



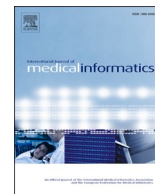
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The effect of Covid-19 in digital media use of Finnish physicians – Four wave longitudinal panel survey

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ABSTRACT

Background: Covid-19 pandemic has boosted digitalization in healthcare, as mobility restrictions and social distancing rules have made healthcare providers to adopt digital tools to replace or complement face-to-face interactions.

Purpose: We discuss the effects of Covid-19 pandemic on physicians' use of digital media. We examine whether Covid-19 conditions have changed how physicians use internet resources for information search, how they engage in social media, and their attitude towards online events.

Basic procedures: The study was done as a longitudinal panel survey in four waves. The sample was a panel including active physicians in Finland. The panel was updated annually. Identical surveys were administered in 2018, 2019, 2020 and 2021. Spring 2020 was the time when Finland executed mobility restrictions and re-organization of healthcare because of pandemic. Comparing results of the survey before and after Covid-19 restrictions gives us a unique opportunity to do comparative analysis of Covid-19 effects.

Main findings: Our results show that the use of digital media for information search stayed relatively stable without statistically significant change during the four-year period covered in the study. The use of social media rose steadily from 2018 to 2021 with no significant difference in the trend. However, there was a significant change in the attitude of Finnish physicians on online events. Year 2021, the attitude remained in this more positive level.

Principal conclusions: As use of digital media including social media was already high prior Covid-19 in Finland, our results do not show significant change because of special circumstances introduced in 2020. However, our results show that the attitudes towards online events turned more positive during Covid-19 related restrictions. This could indicate that Covid-19 era has triggered a change that might continue also when pandemic related restrictions will be removed.

1. Introduction

Digitalization of healthcare has been expected to transform healthcare, and Covid-19 has been proposed to boost this process [1,2]. Due to mobility restrictions and social distancing, many healthcare practices based on face-to-face interactions become difficult, if not impossible. Preparing to sudden increase in patients with new, severe symptoms has caused re-prioritization of healthcare, leading to postponing non-urgent care and re-organization of work.

In this paper, we investigate if Covid-19 has had an impact of physicians' use of digital media. We performed a survey study among

physicians in Finland. The survey was administered in an identical manner in four waves annually from 2018 to 2021. By comparing the survey results of these four years, we are answering a research question:

“Has Covid-19 had an effect on how Finnish physicians use digital media?”

Digital resources have become important in fulfilling everyday information needs of medical professionals. They use digital resources to seek information at the point of care, to update their professional know-how, and to communicate with colleagues [3]. They obtain new information or confirm diagnostic or therapeutic decision [4] through internet. Recent evidence shows that use of online resources in

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information search in European physicians is prevailing method to fulfil information needs, while offline resources are used more seldomly [5].

Whereas using internet to fulfil information needs is already widespread, use of social media by medical professionals for professional purposes is not as common [4,6]. There is indication that social media has an influence especially in the patients' decision making [7,8] and in providing patients emotional support [9], suggesting that the use of social media in healthcare might be actually driven by patients, not healthcare professionals. There is some evidence that Covid-19 has increased the use of social media to disseminate health-related information in both health media and in healthcare professionals [10].

Social distancing and mobility restrictions hinder healthcare ecosystem to organize events that allow person-to-person communication and information sharing. Academic detailing is one of the practices that benefits from in-person peer education visits to improve patient outcomes, and is suffering from Covid-19 related restrictions [11]. Life sciences companies have responded to this challenge by developing their digital service offering; more than 60% of life sciences companies have been reported they have increased virtual meetings with healthcare professionals [12]. However, this increase is only partially offsetting the decline of communication between pharma and healthcare professionals, which has been reported by McKinsey to fall an average of 65% because of Covid-19 [13]. Medical congresses facilitating learning and networking of the community have been postponed or cancelled [14], or organized as virtual or hybrid events with the help of digital technologies [15]. On the other hand, medical congresses experimenting with web-based delivery methods to tackle Covid-19 challenges have reported even higher number of participants and more diverse global audience compared to pre-pandemic face-to-face congress arrangements [16].

