EDITORIAL: DIGITAL MENTAL HEALTH: THE FUTURE IS NOW

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ABSTRACT
Over a decade ago, we foresaw the imminent arrival of the digital health era. Yet, it wasn't until the outbreak of the COVID-19 pandemic that this future truly took shape. The pandemic became a catalyst, seamlessly integrating a spectrum of digital tools into clinical practice, fundamentally transforming the way mental health services were delivered. The inclusion of digital health technologies in our arsenal is not merely an addition; it's a revolutionary shift. These tools are pivotal in enhancing care accessibility and significantly augment our capabilities in diagnosis, treatment, and healthcare delivery, transcending national borders. Telemedicine and clinical systems enabled by the Internet are widely accessible and are beginning to affect the dynamics between doctors and patients, with this trend expected to continue in the future. Telemedicine consultations have become so ubiquitous that they are now routinely conducted via broadband Internet systems hosted in the cloud. This has enabled professionals from various fields within mental health (MH), including psychiatrists, psychologists, marriage and family therapists, and career counselors, to offer e-therapy services.

Over a decade ago, we foresaw the imminent arrival of the digital health era. Yet, it wasn't until the outbreak of the COVID-19 pandemic that this future truly took shape. The pandemic became a catalyst, seamlessly integrating a spectrum of digital tools into clinical practice, fundamentally transforming the way mental health services were delivered. The inclusion of digital health technologies in our arsenal is not merely an addition; it's a revolutionary shift. These tools are pivotal in enhancing care accessibility and significantly augment our capabilities in diagnosis, treatment, and healthcare delivery, transcending national borders. Telemedicine and clinical systems enabled by the Internet are widely accessible and are beginning to affect the dynamics between doctors and patients, with this trend expected to continue in the future. Telemedicine consultations have become so ubiquitous that they are now routinely conducted via broadband Internet systems hosted in the cloud. This has enabled professionals from various fields within mental health (MH), including psychiatrists, psychologists, marriage and family therapists, and career counselors, to offer e-therapy services. Yellowlees and Nafiz [1] have described how MH resources and services available to patients at home or in the community may be provided through a multitude of Internet devices, ranging from computers to iPhones, including:

- Online/video/telephone-based patient support groups and Websites for health information
- Telepsychiatry consultations and e-mail/phone/instant messaging with physicians and other providers from fixed and mobile locations
- Multimedia educational materials developed by patients and providers for both patient and provider education
- Scheduling systems, personal electronic health records, and tools for self-directed decision support and chronic disease management

Mobile applications created expressly to assist people in managing their mental health are available in addition to the aforementioned resources. These apps might have functions like mood tracking, cognitive behavioral therapy activities, relaxation and meditation approaches, and custom coping mechanisms. Research has shown that mood-tracking apps can provide objective measures of bipolar disorder symptoms and reduce depression and anxiety symptoms [2]. The app used in another study showed to improve self-awareness and emotional regulation in individuals with bipolar disorder, allowing users to track their mood, sleep, and medication adherence and providing personalized feedback and coping strategies [3]. Smartphone sensors could be used to monitor behavior and mental health, paving the way for next-generation psychiatric assessment [4]. Apps that track mood can also help depressed people better manage

their mental health and promote self-management. Users could monitor their mood, sleep, and physical activity on the study's app, which also included tools for establishing goals and individualized feedback [5]. However, there are also concerns about the quality and effectiveness of some mood-tracking apps. Therefore, it's essential to choose an app that is evidence-based, user-friendly, and aligned with individual needs and goals. While some apps may be helpful for individuals with bipolar disorder, there is a lack of evidence-based research on the effectiveness of many mood-tracking apps [6].
Self-help websites can be useful resources for treating mental condition symptoms. Internet-based CBT interventions were effective in reducing symptoms of depression and anxiety, and the effects were sustained over time [7]. A guided self-help program for social anxiety disorder delivered via a website was effective in reducing symptoms of social anxiety [8]. Online mental health interventions can be a successful substitute by offering people with mental health illnesses convenient and accessible help. Online cognitive behavioral therapy (iCBT) has equal effects as the in-person approach on treating conditions including panic disorder and agoraphobia [9]. Further, both online CBT and psychoeducation are effective in reducing symptoms of depression [7].
The potential of videoconferencing in telepsychiatry extends far beyond mundane ZOOM meetings. It opens up a world where distance is no longer a barrier to effective mental health care. This advanced technology allows for the seamless integration of therapeutic sessions, consultations, and even group therapy sessions, offering flexibility and accessibility that was previously unimaginable. Telepsychiatry was reliable in diagnosing common psychiatric disorders equivalent to in-person consultations, albeit with a wide variety of diagnostic measures being used across different studies [10-13] REF).While telepsychiatry has potential benefits, there are also limitations and challenges, such as technical issues and concerns about technology and privacy in rural areas [14].
With the advent of DMH technologies, the relationship of the doctor-patient has undoubtedly changed. However, as Andersson has written, “Emerging evidence across trials clearly suggests that the computer cannot totally replace human contact” [15]. A key consideration is to determine whether digital communication will supplement or replace traditional modes of healthcare delivery. With digital communication becoming more prevalent in society, replacing certain aspects of traditional clinical communication with digital methods may be crucial in ensuring access to healthcare services for those who prefer digital means. However, it's important to find a balance and guarantee that patients may access more conventional healthcare delivery methods as well.
Further, the role of digital communication technology in overcoming barriers to healthcare access for marginalized groups cannot be overlooked. Practical access issues,

negative experiences with healthcare providers, and stigmatizing reactions from staff and other patients are some of the main challenges. This technology can provide anonymity and benefits to patients who require an interpreter, thereby reducing patient-related barriers. However, it cannot overcome all barriers, such as the inability to communicate with healthcare professionals or lack of candidacy. It is also important to note that digital communication technology may work best in the context of an existing clinician-patient relationship [16].

