Covid-19 Policy Responses, Digital Health Apps and Data Sharing: Attitudes of Swiss Medical Students

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ABSTRACT

Background: In this paper we present findings from a survey with 256 medical students in Switzerland about their perception of Covid-19 public health measures, their attitude towards digital health apps to respond to the pandemic, and whether the Covid-19 crisis changed their willingness to share their health data in the future for public health research purposes.

Results: Results show that most respondents indicated to be somewhat negatively affected by the pandemic, but deemed the public health policy responses to the pandemic in Switzerland as just right or even as slightly too unrestrictive. Most respondents evaluate the use of apps to respond to the pandemic as positive, and 61.7% indicated that they used the contact tracing app and 97.6% the immunity certificate app. The latter was evaluated more positively than the former. They indicated that a better communication about its benefits or the possibility to share health data for research (e.g. by listing Covid-19 symptoms and vaccination status) would improve the contact tracing app. Nearly all respondents indicated that they would share their health data or samples for research purposes in the future. The types of data they would be willing to share are mostly questionnaires about their health status, blood samples and other biological samples, with social media being the least willing to share. Our findings highlight that most respondents believe that their attitude towards sharing data for public health research did not change during or with the Covid-19 pandemic.

Conclusions: Recent developments in digital health app use were fuelled by the Covid-19 pandemic and the public – as a central actor – defined social trends with regard to digital health app uptake and willingness to share health data. With this survey we aimed to fill the gap of empirically examining how Swiss medical students – a young, technology- and medicine-inclined subpopulation, perceived the Covid-19 pandemic response, how they evaluate the related use of apps to respond to the pandemic as well as their willingness to share data for health research. The results may shed light on how the Covid-19-related use of technology and health data is changing the health landscape in Switzerland.

1. Introduction

The Covid-19 pandemic posed many unprecedented challenges to health care systems worldwide, while it also directly affected many individuals. In comparison to previous pandemics and epidemics, such as the SARS outbreak in 2002, the Covid-19 pandemic was set against a transformed technological context. Countries worldwide have developed contact tracing or warning apps with different privacy standards and ways to store collected data (centralized vs. decentralized) [1]. Many members of the public, scientists and politicians have expressed concern that the crisis could be used to justify the rapid roll out of surveillance technologies that do not meet ethical and human rights standards, in the name of public health protection, for instance by using contract tracing apps that undermine privacy. In Switzerland for instance, the SwissCovid App for contact tracing aims to hold up high standards in data privacy by using a decentralised data storage system. From an ethical point of view, one could applaud that the app was developed by taking into account ethical considerations in line with the concept of ethics by design [2]. In contrast to the pessimistic views which predict the possibility of far-reaching surveillance, others have argued that these developments also offer the chance to bring about a lasting shift in how health data is handled in society, opening up opportunities for a new social contract around data and its potential public benefits [3]. It is also argued that the Covid-19 crisis accelerates the uptake of digital health in general, since Covid-19-related apps were one of the first interactions with digital approaches to health and healthcare for much of the world's population. It will be interesting to observe this prognosis in the coming years. Similarly, another interesting development is whether the Coronavirus crisis and availability of apps that were developed to tackle this threat will change or have already changed the public's attitude to share data about their health for public health research purposes. The public might have experienced the importance of health data availability first-hand during the Covid-19 pandemic and it might have altered their willingness to share their personal health data for such research purposes. Such data availability has been discussed worldwide, and in Switzerland initiatives are launched to increase sharing and linking of health data from different sources, e.g. a parliamentary initiative [4] or the Swiss Personalized Health Network (SPHN), which builds infrastructure to enable exchange of health data for research.

The Swiss public's willingness, their attitudes and concerns to sharing health data or biological samples for personalized health research were assessed before the Covid-19 pandemic [5]. Results showed that 53.6% would be willing to participate in a personalized health research project by providing their health data and biological samples. It furthermore showed that respondents were more willing to provide 'traditional' types of health data, for example health questionnaires, blood or biological samples, as opposed to app-related data [5].

