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Internet perceptions among older adults in Sweden

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Introduction: The digital inequality is still present after decades of development and diffusion of digital media. Age is one of the most important factors predicting access, use, skills, and outcomes, which is somewhat paradoxical as information and communication technologies can create opportunities for older adults to sustain independent living. To increase understanding of older adults' online engagement, this study focuses on perceptions of the internet usage and how it can be a useful tool in everyday life.

Method: A representative survey ($n = 841$).

Results: Analyses point to decreasing support for the internet with increasing age - also within the group of 66 to 85 years old. There are significant correlations between perceptions and internet experience, whereas sociodemographic factors have weak explanatory power. Interestingly, large shares of older adults do not have any opinion of the internet, which could partly explain the persistence of the digital divide and difficulties to increase digital literacy.

Discussion: Online experience and level of anxiety overrule socio-demographics in explanatory power to perceptions. The internet is perceived useful, but also interferes with common habits, the view of digital technology in everyday life and computer anxiety. The findings could affect policy implementation, where it would be useful to implement the idea of the Internet and create an awareness that might precede an intention to advance one's use.

KEYWORDS

internet perceptions, digital equality, digital divide, digital literacy, internet experience, representative survey

1. Introduction

Since the launch of the Internet to a larger public in 1994, the number of Internet users has constantly increased. Nine out of ten Swedes were regular online users by the time of this study in 2019. Age differences in Internet access, however, are still prevalent in favor of younger people and there is a digital inequality due to age. Also when online, older adults are more limited in their use, have a narrower experience in terms of online activities and advanced functions, and are less engaged in digital society than are younger people (Bergström, 2015a, 2017; Van Deursen and Helsper, 2015; Friemel, 2016; Hargittai and Dobransky, 2017; Quan-Haase et al., 2018; Olsson et al., 2019; Van Deursen and Van Dijk, 2019; Petrovčič et al., 2022).

This might seem somewhat paradoxical since the digitalization affects practically all fields of human life and older adults to some extent perceive digital skills and acquiring them a necessity for their inclusion in society (Pihlainen et al., 2021). A large body of research shows that the use of information and communication technologies can sustain independent living (Hänninen et al., 2021), have a potential to minimize social isolation (Boulton-Lewis et al., 2007; Reisenwitz et al., 2007; Van Deursen and Helsper, 2015), and provide opportunities for greater democratic and societal engagement (Boulton-Lewis et al., 2007; Rains, 2008; Loos, 2012; Obi et al., 2013).

Although much research support positive aspects of being a digital citizen, there is also a flip side to the digitalization and how older adults handle and view the development. Adopting digital skills in older age can be experienced as both stressful and unpleasant and early findings pointed to that internet use was associated with a decline in social involvement and with increased loneliness (Kraut et al., 1998). Researchers have also found a mismatch between expectations in particular social contexts and situations that run under new premises, like the digital society, which could lead to frustration, confusion, and restraints in online activities (Schirmer et al., 2022).

Research on digital inequalities uses multifaceted conceptualisations, spanning motivation, access, skills, use, and outcomes (Pearce and Rice, 2013; Lee et al., 2015; Van Deursen and Van Dijk, 2015; Scheerder et al., 2017). The question of engaging in digital technology is also addressed in the digital literacy literature (Schreurs et al., 2017), where for instance variability of experience among older adults is pointed out. Hargittai et al. (2019: 887) call for "a more complex discussion of how older adults vary in their ability to engage fully in the information society." Schreurs et al. (2017) also emphasize a need for understanding older adults' experiences in relation to perceptions to get a better understanding of what helps or hinders digital literacy development. According to Donat et al. (2009, p. 51) "attitudes can strongly influence people's willingness to learn more about the internet and become experienced users," and Birkland (2022) highlights perceptions as a way to understand the role of the Internet in older adults' everyday life.

The importance of understanding nuances of digital inclusion (Petrovčič et al., 2022) and of variations among older adults (Hargittai et al., 2019) are clearly emphasized in contemporary research. Older users' perceptions of digital technology – the bottom-up-perspective – can offer insights into potential challenges older adults come upon and reveal what can be done to create better equality in the digital society (Kania-Lundholm and Torres, 2018; Gallistl and Wanka, 2022). Based on this, the study takes its point of departure in the online society by asking older Internet users about their perceptions of the Internet. This approach especially addresses the need for a better understanding for "how older people perceive and experience mediated communication" (Lüders and Roth Gjevjon, 2017, p. 66), a call for further examining how digital technologies are integrated into older adults' everyday lives (Givskov and Deuze, 2018), and how ICTs are embraced and routinised (Quan-Haase et al., 2016).

