2,290}$= 6.46, *p*<.01), Booking ($F_{2,290}$= 9.16, *p*<.0001), Weather forecast app ($F_{2,290}$= 18.24, *p*<.0001), IO (the public services app) ($F_{2,290}$= 4.68, *p*<.05), App for SPID, the public digital identity system ($F_{2,290}$= 10.33, *p*<.0001).

According to the analyses of variance ANOVA, education generates significant differences among women only regarding Facebook ($F_{3,161}$= 2.80, p<.05), Whatsapp ($F_{3,161}$= 4.66, p<.01), Skype ($F_{3,161}$= 4.23, p<.01), Booking ($F_{3,161}$= 4.27, p<.01), Weather forecast app ($F_{3,161}$= 4.61, p<.01), and App for SPID, the public digital identity system ($F_{3,161}$= 5.70, p<.01). The Bonferroni post-hoc test shows a regular pattern regarding the frequency of use of all these applications: women with low education use them less frequently than those with a higher education. In detail, women with elementary school use Facebook less than those with a secondary school diploma (p<.05) and use Whatsapp less than those both with a secondary school diploma (p<.05) and with a high school (p<.05). Regarding Skype, both women with elementary and secondary school diploma use it less than graduates (p<.01 and p<.05). In respect to Booking, women with elementary school use it less frequently than women with high school diploma (p<.05); as to Weather forecast app and the App for SPID, the public digital identity system, women with elementary again use it less frequently than women with a secondary school diploma (ps<.01).

The marital status is also associated with the frequency of use of these applications. According to the analyses of variance ANOVA, marital status generates significant differences among women only regarding Whatsapp ($F_{3,161}$= 2.87, p<.05), YouTube ($F_{3,161}$= 3.48, p<.05), Messenger ($F_{3,161}$= 3.33, p<.05), Google Maps ($F_{3,161}$= 7.48, p<.0001), and Booking ($F_{3,161}$= 10.67, p<.0001). The Bonferroni post-hoc test shows that widows use Whatsapp and Google Maps less frequently than the married women (p<.05) and use YouTube less frequently than the single women (p<.05). Divorced or separated women use Messenger more frequently than married women and use Booking more frequently than single (p<.0001), married women (p<.0001) and widows (p<.0001).

The former profession of these women is also associated with the frequency of use of these applications. However, according to the analyses of variance ANOVA, former profession generates significant differences among women only regarding the frequency of use of YouTube ($F_{8,147}$= 2.59, p<.05), Skype ($F_{8,147}$= 2.51, p<.05), and GoogleMaps ($F_{8,147}$= 2.74, p<.01). The Bonferroni post-hoc test shows that former professionals use Skype (M=3.00) more frequently than the others, again former professionals (M=4.00) and former employees (M=2.26) use Google Maps more frequently than the other women. Additionally, former professionals (M=4.00) along with former employees (M=3.50) and former factory workers (M=2.18) use YouTube more frequently than the other women.

Finally, also the place of residence is associated with the frequency of use of one of these applications. According to the t test, IO is used by women living in urban environment more frequently than those living in rural contexts (t_{163} = 2.37, p<.05).

4.2.3 Frequency of the actions performed

We investigated further the practices of use of the mobile phone by asking respondents how frequently they were used to perform a range of quite common actions. We collected the answers that we report in Table 4.

Table 4. How frequently older adults perform the following actions (means and *SD*) by gender

	M	W	Tot.
Send a message on Whatsapp	2.79 (1.61)	3.04 (1.60)	2.92 (1.61)
Take photos with your smartphone	2.42 (1.35)	2.58 (1.35)	2.51 (1.35)
Send a message (SMS)	2.15 (1.11)	2.19 (1.17)	2.17 (1.14)
Make videos with your smartphone	2.08 (1.18)	2.10 (1.21)	2.09 (1.20)
Watch videos online	2.01 (1.25)	1.94 (1.19)	1.97 (1.22)
Consult medical analysis reports online	2.13 (1.34)	1.75 (1.19)	1.92 (1.27)
Send an email	2.18 (1.39)	1.62 (1.02)	1.88 (1.24)

