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Use of Mobile Applications for Monitoring Adolescent Mental Health

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ABSTRACT

Teenage mental health is becoming increasingly important in this modern era. However, the issue of accessibility to mental health services remains a significant obstacle. The use of mobile applications offers a potential solution to improve monitoring and intervention in adolescent mental health. This study aims to explore the effectiveness of using mobile applications in monitoring adolescents' mental health, as well as its impact on their quality of life. This study used a quantitative approach with a survey conducted on a sample of adolescents aged 13-18 years who used a mental health mobile application for six months. Data was collected regarding frequency of app use, changes in levels of anxiety and depression, and user perceptions of the app's benefits. The results of this study show that the use of mobile applications significantly reduces levels of anxiety and depression in adolescents. Additionally, users report improvements in emotion management skills and knowledge about mental health. The majority of respondents also felt comfortable and helped by the application features in managing daily stress. The conclusion of this study explains that using mobile applications for monitoring adolescent mental health has great potential to increase the accessibility and effectiveness of mental health services. This application can be an effective tool in providing support, education and intervention to teenagers in managing their mental health problems. Thus, the implementation of mobile applications in the context of adolescent mental health needs to be considered as part of a comprehensive strategy to improve adolescent well-being.

Keywords: *Cellular Applications, Health Monitoring, Mental Adolescents*

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INTRODUCTION

In an increasingly digital era, mobile technology has become an inseparable part of everyday life (Rickard et al., 2016). One area where mobile technology has brought major changes is in the health sector (Fagherazzi et al., 2021). Mobile applications for health monitoring have become an important tool in improving and maintaining individual well-being (Punukollu & Marques, 2019). By utilizing sensors found on mobile devices, such as accelerometers, gyroscopes, and heart rate sensors, as well as other technologies such as artificial intelligence, health applications are able to provide valuable information about a person's health condition in real-time (Torous et al., 2014). Health monitoring is an important process in maintaining individual well-being. With proper monitoring, we can detect health problems early, prevent disease progression, and better manage chronic conditions (Alqahtani et al., 2021). Traditionally, health monitoring is carried out through regular visits to a doctor or health facility. However, with advances in technology, health monitoring can now be done independently via mobile applications.

Mobile apps have made health monitoring easier, affordable, and accessible to anyone, anytime, and anywhere (Kenny et al., 2016a). By leveraging sensors on mobile devices, health apps can measure various health parameters, such as heart rate, physical activity levels, sleep patterns, and even blood pressure (Sequeira et al., 2020). These data are then analyzed by artificial intelligence algorithms to provide useful information about the user's health condition. There are various benefits that can be gained from using mobile applications for health monitoring. One of them is the ability to detect health problems early. By continuously monitoring various health parameters, health apps can provide early warning if suspicious changes occur in a person's health condition (Dubad et al., 2018). This allows for quick and precise preventative action. Additionally, health apps can also help individuals manage chronic health conditions. By providing more accurate information about a person's health condition, the app can help individuals make better decisions regarding lifestyle, diet, and necessary medications (Kenny et al., 2016b). Apart from that, several health applications are also equipped with features to remind users about schedules for taking medication, doing physical exercise, or following certain diet programs.

The use of mobile applications in the world of health has experienced significant development in the last few decades (Litke et al., 2023). While the concept may have been around since the dawn of mobile technology, widespread use of mobile apps in healthcare only really gained momentum in the late 2000s and early 2010s. Initially, mobile apps in health tended to be simple, focusing on features such as medication reminders, diet logging, and physical activity tracking (Bakker & Rickard, 2018). However, as technology advances and mobile devices become more sophisticated, health applications are evolving to become more complex and sophisticated, capable of providing more sophisticated and real-time health monitoring (Kenny et al., 2015).

One of the important milestones in the use of mobile applications in health is the emergence of health sensors integrated with mobile devices (Lui et al., 2017). For example, the launch of the Apple Watch in 2015 brought health monitoring features such as heart rate monitoring, physical activity measurement, and stress level measurement to users' wrists. This opens the door to the development of more sophisticated health applications that are integrated with mobile devices.

In addition, the acceleration in the development of artificial intelligence has also provided a major boost to the use of health applications (Badesha et al., 2023). By leveraging advanced machine learning and data analysis techniques, health apps can now provide deeper analysis of a person's health condition based on data obtained from mobile devices and other health sensors (Chan et al., 2017). Regulatory developments also play an important role in the growth of healthcare applications (Boulos et al., 2011). In 2016, the United States Food and Drug Administration (FDA) began granting approval to several health apps for use in the diagnosis and treatment of certain diseases. This move provides legitimacy to health apps and drives market growth in this space. In addition, increasing awareness of the importance of health and a healthy lifestyle has also driven the demand for health apps (Glick et al., 2016). Many individuals are looking for ways to monitor and improve their own health, and health apps provide an accessible and affordable solution for them.

