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Networked biopower: personalized healthcare in a datafied world

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ABSTRACT
This study fucuses on data-driven personalization in healthcare (DDPH), an umbrella term for collection, storage, and analysis of big individual data with a view to providing patient-specific healthcare solutions, including customized treatments, and disease prevention. Interviews with prominent figures in public healthcare in Israel and Estonia revealed their socio-technical imaginaries regarding DDPH trends. The analysis draws on the Foucauldian conceptualization of biopower, as well as on insights into the dynamics of the networked society. Results suggest that the imaginaries of healthcare elite translate onto new configurations of biopower – termed here 'networked biopower' – which are fostered by DDPH initiatives. They suggest furthermore that 'networked biopower' appears to be utilized by healthcare elite to govern and control, through novel medical surveillance and gazing, both individuals and entire populations.

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Introduction

Today's age of datafication has been marked by an increase in personalization practices, often described as the delivery of the right products and content to the right person at the right time, with the view to maximizing benefits to the individual (e.g., Barry & Charpentier, 2020; Hermann, 2022). However, critical scholarship has pointed out that such developments entail certain risks, among them, major issues relating to privacy and ownership of data, social degradation (e.g., Pariser, 2011; Pinchevski, 2022), and policing by powerful entities (e.g., Yeung, 2017).

A prominent feature of today's healthcare is the proliferation of personalization practices based on collection and analysis of big data. According to proponents, this will provide patient-specific healthcare solutions for preventing disease, preempting its progression, customizing treatments and other benefits, by collecting big individual data including genome, biological samples, and medical records, as well as facts regarding such aspects as lifestyle choices or online activities (see discussion in Erikainen & Chan,

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2019). Recognizing the social and economic potential of big-data personalization practices in healthcare, health institutions, including governmental departments, hospitals, pharmaceutical firms, and insurance companies, are investing gigantic financial, computational, and human resources in these services (Árnason, 2012; Boccia, 2014; Cirillo & Valencia, 2019).

The present study explores the discursive work that goes into data-driven personalization of health (hereafter, DDPH) developments with focus on the imaginaries (Jasanoff & Kim, 2015) of healthcare elites, that is, prominent figures operating in public healthcare institutions. This heterogeneous group comprises directors of hospital departments, researchers in human genome laboratories, and other high-ranking stakeholders with exclusive access to sensitive big (individual) health data such as medical records and genomic profiling. Healthcare elites have technical, financial, and regulatory means to effectively process the data collected, and tend to use the results for a wide range of purposes, like formulating new medical protocols, designing health policies, and insuring large populations.

Healthcare elites are constantly working discursively, communicating the rationale for their actions for realizing the social and economic value of DDPH as they imagine it. Through such discursive performances they make descriptive and normative claims about their understanding, assessment, and expectations regarding DDPH, in an endeavor to establish the criteria by which personalization practices and policies are to be evaluated (Gillespie, 2010; Pfaffenberger, 1992).

The aim of this article is to reveal the discursive work pertaining to DDPH of healthcare elites in Israel and Estonia – two of the world's frontrunners in digital healthcare and personalized data. To this end, semi-structured interviews were conducted with healthcare elites in the above two countries. The study addresses two main questions: What goals do healthcare elites aspire to achieve through DDPH initiatives? and What tools or apparatuses do they believe are requisite for achieving the desired goals?

In addressing these questions, we rely on past and more recent conceptualizations of biopower, in conjunction with insights from studies on the characteristics of the so-called 'networked society' (e.g., Castells, 1996; 2000) in the age of datafication. Scrutinizing participants' views on the DDPH goals and tools through these two very different analytical lenses, we show that the DDPH turn in healthcare has proved instrumental to new modes of biopower, which we term 'networked biopower.' We build on the observation that biopower operates through the management of life processes, the normalization of behaviors, and the subtle shaping of subjectivities (e.g., Foucault, 1990; 2000; Rabinow & Rose, 2006). Accordingly, we show that networked biopower, to the extent that it is rooted in the logic of datafication, has brought surveillance and medical gazing to a new level, thereby augmenting the power of healthcare systems to govern and control both individuals and entire populations.

Personalization of healthcare in an age of datafication

A growing body of studies on health currently envisions the future of public healthcare as shaped more and more by collecting and monitoring big data from different sources (e.g., Árnason, 2012; Boccia, 2014; Hoeyer, 2019). A set of practices that are steadily gaining prominence in healthcare pivot around data-driven personalization of healthcare (hereafter, DDPH). Such strategies are often described as customization of medical treatments, interventions, and healthcare experiences to suit the individual needs, preferences, characteristics, and circumstances of each patient (See discussion in Árnason, 2012; Feero, 2017). Due to DDPH developments, goes the argument, health systems are moving away from the traditional one-size-fits-all approach, focusing instead on providing targeted and precise interventions that are optimized for each patient (e.g., Lee, 2017). One manifestation of such shift relates to Big Data: integrating vast amounts of heterogeneous biological, environmental, and lifestyle data collected from different sources enables data collectors and analysts to target, tailor, and personalize care to everyone's unique biological makeup and health experience. Another and no less radical change involves a new perception of the patient, whom the healthcare system now views as both the main contributor to, and the main beneficiary of, healthcare personalization, and hence, (at least in principle) more informed, more engaged, and more in control of their health (See discussion in Sharon, 2018).

The growing literature on DDPH has also examined actual DDPH practices. One area within which DDPH is becoming increasingly salient is genomic medicine, wherein genetic data are harvested by health institutions (both public and commercial) to identify disease predispositions, select treatments, and predict responses based on an individual's genetic makeup. Another area is behavior intrusion, which involves extraction of data about individual lifestyle habits and environment in order to tailor interventions to improve health outcomes. Telehealth is yet another area in which DDPH practices have gained purchase, such that individuals' health parameters are monitored outside designated health facilities by both the individuals themselves (self-monitoring) and/or by commercial and public health organizations. A related trend is the endorsement of patients' engagement in health management whereby patients' preferences and values are often incorporated into treatment planning (e.g., Ceyhan, 2012; Nafus & Sherman, 2014; Rabinow & Rose, 2006; Sanders, 2017).