Read the newspaper online	2.06 (1.41)	1.70 (1.13)	1.87 (1.28)
Book medical visits online	1.94 (1.25)	1.64 (1.04)	1.78 (1.15)
Top up your phone online	1.80 (1.33)	1.51 (1.08)	1.64 (1.21)
Do online banking	1.57 (1.14)	1.42 (0.98)	1.47 (0.97)
Consult the INPS website	1.70 (1.11)	1.36 (0.76)	1.52 (0.95)
Publish a post or photo online	1.53 (0.99)	1.42 (0.94)	1.47 (0.97)
Shopping online	1.57 (1.06)	1.37 (0.87)	1.46 (0.97)
Comment on a post online	1.38 (0.86)	1.39 (0.92)	1.39 (0.89)
Play online/offline video games	1.30 (0.86)	1.38 (0.99)	1.34 (0.93)
Call on Skype	1.33 (0.82)	1.19 (0.61)	1.25 (0.72)
Follow an influencer	1.13 (0.55)	1.15 (0.62)	1.14 (0.59)
Upload videos to YouTube	1.07 (0.42)	1.05 (0.30)	1.06 (0.36)

NB The five-point scale was: *never, rarely, sometimes, often, always.*

Table 4 reports that a significant portion of the activities undertaken by our respondents occur with a frequency ranging from never to rarely. This observation suggests a limited and sporadic access and use on the part of older adults of online public services such as access and utilization of medical analysis reports, online medical appointment booking, consultation of the INPS website[2], and online banking. The only activities reported to occur between rarely and sometimes are sending Whatsapp messages or SMS, and taking pictures or making videos. Apart from the established practice of sending SMS messages, which older adults adopted later in life, all other activities are associated with the features of WhatsApp, particularly messaging, photography, and videography. Comparing men and women, it turned out that there are some significant differences and all in favor of men. The *t* test shows that men less rarely than women send an email (t_{342}=4.35, p<.0001), read the newspaper online (t_{342}=2.58, p<.05), book medical visits online (t_{342}=2.47, p<.05), consult medical analysis reports online (t_{342}=2.75, p<.01), do home banking (t_{342}=2.61, p<.01), top up the phone online (t_{342}=2.24, p<.05) and consult the INPS website (t_{342}=3.38, p<.01).

Considering now only the older women, it was found that, with age, the frequency of these actions systematically decreases. The analyses of variance Anova have shown that for all these actions there are significant differences, except for sending a SMS, calling on Skype, videogaming online and offline and top up the phone online.[3] The Bonferroni test shows that the prevailing divide in the use of these advanced features is between the young-old (65-74) and the oldest-old (85-99), in the sense that the former perform these actions more frequently than the latter. However, there are four usage practices that show a significant difference between the young-old and the old-old, while no differences are found between the old-old and the oldest-old: uploading videos to YouTube, consulting the INPS website, shopping online, and following an influencer. As to education, the analyses of variance Anova highlight that this variable is associated to all these actions, except sending a message (SMS), playing

---

[2]   INPS is the acronym of The National Social Security Institute. It is a public body that provides services regarding social security benefits, ensures economic support for the weakest segments of the population, through welfare benefits, and provides various types of allowances in the cases provided for by law.

[3]   Send a Whatsapp message ($F_{2,174}$= 18.33, p<.0001), Send an email ($F_{2,174}$= 8.10, p<.0001), Take photos with your smartphone ($F_{2,174}$= 21.00, p<.0001), Publish a post or a photo online ($F_{2,174}$= 5.15, p<.01), Make videos with your smartphone ($F_{2,174}$= = 24.75, p<.0001), Watch videos online ($F_{2,174}$= 11.06, p<.0001), upload videos to YouTube ($F_{2,174}$= 3.66, p<.05), read the newspapers online ($F_{2,174}$= 4.22, p<.05), book medical visits ($F_{2,174}$= 5.05, p<.01), Consult medical analysis reports ($F_{2,174}$= 5.63, p<.01), Consult the INPS website ($F_{2,174}$= 4.83, p<.01), Do online banking ($F_{2,174}$= 5.26, p<.01), Comment on a post online ($F_{2,174}$=3.96, p<.05), Shopping online ($F_{2,174}$= 5.44, p<.01), Follow an influencer online ($F_{2,174}$= 4.94, p<.01).

