Effectiveness of Web-Based "Sipamer" Application and Lecture Method in Increasing Knowledge and Early Detection of Adolescent Mental Health

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ARTICLE INFO	ABSTRACT
	Introduction: Mental illness is a health condition that causes changes in emotions, thoughts and behavior, often affecting teenagers due to psychological and hormonal changes that are not yet stable. This study aims to assess the effectiveness of using web-based applications and lecture methods in improving knowledge and the ability to self-detect mental health disorders in adolescents and first tested in the local Indonesian context. **Methods:** This study used a quasi-experimental design, namely two groups, namely pre-test-post-test, with purposive sampling involving 120 adolescents. The study was conducted in the Working Area of Putri Ayu Health Center, Jambi City, in two Posyandu Remaja Data collection was carried out from July to October 2024 through observation and filling out questionnaires, with data analyzed using covariance analysis.
	Results: Web-based application and lecture method effectively improved mental health knowledge ($p<0.05$). Both interventions significantly improved adolescents' mental health self-detection scores in this group; however, the web-based application showed a greater mean increase than the lecture method. This suggests that the web-based sipamer application is more effective in improving adolescents' mental health knowledge and self-detection skills. The advantages of the Sipamer application lie in its interactive self-screening features and expert system that facilitate early detection, making it a superior solution compared to conventional methods. **Conclusion:** Both the web-based application "Sipamer" and the lecture method effectively increase knowledge and self-assessment of adolescent mental health.

INTRODUCTION

According to the World Health Organization (WHO), mental health is a state of well-being in which an individual is aware of his/her potential, can cope with the pressures that come, can work productively, and is able to contribute to his/her community. When someone has an unhealthy mentality, then anxiety will control him/her (1).

Research has shown that the most common mental health problems experienced by adolescents are sadness, mood swings, anxiety symptoms, depressive symptoms, behavioral problems (rule-breaking behavior and aggressive behavior), hostility, problems with peers, social problems, inattention, thought problems, and attention problems (2)(3)(4)(5).

Mental illness has become one of the important issues in adolescents in Indonesia, this is due to the prevalence of mental illness sufferers, especially in adolescents, which continues to increase every year. This statement is also supported by the Basic Health Research Data released in 2018 which shows that at least around 6.1% of the Indonesian population aged 15 years and over suffer from emotional mental disorders and around 1.6% of them commit suicide. Mental illness is a condition that can be triggered by various factors such as biological, psychological, and other stressor factors such as pressure from the school environment, trauma caused by violence, both physical and sexual harassment, lack of affection from parents, inability to socialize, to alcohol and drug abuse(6)(7)(8).

Web-based educational media has emerged as an innovative solution in the digital era to increase public knowledge about health, including the prevention and control of tuberculosis. One of the main advantages of this media is its wide accessibility, which allows information to reach people in various places, including remote areas with limited access to health.

In addition, web-based platforms can be equipped with interactive features, such as quizzes or self-screening tools, that encourage people to actively participate in understanding and managing their own health risks. This medium is a cheap and effective tool for disseminating health information at scale (9)(10).

Previous studies have shown that the M-Health Application is ideal for practical use. The results of the field trial showed that exposure to the M-Health application significantly increased participants' knowledge. It is evident that using health education resources related to adolescent mental health increases adolescents' awareness and understanding of mental health (11)(8).

Previous studies generally only used one method, such as lectures or m-health applications separately. The combination of the two is rarely explored, even though it can complement the shortcomings of each method. Unlike previous M-Health applications, Sipamer was developed as a web-based expert system that integrates screening for mental disorder symptoms with automatic reporting to health workers. The novelty of this study is the use of a creative combination of web-based applications and lecture techniques to improve the knowledge and skills of adolescents who have so far used conventional methods to detect their own mental health. The development of a more effective and accessible education model, especially in areas with limited resources, can be done by integrating these two methods. This study offers a low-cost method to reach a wider audience using digital technology. The health sector can use it to improve prevention and early detection efforts for adolescent mental health. This method can increase awareness and preventive behavior. The purpose of this study was to evaluate how effective the use of web-based applications and lecture techniques is in improving the knowledge and skills of adolescents to find their own mental health. Therefore, the author innovated in this study to develop a root system for early detection of mental health in adolescents independently. This study aims to develop an application for early detection of mental health problems that can be monitored by health workers, and adolescents can manage their mental health status.

