

Original Article

Android-based Application for Depression, Anxiety, and Stress Screening

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ABSTRACT

The escalating issue of emotional and mental disorders, such as stress, anxiety, and depression, necessitates proactive measures to anticipate adverse effects on individuals experiencing them. One of the ways is by implementing a screening method. An android-based screening application can offer immediate feedback about an individual's mental health condition. This study employs a research and development approach encompassing the preliminary study, model development, and model validation. The outcome of this study was an initial design for an Android-based screening application, DeAs Care, which aims to measure the levels of depression, anxiety, and stress in individuals. The DeAs Care application underwent evaluation by a group of 15 adolescent participants, all between the ages of 18 and 20. The assessment employed a Likert scale with a range of 1 to 5. The results indicated an overall satisfaction rate of 85%, corresponding to a 'Very Good' rating. The application was utilized on 216 adolescent participants to evaluate their levels of depression, anxiety, and stress. The assessment results indicate that the subsequent proportions of participants received a diagnosis of depression: 21% of the participants reported experiencing mild depression, while 20% showed moderate depression. Additionally, 8% had severe depression, and 6% had extremely severe depression. The other 45% of participants indicated they were in normal conditions. As for the participants' anxiety levels, the results of the assessments showed that 15% of them had mild anxiety, 31% had moderate anxiety, 23% had severe anxiety, 16% had extremely severe anxiety, and 15% of them were in a normal state. Furthermore, concerning stress levels, the study found that 20% of individuals had mild stress, 24% experienced moderate stress, 6% experienced severe stress, and 1% experienced extremely high stress levels. In comparison, the remaining 50% reported normal stress levels. The findings indicate that utilizing the DeAs Care Android application for screening adolescent mental health is an effective method for preventing issues related to mental and emotional disorders through self-assessment.

Keywords: Screening, Android-Based Application, Stress, Anxiety, Depression.

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INTRODUCTION

Anxiety and depression, as suggested by the World Health Organization (WHO), are global mental disorders. Approximately 300 million individuals, or 4.4 percent of the worldwide population, have been diagnosed with depression. Additionally, up to 264 people are reported to be suffering from anxiety disorders. According to survey results gathered

by the World Health Organization (WHO), around 10 to 20 percent of adolescents suffer from mental health problems. Furthermore, adolescence is a period when mental problems such as depression, anxiety, and stress frequently emerge. As of 2016, the World Health Organization estimates that approximately 35 million adolescents experienced depression¹.

In Indonesia, there is a population of

706,689 individuals who are over the age of 15 suffer from depression. Among this group, there are a total of 157,6592 cases of depression, particularly among individuals aged 15 to 24 years². Nurtant and Handayan (2021) conducted a study at vocational schools in Wonogiri, revealing that 48.1% of adolescents experience stress, 39.8% experience anxiety, and 12.1% experience depression³. A study conducted by the Department of Child and Adolescent Psychiatry, Faculty of Health Sciences, University of Indonesia, involving adolescents aged 16-24 years in Indonesia, revealed that 88% of those surveyed reported experiencing symptoms of depression as they dealt with problems at that age, and 95.4% reported suffering from symptoms of anxiety at this age⁴.

Adolescents who suffer from depression show symptoms such as an overwhelming feeling of self-pity (82%), difficulty in concentrating (65%), lack of interest in activities (41%), and significant changes in body weight (35%)⁵. *Depression* is a psychological condition characterized by feelings of melancholy, distress, despair, or dissatisfaction, as well as a lack of motivation and excitement for life⁶. Furthermore, depression is characterized by feelings and emotions that are ambiguous, disoriented, hopeless, indifferent, and lacking desire and motivation⁷.

Depression can lead to a range of issues for individuals, encompassing physical, psychological, and social challenges. If not promptly and appropriately treated, depression can give rise to various complications for the affected individual. Untreated depression can escalate into a severe mental illness that profoundly impacts one's mental well-being. It is crucial for those experiencing depression to get early medical and psychological treatment. Moreover, individuals with depression are also susceptible to engaging in suicidal behaviours⁶. Hence, it is crucial to prioritize initiatives aimed at averting depression in adolescents, one of which involves using screening method. Screening is a proactive measure taken to identify the existence of emotional or mental issues at an early stage in an individual⁸.