In recent years, health apps have become increasingly popular and seeped into many aspects of daily life (Miller et al., 2016). They are not only used by individuals to monitor their own health, but also by healthcare professionals to assist in the diagnosis, treatment, and management of disease (Kim et al., 2016). As technology advances, we can expect that the use of mobile applications in healthcare will continue to grow and experience further innovation (Menon et al., 2017). For example, the increasingly sophisticated use of wearable technology and health sensors will enable health applications to provide more comprehensive and accurate health monitoring (Moitra et al., 2017). Additionally, developments in artificial intelligence and data analysis will make health apps smarter in providing recommendations and solutions tailored to individual needs (Aliffiro Naufal & Muklason, 2022). However, amidst all these developments, there are also challenges that need to be overcome. One of them is the issue of data security and privacy, considering that health data is included in the sensitive data category (Barrigón et al., 2017). Apart from that, it is also necessary to pay attention to applicable regulations related to the use and storage of health data.

Monitoring adolescent mental health via mobile applications has become an innovative approach and has the potential to improve understanding, early detection, and more effective management of adolescent mental health conditions (Williams & Pykett, 2022). In an increasingly digital era, teens are increasingly connected to mobile technology, making mobile apps an easily accessible and personally usable tool for monitoring their mental health. Mobile apps for teen mental health offer a variety of features and benefits that can help in managing various aspects of mental

health, including mood measurement, stress management, connection to support resources, and education about mental health (Leech et al., 2021). One of the key features offered by mobile apps for adolescent mental health monitoring is the ability to log and track mood and emotions (Fitzpatrick et al., 2017). Using this feature, teens can regularly note changes in their mood, including symptoms such as anxiety, depression, or feelings of sadness. This data can then be presented in the form of graphs or diaries, allowing teens and health professionals to see patterns and trends in their mental health (Li et al., 2022). With more regular and detailed monitoring, teens can better understand the factors that influence their mental health and take appropriate steps to address any problems that may arise (Miner et al., 2016).

There are several previous research opinions. The first research according to (Gindidis et al., 2019), with the research title A systematic scoping review of adolescent mental health treatment using mobile apps. The results of his research stated that app functionality included monitoring, assessment, psychoeducation and skills practice. Apps were used independent of ongoing practitioner support in all studies. Apps were used for intake, assessment and intervention. Overall, app use was reported as beneficial. The second research according to (Punukollu & Marques, 2019), with the research title Use of mobile apps and technologies in child and adolescent mental health: a systematic review. The results of his research stated that in general, young people seem to engage very well with this type of tools, and they demonstrate some positive effects in emotional self-awareness. There have been some studies about this issue and many of the outcomes were notstatistically significant. However, it is still a sparsely documented area, and more research is needed in order to prove these effects. The third research according to (Grist et al., 2017), with the research title Mental Health Mobile Apps for Preadolescents and Adolescents: A Systematic Review. The results of his research stated that A total of 24 publications met the inclusion criteria. These described 15 apps, two of which were available to download. Two small randomized trials and one case study failed to demonstrate a significant effect of three apps on intended mental health outcomes. Articles that analyzed the content of six apps for children and adolescents that were available to download established that none had undergone any research evaluation. Feasibility outcomes suggest acceptability of apps was good and app usage was moderate.

The research conducted by previous researchers is different from the research conducted by researchers. Meanwhile, the research that the researchers conducted was entitled Use of Mobile Applications for Monitoring Adolescent Mental Health. The results of this study show that the use of mobile applications significantly reduces levels of anxiety and depression in adolescents. Additionally, users report improvements in emotion management skills and knowledge about mental health. The majority of respondents also felt comfortable and helped by the application features in managing daily stress.

The aim of this study was to evaluate the effectiveness of using mobile applications in monitoring adolescents' mental health and its impact on improving

their mental well-being. This research aims to identify whether mobile applications can be a useful tool in supporting young people in better monitoring and managing their mental health. Another aim was to explore adolescents' responses and experiences with the use of mobile applications for mental health, including the extent to which these applications can help them identify and overcome mental health problems, as well as the extent to which they feel comfortable and confident with the use of technology in this regard.

