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mHealth and Self-quantification in Health Promotion: Some Critical Considerations

Abstract. The sphere of digital health and medicine is characterised by continuous and pervasive favourable, techno-utopian views. Transformative expectations and economic rationales are used across different sectors (e.g. medicine, industry, marketing and governmental strategic documents). Diverse eHealth solutions, more recently mobile health (mHealth), have become a spotlight for industry profits and governmental investments. This article gives an argument for why the focus on utopian and instrumental benefits of new technologies in health care is a problematic, reductionist view over the understanding of emerging wider social practices. After an introduction of the rise and difficulties of eHealth project implementation, the focus is put on critical consideration of wider social implications that arise from the integration of mHealth solutions in health promotion programmes. The article looks at the challenges health promotion programmes face with the growing popularity and use of health and healthy lifestyle apps. Frequently, references to Slovenian context are presented. In the conclusions, some vital recommendations are given for policy development when incorporating self-tracking apps into health promotion strategies. Further, the list of references represents a broad overview of recent critical digital health literature and leads to further exploration of the subject.

mZdravje in samokvantificiranje v kontekstu promocije zdravja: nekaj kritičnih razmislekov

Povzetek. Čeprav je področje t. i. digitalne medicine in digitalnega zdravja še vedno v razvojni fazi, ga od preloma tisočletja nenehno podpira in spodbuja nekritična tehno-utopična retorika, ki je prisotna v vseh sektorjih, izraziteje na področju medicine, industrije, oglaševanja ter tudi v strateških dokumentih javnozdravstvenih politik. Raznolike e- in m-zdravstvene rešitve med drugim postajajo središče finančnih interesov industrije in predmet javnega financiranja. Članek problematizira trenutno prevladujoč javni diskurz o instrumentalnih prednostih in utopičnem pogledu na »nove tehnologije« v zdravstvu. Po uvodni kontekstualizaciji vzpona in težav pri implementaciji eZdravstvenih projektov, avtorica natančneje analizira zelene in neželene družbene posledice, ki nastajajo z vpeljevanjem mZdravja v strategije in programe promocije zdravja oziroma javnega zdravja. Dotakne se procesov samokvantificiranja ter tudi izzivov v promociji zdravja, ki nastajajo z naraščanjem priljubljenosti in rabo raznolikih mobilnih (prostodostopnih) aplikacij s področja zdravja, rekreacije in zdravega načina življenja. V članku so na več mestih podane navezave na slovenski kontekst. V zaključku so predlagana priporočila za oblikovalce ter razvijalce javnozdravstvenih programov in strategij, ki bodo vključevale rešitve mZdravja. V seznamu literature je naveden pregled najsodobnejše literature, ki napeljuje na nadaljnje razmisleke o digitalnem zdravju in digitalni medicini.

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Introduction

The digital medicine and digital health arena are rapidly expanding. Not only is there a challenge to keep pace with rapid technological shifts in the health care sphere, but also with the dynamic development of lay and professional terminology. With the turn of the millennium, only a few were familiar with the concept of eHealth (electronic health), while 16 years later, the concept of eHealth has gained several derivatives (e.g. telemedicine, telehealth, most recently mHealth); it became a broader term used to encompass the vast range of emerging practices in health care. Today, numerous definitions of eHealth and its derivatives can be found.¹⁻⁵ Similarly, new words and neologisms, like healthi, connected health, dataveillance, playbour, datafication, gamification, pushed tracking, imposed tracking, wearables and similar recurrently enter our vocabulary. Many rising trends and practices remain a puzzle for some health care professionals, and in particular, for the lay public (users).

However, despite far-reaching and rapid technological advances, the complex culture of eHealth is, evidently, in the phase of infancy. Policymakers, start-ups and hospital leaders have been struggling with large-scale implementation or integration of different digital innovations in the health care arena. One of the challenges is to make great ICT ideas, previously put down in project proposals or/and polished PowerPoint presentations, work in complex social realities.

