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Use of digital healthcare among people living with disabilities

The COVID-19 pandemic highlighted the importance of digital healthcare solutions that can offer many benefits to all sections of the population, but for some key target groups, such as those with disabilities, there is significant potential for its use in making everyday life easier.

In our survey, we examined whether there is a difference in the use of digital health solutions between disabled and the non-disabled people.

Using a telephone survey, we inquired about the use of digital health solutions in a nationally representative sample of the Hungarian adult population (n = 1500). As part of the sample, we also obtained information of the characteristics of people with severe disabilities (n = 74) and those with mild disabilities (n = 198).

Severely disabled people use the internet half as much as non-disabled people (41.9% vs. 86.6%). However, severely disabled Internet users are more likely to use it on a daily basis for health purposes. Disabled people use websites and scientific literature search sites to a lesser extent than non-disabled people, but are more likely to use medical and healthcare professional interfaces. Digital technologies (such as emailing, electronic sharing of findings, online appointments) are less common in interactions with physicians, although they find physicians more positive about patients' use of the Internet.

Although the spread of digital technologies would undoubtedly be useful for people with disabilities, they are still significantly lagging behind those without disabilities, so it would be worthwhile to focus on this target group for both health policy makers and technology developers.

Keywords: disabled people, digital health care, Internet use, e-patients

The digitization of healthcare is one of the key challenges faced today. The need for a digital transformation of the healthcare sector has become an important issue, since the increase in life expectancy and at the same time, the large-scale increase in chronic diseases, together with the rising healthcare expenditure and labour shortage in the healthcare sector worldwide, posed a huge challenge to the world's healthcare systems. The effects of digitalization on medicine have been substantial: more and more patients are turning to the online world in order to be informed, find a remedy for their health problems, contact practitioners, monitor their health with wearable sensors and mobile applications, and manage their chronic diseases. This transformation prompts numerous technical, cultural, ethical, psychological and social questions.

According to the WHO, eHealth "extends the scope, transparency and accessibility of health services and health information, widening the population base capable of accessing the available health services and offering innovation and efficiency gains in the provision of health care" (WHO, 2016 p. 1) and in that way digitalisation can contribute to achieving universal health coverage.

However, the phenomenon of the digital paradox highlights that despite the fact that digital health innovations could be very useful for people who lack the adequate access to healthcare services, "these groups are most likely to be excluded from the

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digital world through their sociodemographic characteristics" (van Kessel et al., 2022 p.2). Several studies confirm that people with disabilities are underrepresented in the growth of digital health (Jones et al., 2018; Valdez et al., 2021). Even the design phase of the new digital health solutions often fails to pay attention to the special needs of disabled people (Henni et al., 2022).

The importance and the speed of permeation of digital technologies were raised remarkably by the COVID-19 pandemic. The use of technologies became more widespread among clinicians and in health care systems as well. The first experiences showed that digital health technology can facilitate pandemic strategy and response in ways that are difficult to achieve manually, and some countries, such as South Korea who have integrated digital technology into government-coordinated containment and mitigation processes, were able to tackle the pandemic more successfully (Whitelaw et al., 2020). COVID-19 outbreak contributed significantly also in Hungary to the widespread use of some digital solutions, like ePrescriptions or the Electronic Healthcare Service Space (Győrffy et al., 2020).

However, the performance of digital healthcare technology, according to a systematic review (Gunasekeran et al., 2021), has not yet been properly investigated in population surveys.

The growing importance of digital health showed up on the patient side as well. As a result of the COVID-19 outbreak, during the closures and restrictions, the population was particularly forced to use digital devices both to collect information related to the epidemic and to communicate with doctors and health care. In some stages of the lockdown measures, they could practically limit themselves to this only.

The COVID-19 pandemic has affected all areas of life in the whole world, and Hungary was not an exemption. The first Covid infection in Hungary was detected on March 14, 2020, and the first death attributable to the coronavirus occurred on March 15, 2020. A relatively low number of cases, compared to Western European data, characterized the first wave of the pandemic. In the spring of 2020, the number of active cases rose until May, reaching 2,000, and then began to decrease until the second half of July, when the numbers began to increase again. The second wave started in August 2020 with an extremely rapid rise. In contrast to the first wave, in this phase, young people were also infected in a higher proportion. The second wave began to come to an end in December 2020, but it did not disappear completely, and the third wave began in February 2021, which was much more serious in terms of both the number of illnesses and deaths than the previous ones, reaching outstanding values even in international comparison. Our survey took place during the second wave of the pandemic. [The short summary of the COVID-19 outbreak in Hungary is based on the news of the official governmental website of the pandemic (www.koronavirus.gov.hu)]

This study aims to review the digital health usage habits and needs among people living with disability, compared to the general Hungarian adult population, during the second wave of COVID-19 outbreak.

