

Stay fit or get bit – ethical issues in sharing health data with insurers' apps

Martani Andrea^a, Shaw David^{ab}, Elger Bernice Simone^{ac}

^a Institute for Biomedical Ethics, University of Basel, Switzerland

^b Care and Public Health Research Institute, Maastricht University, the Netherlands

^c University Center of Legal Medicine, University of Geneva, Switzerland

Summary

In the framework of digital health, mobile applications with health-related content are increasing in number and importance. Many of these apps are targeted at the general public and, although they differ in features and purposes, their functions are often based on the promotion of health and the monitoring of customers' lifestyle data. Apps of this type have also recently been developed by health insurance companies. In many cases, insurers' apps do not simply offer health-related recommendations to the users, but also provide economic incentives to those customers who agree to share their behavioural data through the applications. Although such apps may contribute to the adoption of a health-conscious lifestyle, the fact that they require the sharing of dense individual data with the companies responsible for insurance coverage raises some relevant ethical issues.

This paper investigates the phenomenon of insurers' apps permitting customers to share their data in exchange for monetary rewards currently available in Switzerland. After describing the features and functioning of the apps, we present some ethically relevant aspects related to their use. More specifically, we discuss the issues of transparency of data-sharing purposes, potential discrimination amongst insured people, "quantification" of the users and, finally, the potential tension generated between solidarity and responsibility. We conclude by emphasising that these apps are becoming a new paradigm for insurers in many countries and that a thorough assessment of their ethical and societal implications is required.

Keywords: digital health, health data, ethics, app, insurance

Introduction

Digital health is drastically changing the context of medicine and healthcare. Although a shared and clear definition of this term is lacking [1], it has been argued that digital health encompasses mobile health, health information technologies, wearable devices, telehealth and telemedicine [2]. Although quite diverse in nature, digital health solutions share the distinctive feature that they "provide digital and objective data accessible to both caregivers and

patients [thus leading] to an equal level doctor-patient relationship with shared decision-making and the democratisation of care" [3].

Health apps constitute a relevant component of digital health solutions. In general, the term "health apps" refers to all mobile applications aimed at the promotion of health through supporting self-management, generating pre-diagnosis or producing other therapeutic effects [4]. A recent study on the potential and risks associated with health apps supported by the German Ministry of Health reported that there are over 100,000 apps with health-related content [5]. One reason why health apps are thriving is that a great many of them are not aimed at healthcare professionals or at patients with a specific disease, but are rather targeted at the general public [6].

In this context, health insurers have recently also begun to commercialise some health apps [7]. Many of these apps simply allow customers to deal more efficiently with their documents by digitalising some previously paper-based processes. Others, however, belong more closely to the field of digital health because they include some functions that are strictly related to health promotion [8] and because they aim at directly engaging the users with respect to their health [9]. Specifically, to promote the adoption of a healthier lifestyle, these apps allow users to share their behavioural health-related data with their insurer to better track their habits and provide them with personalised health tips [10]. The insurer often offers monetary awards or similar bonuses as incentives to share data and to try to improve health-related behaviour [10].

Although insurers' data-sharing apps aim at promoting health-conscious behaviour and at giving financial bonuses to people with an active lifestyle, the fact that they are based on the monitoring of individual behaviour and the sharing of health-related personal information also raises some legal and ethical concerns. Indeed, one of these apps was recently criticised by the Federal Data Protection and Information Commissioner (FDPIC), who recommended the revision of a few of its features [11]. In particular, the FDPIC criticised the processing of Basic Health Insurance (BHI) data together with Additional Health Insurance (AHI) data and disapproved of the fact that economic rewards were given also to BHI subscribers. However, the

Correspondence:

Andrea Martani, Institute for Biomedical Ethics, University of Basel, Bernoullistrasse 28, CH-4056 Basel, [andrea.martani\[at\]unibas.ch](mailto:andrea.martani[at]unibas.ch)

idea of using apps to share behavioural health-related data with insurance providers in exchange for monetary rewards was neither questioned in principle nor investigated in depth.

