



HAL
open science

Cybersecurity and Digital Exclusion of Seniors: What Do They Fear?

Jesper Holgersson, Joakim Kävrestad, Marcus Nohlberg

► **To cite this version:**

Jesper Holgersson, Joakim Kävrestad, Marcus Nohlberg. Cybersecurity and Digital Exclusion of Seniors: What Do They Fear?. 15th International Symposium on Human Aspects of Information Security and Assurance (HAISA), Jul 2021, Virtual, United Kingdom. pp.12-21, 10.1007/978-3-030-81111-2_2. hal-04041068

HAL Id: hal-04041068

<https://inria.hal.science/hal-04041068v1>

Submitted on 22 Mar 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License



This document is the original author manuscript of a paper submitted to an IFIP conference proceedings or other IFIP publication by Springer Nature. As such, there may be some differences in the official published version of the paper. Such differences, if any, are usually due to reformatting during preparation for publication or minor corrections made by the author(s) during final proofreading of the publication manuscript.

Cybersecurity and digital exclusion of seniors: what do they fear?

Jesper Holgersson¹[0000-0002-8900-6139], Joakim
Kävrestad¹[0000-0003-2084-9119], and Marcus Nohlberg¹[0000-0001-5962-9995]

University of Skövde, Skövde, Sweden *firstname.lastname@his.se*

Abstract. The rapid development of digitalization has led to a more or less endless variety of ways for individuals to communicate and interact with the outside world. However, in order to take advantage of all the benefits of digitalization, individuals need to have the necessary skills. Seniors represent a group that, compared to other groups, lives in a digital exclusion to an excessive extent, mainly due to the fact that they lack the necessary knowledge to use digital technology and digital services. Based on empirical data collected from seniors partaking in digital training, we have analyzed their perceptions of why they and other seniors are digitally excluded. Our findings point out that a major barrier for seniors to be more digitally included is different variants of fear of using digital technology and digital services. The common denominator can be traced down the possibilities to be exposed to frauds, scams, viruses, and faulty handling, which in turn cause undesired consequences. Consequently, we propose a research agenda where digital training and digital inclusion measurements should be studied side by side with cybersecurity behavior. Thus, making cybersecurity a fundamental part of digital inclusion has the potential to minimize the fears identified in this research as inhibitors to technology adoption.

Keywords: Digital exclusion · Cybersecurity · Digital divide · fear

1 Introduction

The digital divide first and foremost refers to “the gap between those who do and those who do not have access to new forms of information technology” [7, pp 221-222]. The digital divide may refer either to a lack of possibilities to use access to the internet or absent availability to digital equipment, such as computers, tablets, or smartphones [5]. Although, in developed countries where there is an extensive digital infrastructure present, the digital divide is discussed in terms of access to knowledge and skills regarding how to make use of digital technology and services [8].

Among digitally excluded, seniors constitute a large demographic in many developed countries [6]. This situation is problematic due to several reasons. As pointed out by [13], seniors represent a group of citizens with a major need for digital service, for example, with respect to health-related services where the

need often increases with age. At the same time, seniors use digital versions of such services the least. They are in many cases skeptical to start using digital alternatives to services that so far, in many cases, have been offered in more traditional ways [18].

In general, thanks to the increased digitalization of society, public service providers on both a national as well as on a local level have got great opportunities to generate efficiency gains and thereby save taxpayers' money. Moreover, digitalization can bring environmental gains in the form of reduced paper consumption and the ability to provide increased service for citizens through increased accessibility, faster processes, and so on. However, some groups risk being left out, not least seniors. An example from Sweden, which is considered to be one of the leading countries in OECD¹ when it comes to using digital technologies [19], seniors are underrepresented when it comes to using basic digital services, such as healthcare, public transportation, and taxes [10]. As a consequence, this group has limited possibilities to take part in modern society, including making use of digital services provided by governments [22, 24]. To book a doctor's appointment, to pay bills, or to have the opportunity to participate in democratic processes is today cumbersome for digitally excluded elderly. Without the possibility to use electronic IDs and similar commonly used services for identification, it can be assumed that everyday life as a digitally excluded elderly citizen is unnecessarily complicated. Hence, the digital divide is still very much present for many seniors.