Method

Sample

Within the framework of the "E-patients and e-physicians in Hungary: The role and opportunities of digital health solutions in the healthcare system" (OTKA-FK 134372.) research program, a nationally representative computer assisted telephone interview survey (CATI) was conducted, involving 1,723 interviewees. The sample was selected based on a stratified sampling procedure in terms of gender, age, type of settlement and educational level, and according to these criteria, it represents the adult population of Hungary. Data were collected between October 5 and 13, 2021 by Ipsos Zrt. (Budapest). The sampling frame was 12,000 people, randomly selected from an open telephone inquiry database, as well as a supplementary sample of 8,000 people. 11,733 respondents refused to fill in, and 1,293 people dropped out, but the majority of this happened because of the specificity of the sampling quota. Interviewees were accessed on mobile (80%) and landline calls (20%). Corrective weighting was performed on the data based on sex, age, educational attainment and size of settlement in order to improve representativeness. The number of respondents was 1,721, but the analysis was carried out with a correction weighting calculated for 1,500 people. The average of weights was 0.8716, the 25th percentile was 0.4886 and the 75th percentile 1.0796. As part of the sample, we also obtained information of the characteristics of people with severe disabilities (n = 74) and those with mild disabilities (n = 198), so altogether we have reached 272 people affected by disability.

The research has a TUKEB permit, number: IV-10927-1 TUKEB.

Measures

The self-developed questionnaire contained 25 questions (the average time limit of the interviews was 15 minutes). [The questionnaire is available at the following link: https://semmelweis.hu/digitalhealth/files/2022/02/Lakossagi-kerdoiv_final.pdf]. Beside the socio-demographic background and health status variables, we obtained information on several aspects of digital health: frequency of internet use for health purposes, knowledge and use of digital health technologies, positive and negative attitudes related to the use of digital health solutions.

As for measuring disability, we used the internationally accepted Global Activity Limitation Indicator (GALI). This is a one question instrument, which is part of the Minimum European Health Module (MEHM). MEHM is a set of three general questions characterizing three different concepts of health which was developed to be used in social surveys (e.g. European Health Interview Survey, Statistics on Income and Living Conditions or Labour Force Survey). GALI measures restriction in participation instead of functional limitations. The latter is the concept of the Washington Group who developed a set of questions a minimum of four or six variables (difficulties in seeing, hearing, walking, cognition, self-care and communication) and is therefore difficult to implement in nonspecialised surveys with limited space for disability-related variables. For non-specialised surveys, like our present survey, it is recommended to use GALI as a good proxy for measuring disability (Eurostat, 2015).

Based on a systematic review (Van Oyen et al., 2018), GALI as inclusive one question instrument fits all conceptual characteristics specified for a global measure on participation restriction and has a good and sufficient concurrent and predictive validity, and reliability.

We used the GALI from the Hungarian version of the European Health Interview Survey (KSH, 2021a). It is the following question: "For at least the past 6 months, to what extent have you been limited because of a health problem in activities people usually do? Would you say you have been …" with answer categories "severely limited / limited but not severely or / not limited at all?"

Analysis

In this article, we have set out to provide an overview of internet use for health purposes and the topics of digital health. The data was analysed using IBM Statistics (SPSS 27) statistical data analysis software. During the statistical data processing, distributions, cross-tabulations and chi-square tests were performed.

Results

Demography

In our representative sample, 81.8% (*n*=1,220) of the Hungarian adult population stated that they had not been limited at all in everyday activities because of a health problem, whereas 13.3% (*n*=198) reported mild and 5.0% (*n*=74) reported severe limitation.

The proportion of those with disabilities was lower among men than among women (*Figure 1*), as well as those who belong to the higher age group have higher risk for a health-related limitation in everyday activities (*Figure 2*). While the proportion of severely disabled was only 1.8% among people aged 18-59 years, it was 8.9% among those who were 60 or more years old.