Despite these findings before the pandemic, it has not been empirically assessed how the use of digital health apps in the context of pandemic response was perceived by the public in Switzerland and how it changed public willingness to share health data for research. To meet this need, we invited bachelor-level medical students of the University of Bern to respond to our survey. We opted for a pilot study approach, which can be upscaled to a larger study at a later stage. Information on these questions from a cohort of students offer opportunities to identify attitude patterns, behavioral intentions and thus social trends of a sub-sample of the population. In this case they can provide insights into how the uptake of digital health tools and willingness for data sharing might evolve.

In this paper, we will report medical students' perception about implemented Covid-19 public health measures, their attitude towards digital health apps such as the SwissCovid and CovidCert app, and whether the Covid-19 crisis changed their willingness to share their health data in the future for public health research purposes.

2. Methods

We conducted a cross-sectional opinion survey with a cohort of 314 first semester bachelor of medicine students from the University of Bern. We chose this sample, since students are an accessible sample representing the younger population, which might be more inclined to use technology in general. The three topics we aimed to assess are i) how did they perceive the policy responses to Covid-19, ii) what is their opinion on using apps to respond to the pandemic and iii) how did it change their willingness to provide their data for public health research purposes in the future.

We invited students to participate in the survey at the end of a lecture on medical ethics. The lecturer (RP) explained the aim, scope and background of the survey study and students could chose to voluntarily participate in the anonymous survey after the lecture ended. No incentives were given to participate in the survey. The students received the weblink and QR code to the questionnaire on surveymonkey via a lecture slide. The questionnaire was available in English (available as a supplementary file). By completing the questionnaire, participants provided their informed consent. We collected answers for two weeks in February 2022 until responses abridged. The project complies with data protection regulations at each research institution (University of Bern and CHUV). We analysed the data using the software STATA (version 15, College Station, TX, USA). We included only questionnaires with a minimum of 50% data completeness. We employed descriptive statistics, since our sample was rather homogeneous, with no significant outcomes for the demographic variables age, nationality and health status.

3. Results

Sample description

We received a total of 256 responses, representing an overall response rate of 81.5%. Table 1 portrays the key demographic characteristics of respondents. Respondents were mostly female (65.7%), Swiss (92.7%), mostly between 19 and 21 years old and indicated their health status as somewhat healthy or very healthy.

Table 1: Demographic overview of respondents

	Sample	Population	
	n	%	
Total	256	100	
Age			
18	15	6.4%	
19	53	22.5%	
20	70	29.7%	
21	55	23.3%	
22	19	8.1%	

23	11	4.7%	
24	5	2.1%	
25	2	0.9%	
26	2	0.9%	
27	3	1.3%	
28	1	0.4%	
Total	236	100%	
Missing	20		
Sex			
Male	77	32.6%	
Female	155	65.7%	
Other	2	0.9%	
Prefer not to disclose	2	0.9%	
Total	236	100%	
Missing	20		
Nationality			
Swiss	217	92.7%	
Other	23	9.8%	
Total	234	102.6%*	*Due to double nationality
Missing	22		
Health status			
Very unhealthy	1	0.4%	
Somewhat unhealthy	9	3.8%	
Neutral	17	7.2%	
Somewhat healthy	111	47%	
Very healthy	98	41.5%	
Total	236	100%	
Missing	20		

Perception about the personal impact of the pandemic and pandemic responses

We asked how respondents perceived the pandemic's impact on them and most indicated that the pandemic impacted them somewhat negatively (52.7%) or not much (25%). Only 12.9% indicated that it impacted them somewhat positively, 8.6% very negatively and 0.8% very positively. The majority of respondents (51.1%) deemed the public health policy responses (shops and leisure activities closed temporarily, mask requirements, distancing requirements, home office etc.) to the pandemic in Switzerland as just right. Of all respondents, 28.9% perceived the public health policy responses slightly too unrestrictive, whereas 13.7% perceived them as slightly too restrictive. Only 3.9% thought of them as too restrictive and 2.3% as too unsrestrictive.

Opinion on using apps to respond to the pandemic

Most respondents evaluate the use of apps to respond to the pandemic, such as the SwissCovid app for contact tracing or the CovidCert app for showing immunity certificates, as somewhat positive (38.3%) or very positive (22.6%). 21.4% have a neutral opinion towards it and only few evaluate their use as somewhat negatively (14.9%) or very negatively (2.8%, see Figure 1).