The development of DDPH is premised on several assumptions that are held firmly by protagonists. The first often-heard is that targeting groups or individuals who are most likely to be responsive to specific interventions will result in significantly better health outcomes than the one-size-fits-all approach that currently guides preventive and clinical healthcare (Feero, 2017). Another promise is that DDPH initiatives reduce the cost of medical care, owing to, *inter alia*, a more efficient use of drugs, that is, not prescribing a drug to patients who are not likely to respond to it or who are likely to develop side effects. DDPH is also believed to benefit both individuals and society, by virtue of shifting the emphasis from reaction to prevention. In other words, personalized medicine is said to be predictive, insofar as it aims to foresee risks to the future health of persons that are not presently ill, and preventive, insofar as it tries to preclude the realization of the risks identified. Such predictive and preventive practices are expected to enable healthcare to save time and costs (Iriart, 2019). DDPH appears beneficial also because it assumes a transformation in the stance and subjectivity of patients, who are expected to become more proactive, contributing to generation and interpretation of their own data.

While optimists emphasize the benefits of personalization, an emerging stream of research has highlighted the many risks involved in these practices. One relates to the effectiveness of DDPH: While it has proven to be efficacious in few specific health issues, like pharmacogenomics and cancer prevention, research shows that, for the wider population, the results have been disappointing (Hoeyer, 2019). One objection is that any predictions regarding future disease or the time of death have proved unfeasible, because human health is influenced by many different factors, some of these yet unknown to scientists (Barry & Charpentier, 2020; Pasquale, 2015). This argument aligns with the critique of techno-solutionism, which suggests that for those in the business of offering solutions, solvable problems are essential (Sadowski & Bendor, 2019). The critique of 'techno-solutionism' further highlights the tendency to reduce complex issues to technological fixes (Morozov, 2013). Such reductionism overlooks the underlying causes of medical challenges, such as insufficient medical knowledge, economic disparities, and political struggles. For example, solutions to nutrition-related diseases often emphasize data-driven systems rather than addressing the root causes, such as financial hardship.

Scholars have also warned about possible issues related to security and privacy, arguing that privacy violations of personal data increase year by year because of several growing trends in healthcare, such as health information exchange, cloud computing and so on (see e.g., Ajana, 2017).

Critical scholarship pointed also to the economic implications of DDPH, arguing that biotech companies manipulate life to generate economic value, thus serving their economic interests. A related critique concerns the high costs of DDPH initiatives, which are geared toward the individual and necessitate the use of expensive technologies, to the advantage of a small portion of the population. DDPH, it is argued, not only will fail to mitigate the main health problems worldwide, but may also increase existing inequalities, by concentrating resources and technologies in the hands of the population strata that already have the best access to healthcare (e.g., Lee, 2017).

Other apprehensions concern the emergence of new modes of power with which DDPH endows states and commercial institutions. These capabilities, warn some critics, may spur states to exercise biopower over their populations, including classifying patients according to their genetic profile, lifestyle, and life expectancy (e.g., Dujardin, 2020), or punishing those who do not follow experts' demands or meet their expectations. Others caution against an opposite trend whereby healthcare responsibilities are shifted from public institutions to individuals. The idea is that, under the neoliberalist ideology that dominates healthcare terrain in many Western countries, individuals will be nudged to take responsibility for their own health, like learning about and monitoring their susceptibilities (Kant, 2020; Lee, 2017; Lupton, 2014).

This study aims to contribute to the above discussion on the implications of DDPH by analyzing the salient discourse of healthcare elites in Israel and Estonia, in an endeavor to reveal their views, assessments, and predictions regarding these practices. The analysis predicates on past and current conceptualizations of biopower and biopolitics (e.g., Foucault, 1990, 2000; Lemke, 2001; Rabinow & Rose, 2006) and draws on insights into the dynamics of 'networked societies' (Castells, 1996; 2000). Results suggest that DDPH promotes new forms of (bio) power (Rabinow & Rose, 2006), which we subsume under the term 'networked biopower.' More concretely, we argue that the development of networked biopower increases health institutions' ability to improve healthcare, but at the same time, provides these entities with effective means to govern individuals and entire populations, and bolsters their effort to establish neoliberal order.

Biopower and biopolitics then and today

The term 'biopower' was introduced by Foucault in his book *The History of Sexuality* (1976) and further expanded upon in his subsequent lectures and writings (e.g., 1990, 2000). Biopower refers to a form of power that came into being in the eighteenth century and focuses on the vitality of individual bodies and the biological existence of populations. According to Foucault, through disciplines like biology and scientific medicine, experts increasingly use statistical knowledge about diseases to implement state interventions that safeguard the health of national communities. (Foucault, 2003). The related term 'biopolitics' refers to the various mechanisms, strategies, technologies, and rationalities employed to manage life and regulate everyday activities. Foucault distinguishes biopower and biopolitics from other forms of authority by emphasizing that it works less through overt repression and coercion, and more via normalization and control framed in the context of freedom and the self (Ajana, 2017). Similarly, Rabinow and Rose (2006) have explained that biopower and biopolitics involve the normalization of beliefs and assumptions, for example through narratives and discourses. Indeed, Foucault describes 'technologies of the self' as the means by which people shape and manage their own subjectivities and lifestyles through practices like self-monitoring, discipline, and applying knowledge to improve their health and well-being. Depending on the historical setting, these practices could involve (but were not limited to): 'sexual explorations or abstinence; fasting and other dietary restrictions; physical and intellectual exercises; praying and meditation; journaling and epistolary exchanges' (Hernández-Ramírez, 2017, p. 46). Recently, Ajana (2017, p. 5) describes the self-measurements of members of the Quantified Self movements, arguing that 'this positivistic promise of knowledge and mastery is based on the assumption that the coupling of body and data holds the key to self-discovery'.

The Foucauldian analysis of the biopower/biopolitics framework also encountered criticism. One of the major arguments is that the terms 'biopower' and 'biopolitics,' coined and used by Foucault, are incomplete, unsystematic, and hence confusing (see discussions in Lemke, 2001; Peggs & Smart, 2018; Rabinow & Rose, 2006).

Yet, many writers acknowledge the value of the ideas captured by the terms 'biopower' and 'biopolitics' in understanding the emergence of new forms of power in the twenty-first century (Lemke, 2001). All in all, the Foucauldian conceptualization of biopower has been expanded, reconstructed, and adjusted to gauge this wherewithal today. These capabilities include governmental health strategies (like those implemented during the Covid19 pandemic), developments in genomic medicine (Rabinow & Rose, 2006), health education, self-monitoring practices (e.g., Nafus & Sherman, 2014), and personalized medicine (e.g., Ceyhan, 2012) – the latter being the topic of this article.