In this article, we first provide an overview of the features and the functioning of insurers' apps currently available in Switzerland that offer monetary incentives in exchange for data-sharing. Then, we discuss some of the ethical issues related to the sharing of lifestyle data with insurances through these apps. Our discussion is based on an adaptation of the casuistry approach, relying both on the analysis of the apps available on the Swiss market and on further literature review on the topic of digital health and the use of incentives to modify health-related behaviour.

Methodological approach

To further investigate the phenomenon of insurers' data-sharing apps, we searched for all the apps of this kind offered on the Swiss market. For the scope of our search, we defined as "insurers' data-sharing apps" those mobile applications developed or offered by a health insurance company whereby the sharing of individual health-related behavioural data earns a monetary reward or similar compensation. We based our definition on the FDPIC's official communication analysing one of these apps. According to our definition, the distinctive feature of insurers' data-sharing apps is that they provide – on top of general incentives, such as daily challenges or health tips – a series of direct or indirect monetary bonuses as a reward for sharing behavioural health-related data. In this sense, these apps are different from other health-promotion tools such as smoking cessation programmes. In fact, with insurers' apps users are even more strongly motivated to share behavioural health-related data, since – on top of the promise of the long-term benefit of improving their health – they also receive a direct, readily available and more tangible monetary benefit. In this context, we use the term "sharing" to refer to the transfer of data between app users and insurers, and not between users. (We use the term "sharing" and not "collecting" since in most cases these apps simply rely on data collected by other means [for example through fitness trackers]. However, this same process could also be described as "secondary collection", i.e. collection from a source that had already gathered data from the data subject.)

In order to be comprehensive, we decided to investigate the whole Swiss market, thus including insurers' data-sharing apps offered in the framework of both BHI and AHI. We did not consider health insurance plans that simply allowed for reduction of premiums upon participation in specific health promotion activities. (For example, "KPT Krankenkasse AG" offers an insurance plan named "active plus", where customers can obtain premium reductions if they participate in certain health-promoting activities [e.g. yoga courses]. To obtain the discount, customers need to provide evidence of participating in these activities [e.g. receipts], which they can also scan and submit via the insurance app used to submit other documents [e.g. hospital bills]. In this case, however, a proper digital health component is missing, since the app is simply used as an alternative to paper transmission. One example is the ActivePlus Program [12].)

To identify insurers' data-sharing apps, we checked insurers' websites as listed by the Federal Office of Public Health [13] to establish whether they offered apps that fitted our scope of inquiry. After having identified apps that fitted our definition, we analysed their characteristics by reading their description on the insurers' website and on the app stores (Google Play and Apple Store). We then read the terms and conditions (T and C) of the identified apps to better map their functioning. We finally discussed the features of insurers' data-sharing apps by continuing the investigation started by the FDPIC and using a casuistry approach [14–16]. Casuistry, in contrast to principlism approaches in bioethical analysis, is based on a bottom-up procedure, whereby a specific and concrete situation is investigated to elaborate considerations, reflections and maxims of a more general validity and potentially applicable also to similar circumstances to the one analysed [17].

Insurers' data-sharing apps in Switzerland: features and functioning

We finalised our search in January 2019 and were able to identify seven different apps that could fit our definition. Upon further reading of the T and C of the identified apps, we excluded two of these for the following reasons: The app "Ignilife" [18] was indirectly sponsored by one insurance group, but it was specified that the app did not belong to the group and that the apps' producers would not share data with the insurer [19]. The app "maxyourhealth" [20] was sponsored by one insurer, but did not explicitly include a reward programme allowing users to receive monetary incentives for sharing data [21]. We thus included in our analysis the five remaining insurers' data-sharing apps, whose most relevant features are presented in table 1 and described in more depth below.

"Helsana+" permits users to either manually "feed" the app with data about health-related behaviours (e.g. photos of outdoor activities), or link the app directly to other health-monitoring devices (such as fitness trackers). When linked to fitness trackers, the app then automatically collects data on the insured person's lifestyle. In exchange for sharing behavioural data, users are awarded bonus points. Bonus points can either be used to reduce the insurance premium, or they can be redeemed as vouchers spendable with selected marketing partners. According to the insurance company, sharing data through the app can lead to savings of over CHF 300 per year [22]. It is available for both BHI and AHI subscribers, but the former's discount is capped at CHF 75 annually.

