Digital Health Equity and COVID-19 – The Innovation Curve Cannot Reinforce the Social Gradient of Health

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Abstract

The public health crisis posed by COVID-19 has ignited the rapid implementation of digital healthcare. In the current response to the COVID-19 pandemic, digital health has been rightly heralded as an innovative health solution that can ensure ongoing access to clinical care, and allow for public health measures that stem rapid viral transmission and scope of spread. However, we must simultaneously address the often overlooked health equity factors that structure the use of digital health. Unexamined, inequities in access to and implementation of digital health, and the quality of care afforded by digital health, can recapitulate and deepen the inequities that have long existed within our healthcare system.

There is emerging evidence that supports the use of implementation science approaches when scaling digital health; however, even these approaches to implementation often fail to incorporate health equity factors or to address social determinants of health. Using COVID-19 as an example, this perspective presents an evidence-based framework for systematically identifying factors that may impact digital health equity. Access to digital health technologies has a direct impact on health access and outcomes across the United States, and globally. Digital health technologies also interact with other social, cultural and economic factors, and with social determinants of health, to indirectly contribute to health equity. The proposed digital health equity framework considers the social stratification process, material circumstances, and social location and the way these interact with individual factors (biology, appraisal and coping, and health behaviours); environmental factors; and health systems factors (health quality, policy, organizational, and governmental).

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The public health crisis posed by Covid-19 has ignited the rapid implementation of digital healthcare. This commentary urges a health equity-informed implementation of digital health. We introduce the Digital Health Equity Framework (DHEF) for identifying the digital determinants of health, and their links to digital health equity. In the current response to the Covid-19 pandemic, digital health has been rightly heralded as an innovative health solution that can ensure ongoing access to clinical care, and allow for public health measures that stem rapid viral transmission and spread [1,2]. However, unexamined inequities in access to and implementation of digital health, and the quality of care afforded by digital health, can recapitulate and deepen the inequities that have long existed within our healthcare system.

Digital health is broadly defined as "the field of knowledge and practice associated with the development and use of digital technologies to improve health" (p5) [3], across the full range of health technologies introduced into care, including telehealth, mobile health applications and 'wearable' technologies, and use of online health services and tools. During the Covid-19 public health crisis, two modes of digital health have been commonly used: virtual healthcare, or televideo enabled interactions between health providers and patients; and health information that is accessed online or via mobile applications.

While some media commentators have stated that Covid-19 is the 'great leveller,' because it knows no boundaries and can infect rich and poor, young and old, this uncritical perspective misses the systemic factors that impact

outcomes of illness and create health inequities between communities and across the life-course of individuals. Mounting evidence suggests that the Covid-19 pandemic has had far greater associated morbidity and mortality in racialized groups that struggle with the poverty, poor access to healthcare, and compounds pre-existing inequities [4]. Similarly, there has been a lack of attention to health equity in the development of digital health [5], such that when digital health solutions are applied within the pandemic response, they may have unintended consequences of furthering health inequity. For example, access to technology can be limited by poverty, under-resourcing of health systems and neighborhoods, homelessness, and by other factors that decrease engagement with technology and with digital health literacy skills. Health providers may also lack training and competencies in consideration of digital health equity, and in the cultural humility to understand how their patients and communities may experience or interact with technology. Digital health technologies interact with social, cultural and economic realities, and with social determinants of health, to indirectly contribute to health equity.

Here we propose the DHEF [see Figure 1], which applies many health equity factors outlined by Dover and Belon (2019), integrated with digital determinants of health and digital health equity [6]. In their recent approach they survey the many frameworks proposed for considering social determinants of health, and address some of the limitations of the health equity field by moving from a superficial description of factors, to a more comprehensive, ecological approach that considers the multitude of social, cultural, and economic factors that impact health and wellbeing and the interactions among them. Most

significantly, they link these social determinants to health equity, and begin to delineate a structure through which health equity can be measured within organizations and at a health system level.