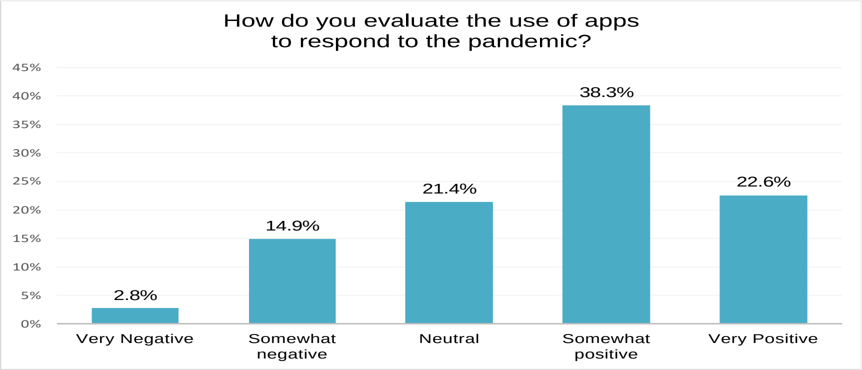

Figure 1: Opinion on using apps to respond to the pandemic

When asked about their use of these apps, 61.7% indicated that they used the SwissCovid app, while 97.6% used the Covid Certificate app. Respondents furthermore evaluated these apps (Figure 2): 56.9% perceived the Covid

Certificte app as very positive and only 5.6% did so with view to the SwissCovid app. 31.5% indicated that they perceived the SwissCovid app as neutral, 30.7% as somewhat negative and 9.3% as very negative. Only 1.6% of respondents evaluated the Covid Certificate app as very negative and 3.6% as somewhat negative.

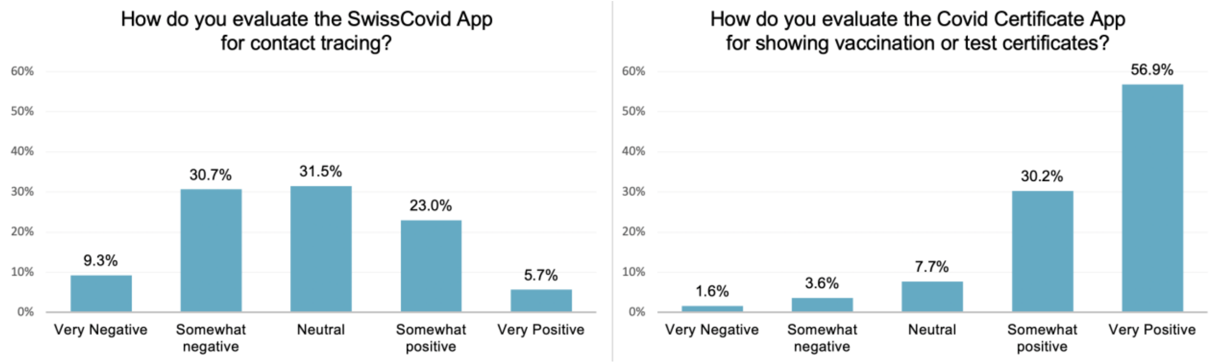

Figure 2: Evaluation of the SwissCovid app and the Covid Certificate app

A majority of respondents (69.6%) indicated that a better communication about its benefits would improve the SwissCovid app (Figure 3). Further 57.1% of respondents think that the possibility to share health data for research, e.g. by listing Covid-19 symptoms and vaccination status, would contribute to enhancing the app. 37.8% of respondents indicated that the app's user friendliness could be improved. 23 respondents gave answers to the open-ended sub-question 'other' and expressed that functioning of the app should be improved, specifically the notifications after having Covid-positive contacts. In addition, some mentioned that a clearer explanation of its relevance should have been given.