"MyCSS" allows users – amongst other services such as scanning insurance documents – to register for the "MyStep" functionality. Once activated, "MyStep" users are not allowed to manually feed data, but they can link their fitness trackers directly to the insurer's app. The app then automatically monitors how many steps the customer takes. As a reward, for every day that the insured person achieves specific step-thresholds (see table 1), he or she receives a cash-credit. These cash-credits are transferred to the insuree's personal account and can be redeemed as cash, for up to CHF 146 per year. MyStep is only available for AHI subscribers.

The “Active” app by Sanitas follows a very similar model to that of “Helsana+”. Insured people can collect bonus points if they share individual health-related data with the app. Data-sharing can be performed either through manual feeding by the user (for example by uploading data about nutrition), or via automatic means, by linking the app to a fitness tracker. Once collected, insurees can then convert the bonus points into vouchers to spend on products offered by business partners. Everybody can register on the app, but only Sanitas insurees can collect bonus points.

“Benevita” is slightly different from the other apps. In order to obtain bonus points, users have to fill in a questionnaire and communicate data concerning their lifestyle habits. Depending on their questionnaires, a certain number of bonus points are assigned to customers. The number of bonus points determines the discount users receive on their AHI premiums. Automatic collection of behavioural health-related data through linking the app with fitness trackers is possible, but it does not allow collection of points and it is simply used to create health-related challenges for the user.

SanaHealth is similar to the “Active” app in its structure, but – being a pilot project limited to 1500 users – it is less developed. Customers can share their data with the app either automatically, by connecting the app to fitness trackers or manually, by providing individual pieces of information about lifestyle habits. Sharing gains users bonus points, which they can then use to buy products from an online shop. It is downloadable for free for all customers of Sanagate, the insurance company offering it.

Ethically relevant aspects of health-data sharing though insurers’ apps in exchange for monetary rewards

The widespread collection and sharing of personal health data has the potential to revolutionise healthcare. Since life-habits and health outcome are linked [33], apps offering the chance to contribute to the adoption of responsible health-related behaviours may lead to health improvements and beneficially affect health interventions [34]. Moreover, the use of financial incentives in this context could encourage responsible behaviour by providing a tangible and short-term benefit on top of the long-term expectations of positive health outcomes.

However, the constant monitoring of behaviour that insurers’ data-sharing apps require also raises a number of ethical and legal questions. When analysing one of these apps, the FDPIC already observed that there were some issues related to the legitimacy of data-linkage, the provision of consent and the payment of economic bonuses. By expanding this analysis in light of the common features of all insurers’ data-sharing apps available on the Swiss market, we have identified four further areas of ethical concern, which are presented here.

Transparency: what are the (true) purposes of data-sharing?

One fundamental principle of legitimate data usage is that of clearly defining the purpose for which data is collected, shared and processed [35–37]. Indeed, Swiss law explicitly limits – with regards to the extent and the objectives of the processing activities – private institutions processing personal data to those purposes that are disclosed at the moment when data is shared and consent by data subjects

Table 1: Insurers’ data-sharing apps in Switzerland.