Figure 1. Digital Health Equity Framework (DHEF)
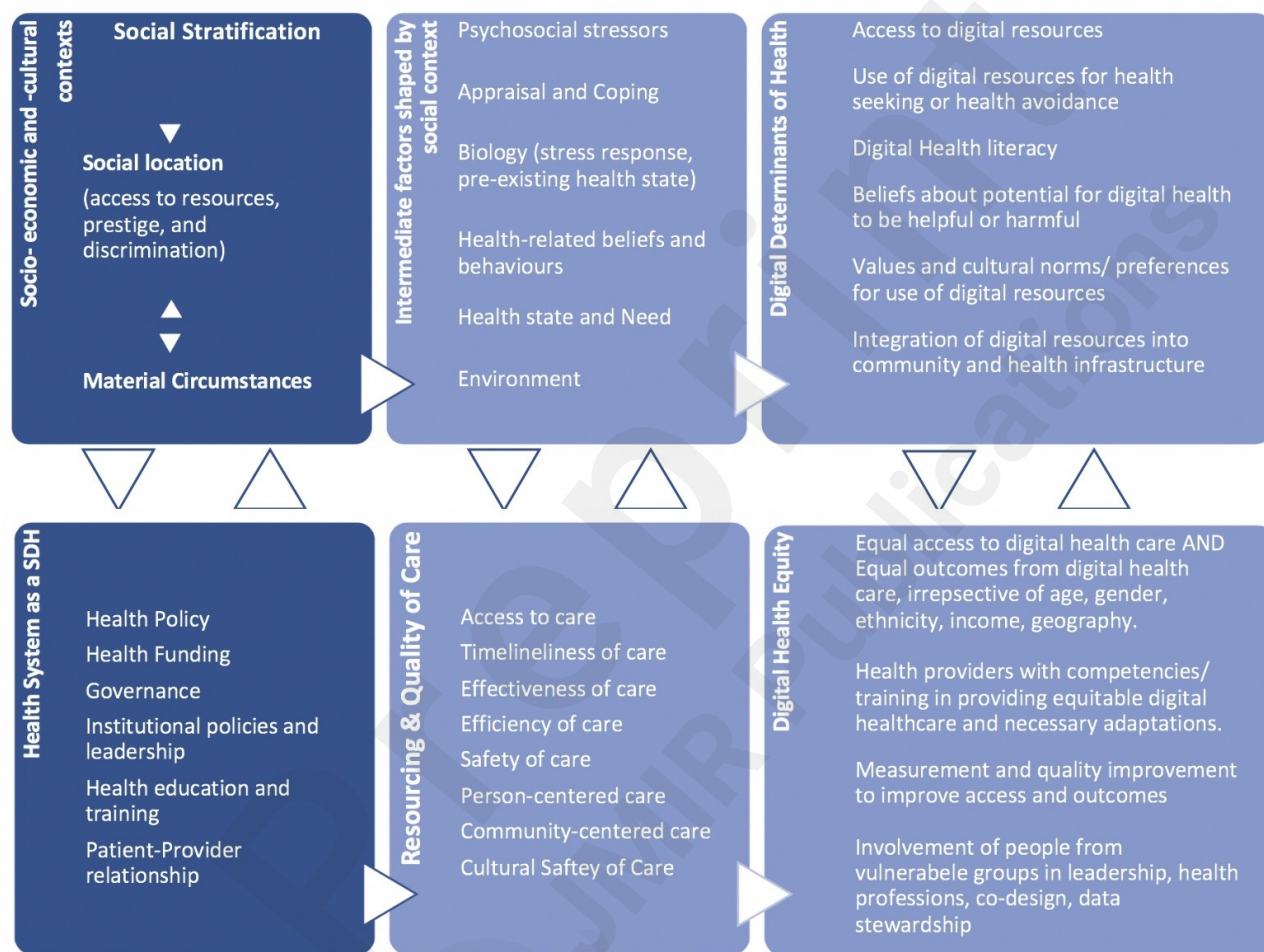
In Dover and Belon's model, which informs the foundation for the DHEF, the process of social stratification within economic, and cultural social contexts refers to the hierarchical allocation and unequal distribution of power, prestige, and resources; this stratification assigns individuals to a social location, a location defined by intersectional factors including race, age, income, geography, rurality, gender, dis/ability, occupation, among other social factors.

One's social location governs exposure to health-related risks and vulnerabilities, including discrimination. A person's social location and material circumstances can be mutually reinforcing, and they also intersect with intermediate factors that shape health and health behaviours, including: psychosocial stressors; styles of appraisal and coping; biology, including current and health status and pre-existing condition; health-related beliefs and behaviours; current health need; and environment [6].

Similarly, in the DHEF [see Figure 1], *digital determinants of health* interact with other *intermediate health factors*, such as psychosocial stressors, pre-existing health conditions, health related beliefs and behaviours, and the environment, along with current health state and needs. For example, access to digital health resources and digital health literacy interacts with the degree and kind of current psychosocial stress a person is experiencing; job loss or poverty, level of education, and previous exposure to digital media can all impact access. Styles of coping and appraisal of risk, along with health-related beliefs can shape beliefs and behaviours about digital health; for example, some patients may have a tendency to avoid healthcare or to minimize risk, leading to corollary avoidance of digital healthcare, privacy-related concerns, or failure to appraise the quality of digital health information, as examples. Just as the environment shapes healthcare access and quality, it also shapes digital health access and quality; those living in over-crowded homes may lack privacy, or may not have access to digital health at all, as with underhoused and homeless populations. All of these intermediate factors are set into play, reinforced, and in turn reinforce the *socio-economic and socio-cultural context,* and *social stratification*

process. Intersections of race, gender, and geography are among the variables that determine one's power in society and define one's social location, which is closely linked to and interacts with material circumstance.