Thus, far it has been common to study older adults as one homogenous group, which might hinder the understanding of their perceptions of the Internet and the use they make of it (Van Deursen and Helsper, 2015, 2017; Hargittai and Dobransky, 2017; Quan-Haase et al., 2018). It is evident that "later life can be considered varied and dynamic" (Givskov and Deuze, 2018, p. 401). By studying a large, representative sample of individuals 66 to 85 years old, potential variations in older adults' perceptions can be detected. The study contributes to the digital equality research, addressing both the digital divide and digital literacy perspectives, and it sheds further light on the age differences among older adults online. The aim of this investigation is to study how older adults perceive different aspects of Internet usage and the Internet in their everyday life. Digital inequality due to age, considered along with a growing importance of digital features in a mediated society (Lüders and Roth Gjevjon, 2017) and the benefits digital tools and applications can bring (Damkjaer et al., 2021), and the obstacles they can create (Schirmer et al., 2022) makes it especially relevant to study how older adults perceive the Internet and online activities.

2. Formation of internet perceptions

Depending on your point of departure, perceptions can be differently understood and studied. This study has a social science approach to the concept of perceptions and adopts an individual perspective. Two overarching frameworks for understanding individuals' views of, in this case, media technology are the Uses and Gratifications theory and the Diffusion of Innovations theory. Both can be considered as rather large theoretical perspectives, where certain aspects are of particular relevance for the conducted study.

The Uses and Gratifications approach identifies different levels of factors to explain and understand media behavior and views of media: society, media structure, and individual characteristics are all considered important (Rosengren, 1974; Ruggiero, 2000; Sullivan, 2013). The focus of the conducted study is the individual level, and from this theoretical framework, the users are supposed to have different perceptions depending on personal experience (Becker and Schönbach, 1989) and socio-demographics (Elvestad and Blekesaune, 2008).

Theories to understand why people adopt or reject technology emphasize access and use, but also includes the importance of perceptions in the adopting process. Two of the most common theories are the diffusion of innovations theory (Rogers, 2003) and the technology acceptance model (TAM; Davis, 1989). The TAM emphasizes, among other things, an item's perceived usefulness and ease of use (Davis, 1989; Venkatesh et al., 2012; Ma et al., 2021), which are concepts closely related to ?bib58 concepts of relative advantage and complexity.

Perceptions can be understood as the process in which one interpret and make sense of objects (Lindsay and Norman, 1977). The concept is somewhat related to the concept of attitudes, although the latter rather refers to evaluation of a particular entity. Perceptions can be considered more open to influence whereas attitudes are mental dispositions, differing positive or negative preferences to an object, person, institution, or event (Ajzen, 2005; Johnson and Boynton, 2010). Much research within the field takes its point of departure in the concept of attitudes. Although not treating perceptions and attitudes as synonyms in the conducted study, attitude research provides a good base for the understanding of perceptions.

A common aspect of both Uses and Gratifications perspective and the Diffusion of innovation theory is experience, a factor which is also emphasized in attitude research. A person's personal experience of an object is crucial for the creation of attitudes and the more positive the experience about an object, the more positive attitudes a person will hold about that object (Fishbein and Ajzen, 1975). Patterns of beliefs and attitudes are strongly associated with acceptance and use of the Internet (Donat et al., 2009; Wagner et al., 2010; Seifert and Schelling, 2018; Dutton and Reisdorf, 2019), and prior experience was an essential factor in understanding people's

attitudes toward technology (Levin and Gordon, 1989; Au and Enderwick, 2000).

Attitudes toward digital technologies correlate with hardware access, use diversity and frequency, skills, and outcomes of Internet use (Lee et al., 2019; Van Deursen and Van Dijk, 2019). Negative attitudes have been found to narrow use and make it less efficient (Reisdorf and Groselj, 2017), and people who have major reservations about the value of the Internet were significantly less likely to use Internet applications (Dutton and Reisdorf, 2019). Older adults' attitudes toward the Internet, however, have been scarcely studied (Seifert and Schelling, 2018).

Pirhonen et al. (2020) show in an interview study that older adults with positive user experiences are more likely to see opportunities with digital technology, whereas those with negative experiences of use express worries and restraint. Experience in terms of time spent online and the breadth of use among older adults have been shown to be positively correlated with attitudes (Van Deursen and Helsper, 2015). Less experiences of the Internet, on the other hand, have been shown to have negative impact on attitude (Lee et al., 2019) and negative experience have caused people to doubt its usefulness (Trocchia and Janda, 2000). Based on attitude research, it is likely that perceptions and experience are closely related.