App's name	Type of data shared	How is data shared?	Rewards for data sharing	How can rewards be used?	Who benefits?
Helsana + [22, 23]	Health-related behavioural data of routine activities (e.g. steps) or time-limited activities (e.g. sport event)	1. Automatically: by linking health apps (e.g. Google fit. or fitness trackers (e.g. Garmin. to the insurance app 2. Manually: by sharing photos or scanning QR codes.	Redeemable bonus points: the amount depends on the insurance cover, and is limited per year (30.000 for AHI and 7.500 for BHI)	Bonus points can be redeemed as cash, benefits in kind, or vouchers. Up to CHF 300 can be redeemed per year.	Insured people. Even underage individuals from the age of 12 can participate upon authorisation by legal representative.
myCSS (MyStep option) [24, 25]	Number of steps per day.	1. Automatically: data from a fitness tracker is synchronised with the app.	Cash credits: CHF 0.40 for every day with 10,000 or more steps; CHF 0.20 for every day with between 7500 and 9999 steps.	Credits are paid as cash to the insured person. Up to CHF 146 (365 days at CHF 0.40) can be redeemed.	Insured people with AHI. However, behavioural data is compared with data concerning BHI of the subscribers for marketing and statistical purposes.
Sanitas Active [26, 27]	Personal data, data about nutrition, sleep, pulse, and other routine activities (e.g. steps, minutes of cycling).	1. Automatically: by linking health apps (e.g. Google fit. or fitness trackers (e.g. Garmin. to the insurance app	Coins: the rewards depend on the achievement of daily targets or the completion of challenges.	Coins can be redeemed as vouchers to be spent with one of partner companies. Collected credits cannot be exchanged for cash.	Insured people with additional insurance.
Swica BENEVITA [28, 29]	Data concerning lifestyle habits and data from fitness trackers.	1. Automatically: data from a fitness tracker is synchronised with the app. 2. Manually: a declaration can be completed online by answering to a series of health-related questions.	Bonus points: depending only on the declaration, a specific amount of points is granted.	Bonus points determine the status of the user and the entitlement to a premium discount up to 15%.	Insured people.
SanaHealth [30–32]	Data concerning physical activity, eating habits, heart rate, blood pressure and sleep patterns.	1. Automatically: data from a fitness tracker or health app is synchronised with SanaHealth. 2. Manually: the person feeds single pieces of information.	Redeemable bonus points.	Bonus points can be used in a user-reserved shop (“SanaHealth-Shop”) to buy a series of products.	Insured people. The app is current being develop as a pilot project limited to 1500 participants.

is obtained [38]. The importance of clearly disclosing the purposes of data processing is especially fundamental with respect to sensitive information such as data concerning health [39].

In this regard, there seems to be an issue concerning transparency with respect to insurers' data-sharing apps, since the entire range of purposes for which users' data is processed is not equally disclosed. The common message that the insurers promoting their apps deliver is that the key purposes of data sharing are the following: (1) improve individual health; (2) help users save some money. For example, the webpage describing and promoting the "Active" app claims that "in the medium and long term you benefit from better health. And in the short term you benefit from the bonus system of our Active app!" [40]. Similarly, "myStep" is advertised as having the objective of "Turn[ing] steps into a bonus", "reward[ing] your physical activity" and "encourag[ing] people to take more exercise and inspir[ing] them to enjoy their health" [24]. However, while these certainly represent some of the purposes of data-sharing and processing, they are certainly not the only reasons. In fact, the T and C customers must agree to in order to use these apps explicitly specify that the purposes of data collection also include more delicate aims, such as using data for marketing purposes and forwarding data to third parties. For example, users of "Helsana+" need to accept that the insurance company "is entitled to forward user data within the context of the above-mentioned processing purposes to all companies in the Helsana Group or to third parties who process the user data for Helsana on a contractual basis" [23].

It is true that by listing the purposes of data sharing and data processing in great detail within the T and C and by requiring explicit agreement therewith, the insurers may err on the side of caution, legally speaking. However, from an ethical perspective, there appears to be a problematic lack of transparency, particularly given that consumers often do not read the fine print closely [41] and that, when confronted with documents such as T and C, people often simply click "Agree", thus giving a type of "blind" consent [42].

In this sense, there is some imbalance concerning the weight given to different types of information by the insurers providing the apps. On the one hand, the beneficial purposes of sharing and processing the data from the perspective of potential users are the main focus of all related webpages and information sheets that describe the product and present the reasons of data sharing. On the other hand, the more delicate purposes of data sharing and data processing are remotely indicated in a document, the T and C, which – because of the nature of how consent is given for the purchase of apps – few users are likely to read. That the users are not adequately informed about the purposes data will be used for seems even more problematic as the data in question is often sensitive, behavioural health-related information. Insurers should be up-front about the use of data for marketing and third-party reuse on the main pages as well as in the small print.

Data-driven discrimination: is it ethical that lifestyle data collected through apps is used to personalise insurance?

