Review Article

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Revolutionizing mental health care: exploring the potential of digital mediation in public health

Abstract

This article addresses the concept of digital public health and explores its application in the field of mental health, focusing on technology mediation as a potential tool to improve care and well-being of individuals. Scientific evidence shows that technological mediation in mental health can have a positive and significant impact on patient outcomes. However, it highlights the importance of addressing equitable access to these digital interventions and collaboration between users and mental health professionals in the design and development of effective solutions. The case of the company Saluta, a digital health center that has led several innovations in mental health through accessible and quality digital platforms, is presented. Finally, strategies are proposed to evaluate the impact of technological mediation in digital health care, including constant monitoring of results, research with solid scientific evidence, and the involvement of users in the design and evaluation process.

Keywords: digital health, artificial intelligence, mental health, technological mediation

Jesús Goenaga-Peña,[1] Mauricio Bonilla-Sánchez[2]
[1]Associate Professor, Faculty of Psychology, University of San Buenaventura, Universidad de San Buenaventura, Colombia
[2]Saluta Centro de Salud Digital, Colombia

Correspondence: Jesús Goenaga Peña, Associate Professor, Faculty of Psychology, University of San Buenaventura, Universidad de San Buenaventura, Medellin, Colombia, Email jesus.goenag@usbmed.edu.co

Introduction

The emergence of digital public health has marked a new era in healthcare and the promotion of wellness in populations. The transition to the digital age has been driven by technological advances that have facilitated access to information through devices such as smartphones and cellular technology. These changes have transformed the collection and management of medical data, improving the efficiency of healthcare services in the diagnosis and treatment of disease. With this transition, health literacy has evolved into digital health literacy, promoting greater interaction between health professionals and individuals in general. This has led to a patient-centered approach, empowering individuals to make informed decisions about their healthcare and improve their well-being.[1]

The concept of digital public health is a complementary approach to traditional digital health, but they differ in the scope of their application. While digital public health focuses on improving the health of the general population and addressing large-scale public health issues, digital health focuses on using digital technologies to improve individual healthcare and facilitate access to healthcare services in a personalized and convenient manner, digital public health can leverage digital health technologies to collect large-scale data and more effectively track population health, while digital health can benefit from digital public health approaches to improve planning and response to health emergencies and to address health issues that affect entire communities.

The contemporary discourse of digital public health has empowered numerous projects that leverage the potential of technology to improve the health and well-being of populations[2] significantly impacting epidemiological surveillance, enabling early detection of outbreaks through the use of big data algorithms[3] optimizing clinical practices, improving communication between health professionals and patients, promoting adherence to treatment and offering more personalized medical care. These initiatives have ranged from mobile applications for chronic disease monitoring and management to digital platforms for the promotion of healthy lifestyles and disease prevention.

This article seeks to compile the available evidence on the effectiveness of digital health and, in particular, technological mediation in mental health as powerful tools to improve the care and well-being of individuals. It aims to describe the current characteristics of digital health, its techniques and main attributes, as well as to identify areas of improvement or weaknesses that need to be strengthened. In addition, it seeks to propose recommendations that foster collaboration between scientists, entrepreneurs and public health professionals, in order to align efforts towards a common discourse around digital health and contribute to the development of more effective strategies and solutions in the field of medical care and mental health. By working together, scientists, entrepreneurs and healthcare practitioners can drive innovation and improve the integration of digital technology into clinical care, providing greater access to quality services and greater attention to the needs of individuals in the field of mental health.

Digital public health concept

Digital public health has emerged as an emerging field of study that focuses on the application of digital technologies and the use of platforms in the field of public health. Despite its growing relevance, there is still a lack of conceptual clarity and unified consensus around its definition.[4] However, several perspectives have been identified, ranging from a reinvention of public health by combining digital concepts and tools to its role as an asset to achieve pre-existing goals in the field of public health.[4]

Because technological advances that provide access to information through devices such as smartphones and other cellular technology-based devices have generated a significant impact on the healthcare system and led to a change in the way medical data is collected and managed, as in the case of conditions such as atrial fibrillation.[1] This paradigm shift is leading to a transition from health literacy to digital health literacy, as well as a transformation in the communication of information between health professionals and individuals. However, this shift has not only involved a focus on patients, but also on people in general, and transcends simple health management to empower people to lead healthier lives. Emerging digital solutions are giving rise to the role of the engaged patient, which involves greater involvement of individuals in their healthcare, taking advantage of the opportunities provided by technology to improve their well-being and make informed decisions about their healthcare.[1]

Thus, digital public health has been defined as the use of information and communication technologies to improve human health, health services and the well-being of individuals and populations.[2] This definition encompasses a wide range of applications giving way to remarkable progress with the realization of numerous projects that have leveraged the growth of mobile technology to improve the health and well-being of populations.[2]

However, research on digital public health has revealed the existence of various approaches with divergent meanings.[4] On the one hand, digital public health is seen as a reinvention of public health, incorporating new ways of working by combining established public health principles with innovative digital concepts and tools. On the other hand, other approaches emphasize that it is a resource for achieving pre-existing public health objectives.