Another aspect of experience focuses on concerns about computer use (Youn, 2009; Park et al., 2012) which is believed to be an important explanatory factor for perceptions of the Internet. Higher privacy concern is, for instance, associated with weaker intentions to turn to online services (Baruh et al., 2017) and more limited use of self-service technologies (Meuter et al., 2003). People are also concerned about the usage itself and sometimes make efforts to restrict their use of digital media due to, among other reasons, a sense of temporal overload and the fact that digital media occupy too much time (Syvertsen and Enli, 2020). This in turn is related to making choices not to waste time "on unpleasant and stressful activities" (Lissitsa and Chachashvili-Bolotin, 2015, p. 46). People have been reported to express concerns toward digital technology as habit-forming or addictive (Seifert and Schelling, 2018), and spend more time than they desire because they depend on the different applications and features offered in the online context (Gatto and Tak, 2008). Older adults have also claimed they do not want to "waste the time they have left" (Gallistl and Wanka, 2022, p. 119) on the time required to become a competent Internet user. Although there are users who want to limit their digital media use (Quan-Haase et al., 2018), this does not seem to be the major perception among older users (Seifert and Schelling, 2018).

Perception formation correlates strongly with socio-demographic factors. Previous studies of perceptions of digital facilities and applications have shown age, level of education, and income to be differentiating factors. Younger persons, persons with a higher level of education, and those with higher income have more positive perceptions toward the technology and different areas of use (Porter and Donthu, 2006). The same patterns have been found within groups of older adults (Hargittai and Dobransky, 2017; Olsson et al., 2019).

Experience with the Internet is also to a large extent explained by socio-demographical factors. Determinants of Internet use also determine digital skills and the digital divide (Van Deursen et al., 2017), although with differences depending on what skills and uses are measured (Van Deursen and Van Dijk, 2011; Scheerder et al., 2017). Previous research has concluded that women, older adults, and persons with a lower level of education tend to use the Internet less effectively and in a less meritorious way than other groups in society (Lissitsa and Chachashvili-Bolotin, 2015; Hargittai and Dobransky, 2017; Van Deursen and Helsper, 2017; Ma et al., 2021). According to Scheerder et al. (2017), age, educational level, and employment status are the most important explanatory factors for the second-level digital divide. Although there are different factors explaining different digital practices and skills (Calderón Gómez et al., 2022), age is one of the most important predictors of usage frequency for most kinds of areas and services (Büchi et al., 2016).

Concerns about digital media also correlate strongly with sex, age, and education. The effect of gender is somewhat inconclusive, but it seems that men are more risk-willing than women when posting private content on the Internet (Fogel and Nehmad, 2009), and women seem to express more concerns generally than do men (O'Neil, 2001; Bergström, 2015b). Studies of perceptions of digital privacy issues are also somewhat inconsistent when measuring the impact of age (Hoofnagle et al., 2010; Taddicken, 2013). Young people seem to be better at managing privacy settings (Marwick and Boyd, 2014), whereas older users tend to be more protective. Further, it seems that users with lower education are less concerned with privacy issues online (Bergström, 2015b), and those who are higher educated have been more likely to manage different privacy settings (Rainie et al., 2013). Van Deursen and Helsper (2015) also found a positive correlation between Internet experience and anxiety to the extent that more experienced older adults' perceived lower risks in use.

2.1. Research questions

Altogether, previous research clearly points to a correlation between perceptions, Internet experience, and computer concerns. All three factors strongly correlate with socio-demographics. Following on theoretical perspectives of the formation of Internet perceptions presented above, the study aims to answer the following research questions:

- What are older adults' perceptions of the internet and internet usage?
- To what extent do internet experience, computer concerns, and socio-demographic factors predict perceptions of the internet among older adults?

3. Materials and methods

The context for the study, Sweden, is characterized by high levels of internet diffusion, and one of the highest-ranking countries when comparing Internet skills and usage comparably also among older adults (Internet World Stats, 2023). A longitudinal, national survey in Sweden shows an increasing proportion of older Internet users between the years 2003 and 2022: $<10\%$ and $>60\%$ respectively (The Swedish Internet Foundation, 2023). This means we have good preconditions for studying perceptions among older Internet users, with a variety of digital

TABLE 1 Summary statistics for the sample.