However, high numbers of internet use among medical professionals are not valid in all parts of the world [17]. Also, as the possibilities of digital media are getting more advanced, healthcare professionals have been found to express needs related to increasing their digital health literacy skills to be able to integrate new digital information to care practice [18]. Finland is generally seen as a forerunner in regards digitalization of healthcare and use of internet for healthcare related information search [19]. For example, use of electronic health records (EHRs) is reaching 100% [20] and the percentage of population using eHealth services is the highest in the European Union [21]. The broadband network has been available in all populated areas of the country, and digital health literacy has been high already at least for a decade [22], allowing individuals to adopt digital tools in their everyday lives. The national electronic patient record system has been widely adopted, as well as the electronic prescription system [23].

The global pandemic resulted in mobility restrictions and social distancing in most parts of the world. These drastic changes caused by Covid-19 have impacted people's online behaviors in general. A study in Germany found out that over 70% of respondents representing adult population reported increased use of digital media [24]. Female respondents had higher increase in social networks, information search and video streaming, whereas male respondents reported increased consumption of gaming and erotic content. Whereas there was surge of digital media use in the early phases of pandemic, surveys done in the USA and the UK indicate that the social media use has stayed relatively stable over the past years [25,26]. There is evidence [27] that social media causes information overload, stress and decrease of mental wellbeing by increasing fear and the perception of risk, which may lead to information avoidance leading to decreased use during crisis situations like Covid-19.

2. Material and methods

2.1. Survey instrument

The survey instrument has been developed to monitor how different

communication channels reach healthcare professionals in Finland. The results have been disseminated to healthcare ecosystem stakeholders, such as pharma companies, health technology providers and policy makers through dissemination events, social media channels and targeted communication with stakeholders. The summaries of the yearly surveys are published at the web site of the organization administering the survey (<http://successclinic.fi>). The questions have been refined through a collaborative process of healthcare ecosystem stakeholders and the company administering the survey (later referred as SC in this paper). For the purpose of this paper, we picked survey questions relevant to our research question. The survey has been repeated yearly for over 10 years. The questions selected for this study have been identical for the four years period analyzed.

The questions selected for the purpose of this study were the following (translated from Finnish by the authors):

1. How are the media you use at work distributed among the following options?
 - Print media
 - Internet (service includes ads)
 - Internet (service does not include ads after login)
2. How often do you use the following social media services?
 - WhatsApp, YouTube, Facebook, Instagram, Twitter, LinkedIn (the survey had more options, we selected these to this paper based on the significance)
 - Daily, Weekly, Monthly, Once in three months, Couple of times a year, More seldom, Never
3. Currently, what is the role of social media in your work?
 - Significant role
 - Moderate role
 - Minor role
 - No role in my work
4. Are you part of some private social media group where you can have a dialogue with other health care professionals about your work?
 - Yes, in several
 - Yes, one
 - No, but I have been considering joining
 - No, but I would like to
 - No, I do not want to
5. How do you see the shift of product trainings from face-to-face personal/ group trainings to online remote trainings?
 - Positive
 - Negative
 - Neutral

The survey was administered online. The survey instrument was implemented with Webropol. Invites were sent by email.

2.2. Data collection and analysis

The participants were recruited through SC panel of Finnish healthcare professionals. The panel has been constructed in an iterative process with the Finnish healthcare professionals. The panel is a representative sample of Finnish physicians. It includes majority of registered physicians in Finland, 27,254 physicians in year 2018.

The data was stored in SC data server located in Finland. SC is a registered registry operator. It follows GDPR regulations in data storage and management. For the purpose of this study, all data analytics were done by SC personnel using SC servers and computing resources.

The data covers years 2018, 2019, 2020 and 2021. The survey instrument has evolved slightly during the years, but the questions examined in this paper have remained identical. The process of administering the survey has followed the same protocol every year. Cherries table [28] is provided in appendix for describing the details of the survey design and protocol.

For the purpose of this study, we selected only respondents who had

registered themselves in the SC panel as “physicians”. Demographics are described in appendix tables. As only the questions related to demographics were mandatory, the number of responses varied between questions. The highest number of individual respondents for the question receiving highest number of responses was 933 in year 2018, 904 in year 2019, 659 in year 2020 and 354 in year 2021. There are variations in response rates between years. However, representativeness of respondents has been yearly checked in regards of specialty, geographical area, and representation of both private and public sector.