In this context, according to Iyamu et al.[4] terms of particular importance have been established for the transition from classic public health to one based on information technologies. Thus, an interest in digitization has been formalized, understood as the technical process of converting analog records into digital data and as the integration of digital technologies in public health operations. Also, the digital transformation approach, which implies a profound cultural change for the integration of digital technologies and the reorganization of health services according to the needs of the population, has become popular.

Particularly, the digital public health approach has had a significant impact in the field of epidemiological surveillance by refining big data algorithms to detect outbreaks and epidemiological trends early.[3] Similarly, digital interventions have proven useful in optimizing clinical interventions, facilitating communication between healthcare professionals and patients, improving treatment adherence, and providing more personalized medical care. Also, digital solutions have proven to be a valuable resource in the prevention of sexually transmitted infections and human immunodeficiency virus (STI/HIV), improving prevention, increasing the accessibility and acceptability of tests, contributing to the awareness of the population, providing a channel to understand and interpret discourses on pre-exposure prophylaxis (PrEP), among other implications.[3] In addition, these solutions have been of great support in the mental health field, offering self-help resources and emotional support to improve care in this field.[3]

Significant activity in the field of digital health has been documented in the European region, with numerous projects focused on harnessing the potential of mobile technology to improve people's health and well-being,[2] ranging from mobile applications for the monitoring and management of chronic diseases to digital platforms for the promotion of healthy lifestyles and disease prevention. Solutions have also been developed to facilitate communication and interaction between health professionals and patients, enabling more personalized and accessible care, facilitating access to health information, remote monitoring and tracking of relevant data for informed health decision-making.

Additionally, in the aftermath of the COVID-19 pandemic, the use of digital tools for health care has experienced remarkable expansion and adoption in diverse contexts and regions. Thus, a revolution in digital health technologies has been spurred, with many health systems turning to digital health as a resource to continue essential health care functions during the pandemic.[5] For example, as reported by Bui et al.[6] a wide range of digital health applications were used in response to the pandemic in Vietnam to strengthen surveillance, risk communication, diagnosis, and treatment of disease.

As the post-pandemic world becomes established, the need for digital interaction with patients to meet new needs and transform value in healthcare is recognized.[5] Thus, the importance of considering human factors in the design, development, and implementation of digital health care is highlighted, as the focus on people as users and consumers underscores the field's ability to respond to secular developments, such as the adoption of person-centered care and consumer health technologies.[7]

In the years since the global COVID-19 contingency, digital health care needs have evolved and become more pressing. The pandemic highlighted the importance of maintaining continuity of care, even during health crises, and digital tools play a critical role in promoting constant interaction between patients and healthcare professionals, ensuring that healthcare services remain accessible and effective, even in emergency situations;[5] also, it has been considered pressing to develop greater capacity to rapidly deploy digital applications and systems for surveillance and risk communication[6] similarly, it is required to ensure that technologies are adequately adapted to users' needs and preferences and that human factors are considered in the design and implementation of digital solutions, since digital health intervention should focus on empowering patients and ensuring the protection of their autonomy, rights and safety.[7]

In order to the above, although digital solutions have been adopted with care in the healthcare sector, there is a paucity of evidence on their benefits and harms.[8] The impact of digital applications on healthcare has not been sufficiently evaluated, which is why the World Health Organization[9] has published a guide for digital health to address this issue and provide guidance to inspire future research on digital applications. It is of utmost relevance to understand that rigorous research and evaluation of digital interventions are fundamental to establish their effectiveness and determine how they can be optimally integrated into routine care, understanding that the technological and human challenges are dynamic and that this is a complex and constantly evolving area of study and intervention, but with significant potential in generating positive impact on people's quality of life, in strengthening the preventive approach in health, in optimizing medical management, and in the development of public health policies and programs at the population level.

