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Research Article

Community-Based Digital Mental Health Modules and Mental Health Literacy Among Generation Z Students in Islamic Boarding Schools

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ABSTRACT

Background: Mental health is a growing issue in educational settings. Islamic boarding schools (pesantren) are educational environments based on a dormitory system. This creates mental health issues. Low mental health literacy among Islamic boarding school students (santri) is a significant issue in Islamic boarding schools (pesantren).

Method: The study used a quasi-experimental, two-group pretest-posttest design with a sample of 78 students divided into intervention 38 studens and control groups 40 studens. The instrument used was the Mental Health Knowledge Questionnaire (MHKQ), Data analysis using paired t-tests and independent t-tests.

Results: The results showed a significant increase in knowledge in the intervention group ($p<0.05$). There were significant differences between the intervention and control groups in indicators of basic concepts, causes, and treatment and management ($p=0.000$), but not in prevention ($p=0.287$).

Conclusion: Digital modules are more effective than leaflets in improving mental health literacy among Islamic boarding school students, although they are not optimal for prevention.

Keywords: Mental health literacy; Digital modules; Islamic boarding school students

INTRODUCTION

Mental health issues are a priority in developing countries today.[1] One of these is Indonesia, which is experiencing a shift in perspectives on infectious diseases to non-communicable

diseases, including psychosocial issues in adolescence.[2] Current issues and trends suggest that Islamic boarding schools (called pesantren in Bahasa) are perceived as unsafe and uncomfortable educational environments.[3] Students, in this case, Islamic boarding school students (santri), face many challenges, including adolescent biological and psychological development, the demands of adapting to the Islamic boarding school environment, the need for discipline and obedience, and the longing for family at home.[4] Previous research on Islamic boarding schools and mental health indicates that nearly 50% of Islamic boarding school students experience mental health issues, ranging from a lack of knowledge to early symptoms of mental health problems.[5] Students in several Islamic boarding schools also demonstrate very low levels of mental health literacy, particularly in terms of knowledge and skills in seeking professional help. Furthermore, the tradition of Islamic boarding schools regarding mental health is considered "possession" or "lack of faith" within the Islamic boarding school environment, thus creating obstacles to improving mental health knowledge in Islamic boarding schools.[6]

Adolescents in Indonesia have experienced an increase (34.9%) in mental health problems from 2022 to the present. Nearly 15.5 million Indonesian adolescents experience psychosocial problems, and nearly 2.6% of them are unable to access professional mental health services.[7] This is almost the same case found in Islamic boarding schools in Indonesia. Four million students in Indonesia have trouble accessing mental health services from professionals such as psychiatrists or psychologists.[8] Furthermore, almost no Islamic boarding schools in Indonesia currently provide mental health services. Therefore, students' knowledge of mental health is very limited and can lead to increased psychosocial problems in Islamic boarding schools. Adolescence is a life stage that currently increases the risk of mental disorders (almost 75% experience severe mental disorders). This phase is called the prodromal phase in adolescence. Appropriate interventions regarding mental health in adolescents are needed to prevent long-term mental health epidemiological problems for health resilience in Indonesia.[9]

The traditions and culture of Islamic boarding schools are currently considered effective methods for fostering students' mental health.[10] These development programs prioritize tradition, culture, religion, and spirituality, such as reciting wirid (Islamic recitations), reciting the Prophet's prayers (Sholawat), and mentoring from senior students and their teachers. In recent years, mental health issues among students have been highlighted in the public sphere, with cases of physical violence, bullying, sexual violence, suicide risk, severe anxiety, depression, and even death due to mental health issues.[11] Since the pandemic, accelerated education through technology and digitalization has become a must in Islamic boarding schools. This has had a negative impact, especially on the exposure of mental health information to today's youth.[12] Inaccurate or unverified sources of mental health information can lead to consequences such as self-diagnosis from irresponsible social media content. Currently, Islamic boarding schools have not fully adapted to the current needs of digital literacy and mental health. However, some Islamic boarding schools have implemented mental health programs that are not yet standardized and based on scientific evidence.[13]