Another ethically relevant aspect related to insurers' data-sharing apps concerns whether favouring users who share behavioural health-related data is ethically acceptable. Some degree of differentiation amongst insured people has always been accepted in Switzerland both in the BHI framework and (even more) in the AHI market. In this sense, individual choices – such as deciding one's own franchise or participating in health promotion programmes – have always had an influence on the amount of money paid for insurance coverage. In consequence, it could be argued that the idea of furthering this tendency through the monitoring of users' behavioural data is acceptable as well, insofar as an active – and thus allegedly beneficial – lifestyle entails a premium-reduction or another economic advantage. Moreover, this idea of enhancing insured people's responsibility for their own behaviour seems consistent with a recently developed definition of health as "the ability to adapt and to self-manage, in the face of social, physical and emotional challenges" [43].

In general, where to set the exact boundary between acceptable differentiations amongst insured people and illegitimate discrimination is a bone of contention [44, 45]. With respect to Swiss healthcare, it is important to draw a clear distinction between the context of BHI and AHI [46]. Despite being offered by private companies, BHI is mandatory and covers a broad range of healthcare services that are equal for everybody and defined by the law. Insurers are obliged to accept all applicants irrespective of their risk profile and – although they have some degree of freedom in setting the price for their premiums (e.g. they can offer lower premiums to people as old as 25) – they are not allowed to profit. AHI, on the contrary, is a market-based system, where insurers can make profit, define eligibility and establish prices and exclusion criteria. Since most of the insurers' data-sharing apps offer an economic advantage that is linked to AHI, the main issue at stake is whether – in the context of the market-oriented AHI – it is ethically acceptable for insureds to receive better economic arrangements (through discounts or rewards) if they share lifestyle data.

Even in market-oriented models of health insurance, different economic arrangements are often seen as ethically troubling if based on features upon which the insured person has no control, such as race, gender or genetic data [47]. This is true also for Switzerland, where the law governs the disclosure of genetic data to insurers in a special way and insurers cannot – for example – ask applicants to undergo genetic testing as a condition of subscribing to AHI [48]. In contrast, differentiation based upon factors that depend on individual choices does not seem to be fundamentally unfair, especially in the framework of AHI. From an ethical standpoint, this is because a difference is often drawn between voluntary and involuntary risk-seekers: whilst a person with inherited genetic features that determine a predisposition towards certain illnesses is seen as a "victim" who deserves support, an individual who, for example, smokes is considered "faulty" and deserving of (economic) disadvantages [49]. In this framework, discriminating – by awarding economic benefits – in favour of those that share

data documenting their healthy lifestyle might therefore seem acceptable.

Yet there are three reasons that seem to make this form of “data-driven” discrimination ethically problematic, even in the framework of AHI. Firstly, the basic claim that discrimination based on lifestyle choices should generally be justifiable because behaviour is both voluntary and a matter of free choice is highly doubtful. Not only has it long been known that unhealthy behaviours are associated with socio-economic conditions over which the individual has little control [50], but behavioural economics has also more recently demonstrated that individuals are not rational decision-makers even with respect to important issues such as health [51]. Secondly, this form of discrimination seems unfair because it interferes with the autonomy of those that have a healthy lifestyle, but refuse to share their data through insurers’ apps, perhaps because of concerns related to data protection. Making economic benefits dependent on consent to share dense behavioural data through an (admittedly) fallible app seems to create pressure to share data, rather than merely incentivise healthy lifestyle habits. Positive behaviours could be monitored (and incentivised) in many other manners, either less privacy-invasive – such as by asking insurees to provide receipts of fitness courses – or more reliable – such as through professional health check-ups. Thirdly and more importantly, this “data-driven” discrimination seems ethically unsound because the exact consequences of data sharing on individual coverage are not clearly outlined. In fact, the T and C of most data-sharing apps say that lifestyle data can be processed for profiling purposes through behaviour analysis [23, 27, 29]. Whereas risk-profiling *per se* is a normal task for insurance companies, it seems ethically problematic to perform it retrospectively (i.e. after being insured) and on the basis of lifestyle data. The piece of legislation governing AHI (Swiss Federal Law on Insurance) already requires individuals to truthfully disclose all relevant information related to their risk profile before they sign an insurance contract, and protects insurers from deceitful non-disclosure as – if the individual lies – the insurance contract can be voided [52]. In this sense, it seems more ethically acceptable to perform the whole processes of profiling, risk-assessment and personalisation of coverage and premium costs upfront in a transparent and explicit fashion, rather than leaving them open to potential ex-post evaluation via lifestyle data. In order to be ethically sound, differentiation in economic arrangements and medical underwriting should be based on clear facts directly and consciously declared by individuals and not on complex profiling based on dense lifestyle data automatically shared through apps.

