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MOBILE APP INNOVATION IN MENTAL HEALTH MONITORING

Nooraisyah *[1]
S3 Studi Pembangunan ULM Banjarmasin
nooraisyah993@gmail.com

Sidderatul Akbar
Fisip ULM Banjarmasin
sidderatulakbar@gmail.com

Nunu Andriani
S3 Studi Pembangunan ULM Banjarmasin
annandifa09@gmail.com

Abstract

In the face of the global mental health challenge, technological innovation, mainly through mobile applications, offers wide potential to support mental health monitoring and interventions. With the increasing prevalence of mental health problems and limited access to conventional mental health services, mobile apps have emerged as important tools to provide easily accessible, timely, and personalised support. Research and development in this field has leveraged advances in artificial intelligence (AI), virtual reality (VR) and augmented reality (AR), wearable technologies, and predictive analysis to create innovative mental health solutions. This mobile application is designed not only for passive monitoring but also for active interventions that can improve the user's psychological well-being. This article examines various aspects of mobile application innovation in mental health, including chatbot-based therapy, immersive therapy with VR/AR, mental health monitoring with wearable technology, integration of health systems for coordinated support, and the importance of considering ethical as well as privacy aspects. By discussing recent and future potential mobile applications in mental health, the study aims to show how mobile technology can play a key role in addressing mental health challenges and improving the accessibility and effectiveness of mental health support.

Keyword: Innovation, Mobile Apps, Mental Health Monitoring.

Introduction

Technological developments have had a significant impact on the health sector, in Indonesia. Government support, along with innovation from the health industry and adoption of technology by the public, continuously brings new developments in the medical field. Some of the latest technologies in healthcare include Telemedicine, Precision Medicine, Wearable Devices, 3D Printing, Nanomedicines, Robotics, Virtual Reality (VR), and Artificial Intelligence (AI). (Haleem et al., 2022). These technologies

[1] Correspondence author

have helped improve medical care, diagnosing diseases faster and more accurately. In its development, health technology encompasses a wide range of applications, such as telemedicine, electronic medical record systems, mobile health applications, wearable sensors, health data analysis, artificial intelligence (AI) in diagnosis and care, and medical robotics. (Attaran, M. 2022; Jeffries et al., 2022).

The main orientation of the advancement of health technology is to improve the quality of services, the efficiency of health processes, and the overall improvement of public health. (Jeffries et al., 2022). For example, the digital transformation strategy in the health sector implemented in Indonesia, launched with a focus on effective health services and not just reporting to officials. This transformation includes digital platforms that are accessible and used by all stakeholders, including universities, pharmaceutical companies, the public, the media, and others. (Huhn et al., 2022).

In the digital age, technologies like Artificial Intelligence (AI) and Machine Learning (ML) have played a key role in predicting diseases, diagnosing medical conditions, and designing personal treatment plans. This intelligent algorithm is able to analyze health data quickly to help doctors make better decisions (Mäkinen et al., 2022).

The role of technology in health is not only stopped at the advancement of diagnostics and care but also in the process of comprehensive digital transformation. For example, an update of the long-term strategy to address the pandemic challenge shows how important digital transformation is in today's health field, including mental health (Mäkinen et al., 2022).

Mental health is an important aspect of a person's well-being, including how individuals think, feel, and behave. Good mental health allows people to enjoy everyday life, appreciate others around them, and face challenges more effectively. Mental health disorders can increase the risk due to a variety of factors, including gender and certain life events. For example, women are at higher risk of depression and anxiety, while men are at greater risk of substance addiction and antisocial behavior. Mental health not only affects the individual himself, but also the way they interact with others, make decisions, and manage stress. (Harvey et al., 2022).

So with that, in this digital age, mental health is becoming a global issue of increasing attention. The growing awareness of the importance ofining mental health will be accompanied by the increasing challenges faced by individuals in their daily lives. Work pressure, social unrest, to the impact of the COVID-19 pandemic, all add to the psychological burden that many people have to bear (Areán et al., 2016).

The impact on mental health is not only perceived by individuals who experience it personally, but also affects various aspects in the wider society, such as personal well-being, interpersonal relationships, unemployment and work productivity, physical health, finance, risk behaviour, stigma and discrimination, and the burden on health services. Increasing awareness and understanding of mental health, improving access

to support services, as well as reducing stigma are important steps to reduce the negative impact of mental-health problems in the community (Areán et al., 2016).

In this context, the importance of access to mental health support services is becoming increasingly vital. Access to mental health support services has been a major focus in many communities around the world. Increased awareness and reduced stigma surrounding mental health issues encourage individuals to seek help. There are several ways to access mental health support services such as Primary Health Services, Online Telemedicine and Counselling Services, Emergency Services for Mental Health Crises, Support and Community Groups, Government and Non-Governmental Services, Mental health Apps, and Education and Workshop Programmes. (Seiferth et al., 2023).

