Exploring modern trends and advances in mental health treatment in the 21st century-mobile mental health: Review article

Abdulrhman Ali Almazam
KSA, National Guard Health Affairs

Saleh Zuwayel Alenizi
KSA, National Guard Health Affairs

Arwa Mohammad Emam
KSA, National Guard Health Affairs

Naif Saad Alqahtani
KSA, National Guard Health Affairs

Maryam Helal Alanazi
KSA, National Guard Health Affairs

Mahfoudh Saad Alghamdi
KSA, National Guard Health Affairs

Sami Farhan Alsharari
KSA, National Guard Health Affairs

Abdulaziz Shaem Alsharari
KSA, National Guard Health Affairs

Ali Eid Atallah Albalawi
KSA, National Guard Health Affairs

Abstract---**Background:** Mobile mental health (mHealth) has revolutionized mental health treatment by integrating technology into patient care, emphasizing patient-centered care (PCC). This shift has transformed patients from passive recipients to active participants in managing their health through technology. Telemental health (TMH) and e-mental health (eMH) are key components, leveraging the Internet and mobile technologies for mental health services. **Aim:** This review article explores modern trends and advancements in mental

health treatment in the 21st century, focusing on the role of mobile technologies in enhancing mental health care. **Methods:** A comprehensive review of literature and current practices related to mHealth and eMH was conducted. The review included analysis of mobile health applications, telepsychiatry models, and emerging technologies in mental health treatment. **Results:** The article highlights significant advancements in mobile mental health, including the growth of mental health apps, the use of ecological momentary assessment (EMA) for real-time data collection, and the integration of mobile technologies into traditional mental health care. Trends indicate increased usage of mobile applications for mental health support, though challenges remain in app evaluation and integration into clinical practice. **Conclusion:** Mobile mental health technologies offer promising enhancements to traditional mental health care by providing accessible, flexible, and cost-effective solutions. However, there is a need for continued evaluation of app efficacy, integration strategies, and patient engagement to maximize the benefits of these technologies in clinical settings.

Keywords---Mobile mental health, telemental health, e-mental health, mobile health applications, ecological momentary assessment, telepsychiatry.

Introduction

Few innovations in technology are more in line with patient-centered care (PCC) than mobile health (mHealth). PCC, which was first conceived in the early 1990s by Harvey Picker and the National Research Council (1) and subsequently endorsed by the Institute of Medicine (2), places emphasis on providing timely, cost-effective, and high-quality healthcare. Person-centered healthcare places more emphasis on treating the patient as a whole than just their symptoms (3). By transforming patients from passive recipients to active participants in their health management (4) through shared decision-making, in accordance with international norms (5), this paradigm shift highlights the significance of participatory medicine. Patient-reported preferences, experiences, and outcomes (PRO) are becoming more and more important when developing guidelines and evaluating the health system. By more closely integrating care into patients' lives than restricting it to acute care or outpatient settings—often jokingly referred to as the "medical home"—mHealth improves patient empowerment and involvement.

Within the framework of telemental health (TMH), patients' empowerment through mHealth, telemedicine, and other technology-based treatments can be comprehended (6). A common definition for the relatively new term "e-mental health" (eMH) is still elusive, however it is characterized as "mental health services and information delivered or enhanced through the Internet and related technologies" (7). Historically, videoconferencing has been used to deliver synchronous or asynchronous mental health care services under the terms TMH and telepsychiatry (TP) (8,9). Information supply; screening, assessment, and

monitoring; intervention; and social support were identified as the four main eMH service delivery domains by a review of the literature up to 2010 (mostly from the USA, Australia, and the Netherlands) (10). Over the past ten years, Internet usage has increased dramatically worldwide, with 44% of Americans using it (6). The highest rise has been seen in Africa, the Middle East, and Latin America. Online health and mental health information varies in quality and readability (11), but it has helped people develop better coping mechanisms, self-efficacy, and empowerment. Consumers have reported improved decision-making about health-related behaviors, improved connections in the doctor-patient relationship, and lower feelings of worry and isolation (12–14). The Internet and associated technologies have the potential to function as primary resources or as a supplement to conventional mental health treatment services.

Notwithstanding the initial sluggish acceptance of mental health apps because the IT infrastructure of mental health organizations was not eligible for federal financing, mobile mental health applications and social networking platforms are expanding quickly. In addition to being a more affordable option than traditional desktop computers, mobile mental health apps offer the following benefits: (I) portability, which allows access anytime and anywhere while overcoming geographical and transportation barriers; (II) advanced features like context-aware interventions and real-time feedback (15). Geographically and among different demographic groups, there is a demand for mental health applications; nevertheless, older persons are less likely to utilize them (15). Programs for reducing stress through apps are becoming more and more popular because of their financial benefits (16). Numerous applications improve social networking, which is characterized as web-based platforms that let users interact with others, explore social networks, and build public or semi-public profiles (17). There is evidence that this media affects health-related behaviors (18). To handle the growing difficulties and complexities in interactions between consumers, patients, caregivers, and other stakeholders, mental health clinicians need a systematic framework (6). In addition to the many difficulties posed by new technology, providers may also have concerns about these developments, much as the general public (19). First and foremost, providers need to assess whatever technologies are being used, how they are being used, and stay up to date on any new options that patients may have. Secondly, they must evaluate the evidence supporting smartphone apps for mental health and how well they work with evidence-based treatments (20). Third, long-term planning might be required as doctors and patients assess the monitoring and applicability of these technologies in clinical care. Fourth, doctors might have to help patients use the right resources at the right times (such refraining from posting on social media when having suicide thoughts, for example). Fifth, it's important for patients and doctors to weigh the advantages (including self-efficacy gains, timely learning, and empowerment) against any potential disadvantages. Lastly, as part of treatment plans, clinicians may need to record the usage of mental health apps.