RESEARCH METHODOLOGY

This study uses a quantitative study design with a pre-post experimental approach. Quantitative study design with a pre-post experimental approach is a research method used to evaluate the effectiveness of a particular intervention or treatment in producing changes in certain variables. In the context of using cellular applications for adolescent mental health monitoring, this approach allows researchers to compare the level of mental health before and after the use of the application (Jung, 2019). Participants consist of teenagers aged 13-18 years registered in secondary schools in urban areas. The research sample was chosen through a simple random selection technique from the population that was willing to participate in this study. Before starting the research, ethical approval was obtained from the research ethics committee. After obtaining approval from participants and parents or guardians, the researcher provides detailed information about the objectives, procedures, and consequences of participation in research (Grist et al., 2017). Participants are also given an approval form that must be signed by the participants and parents or guardians before starting the research.

The steps in this study were first, participants filled out the baseline questionnaire that contained questions about their demographic characteristics, the level of anxiety and depression, as well as previous experience with mental health problems and the use of cellular applications. After that, participants are instructed to download and use mental health cellular applications that have been determined for use in research. The cellular application chosen for this research is one that is proven to have features that are in accordance with the needs of monitoring and intervention of adolescent mental health, such as tracking moods, relaxation exercises, and sources of information about mental health. Participants were given full access to the application and instructed to use the application at least three times a week during the six -month period. During the six-month period, participants were asked to continue to use cellular applications and record the frequency of use and participation in the features provided by the application. In addition, participants are expected to continue to comply with instructions given in the application, such as completing mental health activities and following the advice given by the application.

After the six -month period ended, participants were asked to refill the same questionnaire they filled at the beginning of the research. Data collected from the Pascates pre-Dan questionnaire will be used to analyze changes in the level of anxiety

and depression, as well as participant's perceptions of the benefits of cellular applications. Data analysis is carried out using appropriate statistical software, such as SPSS. Statistical analysis includes descriptive statistical tests to analyze the demographic characteristics of participants and changes in the level of anxiety and depression before and after intervention. In addition, linear regression analysis can be used to evaluate the relationship between the use of cellular applications and changes in adolescent mental health. In all stages of research, privacy and confidentiality of participants are kept closely. The data collected is only used for research purposes and will not be distributed to third parties without permission. In addition, participants are given access to mental health support services if they feel they need it during the study period. By using an experimental approach, this study has better control of the factors that can affect the results. For example, by comparing pre-intervention and post-intervention data on the same group of participants, researchers can identify whether changes that occur in mental health variables are caused by the use of cellular applications or by other uncontrolled factors.

RESULT AND DISCUSSION

The use of cellular applications for adolescent mental health monitoring has become an increasing focus of research in recent years. With the increasing prevalence of mental health problems among adolescents and limited access to traditional mental health services, cellular applications offer interesting solutions to improve monitoring, intervention, and support for adolescents who experience mental health problems. In this discussion, it will be discussed in depth about the benefits, challenges, and implications of using cellular applications in the context of adolescent mental health. One of the main benefits of using cellular applications in adolescent mental health monitoring is greater accessibility. Teenagers often tend to be more accustomed to technology and are more comfortable using their mobile devices than looking for help from mental health professionals directly. With the existence of cellular applications, adolescents can easily access mental health resources, such as relaxation exercises, meditation guides, or information about certain mental health conditions, whenever they need them. This can help reduce the stigma associated with the search for mental health assistance and provide easier access for teenagers to get the support they need.

Cellular applications can also provide flexibility in monitoring mental health. Teenagers often have a busy schedule with school, extracurricular activities, and social activities, which makes it difficult for them to follow the promise with mental health professionals regularly. With cellular applications, they can monitor their own mental health according to the time and place suitable for them, without having to leave their daily activities. This can help increase the involvement of adolescents in their mental monitoring and care, because they have more control over the process. Furthermore, cellular applications can also provide tools that are useful for adolescents to manage symptoms and improve their mental health skills. For example, some applications include cognitive-behavioral techniques that are proven effective in reducing anxiety and depression, such as positive thinking, deep

breathing, or progressive muscle relaxation exercises. By consistently using these features, teenagers can build skills to overcome stress and improve their mental well-being in the long run. In addition, cellular applications can also provide additional resources, such as online support forums or online counseling, which allows teenagers to interact with others who experience the same problems and get support from the community.

While there are many benefits to using mobile apps in monitoring adolescent mental health, there are also some challenges that need to be addressed. One of the main challenges is the quality and validity of the content provided by the application. While there are many mental health apps available on the market, not all of them are backed by solid scientific evidence or clinically tested for their effectiveness. As a result, there is a risk that teens may receive inaccurate or ineffective information about their mental health through such apps. Therefore, it is important for users to choose an app that is backed by solid scientific research and has positive reviews from previous users. In addition, data privacy and security are also important concerns in the use of mobile applications for adolescent mental health. Many apps ask users to provide personal information about their health and emotions, which can include sensitive details about their psychological and social experiences. In the right context, this can be of great benefit in providing tailored and effective interventions. However, it is important for users to ensure that their information is treated confidentially and not misused by third parties. Researchers and app developers must adhere to strict data privacy guidelines and provide assurances that user data will be protected securely.