The availability of services can vary depending on geographical location, insurance coverage, and other factors such as social stigma that can still prevent some people from seeking help. Global and local initiatives continue to work to improve the accessibility and quality of mental health support services. However, access to such services is often limited by various barriers, such as stigma, costs, and availability of services. (Okoro et al., 2024).

Along with technological advances, mobile applications have emerged as one of the innovative solutions to bridge those needs. These applications offer a wide range of facilities, ranging from online consultations with a mental health professional, self-therapy, to monitoring daily psychological conditions. The potential of mobile applications in helping individuals manage their mental health marks a significant progress, but there are still many questions arising around its effectiveness and how best to implement it. (Okoro et al., 2024; Altaf Dar et al., 2023).

The research aims to explore and analyse the extent to which innovation in mobile applications can contribute to the monitoring and improvement of mental health. Through this research, it is expected to generate new insights into the use of technology in support of efforts to maintain and improve public mental health. This includes identifying challenges, opportunities, and innovative strategies that application developers can use to maximize the benefits that can be provided to their users.

Research Method

The research methods used in this study are literature studies. Literature studies are a series of activities that include collection of library data, reading and recording, and managing research materials. (Noble & Smith, 2014; Grbich, 2012; Bazeley, 2013). To do this, there are 7 methods that can be used, including keyword-based searches. This method of research collects a variety of books, journals, or articles that are relevant to the problem and purpose of research. (Linos & Carlson, 2017; Damgaard et al., 2001).

Result and Discussion

Mental Health Concept

Mental health is a state of well-being in which each individual is aware of the potential he has, is able to cope with the stresses of life, can work productively and can contribute to his or her community. This definition covers physical, psychological, and social aspects, not just the absence of mental disorders or mental illnesses. (World Health Organization. 2019).

Mental health is a condition in which our interior is in a state of calm and calm, which allows us to enjoy everyday life and appreciate others around. Mental health also covers the emotional, psychological, and mental state of a person. Mental-healthy individuals are able to make the most of their potential and contribute to their environment. (Panchal et al., 2023).

Mental health plays an important role in everyday life, helping a person to: 1) Achieving Personal Potential: Enabling individuals to realize and their personal potential. Good mental health enables a person to learn new things, develop creativity and think critically. 2) Quality of Life: Enjoy life and face challenges better. Without excessive mental stress, one can live everyday lives happier and more productive. 3) Interpersonal Relationships: Strengthening social relationships and building healthy communication. Mental health supports one's ability to empathize and build relationships with others. 4) Work performance: Improve work efficiency and productivity. A work environment that supports mental health can reduce absence rates and improve work performance. 5) Physical Health: Mental and physical health are interrelated. Mental disorders can affect physical condition, and vice versa. Therefore, keeping a balance between the two is very important. (Panchal et al., 2023; Mauz et al., 2023; Sturgeon, S. 2006).

The Role of Technology in Mental Health

In general, the role of technology can be understood as the use of science and engineering to design and implement solutions that facilitate, improve, or change the way various aspects of human life work. (Okoro et al., 2024). Technology allows humans to results more efficiently, safely, and often at lower costs. The role of technology is crucial in areas such as communication, health, transportation, and education, providing solutions to the problems faced by society and meeting the ever-expanding human needs. (Dominiak et al., 2024).

In healthcare, technology plays an important role in: 1) Improving access to services: Through telemedicine and mobile applications, patients can access medical services from anywhere, facilitating those living in remote areas or with limited mobility. 2) Health Information and Data Processing: Information and communication technology enables the efficient collection, analysis, and storage of health data. Big data and analytics are also used for health research, disease monitoring, and epidemiological analysis. 3) Innovation in Medicine: Modern technologies such as augmented reality

(AR) and virtual reality (VR) have changed the way patients are treated and treated. 4) Increased efficiency: Technology can make clinical processes more efficient, reducing waiting times for patients and the workload for medical staff. (Dominiak et al., 2024; Chen et al., 2024).

Mobile health applications, also known as mHealth (mobile health), are applications designed to provide health services and information through mobile devices such as smartphones and tablets. These applications utilize digital technology and the Internet to facilitate and improve health care (Dominiak et al., 2024). Some mHealth apps offer a variety of features such as online consultation with doctors, booking medications, self-monitoring health, and health education. These apps can improve access to health services, efficiency in services, and comfort for patients. The use of the mHealth app is not meant to replace a face-to-face meeting with a health professional, but rather to complement and enrich a person's overall health experience. (Dominiak et al., 2024).

A mobile application that is used in the health field and can help to monitor health, consult with doctors, to regulate diet and exercise, such as; 1) Halodoc - Allows users to communicate directly with more than 20 thousand licensed doctors in Indonesia, making it a comprehensive platform for a wide range of health needs. 2) Healthy - These digital health services provide benefits to many people, especially when they feel unable to leave home to visit health facilities. The app offers solutions by facilitating online health consultation. 3) FoodSmart - A useful app to help users regulate their daily diet. With this app, users can get healthy food recommendations according to individual nutritional needs. 4) Lifesum - This app helps users in planning and tracking calorie intake as well as physical activity. Very useful for those who want to maintain weight or live a healthier life. 5) Alodokter - Presents complete health information and allows users to consult with doctors online. With Alodocter, users can get direct access to medical advice from health professionals (Areán et al., 2016; Rahayu et al, 2024).