online/offline video games, shopping online, and following an influencer[4]. The Bonferroni test shows that the main divide in the use of these advanced features is between women with low education (primary and secondary schools), who perform these actions less frequently, and women with a high education (high schools and degree) who perform these more frequently. There are other activities that see women with low education performing them less frequently than those with higher education: sending an email (p<.0001), publishing a post or a photo online (*ps* from <.05 to <.01), calling on Skype (*ps* from <.05 to <.01), and commenting a post online (p<.05). All other activities generally show that women with only a primary school education perform them less frequently than women with a secondary school diploma, who, in turn, perform them less frequently than women with a high school diploma or a degree. Marital status is also associate with these actions.[5] The analyses of variance Anova highlight that it is associate not with all, but with many of them. The Bonferroni test shows that widows systematically perform these actions less frequently than the divorced or separated. Although both widows and divorced or separated women live alone, the former exhibit a distinct dissonance with regard to digital, smart, and robotic technologies. Widows use WhatsApp to send messages (p<.05), upload videos to YouTube (p<.05), read online newspapers (p<.05), book medical appointments online (p<.01), consult medical analysis reports online (p<.05), top up their phones online (p<.05), and shop online (p<.05) less frequently than divorced or separated women. Additionally, the widows make videos with their smartphone and follow an influencer online less frequently than the singles (*ps*<.05). In respect to the place of residence of our respondents, the t test highlights that women living in rural areas more frequently than those who live in urban environments send a message on Whatsapp (t_{183}= -2.41, p<.05), read the newspaper online (t_{183}= -2.61, p<.05) and comment a post online (t_{183}= -2.27, p<.05).

5. *Discussion and final remarks*

These results demonstrate that the approach applied in this research – describing the overall sample, comparing older men and women, and finally focusing on older women – has been successful.

The results obtained provide a deeper understanding of the situation of older women with respect to digital, smart and robotic technologies. But let us proceed in order, guided by our two research questions.

Regarding the first research on whether older women experience a distinct dissonance towards these technologies compared to men, our findings confirm this. However, further elaboration is needed.

Firstly, although all older adults generally experience this dissonance, it is particularly pronounced in the case of older women. The data on ownership and frequency of use indicate that the real problem for older women is not the technologies themselves, but rather the IT world, which proves particularly dissonant towards them. A comparison of the frequency of use

---

[4]   Send a message on Whatsapp ($F_{3,181}$=8.00, p<.0001), send an email ($F_{3,181}$=14.06, p<.0001), take photos with your smartphone ($F_{3,181}$= 5.24, p<.0001), publish a post or a photo online ($F_{3,181}$=5.47, p<.01), make videos with your smartphone ($F_{3,181}$= 4.40, p<.01), watch videos online ($F_{3,181}$=5.71, p<.01), upload videos to YouTube ($F_{3,181}$=3.12, p<.05), call on Skype ($F_{3,181}$=8.84, p<.0001), read the newspapers online ($F_{3,181}$=2.92, p<.05), book medical visits ($F_{3,181}$= 3.36, p<.05), consult medical analysis reports online ($F_{3,181}$= 6.14, p<.01), do online banking ($F_{3,181}$= 6.48, p<.0001), comment on a post online ($F_{3,181}$=3.49, p<.05), top up your phone online ($F_{3,181}$=5.19, p<.01), consult the INPS website ($F_{3,181}$=6.11, p<.01).

[5]   Send a message on Whatsapp ($F_{3,181}$=3.32, p<.05), take photos with your smartphone ($F_{3,181}$=2.80, p<.05), make videos with your smartphone ($F_{3,181}$=4.50, p<.05), watch videos online ($F_{3,181}$=4.50, p<.01), consult medical analysis reports online ($F_{3,181}$=3.32, p<.05), upload videos to YouTube ($F_{3,181}$=2.84, p<.05), read the newspapers online ($F_{3,181}$=3.98, p<.01), book medical visits online ($F_{3,181}$=5.30, p<.01), consult medical analysis reports ($F_{3,181}$=3.69, p<.05), top up your phone online ($F_{3,181}$=3.41, p<.05), shopping online ($F_{3,181}$=4.27, p<.01), follow an influencer online ($F_{3,181}$=3.55, p<.05).

of the most commonly used applications revealed that older women use only one application more frequently than men: Whatsapp, while men use other social media more frequently. This is a reasonable assumption, given that older women are typically those who within the family are responsible for maintaining social and emotional relationships, while men tend to be more active on social media platforms, where they often expose themselves publicly, and on Booking.com, where reservations are made. With regards to the frequency of potential uses of the mobile phone, the overall sample demonstrated moderate engagement in activities such as sending Whatsapp messages or SMS, and taking pictures or making videos. However, it showed limited and sporadic access to online public services, including the utilization of medical analysis reports, online medical appointment booking, consultation of the INPS website, and online banking. These findings suggest that older adults face significant barriers to fully exercising their rights of citizenship. The assumption that they must possess digital literacy and technological proficiency—skills many lack—significantly limits their access to essential services and participation in civic life. In particular, older women, who are less likely than men to access these online services, are more severely deprived of their rights of citizenship compared to their male counterparts. The second distinction is that the dissonance suffered by older women in relation to these technologies is not the same for all older women. There are older women who suffer more for this and others less, as we will see below.