Mobile Mental Health

Over time, the meaning of mHealth has changed dramatically. "Emerging mobile communications and network technologies for healthcare systems" (22), as opposed to "unwired e-med" (21), was the term originally used in 2003. More

recently, "wireless communication technologies that transform health, healthcare, and public health" (23, 24) has been used to define it. Over 90,000 consumer health applications (often known as "apps") are reportedly accessible for download (25), with a significant portion of these being devoted to mental health (MH). Few of these apps, meanwhile, have been examined by scientists to determine their advantages or disadvantages, or have received FDA (Food and Drug Administration) approval or review (25). Sixty-nine percent of adult Americans track at least one health indicator (weight, activity level, or symptoms), but only twenty percent of them continue to do so over an extended period of time (26). Patients in primary care settings use mHealth resources at rates that are either higher than or equal to those of the general public (e.g., 55% of patients own smartphones) (27). Flexibility and integration are the two main pillars that support mHealth (28). First of all, it incorporates features that are frequently connected to conventional approaches of health communication, such interactivity, personalization, customization, and message repetition, at a very affordable price. For example, automated answers, scheduling, and monitoring are all done using SMS text message. Second, by tying together mobile devices, hospitals, home-based care, and national health networks, mHealth promotes system integration (26). Notable characteristics consist of The following are some of the features that make it easier for clinicians and patients to communicate remotely: (I) voice and video calling; (II) SMS and multimedia messaging services (MMS) that include educational sound files and video clips; (III) multimedia functions that offer a variety of learning opportunities; (IV) built-in sensors like touch, motion, and GPS that improve lifestyle and social activities and simplify clinical assessments; (V) device connectivity, which is useful and less error-prone than manual data entry. Due to the intricacy of these systems, tablet PCs or cellphones are frequently the main means of communication between physicians and patients in their daily lives, allowing for the bidirectional flow of information that promotes illness self-management. Wireless monitoring devices can gather sensor data, transfer it to a smartphone app for mobile health, send the data to a network, and assist in clinical decision-making (26). This establishes an ongoing information flow that offers updates on development and serves as a reminder for prescribed drugs, visits, and healthy behavior. Many patients find it helpful when their doctors send them SMS texts, instructional films, or inspirational pieces.

Since Ecological Momentary Assessment (EMA) gathers data in real time on a client's emotions, functioning, and actions related to mood, anxiety, and smoking, it is a particularly promising technique for mental health (mMH) care (29–31). Through the frequent sampling of naturalistic experiences and actions, EMA improves evaluation accuracy. EMA began with paper-and-pencil diary techniques (such as prescription calendars), but it has since advanced to the usage of smartphones, which may record instantaneous self-reports while going about daily tasks. Daily diary reporting, signal-dependent reporting, and event-dependent reporting are examples of common EMA techniques. Daily diaries are prone to recollection and social desirability biases, but they also involve reporting on events and mood at the end of the day. Clients using signal-dependent reporting must report symptoms in response to alarms at arbitrary times during the day. Event-dependent reporting is the practice of disclosing symptoms in response to scheduled obstacles or events. While signal-dependent and event-dependent reports are more accurate than the others, they may need a level of

desire and engagement that is difficult for certain participants (32). With less intense engagement, wearable sensors and smartphones have a better potential to capture accurate real-time symptom data.

Mobile Applications for Mental Health

While there may be some differences in the manner that mobile mental health (mMH) develops over time, trends in mHealth show how mMH is still evolving. Text messaging has been used in a variety of mental health contexts, such as substance misuse (31%), schizophrenia (22%), and affective disorders (17%), according to a review of mMH research (33). Reminders (14%), information sharing (17%), encouraging messages (42%), and self-monitoring protocols (42%), frequently in combination, were among the uses of text messages. Numerous studies discussed pilot programs, but some RCTs (randomized controlled trials) noted advantages like better symptom monitoring, treatment adherence, attendance at appointments, and general satisfaction with medical care. SMS text messaging can nevertheless make a big difference through personalization, sympathetic communication, and courteous message—despite certain restrictions, like not being appropriate for remote counseling like other telemedicine techniques (34).