The DHEF expands on the *health system as a social determinant of health*. Moving the dial on health equity, including digital health equity, requires looking beyond individual factors to the health system. We need to ensure that at every level, from the healthcare provider, to the institution, insurers, health regulators, and government, we are able to detect, understand, and work to improve the *resourcing and quality of digital healthcare* for all social groups, in order to reduce digital health disparities. Quality of care, which ensures that care is person-centered, safe, timely, effective, efficient, is also care that is equitable [7]. This includes the quality of digital health care. For example, if digital healthcare is not experienced as culturally safe for a population of users, or if the environments (living spaces, communities, institutions and infrastructure) and material circumstances of groups of people are not considered when developing institutional digital health strategies, or in the provisioning of funding and remuneration models for providers working with vulnerable populations, then the quality of digital care will suffer, and digital health equity will be impacted. The DHEF model highlights the importance of approaching digital health technologies from an ecological perspective, considering the ways that the uses of technology by an individual extend out into (and are shaped by) their social, cultural, and economic position in the world. The case below [see Box 1.] illustrates this interplay using Covid-19 as an example.

Box 1. Covid-19-related Digital Health Equity case example

There are examples, albeit few examples, of digital health research that incorporates considerations of social determinants and health equity, particularly in developing contexts [5], however this approach needs to become mainstream in all implementation of digital health. Just a week ago, the World Health Organization (WHO) released its four year draft global strategy on digital health [3], which aims to support international efforts "to develop the infrastructure for information and communication technologies for health…[and] to promote equitable, affordable and universal access to their benefits" (p3), along with promoting the development of national digital health strategies. In line with the 2030 Agenda for Sustainable Development, the WHO seizes on the "great potential to accelerate human progress, to bridge the digital divide and to develop knowledge societies" (p3). Within the WHO strategy, one of the strategic objectives is to advocate for people-centered health systems that are enabled by digital health. For example, to advance "digital health literacy, gender equality and women's empowerment and inclusive approaches to adoption and management of digital health technologies" (p20). The report mentions a number of approaches that relate to health equity throughout, but these are as yet unformulated within its implementation plan.

In order to consider digital health equity within our health and social contexts, we need systematic ways to ensure that potential health inequities are identified and addressed in digital health policies, strategies, and programs, so that existing health inequities are not re-inscribed onto our virtual health

landscapes. Implementation science, which specifies factors relevant to increase uptake of an innovation, is emerging as critical to guiding the spread and scaling of digital health; however, implementation models often fail to incorporate health equity factors or to address social determinants of health. In order to ensure health equity within digital health, we need to be purposeful in implementing digital health in an equitable way, and measuring health outcomes through an equity lens. If we do not collect health equity data then we cannot monitor health equity outcomes. In turn, understanding the population health needs of vulnerable groups can also identify barriers to implementation that create innovation gaps, such as the gap between population health interest in digital healthcare and the capacity of US hospitals to deliver digital healthcare in response to Covid-19 [8]. Integrating a health equity, approach such as the DHEF, with a health implementation approach is an urgent need, particularly at this time of rapid advance in digital health innovation. This should include determining appropriate health equity metrics and measures for digital health.

Perhaps most importantly, in order to avoid duplicating the social stratification that exists in society at large, we need to ensure the meaningful involvement of people from marginalized and vulnerable groups in positions of digital health leadership, as health providers, and in co-design at all stages of innovation and implementation, including as stewards of their own health outcome data. In times of crisis, such as the current Covid-19 pandemic, utilitarian principles to innovation are often viewed as a way to maximize overall social benefits, while egalitarian principles that address inequalities, are set aside [9].

There is no question that virtual healthcare sustained access to essential healthcare, however, this commentary aims to draw attention to the unintended health equity impacts of the pivot to digital healthcare from the early days of response to the current pandemic. One of the major limitations of this commentary is that we do not have available data to quantify these concerns. We believe that measurement-based approaches to health equity are a high priority for digital health research. There is some emerging work in this area [10], and we hope that the framework we propose can further stimulate investigation into the multiple ways in which digital determinants of health may impact digital health equity. In turn, data will lead to a refinement of the proposed framework. During Covid-19, and in its aftermath, we need to urge ongoing attention to health equity, including digital health equity, and to develop processes and measures to prevent our own blind spots and inattention in this regard. The celebrated curve of innovation cannot reinforce the social gradient of health, whereby people in less advantaged socioeconomic positions have worse access to digital healthcare, lesser quality of digital healthcare, or worse health outcomes.

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Supplementary Files

Figures