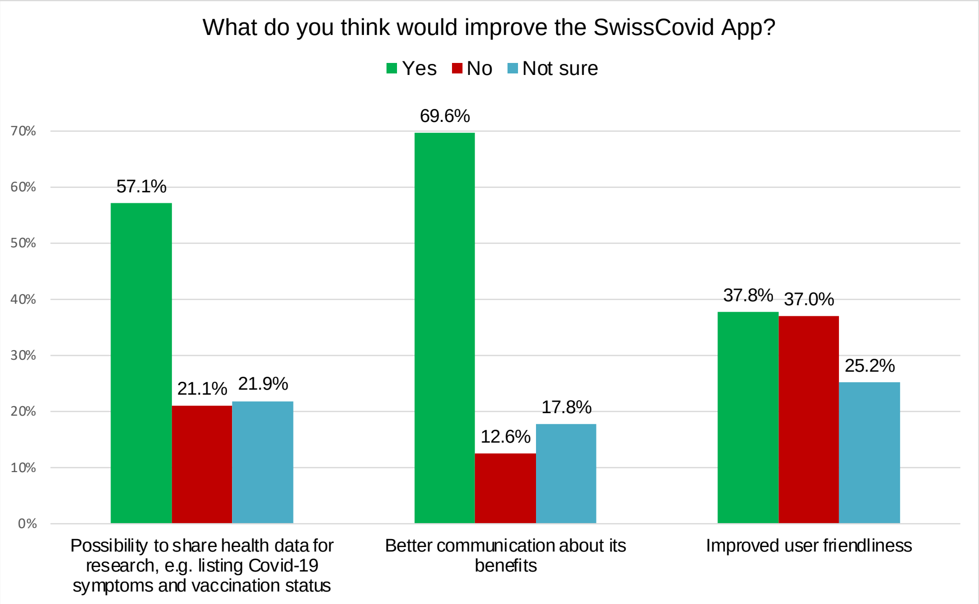

Figure 3: Opinions on what would improve the SwissCovid app.

In general, slightly more than half of all respondents (52.8%) think that the use of apps such as the SwissCovid or Covid Certificate app will increase the public use of other health apps.

In an open question, respondents furthermore indicated their ideas for technologies to respond to the pandemic (we asked "If you could introduce a technology for responding to the pandemic, what would it be?"). Out of 80 responses, two clusters emerged: apps and hard ware technology. Concerning apps, the most frequently raised idea was an app that consolidates general information about viruses, the Covid-19 virus specifically, vaccines and its mechanisms of action, Covid-19 and Long Covid symptoms, as well as current cases, regulations and restrictions. Other ideas were a) an app in which users can note their contacts of the past days, so as to facilitate contact tracing, b) an app which shows all current restrictions in one place, c) an app which evaluates the public experiences during the pandemic, d) an app which focuses on improving mental health during the pandemic, and e) an app that shows Covid-19-positive cases in an up-to-date hotspot map. With regard to technology, respondents raised the idea of improved testing tools for at home use, e.g. "a device that detects a SARS-CoV-

2-infection as early as possible. It should be available for every household" or smart watches which measure antigen levels. In addition, respondents raised ideas for technologies which can be used in public, such as automated machines for checking certificates, ID and temperature at venues or air sensors to measure the amount of virus load in the air in specific places. In general, it was frequently mentioned that good and consolidated information platforms are necessary and suggested that videos that show aerosol circulation are more widely available to promote awareness.

Sharing health data or biological samples for public health research

A large majority of respondents (83.6%) has a very positive (45.8%) or somewhat positive (37.8%) general opinion towards research with health data and human biological samples (like blood, saliva, urine, hair or tissue. Figure 4). While 12.6% are indifferent, only 3.4% have a somewhat negative and 0.4% a very negative opinion towards research with health data and biological samples.