METHOD

Research Type

This quasi-experimental study used a two-group pre-test and post-test method. Media products developed during the study, especially M-Health Sipamer, which is a Teenage Mental Expert system, were used in this study. Before being used in research, the Sipamer application has gone through a content validation process by psychology experts and limited trials at partner schools.

Population and Sample

This study involved adolescents living in the working area of Putri Ayu Health Center. 120 people the sample was selected using a purposive technique by considering inclusion and exclusion criteria. and divided into two groups: 60 people in the intervention group and 60 people in the control group. To participate in the study, adolescents must have access to a device with an internet connection to use the web-based application and be willing to participate. However, candidates who are undergoing mental health treatment, have mental or cognitive disorders that hinder their understanding of the study material will be rejected. The sample consisted of 120 individuals who met the inclusion criteria. A margin of error of 5% was used to collect the sample.

Research Location

This study was conducted at two adolescent health posts in the working area of Putri Ayu Health Center, Jambi City from July to October 2024.

Instrumentation or Tools

The focus of this study was knowledge about mental health and self-reported mental health in adolescents. This knowledge was assessed using a closed-ended questionnaire consisting of ten questions that addressed various aspects of adolescent mental health, such as symptoms and prevention methods. In addition, self-reported mental health in adolescents was assessed through a series of five separate questions that asked participants to rate their understanding of their own mental health.

The model design stage begins with the creation of a prototype; structure and content of the material; image selection; voice-over; and color selection. The validation development stage from experts and practitioners that The Expert System for Early Detection of Mental Illness in Adolescents (Sipamer) developed is easy to understand, clear, interesting, systematic and useful for users and is worthy of being tested.

A Likert scale was used for both questionnaires, where responses were scored from one to five, with one representing "strongly disagree" and five representing "strongly agree." For the knowledge assessment, the total score could range from ten (indicating very low knowledge) to 50 (indicating very high knowledge). In the detection assessment adolescent mental health in general independently, scores range from five (indicating very low risk detection) to 25 (indicating very high risk detection). Scores for each question are combined to obtain a final score, which is then subjected to descriptive analysis to calculate the mean and standard deviation.

To ensure the validity and reliability of the assessment tool, we conducted content validity testing by subject matter experts, along with reliability testing using Cronbach's alpha (0.87). Values above 0.70 for both parameters are considered to indicate good reliability. This method provides a strong evaluation of the effectiveness of web-based applications and lecture methods in improving knowledge and the ability to detect adolescent mental health.

Data Collection Procedures

Sipamer uses a rule-based approach developed from guidelines for early detection of adolescent mental disorders. The algorithm functions as a simple expert system with a decision tree based on symptom scores entered by the user. This study was conducted in two groups, namely the group that used the Sipamer application (Teenage Mental Expert System) and the group that became the control group that received educational lectures. Data collection was carried out by providing questionnaires and self-screening tools to assess the signs and symptoms of mental disorders experienced by respondents. The screening instrument consists of 30 items covering 9 categories of common mental disorder symptoms in adolescents. Namely: 1) Mild Depression 2) Moderate Depression 3) Severe Depression 4) Mild Anxiety Disorder 5) Moderate Anxiety Disorder 6) Severe Anxiety Disorder 7) Early Symptom Schizophrenia 8) Negative Schizophrenia 9) Positive Schizophrenia. Initial data was collected through a pre-test, then intervention was carried out according to the group, and ended with a post-test. Before the intervention, the level of knowledge and self-detection ability regarding the risk of mental disorders among participants was measured. These initial observations and measurements were documented in the data sheet provided. After this baseline assessment, the researcher implemented the intervention using the Sipamer application together with educational lectures. After the intervention, the participants' knowledge and self-detection ability to identify the risk of mental disorders were reassessed.