Because it collects data in real time on clients' feelings, functioning, and actions linked to mood, anxiety, and smoking, the Ecological Momentary Assessment (EMA) is especially well-suited for mental health counseling (mMH) (29–31). To improve assessment accuracy, EMA sample behaviors and experiences repeatedly. From pen and paper diaries (such as prescription calendars) to smartphone-based self-reports while engaging in daily activities, it has advanced. Daily diaries, event-dependent reporting, and signal-dependent reporting are a few EMA technique examples. End-of-day observations on activities and mood are included in daily diaries, but they could be biased by recollections. While event-dependent reporting concentrates on symptoms that occur after certain occurrences, signal-dependent reporting records symptoms at random intervals that are prompted by alarms. While signal-dependent and event-dependent approaches may necessitate a greater degree of participant involvement, they are typically more accurate (32). With minimal effort, real-time symptom data may be more easily captured with smartphones and wearable sensors. Psychological apps are used for many purposes, such as: (I) promoting communication between patients, caregivers, social supports, or providers; (II) enhancing psychotherapy and medical support by means of journaling, diaries, tracking symptoms, and psychoeducation in between clinic visits; (III) using sensors and data activity to monitor symptoms and predict relapse or worsening affective states; (IV) facilitating self-assessment and care through symptom reflection; (V) enhancing learning through interaction rather than traditional paper-based methods; and (VI) planning long-term activities, moods, and therapy homework (20,39,40). Accurate symptom reporting is aided by real-time recording of symptoms, mood, behavior, and cognitions since patients frequently forget important events in between visits (41).

Numerous smartphone applications, especially those focusing on health, stress management, and self-help for anxiety disorders, have been modified to assist different patient populations (42). For instance, the "Fear Fighter" software,

created at the beginning of the year, employs computer-guided exposure therapy for panic and phobias. This software produces good outcomes despite the lack of licensed therapists, which helps patients and physicians by reducing waiting times and increasing the effectiveness of healthcare. Another app from the National Center for Telehealth and Technology, PTSD Coach (http://www.ptsd.va.gov/public/pages/PTSDCoach.asp), assists veterans in coping with the symptoms of PTSD and offers direct access to resources. These apps are meant to be used in addition to conventional therapy, not as a substitute for it.

Psychological applications serve as a supplement to traditional psychotherapy, including psychoeducation, symptom monitoring, and journaling in between in-person sessions. They support introspection on symptoms, self-evaluation, and participatory learning. Through tools for tracking treatments, learning about illnesses, and finding resources for therapy, apps empower patients (43). For example, because of the iPhone's portability, usability, and convenience, soldiers prefer to complete psychometric tests like the Patient Health Questionnaire (PHQ) on this device (44).

Improving patient attendance to therapy is a promising area to address a common cause of worse than ideal psychiatric results. Because of stigma and inadequate understanding, around half of all patients do not seek psychiatric care (45). Education, encouragement, and support, whether given in-person or virtually, can boost the number of patients receiving treatment, raise awareness of its advantages, and foster better provider collaboration—all of which can lead to more favorable results (46). Simple mail, phone, or SMS reminders are examples of recent patient-centered initiatives to increase attendance and adherence (47). 166 psychiatry apps could be found on the Apple Store and 240 on the Android store, according to a search. 95.2% of medical students (N=185; 66.7%) said that a psychiatry app would be helpful, especially with embedded textbook contents and clinical videos. Medical students generally have one to five smartphone apps for usage in the classroom and clinic (48). Nevertheless, comprehensive, high-quality e-learning resources are hard to come by (48). Because app designers are frequently neither trainees nor doctors, user acceptability and content accuracy may suffer (49, 50). Anxiety, a lack of technical skills (such coding), and time constraints are obstacles for clinicians. Physicians may contribute to processes or influence colleagues in app development, just like they do with electronic health records (EHRs). Forward-thinking businesses could incorporate physicians into their designs for enhanced usability and promotional objectives. The evolution of eMental Health (eMH) and its intersection with mobile health (mHealth) provides insight into how technology has transformed mental health care and support. While both eMH and mHealth share some common ground, they also exhibit unique characteristics and trends.

Overview of eMH and Its Interaction with mHealth

Historical Context and Current Trends: The use of the Internet for mental health support began before the advent of mobile health technologies but now overlaps with and informs mHealth developments. Research into the utilization of

these technologies reveals differences in how people, patients, caregivers, and providers interact with and benefit from them.

Internet Usage for Health Information:
- **Demographics:** Internet users seeking health information are predominantly female (86% vs. 73% male). Common topics include disease information, treatments, healthcare providers, food and drug safety, and pregnancy (8).
- **Caregivers:** A significant majority (88%) of caregivers with Internet access seek health information online. Internet use varies with education and income levels; higher education and income are associated with increased use of online health resources.

Online Mental Health Help for Young People:
- **Satisfaction and Usage:** A review of 18 studies indicated high satisfaction among young people (ages 14-25) using online mental health help, with higher usage rates among females (51).
- **Consumer-Driven Sites:** Platforms like PatientsLikeMe allow individuals to connect with others facing similar medical issues, offering a sense of community and support. This is particularly beneficial for young people with developmental challenges who may prefer anonymous or remote interactions (52).

Factors Influencing eMH Care Use:
- **Community Sample in France:** Factors influencing eMH care include predisposing (e.g., age, sex, education), enabling (e.g., social support, financial status), and needs-related (e.g., major depression, suicidal ideation) factors. eMH care was positively associated with severe psychological conditions and did not hinder traditional care but was linked to face-to-face psychotherapy (54).