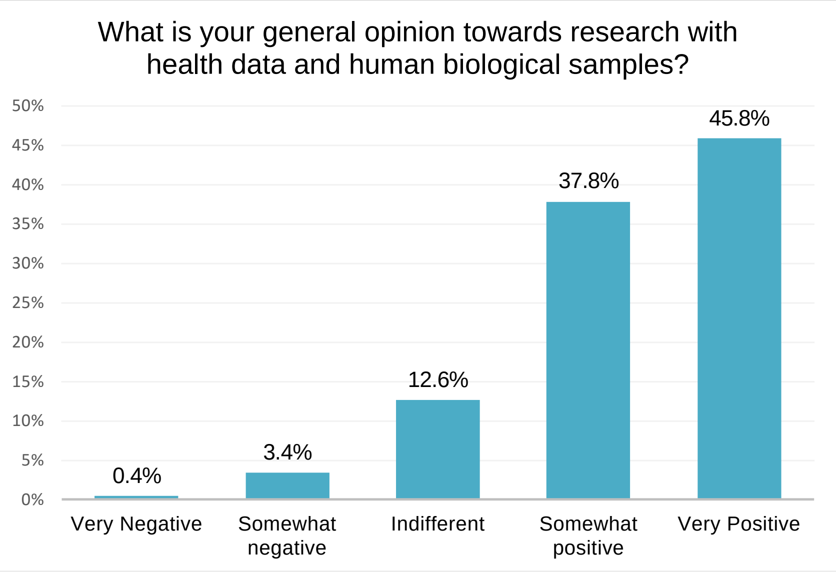

Figure 4. Opinion towards research with health data and human biological samples.

31.5% of respondents indicated that they already participated in health research: 13% of respondents participated multiple times in the past and 18.5% participated once. A large part of respondents (45.4%) indicated that they did not participate in health research yet, but that they would be interested, while 23.1% did not participate.

The majority of respondents (92.4%) would in the future participate in a research project that used their health data or biological samples. Only 7.6% indicated that they would not participate in such project.

As reasons for non-participation respondents mainly named privacy and possible misuse of shared health data, e.g. when insurance companies would be able to access the data (as asked in an open-ended question). Some respondents indicated that they would be more willing to share their health data or biological samples when data would be completely anonymous (yet biological data cannot be per se anonymous).

When being asked if their attitude towards sharing data for public health research change during or with the Covid-19 pandemic, a majority of respondents (75.2%) indicated that it did not and that they still have the same attitude as before. However, 21.4% indicated that it did change their attitude and that they are more willing to share health data for research purposes. The attitude of 3.4% of respondents changed towards being less willing to share health data for research purposes.

Figure 5 shows the types of data respondents would be being willing to share for health research. Of all respondents, 92% would share questionnaires about their health status, 84.9% blood samples, 77.7% biological samples that they can take themselves (e.g. saliva, hair, urine, buccal swab), and 68.5% biological samples that have to be taken by medical staff (e.g. tumor tissue or skin cells). Half of respondents (50.4%) would share data derived from apps about their health or lifestyle (e.g. exercise tracker, food log, heart rate, etc.), whereas 29.8% would be willing to share their social media data for health research. 46.6% would be willing to share their family's medical history. 2.1% would share no data.