Research suggests several, often interrelated, arguments for why seniors are digitally excluded, e.g., negative attitudes and a lack of interest [17], high age and literacy problems [11], and linguistic problems [9]. However, as pointed out by [12]), the main barrier that prevents seniors from embracing the digitalization of society is a general lack of knowledge which in many cases results in a fear of using digital technology and services. [12] concludes that seniors fear what might happen if they push the wrong buttons or when it is safe or not to give out personal information. In addition, research on cybersecurity points out that anxiety and fear of online threats are inhibitors of technology adoption amongst elders [15]. This suggests a low perceived security self-efficacy. Security self-efficacy has been found to be an important factor in information security where a correlation between a high level of security self-efficacy and secure behavior has been identified [23]. Interestingly, research also suggests that seniors and users with low experience with technology are prone to exhibit a less risk-taking behavior [20]. However, it is well known that lack of knowledge, in turn, leads to increased susceptibility of online risks [2, 3]. In addition, [24] emphasize the importance of raising seniors' skills regarding safety when being online and suggest further training of seniors in these matters.

We argue that digital inclusion and security self-efficacy must be studied side by side to enable not only digital inclusion but also secure digital inclusion. This paper aims to explore how fear of using digital technology and services is manifested and perceived among Swedish seniors. The study is carried out

¹ Organisation for Economic Co-operation and Development : <https://www.oecd.org/>

as a survey of over 1000 respondents as part of a series of training workshops intended to increase the digital self-efficacy of the participants. The result is an outline of what fears the respondents perceive as inhibitors to technology adoption, which provides a better understanding of how seniors perceive online threats and what effect that has on technology, their adoption, and self-efficacy of digital technology. As such, this study can serve as a starting point for future efforts in how to promote secure digital inclusion of seniors.

2 Research approach

The research presented is based on qualitative empirical data collected from Swedish seniors. As pointed out in the introduction, Sweden is considered as one of the world’s most developed countries when it comes to digitalization, and 98% of households have Internet access. Data was collected from a series of training sessions organized jointly by Telia Sweden AB² and six Swedish municipalities as a part of the “More Digital” training program. Each training session followed the same basic pattern. Invitations to the training sessions were sent out over a month in advance to all seniors, defined as citizens of at least 65 years of age, in the municipality of interest. No other requirements for participation were stated, such as digital literacy level, but seats were allocated on a first-come, first-served-principle. As a result, all seniors had an equal chance of participating in the workshop which enables a probability sample. It should, however, be acknowledged that the study does only include participants that opted to participate and risk of participation bias cannot be completely mitigated.

The invitations asked the participants to bring any questions they might have and invited the participants to bring their own digital devices. In each session, the participants were distributed over a set of tables. Each table had computers and two supervisors available. One supervisor was a senior provided by the arranging municipality, and the other was a high school student. The intention was to enable the younger generation to teach the seniors about digitalization, and they did so in response to the senior’s questions.

Data was collected using qualitative inquiry [21], based on free text questions handed out as a short open-question questionnaire, and collected on-site. Each inquiry was then transcribed to the digital format by the research team. A small sample of the inquiries was collected online instead of with physical questionnaires, but exactly the same questions were used in the digital variant of the questionnaires. In total, 1099 transcripts were analyzed, collected from workshops distributed over six regionally distributed municipalities. The inquiries covered a wide range of aspects regarding the participants’ experiences of and attitudes towards digital technology. However, in the research presented here, we have been explicitly addressing the participants’ arguments and motives for why they perceive themselves and other seniors as digitally excluded.

² Telia Sweden AB is Sweden’s largest telecom operator. Telia Sweden AB sells connections in fixed telephony, data communications, Internet, digital TV, IP telephony, and mobile telephony to private individuals, companies and organizations.

