

CHAPTER 13

Use Of Digital Technology In Health Care For Children

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USE OF DIGITAL TECHNOLOGY IN HEALTH CARE FOR CHILDREN

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Introduction

With the development of technology and industry, a new era, dubbed the "digital age," has begun. All sectors and fields have been affected by this new era, and traditional practices have been replaced by technology-supported applications. Thus, information exchange and communication between people have accelerated. These developments have also found their place in the field of health, as in other fields. Technology development has created opportunities for patients. With the support of technology added to modern diagnosis and treatment methods, these applications have become easier and more accessible. With digital health technology, the traditional health system has been replaced by a technology-supported health system. It is expected that this situation will completely change the methods of health service delivery in the future. New tools and technologies are initiating a digital transformation in all health systems around the world. This technology provides high efficiency in clinical practices, reduces, or prevents complications and adverse events, prevents patients from experiencing socioeconomic problems, improves people's quality of life, and organizes the working lives of health professionals.

1. Digital health technology

"A phenomenon that allows data, text, and images to be transferred, stored, collected, and displayed over a single infrastructure" is the definition of the term "digitalization." Health services have been affected by the digital change that affects every part of life. A new era has started, especially with the use of digital technologies in health services (Ekinçi et al., 2021). Health technology advancements can enable people to get medical treatment conveniently and comfortably at any time and from any location. The basis for this is that people lead a healthy, high-quality, and prosperous life. Today, owing to digital technology, information is much more accessible. A database may be used to store and access digital medical records from any location. As a result of this, healthcare professionals can gather patient information more quickly (Simsir & Mete, 2002). Patients now have more convenient and rapid access to health knowledge and assistance, no matter where they are. The care recipient and the caregiver do not need to be prepared at the same time when using digital health. Additionally, this implies that countries that have limited access to healthcare services might deliver necessary treatment much more

quickly and easily. This technology benefits both the caregiver and the care recipient, as well as the nation's health system and economy (Simsir & Mete, 2021).

1.1. Definition

Digital health refers to the use of information and communication technology for patient diagnosis and care, risk assessment of healthy people, training of healthcare professionals, and observing and improving public health. Individuals can profit from digital health, but it also has a big impact on the delivery of modern, effective, and high-quality Healthcare (Uysal & Ulusinan, 2020).

1.2. Etiology

The beginning of digital health is the availability of accurate, current, and reliable medical data. By actively utilizing the appropriate health technology and health literacy, people could do this.

Accurate, quick, and efficient information may be given to health professionals with regards to occupational training, health promotion, illness healing, and rehabilitation techniques (Haupeltshofer et al., 2020). With the digitization of documents, the increase in computer speed, the development of cloud-based services, the advancement of mobile technology, and the widespread use of other portable digital devices, digitization is advancing rapidly (Temur and Aksoy, 2022; Gopal et al., 2019; Tezcan, 2016).

1.3. Digital health in the world

The digital world is still seeing technological advancements and changes from the past to the present. And the rate of progress is going to increase in the years to come (Kuyucu, 2017). The market for digital health technology is a developing field that welcomes further investment. This is why investors naturally gravitate toward this field, particularly top internet-supported businesses (Kuh and Erdem, 2021). The World Health Organization actively contributes to the accessibility of digital health services and health information. In this regard, the Global Digital Health Strategy (2020-2025) was developed to accelerate the acceptance and development of digital health apps as well as to improve the health of all people, regardless of age.

The goal is to strengthen the digital health industry in this manner and better represent it to the public. Solutions are provided for a variety of issues with digital health, including monitoring health parameters, being aware of one's own health status, disease diagnosis, treatment, and post-treatment services; online appointments; simple access to appropriate information; asking questions without wasting time; and decreasing possible mistakes.

1.4. Digital health in Turkey

There has been a significant information revolution as a result of the quick development and adoption of technology in the latter part of the 20th century. In Turkey, experiments with digitization in the medical field began in the middle of the 1960s. However, until the 2000s, there had been little real development (Vermisli Peker et al., 2018). Within the framework of the "Health Transformation Program," which was started by the Ministry of Health in 2003, several digital health apps have been activated (Cavmak & Cavmak, 2017; Gumus & Cetin, 2022). Today, these applications are becoming more common. Numerous alternative methods have been employed in the continuous quest to move

healthcare toward digitalization. At the same time, the mobile apps division of the Ministry of Health in Turkey worked to organize the nation's healthcare system with a new digital infrastructure.

Applications including SağlıkNet, e-nabız, the family medicine information system, telemedicine, electronic health records, the national medical rescue team, and the central scheduling system for doctors have all been put in place (Bayrak & Dalkiran, 2022; Ministry of Health, 2019).

1.5. Tools for digital health

Today, diagnosis and treatment are carried out considerably more quickly owing to technology in the field of health, where information technologies are employed most frequently (Leblalta et al., 2022, 2021). The use of information and communication technology in electronic health, health-related services, and procedures is referred to as "e-health" (electronic health) or "digital health" (Krey et al., 2019). The term "digital health care," which has gained significant importance for contemporary health systems around the world, encompasses a wide range of scientific concepts and technologies, including artificial intelligence, 3D printers, wearable health technologies, integrated data systems, telehealth, and mobile health (Ozen, 2021; Sultan, 2015).