New technologies are continually being created to enhance the delivery and efficacy of mental health care as the area of DMH continues to advance. The advent of artificial intelligence (AI) in mental health, represents an even more profound change. AI's ability to analyze vast amounts of data, recognize patterns, and even predict certain mental health trends or crises could revolutionize diagnosis and treatment. As a subset of AI, machine learning (ML), for instance, may be a helpful tool for determining which patients may benefit from a specific therapeutic strategy. Additionally, it may lead to more accurate mental health diagnoses and more customized treatment regimens, which would eventually benefit patients [17].

Advances in AI applications such as Predictive Modeling (PM) and ML techniques provide opportunities for making use of data to improve care and decrease costs through a variety of mechanisms, such as early identification of patients requiring more intensive follow-up through readmission and post-operative complication risk models, and automation of diagnostic interpretation previously completed by humans [18]. Mood and anxiety studies use algorithms to interpret or predict participants' status (e.g., naive Bayes classifiers, decision trees, random forests, linear regression, Bayesian networks, logistic regression, and other ML methods) [19]. A variety of sensors and wearables are being used today, and they are creating new options for patient care, clinician decision-making, and population health. These options reduce geographical, cost, and temporal barriers, and they also provide an opportunity to bring patients and clinical teams together for communication, support, and intervention. A scoping review of these technologies for mood and anxiety disorders [20, 4] found smartphones (66.3%), wristbands or smartwatches (22.8%), and holters (6.5%) as the most common. The most common sensors (e.g., smartwatches, heart rate monitors, smart glasses) were accelerometers (50.0%), phones (39.1%), global positioning systems (GPS) (35.9%), microphones (30.4%), actigraphs (25.0%), and electrocardiograms (ECG) (25.0%).

Chatbots refer to digital tools designed to either replace or complement human support agents through the utilization of AI and other automation technologies [21]. As AI technology has rapidly advanced, a variety of chatbots have been created to screen, diagnose, and treat mental health conditions. These chatbots not only serve as a

supplement to the clinical workforce but also appeal to patients who may be reluctant to seek help from clinicians due to societal stigma [22]. Scholars have raised concerns about users becoming excessively attached to chatbots, potentially stemming from a distorted or para-social relationship, which could be attributed to a patient's psychiatric illness [23]. Ethical considerations, including confidentiality and privacy, have also emerged as significant factors influencing the future of chatbots in mental health. For instance, research indicated that users' perceived privacy risk associated with chatbot usage negatively impacted their satisfaction and intention to continue using the chatbot [24]. Ethical issues such as safeguarding user information, ensuring data privacy, and addressing responsibility in the event of interactive accidents could significantly preclude the effectiveness of chatbot usage for mental health [25].

Therefore, future chatbots can be equipped with advanced natural language understanding capabilities, enabling them to listen empathically to users and deliver empathic and contextually relevant responses [26].

Competency-based education focuses on clinical skill development in addition to knowledge acquisition. An overview of competencies for synchronous and asynchronous competencies covered sets designed for video, mobile health, social media, wearable sensors technologies [27].The WPA's Global Guidelines for Telepsychiatry along with other guidelines may pave the way for further initiatives related to enhanced education and competency training for professionals worldwide, enabling them to practice the golden standards of telepsychiatry [28-30]. Relevant CME courses at national and international conferences should become a standard and tradition rather than an exception or one-time event .

For AI, new reporting guidelines have been developed to bridge the development-to-implementation gap in clinical artificial intelligence [31]. DECIDE-AI considered the complexity of human decision-making processes, differences between the development population and the target patient population, and safety evaluation as users’ decisions may not mirror the algorithm’s recommendations. Future studies could investigate smartphone, biological, and clinical data to identify markers of risk, diagnosis, state, stage, treatment response, and prognosis in different populations [20,32].

More broadly, digital phenotyping or behavioral markers are being developed for both clinical and non-clinical populations to correlate multimodal sensor data, cognitions, and depressive mood. The creation of large multicentric databases is an essential element in the development and validation of artificial intelligence tools, particularly in the setting of deep learning [33].

Thus, institutional movement on mobile health, wearable sensor, and informatics practices has not been rapid and it requires substantial planning and organizational

change [27]. These issues and the complexity of AI, ML, and PM processes – and the misperception that these technologies are replacing humans instead of complementing our work – are not easy to communicate to an individual patient, leaders, and the general public.

Yet, the effectiveness of the above mentioned digital tools and interventions relies heavily on our foundational understanding and practical application of these tools. Just as a state-of-the-art Rolls Royce remains stationary without a knowledgeable driver, sophisticated digital health technologies are ineffective without skilled operators. Our current educational system in medicine and psychiatry often overlooks the importance of this digital competency, a gap that needs urgent addressing. The current generation of medical students and young doctors must be equipped not just with theoretical knowledge, but with hands-on, practical experience in using these technologies. Consequently, the role of international associations like the WPA and educational institutions becomes more crucial than ever. They must lead the way in integrating these digital advances into mental health facilities, influencing policy, and shaping clinical practice. By fostering an environment that encourages digital literacy, innovation, and practical application, these organizations can ensure that the future of mental health care is not just about technology, but about effectively using technology to enhance patient care and outcomes.

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