The evolvement of the concepts of biopower and biopolitics in the past two decades has been directly linked to the domination of neoliberalism in the twenty-first century. The focus is on how neoliberal governance employs bio-power to regulate populations, emphasizing individual self-governance and the commodification of health and life. Health, the argument goes, becomes a domain where bio-power is exerted, but individuals are not only subject to health governance but are also expected to govern themselves in accordance with market logics. One of the key links between bio-power and neoliberalism is the creation of the 'entrepreneurial subject,' a self-regulating individual who is responsible for optimizing their health, productivity, and well-being. Foucault's analysis of bio-power illustrates how power operates not only through top-down regulation but also through internalized self-discipline (e.g., Foucault, 2003). Predicating on this realization, current scholars argue that in neoliberal societies, individuals are encouraged to see themselves as entrepreneurs of their own lives, managing their health, career, and personal development as investments in their future (Dean, 1999). This individualization of responsibility shifts the burden of health, well-being, and success from the state or community to the individual.

Neoliberalism's intersection with bio-power is also evident in the marketization of life and the commodification of health. As many scholars observed, in neoliberal societies, life itself becomes a commodity that can be measured, optimized, and traded. Example in the context of DDPH are startups that target specific cardiological conditions reflect the commodification of health. This 'biocapitalism' creates new forms of value extraction from life itself, as commercial entities that develop cardiological technologies, for example, profit from the development and sale of these technologies, while individuals are increasingly responsible for purchasing and consuming these products to maintain their health and well-being.

Scholars argue also that neoliberal bio-power also perpetuates a form of 'biopolitical inequality,' where certain populations are subject to heightened surveillance, regulation, and control. For example, the policing of reproductive rights, the criminalization of drug use, and the management of migrant populations through health policies reflect how bio-power is differentially applied to marginalized groups. Lemke for example noted that the neoliberal form of bio-power deepens social divisions, as those who are unable to invest in their health (due to poverty, lack of education, or discrimination) are pathologized as irresponsible or failures of self-governance.

The present study endeavors to contribute to the growing literature on biopower in a digital context by identifying its new forms, which in the age of datafication have become increasingly noticeable, and which we refer to as 'network biopower.' To this end, we utilize three major concepts in social theories germane to the dynamics of the networked society: decentralization, connectivity, and timeless time.

Decentralization involves the traditional hierarchical structures that were challenged in the networked age, in which power and decision-making are increasingly distributed among diverse actors, including individuals, online communities, and grassroots movements (e.g., Giddens, 2003). This development has been shown to allow for greater participation and collaboration among the different nodes, or actors in the network. However, as contemporary critics consistently point out, digital networks – particularly social media sites and digital platforms – also reinforce centralized mechanisms. Those who maintain these constructs exert control over critical decisions, like content moderation, advertising models, and user experience. The networked society has been further characterized by a stronger *connectivity* among individuals, organizations, and institutions in the network (Castells, 1996), owing to the spread of the Internet, and the proliferation of mobile devices that facilitate instant communication and information exchange across vast distances and contexts. In the age of networked media – like social media sites, digital platforms, interactive websites, and online apps, *connectivity* is also associated with the so-called 'contexts collapse' (e.g., Marwick & boyd, 2014; Zillich & Müller, 2019), whereby individuals and groups who traditionally navigate different contexts separately – families, work, friendships etc. – are ‘flattened’ into a single stratum. The term *timeless time* (Castells, 1996) refers, in social theory, to the accelerated pace of life and the transformative effects of digital technologies on temporal experiences; it also connotes the blurring of boundaries between past and future. One important element is the emergence of ‘predictive products’ (Zuboff, 2019) which ostensibly enable analysts to predict people’s behaviors on the basis of their behavior patterns in the past. Another is the accumulation of big data by digital networks controllers – like owners of digital platforms, for future (often unspecified or unknown) uses (e.g., Sadowski, 2020).

Methodology

The study examines the emergence of networked biopower in Israel and Estonia, countries recognized for their advancements in personalized healthcare (Prins et al., 2021). Estonia, specifically, is chosen due to its innovative health-data repository linking the national biobank and electronic health records (Fletcher, 2004). In 2000, Estonia passed the Human Genes Research Act, the first of its kind globally, regulating genome research and enabling the implementation of personalized medicine. This legislation established a legal framework for a gene bank of the country’s population, governing the processing of tissue samples, DNA work, health data, and genealogical information storage. This initiative places Estonia among the leading nations in national-population gene mapping (Fletcher, 2004).

Estonia makes a compelling case study also due to its substantial investment in national IT infrastructure and expertise, leading to the digitalization of various aspects of daily life. The integrated system connects major health registries and hospitals, enabling the sharing of comprehensive medical information, including health history, hospital records, and prescriptions. These data are used to create personalized treatment plans securely through blockchain technology. By 2019, over 95% of hospital and doctor data had been digitized (Sikkut, 2019). The National Biobank, which was initially established in 2001 and which in 2007 became the Estonian Genome Center, has steadily expanded its databases and research projects. By 2011, it included 52,000 adult participants, and an additional 150,000 were added in 2018–2019. This cohort represents 20% of Estonia’s adult population (Prins et al., 2021).

Israel, much like Estonia, is considered a valuable genomic resource due to its diverse population groups living within a small geographic area. The country established Electronic Health Records (EHR) in the early 1980s, covering 98% of the population at the time of writing. Israel has also become a prominent location for clinical trials, attracting global and local biopharma companies due to its top-notch research hospitals and expertise in areas like cancer research, immunology, and degenerative diseases. The country’s compact size simplifies participant recruitment for trials.

In March 2018, the Israeli government approved a NIS 1 billion ($300 million) five-year national digital health plan entitled ‘The Growth Engine’ (Government Resolution #3709). This plan aims to enhance the healthcare system by focusing on technological advancements, international collaboration, joint academic-industry efforts, and regulatory updates to foster big-data research. A key initiative under this plan, beginning in March 2023, is the Psifas project, gathering health data and biological samples from a diverse range of volunteers in terms of age, ethnicity, and socio-economic background.

The project's findings are expected to accelerate the development of personalized medical treatments tailored to Israel's multiethnic society.