Data analysis was conducted using content analysis [4, 14, 25]. In its essence, content analysis yields “a relatively systematic and comprehensive summary or overview of the data set as a whole” [25, p. 182], by observing repeating themes and categorizing them using a coding system that is developed inductively during the coding process. As a starting point, one of the researchers (researcher 1) read through the transcripts and documented each theme to get an overall general picture of the content. Second, researcher 1 used the initial set of codes and put those into a spreadsheet. For each unique statement made by the respondents, the researcher marked which of the themes were applicable. As an example, the statement “Uncertainty about how the technology works. Fear of account hijacking or data loss, spam? Hidden costs for e.g., download” is a statement which was interpreted as first and foremost a general fear of using digital technology and what that might bring in terms of exposure for threats. Moreover, the statement also was interpreted as a fear of doing things wrong, which might result in unpleasant consequences for the respondent. In addition, the statement was also interpreted as an explicit fear of being conned or fooled which is based on the respondent’s uncertainty. For each of the statements, researcher 1 tried to interpret the inherent meaning in order to associate the statement to the corresponding themes initially identified.

In order to ensure coding consistency and intercoder reliability, the remaining members of the research team (two researchers) individually reanalyzed the initial coding and noted any misconceptions and uncertainties. Thereafter, the research team met and completed the coding process in consensus.

3 Results and analysis

As pointed out, the participants were asked about their perceptions as to why they and/or other seniors are digitally excluded. In doing so, out of the 1099 participants answering the question, 423 of the participants express a general fear of what digitization and the use of digital technology may bring. A general fear of being forced to change behavior where you as an individual do not feel that you have full control over what you can and cannot do and what consequences any actions may have in a longer perspective is something that frightens these participants. As such, a general fear of technology limits the elderly from taking full advantage of digitization and therefore is a major contributor to the digital divide. The participants describe that computers are something new, and learning something new on your own is both difficult and scary, as shown by some of the collected quotes (translated from Swedish):

- We “chicken out” from the news we do not really understand without help (Woman, 74)
- Because it has not been natural for us to use the computer from childhood. It becomes more frightening (Woman, 72)
- Fear of feeling unknowing, fear of doing wrong and not taking the consequences of one’s actions (woman, 86)

- Lack of contact with the younger generation, fear of doing wrong, lack of information from the society (Man, 69)

Further analysis of the data revealed four types of fear addressed by the participants: 1) Fear of doing things wrong and what consequences doing things wrong might bring to the participants. 2) Fear of new technology advancements which acts as an inhibitor towards using digital technology. 3) Fear of being conned or tricked by impostors as well as being exposed to, e.g., Trojans and viruses. 4) Fear of letting others understand how little the participants know about how to use digital technology and digital services, i.e., a sense of shame or embarrassment. Obviously, these types overlap to various degrees, but we have chosen to present each category individually. The fear types identified, and the number of participants specifically addressing each of those types is presented in Table 1. These types of fears are presented and discussed in the remainder of this section.

| Label | Prevalence |
|------------------------|-------------------|
| Fear | 423 participants |
| Fear of doing wrong | 131 participants |
| Fear of new technology | 79 participants |
| Fear of being conned | 65 participants |
| Shame | 18 participants |

Table 1. Identified types of fear

3.1 Fear of doing wrong

The most prevalent type of fear was fear of doing wrong, expressed by 131 (12%) of the participants. Fear of doing wrong includes many different aspects. Still, in its essence, it seems to be about fear of not knowing what to do when using digital technology and what negative consequences might be the result of poorly performed actions, or as two of the participants state: “You are scared of ”destroying” and do not dare to test (Man, no age),” “Not as brave as younger, believe hat something can break if you push the wrong button (Woman, 70)”. In addition, several respondents mention not daring to test in fear of what that might result in, and not knowing the result of a certain action leads to not daring to perform that action at all. This fear is highlighted by quotes from some of the participants as follows: “Because the belief that the computer can break off the press to mush, and that is not the case (Man, 76)”, “Believe they can make mistakes, afraid to try (Woman, 78)”.