Technology mediation and mental health

Contemporary dynamics have accelerated the adoption and implementation of digital solutions in healthcare around the world. However, it is essential to ensure that these technologies are implemented equitably and tailored to the needs of all populations, including low-income and those located in rural regions.[5] Mental health is one of the fields in which digital technology has shown great potential, and effective implementation of digital solutions can significantly improve the care and well-being of people suffering from mental disorders.

As a specific experience regarding the development of technological mediation in mental health processes reported in the scientific literature, the specific context of India stands out, where the relationship between quantification and digitization of mental health as amenable to technological intervention has become relevant. Digitization has enabled the collection of mental health data, diagnosis of problems, and facilitation of interventions and clinical management.[10] However, the use of these technologies also poses challenges in terms of disciplining and liberating users, highlighting the need for a global debate and research analyzing the role of digitization in mental health. And despite the widespread use of digital tools and apps by patients to manage their mental health, these

solutions are rarely routinely integrated into clinical care, as indicated by Noel et al.,[11] communication between clinicians and patients about these self-management tools is limited, which can negatively affect mental health care outcomes. To address this gap, the authors suggest incorporating a technology specialist into the care process who can identify technology-based supports that reflect evidence and ensure patient privacy and safety.

The digital revolution has led to major changes in our daily lives and how we interact with the world. Dependence on digital technology has further increased, leading to greater concern about its effects on mental health. There is evidence[12,13] demonstrating that intensive use of digital media can have both positive and negative effects on the brain and human behavior, and diverse associations have been shown between the use of technologies and mental health, both positive and negative, and although changes in some of these associations have been identified over time, firm conclusions about their evolution have not yet been reached, largely due to a lack of studies documenting and evaluating mental health indicators directly associated with digital contexts, so it is crucial to continue this line of research. Regarding neuroscientific evidence,[13] on the one hand, specific morphological alterations in the brain associated with the use of technology have been observed, and it has been highlighted how it can affect brain functions such as visual perception, language and cognition; on the other hand, it has not been conclusively confirmed that excessive screen time is directly linked to mental health or well-being problems. Despite these uncertainties, the importance of using digital technology in a conscious and sensible way, taking advantage of its potential to improve personal and professional relationships, is emphasized.

However, equitable access to digital mental health interventions is also a critical aspect to consider. While digital technologies have the potential to prevent and treat mental health problems in people with chronic conditions, proper evaluation of their relevance and efficacy in different populations, such as children and youth, is required.[14] There is a need to develop engaging digital interventions that address the needs and preferences of adolescents, which requires collaboration between people with lived experience, mental health experts, and human-computer interaction professionals.[15] In this regard, some studies[16,17] document that the integration of digital technology in the intervention of some mental disorders and risk factors associated with suicidal behavior, can be beneficial, provided that the aspects of ease of use and user autonomy are taken into account. In this sense, data collected through digital tools can be useful for monitoring and early intervention, and the development of care models that include digital infrastructures can have a positive impact on mental health outcomes.

In this vein, evidence associated with technology-mediated mental health intervention presented evidence, during the COVID-19 pandemic, associated with technology-facilitated care coordination as an enhancer of mental health and suicide indicators. Iorfino et al.[17] revealed that care coordination through digital technologies could reduce hospitalizations for self-harm and suicide deaths, as well as the prevalence of serious psychological disorders. In addition, strengthening the entire mental health system was found to have the greatest impact on patient outcomes, in contrast to a focus on individual components of the system. This highlights the importance of investing in new models of care and digital infrastructure to support them, which could be essential to address current and future challenges in the mental health field.

Consequently, the available evidence suggests that technological mediation in mental health can be a powerful tool for improving people's care and well-being, especially in the post-pandemic context. However, careful consideration needs to be given to equitable access to these digital interventions and to involve mental health users and professionals in the design and development of effective and engaging solutions. By harnessing the potential of digital technology and addressing the challenges and limitations, a more person-centered and evidence-based approach to addressing mental disorders in the digital age can be facilitated. With transparent and credible collaborations between scientists and technology companies, it is possible to ensure that technology mediation in mental health is an effective and beneficial tool.

Digital innovations in mental health

Given that technology mediation in mental health has the potential to revolutionize the way mental disorders are addressed and care is provided to patients, it is critical to ensure effective integration of digital solutions into clinical care, considering both the technical aspects and the human factors involved. Collaboration between mental health professionals and technology experts is key to developing effective and engaging digital interventions that improve people's mental health and well-being.