In both Estonia and Israel, semi-structured interviews were conducted in 2023 (Spring to Fall) with a total of 22 persons operating in public health institutions: medical experts working at the management or executive level in genome laboratories, heads of research departments in hospitals and universities, managers in both countries' Ministries of Health, managers of health funds, and more. To select participants, we first mapped out the relevant institutions in Israel and Estonia, and then identified potential interviewees among their employees. Most interviews were conducted face-to-face, and several through zoom. The interviews lasted between 1 and 3 h and were recorded and transcribed. All names, roles, and personal details have been anonymized to ensure informants' privacy. We examined the transcripts of the interviews line-by-line: identified key ideas and assigned them codes with the aim of capturing participates' primary 'cognitive frames' (Orlikowski & Gash, 1994) regarding DDPH conceptions and practices. After that we looked for patterns and relationships between codes. We then synthesized our findings into a grounded theory that we term 'network biopower.'

Healthcare elites' socio-technical imaginaries regarding DDPH

In what follows we show how networked biopower, as a new form of power, is reflected and constructed in the DDPH-related imaginaries of healthcare elites in Israel and in Estonia. We demonstrate that these experts see DDPH initiatives, those that have already been implemented and the ones they envision, as promoting networked biopower, and thereby enabling healthcare institutions to govern, through surveillance and medical-gazing, individuals and entire populations. As explained above, we unpack the term 'networked biopower,' focusing on three of its constituent elements: *decentralization, connectivity*, and *timeless time*.

Decentralization

One important aspect of networked biopower which emerged from the interviews relates to *decentralization* of today's 'networked society' (Castells, 1996), conceived as the process by which power, decision-making, and resources are dispersed away from central authorities to local or regional levels, or to non-governmental entities. Of particular relevance to the present enquiry is a critical observation that decentralized environments are characterized by the spreading of authority and decision-making across a network of nodes (or actors) rather than being concentrated in a single central authority. This often means that no single entity has overarching control over the system. Decisions are made collectively, with nodes typically working through consensus mechanisms to verify transactions or manage resources. Examples are virtual communities on SNS (e.g., Aichner et al., 2021) and flat organization (Ashuri & Bar-Ilan, 2016). However, as critics often observe, this tendency does not necessarily result in the absence of hierarchy or authority but rather in a reconfiguration of power structures that can be manifested in various forms, including political, economic, and cultural decentralization.

Our analysis of the interviews opens to view the various manifestations of decentralization in personalized healthcare, and more importantly, how this development has given rise to a new configuration of biopower, i.e., networked biopower. In consideration of analytical efficacity, we anchored our analysis of the interviews in Baran's (1964) widely referenced taxonomy in which he distinguishes between *centralized*, *decentralized*, and *distributed* networks. In this classification, a *centralized* network has either one central node, or a central cluster of tightly connected nodes, that is connected to all other nodes in the network, while all these other nodes are connected only to the central node. Interviewees in both Israel and Estonia admitted that, in today's age of datafication, the capabilities of traditional centralized healthcare institutions – like governmental arms and major health funds (particularly in Israel) – to shape people's self-perception, desires, and behaviors are increasing owing to the advanced development of data extraction and analysis technologies. Major figures in these central institutions explained in the interviews that, through individual surveillance, they now acquired huge amounts of health-related data, information and knowledge, based on which they can affect people's lives, and the lives of their 'digital twins,' i.e., their virtual replicas that can be used to simulate their behavior so as to better understand their conduct in real life (e.g., MacKinsey & Company, 2023). A concrete example was offered by an interviewee occupying an important post in Israel's Health Ministry:

> We collect a lot of data from a lot of people […]. In the case of genomic data (for example), it is our aim that every born baby should be provided with a genetic I.D. In this way we could limit and even prevent the [future] birth of foetuses with major malformations or terminal genetic disorders.

All interviewees concurred that a major goal of traditional central institutions involved in DDPH is to boost their power by providing personalized healthcare to as many individuals as possible. In their opinion, this objective can be achieved through, enlarging their data repositories by collecting data from more and more nodes, and refining the apparatuses for analyzing them. The CEO of a major health fund in Israel said: 'We try to collect all data we can put our hands on […]. We hope to have, in the near future, [for example] a genomic sequencing for all [the fund's] members, on the bases of which we can make informed decisions of who should get which treatment.' This hope aligns with the critique of techno-solutionism, which argues that for those in the business of providing solutions, solvable problems are crucial. In the context of healthcare, the desire to make informed decisions about who should receive specific treatments justifies, according to this interview, the construction of centralized data repositories, comprising all the data that the central institution can access.

Another type of network in Baran's taxonomy is classified as *decentralized*. The nodes in such a network are arranged in a hierarchical order, with those at the bottom forming star-shaped networks of their own, each connected with a node one level higher in the hierarchy. Interviewees in both Israel and Estonia stated that, new decentralized modes of biopower were emerging in healthcare, enabled through stakeholders' mutual independence, and particularly their lack of dependence on central organizations like state authorities (Törnberg, 2023). The CEO of one health fund in Israel commented in this connection: 'We develop our own health-data repositories. We depend on no one […]. About ten years ago we established an in-house research center. We are pioneering personalized healthcare.'

While acknowledging healthcare authorities' comparative independence, interviewees emphasized the growing interdependency among stakeholder, particularly national institutions' reliance on commercial entities. Two major figures in the Israeli Health Ministry mentioned a 2018 government scheme ('The Israeli National Plan for Digital Health as a Growth Engine') which offers commercial entities such as startup firms access to data repositories held by the State. One of them said: 'These collaborations are essential. A modern healthcare system cannot be developed without them.' A researcher working for a genome laboratory in Estonia echoed this opinion:

> […] In our research we collaborate with startups and other commercial bodies. We try to get joint funding. We have no choice: without them, we have neither the technology nor the resources to hire staff; without us, they lack the data they can use to improve their technology. Is it an ideal arrangement? It is not. It goes without saying that there might be ethical issues, like privacy and responsibility. But is this collaboration necessary for a better future of healthcare? Absolutely.

In this context, concerns were also raised regarding the commercial interests of for-profit actors involved in DDPH that might promote inequity in personalized services (Lemke, 2001), as is evident in the following statement by a major figure in Israel's Health Ministry:

> Commercial entities in Israel develop personalized products (like a self-operated home ultrasound system for remote fetal assessment during pregnancy); but look at the billboards: They only advertise [these products] in affluent districts, like Tel Aviv. This is because these personalized services are intended only for those who can pay for them.