Within the adolescent group, screening can be conducted by leveraging technological advancements that provide individual access for each teenager while ensuring participant confidentiality⁹. Adolescents extensively utilize

digital media and possess the ability to comprehend mental health-related material¹⁰. Multiple research papers have conducted mental health screening through applications. A study by Eanggarsita Auliasin et al. created an app to identify symptoms of depression in adolescents¹¹. Further research and various prototypes have led to developing a teenage mental health screening application that can generate real-time feedback and offer insights into mental health⁸.

The objective of this study is to assess the levels of depression, anxiety, and stress among adolescents by utilizing an Android application for screening. The aim is to mitigate the adverse effects of mental health issues in adolescents and offer health education to those affected by these disorders.

The significance of this research lies in its contribution to providing a comprehensive understanding for parents and other individuals in addressing the behavioural indicators of depression in adolescents, both ones who have already experienced depression and those who are at risk of developing depression. By familiarizing themselves with these signs and symptoms, it is expected that parents and individuals in their vicinity might mitigate more severe psychological issues in adolescents by enacting suitable interventions.

METHOD

This study employs research and development (R&D) approach. Development research is the systematic process of designing and validating products for education¹². The approach utilized is level I research and development, which includes preliminary study, model development, and model validation¹³. In this research, the Depression Anxiety Stress Scales (DASS)-42 questionnaire was used to develop an Android-based depression, anxiety, and stress screening application, DeAs Care. The DASS-42 questionnaire is a reliable and valid means for identifying anxiety, stress, and depression disorders¹⁴.

The research has received ethical approval under reference No. 1160/KEKP/Adm2/VIII/2021. This research was conducted in three distinct phases, specifically:

1. Preliminary study
 Researchers conduct analyses to investigate the underlying causes of problems or phenomena. The issues related to mental disorders, specifically stress, anxiety, and depression that can affect adolescents, were examined along with several potential contributing factors.
2. Model development
 Relevant theoretical frameworks are reviewed in pursuit of resolving issues or phenomena. Comprehensive examinations of various concepts, theories, and research findings are conducted to serve as a foundation for further research. Furthermore, investigated potential solutions could be adopted to promote and preserve mental health in adolescents.
3. Model validation
 The final part of the research involves assessing the model's validity by quantitative, qualitative, or mixed methods. This evaluation provides assessments and feedback on the generated model or product. Subsequently, enhancements are implemented until the product/model reaches a state of readiness and validity. In this study, an internal evaluation of application usage was conducted among application users.

RESULTS

This study produced an Android application, DeAs Care, which is used for screening levels of depression, anxiety, and stress. This application facilitates the assessment of an individual's emotional and mental state by answering the provided questionnaire. The system presents multiple primary menus, including the Depression, Anxiety, and Stress Questionnaire (Dass 42), mental health information, and strategies for managing depression, anxiety, and stress. These menus serve as a valuable resource for users to get information and understanding about the signs and symptoms of emotional and mental problems commonly experienced, especially among adolescents.

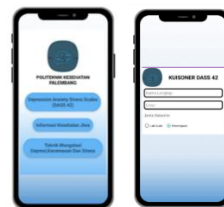


Figure 1. Main Menu



Figure 2. Start Screening



Figure 3. Examination Result



Figure 4. Information and techniques to overcome the problem.

Table 1. Application Usage Evaluation Results (N=15)

No	Questions	Mean	Max Score	Median	Std. Dev.
1.	The App is easy to use	4,26	5	4	0,593
2.	The App display is attracting	3,93	5	4	0,798
3.	The App features are useful	4,33	5	4	0,617
4.	The App language is understandable	4,26	5	4	0,457
5.	Examination results are understandable	4,2	5	4	0,560
6.	Information displayed is beneficial	4,46	5	4	0,516
7.	Tips given are easy to implement	4,2	5	4	0,560

The frequency of 105 was derived from the evaluation responses of 15 participants who completed 7 questions of the application evaluation questionnaire. Moreover, the mean score derived from the evaluation results was

calculated using the following equation (arikinro): $P = \frac{\sum R}{N} \times 100\%$. P stands for percentage of answers, $\sum R$ for total frequency of answers, and N for maximum score.

According to this formula, the maximum score

on the scale can be calculated by multiplying the highest score (5) by the number of question items and the number of respondents. Therefore, the maximum score (N) is 525, and the total frequency of answers is 445 ($\sum R$). The final percentage was 85%, placing it in the 'Very Good' category.