		Percent	*N*
Sex	Female	52.0	437
	Male	48.0	404
Age	66–70 years	32.1	270
	71-−75 years	32.0	269
	76–80 years	21.4	180
	81–85 years	14.5	122
Education	Low	32.6	274
	Middle-low	21.8	183
	Middle-high	17.7	149
	High	24.1	203
Internet use	Daily	56.2	473
	Several times a week	13.8	116
	Once a week	5.1	43
	Once a month	3.6	30
	Once during the last 6 months	0.4	3
	Once during the last 12 months	0.7	6
Number of activities	Mean = 6.8 (0-19), Std.Dev. 3.8		
Cyber anxiety index	Mean = 36.5 (0-52), Std.Dev. 8.5		

Source: The Western Sweden SOM Survey 2019.

experience in both quantity and quality by the time of the study. Given the Swedish context, we have a comparably mature internet audience also among older adults. Perceptions in other contexts where the media structure and the maturity among the audience differ, would most likely come to other conclusions than the presented study.

The presented analyses are based on data collected within the frame of the Swedish SOM Surveys. The SOM Institute, University of Gothenburg, conducts annual population surveys on society, opinions, and media. Beginning in 1986, every year a random sample of the Swedish population, both nationally and regionally, has received the survey.

Perceptions of the Internet among older adults were measured in the West Sweden regional survey 2019 (see Falk et al., 2020, for a methodological overview). The survey questionnaire (16 pages) had a specific focus on Internet-related issues, ranging from different aspects of use to anxiety and perceptions. The questionnaire also contains questions on diverse media habits, use of, and attitudes to different areas of the public sector and a few pages of background information. A mixed-mode design of mail and web was used. A random sample of 6.000 persons aged 16–85 years living in the region was selected. The net response rate for the total survey was 50%, and in the selected group for this study it was 70%. In the data set, there are 900 persons aged 66 to 85 years,

TABLE 2 Perceptions of the Internet in the population 16 to 85 years (opinion balance and per cent).

	16–65 years	Total group of 66–85 years	66–70 years	71–75 years	76–80 years	81–85 years
Learning new things	+81 (n.o. 2%)	+43 (n.o. 13%)	+55 (n.o. 7%)	+59 (n.o. 11%)	+38 (n.o. 21%)	+21 (n.o. 21%)
Looking for solutions	+81 (n.o. 1%)	+51 (n.o. 10%)	+59 (n.o. 5%)	+54 (n.o. 8%)	+47 (n.o. 18%)	+28 (n.o. 19%)
Too much or not too much time spent online	+4 (n.o. 2%)	+58 (n.o. 10%)	+59 (n.o. 6%)	+63 (n.o. 8%)	+48 (n.o. 16%)	+62 (n.o. 21%)
Hard or less hard keeping up with what happens	+41 (n.o. 4%)	+59 (n.o. 13%)	+64 (n.o. 6%)	+64 (n.o. 12%)	+47 (n.o. 21%)	+49 (n.o. 27%)
More or less device-free periods	+9 (n.o. 6%)	+50 (n.o. 23%)	+50 (n.o. 14%)	+51 (n.o. 20%)	+50 (n.o. 31%)	+46 (n.o. 44%)
Problems vs opportunities	+60 (n.o. 6%)	+46 (n.o. 21%)	+51 (n.o. 13%)	+43 (n.o. 19%)	+42 (n.o. 30%)	+42 (n.o. 35%)
More or less feeling of being monitored	+5 (n.o. 5%)	+34 (n.o. 19%)	+24 (n.o. 11%)	+35 (n.o. 19%)	+43 (n.o. 24%)	+47 (n.o. 35%)
Smallest number of answers	1.959	675	240	228	130	77

Comment: The question is "What is your opinion on the following statements?". Answering options: "Totally agree," "Partially agree," "Hardly agree," "Disagree" and "No perception/opinion" (n.o.). The opinion balance shows the share that totally and partially agrees minus the share that hardly agrees or disagrees. The opinion balance can vary between +100 (all agree) and −100 (no one agrees). Source: The Western Sweden SOM Survey 2019.

of whom 841 passed the filter of being an Internet user and were directed to the question about Internet perceptions.

The respondents in the SOM Surveys resemble the population on key demographics. However, there is a small underrepresentation of persons less established in society – younger and foreign-born – where country of birth accounts for the largest bias (Falk et al., 2020).