The third type of network in Baran's (1964) taxonomy is classified as *distributed*. In networks that fall under this rubric, every node has many connections (or edges) to other nodes. The analysis of the interviews revealed the emergence of distributed healthcare networks.

Interviewees unequivocally admitted that, in today's age of datafication, a growing number of stakeholders (big and small, public and commercial) are enlarging their data repositories, and by implication, increasing their capabilities of governing individuals at a distance by targeting them in various aspects of everyday life. An Estonian interviewee working on health dossiers in the country's Ministry of Social Affairs explain:

> They [corporate stakeholders] collaborate with universities to obtain joint funding, and they want to use data from national biobanks to improve their algorithms. We are worried that we might lose track of who collaborates with whom, who sees what, and who protects the quality of the data and the codes.

In the same vein, the interviewees mentioned the growing power of commercial stakeholders that, owing to the big data repository in their possession (or to ones they have access to) are gaining autonomy, and thus also power. As a palpable effect of this development interviewees cited the re-distribution of power in healthcare, with central institutions losing their grip on the data harvested from individuals, and with them, also on the decisions how these data and insights from their analysis are to be utilized. An illustrative example is a statement by a chief figure in Israel's Ministry of Health:

> We know that many stakeholders in the country collect personal data, like genomic data, but we [in the Health Ministry] don't know what they do with this information, nor what they

> do with the insights that they derive from analyzing it. We are losing control […] We have to abide by very harsh regulations, but the Israeli health funds and industrial entities don't.

Regardless of their views and assessments of how health data are collected, stored, and analyzed nowadays, with two exceptions (a major figure in Israel's healthcare authority and a senior staff member in an Estonian hospital), none of the interviewees expressed serious concerns about the rapid decentralization of the ecosystem; if anything, they saw this process as inevitable. Nor did they consider concrete steps to regulate it, e.g., by coordinating the relationships between the various public and commercial institutions that are involved in the personalization of healthcare today or may be so in the future, or by regulating the types of data different stakeholders collect and use.

Connectivity

Another important aspect of networked biopower is *connectivity*. Drawing on a large body of studies on the nature and characteristics of a networked society (particularly with reference to participatory media, like SNS), we conceptualize *connectivity* as the collapse of social contexts (e.g., Marwick & boyd, 2014; Zillich & Müller, 2019), whereby multiple audiences are 'flattened' into a single stratum. In connection to medical or 'panoptic' gaze, this phenomenon can be metaphorically described using Ceyhan's (2012) turn of phrase, namely, that multiple actors are able to connect 'the dots' created in 'non-traditional places,' meaning areas unrelated to healthcare, and through this engender new knowledge. These capabilities could then be fed into disciplinary practices, such as the targeting of individuals, as well as of large populations, with personalized content and services via ubiquitous media: smartphones apps, pushups, websites and more. A senior figure in an Israeli health fund explained this logic:

> People constantly leave digital traces on social network sites, while using apps and so on. Our goal is to formulate 'a consumer journey' for every user and get to know their lifestyle, like their eating habits. We will link this information to that person's medical records. For example, we'll be able to learn about the eating habits of a person who has been diagnosed with diabetes.

The above statement epitomizes Foucault's observation that the rise of biopower is contingent on the evolvement of systematic knowledge in the human sciences (Foucault, 1990; 2000). On this rationale, in the networked age of context collapse, the ability of healthcare systems to connect the 'dots' from multiple resources and areas has empowered them to produce a 'spectacular body' (Sanders, 2017) whose movements, habits, and internal workings are rendered more knowable, and therefore more manageable. Thus, a key figure in one of Israel's major health funds provided a future (expected) scenario:

> We hope to be able to know how people feel, what they do, and what they eat. For example, if we know that a person is at high risk for diabetes on the basis of the blood test results collected and we also know their eating habits because they us a nutrition app that we develop, we can provide them with nutrition guidance through automatic messaging systems.

In the mind's eye of all of our interviewees, the connectivity mechanism in a networked age was tantamount to healthcare systems' growing capability to manage multiple aspects of peoples' lives, not necessarily related to healthcare. This is how a researcher working for an Estonian human genome laboratory explained this idea:

> We are now collecting DNA from individuals only in order to advise them on potential disease. But soon, we will also advise them on what type of food best fits their body, and in my future dream, we will expand this to giving people advice about a wider range of factors – what types of education and learning styles match best with your genome, and what type of career path would be optimal.

The aspiration reflected in the above testimony centers around influencing people in a variety of life contexts. Nikolas Rose (1999, pp. 49–50), uses the phrase 'governing at a distance' to describe such power of institutions to indirectly shape individuals' conduct. In this process, an individual operates as a free and responsible agent who voluntarily conducts him/herself in accordance with norms of a healthy lifestyle, and at the same time embodies the knowledge accrued and articulated by experts.

By and large, the interviewees were certain that, by virtue of the connectivity mechanism, they are increasing their capabilities of governing individuals at a distance by targeting them in various aspects of everyday life. Two main governing techniques were mentioned. One is sending direct messages to individuals using networked media, like SNS or smartphone applications. An example is sending pushup messages or emails to one's devices with workout instructions. The second is distributing messages to other members in one's social network (or milieu) – for instance, by creating a WhatsApp group for people who suffer from a specific illness. Thus, an interviewee who works as a manager in one of Israel's largest health funds said:

> We are currently developing smartphone apps that monitor people's physical activities. We can now use SNS and mobile applications to target specific individuals with specific training suggestions 24/7 and will be able to do this even better in the future.

In the age of datafication, the capabilities of 'governing at a distance' are also enhanced by means of 'automatic governmentality' (Rouvroy, 2020), namely the governing of social world based on algorithmic processing of big-data sets rather than on politics, law and social norms. As Antoinette Rouvroy observed (2020), governing at a distance 'is a subliminal mode of government that consists of directing people's attention toward certain things, in modifying the informational or physical environment so that behaviors are no longer obligatory but necessary'. With reference to DDPH, interviewees underscored the important role of 'automatic governmentality' in establishing and maintaining institutional connections with patients and citizens. In their conception, the data-driven algorithmic systems, developed either by their institutions or by second and third parties, are actors that mediate the relationship between health institutions and the people they serve by providing the latter with health-related knowledge and behavioral instructions. One vivid example of this trend was provided by a chief figure in an Israeli health fund. Referring to an algorithmic system implemented recently by that organization, the interviewee said:

> Recently, through a collaboration with a commercial startup that developed an AI Chatbot, we launched a system that our patients can easily utilize by means of an app they can download to their mobile phones. Users of this app describe their symptoms (by answering a set of questions) and receive a medical diagnosis based on their answers, as well as medical instructions (e.g., whether they need to see a doctor or what to do). The relationship between us and our patients is managed by this system. When someone suffers from a headache, for example, they don't have to see a doctor. This saves time and money, and we are currently developing other alike systems.