Direct feedbacks from the participants indicated that while easily accessible screening results were valuable knowledge for

adolescents, a consultation function for users linked to mental health professionals such as psychiatrists and psychologists was also required. This feature would serve as an internet-based consultation platform that might be utilized based on the specific requirements and circumstances of users seeking solutions, particularly those facing severe and extremely severe levels of depression, anxiety, and stress.

Table 2. The Overview of Depression, Anxiety, and Stress Levels in Adolescents (N=216)

Depression, Anxiety, and Stress Levels					
	Normal	Mild	Moderate	Severe	Very Severe
Depression	98 (45%)	45 (21%)	44 (20%)	17 (8%)	12 (6%)
Anxiety	32 (15%)	33 (15%)	67 (31%)	50 (23%)	34 (16%)
Stress	107 (50%)	43 (20%)	51 (24%)	13 (6%)	2(1%)

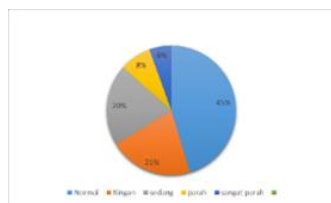


Figure 5. Adolescents' Depression Level

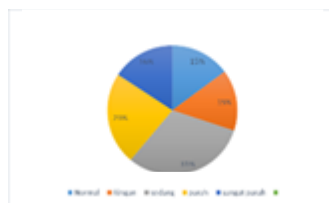


Figure 6. Adolescents' Anxiety Level

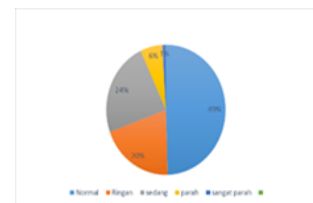


Figure 7. Adolescents' Stress Level

The findings of screening on the DeAs Care application revealed the levels of depression, anxiety, and stress among 216 adolescent responders. In regard to the severity of depression, the study showed that 21% of participants had mild depression, 20% had moderate depression, 8% had severe depression, and 6% had extremely severe depression. The remaining 45% of participants were in a normal condition. In terms of anxiety levels, 15% of the participants experienced light anxiety, 31% experienced moderate anxiety, 23% experienced severe anxiety, 16% experienced extremely severe anxiety, and 15% were in normal category. Regarding stress levels, the study revealed that 20% of participants reported light stress, 24% reported moderate stress, 6% reported severe stress, and 1% reported extremely severe stress. Additionally, 50% of participants appeared to be under normal conditions.

DISCUSSION

According to data from Basic Health Research in 2013, the prevalence of significant mental disorders in Indonesia was 1.7 per million, meaning that 1-2 out of every 1000 Indonesians experienced severe mental problems¹⁵. In 2018, a study revealed a notable rise in the incidence of severe mental diseases, reaching a rate of 7 per million. It indicates that 7 out of every 1000 Indonesians were affected by significant mental problems¹⁶. Based on these findings, it can be inferred that the prevalence of severe mental diseases in Indonesia had a 5.3% rise between 2013 and 2018².

Depression, anxiety, and stress are three prevalent mental diseases in Indonesia, with a significant increase of 312% since 2013 (17 The rising prevalence of severe mental disorders in Indonesia indicates the criticality of assessing the risk for mental health issues within the community through mental health screening¹⁸.

Screening is a diagnostic process to identify potential abnormalities or issues in individuals without complaints or symptoms related to a specific condition⁸. The study

utilized the DeAs Care mental health screening application to conduct mental health screening. The application offers three primary menu options: the Dass 42 questionnaire, mental health information, and strategies for managing depression, anxiety, and stress.

On the Dass 42 questionnaire menu, participants are requested to respond to a series of inquiries that relate to prevalent symptoms associated with stress, anxiety, and depression. This strategy enables program users to choose symptoms that align with their recent experiences within the past 30 days. Subsequently, the system will examine each chosen symptom individually by following the database's flow and considering the user's submitted information. Upon finishing all the questions, responders will receive depression, anxiety, and stress results automatically.

The DeAs Care Application's second section provides mental health information, including coping mechanisms for stress, anxiety, and depression. An essential aspect of promoting the mental well-being of adolescents using this application is deep breathing relaxation techniques and five-finger hypnosis. These techniques can be independently practiced alleviating symptoms of depression, anxiety, and stress effectively. Adolescents can utilize accessible relaxation practices as a proactive measure to ward off depression, anxiety, and stress from a very early stage.