Microsoft® Excel® for Microsoft 365 MSO 64-bit -program was used in all analyses. Data analysis includes creation of summative graphic representations of distribution of answers, and χ^2 -test (Chi-squared test) for identifying statistical significance of differences between years.

3. Results

We group our findings here into three broad categories according to the type of media as follows:

1. Media services. This category includes external media services based on broadcasting model, where media content is created and/or curated primarily by the service provider, for example, professional magazines and national databased used to communicate standard care information.

2 Social media. This category includes social media platforms, where the content is both produced and consumed by the users, such as Twitter, Facebook and LinkedIn.

3. Attitudes towards online training. Online trainings were described in the survey to mean marketing services used by pharmaceutical companies or other product or service providers to train physicians on their offerings.

The demographics of respondents were similar in each year, representing the demographics of the Finnish physicians. This allows statistical comparisons across years. In year 2018, 39% of the respondents were male and 61% female.

3.1. Use of media services

The physicians reported that their use of print and internet-based media services had remained relatively stable (Fig. 1). Digital media is clearly more common (70% of respondents) way to access professional information compared to print media (30% respondents), and this has remained the same for the past four years.

3.2. Social media

The most frequently used social media was WhatsApp, which was used daily by 91% of the respondents, with the annual growth of 3% during the analysis period. YouTube and Facebook use has stayed rather stable. Both are used weekly or more often by more than 50% of Finnish physicians. Instagram, Twitter and LinkedIn have lower usage numbers.

Fig. 2 summarizes the results, and shows the numbers used for calculating statistical significance of differences between years. χ^2 -test

shows no statistical significance between years in any of the usage frequencies ($X^2(15) = 21,74$, $df = 15$, $p = 0,115$).

Majority of the respondents report that social media plays a moderate role in their work (see Fig. 3). There was a significant relationship between yearly periods and yearly evaluation of the role of social media in the working context ($X^2(9) = 34,70$, $df = 9$, $p < 0,001$). The number of respondents who answer that social media has no role in their work has dropped from 29% in 2018 to 20 % in 2020, and it remained on that level also in 2021. The number of users who report that social media has a moderate role in their work increased from 15% in year 2019 to 25% in year 2020, and then dropped to 22% in 2021.

More than half of the respondents reported that they are members in one or more private groups in social media to discuss work related topics (see Fig. 4). 38% of respondents were members of closed social media groups in 2021, whereas the number had been 25% in 2018. At the same time, number of respondents who show no interest towards joining social media private groups has decreased from 39% in 2018 to 31% in 2021. There was a significant relationship between yearly periods and the attitude towards private groups in social media in years 2018–2021 ($X^2(12) = 35,47$, $df = 12$, $p < 0,001$). However, the growth seems to be rather stable over the analysis period.

3.3. Online training

Interestingly, the attitudes towards participating remote online product trainings had changed into more positive in year 2021 ($X^2(6) = 201,39$, $df = 6$, $p < 0,001$). Before Covid-19, about 10% of respondents (12% in 2018 and 11% in 2019) report positive attitude towards online training. During 2020 there is a significant raise to 22%, and this further continued growing in 2021 into 38% (see Fig. 5).

4. Discussion

Covid-19 pandemic has been expected to boost digitalization of healthcare. Our findings show that there is no increase of use of online resources in information search of physicians in Finland. The use of digital media continues to be high, and print media seems to be maintaining its role among Finnish physicians. Our results highlight that the use of social media is growing and increasing its importance among Finnish physicians, but this growth has started already before Covid-19, and our results do not show significantly increased growth in 2020 and 2021. However, our results show change in attitudes towards online training into more positive.