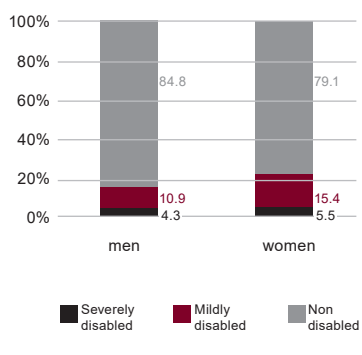

Figure 1 Proportion of disabled by sex

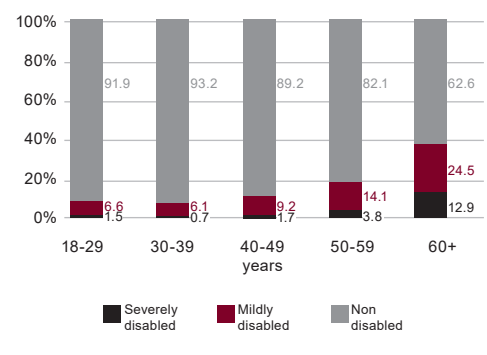

Figure 2 Proportion of disabled by age

The educational attainment and the type of the settlement was also important in this regard. While the proportion of severely disabled was only 1.5% among those with higher education, this proportion was 11.2% among those with a maximum of eight primary school years. Similarly (although the difference is smaller), only 2.2% of people living in the capital reported severe limitation in everyday activities due to health reasons compared to 6.5% of people living in villages.

Internet use

According to our data, severely disabled people use the internet half as much as non-disabled people (41.9% vs. 86.6%). Mildly disabled people are in-between the above-mentioned two groups: 63.1% of them stated that they used the internet in general (*Table 1*).

Table 1 Internet usage (%)

		Severely disabled	Mildly disabled	Non disabled
Internet use	Yes	41.9% (n=31)	63.1% (n=125)	86.6% (n=1056)
	No	58.1% (n=43)	36.9% (n=73)	13.4% (n=163)

If we consider the different age distribution of the disabled and non-disabled groups, there is still a difference in internet use between the two groups: non-disabled people under 60 years of age use the internet 5 percentage points more than disabled people of the same age, while the difference is much larger for the 60+ age group: while more than half of the non-disabled (54.9%) and only one third of the disabled (33.5%) use the internet.

Nevertheless, among active internet users, the most frequent internet use for health purposes is higher in the disabled groups: 30.0% of severely and 22.4% of mildly disabled people use the it on a daily basis for searching for health information, whereas this percentage is only 11.6% in the non-disabled group (*Table 2*).

Table 2 Frequency of internet use (%)

		Severely disabled	Mildly disabled	Non disabled
Internet use	Daily	30.0% (n=9)	22.4% (n=28)	11.6% (n=123)
	Weekly	10.0% (n=3)	26.4% (n=33)	22.6% (n=239)
	Monthly	10.0% (n=3)	16.0% (n=20)	23.2% (n=245)
	Less frequently	30.0% (n=9)	24.8% (n=31)	30.0% (n=317)
	Never	20.0% (n=6)	10.4% (n=13)	12.5% (n=132)

Sources of information on the internet

Respondents use a variety of channels to get health related information. Altogether, the adult population use 2.75 sources on average to get information on health related topics. The most popular sources are webpages, 3 out of 4 persons use them to get to acquired knowledge on health and illnesses. Social media and Youtube are also among the most often used channels.

However, we can discover a slight difference of emphasis if we compare disabled and non-disabled groups. People living with disabilities tend to utilize professional sources, like professional journals significantly more frequently, whereas webpages are less favoured among them (*Figure 3*). Meanwhile, there is no significant difference in the usage of social media, blogs, podcasts, online patient groups or social video sharing networks like Youtube.

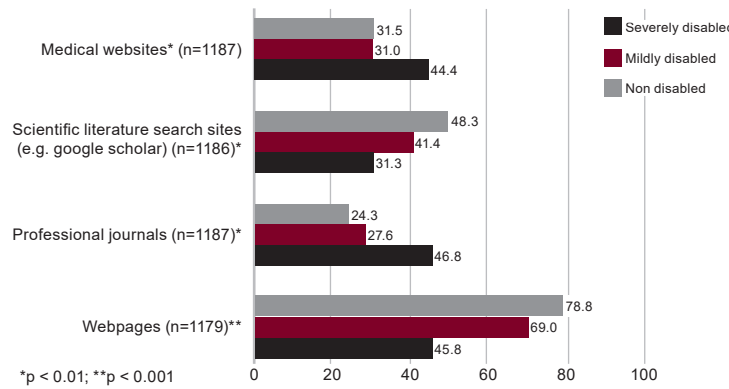

Figure 3 Health related information searching platforms usage (multiple answers were allowed)

Although, it should be added that these differences are no longer significant when age is taken into account. The older age structure of the disabled group therefore seems to influence the results.