1.5.1. Telehealth

To enable clinicians to provide medical treatment remotely, telemedicine enables clinical services to take advantage of information technology, visual imaging, and telecommunications connectivity. The delivery of medical services remotely by a physician is not the only definition of telehealth. It also includes telemedicine, teleeducation, telenursing, and telepharmacy services offered by anyone other than healthcare providers. Looking more closely at these concepts reveals that, under telehealth, patients and healthcare professionals are not physically present in the same place and that healthcare services are supported digitally (Ozen, 2021; Uysal & Ulusinan, 2020)

1.5.2. 3D Printers

3D printers have been around since the 1980s, when computers first became widely used. Their application to health, however, is recent. Despite being new, it has a wide range of uses in healthcare. In many sectors of health, printing technology is favored because it can generate products that are personalized or meet specific requirements. The main applications in the field of health include the production of tissues and organs, orthoses, prostheses, and implants; surgical planning; radiological programs; hearing aids; dental prostheses; and tools that guard against life-threatening infectious diseases like AIDS, as well as pharmacological applications, educational applications, and the production of surgical instruments (Uysal & Ulusinan, 2020).

1.5.3. Integrated regional and national and international health communication networks

With the use of computers, health information programs, and information processing and transmission technologies, health telematics enables us to share and transfer health information. Health informatics are used in telehealth to provide services remotely. By ensuring continuity across the nation, health informatics attempts to deliver all required

healthcare services in the most practical, efficient, and affordable manner possible. Every day, there has to be a huge interchange of information between health institutions and the people in charge in order to assure continuity (Erkilic & Yalcin, 2020).

Health information networks on a national and worldwide level are developing. They make it easier for both healthy and ill individuals to move around and access information, as well as for healthcare professionals to share that information (Long et al., 2018). Health services become more effective and of higher quality as a result. The health information network's goal is to provide access to health information and communication services as well as communication and storage methods for use by health applications, professionals, and the public. Additionally, it offers services like a network for health information, data security and privacy, load balancing, service quality and continuity, integration, development and enhancement of health information resources, and support for workflow (Erkilic & Yalcin, 2020; Long et al., 2018; Health Ministry, 2019; Avci & Avsar, 2016; Uysal & Ulusinan, 2020).

1.5.4. Mobil health

Mobile devices can use all of the telehealth services, and the term "mobile health" is used to refer to telemedicine as well (Tezcan, 2016). Online resources and mobile applications have started to play a significant role for users as healthcare services have become more digital (Ekinici et al., 2021). A more recent concept, mobile health refers to services supported by transportable communication devices such as smartphones, tablets, personal digital assistants, and wireless patient monitoring (Long et al., 2018). A wide range of smartphone applications, from telemedicine programs to pharmacy programs, fall under the heading of "mobile healthcare" (Ozen, 2021). Applications for mobile health may track vital signs, eating habits, health and disease features, and daily activities like exercise. Additionally, by delivering individualized recommendations for healthy lifestyles, mobile applications offer personalized solutions (Uysal & Ulusinan, 2020).

1.5.5. Wearable health technologies

Devices and computers that may be readily worn on the body and incorporated into clothes and other items are known as wearable technology (Sultan, 2015). The primary advantage of the devices is that they can perform many of the same essential tasks as computers and cell phones and, in some cases, exceed them. People may rapidly obtain information utilizing this technology via the internet. Health is the most significant application area for wearable technology (Erkilic & Yalcin, 2020). Wearable technologies, which have gained a lot of appeal in the healthcare industry, enable patients to remotely check their health condition and communicate their data to the physician without needing to go to a hospital. By continuously tracking health and illness data, bigger issues that can develop with early intervention might be avoided. As a result, unnecessary processes are avoided, which lowers expenses and raises the standard of healthcare (Uysal & Ulusinan, 2020).

By gathering data and collecting information about human health, wearable health devices not only help improve health status but also help advance health technology (Lou et al., 2020; Erkilic & Yalcin, 2020).

1.5.6. Digital self-tracking technologies

Remote patient monitoring using information technology is also gaining popularity.

Digital self-monitoring technologies are quickly spreading throughout Turkey as a result of improvements in health technology (Leblalta et al., 2022). The usage of digital self-tracking devices is rapidly expanding throughout Turkey and the rest of the world as a reflection of technical advancements and the digitization of the health sector. These technologies are frequently employed in the monitoring and treatment of chronic illnesses (Leblalta et al., 2022; Morgan, 2016). Remote patient monitoring using information technology is also gaining popularity. These technologies are exceptional for analyzing changes in the connection between technology and the body.