4.1. Principal findings

Our findings show that the use of web sites in information search is already at a high level among Finnish physicians. The numbers were at a high level already before year 2020, and the use of web resources in information search remained in high level also in 2020. Interestingly, also print media stayed at the level of previous years, indicating that Covid-19 has not had an impact on Finnish physicians information

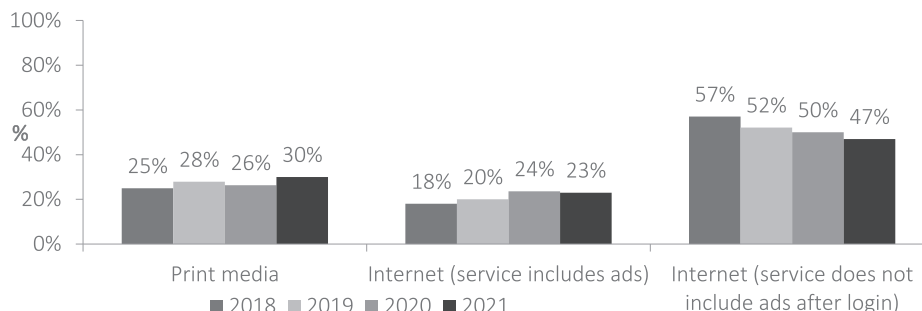


Fig. 1. The use of media services. Answers to question “How are the media you use at work distributed among the following options? “

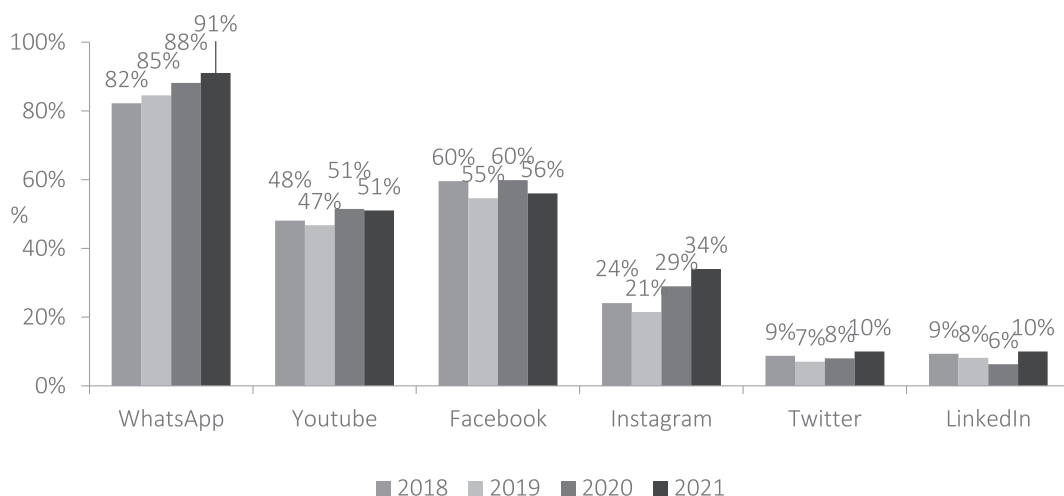


Fig. 2. A share of daily and weekly users of different social media. Answers to question “How often do you use the following social media?” A share of those, who use the social media daily or weekly.

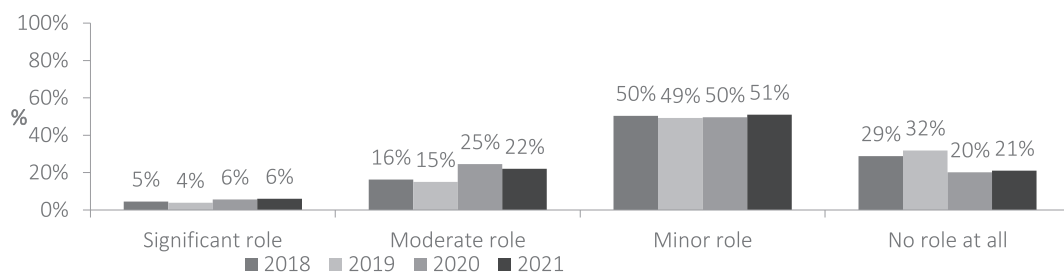


Fig. 3. The role of social media in the work context. Answers to question “Currently, what is the role of social media in your work?”