The epidemiological framework in the community emphasizes that both current and future health burdens must be considered.[14] Therefore, interventions are needed to promote health

by increasing mental health literacy in Islamic boarding schools.[15] These interventions can integrate the local culture of Islamic boarding schools with current technology that Generation Z uses. Mental health interventions can be implemented through digitalization, integrated with active non-professional approaches such as peer group training, to help improve and accelerate mental health prevention in Islamic boarding schools.[16] The development of digital modules is currently adapted to the domain of mental health literacy through knowledge about adolescent mental health, recognizing the signs and symptoms of mental health, and knowledge in efforts to overcome mental health problems in Islamic boarding schools.[17,18] The digital modules are designed with Islamic cultural values and traditions in mind, integrating psychoeducational concepts for students.

There are currently many studies on mental health literacy in Islamic boarding schools. However, studies that discuss mental health interventions through digital modules and a community epidemiology approach, considering the contextual factors of Islamic boarding schools as social determinants of mental health, are still lacking.[19] Modernization in Islamic boarding schools can be better, especially in efforts to prevent mental health problems, and needs to be improved through good literacy with knowledge of access to correct mental health services.[20] These findings indicate that mental health literacy through modernization (digital modules) is not enough. However, there is a need for systematic referral services and social support in the digital module.[21] The digital module also provides information on effective mental health services in Islamic boarding schools. The purpose of this study was to analyze changes in mental health literacy (knowledge) before and after the intervention group received a digital module, compare these changes with those of the control group, and identify sociodemographic factors that affect the digital module's effectiveness.

METHOD

This study used a quasi-experimental, two-group pretest-posttest design. The study population comprised 80 students enrolled at the Darrus Salam Islamic boarding school in Sumber Bening Village, Bantur District, Malang Regency. The sampling technique used was non-probability purposive sampling. The selected sample comprised 78 students (respondents). Inclusion criteria were students registered at the Islamic boarding school, aged 13-18 years, who attended all sessions during the study, could read and use digital modules, and owned a mobile phone. Exclusion criteria were students who were sick or did not fully participate. The research variables included the digital module as the independent variable and knowledge level (literacy) as the dependent variable.

The instrument used was the Mental Health Knowledge Questionnaire (MHKQ) to assess a person's knowledge of mental health.[22] The questionnaire consisted of 16 Yes/No questions. A score of 1 was given for a correct answer and 0 for an incorrect answer. For favorable items, a "yes" answer was assigned a score of 1 and a "no" answer a score of 0; for unfavorable items, the opposite applied. The total score was obtained by summing all 16 item scores, with a range of 1–16. A higher score indicates a better level of mental health knowledge. The questionnaire has also been translated into Indonesian and has a Cronbach's Alpha value of 0.912.[23]

Data collection was conducted at the Darrus Salam Islamic Boarding School, Sumber Bening Village, Bantur District, Malang Regency, over 6 months, from July to December 2025. The first stage provided a pretest on mental health literacy to students. Then, the intervention group was introduced to the digital module study. The digital module is entitled Psychoeducation of mental health for students based on Islamic boarding school culture and traditions. The module has three sessions. The first session is about mental health knowledge in Islamic boarding schools; the second, about the signs and symptoms of mental health in Islamic boarding schools; and the third, about access to mental health services in Islamic boarding schools (formal or informal). In addition to these sessions, a WhatsApp group was formed as an informal mental health support service for students, facilitated by peers and ustadz or their teacher. The control group was only given a leaflet about mental health knowledge and access to mental health services in Islamic boarding schools. Mental health literacy was then measured for both groups using a post-test. The statistical tests used were the chi-square test and the paired-samples t-test.