3.2 Fear of new technology

Rather than a fear of doing something wrong, fear of new technology highlight insecurity connected to using new technology that is unknown and a feeling of

being left alone with no one to turn to for help. When analyzing the data, we found in total 79 participants (7%) who express a lack of interest and low self-esteem as well as lack of knowledge as specific inhibitors of technology adoptions. As can be seen in the following quotes, fear of the technology component itself may act as an inhibitor for digital inclusion of seniors: “The starting point” is unknown and scary (Woman, 74)”, “Fear of new technology. Bad self-esteem and unenterprising (Woman, 89)”, “Not used to handle a computer, afraid of trying (Man, 83)”, and “Fear of the computer, hard to learn, hard to get help (Man, 70)”.

3.3 Fear of being conned

This theme explicitly addresses the fear of being conned and subjected to various types of fraud online. 65 participants (6%) of the participants mention a fear of being victimized in this way. They mention having read about fraudsters, viruses, account hijacking, and similar. This leads to suspicion and a fear of losing accounts or money when using digital technology and the internet. As highlighted by quotes from four of the participants, fear of being conned is often expressed together with a general fear or perceived lack of knowledge, i.e., in many cases, they are afraid to push a button or following a link due to the possibility of being tricked in some way. This might be hard for any user of digital technology, but it seems a lot harder for a user who is not familiar with the digital equipment being used.

- Insecurity about how technology works. Fear of account hijacking or loss of information, spam? Hidden costs when, for instance, downloading (Woman, 65)
- Feeling of insecurity, fear of pressing buttons. Fear of costs, Afraid that someone will access your account (Woman, 68)
- You do not want to get drawn in. It is easy to be conned (Man, 80)
- We did not learn in school. Are scared because you read so much in the papers about trickery and hoaxes (Woman, 72)

3.4 Shame

The final category of fears identified in the data was shame, present in 18 of the responses (2%). Shame was described by the participants as feeling insecure about asking for help: “Fear, does not want to be of trouble (Man, 69)” and not wanting to show that they do not understand or know what to do since admitting such a lack of digital knowledge is embarrassing to admit for others: “Fear, does not want to be of trouble (Man, 69)”, “Raised in a different way, no making mistakes! Got no one to ask (Woman, 75)”. Also, handling digital components poorly or faulty, thus possibly causing them to malfunction, is seen as an embarrassment that is avoided if possible: “Breaking the computer, fear of not succeeding (Man, 76)”.

4 Discussion and conclusion

This paper aims to explore how fear of using digital technology and services is manifested and perceived among Swedish seniors. The study is carried out as a survey of over 1000 respondents as part of a series of training workshops intended to increase the digital self-efficacy of the participants. The result is an outline of what fears the respondents perceive as inhibitors to technology adoption, which provides a better understanding of how seniors perceive online threats and what effect that has on technology, their adoption, and self-efficacy of digital technology.

The aim of this research was to explore how fear of using digital technology and services is manifested and perceived among Swedish seniors. The study was carried out as a survey distributed to participants of a workshop series intending to increase the digital self-efficacy of the elderly. This paper reports on the results of an open question where the participants were asked about their explanations for why seniors are digitally excluded. The gathered data was analyzed using content analysis, where one researcher coded the majority of the data, and the rest of the research team checked the coding for consistency. First, the data was analysed to identify the prevalence of fear as an explanation for digital exclusion. The analysis showed that about 38% of the respondents explained digital exclusion amongst seniors with a general sense of fear. A general pattern was that a lack of knowledge or understanding of the digital world leads to fear that has a paralyzing effect on seniors' motivation to become active members of the digital society.

A deeper analysis intended to identify the types of fears perceived by the participants. Four distinct types of fears were identified. *Fear of doing wrong* was described by the participants as a general fear stemming from not knowing what may happen if you try, leading to not trying at all. *Fear of new technology* was expressed as a general fear of the digital world which is perceived as fear of the unknown. *Fear of being conned* speaks to a perceived risk of being victimized by, for instance, account hijacking or online fraud and *shame* is a feeling of not wanting to disclose your ignorance or ask for help. While the types of fear are different, they are often overlapping, expressed in combination with a perceived lack of knowledge and lack of information source. This suggests that the underlying factor is a lack of understanding of digital technology. On this note, several participants mentioned that they feel like there is a lack of support and that they are just expected to know what to do from the start. This, in turn, leads to a lack of interest or fear of testing new technology, which can explain why seniors do not engage with the digital society to the same extent as the remaining members of the society. A consequence is, of course, that the digital divide is cemented.