1.5.7. Big data management and artificial intelligence

New technologies have evolved as a result of the unique characteristics of human intellect and the growth of intelligence. Artificial intelligence is among them. Artificial intelligence is now widely used in a variety of fields, including computers, mobile phones, the automobile industry, and the industrial sector. Artificial intelligence is commonly defined as information processing systems that resemble human intelligence-related activities such as learning, reasoning, adaptability, and interaction. Applications of artificial intelligence are utilized or tested for a variety of health service delivery and research objectives, including illness diagnosis, chronic disease management, and the provision of health care (Uysal & Ulusinan, 2020).

1.5.8. Health-related digital games

Digital health games are acknowledged as an original and successful approach for promoting public health and raising awareness of health literacy. While health games provide users with entertaining advice for leading healthy lives, they also impart fundamental knowledge about how the human body functions. In this context, health games may be utilized as an additional instrument for a variety of purposes, including enhancing the quality of life, rehabilitation, learning about various diseases, and learning how to treat them. One method of promoting digital health is through games (Avci & Avsar, 2016).

1.6. Consequences of Using Digital Health Technology

Digitization is in every aspect of life today. Health services that include digital technology and will be available globally are now being developed and are improving daily. Patients are no longer limited by time or place thanks to this adaptable healthcare system. Basic characteristics include self-care, social support, integrated care, self-monitoring of health outcomes, and quick remote intervention. Numerous potentials exist to influence primary healthcare's future and make successful public health initiatives possible thanks to digital technologies. They accelerate the change to digital health education, practices, and policies.

Numerous potentials exist to influence primary healthcare's future and make successful public health initiatives possible thanks to digital technologies. They propel a change in digital health education, practices, and policies. A number of significant steps have been taken toward reducing the complexity of health services as a result of the digitalization of hospital applications and health services. These include shorter patient wait times and fewer stays in the hospital, the replacement of paper documents and file stacks with digital formats, and interactive staff-patient communication. Being unable to visit the hospital owing to distance or other issues is no longer a concern thanks to digital health applications. Exams, interviews, and interactions between patients and medical

personnel are now given in an ideal and efficient manner (Ozen, 2021; Long et al., 2018).

2. Childhood and digital health technology

Digital health technology is generally defined as the use of technology in the promotion, prevention, treatment and maintenance of health and health services. Mobile health (mHealth), health information technology (IT), text messaging, applications, wearable devices, telehealth and telemedicine, digital gaming, virtual reality, robotics, online support groups and social networks are digital health technology applications used during childhood. This technology can be used in a variety of ways, such as information presentation, two-way communication, or long-term assessment (Cheng et al. 2020; Devine et. al 2018).

Wearable or small sensors used in children are a constant source of data. Children who do not have to go to the hospital for a checkup will not be absent from school. In addition, the working parent does not have to take time off to take the child to the hospital, saving time and money (Sacks et al. 2022).

2.1. Advantages and disadvantages of using digital health technology according to childhood periods

After the Covid 19 pandemic, telehealth applications have increased all over the world. Thanks to the interviews made by videoconference, patients from long distances were reached. In addition, health professionals communicated with each other more easily and exchanged information. Telehealth has positive aspects as well as disadvantages. There are some concerns about security. In addition, the presence of face-to-face communication negatively affects interpersonal relations. Participants need technical support and devices such as computers and phones (Devine et al. 2018).

With the widespread use of digital health in recent years, children and adolescents were exposed to digital stimuli at a young age. Smartphones and tablets have become the most preferred “toys” for children in development. The effects of digital devices on sleep, vision, hearing, metabolic functions, parent-child relationships and emotional development have been observed (Pisano et al., 2022).

2.2. Healthy child and digital health technology

Digital technologies may suggest that they reduce children’s activities. However, if used correctly and appropriately, they have many benefits. For example, digital tools such as gaming consoles, smartphones and social media can be useful to promote physical activity. They organize children’s free time. They can provide stimulating methods for getting activities and peer support with fitness programs and daily goal reminders. In particular, gamification can improve user experiences and motivate children to participate in physical activity. Developing creative ways to engage children and adolescents in physical activity may include participating in online physical education classes or playing physically active games. Social media can support children and their families to participate in sports such as running, biking, swimming. Smart watches and other devices send instant notifications with functions such as counting steps and measuring heart rate, and thus encourage increasing physical activity (Malizia et al. 2021; Riley et al 2018).

3. Sick child and digital health technology

Digital health technology is used in the treatment of many diseases such as diabetes,

oncology, anxiety disorders in children. In children with oncological disease, virtual reality is generally used to relieve pain and alleviate symptom distress associated with treatments such as chemotherapy (Cheng et al 2020). Digital health technology also has an effect on anxiety. Virtual reality, web-based technology and a humanoid robot are used to reduce anxiety (Cheng et al 2020).

In diabetic children, digital tools are also used to educate children and to monitor their own diseases and treatments. Various new channels have been found for patient education and communication. Personalized robots for diabetes education and daily use have become more affordable and acceptable for management. Applications integrated into the camera of mobile phones are used to determine the carbohydrate content of foods and to demonstrate correct injection techniques. Wearable devices with cameras are being developed that can be used to assess dietary intake and can interact with deep-learning computer techniques for sleep quality evaluation (Fernandez-Luque 2021).

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