Support Groups and Community Participation

Internet-Mediated Support Groups:
- **Premises:** Support groups are based on knowledge affecting behavior changes, peer support, and the personalized nature of online contact with healthcare providers (55).
- **Populations Served:**
  - **Stigmatized or Rare Illnesses:** Individuals with stigmatizing conditions or rare illnesses benefit from the anonymity and support of online communities.
  - **Schizotypal Personality Disorder:** Patients with social interaction difficulties may find online interactions more manageable.
  - **Military Personnel:** Preference for technology-based mental health platforms due to stigma and fear of seeking in-person help (33% more willing to use technology-based platforms) (6).
  - **Caregivers:** Online support has been shown to reduce stress and improve quality of life for caregivers, particularly in rural areas (56).

Structured Information and Self-Directed Tools:
- **Health Promotion and Disease Prevention:** Tools like mood assessments, exercise logs, and behavior tracking apps support self-

management and health promotion. Examples include mood diaries and apps that map behavior patterns (e.g., MoodyMe) (20,39,40).

- **Young People:** Structured health information and online treatment options are beneficial in various settings, including schools and home-based care (e.g., Kindertelefoon, ReachOut) (41).

Informal Advice and Oversight by Health Professionals:

- **Psychotic Patients:** Contrary to misconceptions, individuals with psychosis use the Internet for illness-related information, despite potential challenges (57,58).
- **Bulletin Boards and Asynchronous Chats:** Online forums with occasional professional input can provide education, correct misconceptions, and guide patients to seek professional help when needed.
- **Social Networking Sites:** A study found that 25% of college students exhibited depressive symptoms based on DSM-IV criteria, with online reinforcement potentially influencing public disclosure of symptoms (59).

Support for Rural and Urban Areas:

- **Anonymous and Stigma-Free Help:** Internet-based support offers anonymous assistance and self-help interventions, benefiting patients and caregivers in both rural and urban settings. This includes decision support hotlines, problem-solving training, and formal self-diagnosis tools (e.g., Patient Health Questionnaire, Hospital Anxiety and Depression Scale) (60).

Overall, the integration of eMH and mHealth technologies reflects a shift toward more accessible, personalized, and flexible mental health care options. Understanding these trends and the diverse needs of users helps in the effective implementation and utilization of these technologies. The integration of technology into clinical care, particularly through telepsychiatric care and other evidence-based options, offers various models and methodologies that have been shown to be effective in different contexts. Here's a summary of the key points related to traditional clinician-assisted decisions, telepsychiatric care, and other evidence-based options:

1. Traditional Clinician-Assisted Decisions

Patient-Doctor Correspondence:

- **Integration with EHR:** The increase in online health information allows patients to have more informed discussions with their doctors about their conditions and treatment options (13). This is especially beneficial for conditions like schizophrenia, where patients may experience a more egalitarian relationship with their providers due to shared decision-making (61).

Patient Perceptions:

- **Schizophrenia:** Patients with schizophrenia have reported positive experiences with patient-doctor correspondence, finding it beneficial in maintaining a sense of partnership and safety without the discomfort of face-to-face interactions (58).

2. Internet-Based Cognitive Behavioral Therapy (ICBT) and Other Treatments

Effectiveness:
- **ICBT:** Internet-based cognitive behavioral therapy is effective for depression and anxiety when guided by a qualified therapist (62). It compares favorably with in-person CBT in terms of effect size and recovery rates (65). The combination of internet-based cognitive therapy with text messaging (mobile cognitive therapy; mCT) and therapist contact helps prevent relapse and is feasible for both patients and therapists (66).

Online Interventions:
- **Comparability:** Online mental health interventions have been shown to be as effective as traditional in-person therapy for disorders such as depression and anxiety (67-69). A study of CBT for social phobia demonstrated that long-term effects of online treatment were comparable to in-person therapy (68).

3. Telepsychiatry Models

Asynchronous Telepsychiatry (ATP):
- **Feasibility and Cost-Effectiveness:** ATP involves screening questionnaires, video capture, and remote psychiatrist review. It has been found to be feasible, valid, reliable, and cost-effective, with successful implementation about 80% of the time (9).

Synchronous Telepsychiatry (STP):
- **Models and Intensity:** STP includes various models from low to high intensity, such as tele-education and videoconferencing. These models have different implications for cost, feasibility, and the depth of the provider-patient relationship (6,7,70-73).

-

4. Guidelines and Considerations for Technology Integration
Clinical Practice Guidelines:
- **Scope:** Adult TMH guidelines cover clinical, administrative, and technical aspects. New guidelines for children and adolescents are in development to address specialized populations and settings. Existing guidelines may not fully address all technology innovations (e.g., texting, e-mail, online coaching) (6).

Considerations for Technology Integration:
1. **Patient Factors:**
   - **Comfort and Familiarity:** Patient receptiveness and familiarity with technology impact the success of telehealth models. Patient preferences, access to technology, and language considerations are crucial (13).
2. **Disease Factors:**
   - **Appropriateness:** The technology modality should match the disease's natural history. Chronic diseases might benefit from online support groups or wearable devices for monitoring (13).

3. **Provider Factors:**
    o **Quality and Resources:** Providers need to ensure they have the time and resources to maintain quality care with the addition of new technologies. Expectations should be clearly communicated regarding whether the technology will replace or supplement in-person services (13).

