Gender Differences in ICT Acceptance for Health Purposes, Online Health Information Seeking, and Health Behaviour among Estonian Older Adults during the Covid-19 Crisis

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Abstract: ICT tools play an important role in accessing health information today. Although health ratings have improved in Estonia, the inequalities in women's and men's health continue to persist. As consumption of relevant information creates favourable preconditions for better health behaviour, it is paramount to study gender differences regarding online health information seeking and its relations to health behaviour. This article focuses on gender differences in ICT acceptance for health purposes, online health information seeking, and health behaviour choices among Estonian older adults. A survey involving 204 men and 297 women aged 50 and over living in Estonia was conducted in the summer of 2020. Cross-tabulation and chi-square tests were used to analyse the retrieved data. The results indicate that women prioritised remote communication with a medical doctor more during the Covid-19 crisis while men were more eager to use digital applications for health purposes. The latter also reported better access to computers and smart devices allowing them to conduct online health information searches more conveniently. Men also stood out for their readiness to be vaccinated against Covid-19. Thus, their interest in digital health information should be given due consideration when developing various health services and apps along with national health communication

1 INTRODUCTION

Information and Communication Technologies (ICTs) provide older people with opportunities to access useful health information and enable distant communication with medical professionals (Ageing, 2021; Haase et al, 2021; Nedeljko et al, 2021). This is especially important now during the Covid-19 crisis when older adults are known to be most vulnerable to the disease and distance communication has been widely recommended by the authorities everywhere (Choi et al, 2021; Kor et al, 2021; Moore and Hancock, 2020). Thus, it is no wonder that internet use among older people in Estonia has increased during the Covid-19 crisis. For example, if in 2019 69% of the 55-75-year-olds used the internet every week, then in 2021 the corresponding figure was

74%. Among men, the growth in internet use has been greater (Eurostat, 2022).

In Estonia, life expectancy and health ratings have improved steadily, however the inequalities in women's and men's health continue to persist (Naiste, 2022). Although men's health and their readiness to see a doctor have improved during the last decade, they are still more indifferent about their health (Abuladze et al, 2017). As non-communicable health problems, often related to poor health behaviour choices, are largely preventable, the consumption of relevant health information and better health awareness could to some extent be conducive to the extended life expectancy of men (Eriksson-Backa et al, 2018, Ek, 2015). Therefore, this study focuses on gender differences in acceptance of ICT tools for health purposes, online health information behaviour and health behaviour among Estonian older adults during the Covid-19 pandemic when everyone was

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advised to manage their daily affairs and communicate with others remotely in order to prevent the virus.

On the one hand, Estonia is a country often acclaimed for its digital success (e.g., solutions like digital signatures, electronic tax returns, e-Business Register, X-road, and Industry 4.0 (e-Estonia) (Kattel and Mergel, 2019). On the other hand, it compares rather unfavourably with the rest of the EU as to poor health, gender inequality in healthy life years and life expectancy, but also in connection with the digital divide between generations (European, 2019). For example, the healthy life years of Estonian men at birth (53,9) is the second-lowest figure in the EU (64,2) (Eurostat, 2022a). The corresponding figure for women is also not high, i.e., 57,7, compared to the EU average of 65,1 (Ibid). This clearly calls for a more detailed examination of the gender differences in online health information behaviour among Estonian older adults.

The remaining part of the paper proceeds as follows: the second section presents the findings of earlier studies on gender differences in ICT usage and in use of computers and smart devices for health purposes, and the links between ICT acceptance, online health information seeking, and health behaviour among older people followed by the hypotheses of the study. Subsequently, the applied methodology will be introduced together with the principal outcomes of the study. The paper ends with a discussion of the findings and conclusions drawn from them.

2 LITERATURE REVIEW

2.1 ICT Adoption among Older People

Studies often indicate that the groups who have been less familiar with new technology mainly comprise older people and women (Goswami and Dutta, 2016; Ihm and Hsieh 2015; Peacock and Künemund, 2007). However, older people's digital skills vary greatly along with their use of computers and smart devices (Menéndez Alvarez-Dardet et al, 2020). As Anderson and Perrin (2017) from the Pew Research Centre note, those who are younger, more affluent, and more highly educated report owning and using various technologies at rates similar to adults under the age of 65.