Use of digital health technologies

In the survey, we asked about digital technologies patients have heard of and that used. Online appointment booking and ePrescription were widely known in the population, and also more than 80 per cent of the adult population have already heard about the different types of sensors like smart watches. However, less than half of the respondents were familiar with FB for health purposes (48.2%) and teleconsultations (38.2%). Of course, hearing of something does not mean that somebody uses a digital health technology as well, the proportion of usage of the different technologies and devices were lower than the before mentioned values. The most popular was ePrescription, almost 3 out of 4 people have already used it (72.5%), and we can not observe statistically significant differences between disabled and non-disabled

people in that sense, just as like in case of use of teleconsultations or social media for health purposes. All the other examined technologies (online appointment booking, using sensors, using healthcare apps, data, findings digital forwarding health data) were more favorited by non-disabled people (*Figure 4*).

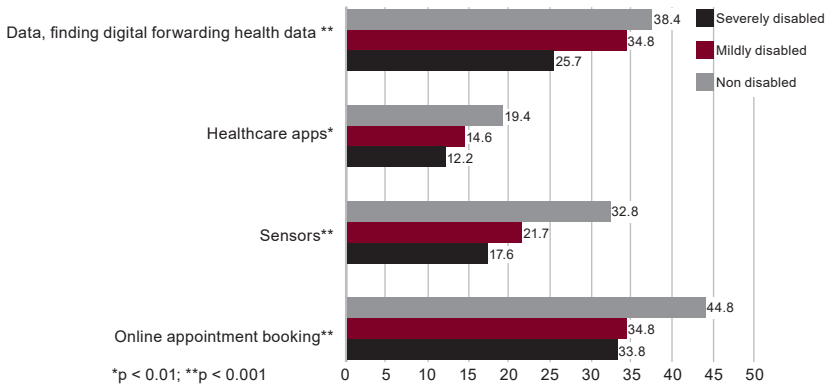

Figure 4 Use of digital health technologies

Nevertheless, there was a significant difference in the number of digital solutions heard about by the disabled and non-disabled groups (disabled: mean: 4.4, N=272, non- disabled: mean: 4.9, N=1220, p=0.01) and the number of digital solutions used (disabled: mean: 2.0, N=272, non- disabled: mean: 2.3, N=1220, p=0.005).

Interestingly, when we asked the respondents about digital technologies they would like to use from those they have not tried yet, the openness was smaller among people living with disability in case of all of the possibilities we asked about (*Table 3*).

Table 3 Desire for using different types of digital health technologies not used before

(%)	Severely disabled	Mildly disabled	Non disabled
e-Prescriptions (n=300)**	23.1	16.7	64.2
Online appointment booking (n=633)**	34.4	25.6	55.0
Sensors (n=280)**	40.5	33.3	41.6
Data, findings digital forwarding health data (n=420)**	16.7	34.8	65.4
Teleconsultations (n=477)**	43.8	42.2	47.1

*p < 0.01; **p < 0.001

Similarly, when we asked about the patients' needs in connection with digital communication and use of devices, disabled people are disadvantaged in all aspects, both in technologies already used and in options that the respondents had not tried before but they would like to use if they had the opportunity (*Table 4*).

Table 4 Use and desire for use of digital health technologies

	Severely disabled		Mildly disabled		Non disabled	
	already used	would like to use	already used	would like to use	already used	would like to use
Communicate with the doctor by email** (n=1491)	8.1	35.1	20.7	32.3	25.6	41.9
Sharing pictures with the doctor through digital channels** (n=1492)	1.4	28.4	9.6	29.3	8.4	43.5
Having a teleconsultation with your doctor (Skype or video consultation)* (n=1490)	0	39.7	4.5	38.4	4.6	51.1
Share health documentation electronically with the doctor** (n=1493)	10.8	40.5	18.6	33.7	19.6	51.3
Monitoring changes in health status with a smartphone* (n=1491)	2.7	43.8	4.5	32.3	1.7	43.1
Using health sensors at home* (n=1492)	14.9	36.5	18.7	38.4	12.5	48.9
Browse websites for authentic medical information* (n=1492)	10.8	36.5	16.6	39.7	16.2	49.5
Making appointments with the doctor online** (n=1491)	19.2	34.2	25.3	33.3	31.1	48.6
Having the doctor recommend an application, sensor, etc.* (n=1491)	1.4	39.7	4	45.5	2.8	55.3

Advantages and disadvantages of using digital health technologies

Using digital health solutions can have several benefits and weaknesses at the same time. Respondents considered the biggest advantage of digital health to be comfortable (90.2% thought so), time saving (88.8%), reducing the number of face-to-face doctor–patient encounters (83.3%), improving care efficiency (74.8%), and helping patients cooperate better in the healing process (73.1%). On the other hand, using digital health can mean that care becomes impersonal (76.1%), patients misinterpret their shared health data (72.3%), faulty technology can jeopardise patients' recovery (68.5%), makes patients /doctors frustrated/ patients dissatisfied (65.4%) and increases the administrative burden of doctors (62%).