While realizing that big data (tolls and processing), has revolutionized problem-solving by offering vast amounts of information for analysis, the study's interviewees overlooked the fact that it is far from a comprehensive solution to complex health problems. Although specifically asked on the limitations of DDPH, the majority of interviewees did not raise serious concerns how documented constraints – such as the lack of context, potential for bias, and ethical concerns – will impact both individuals and society at large.

Timeless time

Timeless time (Castells, 1996) is yet another mechanism responsible for the evolvement of networked biopower. Castells (2011) used this term to capture the speed and simultaneity of communication in the networked world, and the blurring of boundaries between work and leisure that characterizes contemporary society. In the age of datafication, these tendencies promote biopower, insofar as they enable healthcare elites to gain and utilize expert knowledge around the clock. As the CEO of a major Israeli health fund explained:

> By processing an individual's medical test results we can know if they suffer from Osteoporosis. A person can look good and feel good, but the physician who treats them receives, in real time, information regarding their medical condition and, based on it, can initiate immediate treatment – all this before the person even knows they are ill.

In a datafied world, the *timeless time* phenomenon is also instrumental to the blurring of the sequence of the past, present and future. As many critics demonstrate, in the age of datafication, upholders of digital networks systematically collect vast amounts of data from actors of the networks, not always with a clear or immediate purpose in mind. This practice is underpinned by the assumption that data, even if not immediately useful, will become valuable in future applications (e.g., Sadowski, 2020). Combined with their formidable capabilities to create expert knowledge in real time and in the future, as well as to target individuals and masses with relevant information and instructions, their enormous data repositories and computational power enable healthcare institutions to create what Zuboff (2019) called 'prediction products,' which anticipate what anyone may do in the near or remote future. In other words, in the hands of medical experts operating in healthcare institutions, the insights from the aggregation and analysis of massive amounts of data become an important source of these entities' social and economic biopower. Both Israeli and Estonian interviewees assigned considerable weight to the prediction products developed by their respective institutions through the processing of the data they collect, on the grounds that they enable better health-related predictions. Based on such predictions, the interviewees stated, they can communicate to people, better than before, personalized guidelines regarding healthy physicality and lifestyle, and propel individuals to conform to these standards. A key figure in Israel's Ministry of Health provided an illustrative example:

> One major problem we face today is the birth of children with terminal genetic disorders. Treating them costs a fortune, and one cannot even speak of what the parents go through. We are now developing means that will enable us to detect in advance the risks of a couple having sick children and prevent the birth of such children. In the case of orthodox couples [who reject abortions] this information could even impact marriage decisions.

Conclusion

In regard to the drastic transformations that occurred in healthcare at the turn of the twenty-first century, authors Nikolas Rose and Paul Rabinow observe, in their article 'Biopower Today' (2006), that 'a modified biopolitical rationality in relation to health is taking shape, in which knowledge, power and subjectivity are entering into new configurations, some visible, some potential' (p. 213). In the current article, we have traced the formation of one such configuration that expands existing modes of biopower to what we term 'networked biopower.'

Our analysis of the socio-technical imaginaries of healthcare elites in Israel and Estonia regarding DDPH shows that participants conceive of DDPH tools and practices as instrumental in expanding biopower to unprecedented levels. Networked biopower is an outcome of such initiatives – a concept that captures two aspirations pinned on DDPH developments and possible benefits thereof articulated in the interviews. One pertains to goals ascribed to DDPH, namely, the desire to increase health experts' knowledge about individuals and entire populations through medical gazing facilitated by the harvesting of individual data – such as medical records, as well as information regarding lifestyle, habits, social connections and more – which are created around the clock in many settings and social contexts. Expert knowledge that can be derived from the analysis of such data was almost unanimously deemed necessary for putting in place efficient and effective personalized healthcare systems. More specifically, participants felt that the idea was to expand panoptically their medical gaze to enable experts in both public and commercial health organizations to designate the 'right' treatments to the 'right' individuals at the right time.

The analysis has also revealed participants' ideas about the tools and biopolitical strategies that are currently employed, and that they believed would be required in the future, to achieve this goal and to obtain the requisite expert knowledge. One such means is to widely endorse and decentralize the harvesting and analysis of data, thereby placing big individual data in the hands of various human and non-human actors (like computers and, more specifically, algorithms). Another is to gather data from multiple sources, including data which were created or disseminated in contexts unrelated to healthcare either by individuals or by members of their online and offline social networks, including friends and family members. A third is to use ubiquitous real-time media, such as SNS or self-operated remote monitoring devices that facilitate the collection of personal data everywhere, in order to continuously enlarge the institutions' data repositories, and thus also their power to intervene in the life of masses.

Yet another aspiration manifested in the DDPH imaginaries of healthcare elites is to enhance the power of healthcare organizations through interventions in individuals' behaviors. Interviewees envision offering individuals tailored instructions, treatments, and drugs around the clock, utilizing ubiquitous media like SNS or smartphone automatic messaging. Importantly, in deploying such technologies, they are also eager to target individuals' minds. This objective involves affecting individuals' lifestyles (e.g., by guiding their careers), their social interactions (e.g., by suggesting how to relate to family and friends), and their choices (e.g., advising on a partner with whom to start a family, or even on terminating a pregnancy).