It could be surmised that during the Covid-19 crisis almost everyone started using either a computer or smart devices. However, research show that the digital divide among the older people has deepened even more during the pandemic (ELSA, 2021). For example, the English Longitudinal Study of Ageing (ELSA) Covid-19 Substudy (Wave 1), conducted in the summer of 2020 show that while just under a quarter (24%) of over-75s in England have increased their internet usage since the pandemic hit, this is mainly driven by the existing users going online more often. Most older online users stated that their use has remained unchanged, with nearly one in ten actually using it less (ELSA, 2021).

2.2 Gender Differences in ICT Use among Older Adults

With respect to gender, it is more difficult to draw conclusions about the acceptance and use of ICT. According to some studies men tend to use digital devices more than their female counterparts (Goswami and Dutta, 2016; Durndell et al, 2000). Lately Shi et al (2021) explored the current status of e-health literacy among Chinese older adults and analysed the related influencing factors and found that gender is an important factor in health information literacy at the individual level. Marston and her colleagues' (2016) study on technology use and adoption (digital device/internet use, ownership, length, and frequency as well as social networking) among people aged 65 or older in Australia shows that most participants owned a computer with men being its main user (Marston et al 2016). Sieverding and Koch (2009) established that there was no significant difference between gender in assessments of digital skills, however, women judged their computer competence to be lower than did men.

However, the gap in Europe has not been very large in the last years. According to Eurostat, in 2020, an average of 87% of men and 85% of women aged 16-75 used the internet in Europe (Eurostat, 2022). In Estonia, statistics show that while in the past (e.g., in 2005) men were more avid internet-users, then by 2019 the gap had disappeared: 89% of men and 88% of women aged 16-74 used the internet. In 2020, the proportion of men and women using the internet was already on par (88%) (Statistics, 2021).

Menéndez Alvarez-Dardet et al. (2020) have highlighted that the differences between older males and females do not seem to be unequivocal, instead they are related to other sociodemographic indicators, such as educational level. As Anderson and Perrin (2017) note, those older people who are more affluent, and more highly educated report owning and using various technologies at rates similar to younger people. However, those seniors who are less affluent or with lower levels of educational attainment continue to have a distant relationship with digital technology (Ibid).

A wide range of digital health-related applications for older people has been developed in advanced countries, however they have been found to be less attractive to them as compared to younger people (Choi, et al, 2021; Broekhus et al, 2019; Gordon and Hornbrook, 2018). The readiness of older people to use them often depends on the ease of use of their apps and services and perceived efficiency (Enwald et al, 2016; Heart and Kalderon, 2013). Another problem is their lukewarm interest in online health information (Ihm, Jennifer and Chul-Joo Lee, 2021; Moore and Hancock, 2020).

2.3 OHISB among Older People

Online health information seeking behaviour (OHISB) can be construed as in general means how individuals seek information about their health, risks, illnesses, and health-protective behaviours (Lambert and Loiselle, 2007; Mills and Todorova, 2016) in the online environment referring also to a series interaction diminishing uncertainty with respect to health status (Tardy & Hale, 1998).

Studies suggest that women are more likely to seek health information online (Hallyburton and Evarts, 2014). In the study of Eriksson-Backa et al (2018), gender was significantly related to both interest in information about health or illness (chisquare=8.345, p \leq .05) and seeking activity (chisquare=13.202, p \leq .001). 80% of the female respondents compared to 65% of the male respondents claimed to be fairly or very interested in health information, and 71% of the women but only 50% of the men sought information fairly or very often. Study of Enwald et al (2016) on OHISB among Finnish older people indicate that women were more likely to have shared information with others related to physical activity.

According to Ek (2015), men often lack motivation for health information seeking. He found that Finnish women are more interested in health information, and they are much more active healthrelated information seekers as compared to men. Women also pay more attention to potential worldwide pandemics and are more attentive to how the daily goods they purchase affect their health (Ibid.). Another study indicates that, there are subgroups including younger, more active, and family-oriented males that may be reached with online health information (Weber et al, 2020).