Data Analysis

Descriptive analysis is conducted to describe the characteristics of the data obtained, including the mean, standard deviation (SD), distribution, and frequency of the parameters measured. In addition, data distribution analysis is conducted to determine the pattern or trend of values that appear, so that it can be known whether the data is normally distributed. The Chi-square test is used to determine the relationship between characteristicsteenagerwith knowledge of mental health. Before conducting an inferential test, a normality test is conducted to determine whether the data obtained is normally distributed.

The results of the normality test showed p>0.05, which indicates that the data is normally distributed. Therefore, because the data meets the assumption of normality, an inferential test was carried out using a parametric test, especially the analysis. Analysis of covariance (ANOVA) was used to control for covariate variables such as baseline differences in knowledge levels, thereby increasing the accuracy of intervention effect estimates. If the results show p<0.05, then the data is considered significant. All data were analyzed using SPSS 22 software.

Ethical Approval

This research has received ethical approval from the Health Research Ethics Commission of the Jambi Ministry of Health, with protocol number: LB.02.06/2/860/2024 approval date 2 July 2024.All procedures followed established research ethics standards, while ensuring the protection of participants' rights and privacy.

RESULTS

Most of the participants were between the ages of10And19years, with almost equal gender distribution between males and females in both groups. In terms of education level, participants Middle and High School. All characteristics show a relationship with knowledge about mental health (p<0.05).(Table 1)

Table 1. Chi-Square Test Results to determine the relationship between the frequency of respondent characteristics and knowledge about mental health

Parameter	Web Applications n (%)	p-value	Lecture n (%)	p-value
Age		0.006		0.009
10–15 years	15 (25)		12 (20)	
16-19 years	45 (75)		48 (80)	
Gender		0.004		0.007
Woman	30 (50)		32 (53)	
Man	30 (50)		28 (47)	

Both web-based applications and lecture methods effectively enhance knowledge about mental health(p<0.05). In particular, the web-based application showed a more substantial increase in knowledge, with an increase of 32.2 points, which was statistically more significant than the lecture method's increase of 19.3 points. Although results support the effectiveness of the app, participant engagement may be influenced by technology preferences and facilitator variation. Additionally, reliance on an internet connection may limit the sustainability of the intervention. Further studies are needed to assess curriculum integration and scalability (Table 2).

Table 2. Differences in average knowledge about mental health using web applications and lectures

Group	Pre-test (Mean ± SD)	Post-test (Mean ± SD)	Mean Difference (Mean ± SD)	t	p-value
Intervention (Sipamer)	52.3 ± 10.5	84.5 ± 10.1	32.2 ± 6.5	18.75	<0.003
Control (Lecture)	54.1 ± 11.2	73.4 ± 10.3	19.3 ± 7.3	10.94	<0.007

Both interventions web-based method The application and lecture method significantly improved self-detection scores mental disorders(p<0.001). However, the web-based application showed a more significant increase of31.4points, which is statistically more significant than a 1 point increase.8.4points observed by the lecture method.

Thus, web-based applications are more effective in improving detection capabilities mental disorders in adolescents (Table 3).

Table 3. Difference in average risk detection mental disorders independently using web applications and lectures

Parameter	Pre-test (Mean ± SD)	Post-test (Mean ± SD)	Mean Difference (Mean ± SD)	t	p-value
Intervention (Sipamer)	50.6 ± 13.8	80.1 ± 11.7	31.4 ± 9.3	17.32	<0.001
Control (Lecture)	51.3 ± 14.2	67.8 ± 12.6	18.4 ± 10.1	10.62	<0.001

User involvement in the learning process. In addition, web-based media offers a variety of resources, including articles, videos, podcasts, and e-books, which support flexible and multi-sensory learning experiences (12).