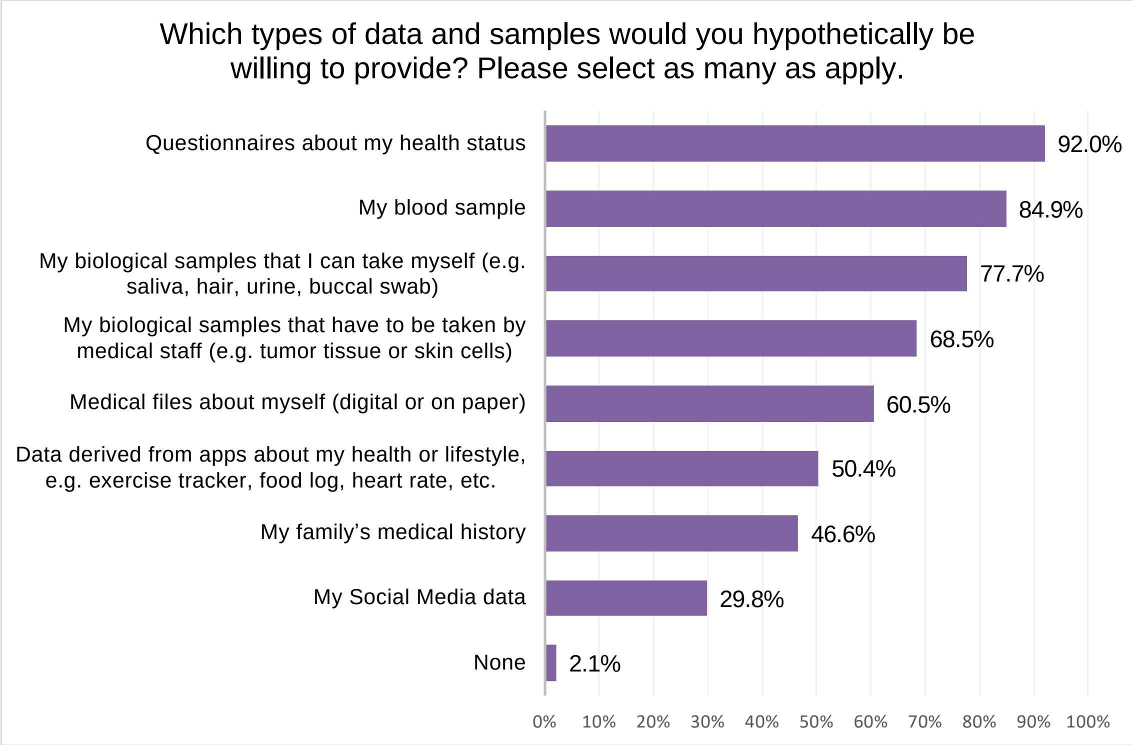

Figure 5. Sensitivity to share different types of data.

4. Discussion

With this survey we aimed to fill the gap of empirically examining how Swiss medical students perceived the Covid-19 pandemic response, how they evaluate the related use of apps to respond to the pandemic as well as their willingness to share data for health research. The results of this survey may shed light on how the Covid-19-related use of technology and health data is changing the health landscape in Switzerland after the Coronavirus pandemic. They show that a majority of respondents indicated to be somewhat negatively affected by the pandemic, but still deemed the public health policy responses (shops and leisure activities closed temporarily, mask requirements, distancing requirements, home office etc.) to the pandemic in Switzerland as just right or even slightly too unrestrictive. This survey was conducted right before most public health measures to contain the Covid-19 virus were ended on February 16th 2022. At the point of data collection, the comprehensive opening step had already been announced publicly. The public health measures might thus have been evaluated more positively in hindsight than during a wide-ranging lockdown with more restrictions such as in March 2020. Furthermore, the potential selection bias of respondents needs to be considered: medical students are presumably inclined to value health more than other societal values and have a favourable attitude towards public health measures recommended by health experts. Despite these considerations, our findings are similar to a survey mandated by the Swiss Federal Office for Public Health and conducted at the same time as our survey, which showed that a large majority supported the lifting of measures and only 28% believed that the measures were lifted too hastily [6,7]. They also found that the public generally approved of closing shops and services in Feburary 2022, whereas more people were against such measures in October 2020 [7].

With regard to digital health apps, most respondents evaluated the use of apps to respond to the pandemic as positive, especially the Covid Certificate app, whereas they assessed the SwissCovid app as lacking sufficient communication about its benefits. A majority of respondents deemed a possibility to share health data for research, e.g. by listing Covid-19 symptoms and vaccination status, to contribute to enhancing the app. In another study evaluating the public attitude of ca. 1000 participants each in Switzerland, Germany and Austria towards using the SwissCovid contact tracing app, 46% of Swiss respondents indicated to have downloaded the app – the highest rate compared to Germany (38%) and Austria (18%) [8]. The SwissCovid app was introduced very early in the pandemic and its decentralized, privacy-protecting setup was communicated broadly and thus reached comparable high levels of public trust. The app was however not downloaded by the desired 80% of the population, but reached 2.290.000 active apps in January 2021 [9]. Better communication about its benefits could have accelerated the app's potential.

In terms of data sharing, results show that nearly all surveyed medical students would share their health data or biological samples for public health research purposes. We did not find any comparable studies conducted with medical students, yet our findings differ from similar studies conducted with the general population in Switzerland, which show that willingness is lower but a majority is nonetheless willing to share their data for research. In two representative surveys of the Swiss population conducted in the past years on data sharing, 54% of the public reported to willingly share their data for personalized health research purposes in 2019 [5], and 71% of respondents would share data for medical research in 2021, yet only in anonymous form [10]. Globally, a survey across 22 countries found that willingness of the 36,268 respondents was with 47.4% similar overall, but that willingness rates varied between 29% in Japan to 63.7% in Mexico [11]. Since values of a society vary across countries and several factors in which the study occurs play a role (e.g. setting in which the study takes place, surveyed population, phrasing of questions etc.), it is not always possible to compare such findings across studies and contexts. The main reason why this study found a much higher willingness might be that medical students are aiming to work in the health sector themselves and thus are inherently positively inclined towards sharing data for health research. The general public, in contrast, is more reserved, treating health data as sensitive and to be protected [12]. Yet, previous survey data from Switzerland has already shown that willingness to share data depends on the types of data to share and the conditions under which data sharing occurs, such as which information would be shared and with whom. Based on the empirical data, Ienca is hence right to claim that Swiss citizens are willing to share their health data in general, but at the same time wish to control which information they would like to share and with whom, concluding that data sharing and protecting privacy is not mutually exclusive [13].