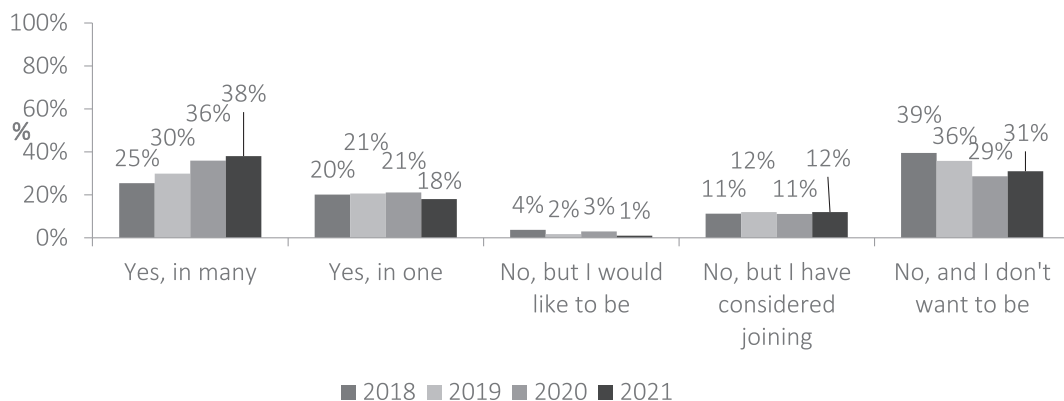


Fig. 4. Participation in private work related social media groups. Answers to question “Are you part of some private social media group where you can have a dialogue with other health care professionals about your work?”

searching practices. In Finland, the digital platforms providing access to latest care guidelines and databases of medical products seem to have a relatively established role in the everyday work of care professionals. Close to 90% of professionals report frequent use of digital media portals for accessing work related information, and Covid-19 does not seem to have a major effect in that.

Social media tools, such as instant messaging, private work-related group communication, and peer-created content, also have reached a high level of frequent use in the work-related communication and information sharing. Our results show that the use of social media has been on a steady rise already before 2020. There is an increase both in numbers of users and the frequency of use. However, this rise seems to be stable over years, with no significant difference in the rise in year

2020. This is well aligned with surveys for general public, which show that the use of social media has been rather stable during last five years [26]. Interestingly, the numbers of Finnish physicians who report using Twitter for work purposes was found to be rather low in our study, whereas it has been seen to be popular among healthcare professionals in some other contexts [29,30].

Our findings show that the biggest changes are in increase of positive attitude towards online training. This can be seen as an indication experiences of participating had been positive. As pandemic is forcing event organizers to adopt digital practices, it is likely that this creates opportunities to learn and develop practices that embrace the possibilities of virtual events in ways that can serve the medical community also after pandemic [14]. As there is a positive change in attitude, we predict

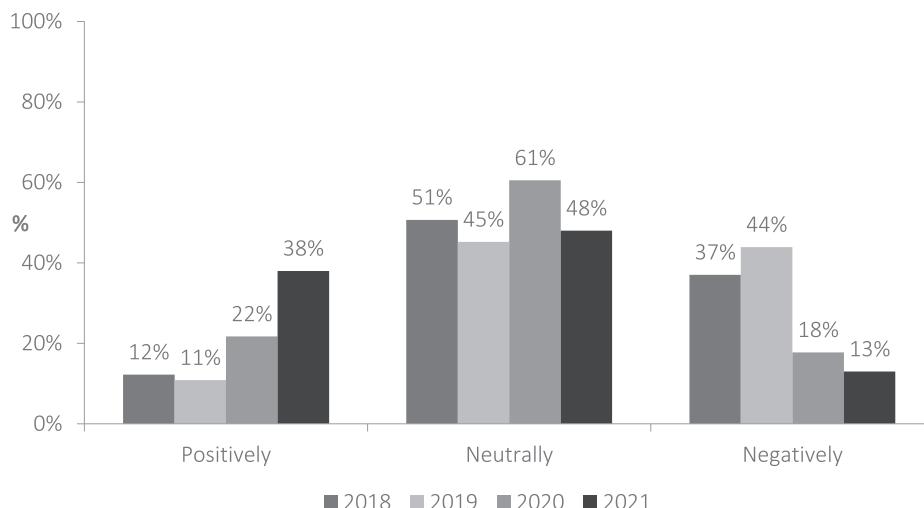


Fig. 5. The attitude towards remote online product training. Answers to question “How do you see the shift of product trainings from face-to-face personal and group trainings to online remote trainings?”

that this change can lead to more participation of online events also in the future.