If we try to compare the opinion of disabled and non-disabled respondents, their answers show differences to some degree: disabled people seem to be more pessimistic, they find less benefits and more limitation for digital technologies. There was a significant difference in the number of benefits of digital solutions mentioned by the disabled and non-disabled groups (disabled: mean: 7.4, N=272, non-disabled: mean: 7.7, N=1220, p=0.02) and the number of disadvantages as well (disabled: mean: 6.1, N=272, non-disabled: mean: 5.6, N=1220, p=0.005).

Discussion

The proportion of people living with disability in our survey is very similar to the results of the latest Hungarian Microcensus, which was done in 2016, with a special focus on disability (KSH, 2018). In the Microcensus, 84.2% of the population lived without disabilities, 9.5% experienced mild and 6.3% reported severe disability (KSH, 2018). However, The European Health Interview Survey conducted in 2019 showed somewhat higher rates for disability: 19.3% reported mild and 6.4% severe limitations in everyday life because of a health problem (KSH, 2021b). Nevertheless, we can interpret our data as representative to the Hungarian adult population, including people living with disability.

In our research, we focused on the knowledge about, the attitudes towards and the usage of digital health technologies and devices and we found some differences between disabled and non-disabled groups about the issue under consideration. Disabled people tend to find less advantage in digital technology, although potentially it could be more useful for them. Distrust is an important aspect, they seem to be less open to new technologies, but we must not forget about the possible lack of available opportunities they may have. Even though the first publication about the inverse care law is 50 years old (Tudor Hart 1971), the main concept is still relevant: disadvantaged populations need more health care than advantaged populations, but receive less. Digital health technologies could hold the possibility to tackle the inequalities, but in reality, it widens the gap. Our results are in line with the international literature and confirm that already existing health disparities are likely to increase with the uptake of digital health technologies (Valdez et al., 2021; Jones et al., 2018; Jones et al., 2020). Van Kessel calls this phenomenon the digital paradox: "the potential that digital health innovations hold can be transformational for delivering care to underserved population groups, but these groups are most likely to be excluded from the digital world through their sociodemographic characteristics" (van Kessel et al., 2022, p. 2.).

However, it is also worth mentioning that according to our result, people living with disability show a definite interest for digital health solutions: almost 40% of them would like to use various kinds of digital health technologies, like teleconsultation or sharing health documentation electronically.

As for the findings from this study, a number of limitations must be noted. First of all, the survey was designed for the general adult population, that's why the subsample of people living with disability is relatively low (n=272). The low number did not allow more complex analyses. In that sense we have to be cautious when interpreting the results because there may be some confounding factors (like age or educational attainment) behind them. We didn't aim to establish a causal link between disability and the use of digital health (this would be impossible in a cross-sectional study anyway), but to show the acceptance and use of digital technologies among people with disabilities.

When interpreting our results, it is important to keep in mind that living with a disability is most common among elderly people. Thus, the effects of age and living with disability are combined in the successful use of digital health. The different inequality factors interact, further limiting access. It is important to keep all these factors in mind when planning digital health ecosystems.

Secondly, as we had time limitations with the questionnaire (taking into account that phone surveys should be shorter in general than personal interviews), we had no possibility for using a detailed question set about the type of disability based on functional limitations, even though that based on other research results, there is some diversity among the different disabled groups. For example, people with mobility disabilities were 1.28 times more likely, while people with hearing disabilities were 1.22 times less likely to use telehealth during the pandemic than people with other disabilities (Friedman & Van Puymbrouck, 2021).

Finally, the COVID-19 pandemic has affected all areas of life, including our data collection. Unfortunately, we did not have information about access to telehealth prior to the pandemic, as the survey provides only cross-sectional data and we did not use retrospective questions.

Conclusion

The use of digital technologies is fundamentally transforming healthcare. E-health could create an opportunity to reduce health inequalities. However, during the COVID pandemic, it has been proven that the risk of digital exclusion is higher in certain groups. This risk can be higher in groups with multiple disadvantages, like elderly, less educated people living with disabilities. Equitable use of digital technologies must be ensured so that not only high-income countries or populations enjoy its benefits. People with disabilities and other vulnerable groups must be placed at the center of digital health development. The realization of equitable access to digital healthcare would significantly improve the health and well-being of the population.

Acknowledgement

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