Bidmon and Terlutter (2015) wanted to know why women use the internet more often for health-

related information searches than men. They were also interested in gender differences in their research subjects' current use of the internet for communicating with their general practitioner (GP) and in their future intention to do so (virtual patientphysician relationship). Their results indicate that women use the internet for health-related information searches to a higher degree for social motives and enjoyment and they judge their information retrieval outcomes more profoundly than men. Women also reported higher health and nutrition awareness as well as a higher personal disposition of being wellinformed as a patient. They concluded that women have a stronger social motive for and experience greater enjoyment in health-related information searches, explained by social role interpretations, suggesting these needs should be met when offering health-related information on the internet. The authors also established that men were more open to engaging in a remote relationship with the GP; therefore, they could be the primary target group for additional online services offered by GPs.

In view of the above, it would be instrumental to learn which older people use digital technology and which do not, to what extent it is used for health purposes and to what extent it affects health behaviours (e.g., vaccination readiness). Little research has been done in the era of internet and ICT dominance, e.g., during the Covid-19 pandemic when everything seems to have moved online (Pourrazavi et al, 2022; Tan et al, 2022; Choi et al, 2021; Zhao et al, 2020) most of which do not focus on gender differences. It is necessary to investigate the situation in Estonia as no major studies on the health information behaviour of older people have recently been conducted here. As Estonia is a renowned digital country, the authors of the article expect the patterns of health information behaviour of older adults to be slightly different here than elsewhere in the world. In this study, in light of the ongoing pandemic, the authors were interested also in older adults' readiness to vaccinate themselves against Covid-19 and how this correlates with their online health information behaviour.

The overall aim of the article is to analyse gender differences in acceptance of digital technology for health purposes (access to computers and smart devices, willingness to use digital health applications and services, and to communicate with medical doctors remotely), online health information behaviour (OHISB) (frequency of seeking online health information, preferences for information sources, problems in finding and assessing the retrieved information), and its relations to health behaviour choices including vaccination readiness for Covid-19.

The article makes the following hypotheses:

- 1. 50+ men are more interested in technical solutions, and remote communication with a general practitioner (GP) than women.
- 2. Men have higher computer self-efficacy ratings.
- 3. Men are less likely to seek information on health and diseases.
- Women exhibit better health behaviour, including vaccination readiness against Covid-19.

3 METHODOLOGIES

The data for this study originates from a larger survey conducted among Estonian older adults by the market research company Norstat in 2020. Half of the participants were questioned online and the other half over the phone between 20 July and 3 August. The survey had a representative sample in terms of gender, age, and nationality. As the prevalence of internet use drops among Estonian people already in their 50s, this study centres on adults aged 50 and older. The sample included 501 respondents: 204 (40,7%) men and 297 (59,3%) women from age 50 onwards.

3.1 Participants

The sample included 204 (40,7 %) men and 297 (59,3 %) women. The oldest participant was 94, the youngest ones 50 years old. The median age was 65. The representative group of 55 to 64 comprised 154 people, whereas 130 respondents made up the 65 to 74 age group and 51 belonged to the 75+ group. 75+ were included because the official statistics in Estonia do not report on this age group's internet use. 71,7% of the respondents were Estonians and almost half of them (52,9%) were pensioners. 54,5% of the respondents had an average income per family member in the range of 351-750 euros.

The questionnaire comprised 15 substantive multiple-choice questions as well as questions regarding the socio-demographic profile of the respondents (gender, age, nationality, education level, employed/unemployed) and monthly income. 10 questions have been used in this article, which provided more information on ICT acceptance, OHISB, health behaviour, and health. For each question, it was possible to choose between different answer options. For some, the respondent could choose between yes/no (e.g., do you have access to a computer or a smart device?). For others (e.g., which sources of information do you prefer?) there was a list from which the respondent could choose multiple answers. For assessment of their digital competence and health, a Likert-type scale was used, with a choice of 5 options (very good/good/fair /poor/ I do not wish to answer this question). For frequencies (e.g., how often do you need information on illnesses or health in general), the respondent could choose between 4 options (once a week or more often/ 2 to 3 times a month/ 2 to 3 times per 3 months/ 2 to 3 times a year or less often).