4.2. Strengths and limitations of the study

As the survey used in this study has been repeated in a same form before and during pandemic, it provides a unique dataset for analysis of changes in media consumption of physicians. Also, the response rates and demographic distribution of the survey each year are high enough to be representative of the Finnish population of the physicians. However, limiting the scope to the Finnish physicians limits the generalizability of the results. As Finland has high level of digitalization also in healthcare, the results may not be directly applicable in areas with lower level of adoption of digital media in general population and in healthcare particularly. For example, in other areas the physicians may be in a different phase of an adoption curve of social media or national digital health web resources. The quantitative nature of the survey limits the insights we have to interpret reasons behind changes and getting explanations of different usage patterns.

4.3. Future work

Our survey has explanatory power to show trends and changes in the use of digital media, but only in regards how much digital media is used, and how many physicians use digital media in their work. However, our survey does not allow us to increase understanding on how the use of digital media has evolved as they have become more common

communication tools. Future work on the role of digital media and its impact on work practice would be needed.

Summary table

what was already known on the topic	what this study added to our knowledge
Covid-19 has boosted digitalization of healthcare	Covid-19 has not had an effect on information search and social media use in Finland, but it has increased positive attitude towards online training
Use of social media in professional context is increasing among physicians	In Finland, the physicians’ use of social media has been steadily increasing for four years, with no significant change in this trend because of Covid-19
Because of Covid-19, product trainings have been done almost entirely through digital means	Increase of digital product trainings has resulted in more positive attitude towards them

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. CHERRIES description of survey [28]

Category	Checklist item	Explanation
Design	Describe survey design	Survey was targeted for physicians in Finland. The sample was gathered from Success Clinic’s physician register.
Institutional review board approval and informed consent process	IRB approval	The research follows the ethical guidelines of ethics committee of Human Sciences at University of Oulu (Eudaimonia)
	Informed consent	The participants were informed the length of the survey within invitation letter. The consent to analyse data was given when responding the survey. The data were stored in data secure database, which requires passwords from users. The investigator was Success Clinic. The purpose of the study was to gather opinions from physicians.
	Data protection	No personal information was collected. The aggregated results were stored in company’s data secure database, and access to data is not possible without passwords.

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Category	Checklist item	Explanation
Development and pre-testing	Development and testing	The survey was developed and tested by researchers working in Success Clinic.
	Recruitment process and description of the sample having access to the questionnaire	Open survey versus closed survey Contact mode Advertising the survey
Survey administration	Web/e-mail	The survey was a closed survey. The participants were contacted via email, and individual access to survey was abled.
	Context	The survey was not advertised. The invitation was sent for all individuals of the register.
	Mandator/voluntary	The invitations were sent via email. The responses were entered manually by each participant, and the responses were saved to the database.
	Incentives	The survey was not posted on any website.
	Time/Date	The survey was voluntary, receivers of invitation had a choice to answer or not. No incentives were offered.
	Randomization of items or questions	The data were collected in years 2018, 2019 and 2020.
	Adaptive questions	The items were not randomised, the order was the same for each participant.
	Number of items	The questions were not adaptive. 27 items.
	Number of screens (pages)	9 pages.
	Completeness check	The completeness was checked from database by each response of the survey. Some questions were mandatory.
Response rates	Review step	The respondents were able to review and change their answers using 'Back' button in each page of the survey.
	Unique site visitor	N/A
	View rate (unique survey visitors/unique site visitors)	N/A
	Participation rate (unique visitors who agreed to participate/unique first survey page visitors)	N/A
Preventing multiple entries from the same individual	Completion rate (users who finished the survey/users who agreed to participate)	Total number of responses was approximately 3% of the physicians the invitation was sent to.
	Cookies used	The link for the survey was available for each participant only once. If someone would try to answer again, the system informs that individual access was already used.
	IP check	Duplicate entries were not possible, see before.
Analysis	Log file analysis	–
	Registration	See before.
	Handling incomplete questionnaires	All responses were analysed.
	Questionnaires submitted with an atypical timestamp	–
	Statistical correction	No statistical correction was used.