The analysis conducted has yielded a correlation between the interviewees' aspiration to enhance the authority of healthcare institutions through Data-Driven Public Health

(DDPH) and the concepts put forth by Foucault and his followers regarding the wielding of power by organizations through strategic administrative structures and statistical analyses they carry out. The study indicates that various independent stakeholders involved in public health today, including epidemiologists, medical professionals, political figures, healthcare institutions, commercial data-driven companies, and others, have been authorized – and are actively asserting their claim to such a mandate – to bear the responsibility for measuring, monitoring, and regulating the health of the population. In this capacity, they develop and utilize tools that fortify biopower's political and medical influence, which comprise surveillance technologies like social networking sites (SNS) and AI Chatbots, as well as behavioral nudging tactics such as instant automated messages. These resources enable healthcare professionals to obtain insights about individuals and entire populations and to offer people guidance on healthy norms of physicality and lifestyle. Such activities are already underway and are anticipated to continue in the future. We suggest that at the core of the imaginaries analyzed regarding DDPH initiatives is a deeply held 'techo-solutionism' (e.g., Morozov, 2013; Sadowski, 2020): the belief that problems, even those that should not be thought of as problems in the first place, can be solved technologically. By recasting all health-related matters as problems waiting for a techno-fix, the space for critical evaluation of the 'solutions' at hand, shrinks.

This study has focused on data-driven personalization in the specific context of healthcare. Yet, the analysis distinctly demonstrates that the interviewees' ideas about data-driven personalization in healthcare are deeply rooted in what can be called 'the logic of datafication,' which rests on interpretative schemes pertaining to data collection, analysis, and usage in other social contexts as well. One prominent notion that arose from the interviews is that the extraction of data, and in particular health data, is unlimited in scope, and has an infinite growth potential. Critics have argued that such perceptions – reflected in a distinctive rhetoric such as 'data is the new oil' – sustain the capitalist-colonialist fantasy of perpetual economic growth without material limitations (e.g., Mejias & Couldry, 2024; Taffel, 2023) and may in consequence legitimize the establishment of huge data repositories in different domains, one of them, healthcare.

Another conception expressed in the course of the interviews is, to use boyd and Crawford's formulation of the myth (2012), that 'large data sets offer a higher form of intelligence and knowledge that can generate insights that were previously impossible, with the aura of truth, objectivity, and accuracy' (p. 663). Thus, participants believed that, based on the data harvested, medical experts would obtain more accurate knowledge about individuals and entire populations, and that such gains legitimized the collection of data from different sources and in different contexts, among them those outside healthcare.

A third belief expressed by interviewees is that the analysis of data *en masse* facilitates the development of predictive tools that afford useful – and hence justifiable – disciplinary power, e.g., in the form of personalized nudging, policing, and punitive capabilities. According to participants, in the context of healthcare, such outcomes legitimize institutional medical-gazing, as well as devising ways to target the sick and the healthy alike with communications about norms of healthy physicality and lifestyle, as well as with instructions on norm-conforming behaviors.

A related belief is that big data technologies will benefit the entire population. However, many studies show that the use of this type of technology (including in the domain of healthcare) contributes to discrimination, namely, to favoring privileged populations over others (e.g., Lemke, 2001; Mejias & Couldry, 2024).

The fast development of DDPH initiatives demands a critical evaluation of the risks and opportunities they entail. If we do not take count of the possible effects of DDPH initiatives, we risk permitting the growth of truly powerful agents while turning a blind eye to the harm they can and do cause to both individuals and societies.

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References

Aichner, T., Grünfelder, M., Maurer, O., & Jegeni, D. (2021). Twenty-five years of social media: A review of social media applications and definitions from 1994 to 2019. *Cyberpsychology, Behavior, and Social Networking*, *24*(4), 215–222. https://doi.org/10.1089/cyber.2020.0134

Ajana, B. (2017). Digital health and the biopolitics of the quantified self. *Digital Health*, *3*, 1–18. https://doi.org/10.1177/2055207616689509

Árnason, V. (2012). The personal is political: Ethics and personalized medicine. *Ethical Perspectives*, *19*(1), 103–122. https://doi.org/10.1177/2055207616689509

Ashuri, T., & Bar-Ilan, Y. (2016). How flat organizations filter: Organizational gatekeeping in a networked environment. *Information, Communication and Society*, *19*(10), 1411–1426.

Baran, P. (1964). On distributed communications networks. *IEEE Transactions on Communications Systems*, *12*(1), 1–9. https://doi.org/10.1109/TCOM.1964.1088883

Barry, L., & Charpentier, A. (2020). Personalization as a promise: Can Big Data change the practice of insurance? *Big Data & Society*, *7*(1), 1. https://doi.org/10.1177/2053951720935143

Boccia, S. (2014). Why is personalized medicine relevant to public health? *The European Journal of Public Health*, *24*(3), 349–350. https://doi.org/10.1093/eurpub/cku030

boyd, D., & Crawford, K. (2012). Critical questions for big data: Provocations for a cultural, technological, and scholarly phenomenon. *Information, Communication & Society*, *15*(5), 662–679. https://doi.org/10.1080/1369118X.2012.678878