This study received ethical approval from the research ethics committee of the Chakra Brahmanda Lentera with ethical approval statement No. 15.1/13/V/EC/KEP/LCBL/2025.

RESULTS

Table 1 describes the characteristics of respondents, comprising 10 items: age, gender, family visits to Islamic boarding schools, monthly pocket money, ownership of a mobile phone, length of stay at Islamic boarding schools, domicile, experience in treating illness, self-diagnosis, and basic knowledge of mental health. The table compares the characteristics between the control and intervention groups. The results of the chi-square test indicate that the two groups have homogeneous characteristics (P>0.05), allowing comparisons between the intervention and control groups.

Table 1. Characteristics of respondents in the intervention and control groups (n=78)

No.	Characteristics	Intervention group (n=38)	Control group (n=40)	P-value
1	Age (years, Mean±SD)	15.7± 0.455	15.10 ± 0.425	0.087
2	Gender			0.341
	Male	13 (37.5%)	20 (50%)	
	Female	25 (62.5%)	20 (50%)	
3	Family visits to the Islamic boarding school			0.479
	Once a month	23 (55%)	26 (65%)	
	Twice a month	14 (45%)	14 (35%)	
4	Monthly pocket money			0.423
	IDR. >300,000	31 (82.5%)	30 (75%)	
	IDR. <300,000	7 (17.5%)	20 (25%)	
5	Own a Cell Phone			1.000
	Yes	38 (100%)	38 (100%)	
	No	0 (0%)	0 (0%)	
6	Length of Time at Islamic Boarding School			0.384
	>3 years	15 (42.5%)	21 (52.5%)	
	<3 years	23 (57.5%)	19 (47.5%)	
7	Place of Residence			0.822

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No.	Characteristics	Intervention group (n=38)	Control group (n=40)	P-value
	Within Malang Regency	16 (45%)	17 (42.5%)	
	Outside Malang Regency	22(55%)	23 (57.5%)	
8	Experience with Illness Treatment			0.870
	Professionals	5 (12.5%)	8 (20%)	
	Self-Treatment	21 (52.5%)	20 (50%)	
	Left to Own	12 (35%)	12 (30%)	
9	Ever performed a self-diagnosis			0.220
	Yes	28 (73.7%)	34 (85%)	
	No.	10 (26.3%)	6 (15%)	
10	Knowledge of the causes of mental health problems			0.485
	Spirits/jinns/possession	23 (62.5%)	28 (70%)	
	Environmental/social/biological	15 (37.5%)	12 (30%)	

Table 2 presents the Shapiro-Wilk normality test results and Sig. value in the intervention group before the intervention (0.228) and after the intervention (0.663), as well as the control group before the intervention (0.376) and after the intervention (0.052), all above the threshold of 0.05. Thus, the distribution is normal.

Table 2. Results of the data normality test

Data Group	Shapiro wilk		
	SD	DF	Sig.
Knowledge level before intervention	2.308	38	0.228
Knowledge level after intervention	0.877	38	0.663
Knowledge level before control	1.861	40	0.376
Knowledge level after control	1.908	40	0.052

Table 3. The homogeneity test using the Levene test shows Sig. values for measurements before the intervention (0.075) and after the intervention (0.225), both > 0.05, indicating that the variance between the intervention and control groups is homogeneous.

Table 3. Homogeneity Test Results

Measurement Time	Groups Compared	Leven statistic	Df1	Df2	Sig.
Before Intervention	Intervention vs. Control	3.255	1	78	0.075
After Intervention	Intervention vs. Control	1.496	1	78	0.225

Table 4 presents the results of a paired t-test, which shows a significant increase in scores on all knowledge indicators (MHKQ) in the intervention group ($p < 0.05$). The highest increase occurred in the indicator on the causes of mental health disorders (mean post-score 4.18 and pre-score 2.97), a difference of +1.211 (p-value 0.000). The control group also experienced an increase, but only in three indicators (prevention of mental health problems). The control group showed an increase in MHKQ knowledge, but it was not clinically significant because the difference was smaller than in the intervention group. This indicator also did not show a significant increase (p-value = 0.160).