Appendix B. Demographics from the 2018 survey

Demographics in 2018	
Age group	Share
18–29 years	4%
30–39 years	21%
40–49 years	23%
50–59 years	27%
60–69 years	20%
70 years or more	4%
Gender	Share
Male	39%
Female	61%
Area	Share
Helsinki	17%
Uusimaa (not Helsinki)	15%
Pirkanmaa	13%
Varsinais-Suomi	11%
Pohjois-Pohjanmaa	10%
Pohjois-Savo	8%
Keski-Suomi	6%
Päijät-Häme	4%
Vaasa	3%
Satakunta	3%
Etelä-Karjala	2%
Etelä-Pohjanmaa	2%
Kanta-Häme	2%
Lappi	2%
Kymenlaakso	2%
Etelä-Savo	1%
Pohjois-Karjala	1%
Itä-Savo	1%
Kainuu	1%
Keski-Pohjanmaa	0,4%

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Demographics in 2018	
Länsi-Pohja	0,4%
Place of practice	Share
University Hospital	28%
Health center	23%
Private practice	21%
Central Hospital	16%
Other	8%
Other hospital (former regional hospital)	7%
Occupational health center	6%
Specialty	Share
General medicine	17%
Specializing (also select field)	16%
Non-specialized	9%
Dentistry	8%
Psychiatry	6%
Anaesthesiology and intensive care	5%
Occupational health care	5%
Pediatrics	4%
Internal diseases	4%
Orthopedics and traumatology	4%
Geriatrics	3%
Gynecology and childbirth	3%
Neurology	2%
Ear nose and throat diseases	2%
Adolescent psychiatry	2%
Radiology	2%
Eye diseases	2%
Child psychiatry	2%
Lung diseases and allergology	1%
Cancers	1%
Gastroenterological surgery	1%
Bachelor of medicine	1%
Rheumatology	1%
Urology	1%
Acute medicine	1%
Physiotherapy	1%
Pediatric neurology	1%
General surgery	1%
Pediatric surgery	1%
Cardiac and thoracic surgery	1%
Endocrinology	1%
Pathology	1%
Health care	1%
Skin diseases and allergology	1%
Neurosurgery	1%
Vascular surgery	1%
Foniatría	0,3%
Cardiology	0,3%
Clinical physiology and isotope medicine	0,3%
Clinical hematology	0,3%
Clinical neurophysiology	0,3%
Plastic surgery	0,3%
Oral and maxillofacial surgery	0,3%
Gastroenterology	0,2%
Clinical microbiology	0,2%
Sports medicine	0,2%
Forensic psychiatry	0,2%
Hand surgery	0,1%
Nephrology	0,1%

Appendix C. Numbers used in χ^2 -test (Chi-squared test)

Table: Numbers used in Fig. 2

	2018 Daily- Weekly	2018 Daily -Monthly	2019 Daily- Weekly	2019 Daily -Monthly	2020 Daily- Weekly	2020 Daily -Monthly	2021 Daily- Weekly	2021 Daily -Monthly
WhatsApp	503	516	339	345	400	405	321	323
Youtube	286	410	185	258	233	339	181	267
Facebook	342	360	219	235	273	290	200	215
Instagram	126	145	79	100	131	158	122	135
Twitter	44	62	25	40	35	62	34	50
LinkedIn	50	98	30	60	28	57	36	49

Table: Numbers used in Fig. 3

Role of social media in my work	2018	2019	2020	2021
Small role	322	204	229	180
No role at all	184	132	93	73
Moderate role	104	62	113	77
Significant role	29	16	26	21
Total	639	414	461	351

Table: Numbers of respondents, see % in Fig. 4.

Participation in closed social media groups	2018	2019	2020	2021
No, I do not want to	253	146	133	111
Yes, in several	163	122	167	133
Yes, one	129	84	98	65
No, but I have been considering joining	72	49	52	42
No, but I would like to	24	7	14	3
Total	641	408	464	354

Table: The number of respondents, see % in Fig. 5.

	2018	2019	2020	2021
Positively	78	42	94	135
Neutrally	323	175	261	170
Negatively	236	170	77	46

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