With the advancement of technology, these health applications make it easier for users to access health information and services directly from mobile devices. Each application offers unique and useful features to suit the specific needs of its users.

Challenges faced in the development of mental health applications

The development of a successful mental health application requires a holistic, multidisciplinary approach, to ensure that the application can provide effective, ethical, and sustainable support to its users.

Development of mental health applications faces several significant challenges: 1) Privacy and Data Security: Mental health is a very personal and sensitive area. Therefore, protecting privacy and patient data is a big challenge. Developers must ensure that user data is secure and inaccessible to unauthorized third parties. 2) Quality and Effectiveness: In order to produce significant benefits, the application must be

clinically valid and effective in helping the user. Proving this effectiveness through research can be challenging. 3) User Adoption and Retention: Many mental health applications struggle to retain users after they are initially downloaded. Providing good value and user experience is key to retaining users. 4) Accessibility: There is a challenge to make this application affordable and easily accessible by different groups of users. Overcoming language barriers, access to smartphones, and digital gaps are some of the challenges to anticipate. 5) Rules and Compliance: Given the sensitivity of data and mental health information, this application must comply with laws and regulatory rules. In some cases, these regulations can be very detailed and require developers to do more compliance work (Bond et al., 2023; Iwaya et al., 2023).

Innovative opportunities in the development of mental health applications

Innovative opportunities in the development of mental health applications continue to grow alongside technological advances and deeper understanding about mental health. Here are some promising opportunities that may shape the future of mental health applications: 1) Artificial Intelligence (AI) and Machine Learning consist of; a) Chatbot-based therapy: applications that use AI to provide real-time emotional support or cognitive behavioral therapy to users, allowing full-time access to mental health support, b) Personalization of Nursing: AI can analyze data from user interactions to tailor advice and interventions that better fit their unique needs. 2) Virtual reality (VR) and augmented reality (AR), consisting of; (a) Immersive therapy: VR and AR offer opportunities for exposure therapy in a safe and controlled environment, very useful for the treatment of PTSD, anxiety, and phobias, (b) Meditation and Mindfulness: Through visual and audio immersion, VR can enhance the experience of meditation or mindfulness, offering patience of mind and deep relaxation. 3) Wearable technology, consisting of; (a) Real-time Mental Health Monitoring: Use of wearables, such as smart watches that can monitor heart rate, sleep patterns, and stress levels, providing data that can help individuals and therapists understand mental health pattern more clearly, (b) Direct intervention: Wearables can also be used to convey interventions on time, like warnings to perform breathing techniques when stress detection increases. 4) Predictive analysis. Data-based prevention: By analyzing trends and mental health data over time, the application can help identify patterns or events that may lead to a decline in mental health, allowing early intervention. 5) Health System Integration. Collaboration with Health Professionals: The integration of applications with electronic health records and other systems facilitates care coordination between users and their health service providers, including therapists and doctors. 6) Peer-to-peer community and support. Online support community: Developing a safe space for users to share experiences and support can strengthen their recovery journey. It also reduces stigma and gives a sense of not being alone. 7) Accessibility and Inclusiveness. Universal Design:

Making applications accessible to everyone, including those with disabilities, means using universal design principles, and ensuring that applications can be used in a variety of ways. (misalnya, pembaca layar, kontrol suara). 8) Application of Ethics and Safety in Design. Ethical and Privacy Considerations: Develop features with strong considerations on user ethics and privacy, help build confidence and ensure that the application improves the well-being without endangering the user (Spadaro et al., 2021; Bond et al., 2023; Ugwu et al., 2024).

Innovative mental health applications can play a key role in addressing global mental health challenges. By leveraging the latest technology and integrating insights from clinical psychology, developers can create solutions that have a broad and profound impact on individual mental health.

Conclusion

Technological advances have opened up innovative opportunities in the development of mobile applications for monitoring mental health. Artificial intelligence (AI), virtual and augmented reality, wearable technology, predictive analysis, as well as health system integration, all offer exciting prospects to support mental health treatment and monitoring.

This type of mobile application can provide chatbot-based therapy, personalization of care, immersive therapies, meditation and mindfulness, as well as real-time mental health monitoring. In addition, the app can also identify patterns or events that can lead to a decline in mental health, and facilitate care between users and their healthcare providers.

Using a mobile app for mental health can provide important benefits and support for many individuals, especially those who may not be able to access mental health services directly or face obstacles to seek help. Accessing this support virtually through a mobile application can contribute significantly to reducing the stigma surrounding mental health and stimulate more people to seek the help and support they need.

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