In terms of ownership of these technologies, widows for example are the most vulnerable group, as they have the least access to such resources. Furthermore, although older women residing in rural areas are more likely to possess a cell phone than their urban counterparts (75.4% vs 24.6%), three-quarters of the older women who previously engaged in agricultural labor lack such a device. There is a rich literature that illustrates and explains why, in general, rural people are more likely to possess more mobile phones (e.g., FORTUNATI, DE LUCA 2011; FORTUNATI, MANGANELLI, DE LUCA 2015). In particular, the reasons that might be identified for older women are as follows. First, rural women may face greater isolation due to lower population density and fewer opportunities for in-person socialization. Second, mobile phones may be perceived as essential tools for safety and emergencies in rural areas, where distances can be vast and access to medical facilities may be far away. Finally, factors such as the necessity of mobile communication, the maintenance of social support networks, and specific economic considerations in rural settings may also play a role. Whit respect to the lack of the mobile phone among older women who worked in the fields, several hypotheses could explain this result: these rural women face a lower level of education (all have only an elementary school license) and very likely have a lower level of income. In general, our findings suggest that women with lower levels of education are largely excluded from the IT world. In the event of separation or divorce, women are often left without the landline phone, as the telephone contract is typically in the in the husband's name, who is very often considered the head of the household.

With regard to the frequency of use, it emerges that women with lower levels of education, even when they do gain access to these technologies, tend to fail to use them with a profitable frequency. For instance, these women use applications such as Facebook, Whatsapp, etc. less frequently than more educated women. Widowed women confirm their specific vulnerability, since they use for example Whatsapp and Google Maps less than married women, probably because their sociability as well as their mobility following widowhood suffer a drastic decline. Separated or divorced women, who we have seen losing their landlines, compensate for this lack by using advanced communication tools such as use Messenger and Booking.com more than married women. The older women who were professionals and employees use Skype, Google Maps and YouTube more frequently than the other old women. With regard to the ability to access public services, widows and women with low levels of education have limited access to these, while older women living in rural environments demonstrate an advanced use of their

mobile phone, sending Whatsapp messages, reading the newspaper online and commenting on posts online with greater frequency than those residing in urban areas.

In response to our second research question, which sought to ascertain whether young older women (65-74 years), old-old women (75-84 years) and old-oldest women (85 years and older) exhibited comparable or disparate levels of dissonance towards these technologies, our findings indicate that the answer is affirmative. While the younger cohort of older women is increasingly engaging with digital technologies, participation declines significantly among older women and the oldest cohort, indicating a pressing need to address these generational divides.

Overall, these findings highlight a concerning trend: the phenomenon of "digital bullying" targeting older individuals, particularly older women. The very tools that could empower and connect older women have instead become arenas for their marginalization, where ageist attitudes and gender biases intersect to devalue them. This subtle yet insidious form of digital ageism not only erodes the confidence of older women but also limits their willingness and ability to engage with new technologies.

Confronting this digital bullying is crucial as we move forward. It is imperative that we reconsider societal perceptions of aging and technology, amplify the voices of older women, and dismantle the biases that render them invisible in the digital realm. While barriers persist, continued research is essential to gain a full understanding of these dynamics and to develop appropriate strategies to contrast them.

References

BUSCH T. 1996. *Gender, group composition, cooperation, and self-efficacy in computer studies*, in «Journal of Educational Computing Research», 15(2), 125 ff.

DIMAGGIO P.J., HARGITTAI E. 2001. *From the 'digital divide' to 'digital inequality': Studying Internet use as penetration increases*, Center for Arts and Cultural Policy Studies, Woodrow Wilson School, Princeton University, Working Paper Series, 15. Available at: https://digitalinclusion.typepad.com/digital_inclusion/documentos/digitalinequality.pdf.

DURNDELL A., HAAG Z. 2002. *Computer self efficacy, computer anxiety, attitudes towards the Internet and reported experience with the Internet, by gender, in an east European sample*, in «Computers in Human Behavior», 18(5), 521 ff.

ENSMENGER N. 2015. *"Beards, sandals, and other signs of rugged individualism": Masculine culture within the computing professions*, in «Osiris», 30(1), 38 ff. https://doi.org.10.1086/682955.