The quantified self: are users merely what their data say they are?

At a practical level, the principle underlying the idea of rewarding insured persons for sharing some health-related data is that adopting a responsible lifestyle contributes to improving health. In this sense, a discount on the insurance premium or other monetary bonuses are presented as incentives for adopting a healthy lifestyle. Moreover, there are also economic reasons for granting a monetary reward in exchange for data confirming the adoption of a responsible health-related behaviour. Just as with discounts grant-

ed for the performance of regular health check-ups [53], the assumption is made that if insured people demonstrate they are trying to keep fit, they will be less likely to make use of healthcare services, thus reducing their consumption of healthcare resources and earning them an economic benefit. On the other hand, people who do not share data would not have access to discounts, because insurers assume that their undocumented lifestyle might be unhealthy, thus increasing the likelihood that they will be in need of healthcare services in the future. In this sense, insurers’ data-sharing apps seem to foster the idea that individuals and their health status are quantifiable through the data they produce with their self-tracking devices and apps [54].

Quantification of individuals in the context of health has sparked a polarised ethical debate [55]. On the one hand, advocates for self-quantification through tracking devices underline how this would serve the principle of beneficence. In fact, since tracking devices allegedly allow insurers to collect objective lifestyle health-related data, the latter can be used to personalise treatment and thus improve care. On the other hand, concerns have been raised with respect to autonomy and self-tracking has been described as disempowering, because it potentially allows the control and the surveillance of others who have access to the data of the tracked person.

In the context of insurers’ data-sharing apps, promoting the idea that people are simply what their data say raises three issues. Firstly, it is disputable that the lifestyle data shared through the apps corresponds to the aspiration of truth and objectivity of self-tracking technology [56]. In fact, because of such apps’ inherent limitations, there is no guarantee that the few types of data shared are actually accurate. For example, the T and C of one app specify that the app “draws exercise data from third-party sources [e.g. fitness trackers] and assumes no liability for the accuracy and correctness of this information” [27]. Secondly, as the amount of data that can be shared through these apps is limited (some relevant risks factors such as smoking are not included), their focus seems too narrow for them to be used to define a concept as complex as health status. For example, a person could reap substantial benefits from sharing data through these apps, but also be “hiding” other habits (such as heavy drinking), which could impose much heavier costs on the healthcare system than someone who merely does not share data or exercises less. Thirdly, the fact that these apps share data with insurers fuels the concerns that some form of surveillance could take place, since health insurers have a vested interest in analysing the health-related behaviour of their customers.

Tension with solidarity: is it ethical to stress the “moral” side of personal responsibility?

One last remark must be made concerning the impact that insurers’ data-sharing apps can have more broadly on some of the ethical foundations of healthcare as a component of the system of social security. Along with security and protection, the crucial pillars of healthcare systems in Europe are solidarity and responsibility [57, 58]. Solidarity dictates that people who are in specific situations of need or risk should be included in the protection given by the social security system, and that the costs of the disadvantages related to their condition should be shared amongst

all members of society, regardless of health status [59]. Responsibility, on the contrary, stresses that social protection cannot be indiscriminate and that individual freedom cannot excessively go against the interests of the community. In this context, striking a socially accepted balance between individual responsibility and communal solidarity is a crucial challenge. In the Swiss healthcare system, this balance is achieved by combining the guarantee – thanks to mandatory BHI – of a large basic benefit basket for everybody, with the possibility of personalising this offer through the subscription of AHI or the selection of a BHI with higher deductibles or with a managed care model at a lower premium rate [60]. Individual responsibility thus plays an important role, but it is anchored in personal preferences and objectively defined criteria, rather than in lifestyle and behaviour.