Training and Education:
- **Adaptability:** When integrating new technologies, consider the evolving literature and recommendations. Ensure the chosen modalities are practical, feasible, and enhance patient care without compromising quality. In summary, the integration of telepsychiatric care and internet-based therapies offers promising alternatives to traditional face-to-face interactions, with evidence supporting their effectiveness and feasibility. However, careful consideration of patient needs, disease characteristics, and provider resources is essential to optimize the benefits and maintain the quality of care.

Roles of Healthcare Providers:
In the context of mobile mental health (mHealth) and the integration of technology into mental health treatment, healthcare providers, including psychiatrists, pharmacists, and nurses, play crucial roles. Their responsibilities can be broadly categorized as follows:

1. Psychiatrist:
- **Assessment and Diagnosis:** Psychiatrists are responsible for diagnosing mental health conditions and determining appropriate treatment plans. In the mHealth context, they may use mobile technologies to conduct assessments and monitor patients' symptoms in real-time.
- **Telepsychiatry:** They provide remote consultations via telepsychiatry, enabling patients to receive psychiatric care from anywhere. This expands access to care, especially in underserved areas.
- **Treatment and Medication Management:** Psychiatrists prescribe medications and oversee their use. They may leverage mobile apps to track medication adherence and side effects, adjusting treatment as needed based on real-time data.
- **Patient Education:** Educating patients on using mHealth tools effectively, ensuring they understand how to engage with these technologies for their treatment.

2. Pharmacist:
- **Medication Management:** Pharmacists ensure that medications prescribed through mHealth platforms are dispensed correctly. They also provide guidance on proper medication use, potential interactions, and side effects.
- **Patient Counseling:** Pharmacists educate patients about their medications, including how to use mobile apps to track their medication schedule, monitor side effects, and manage refills.

- **Medication Adherence Support:** They collaborate with other healthcare providers to monitor patients' adherence to medication regimens, often using data collected through mobile apps.

3. Nurses:
- **Patient Monitoring:** Nurses play a key role in monitoring patients' health status through mobile health platforms. They may track vital signs, symptoms, and other health indicators, providing timely interventions when necessary.
- **Patient Support and Education:** Nurses offer continuous support to patients, helping them navigate mHealth tools, understand their treatment plans, and adhere to prescribed therapies. They also educate patients on using these tools to self-manage their conditions.
- **Coordination of Care:** Nurses often act as coordinators, ensuring that information collected via mHealth platforms is effectively communicated among all members of the healthcare team. They help to ensure that the care plan is cohesive and well-integrated.

Overall Role

Healthcare providers collaborate closely in the mHealth context to ensure that mobile technologies are effectively integrated into mental health care. This collaboration enhances patient engagement, improves treatment adherence, and ultimately leads to better mental health outcomes.

Conclusion

The integration of mobile technologies into mental health treatment represents a significant shift towards more accessible, patient-centered care. Mobile mental health (mHealth) and e-mental health (eMH) are rapidly evolving fields that leverage technology to enhance traditional mental health services. The rise of mobile health applications has expanded the reach of mental health support, making it possible for individuals to access care and support more conveniently and affordably. One of the key advancements discussed in this review is the use of ecological momentary assessment (EMA), which allows for real-time data collection on patients' moods, behaviors, and symptoms. This method improves the accuracy of mental health assessments by capturing data in naturalistic settings, thus providing a more comprehensive understanding of patients' conditions. The transition from paper-based diaries to smartphone-based reporting systems represents a significant improvement in data collection methods, offering more precise and timely insights into patients' mental health. The review also emphasizes the benefits of integrating mobile applications into mental health care, including enhanced patient engagement, improved access to resources, and better management of symptoms. Applications designed for mental health support can facilitate communication between patients and providers, monitor symptoms, and offer psychoeducation, thereby complementing traditional therapy rather than replacing it. Despite these advancements, there are challenges that need to be addressed. The evaluation of mobile health apps remains inconsistent, with few undergoing rigorous scientific scrutiny or obtaining regulatory approval. Furthermore, there is a need for more structured

frameworks to integrate these technologies into clinical practice effectively. Providers must stay informed about the latest technologies and assess their evidence base and compatibility with established treatments. In summary, while mobile mental health technologies hold great promise, ongoing research, evaluation, and integration efforts are essential to ensure they are used effectively and ethically. Addressing these challenges will help maximize the potential benefits of mHealth and eMH, ultimately improving mental health outcomes for a broader range of individuals.

