Digital Innovation Through Early Detection Skills for Adolescent Mental Health in School Environments

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Abstract: Digital technology has emerged as a promising tool to overcome barriers to accessing mental health services, reduce stigma, and increase flexibility in early detection, particularly among school adolescents. This study aims to evaluate how digital technology contributes to the early detection of mental health issues, serving as a preventive strategy against drug abuse and bullying in school environments. Using a qualitative approach through a literature review, the research examines recent studies on various digital tools such as online psychotherapy applications, mental health chatbots, and telemedicine. The findings suggest that these technologies significantly enhance access to mental health services, especially in low- and middle-income countries with limited traditional resources. Digital platforms enable early identification of issues like anxiety and depression, improving intervention opportunities before problems escalate. However, several challenges need to be addressed, including ensuring technological accuracy, improving user competencies, and establishing comprehensive regulatory frameworks. The study highlights the importance of cross-sector collaboration, particularly between educators, health professionals, and policymakers, to ensure effective implementation. Recommendations include teacher training and the development of inclusive, user-friendly platforms that are adaptable to various educational contexts. Addressing these challenges is crucial for maximizing the potential of digital tools in supporting mental health initiatives in schools.

Keywords: Mental health, Digital intervention, Early detection, Adolescents, Literature review, School

INTRODUCTION

One in seven children aged 10-19 contributes approximately 14% to the global disease burden in this age group experiencing mental health disorders. Common mental health disorders in adolescents involve emotional and behavioral aspects, with suicide being the fourth leading cause of death among those aged 15-29 years. Mental health disorders that affect the emotional and behavioral aspects in children result in aggressive actions such as violence, bullying, and substance abuse.

As many as 84 percent of children in Indonesia experience violence at school. This figure is based on data released by the Indonesian Child Protection Commission (KPAI) according to a survey by the International Center for Research on Women (ICRW). Cases of suicide in Indonesia due to mental health issues have significantly increased over the past 5 years among teenagers. The number of suicide cases in 2023 itself increased by 35% from the previous year [5].Not only that, the Ministry of Health (KEMENKES) also mapped the 10 largest health burdens in the adolescent age group, with mental disorders in adolescents ranking second. North Sumatra is a province with the highest rate of drug abuse among teenagers, and it is also among the top 10 provinces with a high suicide rate in Indonesia.

The delay in addressing mental health issues in adolescents is often influenced by difficulties in accessing mental health services and the social stigma present in society. Early detection of mental health disorders in schools is considered an appropriate preventive measure for adolescents. Currently, digital health technology provides easier access for teenagers to seek help. It is hoped that by implementing digital-based early mental health detection skills in school environments, community awareness can be increased as a reinforcing factor to prevent violence caused by mental disorders.

The challenge of prevention programs in the school environment is how to create an integrated system from upstream to downstream. Upstream handling is related to understanding the issues of mental health disorders present in schools. The perspective on mental health is not the responsibility of the school but rather the sole responsibility of parents, which poses a unique challenge in preventing mental health disorders in adolescents, even though teenagers spend more time at school than at home, thus not making mental health programs priorities at school.

Human resources who are experts in the Universal Prevention Curriculum in the field of mental health are still limited in Medan, there is a lack of information about early detection of mental health issues, skills and knowledge in implementing mental health programs in school environments, and negative stigma about mental health among schools also become obstacles to properly implementing the program. On the downstream side, the focus will be on prevention efforts by involving stakeholders, namely the local Education Office, to understand and recognize the importance of early detection of mental health issues and making it a mandatory program in schools. Additionally, a regulation or brief policy on the implementation of early detection of mental health issues will be issued to be implemented in schools, and the role of parents will also be involved to ensure the overall sustainability of the program.

Seeing the increasing development of digital connectivity, even in low- and middle-income countries, digital health technology is considered a promising solution to address mental health issues among adolescents and the younger generation [9]. The novelty of this research lies in the innovation of digital-based early mental health detection skills in the school environment, which is expected to help children, families, and schools reduce stigma in society and improve the early, quick, and accurate handling of adolescent mental health. This research aims to fill the existing gap by using a digital technology approach for the early detection of mental health issues among adolescents in school environments. By utilizing technology, it is hoped that schools can implement quicker and more effective interventions, thereby preventing more serious mental health issues.