The questions included: a) *ICT acceptance (for health purposes)*: 1) Do you have access to a personal computer or similar digital device which can be used for conducting online searches? 2) During the COVID-19 lockdown, how important was it for you to have access to a doctor from a distance (e.g., exchanging e-mails, texting, video consultations)? 3) Would you have any use for digital health solutions or services? For instance, the kind that allows you to consult with medical personnel, monitor your blood pressure or sleep patterns, check your heart rate, remind you to take a pill or keep you company?

b) Self-reported digital competence: 4) How would you rate your computer skills? 5) When searching for online information on health concerns or illnesses have you experienced the following problems.

c) *OHISB.* 6) When did you last conduct an online search on health, illnesses, or disease prevention?) 7) You come across health information by accident (e.g., while reading another article you also spot health news) or by conducting a relevant search (e.g., you submit the specific query)?

Health behaviour. 8) Do you engage in any of the following activities? 9) Would like to get vaccinated if the opportunity arose?

Self-reported health: 10) How do you rate your general health status?

Socioeconomic indicators included gender, age, nationality, level of education, employment, and monthly income.

3.2 Data Analysis

Cross-tabulation and chi-square tests were used to analyse the retrieved data.

4 **RESULTS**

This section provides an overview of the gender differences identified in the following categories: ICT acceptance for health purposes, self-reported computer skills, OHISB, health behaviour, and selfreported health.

4.1 ICT Acceptance for Health Purposes

As could be expected, more men (86,3%) than women (74,1%) reported access to a computer or a smart device (p<,05; $\chi^2(1) = 10,87$) (see Table 1). They also expressed greater interest in various digital health gadgets and services, e.g., electronic sleep trackers and aids, blood pressure or pulse monitors and robot communication: 39,5% of men aged 50+ and over were interested in such devices compared to 28,7% of women of the same age. The difference was statistically significant (p<,05; $\chi^2(3) = 9,64$).

However, more women (53,9%) than men (36,5%) deemed it important to have access to a doctor from a distance (exchanging e-mails, texting, video consultations) during the COVID-19 lockdown. The difference was statistically significant (p<,01; $\chi2(2) = 13,87$).

There was no statistical difference between men and women regarding different levels of education or age groups. With respect to different nationalities, non-Estonian women considered it slightly more important (61,9%) to have the opportunity to communicate with a doctor (remotely) than Estonian women (51,1%). The difference was statistically significant ($p < ,05; \chi 2$ (2) = 7,29).

4.2 Self-reported Computers Skills

There was no statistical difference between genders in computer skills ratings (p>,05; $\chi 2$ (3) = 5,95). In general, almost half of the respondents chose the response that they would not have any problems finding and interpreting information. A significant difference between men and women emerged only in the category "I don't know what to make of the information retrieved (e.g., should I believe the article/story or not)". Here, 41,8% of women and 31,3% of men chose this category. The difference was statistically significant (p <,05; $\chi 2$ (1) = 4,68).

4.3 OHISB

4.3.1 Frequency of Online Health Information Searches

42,5% had searched for information on health, illness or disease prevention at least once in the last 30 days, and a little over a fifth (22%) in the last 7 days. 12,1% answered that they had never searched the internet for information on health or diseases. There was no statistically significant difference between men and women regarding the last time they searched the internet. Both the chi square test and the distribution of answers in the table produced the same result.

When analysing the answers of men from different educational backgrounds, it was found that 61,5% of men with higher education had looked for information within the preceding month. In other groups with lower educational levels fewer men had looked for information during the preceding month, their percentage points ranged from 33,0% to 46,9%. The difference was statistically significant ($p < ,05; \chi 2$ (9) = 21,13). In the case of women, there was no statistically significant difference by educational level.

As regards ethnicity, the difference was not significant. However, the age variable accounted for a statistically significant difference in the answers of women: during the previous month, women aged 55-64 had searched for more information than older (64+) females (68,1%). The difference was statistically significant (p < 0.05; $\chi 2$ (9) = 18,30).

There were no significant gender differences in the information being found by accident or searched for specifically. There were slightly more men who initiated a particular search themselves as opposed to finding the relevant pages by chance, but the difference was not statistically significant.