ESTES C. 2001. *Social policy & aging: A critical perspective*, Sage.

EUROSTAT 2022. *EU survey on the use of information and communication technologies (ICT) in households and by individuals*. Available at: https://ec.europa.eu/eurostat/cache/metadata/fr/isoc_i_esms.htm#:~:text=The%20EU%20survey%20on%20the,in%20households%20and%20by%20individuals.

FORTUNATI L., DE LUCA F. 2011. *Micro and macro spatial dimensions of new media in five European countries*, in ESPOSITO A. ESPOSITO A.M., MARTONE R., MÜLLER V.C., SCARPETTA G. (eds.), *Towards Autonomous, Adaptive, and Context–Aware Multimodal Interfaces. Theoretical and Practical Issues*, Springer, 190 ff.

FORTUNATI L., TAIPALE S. 2013. *The diffusion and use of information and communication technologies and the city from 1996 to 2009*, in «First Monday», 18(11).

FORTUNATI L., MANGANELLI A.M., DE LUCA F. 2015. *Is mobile phone use associated with spatial dimensions? A comparative study on mobile phone use in five European countries*, in «Information, Communication & Society», 18(9), 1057 ff. https://doi.org/10.1080/1369118X.2015.1015592.

FORTUNATI L., EDWARDS A.P. 2022. *Gender and Human-Machine Communication: Where Are We?*, in «Human-Machine Communication», 5, 7 ff. https://doi.org/10.30658/hmc.5.1.

FORTUNATI L., FARINOSI M. forthcoming. *Ageing in the Digital Era: A Study on Italian Older Adults' Complex Relationship with Mobile Phones and Digital Technologies*, in «Mobile Media and Communication».

FORTUNATI L., FARINOSI M., ESPOSITO A., CAVALLO F. 2025. *How older adults integrate smart and robotic technologies into the daily lives*, in FIORINI L., SORRENTINO A., CAVALLO F., (eds.), *ForItAAL 2024*, Springer, 51 ff.

GANITO C. 2018. *Gendering Old Age: The Role of Mobile Phones in the Experience of Aging for Women*, in ZHOU J., SALVENDY G. (eds.), *Human Aspects of IT for the Aged Population. Acceptance, Communication and Participation. ITAP 2018, Lecture Notes in Computer Science, vol 10926.* Springer, 40 ff.

HARAWAY D. 1985. *A manifesto for cyborgs: Science, technology, and socialist feminism in the 1980s*, in «Socialist Review», 80, 65 ff.

HONG S.I. 2016. *Community older adults' attitude towards the use of assistive devices*, in «Asia Pacific Journal of Social Work and Development», 26(4), 217 ff.

HSIAO H.C., TU Y.L., CHUNG H.N. 2012. *Perceived social supports, computer self-efficacy, and computer use among high school students*, in «The Turkish Online Journal of Educational Technology», 11(2), 167 ff.

HWANG Y.S. 2021. *Psychological factors that affect the acceptance and need for ICT services for older adults with chronic diseases*, in «Gerontechnology», 20(2): 1 ff.

IMHOF M., VOLLMEYER R., BEIERLEIN C. 2007. *Computer use and the gender gap: the issue of access, use, motivation, and performance*, in «Computers in Human Behavior», 23(6), 2823 ff.

IÑIGUEZ BERROZPE T., ELBOJ SASO C., FLECHA A., MARCALETTI F. 2020. *Benefits of adult education participation for low-educated women*, in «Adult Education Quarterly», 70(1), 64 ff. https://doi.org/10.1177/0741713619870793.

ITU 2023. *The gender digital divide*. Available at: https://www.itu.int/itu-d/reports/statistics/2023/10/10/ff23-the-gender-digital-divide/.

KADYLAK T., COTTON S.R., FENNELL C. 2021. *Willingness to use automated vehicles: Results from a large and diverse sample of US older adults*, in «Gerontology and Geriatric Medicine», 7, 1 ff.

KENNEDY T., WELLMAN B., KLEMENT K. 2003. *Gendering the digital divide*, in «IT & Society», 1(5), 72 ff.

KONDO N.K.C., NAGAMINE Y., OTA A., SHOBUGAWA Y., CABLE N., TAJIKA A., NAKAGOMI A., CHISHIMA I., IDE K., UENO T., FUJIHARA S., FUJINAMI Y., YASUFUKU Y., UENO T. 2021. *Understanding the role of Internet access on health and health equity toward healthy ageing in the western Pacific Region*. World Health Organization: Geneva, Switzerland.