3.1. Dependent variables

Deriving from the theoretical perspectives, survey questions were constructed to measure perceptions related to individual experience and thoughts, rather than perceptions of what implications the Internet might have on society. According to Donat et al. (2009), this perspective relates more strongly to individual experience, which is used as an explanatory factor. Older adults' perceptions of the Internet were collected in a grid question with eight items: *I often learn new things on the Internet; When I need to learn something new, I mainly look for the solution on the Internet; The Internet takes up too much of my time; It's hard to keep up to date with what's happening on the Internet; I would like more mobile-free/Internet-free periods; The Internet contributes to more problems than opportunities in life; I feel monitored on the Internet*. A four-point scale was used: *Totally agree*, *Partially agree*, *Hardly agree*, *Disagree,* and the option *No perception/opinion* was also offered after the scale. The perceptions in the study vary somewhat in character. The first two are more related to usefulness of the Internet (the cognitive dimension in Ajzen's (2005) terminology], whereas the others relate to emotions surrounding Internet use and the Internet in everyday life [the affective dimension according to Ajzen (2005)].

To make a more coherent multivariate analysis, all scales were constructed from negative toward the Internet (1) to positive toward the Internet (4) before conducting the regression analysis.

3.2. Independent variables

Internet experience was operationalised by frequency of use and number of activities. Frequency was measured in a single question: *How often do you use the Internet?* A seven-point scale was used: *Never*, *Once during the last 12 months, Once during the last 6 months*, *Once a month*, *Once a week, Several times a week,* and *Daily*. Number of activities was measured in a grid question: *How often do you use the Internet for the following purposes? Nineteen* items were included in the question. The same seven-point scale that was used previously was used for eight items in the questionnaire. The remaining 11 items also had the answering option *Several times a day*. For the analysis, the responses from the 19 answers were dichotomised into never (0) and some time (all other scale points). An additive index was then constructed to measure the breadth of activities.

Cyber anxiety was measured in a grid question including a wide variety of perspectives: *If you look at the situation today, how worrying do you yourself experience the following for the future?* The grid contains 13 items: *Cyber-attacks; Election campaigns in Sweden are exposed to advocacy campaigns from other countries; Prolonged electrical breakdown; Robots and artificial intelligence will gain too much power; The cashless society; Prolonged shutdown of the Internet; Physical stores are shut down due to e-commerce; Internet security; Jobs disappear due to automation; Groups and calls on the Internet gain too much political influence; A society where we are increasingly monitored; Prolonged malfunction in the mobile network; Electricity shortage.* A four-point scale was used: *Very worrying, Quite worrying, Not very worrying,* and *Not at all worrying*. An additive index using all 13 items and the whole scale was constructed for the regression analysis.

Socio-demographic variables used are age, sex, and level of education. Age, measured by year of birth, and sex were both integrated with the data set from public registers. Education was measured in a survey question with eight fixed categories, then divided into four groups in the final data set: *low*, *middle-low*, *middle-high,* and *high* educational levels (Table 1).

3.3. Data processing

Data is presented as bivariate descriptives, correlations, and ordinary least square regressions. The descriptive part is also presented with an opinion balance measure. The opinion balance shows the share of respondents who *totally agree* and *partially agree* minus the share of respondents who *Hardly agree* and *Disagree*. The opinion balance can vary between +100 (all agree) and −100 (no one agrees).

4. Results

Turning to the findings, the presentation will be made in two steps. First, bivariate analyses describe how the different aspects of the Internet are perceived by Swedes aged 66 to 85 years, and in different age groups among the older adults. This is followed by multivariate analyses to reveal what factors contribute to the understanding of older adults' perceptions of the Internet, and to what extent.

4.1. Older adults' perceptions of the internet

The bivariate analysis compares the group of older adults to the total population of individuals 16 to 65 years old, and different age groups within the group of older adults (Table 2). Firstly, it is evident that many Internet users in the younger population have an opinion on the different matters (no opinion varies between 1 and 6% among those 16 to 65 years old). In the group of those 66 to 85 years old, the share of no-opinions ranges from 10 to 23%. This is clearly indicating a divide in even taking a stand, suggesting that older adults to a lower extent think about digital matters as measured in the survey. This is especially evident for the perception of the Internet contributing to problems rather than opportunities (23% no opinion) and the perception of a desire for mobile or Internet-free periods (21%).

TABLE 3 Regression (OLS, standardized beta coefficients).