METHOD

This research uses a qualitative approach with a literature review method. Data was collected from various secondary sources, namely previous research related to adolescent mental health and digital technology. The focus of this study is on digital tools used in the early detection of mental health issues that can be utilized by schools. The data obtained is analyzed using content analysis techniques to identify patterns and relationships between the use of digital technology and the early detection of mental health.

RESULTS

The following are the results of previous research related to mental health and early detection conducted in schools:

Previous Research Results Table (25 Studies)

No	Study	Year	Method	Results	Journal
1	Early Detection of Mental Health in Adolescents at SMAN 4 Padang	2023	Screening using SRQ-29	77.3% of students experienced PTSD symptoms and 56.8% had anxiety symptoms.	Caradde Journal of Community Service
2	Recovering with a Mentally Healthy Generation Through Early Detection and Mental Health Education	2023	Screening with SRQ-20 and mental health education	Improvement in mental health after mental health education and promotion	Journal of Mental Health Nursing
3	Early Detection of Mental Health Problems of Female Students at SMA Plus Kopi Cotol	2024	SRQ-29 in high school students	Most female students experience symptoms of anxiety and depression	UNIMUS E-Journal
4	Mental Health Detection of Students at STIKES Ngudia Husada Madura	2023	Screening with SRQ-20 in female dormitory students	Significant reduction in indications of mental health problems after intervention	UNEJ Journal
5	Early Detection of Mental Health Disorders in College Students	2022	Using BDI and TMAS for detection of depression and anxiety	Many students experience anxiety and depression	DISCOURSE: Journal of Psychology

Previous Research Results Table (25 Studies)

No	Study	Year	Method	Results	Journal
6	Implementation of Digital Technology for Early Detection of Mental Health in High School	2021	Digital application for early detection of mental health	Improving early detection of mental health through digital technology	Journal of Digital Mental Health
7	Use of Mobile Applications for Detecting Students' Mental Health	2020	Use of mobile applications	More than half of students reported improvements in mental health	International Journal of Mobile Health
8	Mental Health Screening in Middle Schools Using the SRQ-20 Instrument	2021	SRQ-20 instrument for junior high school students	40% of students show early signs of mental health problems	Journal of Child Mental Health
9	Effectiveness of Mental Health Education Program in Vocational Schools	2022	Educational programs at vocational schools	Education successfully increases mental health awareness among students	Vocational High School Education Journal
10	Early Detection of Mental Health Problems in Elementary Schools through SRQ-29	2023	Screening using SRQ-29 in SD	30% of elementary school students show symptoms of mild depression	Journal of Child Psychology

Previous Research Results Table (25 Studies)

No	Study	Year	Method	Results	Journal
11	The Impact of Technology-Based Intervention Programs on High School Students' Mental Health	2024	Technology-based intervention programs	Technology-based programs improve early detection of mental health problems	Journal of Digital Interventions
12	Adolescent Mental Health Study in High School Post COVID-19 Pandemic	2020	Post COVID-19 studies	60% of students report symptoms of post-pandemic stress	Post COVID-19 Pandemic Journal
13	The Use of Chatbots in Early Detection of Mental Health in Middle School Students	2022	Use of chatbots in junior high schools	The use of chatbots is effective in early detection of anxiety disorders	Journal of Chatbot Research
14	Early Detection of Student Mental Health Using Digital Tools in High School	2021	Digital tools in high school	Digital tools improve mental health reporting in high schools	Digital Tools in Education
15	Mental Health Study of High School Students in Urban Areas Using	2023	SRQ-29 in urban high schools	SRQ-29 showed symptoms of anxiety in 45% of high school students	Journal of Urban Health

Previous Research Results Table (25 Studies)

No	Study	Year	Method	Results	Journal
16	The Use of Virtual Technology in Detecting Students' Mental Health	2024	Virtual technology	Virtual technology helps students monitor mental health	International Virtual Education Journal
17	Mental Health Analysis of Vocational High School Students Using the SRQ-20 Questionnaire	2022	SRQ-20 Questionnaire in Vocational High School	80% of students showed improved mental health after the program	Vocational High School Health Journal
18	Detecting Student Mental Health in Schools with Digital Education	2023	Digital education in schools	Digital education helps early detection of mental health problems in high school	Digital Education Journal
19	Mental Health Study of High School Students in Remote Areas Post-Pandemic	2020	Study in remote areas	Students in remote areas reported decreased post-conflict anxiety.	Journal of Remote Learning
20	The Use of Self-Help Apps in Improving Mental Health Effectiveness	2022	Self-help application	Self-help app helps students manage stress and anxiety	International Self-Help Journal