References

1. Frampton SB, Guastello S. Honoring the Life of a Pioneer in Patient-Centered Care:Harvey Picker, PhD (1915-2008). *Patient* 2008;1:73–5.
2. Institute of Medicine. Crossing the quality chasm: A new health system for the 21st century. Washington: National Academies Press, 2001.
3. Miles A, Mezzich J. The care of the patient and the soul of the clinic:Person-centered medicine as an emergent model of modern clinical practice. *Int J Pers Cent Med* 2011;1:207–22.
4. Frydman GJ. Patient-driven research: rich opportunities and real risks. *J Participat Med* 2009, Available online: http://ojs.jopm.org/index.php/jpm/article/view/28/18
5. Witteman HO, Dansokho SC, Colquhoun H, et al. User-centered design and the development of patient decision aids: protocol for a systematic review. *Syst Rev* 2015;4:11.
6. Hilty DM, Chan S, Torous J, et al. New frontiers in healthcare and technology: Internet- and web-based mental options emerge to complement in-person and telepsychiatric care options. *J Health Med Informatics* 2015;6:1–14.
7. Christensen H, Griffiths K, Evans K, et al. *E-mental health in Australia: implications of the internet and related technologies for policy*. Canberra: Commonwealth Department of Health and Ageing, 2002.
8. Hilty DM, Ferrer DC, Parish MB, et al. The effectiveness of telemental health: a 2013 review. *Telemed J E Health* 2013;19:444–54.
9. Yellowlees PM, Odor A, Iosif AM, et al. Transcultural psychiatry made simple–asynchronous telepsychiatry as an approach to providing culturally relevant care. *Telemed J E Health* 2013;19:259–64.
10. Lal S, Adair CE. E-mental health: A rapid review of the literature. *Psychiatr Serv* 2014;65:24–32.
11. Ferreira-Lay P, Miller S. The quality of Internet information on depression for lay people. *Psychiatric Bulletin* 2008;32:170–3.
12. Morahan-Martin JM. How Internet users find, evaluate, and use online health information: a cross-cultural review. *Cyberpsychol Behav* 2004;7:497–510.
13. Murray E, Lo B, Pollack L, et al. The impact of health information on the Internet on the physician-patient relationship: Patient perceptions. *Arch Intern Med* 2003;163:1727–34.
14. Hu C, Kung S, Rummans TA, et al. Reducing caregiver stress with internet-based interventions: a systematic review of open-label and randomized controlled trials. *J Am Med Inform Assoc* 2015;22:e194–e209.
15. Torous J, Chan SR, Yee-Marie Tan S, et al. Patient Smartphone Ownership and Interest in Mobile Apps to Monitor Symptoms of Mental Health

Conditions: A Survey in Four Geographically Distinct Psychiatric Clinics. *JMIR Ment Health* 2014;1:e5.

16. Luxton DD, Hansen RN, Stanfill K. Mobile app self-care versus in-office care for stress reduction: a cost minimization analysis. *J Telemed Telecare* 2014;20:431–5.

17. Boyd DM, Ellison NB. Social network sites: definition, history, and scholarship. *J Comput-Mediated Commun* 2007;13:210–30.

18. Laranjo L, Arguel A, Neves AL, et al. The influence of social networking sites on health behavior change: a systematic review and meta-analysis. *J Am Med Inform Assoc* 2015;22:243–56.

19. Ben-Zeev D. How I stopped fearing technology-based interventions. *Psychiatr Serv* 2014;65:1183.

20. Chan SR, Torous JB, Hinton WL, et al. Psychiatric apps: Patient self-assessment, communication, and potential treatment interventions. In: Mucic D, Hilty DM. editors. *Key Issues in e-Mental Health*. New York: Springer Publishing, 2015;217–29.

21. Laxminarayan S, Istepanian RS. UNWIRED E-MED: the next generation of wireless and internet telemedicine systems. *IEEE Trans Inf Technol Biomed* 2000;4:189–93.

22. Istepanian RS, Lacal J. Emerging mobile communication technologies for health: some imperative notes on m-health. In: *Proceedings of the 25th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, 2003. United States of America*: IEEE, 2003;1414–16.

23. Steinhubl SR, Muse ED, Topol EJ. Can mobile health technologies transform health care? *JAMA* 2013;310:2395–6.

24. Free C, Phillips G, Felix L, et al. The effectiveness of m-health technologies for improving health and health services: a systematic review protocol. *BMC Res Notes* 2010;3:250.

25. Pelletier SG. Explosive growth in health care apps raises oversight questions. *AAMC Reporter* 2012, Available online: https://www.aamc.org/newsroom/reporter/october2012/308516/health-care-apps.htm

26. Honeyman E, Ding H, Varnfield M, et al. Mobile health applications in cardiac care. *Interv Cardiol* 2014;6:227–40

27. Fox S, Duggan M. Tracking for health. *Pew Research Center* 2013, Available online: http://pewinternet.org/Reports/2013/Tracking-for-Health.aspx

28. Bauer AM, Rue T, Keppel GA, et al. Use of mobile health (mHealth) tools by primary care patients in the WWAMI region Practice and Research Network (WPRN). *J Am Board Fam Med* 2014;27:780–8.

29. Carlson EB, Field NP, Ruzek JI, et al. Advantages and psychometric validation of proximal intensive assessments of patient-reported outcomes collected in daily life. *Qual Life Res* 2016;25:507–16.

30. van Os J, Delespaul P, Barge D, et al. Testing an mHealth momentary assessment Routine Outcome Monitoring application: a focus on restoration of daily life positive mood states. *PLoS One* 2014;9:e115254.

31. Langdon KJ, Farris SG, Overup CS, et al. Associations between anxiety sensitivity, negative affect, and smoking during a self-guided smoking cessation attempt. *Nicotine Tob Res* 2016;18:1188–5.

32. Berkman ET, Giuliani NR, Pruitt AK. Comparison of text messaging and paper-and-pencil for ecological momentary assessment of food craving and intake. *Appetite* 2014;81:131–7.

33. Berrouiguet S, Baca-García E, Brandt S, et al. Fundamentals for future mobile-health (mHealth): a systematic review of mobile phone and web-based text messaging in mental health. *J Med Internet Res* 2016;18:e135.