	Learning new things		Looking for solutions		Too much or not too much time spent online		Hard or less hard keeping up with what happens		More or fewer device-free periods		Problems vs opportunities		Feeling monitored	
	Std Beta		Std Beta		Std Beta		Std Beta		Std Beta		Std Beta		Std Beta	
Internet frequency	0.208	***	0.206	***	0.047		0.085		0.173	***	0.260	***	0.139	**
Number of Internet areas	0.297	***	0.302	***	−0.193	***	−0.264	***	−0.090		0.107	**	−0.107	**
Cyber anxiety	0.117	**	0.041		−0.106	*	−0.137	***	−0.195	***	−0.248	***	−0.345	***
Sex	0.001		−0.059		−0.097	*	0.008		−0.136	**	−0.064		−0.137	***
Age (66–85)	0.003		0.020		0.042		−0.065		0.109	*	0.091	*	0.168	***
Education	0.094		0.037		−0.024		0.022		0.075		0.026		0.002	
Adj R2	0.222		0.188		0.042		0.058		0.075		0.156		0.143	
n	594		603		596		577		515		530		543	

Comment: *Respondents answering "No opinion" are excluded from the analysis.* $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. ***Source:*** *The Western Sweden SOM Survey 2019.*

The share of no-opinion increases with age among older adults. The number varies between 7% (66–70 years old) and 21% (81–85 years old) for the perception of learning from the Internet and between 14 and 44% for the perception of mobile- or Internet-free periods. The older the individual, the more likely that he or she has not thought about these topics or at least has not yet formed an opinion of them.

In the younger part of the population, 16 to 65 years old, a predominant proportion of the respondents agree that they are learning from the Internet (opinion balance +81) and turn to the Internet for solutions (+81). Many respondents in this group do not agree that the Internet contributes to more problems than opportunities (+50) or that it is hard to keep up on what is happening on the Internet (−41). The Internet is perceived predominantly as positive and something one wants to keep up with. The other perceptions in the study are more diverse among those 16 to 65 years old. The opinion balance is quite close to zero, meaning that there is no general agreement on perceptions of time spent online, Internet-free periods, or feeling monitored.

Turning to older adults, a somewhat different pattern occurs. As for the rest of the population, there are two positive measures also among older adults: learning from the Internet and using the Internet for looking for solutions. The opinion balance is; however, lower than in the younger population (+43 and +51, respectively). A large share of respondents 66 years and older, larger than in the rest of the population, perceive that Internet use takes too much time (+58 compared to +4). Older adults also find it harder to keep up with what is happening online (+59), and many wish for more Internet-free periods (+60). Older adults to a lower extent than the younger part of the population feel monitored on the Internet (−34 and −5 respectively) but are somewhat less supportive toward the Internet contributing to opportunities rather than problems (-46 compared to −60).

It is evident that the positive experiences of learning from the Internet decline with increasing age (Table 2). The opinion balance for learning new things on the Internet decreases from +55 among those 66–70 years old to +21 for those 81–85 years old, and roughly the same figures can be found for looking for solutions on the Internet (+59 and +28, respectively). When asking about feeling monitored online, this perception is stronger among the youngest older adults (+24 compared to +47). Together with the large share of no-opinion answers, this indicates that surveillance is not top of mind in the group of oldest adults. For the other issues measured in the study, the opinion balance is almost equally negative in all the age groups of those 66–85 years old.

The bivariate analysis clearly shows that there is a digital divide in perceptions of the Internet, no matter whether usefulness, space in everyday life, or anxiety is measured. The older the age cohort, the larger the shares that do not take a stand on the measures, and when taking a position, older adults are less positive or more negative than younger persons. The perceived usefulness decreases with age, whereas time issues do not seem to concern older people to the same extent as for younger people. One explanation could be that there is a strong correlation between use and attitude: the more experienced the individual, the more positive. Correlations between learning and looking for solutions, respectively, and frequency of use are higher (Pearson's r 0.534 $p < 0.01$ for learning online and 0.515 $p < 0.01$ for turning to the Internet to look something up)

than for perceptions of other aspects of the Internet in everyday life measured in the survey (between 0.100 $p < 0.01$ and 0.297 $p < 0.01$). It is not possible from the data to measure causality. It is, however, possible to test the impact of experience on perceptions under control for socio-demographic factors, which is presented in the following section.

4.2. Understanding perceptions – regression analyses

Based on the literature, perceptions of the Internet are supposed to correlate with Internet experience, computer anxiety, and socio-demographic factors. To confirm the strength of such a model and the independent impact of each explanatory variable, regression analysis for each of the measured perceptions was carried out. In Table 3, the standardized beta coefficients from ordinary least square regression analyses are presented.

Starting with the explanatory power of the model for each measured perception, it varies. The chosen model best explains the perception of learning new things on the Internet (adj $R^2 = 0.222$). The model has significant power in also explaining turning to the Internet to look for new things (adj $R^2 = 0.188$), the perception that the Internet contributes to more problems than opportunities (adj $R^2 = 0.156$), and the perception of feeling monitored online (adj $R^2 = 0.143$). The view of time spent online is, on the other hand, only vaguely explained by the included factors (adj $R^2 = 0.042$).