Because of their features, insurers' data-sharing apps can have a substantial impact on the delicate balance between personal responsibility and solidarity in Swiss healthcare. By rewarding those who accept being monitored, these apps "moralise" the idea of responsibility, since they introduce differences – albeit minimal, since rewards have a modest economic value for the moment – between "deserving" and "undeserving" agents [61]. This latently reinforces the idea that insured persons are allowed to contribute less to the financing of healthcare because of their lifestyle. In other words, insurers' data-sharing apps stress the link between responsibility and lifestyle choices. In Switzerland, the debate concerning the extent and the role of personal responsibility for health is an open one, and whether lifestyle should be considered as an important element to limit solidarity in healthcare is often discussed [62, 63]. In this respect, although increasing responsibility for health-relevant behaviours is not ethically problematic *per se*, whether this is the right direction for the future evolution of healthcare in Switzerland is something that ought to be collectively and openly discussed, rather than being subtly introduced through mobile apps that are not clinically validated.

Careful discussion before the delicate balance between solidarity and responsibility in healthcare is modified is particularly important from an economic standpoint. An argument for justifying premium reductions according to behavioural habits could be that people – by means of adopting a healthy lifestyle – still contribute positively to the insurance model, as the savings they produce through healthy habits would offset the small economic benefits they receive. However, whether this is the case is an empirical question and, before any such system is implemented, a reliable amount of evidence regarding the real economic consequences of following specific lifestyles should be collected. A recent study exploring the impact of digital health solutions on healthcare utilisation in the US demonstrated that these are not associated with any large short-term increases or decreases in health care usage [64]. More generally, empirical evidence seems to show that, from a purely economic perspective, the adoption of what could be regarded as an "active" lifestyle actually increases health expenditure, since active people have a longer life expectancy and are thus more likely to suffer from age-related chronic diseases [65]. Moreover, as outlined above, the fact remains that people could "exploit" the system to

obtain monetary benefits by providing biased data or by "hiding" other unhealthy habits that are not measured (e.g. smoking). This is even more likely given that these apps are not clinically validated and that T and C often underline that use of the apps is undertaken "entirely at the user's own risk" [23].

Conclusion

Insurers' data-sharing apps are a representative and relevant technological instrument in the field of digital health. The phenomenon of insurance apps permitting the transfer of health and lifestyle data in exchange for monetary rewards is thriving and apps of this kind are not exclusive to Switzerland. In 2016, Generali, the third largest insurance group in the EU [66], announced the launch of the "Vitality" programme [67], which is based on continuous monitoring of health-related behaviour of insured persons through, amongst other means, an app linked to fitness trackers. The "Vitality" programme is aimed at promoting a more active lifestyle amongst insured persons and offers several monetary rewards in exchange for the sharing of health-related data. The financial benefits include, for example, a 40% discount on the purchase of a fitness device and a definite amount of bonus points for every data-upload [68]. "Vitality Health" in the UK also offers a similar programme, proposing tailored insurance plans with special discounts if the person accepts the transfer of personal health data through fitness tracker and regular visits [69]. The same model is offered by "Discovery" in South Africa, where sharing also entails the transfer of data concerning users' medication adherence [70].

From this article, it has emerged that insurers' data-sharing apps are presented as a way of incentivising the adoption of a healthier lifestyle, saving money and reducing the burden of those illnesses that are co-caused by some specific health-related behaviours. However, the use of these apps also raises a series of problematic ethical issues, particularly with regard to the issues of transparency, discrimination, the quantification of the self and the balance between responsibility and solidarity in healthcare. Moreover, in addition to some widespread scepticism concerning the use of monetary incentives to improve behaviour [71], at present decisive evidence demonstrating the beneficial impact of health-related mobile applications – either in terms of clinical effectiveness or in terms of healthcare-resources consumption – is lacking [64, 72–76].

As society ages and the impact of chronic illnesses grows, the pressure of increasing efficiency while decreasing healthcare costs will continue to rise. In this sense, the use of data and the implementation of digital health represent powerful ingredients to help reduce costs and better allocate scarce resources [77]. However, new developments such as insurers' data-sharing apps must continue to be critically assessed and evaluated in order to protect citizens – both healthy and unhealthy – from potential discrimination and exposure to privacy risks.

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Potential competing interests

The authors have no conflict of interest to declare.

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