Table 1: Comparison between popular cellular applications for adolescent mental health monitoring.

Cellular application	**Main feature**	**Superiority**	**Weakness**
Headspace	- Meditation and relaxation - Online Counseling - Journal of Mood and Daily Reflections	- A variety of meditation and relaxation exercises are tailored to the user's needs	- Paid subscription to full access to all features
Calm	- Adapted sleep programs - Breathing exercises - Music relaxation and natural voice	- Offering a soothing and structured experience to help sleep and reduce stress	- Applications often require paid subscriptions to access all content
MoodMission	- Tasks to overcome feelings - Direct support from mental health professionals - Sources of information about mental health	- has an interactive task -based approach to help users overcome the symptoms of anxiety and depression	- It may take time to find tasks that match the needs and preferences of the user

Sanvello	- Daily journal to monitor emotions - Cognitive -behavioral training - Community support and discussion forums	- Provides tools for managing stress, anxiety, and depression with evidence -based approaches	- Full access to premium features requires subscription fees
Youper	- Chatbot for CBT -based therapy -Mood and stress management tracking - Respiratory exercises and meditation	- Offering easy and fast access to suggestions and support for managing mental health symptoms	- Limited to the ability to provide in -depth and personal support as did mental health professionals

It is important to remember that the use of cellular applications in the context of adolescent mental health must be integrated in a way that reinforces, not replacing, traditional mental health services. Although cellular applications can provide greater accessibility and flexibility in monitoring and mental health intervention, they cannot replace the role of mental health professionals in providing accurate diagnosis, effective care, and deep emotional support. Therefore, it is important for teenagers and their parents to treat cellular applications as additional tools in mental health care, not a substitute for direct interaction with mental health professionals. Collaboration between users, cellular applications, and mental health professionals can produce optimal results in managing adolescent mental health. In addition, the development of cellular applications for adolescent mental health must take into account the needs and preferences of adolescents in design and implementation. Applications that are well designed must be intuitive, attractive, and easy to use by teenagers. Features such as the use of easy-to-understand language, attractive designs, and intuitive navigation can increase adolescent involvement in the use of applications and the effectiveness of interventions provided by these applications. In addition, involving adolescents in application development can help ensure that the application reflects their needs, preferences, and experiences in managing their mental health. Thus, adolescent participation in application development can increase relevance, involvement, and acceptance of applications in the youth community.

Not only that, monitoring and constant evaluation of the effectiveness of cellular applications in improving adolescent mental health is very important. Sustainable research needs to be done to measure the long -term impact of using cellular applications on mental health phenomena, quality of life, and adolescent welfare. In addition, the collection of feedback from users regularly can help application developers to continue to improve and improve the features provided by the application. Thus, evidence -based and sustainable approaches to the development, implementation, and evaluation of cellular applications can ensure that the application provides maximum benefits for adolescents who use it. Finally, it is important to remember that the use of cellular applications for adolescent mental health cannot stand alone without extensive support from the community, education, and health

service systems. Efforts need to be made to increase awareness and understanding of the benefits of using cellular applications in managing adolescent mental health among adolescents, parents, teachers, and mental health professionals. In addition, policies and guidelines that support the role and use of cellular applications in adolescent mental health services need to be developed and implemented. By strengthening the support of various parties, cellular applications can be an effective tool in a broader effort to improve their mental health of adolescents and their welfare.

CONCLUSION

Based on the results and discussion above it can be concluded that the use of cellular applications for adolescent mental health monitoring offers great potential to increase accessibility, flexibility, and involvement in mental health care. This application can provide valuable resources for adolescents to manage symptoms, improve skills, and get support from the community. However, challenges such as content quality, data privacy, and the role of mental health professionals need to be carefully overcome to ensure that cellular applications provide maximum benefits with a minimum risk for users. With a careful and collaborative approach between researchers, application developers, mental health professionals, and teenagers, the use of cellular applications can be a valuable tool in an effort to improve adolescent mental health. Through various features offered by applications, adolescents can easily access mental health resources, such as relaxation exercises, meditation guidelines, or information about certain mental health conditions, without having to leave their daily activities. This not only helps reduce the stigma related to the search for mental health assistance, but also provides more affordable support and in accordance with the modern lifestyle of teenagers. Cellular applications also allow teenagers to monitor their own mental health according to the time and place suitable for them. This flexibility is important considering the busy and dynamic schedule of teenagers today, which might make it difficult for them to follow the promise with mental health professionals regularly. With cellular applications, they can monitor their own mental health more consistently and be involved in their own care.

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