4.3.2 Preference for Health Information Sources

To the question – what are the main online sources you obtain health information from? – the option "arbitrary sources of information that Google displays first" was chosen in 47,2% of the cases. The option "designated e-health portals and websites on illnesses" was mentioned in 39,9% of the responses, "online publications in the professional press, news portals and their health sections and health magazines" in 31,3% of the cases, and Wikipedia amounted to one fifth (20,2%). The remaining variants were chosen less frequently, for example research databases and open access sites disseminating research outputs (15,4%), internet forums and discussion groups where people share their experiences with medical professionals and illnesses (14,4%), social media platforms (Facebook, Twitter, YouTube, etc) (13,9%), official websites of international organisations, government offices and public agencies (e.g. WHO, Estonian National Institute for Health Development, Estonian Health Board) (11,9%), alternative medicine websites (alternatiivravi.ee, tervisekliinik.ee) (5,3%), movies/videos (5,3%), alternative media (e.g. Telegram) (3,3%) and blogs (2,5%). The choices of men and women were statistically significantly different only for the two option: a) "special health and disease portals and websites", where 46,8% of women and only 31.3% of men chose this category (p <,01; χ^2 (1) =9,88), and b) "online publications of professional journalism, news portals and their health sections and health magazines" which was selected by 35,9% of women and only a quarter (25%) of men. The difference was statistically significant (p < 01; $\chi 2$ (1) = 5,43).

4.4 Choices in Health Behaviour

The majority of respondents (69,5%) monitor their diet, try to eat healthy (e.g., plenty of fruits and vegetables). 76,1% of women and 59,8% of men opted for this answer. The difference was statistically significant (p <,001; $\chi 2$ (1) = 15,13). 60,9% said they walk or go cycling on a regular basis. 31,7% swim, work out in a gym, exercise, or do other sports at home. 62,3% claimed to be physically active in other ways (e.g., gardening). 30,3% reported sitting a lot. 23,2% ate fatty foods, semi-finished products, or sweets. 9,6% reported smoking and 4,1% frequently consumed alcohol.

There were many more fatty food lovers among men with basic education (77,8%), while the corresponding figure for men with higher levels of education ranged from 12% to 31%. The difference was statistically significant (p <,001; $\chi 2$ (3) = 22,79). The comparison of different levels of education among men and women revealed that a healthy diet gave statistically significantly different results among women: the lower the level of education, the fewer healthy eaters were among them, e.g., they accounted for 44,4% of women with basic education and 67,5% of women with higher education. The difference was statistically significant (p <,05; $\chi 2$ (3) = 8,94).

In addition to diet, the difference between men and women was also evident in the consumption of alcohol where 7,4% of men chose the answer "consume alcohol often". In the case of women, the corresponding figure was only 1,7%. The difference was statistically significant (p <,01; $\chi 2$ (1) = 10,14). The difference was also statistically significant for smoking (p <,01; $\chi 2$ (1) = 8,53). 6,4% of women and 14,2% of men chose this answer. The responses of men and women by comparison did not differ in all other categories.

There was a statistically significant difference between men as regards their time spent sitting, men with higher and secondary education sat significantly more than others (on average 35% of men). The difference was statistically significant (p <,05; $\chi 2$ (3) = 9,05). There were no differences between the subgroups of other men or women in terms of educational attainment.

The results also surprisingly indicated that men appeared to be more enthusiastic about getting vaccinated against Covid-19. 60,8% of men agreed to be vaccinated and the corresponding figure for women was 48.5%. The difference was statistically significant (p<.05, $\chi^2(2)=7.54$).

4.5 Self-reported Health

61,9% of the respondents considered their health to be quite good, 4,8% downright excellent. Almost a third (30,8%) rated it as poor and 2,5% as very bad. Gender differences were not statistically significant here.

Looking at different age groups of men and women, younger women rated their health better compared to other groups (78,6% rated it as excellent or fairly good). The older the women were, the less they rated their health as good or excellent. For example, among 75+ women 53,6% of the respondents reported such ratings. Assessment of one's health status in different age groups was statistically significant only for women (p <,01; $\chi 2$ (9) = 21,91). Among men, assessment of health status did not differ (p>,05; $\chi 2$ (9) = 13,24).