An interesting result of our survey is that less respondents (83.6%) reported a positive general opinion towards research with health data or biological samples and more respondents (92.44%) are actually willing to share their data or samples for research. An interpretation is that respondents deem research with data or samples as important and needed, but are also aware about the potential risks and disadvantages for certain types of research. Most respondents furthermore believe that their attitude towards sharing data for public health research did not change during or with the Covid-19 pandemic, which is contrary to our expectation. A longitudinal survey with the general public conducted by Sotomo found that public willingness to share data for medical research was higher in 2022 (55%) than before the Covid-19 pandemic (42% in 2018) [14], which would also have been our hypothesis for the medical student sample.

Similar to previous findings from the general public [5], medical students reported to be most willing to share questionnaires about their health status, blood samples and biological samples, and least willing to share social media data (yet still with nearly 30% more willing than the general public). Half of them were willing to share health data derived from digital health apps. Apparently, medical students still hold a ‘traditional’ approach to types of health data, in which data about health or lifestyle derived from the digital sphere might not have gained the same status. Uncertainty about the uses of digital health data might have also lowered trust in sharing this type of data among the younger generation [15].

The information derived from this pilot study offers opportunities for policymakers and actors of the digital health ecosystem to evaluate whether the uptake of digital health tools and willingness for data sharing changed due to the Covid-19 pandemic and might evolve in the future. Some features of digital health apps could be detected that can be improved for future use: the benefits of implemented digital health apps should be better communicated to the public and its relevance should be explained more clearly when used as part of pandemic response. In addition, the possibility to share health data for research, e.g. by listing Covid-19 symptoms and vaccination status, could increase the added value of the app.

A limitation of our study is the sample consisting of medical students: They represent the a technology- and medicine-inclined younger generation, which is usually more literate and less concerned to use digital apps: Thus, they are potentially more positively inclined towards the use of digital health apps and more willing to donate data for health research. Given the rather small size of our sample due to the pilot study approach, it represents only a fraction of the Swiss population; one which might be more positive towards digital health apps and more willing to share data than the broad public. A larger study with a more diverse sample representing the overall population is therefore needed. However, this sample provides insights into the attitude of the health literate, younger generation towards the use of digital health apps and data sharing. Moreover, this survey captures respondents’ attitudes and opinions at a single point in time. A longitudinal survey study could more thoroughly assess how respondents’ views develop and change.

5. Conclusion

Recent developments in digital health app use were fuelled by the Covid-19 pandemic and the public – as a central actor – defined social trends with regard to digital health app uptake and willingness to share health data. This study revealed that a majority of medical students of the surveyed sample felt somewhat negatively affected by the pandemic, but most also deemed the public health policy responses to the pandemic in Switzerland as just right. It furthermore showed that most respondents evaluate the use of apps to respond to the pandemic positively. Nearly all indicated that they would participate in a research project that used their health data or biological samples in the future, but most believe that the Covid-19 pandemic did not change their attitude towards sharing their data or samples for public health research. We conclude that providing the public with information about the benefits of digital health apps and giving them the choice to control which data they share with whom is key to foster sustainable developments in digital health and data sharing.

6. Declarations

Ethics approval and consent to participate

The survey was carried out in accordance with data protection regulations at each research institution (University of Bern and CHUV Lausanne). Anonymous surveys do not fall under the regulations of the Swiss Human Research Act; an ethics approval was therefore not necessary, which was confirmed by the Cantonal Ethics Commission of the Canton Bern. Informed consent was obtained from all study participants by responding to the survey.

Consent for publication

By participating in the survey, respondents gave their consent for publication.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

CB, RP and RJ conceived the research and designed the study. CB and RP collected the data. CB analyzed and interpreted the data and wrote the manuscript and RP and RJ provided comments. All authors read, amended and approved the final manuscript.

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