In the context of cybersecurity, previous research has suggested that anxiety and fear of being conned are indeed inhibitors to technology adoption [15]. The results of this research emphasize that notion. Interestingly, research into cybersecurity awareness suggests that anxiety and fear can lead to higher awareness of cyber-threats which, in turn, leads to more secure behavior [20]. The main

conclusion that can be drawn from our research is that fear stemming from a lack of knowledge is an inhibitor to technology adoption among seniors, i.e. if using digital technology is avoided, the risk of being exposed to threats and frauds are severely limited, but the prize that has to be paid is to be left out of all the positive aspects that can be associated with the usage of digital technology. As such, this problem should be addressed with efforts into training seniors to increase their digital self-efficacy. As pointed out by [24], one major competence that should be included when designing training programs for seniors is how to use digital technology and digital services in a safe manner. In addition, [12] points in the same direction when highlighting the fear of being exposed to threats and frauds as one major component that should be included in training programs for seniors where the goal is to enhance digital inclusion. Likewise, training is described in scientific literature as the go-to solution for increasing cybersecurity awareness and thus, decreasing the risk of victimization for online frauds, account hijacking and so on [1]. Given the fears perceived by the participants in this research, the suggestion of training to improve cybersecurity behavior, and the possibility for higher awareness stemming from fear and anxiety, we argue that digital inclusion and cybersecurity behavior should be studied side by side. We argue that secure digital inclusion makes for a promising research domain and suggest that future research should focus not only on how to include seniors in the digital world but on how to do so securely. Making cybersecurity a fundamental part of digital inclusion has the potential to minimize the fears identified in this research as inhibitors to technology adoption.

This research took place in a Swedish environment using a qualitative approach. While the dataset was gathered from 1099 respondents, a statistical analysis measuring the generalizability of the results was not possible to obtain in this study. Instead, it intends to provide insights into how fear of technology works as an inhibitor to technology adoption. Further, the Swedish context may present limitations as to how the results of this study are applicable in other nations. On that note, national culture is known to impact, for instance, cybersecurity behavior [16]. As such, a possible direction for future work is to research the same topic as this study but in other nations.

References

1. Al-Alosi, H.: Cyber-violence: Digital abuse in the context of domestic violence. *UNSWLJ* **40**, 1573 (2017)
2. Bada, M., Sasse, A.M., Nurse, J.R.: Cyber security awareness campaigns: Why do they fail to change behaviour? *arXiv preprint arXiv:1901.02672* (2019)
3. Bagga, T., Sodhi, J., Shukla, B., Qazi, M.: Smartphone security behaviour of the indian smartphone user. *Man In India* **97**(24), 333–344 (2017)
4. Berelson, B.: *Content analysis in communication research. Content analysis in communication research.*, Free Press, New York, NY, US (1952)
5. Bélanger, F., Carter, L.: Trust and risk in e-government adoption. *The Journal of Strategic Information Systems* **17**(2), 165–176 (2008). <https://doi.org/DOI:10.1016/j.jsis.2007.12.002>, <http://www.sciencedirect.com/science/article/B6VG3-4RN4892-1/2/af26a5d6a3b53b9cf437a405625045d4>