5 DISCUSSIONS

The first hypothesis -50+ men living in Estonia are more interested in technical solutions, remote communication with GP – was partially confirmed. Men reported better access to ICT devices (computers and smart devices) and were more willing to use digital apps and services for health purposes. Thus, in this respect the results of this study differed from the outcomes of Ek (2015). However, the current study also revealed that women found it more important to communicate with a GP remotely during the Covid-

Hypothesis	Have hypotheses been confirmed?	Men	Women
50+ men are more interested in technical solutions, and remote communication with a general practitioner (GP) than women.	Partly	Men (86,3%) reported better access to ICT devices. Men were more willing to use digital apps and services for health purposes.	74,1% of women had access to a computer, or a smart device. Women found it more important to communicate with a GP remotely during the Covid-19 crisis.
Men have higher computer self-efficacy ratings.	No	In general, there was no statistical difference between genders in computer skills ratings.	However, more women (41,8%) than men (31,2%) chose the category "I don't know what to make of the information retrieved (e.g., should I believe the article/story or not)".
Men are less likely to seek information on health and diseases.	No	There was no significant difference between genders in the frequency of information seeking.	Although women chose certain sources of health information (e.g., special health and disease portals and websites and online outlets of professional journalism) more often there were no major differences between gender in terms of source preference.
Women exhibit better health behaviour, including vaccination readiness against Covid-19.	Partly	Men appeared to be more enthusiastic about getting vaccinated against Covid-19.	The hypothesis was true in respect to alcohol and tobacco use.

Table 1: Hyphotheses and	the results.
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19 crisis. Thus, it can be said that women's and men's interest in using ICT tools for health purposes is slightly different which became also evident in a study conducted by Bidmon and Terlutter (2015). This may be explained by the fact that men are fond of technology, but their desire to go to the doctor and communicate with him/her is lower.

The second hypothesis that men show higher computer self-efficacy ratings proved to be false as there was no statistical difference between genders in computer skills ratings. However, more women than men expressed doubts about their ability to interpret the information retrieved.

The third hypothesis that men are less likely to seek information on health and diseases was also false. There was no significant difference between genders in the frequency of information seeking. In this respect, this result differs from, for example, some studies conducted in the Nordic countries (Eriksson-Backa et al, 2018; Ek, 2015).

Although women chose certain sources of health information (e.g., special health and disease portals and websites and online outlets of professional journalism) more often there were no major differences between gender in terms of source preference. However, it is worrying that random search results displayed by Google first were popular among men and women alike, suggesting modest levels of critical evaluation of the sources.

The fourth hypothesis – women exhibit better health behaviour, including vaccination readiness against Covid-19 – was true in terms of alcohol and tobacco use. However, men appeared to be more enthusiastic about getting vaccinated against Covid-19, which was quite surprising. This result is partly in line with Estonian vaccination statistics (Estonian, 2022) according to which 65+ men have been vaccinated more than women. One could ask what sparks men's interest in vaccination at an older age. This most probably may be put down to their poorer health.

A sedentary lifestyle seems to be a problem among older adults, especially among those who use computers and smart devices.

This study revealed that slightly different trends have emerged in Estonia compared to the previous studies (e.g., Eriksson-Backa et al, 2018; Ek, 2015; Hallyburton and Evarts, 2014), which could be explained by the peculiarities of Estonia as a top performer in the digitalisation of its administration and public services.

Due to the limited scope of the questionnaire and the subsequent study, this survey did not attempt to establish which attributes, in addition to the sociodemographic characteristics, influence personal interest in electronic health information and health behaviour (e.g., psychological characteristics of the respondent, past experience with technology and information retrieval, trust in physicians, etc.). All these aspects warrant further investigation.

6 CONCLUSIONS

Gender differences in health information behaviour were not particularly pronounced among 50+ people living in Estonia. However, men reported better access to computers and smart devices and a higher willingness to use ICT for health purposes. Women, on the other hand, were more interested in remote communication with a medical doctor during the pandemic. Men, as expected, smoke and consume more alcohol, while women eat more fatty foods.

The premise that men tend to be ignorant about their health was misguided. Perhaps the peculiarity of Estonia as a smart/digital country also accounts for the fact that men are increasingly more interested in health information retrieved via digital channels.

It follows from the above that in the realm of health communication and/or promotion, it is well worth the effort to try to reach 50+ men through digital channels.

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