In this context, the initiatives of the digital health center, Saluta, have led several digital innovations in mental health, focusing on strengthening care and emotional support through accessible and quality digital platforms. The organization has implemented a digital care service via chat, where psychology professionals are available in real time to provide psycho-counseling support. This has enabled patients to access the help they need in a timely manner and without time or geographic location restrictions. In addition, Saluta has conducted research to develop bereavement care chatbot models, based on decision tree algorithms and supported by sound psychological and psychiatric theories. These chatbots offer compassionate accompaniment and guidance to those facing bereavement processes, providing valuable support in emotionally difficult times.

Other digital innovations of the organization are associated with the incorporation of natural language processing algorithms to streamline initial access to digital mental health care. This strategy aims to provide psycho-guiding information in the first digital interactions, reducing anxiety and providing guidance on next steps in care. Importantly, this implementation does not seek to replace the valuable role of patient-professional interaction, but to complement it with a first care that is welcoming and understanding. Saluta's vision is focused on leveraging technology to improve mental health care, ensuring that every individual seeking support finds a warm and specialized response.

Healthcare organizations that are incorporating and strengthening digital health strategies must establish strong and strategic ties with academia and science in order to develop interventions that represent valuable contributions to reducing barriers to accessing mental health care, offering a safe and reliable platform for people to take care of their emotional well-being in a continuous and efficient manner. The combination of highly skilled professionals and innovative digital solutions make it possible to make a significant difference that impacts the beneficiaries of health and, especially, mental health programs. In addition, effective integration of these digital innovations into clinical care requires close collaboration between mental health and technology experts, ensuring that interventions are effective and engaging to improve people's mental health and well-being.

Finally, given that it is necessary to document in scientific literature these processes of digital health development, some strategies to

follow up and evaluate the impact of technological mediation used in digital health care processes are considered to include: 1) Outcome monitoring actions that involve constant follow-up to collect indicators of effectiveness of digital interventions implemented in mental health care; 2) Research and contrast with scientific evidence to evaluate the effectiveness of interventions through studies with representative samples, comparisons with control groups and adequate statistical analysis to obtain solid conclusions; 3) Involvement of users in the process of design, development and evaluation of digital interventions, since patient feedback and opinion are essential to identify possible improvements and to ensure acceptability and that innovations meet their needs and preferences; 4) Considering the adaptability and scalability of digital interventions for different contexts and populations so that they can be effectively implemented in diverse situations and can be extended to a larger number of users; and 5) Continuous updating as adjustments and improvements should be made based on feedback and outcomes to ensure that interventions are effective and appropriate for the changing needs of patients.

Conclusion

In the digital revolution, access to digital devices and applications has led to an increase in technological dependence, leaving questions about its effects on mental health, which still do not have clear answers, so continued research is required to better understand its impact. For their part, the advancement and adoption of digital technologies in the field of public health, specifically in mental health, have shown great potential to improve care, well-being and quality of life for individuals. Technology mediation in digital public health has become a valuable tool for addressing mental disorders and promoting more effective, equitable, and accessible care. However, it is essential to carefully address the challenges and limitations of these digital innovations to ensure their effectiveness and benefits.

Newly emerging organizations, which have emerged within the digital health discourse, and classic health care organizations must establish leadership in the implementation of digital innovations, such as solutions based on machine learning, data analytics, natural language processing, among others that facilitate initial access to digital mental health care, providing psycho-guiding information and reducing user anxiety. The success of these digital interventions depends on collaboration between mental health professionals and technology experts who develop an effective integration of digital solutions with a person-centered approach that takes into account the needs and preferences of users. This denotes that organizations must fund, hand in hand with academia and territorial health authorities, continuous and rigorous research processes that ensure effective interventions and public health policies that leverage the potential of digital technology to improve people's quality of life and promote mental health in society.

It is essential to approach digital health with a human approach, ensuring that interventions are accessible, effective and ethical for all users. For this reason, all innovations in the field should be documented and subject to ongoing rigorous impact evaluation processes to establish their effectiveness and ensure their appropriate implementation in routine care.

Finally, the field of digital public health has opened up a wide range of possibilities for improving the mental health and well-being of individuals and populations; however, much remains to be explored and understood in terms of its potential and limitations. Collaboration between science, academia, health organizations and technology companies will be critical to further progress in the development and implementation of effective digital solutions that promote mental health and improve people's quality of life. Technology mediation in mental health is a powerful tool that, when applied responsibly and equitably, has the potential to revolutionize mental health care and positively impact people's lives.

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Conflicts of interest

The authors declare that there is no conflicts of interest.

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