LI N., KIRKUP G. 2007. *Gender and cultural differences in Internet use: a study of China and the UK*, in «Computers & Education», 48(2), 301 ff.

LI Q., LUXIMON Y. 2016. *Older adults and digital technology: A study of user perception and usage behavior*, in «Advances in Physical Ergonomics and Human Factors», 155 ff. https://doi.org/10.1007/978-3-319-41694-6_16.

LIFF S., SHEPHERD A. 2004. *An evolving gender digital divide?*, in «Oxford Internet Institute, Internet Issue Brief, 2». Available at: https://www.webuse.org/images/press/2004-08-OII-DigitalInequality.pdf.

LINGEL J., CRAWFORD K. 2020. *Alexa, tell me about your mother": The history of the secretary and the end of secrecy*, in «Catalyst: Feminism, Theory, Technoscience», 6(1), 1 ff. https://doi.org/10.28968/cftt.v6i1.29949.

MENENDEZ ALVAREZ-DARDET S., LORENCE B., PEREZ-PADILLA J. 2020. *Older adults and ICT adoption: Analysis of the use and attitudes toward computers in elderly Spanish people*, in «Computers in Human Behavior», 110, 106377.

NAGLE S., SCHMIDT L. 2012. *Computer acceptance of older adults*, in «Work», 41(Supp. 1), 3541 ff.

OUDSHOORN N., PINCH T. 2003. *How users matter: The co-construction of users and technology (inside technology)*, MIT Press.

PAN S., JORDAN-MARSH M. 2010. *Internet use intention and adoption among Chinese older adults: From the expanded technology acceptance model perspective*, in «Computers in Human Behavior», 26(5), 1111 ff.

POELMANS S., TRUYEN F., STOCKMAN C. 2012. *ICT skills and computer self-efficacy of higher education students*, in INTED2012 - 6th International Technology, Education and Development Conference Proceedings, IATED, 1123 ff.

RAHMAN M.M., DEB S., STRAWDERMAN L., BURCH R., SMITH B. 2019. *How the older population perceives self-driving vehicles*, in «Transportation Research Part F: Traffic Psychology and Behaviour», 65, 242 ff.

RATZENBÖCK B. 2016. *"Let's take a look together": walking interviews in domestic spaces as a means to examine ICT experiences of women 60+*, in «Journal of Communication and Public Relations», 18(1(37)), 49 ff.

ROSALES A., SVENSSON J. 2021. *Perceptions of age in contemporary tech*, in «Nordicom Review», 41, 79-91. https://doi.org/10.2478/nor-2021-0021.

ROSALES A., FERNÁNDEZ-ARDÈVOL M. 2016. *Beyond WhatsApp: older people and smartphones*, in «Romanian Journal of Communication and Public Relations», 18(1(37)), 27 ff.

SCHWAIGER L. 2006. *To be forever young? Towards reframing corporeal subjectivity in maturity*, in «International Journal of Ageing and Later Life», 1(1), 11 ff.

SEIFERT A., SCHELLING H.R. 2015. *Mobile use of the Internet using smartphones or tablets by Swiss people over 65 years*, in «Gerontechnology», 14(1): 57 ff.

TSAI M.J., TSAI C.C. 2010. *Junior high school students' Internet usage and self-efficacy: a re-examination of the gender gap*, in «Computers & Education», 54, 1182 ff.

UNECE. 2023. *UNECE Statistical Database.* Available at: https://unece.org/data.

VINCENT J. 2023. *Life stage or Age? Reviewing perceptions of oldest digital technologies users*, in ROSALES A., FERNÁNDEZ-ARDÈVOL M., SVENSSON J. (eds.), *Digital Ageism. How it Operates and Approaching to Tackling it*, Routeledge.

WONG C.K., YEUNG D.Y., HO H.C., TSE K.P., LAM C.Y. 2014. *Chinese older adults' Internet use for health information*, in «Journal of Applied Gerontology», 33(3), 316 ff.

Woodward K. (ed.) 1999. *Figuring age: Women, bodies, generations*, Indiana University Press.

ZAIDI A., HOWSE K. 2017. *The policy discourse of active ageing: Some reflections*, in «Journal of Population Ageing», 10(1), 1 ff. https://doi.org/10.1007/s12062-017-9174-6.

ZHANG M. 2023. *Older people's attitudes towards emerging technologies: A systematic literature review*, in «Public Understanding of Science», 32(8), 948 ff. https://doi.org/10.1177/09636625231171677.