DISCUSSION

This study aims to assess the effectiveness of using web-based applications and lecture methods in improving knowledge and ability to detectsymptoms of mental disorders in adolescents. Web applications effectively enhance user knowledge. This can be attributed to the power of web-based media as a powerful tool for knowledge acquisition and access to various sources of information. Specifically, web-based media allows users to obtain information anytime and anywhere, as long as they have internet connectivity. This ease of access empowers individuals to explore knowledge that may have previously been inaccessible.(13)(14).The effectiveness of the Sipamer web application is also in line with Bandura's Social Learning Theory, which emphasizes learning through observation and social interaction in a digital context. Its interactive format is also in line with Sweller's Cognitive Load Theory, which reduces working memory load through visualization and active engagement (15)(16).

In addition, web-based platforms facilitate rapid information updates, which is essential in fields that require up-to-date data, such as science, technology, and healthcare. The platform also supports two-way interaction between users and information providers. Features such as discussion forums, comments, and sharing options encourage better interaction.(17)(8)(18).to reduce cognitive load by facilitating the digestion and retention of information. Users tend to be more engaged with educational materials presented in an interactive and engaging format, thereby enhancing their overall learning experience.(19),(20)

Findings thishas significant implications for public health policy especially in teenagers. Integration of web-based applications as a supporting tool in early detection programs mental disorderscan play an important role in national health strategies, particularly in the context of a global pandemic where physical access to health services is often limited.(21)(22) (23).While promising, the use of Sipamer faces scalability barriers in areas with limited internet access and digital literacy. The development of an offline version or additional digital literacy training is needed to increase reach.

The lecture method provides a valuable opportunity for direct interaction between the presenter and the participants, allowing for immediate clarification of any questions or confusion. In addition, a well-structured lecture can convey information systematically, facilitating participants' understanding of important concepts mental health, such as symptoms and prevention strategies. By including visual aids and case examples, the lectures help participants connect theoretical knowledge to real-life scenarios, thereby increasing information retention. This improved knowledge is expected to encourage individuals to proactively identify symptoms and risk factors associated with mental disorders and to educate others in their communities(11),(24)(25).

Therefore, both web-based applications and lecture methods have great potential to increase awareness and understanding teenageraboutmental health which ultimately contributes to the prevention and control of the disease in the wider community (18). Education, both through web-based applications and lecture methods, has a significant impact on increasing participants' knowledge. This is supported by the characteristics of respondents whoStillYoung age group tends to have better access to technology and greater interaction with digital media. This age group also has a higher learning capacity, allowing them to absorb new information quickly (26)(27)(28).

This study identified several technical limitations associated with the use of the app, including requirements for a stable internet connection and adequate digital literacy skills. Although the app is designed to be easy to use,

some users with low digital literacy experienced difficulties in navigation. This finding suggests the need for additional training or a more intuitive interface to improve accessibility across different user groups.

CONCULASION

Both web-based applications "Sishow off" and lecture methods are effective in increasing knowledge and self-assessment of risk mental disorders. This intervention model has the potential to be adopted as part of a national-scale adolescent mental health promotion program, especially in digital-based UKS and Posyandu Remaja programs.

AUTHOR'S CONTRIBUTION STATEMENT

Puspita Sari, Main Author, conceptualized and designed the research, prepared the draft manuscript, and reviewed the manuscript; M. Ridwan, led the data collection, provided advice on data analysis; La Ode R, reviewed the manuscript and interpreted the data.

CONFLICT OF INTEREST

The author declares that he has no conflict of interest.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

In compiling this manuscript, the author used AI tools, specifically Grammarly and QuillBot, solely to improve grammar, spelling, and sentence clarity. The author is fully responsible for the content and integrity of the manuscript.

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