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Table 4. Paired t-test of knowledge (MHKQ)

Indicator	Group	Mean Pre	Mean Post	Difference Pre-Post	95% CI	P Value
Basic mental health concepts	Intervention (n=38)	3.16	4.26	+1.105	0.811 – 1.399	0.000
	Control (n=40)	2.78	3.28	+0.500	0.271 – 0.729	0.000
Causes of mental health disorders	Intervention (n=38)	2.97	4.18	+1.211	0.913 – 1.508	0.000
	Control (n=40)	3.18	3.40	+0.225	0.072 – 0.378	0.005
Prevention of mental health problems	Intervention (n=38)	0.63	0.74	+0.105	0.003 – 0.207	0.044
	Control (n=40)	0.63	0.68	+0.050	-0121– 0.021	0.160
Mental health treatment and management	Intervention (n=38)	3.08	4.13	+1.053	0.720 – 1.385	0.000
	Control (n=40)	3.13	3.63	+0.500	0.271 – 0.729	0.000

Table 5 explains the independent test and the results showed a significant difference in the mean between the intervention and control groups in three indicators: the basic concept of mental health (mean difference 0.98; p = 0.000), the causes of mental health disorders (mean difference 0.78; p = 0.000), and the treatment and management of mental health problems (mean difference 0.50; p = 0.000). However, in the indicator of preventing mental health problems, no significant difference was found between the two groups (mean difference 0.06; p = 0.287).

Table 5. Independent t-test of knowledge (MHKQ)

Indicator	Mean intervention	Mean control	Mean Difference	95% CI	P Value
Basic concepts of mental health	4.26	3.28	0.98	0.71 –1.25	0.000
Causes of mental health disorders	4.18	3.40	0.78	0.52 – 1.04	0.000
Prevention of mental health problems	0.74	0.68	0.06	-0.05 – 0.17	0.287
Treatment and management of mental health problems	4.13	3,63	0.50	0.23 – 0.77	0.000

DISCUSSION

The results showed that digital mental health literacy in the intervention group increased more than in the control group. In the indicator of basic mental health concepts, the average score for the intervention group increased from 3.16 to 4.26, while the control group increased from 2.78 to 3.28. In the indicator of causes of mental health disorders, the intervention group

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increased from 2.97 to 4.18, while the control group increased from 3.18 to 3.40. In the prevention of mental health problems indicator, the intervention group increased from 0.63 to 0.74, while the control group increased from 0.63 to 0.68. In the indicator of treatment and management of mental health problems, the intervention group increased from 3.08 to 4.13, while the control group increased from 3.13 to 3.63. Overall, the average increase in the intervention group was higher than in the control group across all indicators, indicating that e-module-based education is more effective in improving digital mental health literacy.

The mental health literacy program at the Islamic boarding school was technology-based, using digital modules. The treatment consisted of two groups: an intervention group and a control group. The intervention group focused more on the digital module. Digitalization is a rapid response among Generation Z.[24] They are more responsive to technology. This is consistent with research showing that Generation Z prefers audio-visual media over leaflets. Leaflets themselves are a medium for health promotion. However, they focus on only one aspect: visuals. Digital modules that include audio-visual components are more effective for health promotion, especially among Generation Z.[25] The digital module developed in this study integrates text, illustrations, and interactive elements, which aligns with recommendations that media that engage multiple senses are more effective in encouraging health behavior change among Generation Z.[26]

The digital module demonstrated that mental health interventions using audiovisual media were more effective.[27] This was evident from the results of all indicators, which were significant. The highest scores were on knowledge of the causes of mental health disorders, then basic concepts of mental health, and treatment and management. This intervention aligns with research on mental health literacy, as software is more effective than conventional methods.[28] Furthermore, in the study, the intervention group was also monitored through a WhatsApp group related to knowledge of mental health disorders in Islamic boarding schools. This was an effort to implement informal health-seeking behavior. The WhatsApp group served as a forum for friends and religious teachers to discuss mental health issues.[29] This model aligns with social support, which can have a positive impact on groups in need of health assistance.