eHealth: The Rise and Challenges

If eHealth was barely in use before 2000, it has quickly become a buzzword,⁶ and offers great promise for the transformation of health care practice. In industry and governmental strategies, the dominant rhetoric is pervasive enthusiasm for how new technologies will improve health care, reduce costs, empower people and patients, facilitate paperwork and in all aspects, transform health care for the better. From an industry (developers of digital health care solutions) perspective, software is starting to play a central role in addressing problems of the aging society and the escalating cost of health care services. Enablers of such digital health are a growing number of sensors for sensing the human body and communication infrastructure for remote meetings, data sharing, and messaging.⁷ As Lupton (a leading sociologist in critical digital health studies) argues, “digital health technologies are represented as offering an ideal, cost-effective solution to the wicked problem of health

care delivery and encouraging people to change their behaviours in an effort to avoid ill health”.⁸

Utopian discourse has resonated in governmental and EU policies as well. Since 2004, when the first eHealth Action Plan⁹ was adopted on the European level, the European Commission has been developing targeted policy initiatives aimed at pushing forward and widening the adaptation of eHealth through EU member states. Despite these efforts, the implementation of different eHealth solutions has been rather slow and thorny on a wider scale and national levels. Several plans were not fully implemented; many EU-funded projects got stuck in the pilot phase.

Also, national eHealth projects face different financial manipulations, technical problems and delays in project delivery. For example, in the United Kingdom, the NHS Connecting for Health programme had failed by 2009, causing enormous financial losses, ultimately to be deemed “a fiasco”;⁶ later in 2013, some projects and responsibilities were taken over by the Health and Social Care Information Centre.¹⁰ Similarly in Slovenia, there has been loud media criticism,¹¹ difficulties and delays in reaching the technical and organisational goals of the National eHealth Project. In December 2015, the project was taken over by the National Institute for Public Health but remained financed by the Slovenian Ministry of Health. In 2016, several steps were made towards organisational improvements, and visible implementations were made (e.g., e-prescriptions and the portal for users called zVem).¹²

By now, only isolated good practices and limited success in the sphere of improving medical practice, public health and medical conditions can be tracked. In Slovenia, several programmes and projects can be presented as examples of good practice; TeleKap (TeleStroke – a national programme and network of professionals who, from a distance, support and diagnose patients with brain stroke, using ICT communication channels) is presented as one of the most successful products of the National eHealth Project. This programme still faces several polemics and publicly run disputes. Another good example of telemedicine practice (presently limited to coronary and diabetic patients) is found at the General Hospital Slovenj Gradec and Community Healthcare Centre Ravne. A group of different interdisciplinary experts there is persistently trying to spread a successful model of their telemedical health centre, CEZAR, on a wider national level.^{13,14}

Among Slovenian hospitals, the paediatric clinic of the University Medical Centre Ljubljana was one of the few and first to adopt the complex information system Think!Med™. As a rare thriving example, it served as a case study for Kumar, who, based on the theory of diffusion of innovations, analysed user perspective and experiences.¹⁵ Additionally, among start-ups, mHealth solutions developed by Modra Jagoda (e.g. RheumaHelper, a mobile tool for rheumatologists, and Mediatelly – a drugs database), provide apps for doctors.¹⁶ The company collaborates with clinicians in the process of app development. In the field of healthy lifestyles, the Slovenian-Croatian start-up Bellabeat is frequently exposed (in the media and at events) as a regional start-up with wider international recognition, sufficient financial support and commercial success. Bellabeat started with the production of monitors (e.g. foetal heartbeat, stress level) and gadgets for use during pregnancy; currently, the company is introducing smart jewellery for women, the skilfully designed Leaf tracks and monitors sleep, activity and reproductive health of female users, with the goal of reducing stress levels and improving health.¹⁷

Digital health projects and solutions in Slovenia are dispersed among several institutes, faculties, organisations, hospitals and technological parks. Since 2014, led by the active initiative HealthDay.si, a vibrant community of health-tech companies and organisations from Slovenia has developed. In September 2016 organisers of the initiative published a second version of The Green Book, presenting key actors and digital health solutions developed by Slovenian health-tech companies.¹⁸ It is important to remember that this field is ever changing and developing.

Moving Beyond the Magic Bullet

On the EU level, the current *eHealth Action Plan 2012-2020: Innovative for health care in the 21st-century*¹ aims at addressing some of the previously recognised obstacles. However, the idealistic character and revolutionary potentials of eHealth remain its main driving motivators. According to the designers of this strategic document, eHealth “delivers more personalised ‘citizen-centric’ healthcare, which is more targeted, effective and efficient. It facilitates socio-economic inclusion and equality, quality of life and patient empowerment through greater transparency, access to services and information.”²¹

There is no doubt that digitalisation and integrating new technology solutions in health care can facilitate many improvements. However, there is a need for a more balanced critical evaluation of contemporary practices and recurrent transformations in health care due to unleashed computerisation and digitalisation; immersing processes should be situated in wider socio-political context.