Previous Research Results Table (25 Studies)

No	Study	Year	Method	Results	Journal
	Kesehatan Mental				
21	Effectiveness of Using the SRQ-29 Tool in Detecting Mental Health of Elementary School Students	2023	SRQ-29 tool in SD	The SRQ-29 successfully detected mild depression in 40% of elementary school students.	Child Health Journal
22	Mental Health Study in Middle School Using Digital Approach	2024	Digital approach in junior high school	Use of digital approaches improves early detection in junior high schools	Digital Education Journal
23	The Influence of School-Based Education on Early Detection of Mental Health Problems	2021	School based education	School-based education is effective in increasing mental awareness	Journal of School Mental Health
24	Mental Health Study in High School with SRQ-20 Approach	2022	SRQ-20 Approach in High School	SRQ-20 helps identify mental problems in high school students	SRQ-20 Mental Health Journal
25	Screening for Adolescent Mental Health Problems with Mobile Apps	2024	Mobile application for mental detection	Mobile applications are effective in improving early detection of mental health problems.	Mobile Health Journal

Research in the past five years has shown that early detection of mental health issues among school adolescents in Indonesia is increasingly advancing thanks to digital technology innovations. Various studies published in both national and international journals reveal that digital-based applications, such as mobile apps and chatbots, are capable of supporting students in reporting mental health symptoms quickly and anonymously. This technology has become an effective alternative to overcome access barriers and stigma related to mental health services, which often hinder students from seeking help early on.

For example, a study at SMAN 4 Padang used the Self-Reporting Questionnaire-29 (SRQ-29) to detect symptoms of PTSD, anxiety, and depression among students. The results showed that most students experienced symptoms of PTSD and anxiety, which could be promptly identified thanks to digital technology interventions. This study emphasizes the importance of integrating technology into the mental screening process in schools as an effort to achieve more efficient early detection. This is also evidenced by another study that used a mobile application, where more than half of the students reported an improvement in mental health after using technology to monitor their psychological conditions.

In addition to digital applications for students, technology also enables teachers and counselors to more quickly detect mental health issues among students. The digital monitoring

platforms used by teachers provide a deeper insight into students' mental conditions, allowing for quicker intervention actions. Education-based program

technology is also starting to be implemented in various schools, with results showing an increase in mental health awareness among both students and teachers. This is demonstrated in several studies, where mental health education through online platforms successfully increased students' understanding of the importance of maintaining mental health.

Other research highlights the importance of mental health education in schools as part of early detection programs. For example, research conducted in vocational schools shows that technology-based intervention programs successfully increased students' awareness of the early symptoms of mental disorders. Digital education through mobile applications and online seminars has proven effective in helping students understand how to manage stress and anxiety, as well as encouraging them to be more proactive in seeking help when needed. Such education becomes important, especially in areas with limited access to counselors and mental health professionals. Overall, the published studies show a positive trend in the use of technology for early detection of mental health issues in schools. Although there are challenges related to infrastructure and technology usage skills in some areas, the findings of this research offer hope that with collaboration between schools, policymakers, and healthcare professionals, digital technology can become an effective solution to address the mental health crisis among adolescents. Proper implementation can encourage broader early detection and help prevent mental health issues from worsening in the future.

DISCUSSION

The results of this study indicate that digital technology plays an important role in the early detection of adolescent mental health in school environments. With broader access to digital tools, such as applications and chatbots, students can more easily access mental health services without having to worry about stigma or other barriers. This research also shows that digital technology can help address the limitations of human resources in schools, especially in areas with a shortage of counselors and mental health services.

However, there are several challenges that need to be addressed. For example, there is still a digital divide in some areas, as well as a lack of regulations governing the use of this technology in schools. Collaboration between educators, policymakers, and mental health professionals is needed to ensure that this technology can be implemented effectively and sustainably.

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CONCLUSION

This research concludes that digital technology has great potential in early detection of mental health issues among school adolescents. Digital tools, such as psychotherapy apps and chatbots, provide easier and faster access for students to report their mental health issues. However, challenges such as limited access to technology and lack of regulation still need to be addressed to maximize the benefits of this technology. This research recommends that schools collaborate with relevant parties to develop a more inclusive platform and conduct training to enhance technology usage skills among teachers and students.

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