34. Odeny TA, Newman M, Bukusi EA, et al. Developing content for a mHealth intervention to promote postpartum retention in prevention of mother-to-child HIV transmission programs and early infant diagnosis of HIV: a qualitative study. *PLoS One* 2014;9:e106383.

35. Thompson WK, Gershon A, O'Hara R, et al. The prediction of study-emergent suicidal ideation in bipolar disorder: a pilot study using ecological momentary assessment data. *Bipolar Disord* 2014;16:669–77.

36. Depp CA, Moore RC, Perivoliotis D, et al. Technology to assess and support self-management in serious mental illness. *Dialogues Clin Neurosci* 2016;18:171–83.

37. Depp CA, Kim DH, Vergel de Dios L, et al. A pilot study of mood ratings captured by mobile phone versus paper-and-pencil mood charts in bipolar disorder. *J Dual Diagn* 2012;8:326–32.

38. Cain AE, Depp CA, Jeste DV. Ecological momentary assessment in aging research: a critical review. *J Psychiatr Res* 2009;43:987–96.

39. Harrison V, Proudfoot J, Wee PP, et al. Mobile mental health: review of the emerging field and proof of concept study. *J Ment Health* 2011;20:509–24.

40. Hilty D, Yellowlees PM, Parrish MB, et al. Telepsychiatry: Effective, Evidence-Based, and at a Tipping Point in Health Care Delivery? *Psychiatr Clin North Am* 2015;38:559–92.

41. Moskowitz DS, Young SN. Ecological momentary assessment: what it is and why it is a method of the future in clinical psychopharmacology. *J Psychiatry Neurosci* 2006;31:13–20.

42. Torous J, Staples P, Shanahan M, et al. Utilizing a Personal Smartphone Custom App to Assess the Patient Health Questionnaire-9 (PHQ-9) Depressive Symptoms in Patients With Major Depressive Disorder. *JMIR Ment Health* 2015;2:e8.

43. Luxton DD, McCann RA, Bush NE, et al. mHealth for mental health: integrating smartphone technology in behavioral healthcare. *Prof Psychol Res Practice* 2011;42:505–12.

44. Bush NE, Skopp N, Smolenski D, et al. Behavioral screening measures delivered with a smartphone app: psychometric properties and user preference. *J Nerv Ment Dis* 2013;201:991–5.

45. Agyapong VI, Rogers C, Machale S, et al. Factors predicting adherence with psychiatric follow-up appointments for patients assessed by the liaison psychiatric team in the emergency department. *Int J Psychiatry Med* 2010;40:217–28.

46. Gonzalez J, Williams JW, Noël PH, et al. Adherence to mental health treatment in a primary care clinic. *J Am Board Fam Pract* 2005;18:87–96.

47. Zanjani F, Davis T, Newsham P, et al. Management of psychiatric appointments by telephone. *J Telemed Telecare* 2015;21:61–3.

48. Zhang MW, Ho CS, Ho RC. Methodology of development and students' perceptions of a psychiatry educational smartphone application. *Technol Health Care* 2014;22:847–55.

49. Barton AJ. The regulation of mobile health applications. *BMC Med* 2012;10:46.

50. Subhi Y, Todsen T, Ringstd C, et al. Designing web-apps for smartphones can be easy as making slideshow presentations. *BMC Res Notes* 2014;7:94.

51. Kauer SD, Mangan C, Sanci L. Do online mental health services improve help-seeking for young people? A systematic review. *J Med Internet Res* 2014;16:e66.

52. Berger M, Wagner TH, Baker LC. Internet use and stigmatized illness. *Soc Sci Med* 2005;61:1821–7.

53. Griffiths KM, Calear AL, Banfield M. Systematic review on Internet Support Groups (ISGs) and depression (1): Do ISGs reduce depressive symptoms? *J Med Internet Res* 2009;11:e40.

54. Younes N, Chollet A, Menard E, et al. E-mental health care among young adults and help-seeking behaviors: A transversal study in a community sample. *J Med Internet Res* 2015;17:e123.

55. Antze P. *On the pragmatics of empathy in the neurodiversity movement*. In: Lambek M. editor. *Ordinary Ethics*. New York: Fordham University Press, 2010;310–27.

56. Blusi M, Dalin R, Jong M. The benefits of e-health support for older family caregivers in rural areas. *J Telemed Telecare* 2014;20:63–9.

57. Schrank B, Sibitz I, Unger A, et al. How use patients with schizophrenia the Internet:Qualitative study. *J Med Internet Res* 2010;12:e70.

58. Koivunen M, Välimäki M, Pitkänen A, et al. A preliminary usability evaluation of Web-based portal application for patients with schizophrenia. *J Psychiatr Ment Health Nurs* 2007;14:462–9.

59. Moreno MA, Jelenchick LA, Egan KG, et al. Feeling bad on Facebook: Depression disclosures by college students on a social networking site. *Depression Anxiety* 2011;28:447–55.

60. Riper H, Kramer J, Smit F, et al. Web-based self-help for problem drinkers: a pragmatic randomized trial. *Addiction* 2008;103:218–27.