In the insightful book, *The Digital Doctor: Hope, Hype, and Harm at the Dawn of Medicine's Computer Age*, Robert Wachter gives a contextual analysis of the journey American health care has taken with health care information technology. He illuminates how technology changes medicine and how it does not. Among others, he mentions a study conducted by researchers at Johns Hopkins Hospital in 2013; they found out that medical interns spent just 12 % of their time talking to their patients and more than 40 % of their time using computers. The author also tackles one of the thorny issues in American health care concerning financial aspects, conflicts of interest and snowballing costs of health care; health care changed from a service to an industry when investors entered the field of health care, and all sorts of medical care were commercialised.⁶

Many other researchers tackled problems emerging in the health care arena along with the rise of intense digitalisation of health care or, as Wachter puts it, “digital bulldozer”:⁶ Topics from the introduction of expert patients, who, using self-tracking devices, will become experts and managers of their chronic disease or prevent ill-health,^{19,20} to the hyper-medicalisation of cyberspace,²¹ where people seek health information online²² and form online health communities.^{23,24} Professional medical associations, such as the Australian Medical Association, think that “doctor in a mouse” trend is alarming due to incorrect self-diagnoses by patients using Internet resources.²⁵ The distribution of power and authority in doctor-patient relationships is changing as well (see the *Journal of Medical Internet Research* for articles on the subject). Furthermore, with the growing popularity of wearables (self-tracking devices), intense quantification of human life functions, health habits and behaviour is emerging (e.g. the “quantified self” movement).²⁶

Numerous commercial and profit-driven interests can be found behind many health apps. One of the most problematic aspects of health apps is the production, use and commercialisation of data generated by users. There is growing talk about lively data, data economy,²⁶⁻²⁸ the monetisation of data, and the ways big data is becoming the new oil, a fundamental belief

motivating many companies and founders behind self-tracking technologies.

This article has covered but a few features of digital medicine and digital health. One aspect worthy of further focus is the relationship between digital health, consumerism and capitalism, where the apps industry is exploiting health problems and aspirations for healthy life, human fears, suffering and struggles, and turning them into enormous profit-making opportunities. If observed from a critical distance, the ideas of avoiding, controlling and measuring health and ill-health have a lot to do with the relationship between capitalism and hyper-commercialisation and health and ill-health.

mHealth: Current Trend and Buzzword

Deborah Lupton elaborates that a third wave of digital technology adaptation in health care is emerging; the process moves beyond the digitalisation, transmission and efficient management of health information towards the interaction (active involvement) and exchange of data between users, institutions, systems and stakeholders from various sectors.²⁷

Therefore, mHealth is a predominant trend in the context of digital health, especially among users and the healthy lifestyle and technological industries. mHealth, as defined by the World Health Organisation, is “an area of eHealth, and it is the medical and public health practice supported by mobile devices, such as mobile phones, patient monitor devices, personal digital assistants, tablets, and other wireless devices.”²⁹ It also includes applications (apps), such as lifestyle and wellbeing apps, “that may connect to medical devices or sensors (e.g. bracelets or watches) as well as personal guidance systems, health information and medication reminders provided by SMS and telemedicine provided wirelessly.”³⁰ mHealth apps include the use of mobile devices in collecting community and clinical health data, delivery of health care information to practitioners, researchers, and patients, real-time monitoring of patient vital signs, and direct provision of care.³¹

The term mHealth is being replaced with “connected health” mainly in the USA. Even though it is not an utterly new term, there is no standard definition. Yet, “on a broader note, connected health is the umbrella term arrived to lessen the confusion over the definitions of telemedicine, telehealth and mHealth.”³²