6. van Deursen, A., Helsper, E.: A nuanced understanding of internet use and non-use among the elderly. *European Journal of Communication* **30**(2), 171–187 (2015). <https://doi.org/10.1177/0267323115578059>, <https://doi.org/10.1177/0267323115578059>
7. van Dijk, J.: Digital divide research, achievements and shortcomings. *Poetics* **34**(4), 221–235 (2006)
8. Ebbers, W.E., Jansen, M.G.M., van Deursen, A.J.A.M.: Impact of the digital divide on e-government: Expanding from channel choice to channel usage. *Government Information Quarterly* **33**(4), 685–692 (2016). <https://doi.org/https://doi.org/10.1016/j.giq.2016.08.007>, <http://www.sciencedirect.com/science/article/pii/S0740624X16301460>
9. Fortes, R.P.M., Martins, G.A., Castro, P.C.: A review of senescent’s motivation in the use of tactile devices. *Procedia Computer Science* **67**, 376–387 (2015). <https://doi.org/https://doi.org/10.1016/j.procs.2015.09.282>, <http://www.sciencedirect.com/science/article/pii/S1877050915031282>
10. internet foundation, T.S.: The swedes and the internet. Report (2019), www.svenskarnaochinternet
11. Hill, R., Betts, L.R., Gardner, S.E.: Older adults’ experiences and perceptions of digital technology: (dis)empowerment, well-being, and inclusion. *Computers in Human Behavior* **48**, 415–423 (2015). <https://doi.org/https://doi.org/10.1016/j.chb.2015.01.062>, <http://www.sciencedirect.com/science/article/pii/S0747563215000904>
12. Holgersson, J., Söderström, E.: Bridging the gap: Exploring elderly citizens’ perceptions of digital exclusion. In: 27th European Conference on Information Systems (ECIS), Stockholm & Uppsala, Sweden, June 8-14, 2019. Association for Information Systems (2019)
13. Jarke, J.: Co-creating Digital Public Services for an Ageing Society - Evidence for User-centric Design. Springer (2020). <https://doi.org/10.1007/978-3-030-52873-7>
14. Krippendorff, K.: Reliability in content analysis: Some common misconceptions and recommendations. *Human Communication Research* **30**(3), 411–433 (2006). <https://doi.org/10.1111/j.1468-2958.2004.tb00738.x>, <https://doi.org/10.1111/j.1468-2958.2004.tb00738.x>
15. Kumar, S., Ureel, L.C., King, H., Wallace, C.: Lessons from our elders: identifying obstacles to digital literacy through direct engagement. In: Proceedings of the 6th International Conference on PErvasive Technologies Related to Assistive Environments. pp. 1–8 (2013)
16. Ndibwile, J.D., Luhanga, E.T., Fall, D., Kadobayashi, Y.: A demographic perspective of smartphone security and its redesigned notifications. *Journal of Information Processing* **27**, 773–786 (2019)
17. Niehaves, B., Plattfaut, R.: Internet adoption by the elderly: employing is technology acceptance theories for understanding the age-related digital divide. *European Journal of Information Systems* **23**(6), 708–726 (2014). <https://doi.org/10.1057/ejis.2013.19>, <https://doi.org/10.1057/ejis.2013.19>
18. Nishijima, M., Ivanauskas, T.M., Sarti, F.M.: Evolution and determinants of digital divide in brazil (2005–2013). *Telecommunications Policy* **41**(1), 12–24 (2017). <https://doi.org/https://doi.org/10.1016/j.telpol.2016.10.004>, <http://www.sciencedirect.com/science/article/pii/S0308596116301835>
19. OECD: Going digital in sweden - oecd reviews of digital transformation. Report (2018), <https://www.oecd.org/sweden/going-digital-in-sweden.pdf>

20. Pattinson, M., Butavicius, M., Parsons, K., McCormac, A., Calic, D.: Factors that influence information security behavior: An australian web-based study. In: International Conference on Human Aspects of Information Security, Privacy, and Trust. pp. 231–241. Springer (2015)
21. Patton, M.Q.: Qualitative research evaluation methods. Sage, London (2002)
22. Polat, R.K.: Digital exclusion in turkey: A policy perspective. *Government Information Quarterly* **29**(4), 589–596 (2012). <https://doi.org/https://doi.org/10.1016/j.giq.2012.03.002>, <https://www.sciencedirect.com/science/article/pii/S0740624X12000950>
23. Rhee, H.S., Kim, C., Ryu, Y.U.: Self-efficacy in information security: Its influence on end users' information security practice behavior. *Computers & security* **28**(8), 816–826 (2009)
24. Rose, J., Holgersson, J., Söderström, E.: Digital inclusion competences for senior citizens: The survival basics. In: International Conference on Electronic Government. pp. 151–163. Springer (2020)
25. Silverman, D.: Interpreting Qualitative Data: Methods for Analysing Talk, Text and Interaction, vol. 2nd edition. Sage, London (2001)