61. Hamann J, Leucht S, Kissling W. Shared decision making in psychiatry. *Acta Psychiatr Scand* 2003;107:403–9.

62. Huguet A, Rao S, McGrath PJ, et al. A systematic review of cognitive behavioral therapy and behavioral activation apps for depression. *PLoS ONE* 2016;11:e0154248.

63. Andersson G, Hedman E. Effectiveness of guided Internet-based cognitive behavior therapy in regular clinical settings. *Verhaltenstherapie* 2013;23:140–8.

64. Andersson G, Hesser H, Veilord A, et al. Randomised controlled non-inferiority trial with 3-year follow-up of Internet-delivered versus face-to-face group cognitive behavioural therapy for depression. *J Affect Disord* 2013;151:986–94.

65. Ruwaard J, Lange A, Schrieken B, et al. The effectiveness of online cognitive behavioral treatment in routine clinical practice. *PLoS One* 2012;7:e40089.

66. Kok G, Bockting C, Berger H, et al. Mobile cognitive therapy: Adherence and acceptability of an online intervention in remitted recurrently depressed patients. *Internet Interventions* 2014;1:65.

67. Amstadter AB, Broman-Fulks J, Zinzow H, et al. Internet-based interventions for traumatic stress-related mental health problems: A review and suggestion for future research. *Clin Psychol Rev* 2009;29:410–20.

68. Carlbring P, Nordgren LB, Furmark T, et al. Long-term outcome of Internet-delivered cognitive-behavioural therapy for social phobia: A 30-month follow-up. *Behav Res Ther* 2009;47:848–50.

69. Kiropoulos LA, Klein B, Austin DW, et al. Is internet-based CBT for panic disorder and agoraphobia as effective as face-to-face CBT? *J Anxiety Disord* 2008;22:1273–84.

70. Yellowlees PM, Hilty DM, Marks SL, et al. A retrospective analysis of child and adolescent e-mental health. *J Amer Acad Child Adol Psychiat* 2008;47:1–5.

71. Fortney JC, Pyne JM, Turner EE, et al. Telepsychiatry integration of mental health services into rural primary care settings. *Int Rev Psychiatry* 2015;27:525–39.

72. Myers K, Vander Stoep A, Zhou C, et al. Effectiveness of a telehealth service delivery model for treating attention deficit/hyperactivity disorder: a community-based randomized controlled trial. *J Am Acad Child Adolesc Psychiatry* 2015;54:263–74.

73. Hilty, D. M., Chan, S., Hwang, T., Wong, A., & Bauer, A. M. (2018). Advances in mobile mental health: opportunities and implications for the spectrum of e-mental health services. *Focus*, *16*(3), 314-327.

استكشاف الاتجاهات الحديثة والتقدمات في علاج الصحة النفسية في القرن الحادي والعشرين ـ الصحة النفسية المتنقلة: مقال مراجعة

الملخص:

الخلفية :أحدثت الصحة النفسية المتنقلة (mHealth) ثورة في علاج الصحة النفسية من خلال دمج التكنولوجيا في رعاية المرضى، مع التركيز على رعاية المرضى المركزية (PCC). لقد حولت هذه النقلة المرضى من مستلمين سلبيين إلى مشاركين نشطين في إدارة صحتهم عبر التكنولوجيا. تعد الصحة النفسية عن بُعد (TMH) والصحة النفسية الإلكترونية (eMH) من المكونات الرئيسية، حيث تستفيد من الإنترنت والتقنيات المحمولة لخدمات الصحة النفسية.

الهدف :يستكشف هذا المقال المراجعي الاتجاهات والتقدمات الحديثة في علاج الصحة النفسية في القرن الحادي والعشرين، مع التركيز على دور التكنولوجيا المحمولة في تعزيز رعاية الصحة النفسية.

الطرق :تم إجراء مراجعة شاملة للأدبيات والممارسات الحالية المتعلقة بالصحة النفسية المتنقلة والصحة النفسية الإلكترونية. شملت المراجعة تحليل تطبيقات الصحة المتنقلة، ونماذج التلpsychيا، والتقنيات الناشئة في علاج الصحة النفسية.

النتائج :يبرز المقال التقدمات الكبيرة في الصحة النفسية المتنقلة، بما في ذلك نمو تطبيقات الصحة النفسية، واستخدام تقييم اللحظات البيئية (EMA) لجمع البيانات في الوقت الفعلي، ودمج التقنيات المحمولة في رعاية الصحة النفسية التقليدية. تشير الاتجاهات إلى زيادة استخدام التطبيقات المحمولة لدعم الصحة النفسية، على الرغم من أن التحديات لا تزال قائمة في تقييم التطبيقات ودمجها في الممارسة السريرية.

الاستنتاج :توفر تقنيات الصحة النفسية المتنقلة تحسينات واعدة للرعاية التقليدية للصحة النفسية من خلال تقديم حلول ميسورة ومرنة وفعالة من حيث التكلفة. ومع ذلك، هناك حاجة إلى تقييم مستمر لفعالية التطبيقات، واستراتيجيات الدمج، ومشاركة المرضى لتحقيق أقصى استفادة من هذه التقنيات في الأوساط السريرية.

الكلمات المفتاحية :الصحة النفسية المتنقلة، الصحة النفسية عن بُعد، الصحة النفسية الإلكترونية، تطبيقات الصحة المتنقلة، تقييم اللحظات البيئية.