Commercial Exploitation of Health and Healthy Life Style

Clearly, the market of health, healthy lifestyle and medical apps is booming. In 2014, nearly 100,000 mHealth apps were available across multiple platforms such as iTunes, Google play, Windows Marketplace, BlackBerry World,³⁰ by the end of 2015, more than 165,000 mobile health apps were available.³² Financial predictions are heading towards the sky: “The global telemedicine market is expected to continue to expand to \$27.3 billion in 2016.”³⁰ EU made estimations, that in 2017, if its potential were fully unlocked, mHealth could save €99 billion in health care costs in the EU.³⁴ “By 2017, 3.4 billion people worldwide will own a smartphone and half of them will be using mHealth apps.”³⁰

Using quantified self-wearable sensors, apps and platforms makes it possible to capture and record data about nearly all aspects of human health and fitness, including mental, emotional, physiological, lifestyle and social dimensions. A large rise in use and popularity of different self-tracking devices (e.g. smartphones, smart watches, smart jewellery and similar wearables) can be observed. Most smartphones have activity-tracking capabilities; some of the most popular activity trackers are the Fitbit, Jawbone UP® and similar. On a broader sociocultural level, significant consequences of self-tracking practices are predominant cultural expectations concerning self-awareness, taking responsibility for managing and governing oneself, and improving one’s life chances, which represents the apotheosis of the neoliberal, entrepreneurial citizen ideal.²⁶

It is worth mentioning that a great proportion of health apps focus on healthy lifestyles (e.g. managing stress, improving fitness, controlling diet) and health promotion programmes. “Among 165,000 mobile health apps available, nearly two-thirds are focused on general wellness issues like fitness, lifestyle & stress, and diet. The remainder is made up by apps focused on specific health conditions (9 %), medication info & reminders (6 %), and women’s health & pregnancy (7 %). Mental health apps led among disease-specific apps, followed by diabetes.”³³

Applying Apps in Health Promotion: A Critical Perspective

Today, public health programmes are no longer confined to clinical institutions but can be delivered through diffuse and fragmented networks of locations.³⁵ The many options people have, from commercial or governmental organisations, have led to the opening of many frontier zones of expertise to

the development of borderline practices, half way between medicine and self-care.

At first glance, with the use of health apps and different nagging technologies (leading people to desired behaviour), a set of promising options is opening for improvements in health promotion and public health programmes. In Slovenia for example, there is an app for encouraging blood donation called “Daruj kri” (*Donate blood*); the app “Vem, kaj jem” (*I know what I eat*) was one of the first apps developed in Slovenia for diabetes patients (an overview of mHealth solutions for diabetes mellitus management in Slovenia is presented by Vrbnjak *et al.*⁴), and the 24alife portal is a result of interdisciplinary partners, mainly Slovenian professionals, offering a complete solution for healthier and happier life, to name a few.

The dominant idea behind integrating digital solutions and apps in health promotion programmes is that people can have a better understanding and control of their health status and their relationship with the world around them. By empowering people to easily measure, report and compare their own personal environment, such tools transform everyday citizens into reporting agents who uncover and visualise unseen elements in their lives and co-produce knowledge to improve both their individual lives and the lives of their communities.³⁶

Although the critical examination of digital health remains relatively nascent, a growing body of so-called critical health digital studies literature is now available, where authors question forms of “healthism”, also interpreted as the fetishisation of anything and everything deemed healthy^{5,37} and problematise theoretical and practical consequences of the new ways of monitoring, measuring and commodifying health and healthy lifestyle in health promotion programmes.^{35,38,39}

However, with the growth of mHealth apps and the increasingly popular self-tracking culture, there is a fine line between consensual, pushed and imposed self-tracking.²⁶ “According to recent research, the problem is that many off-the-shelf-tracking options, sold through appeals to “empowerment” do not actually help people. As a result, few people are getting out of their self-tracking devices what they hoped they would.” Additionally, “around 60 % of health-related apps fall into disuse after six months of ownership.”³⁸

In a short, yet concise critical commentary on health promotion in the digital era, Lupton⁴⁰ points out a few crucial issues that need careful further attention, like possibilities of incorporating self-tracking

technologies in health promotion programmes, past investigations into how websites and social-medical sites generate and disseminate information about strategies for promoting health, options to use digital gaming technologies (so-called gamification) in public health programmes, using big data to produce insights into population health and other issues. Lupton’s conclusions are that governmental health programmes need to address issues of surveillance, ethics in big data use, questions about when encouragement become persuasion, the limits of participatory democracy via digital media (many people continue to struggle with access to digital technologies, the Internet or simply do not use them, or do not have the knowledge, skills or capacity to use it), commodification and commercial interests in digital media, and interference into personal space.⁴⁰