The results obtained from the mental health screening conducted using the Deas Care application on 216 adolescents revealed that 55% of respondents showed symptoms of depression, while the remaining 45% were in a normal mental state. Additionally, 85% of adolescents experienced symptoms of anxiety, with only 15% being in a normal state. Furthermore, 51% of respondents experienced symptoms of stress, while the remaining 49% were in a normal mental state. Based on these findings, it is evident that over 50% of adolescents encounter depression and stress, while 85% of the total suffer from anxiety.

This study demonstrates that adolescents undergo unnoticed anxiety, depression, and stress despite engaging in typical activities like their peers in regular circumstances. This phenomenon arises due to the prevalent perception among adolescents that they impose a significant strain on their parents, particularly in terms of financial obligations, and they believe they are incapable of bringing

joy to their parents. In addition to that, this phenomenon can also result from insufficient communication, emotional connection, and intimacy with their parents or other family members inside the household. Despite everyone's efforts to contribute their utmost to the family, there is a lack of emotional intimacy and openness among them. This situation leads to adolescents lacking a trustworthy friend with whom they can communicate and express their growing ambitions and difficulties.

Furthermore, adolescents encounter challenges that they need help resolving and clarity about appropriate courses of action. Besides, in addition to academic responsibilities that demand concentration and effort, they may also face stress, anxiety, and even depression due to personal and social challenges within their school or community.

Adolescents experiencing pressure struggle to employ effective problem-solving strategies¹⁹. If adolescents do not receive intervention to address the challenges they are facing, they are susceptible to developing mental disorders⁹. To mitigate the occurrence of mental disorders in adolescents, it is essential to prioritize the preservation of their mental well-being through the implementation of screening.

Multiple studies indicate that mental health screening applications are highly beneficial in the prevention of emotional and mental disorders throughout society. An example of such an application is the Android Screening Mental Health application, designed to identify mental health issues in individuals. Additionally, it can be utilized to monitor the mental well-being of adolescents in real-time. Android-based mental health applications can efficiently and effortlessly facilitate mental health screening while gathering information about an individual's mental well-being²¹. The BAPER application, accessible on the Google Play store, is an Android-based self-screening tool designed to identify mental health issues early and mitigate the likelihood of mental disorders in adolescents⁷.

Websites have also incorporated numerous mental health assessments employing the Depression Anxiety Stress Scales (DASS)-42 questionnaire instrument for analysis. The study included a total of 324 individuals who completed the website survey designed for youths, adults, and the elderly²². The utilization of the Dass-42 questionnaire in this study aligns with the DeAs care program, which employs the

Dass-42 instrument. Therefore, the DeAs care application is suitable for conducting extensive public health screening across many age groups, including adolescents, adults, and elders.

To enhance individuals' mental well-being, particularly among adolescents, it is fundamental for all stakeholders to actively pursue a range of initiatives that align with the latest advancements in science and technology. Thus, to address the diverse range of conditions and issues related to mental and emotional disorders faced by adolescents, it is vital to provide support and intervention aimed at enhancing their mental well-being. This proactive approach is crucial in preventing the onset and consequences of mental and emotional disorders in adolescents²³. Efforts to mitigate the incidence of emotional and mental health problems can be directed toward enhancing the overall mental well-being of the community and safeguarding individuals who are susceptible or in jeopardy of developing mental illnesses²⁴.

Various strategies can be implemented to enhance the mental well-being of adolescents. These include raising awareness about mental health in the community and educational settings, establishing mental health units (UKS) in schools, providing integrated mental health services (Posyandu) for adolescents, organizing youth support groups, utilizing social media and health education websites to promote adolescent mental health, and utilizing readily available mental health screening applications as an early detection tool.

CONCLUSION

Considering the research findings, utilizing the Android-based Deas Care application to screen for emotional and mental issues in adolescents is effective in preventing the development of mental disorders in this age group. The application enables adolescents to conduct self-assessments to detect mental health disorders at an early stage. Additionally, users can access knowledge regarding mental health and methods for preserving their well-being via this application. Integrating mental health screening with applications might facilitate the promotion of mental well-being by promptly identifying indications and symptoms of emotional and mental disorders, hence

averting the onset of such problems in society. This application will continue to be updated under user demands, feedback, and recommendations, ultimately improving the community's optimal mental health.

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