Castells, M. (1996). *The network society. The information Age: Economy, society and culture* (Vol. 1). Blackwell.
Castells, M. (2000). Toward a sociology of the network society. *Contemporary Sociology*, *29*(5), 693–699. https://doi.org/10.2307/2655234
Castells, M. (2011). *The rise of the network society*. John wiley & sons.
Ceyhan, A. (2012). Surveillance as biopower. In K. Ball, H. Kevin, & D. Lyon (Eds.), *Routledge handbook of surveillance studies* (pp. 38–46). Routledge.
Cirillo, D., & Valencia, A. (2019). Big data analytics for personalized medicine. *Current Opinion in Biotechnology*, *58*, 161–167. https://doi.org/10.1016/j.copbio.2019.03.004
Dean, M. (1999). *Governmentality: Power and rule in modern society*. Sage.
Dujardin, C. (2020). 'Precision medicine': Critical reflections on Europe's latest healthcare paradigm. In J. Mansnerus, R. Lahti, & A. Blick (Eds.), *Personalized medicine: Legal and ethical challenges* (pp. 60–79). University of Helsinki, Faculty of Law.
Erikainen, S., & Chan, S. (2019). Contested futures: Envisioning personalized, stratified, and precision medicine. *New Genetics and Society*, *38*(3), 308–330. https://doi.org/10.1080/14636778.2019.1637720
Feero, W. G. (2017). Introducing "Genomics and precision health". *JAMA*, *317*(18), 1842–1843. https://doi.org/10.1001/jama.2016.20625
Fletcher, A. L. (2004). Field of genes: The politics of science and identity in the Estonian genome project. *New Genetics and Society*, *23*(1), 3–14. https://doi.org/10.1080/1463677042000189589
Foucault, M. (1990). *The history of sexuality* (Vol. I, trans.). Vintage.
Foucault, M. (2000). The politics of health in the eighteenth century. In J. D. Faubion (Ed.), *Power* (pp. 90–105). The New Press.
Foucault, M. (2003). *Society must be defended*. Picador.
Giddens, A. (2003). *Runaway world: How globalization is reshaping our lives*. Taylor & Francis.
Gillespie, T. (2010). The politics of 'platforms'. *New Media & Society*, *12*(3), 347–364. https://doi.org/10.1177/1461444809342738
Hermann, E. (2022). Artificial intelligence and mass personalization of communication content—An ethical and literacy perspective. *New Media & Society*, *24*(5), 1258–1277. https://doi.org/10.1177/14614448211022702
Hernández-Ramírez, R. (2017). Technology and self-modification: Understanding technologies of the self after Foucault. *Journal of Science and Technology of the Arts*, *9*(3), 45–57. https://doi.org/10.7559/citarj.v9i3.423
Hoeyer, K. (2019). Data as promise: Reconfiguring Danish public health through personalized medicine. *Social Studies of Science*, *49*(4), 531–555. https://doi.org/10.1177/0306312719858697
Iriart, B. (2019). Precision medicine/personalized medicine: A critical analysis of movements in the transformation of biomedicine in the early 21st century. *Cadernos de Saúde Pública*, *35*(3), 11–23. https://doi.org/10.1590/0102-311x00153118
Jasanoff, S., & Kim, S. H. (2015). *Dreamscapes of modernity: Sociotechnical imaginaries and the fabrication of power*. University of Chicago Press.
Kant, T. (2020). *Making it personal: Algorithmic personalization, identity, and everyday life*. Oxford University Press.
Lee, S. (2017). Consuming DNA: The good citizen in the age of precision medicine. *Annual Review of Anthropology*, *46*(1), 33–48. https://doi.org/10.1146/annurev-anthro-102116-041547
Lemke, T. (2001). 'The birth of bio-politics': Michel Foucault's lecture at the Collège de France on neoliberal governmentality. *Economy and Society*, *30*(2), 190–207. https://doi.org/10.1080/03085140120042271
Lupton, D. (2014). Critical perspectives on digital health technologies. *Sociology Compass*, *8*(12), 1344–1359. https://doi.org/10.1111/soc4.12226
MacKinsey and Company. (2023). What is digital -twin technology? https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-digital-twin-technology
Marwick, A. E., & boyd, D. (2014). Networked privacy: How teenagers negotiate context in social media. *New Media & Society*, *16*(7), 1051–1067. https://doi.org/10.1177/1461444814543995

Mejias, U. A., & Couldry, N. (2024). *Data grab: The new colonialism of Big Tech and how to fight back*. University of Chicago Press.
Morozov, E. (2013). *To save everything, click here: The folly of technological solutionism*. Public Affairs.
Nafus, D., & Sherman, J. (2014). Big data, big questions| this one does not go up to 11: The quantified self movement as an alternative big data practice. *International Journal of Communication*, *8*, 11.
Orlikowski, W. J., & Gash, D. C. (1994). Technological frames: Making sense of information technology in organizations. *ACM Transactions on Information Systems (TOIS)*, *12*(2), 174–207. https://doi.org/10.1145/196734.196745
Pariser, E. (2011). *The filter bubble: What the Internet is hiding from you*. Penguin UK.
Pasquale, F. (2015). *The black box society: The secret algorithms that control money and information*. Harvard University Press.
Peggs, K., & Smart, B. (2018). Foucault's biopower. In L. Downing (Ed.), *After Foucault: Culture, theory, and criticism in the 21st century. After series* (pp. 61–78). Cambridge University Press.
Pfaffenberger, B. (1992). Technological dramas. *Science, Technology, & Human Values*, *17*(3), 282–312. https://doi.org/10.1177/016224399201700302
Pinchevski, A. (2022). *Echo*. MIT Press.
Prins, B. P., Leitsalu, L., Pärna, K., Fischer, K., Metspalu, A., Haller, T., & Snieder, H. (2021). Advances in genomic discovery and implications for personalized prevention and medicine: Estonia as example. *Journal of Personalized Medicine*, *11*(5), 358. https://doi.org/10.3390/jpm11050358
Rabinow, P., & Rose, N. (2006). Biopower today. *BioSocieties*, *1*(2), 195–217. https://doi.org/10.1017/S1745855206040014
Rose, N. (1999). *Powers of freedom*. Cambridge University Press.
Rouvroy, A. (2020). Algorithmic governmentality and the death of politics. *Green European Journal*. https://www.greeneuropeanjournal.eu/algorithmic-governmentality-and-the-death-of-politics/
Sadowski, J. (2020). *Too smart: How digital capitalism is extracting data, controlling our lives, and taking over the world*. MIT Press.
Sadowski, J., & Bendor, R. (2019). Selling smartness: Corporate narratives and the smart city as a sociotechnical imaginary. *Science, Technology, & Human Values*, *44*(3), 540–563. https://doi.org/10.1177/0162243918806061
Sanders, R. (2017). Self-tracking in the digital era: Biopower, patriarchy, and the new biometric body projects. *Body & Society*, *23*(1), 36–63. https://doi.org/10.1177/1357034X16660366
Sharon, T. (2018). When digital health meets digital capitalism, how many common goods are at stake? *Big Data & Society*, *5*(2), 1–12. https://doi.org/10.1177/2053951718819032
Sikkut, R. (2019). *Learning from the Estonian e-health system. Online article in Health Europa*. https://www.healtheuropa.com/estonian-e-health-system/89750/
Taffel, S. (2023). Data and oil: Metaphor, materiality and metabolic rifts. *New Media & Society*, *25*(5), 980–998. https://doi.org/10.1177/14614448211017887
Törnberg, P. (2023). How platforms govern: Social regulation in digital capitalism. *Big Data & Society*, *10*(1), 1–13. https://doi.org/10.1177/20539517231153808
Yeung, K. (2017). Hypernudge': Big Data as a mode of regulation by design. *Information, Communication & Society*, *20*(1), 118–136. https://doi.org/10.1080/1369118X.2016.1186713
Zillich, A. F., & Müller, K. F. (2019). Norms as regulating factors for self-disclosure in a collapsed context: Norm orientation among referent others on Facebook. *International Journal of Communication*, *13*, 2632–2651.
Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. Profile Books.