Conclusions

In his book, *The Blind Giant: Being Human in a Digital World* Harkaway⁴¹ playfully describes a digital dream world, where shining, healthy people move through a sunlit space filled with birds, plants and slick technology. They are fit because they monitor their own health and pay attention to what they eat; they know the pattern of their own DNA and risks that are unique to them. “They take steps to make sure they do not increase genetic predispositions to cancer or Alzheimer’s; they work out and eat well, knowing the precise benefit of each effortful hour.”⁴¹ Interpreted as a caricature, the scenes of the brave new digital world could as well represent the dominant view of “Silicon Valley” future trends, where many health problems and unhealthy behaviours will be eliminated with the use of technological interaction.

Clearly, the reality is not as shiny as state-of-perfection predictions; health and social sciences professionals involved in public health programmes are familiar with obstacles and challenges in changing complex human behaviour into desired, healthier directions (e.g. quitting smoking, losing weight, exercising, reducing alcohol consumption, avoiding risky sexual practices). There is no short-cut or easy-fix solution.

My intention was to highlight the problematic, currently dominant idea of a technological fix in the landscape of digital medicine. In their article, Boyd and Crawford mention Kranzberg who argues, “technology is neither good nor bad; nor is it neutral technology’s interaction with social ecology is such that technical developments frequently have environmental, social, and human consequences that go far beyond the immediate purposes of technical devices and practices themselves.”²⁸

Likewise, to this extent, apps cannot be stopped from being oppressive or emancipatory.³⁵ What is sure is that there is a whole range of unexpected negotiations, contradictions and complexities in human behaviour; social practices can be detected that cannot be reduced to instrumental benefits of using health apps. "Technologies are never value-neutral objects; they privilege some forms of actions and limit others."²⁷ Thus, health apps can be understood as sociocultural artefacts. For example, a study of sexuality and reproductive apps argues they represent and generate strongly gendered embodiment, supporting norms of male high-performing, competitive bodies on one side and reproductive, and good mother female bodies on the other.⁴² It is important to challenge the social consequences of extended use of health apps; they are pushing the society towards exceeded normality, which is defined by digital algorithms.

Still, while humans have been traditionally characterised as agents, namely non-deterministic, creative, and self-reflexive subjects, now the tendency is towards a transformation of both objects and subjects into actants, namely deterministic mechanisms. Currently, while the value of users/citizens' empowerment through "by-design" approaches has been widely recognised also as a normative principle, "in-design" approaches protect and promote the active use of individual rights leads to privacy, but also to other rights of control of potential options within the architecture of the systems still require reflection for potential implementations.⁴³

Most importantly, in designing health strategies, policy makers need to pay attention to the limited capacities and discriminatory nature of the Internet; economic and technological sources are not evenly distributed. Not everybody has equal skills, knowledge or desire to access the Internet and use smart technologies.⁴⁰ Disadvantaged social groups, chronically ill and older people often lack digital literacy or simply economic resources for obtaining technological solutions. Today, wearable and self-tracking technologies are often highly aestheticised, overpriced object only elites can afford. The author of this article conducted qualitative research about the use of preventive health programmes among healthy adults and selected chronically ill patients in remote (mostly rural) areas in Slovenia,⁴⁴ and found that the use of health apps or the Internet in relation to governmental health preventive programmes among the adult and older population remains out of their interest. What they predominately hope and wish for is a feeling of inclusion, intensified and better personal

communication with doctors, and easier access to the health system.

Similarly, Neff and Nafus⁵ argue that existing social and health inequalities might become even deeper with the extensive use of "healthy" self-tracking tools. Currently, concerns arise out the industry, where self-tracking tools are mostly designed for individuals who are young and already fit. Companies encourage people to conform to their narrow view of the way to health while ignoring other, potentially less-profitable customers, like the injured, poor, or middle-aged. On the other hand, looking outside this presumption, from the independent-living perspective, older people are treated as if they only need surveillance.⁵

To conclude, when designing public health strategies, governmental institutes and agencies must consider the limits of technological fixes and changes of human behaviour, hidden power relations, intensive dilemmas over surveillance and privacy issues, possibilities of commercial exploitation and many other interests of different actors in the mHealth ecosystems.

Conflict of Interest

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