Generally, frequency and breadth of Internet use are the strongest significant explanatory variables for the different perceptions measured. Frequency of use has a positive impact on perceptions of the Internet. In the studied population, the more often one uses the Internet, the more one uses it for learning activities and looking things up, and the less negativity one expresses about the Internet in everyday life. This is significant for seeing opportunities rather than problems, for feeling monitored, and for a lower desire for more mobile- and Internet-free time.

Breadth, measured by number of activities, has significant positive impact on the two learning perceptions in the study and on seeing opportunities rather than problems with the Internet. However, it negatively impacts the other perceptions. The more activities with which an individual engages, the more likely that person is to find it hard to keep up, believe that the Internet takes too much time, and feel that one is being monitored. Breadth of use works in two ways, depending on topic.

Cyber anxiety measured by an additive index has independent explanatory value in the chosen model for six of the seven perceptions in the survey. The more anxiety, the more one perceives learning new things online (0.117 $p < 0.01$). Higher anxiety correlates negatively with other perceptions in the study. The more anxious, the more negative when it comes to time spent online, keeping up with what happens, desire for Internet-free periods, and feeling monitored; and with more anxiety one also is more oriented toward problems than opportunities.

Among the socio-demographic variables, sex has an independent, significant impact on the time issue (−0.097 $p < 0.05$), a desire for more Internet-free periods (−0.136 $p < 0.01$), and the feeling of being monitored (−0.137 $p < 0.001$). The association is negative, meaning that older women have more negative perceptions toward the Internet in these areas than older men. Age has a weak positive impact on the problem/solution perception and the desire for Internet-free periods, and a somewhat stronger positive impact regarding the monitoring issue. The older the individual, the more they are in favor of the Internet. Education has no independent explanatory value in this model, for any of the perceptions measured. Altogether, socio-demographics are out-ruled by different aspects of Internet experience when trying to grasp older adults' perceptions of the Internet.

5. Discussion

The presented study clearly shows that older adults have diverse thoughts about digital technology. There is an overall positive attitude in favor of digital technology and its contributions, combined with some concern for how it affects everyday life. The support for perceptions related to usefulness is unequivocal and strong, although that strength declines with increasing age. The picture turns out to be more diverse when measuring perceptions of Internet technology in everyday life and of problems associated with usage.

When trying to explain differences in perceptions, online experience and level of anxiety overrule socio-demographics in explanatory power when controlling for all variables in a regression model. The more experienced that older users are in terms of frequency, the more positive they are toward learning from the Internet, looking for solutions online, and seeing opportunities rather than problems; they also feel less monitored and to a lesser extent desire Internet-free periods than less experienced users.

Breadth of use (number of activities) works in two ways: the broader the use, the more positive toward learning and finding solutions online. But in contrast, the broader the use, the less positive about time spent and keeping up with what happens online. One interpretation could be that while surfing the Internet for several purposes one finds useful things that one needs or could make use of. But at the same time, broad surfing might interfere with other parts of life in ways that one finds less attractive, wishing for more device-free periods, spending less time online, and feeling more monitored than people with a less broad online usage. This could be a consequence of not wanting to waste time (Lissitsa and Chachashvili-Bolotin, 2015), wanting to avoid addictive habits (Seifert and Schelling, 2018), or wanting to become less dependent on digital applications (Quan-Haase et al., 2018). Future research could preferably explore this paradox of how breadth of use affects different aspects of the Internet.

Experience is a strong explanatory factor for perceptions, and on an overall level there is a positive correlation between both frequency and breadth of use and a favorable attitude toward the Internet. The presented study confirms previous studies in this regard (Levin and Gordon, 1989; Au and Enderwick, 2000; Trocchia and Janda, 2000; Van Deursen and Helsper, 2015), and the correlation between usage and perceptions is also in line with more general research on attitudes and behavior (Ajzen, 2005; Porter and Donthu, 2006; Solomon et al., 2010).

Another dimension of experience measured in the study is cyber anxiety. Thirteen different measures of anxiety were added

into an index. It turned out that higher anxiety level is negatively correlated with most perceptions in the study. Anxious older adults believe that too much time is spent online, that it is hard to keep up, that they want device-free periods, and that they are more problem-oriented and feel monitored to a larger extent. Computer anxiety was previously found to negatively influence use of Internet services (Meuter et al., 2003; Baruh et al., 2017) and raise concerns about addiction and the wasting of time (Lissitsa and Chachashvili-Bolotin, 2015; Seifert and Schelling, 2018; Syvertsen and Enli, 2020), just as in the presented study. To have a more anxious view at the outset clearly affects how one views Internet usage and the Internet in everyday life, and addressing this topic would probably help policy makers when trying to lower barriers among older adults and make them more engaged Internet users.