The concept of digital modules can increase a person's knowledge. Knowledge is formed through the process of someone seeing, feeling, and analyzing their experiences.[30] These components can strengthen someone in increasing their knowledge of health. Health and illness are experiences received from the process of identifying the problems a person faces. Through this experience, people can tell stories to friends, relatives, those closest to them, and even professional staff.[31] The concept of forming knowledge through several methods, one of which is through the concept of learning. Learning encourages people to interact more, share experiences, and motivate one another to increase their knowledge.[32] So, someone who is exposed to learning will be able to change their behavior.

Several studies on digitalization and health promotion can provide more specific insights into the impact of interventions on individual changes. Research results show that with current digitalization, a person's self-care skills have improved and become more effective.[33] Likewise, other studies explain that digital interventions can reduce stigma in people with mental health problems. Video and film media can also increase mental health help-seeking

behavior because of increased knowledge.[34] However, leaflets are currently ineffective as visual media. Because there is no audio component, they are unable to encourage changes in adolescent health behaviors, particularly indicators of practical health-promotion skills.

Clinically, increased knowledge in the intervention group had a significant impact on epidemiology. So far, preventive behavior and mental health treatment in Islamic boarding schools have focused more on tradition, culture, and Islamic beliefs.[35] This belief is why understanding the biopsychosocial concept can reduce the need for treatment in the community, thereby preventing an increase in referrals to professionals such as doctors, psychiatrists, nurses, or psychologists.[36] One study on efforts to prevent reproductive health problems can be conducted through an illustrated book intervention to improve adolescent knowledge.[37] However, this study still requires a longer intervention period. Indicators for preventing mental health problems have not shown significant differences between groups. Through these findings, it can be used as a reference for mental health in Islamic boarding schools, as it is very important to carry out early detection efforts as a form of preventing health problems in Islamic boarding schools.[38]

Early detection of mental health in Islamic boarding schools can be used as a reference for providing sustainable interventions on health promotion as a promotive and primary prevention effort in Islamic boarding schools. Primary prevention or promotive efforts can be integrated into an Islamic boarding school curriculum, and clinical practice aspects can be added as preventive efforts and as direct simulation.[39] This will optimize the clinical and epidemiological impact and maximize the long-term benefits for the at-risk population, namely Islamic boarding school students, whose numbers reach millions in Indonesia.

CONCLUSION

Epidemiologically, this study demonstrated that the intervention group increased mental health literacy in Islamic boarding schools compared to the control group, particularly in basic mental health concepts, causes of mental health problems, and mental health management and treatment. However, literacy level did not significantly affect the indicator for mental health problem prevention. Recommendations for further research include developing a prospective cohort study design to measure the duration of post-intervention knowledge retention and assessing predictive factors (such as social support, frequency of information access, and baseline mental health status) that moderate the intervention's effectiveness in Islamic boarding school populations. Epidemiologically, a hybrid effectiveness-implementation study is needed to evaluate the sustainability of this program on a large scale, given the increasing prevalence of mental health disorders among adolescents in Islamic boarding schools. This enables the integration of this evidence-based intervention into school health policies and Islamic boarding school curricula nationwide.

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Declarations

Authors' contributions

NNF was responsible for the conceptualization, methodology development, data curation, formal analysis, and initial drafting of the manuscript. AGA contributed through conceptual design, supervision, securing funding, and reviewing and editing the manuscript. MU participated in the investigation phase, resource provision, validation procedures, and review and editing of the manuscript.

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Conflict of interest

There is no conflict of interest in this research.

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