Although Petrovčič et al. (2022, p. 1) find that "socio-demographics remain critical in explaining gradations in digital inclusion," the presented study comes to a somewhat different conclusion: among older users, socio-demographic factors have little or no impact, whereas online experience and cyber anxiety rather define how different aspects of the Internet are perceived. This is rather in line with Dutton and Reisdorf (2019), who reveal a need to move intervention efforts toward a focus on shaping attitudes and beliefs, which are more subject to change than are the more fixed demographic factors commonly linked to divides. The diverse findings about the impact of socio-demographics can probably be attributed to contextual differences between the different studies. This reveals a need for comparative studies including information about the media surroundings and internet penetration, as well as cultural background in which the Internet experience takes place.

Socio-demographics do, however, matter to some extent. From a perceptions perspective, the Internet is not first and foremost a gendered technology. But independent effects of gender can be traced when it comes to a desire for more Internet-free periods and feeling monitored, where women are significantly more negative than men. This could be seen as partly in line with previous research showing that women tend to express more concerns than men regarding Internet privacy (O'Neil, 2001; Bergström, 2015b), and it is evident that although gender plays a minor role in understanding digital activities among older adults, it needs to be taken into consideration to get a full picture of older adults as onliners.

Within the group of older adults, age only has a significant but rather weak independent effect on three of the perceptions. Among those taking a position on these statements in the study, the oldest among the older adults express significantly more positive attitudes; the desire for device-free periods decreases with age, and the older the individual, the more opportunity oriented and the lower the feeling of being monitored. Related to this is probably the increasing number of no-opinion answers with age. The older the group of individuals, the larger the share of those who do not take a stand on the perceptions studied, and when doing so, they are not too worried because it probably does not concern them.

This too is important from a policy point of view. If older adults do not even think about the Internet, think less about it, or have negative perceptions of Internet technology, interventions of access and education might not be effective at all. As stated by Ajzen (2005), behavioral intention is strongly related to attitudes, and a first step would rather be to implement the idea of the Internet and its pros and cons in older adults' minds, to create an awareness that might precede an intention to advance one's use.

It is important to note that the data collection was made in fall 2019, about half a year before the COVID-19 pandemic hit the world. This could of course change the scene also for older adults and how they perceive different aspects of the Internet in everyday lives, positively or negatively. These are questions which could preferably be addressed in future research.

Although the presented study applies a higher upper age limit than what has been common (Dickinson et al., 2007; Friemel, 2016), it is evident that we still lack information about the oldest internet users. To better grasp digital inequalities within a larger group of older adults, survey samples could preferably remove the upper age limit to provide a more inclusive analysis of perceptions, skills and use of digital technology.

The presented study has a clear Western world framework, from problematization to conclusions. It is a well-known fact, however, that diffusion of, and accessibility to the internet differs between the continents. Applying a comparative perspective of digital equality in older populations is a strongly encouraged for future research. Comparing contexts, conditions, perceptions, and patterns of use, would give a more comprehensive picture of factors shaping life in a digital society, which in turn would be of great value for policy makers.

Another limitation is the narrow focus, in the article, on the correlation between experience and perceptions. As outlined in the literature review, this is one perspective among several others. As pointed out previously, it is important to consider the dynamics between factors on different levels (Kärnä et al., 2022). The sample used is cross-sectional, with only one measure point. Applying a similar design on a longitudinal panel would give answers to how persistent these perceptions are, and how different kind of experience and other factors could alter them over time.

Altogether, it is evident from the presented study that older Internet users' perceptions of the Internet differ from younger users. They do not take a stand to the same extent, and when doing so, older adults are generally more negative than younger persons. The digital divide goes beyond not only access, skills, and outcomes, as outlined previously (Pearce and Rice, 2013; Lee et al., 2015; Van Deursen and Van Dijk, 2015; Scheerder et al., 2017; Dutton and Reisdorf, 2019); it also includes how different aspects of the Internet are perceived.

There are clear disadvantages of not being a comfortable Internet user in a digitalised world. The study has shown that older adults are to some extent more hesitant or less engaged than the younger parts of the population. To better understand digital inequalities, capturing perceptions and working with knowledge and creating a deeper understanding and confidence could be a strategic way to achieve a larger digital inclusion.

Data availability statement

Publicly available datasets were analyzed in this study. This data can be found at: snd.gu.se/en The Western Sweden SOM Survey 2019.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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