Jurnal Teknokes
Homepage: teknokes.org; Vol. 18, No. 2, pp. 124-134, June 2025;
e-ISSN: 2407-8964
p-ISSN: 1907-7904

RESEARCH PAPER
OPEN ACCES

Digital Innovation for Monitoring the Mental Health of Students at UPN "Veteran" East Java Using the PHQ-9 Instrument

Hendra Maulana[1], Delia Citra Kurniasari[2], Lintang Sari Putri Wardhani[2], Tsabita Safana Mustofa[2], and Erica Aprilia Sutrisni[2]
[1] Department of Digital Business, UPN "Veteran" Jawa Timur, Surabaya, Indonesia
[2] Department of Informatic, UPN "Veteran" Jawa Timur, Surabaya, Indonesia

ABSTRACT

Mental health issues, especially depression, are increasingly prevalent among university students in Indonesia, primarily due to academic, social, and emotional pressures during the transition from adolescence to adulthood. This study developed and evaluated UWAYS, a mobile application designed to assist the early detection of depressive symptoms using the Patient Health Questionnaire-9 (PHQ-9). The app features include an interactive PHQ-9 self-assessment, historical tracking of assessment results, and automatic initial recommendations based on score classifications. Involving 100 active students of UPN "Veteran" East Java, the results showed that most participants fell within the mild to moderate depression categories, with sleep disturbance and low self-confidence as the most common symptoms. The System Usability Scale (SUS) assessment yielded an average score of 77.3, indicating good usability and positive user acceptance. These findings confirm that UWAYS provides an accessible, practical, and user-friendly tool for independent mental health screening among students. This application serves as an initial step to support mental health management in the campus environment and offers potential for further integration with university counseling services. The study also highlights that the lack of early detection mechanisms on campus remains a gap that can be addressed through digital innovation like UWAYS, which combines scientific accuracy, data confidentiality, and ease of use to encourage proactive mental health awareness among students.

PAPER HISTORY
Received March 16, 2025
Revised Mei 30, 2025
Accepted 13 June, 2025
Published June 27,2025

KEYWORDS
Mental Health;
Depression;
PHQ-9;
Mobile App;
Student

AUTHOR EMAIL
hendra.maulana.if@upnjatim.ac.id
21081010022@student.upnjatim.ac.id
21081010247@student.upnjatim.ac.id
21081010282@student.upnjatim.ac.id
21081010285@student.upnjatim.ac.id

1. INTRODUCTION

Mental health has become an issue that has received increasing attention among academics, practitioners, and the general public [1]. Detecting mental disorders, especially depression, requires reliable, easy-to-use and standardized instruments. Concern for mental health continues to grow, especially with the emergence of various vulnerable groups requiring further psychological support. One such group that often becomes the focus of research in this context is the student population. The college environment presents complex dynamics, both in terms of academic and social demands. The pressures of university life stem not only from the study load, but also from expectations of emotional and financial independence [2], [3]. The transition from previous education to university poses significant adjustment challenges, which in turn contributes to the risk of psychological disorders. Becoming a university student marks a transitional phase from adolescence to adulthood, filled with new responsibilities and expectations. Students are required to cope with heavy academic demands, social pressures, and the need to achieve emotional and financial self-sufficiency [4], [5]. These conditions render students particularly vulnerable to mental health disorders, especially depression and anxiety disorders [6].

According to data from the World Health Organization (WHO), more than 280 million people worldwide experience depression, making it one of the leading causes of disability globally [7], [8]. Depression is more common in women than men, with a prevalence of around 5% among adults. In Indonesia, the 2018 Basic Health Research (Riskesdas) noted that over 19 million people over the age of 15 experienced mental emotional disorders, and more than 12 million experienced depression [9], [10]. This figure indicates that approximately 6.1% of the Indonesian population experiences mental emotional disorders characterized by symptoms of depression and anxiety. In the midst of increasing awareness of the importance of mental health, attention toward productive-age groups such as university students, has also increased. Students are a group that is classified as vulnerable to mental health disorders, especially depression, because they are in the transition phase from adolescence to adulthood, which is filled with pressure and responsibility [11]. In recent years, the

Corresponding author: Hendra Maulana, hendra.maulana.if@upnjatim.ac.id, Department of Digital Business, UPN "Veteran" Jawa Timur, Surabaya, Indonesia
DOI: https://doi.org/10.35882/teknokes.v18i2.31

e-ISSN: 2407-8964
p-ISSN: 1907-7904

prevalence of depression among Indonesian students has shown alarming figures. Research at Universitas Muhammadiyah Jakarta in 2022 found that out of 114 medical students from the class of 2020, 19.2% experienced moderate depression [12], 11.4% mild, 6.1% severe, and 10.5% very severe. Meanwhile, research at Airlangga University in 2023 noted that 26.4% of medical students experienced moderate to severe depression [13]. At Diponegoro University, research using the BDI-II showed that 64.8% of 156 medical students experienced symptoms of depression from mild to severe levels [14]. Another study conducted at Mulawarman University reported that 25.6% of students experienced mild depression, 17% moderate, and 8.8% severe [15]. In addition, a study at Udayana University found that 38% of medical students had depression [16]. This data shows that the prevalence of depression among Indonesian students is quite high and requires serious attention. Factors such as academic pressure, social demands, and the transition to independence may contribute to these high rates of depression among university students [17], [18], [19].

The high prevalence of depression among university students highlights the critical importance of mental health in higher education settings. Depressive disorders are progressive in nature, and without appropriate intervention, early symptoms such as fatigue, loss of interest, or sleep disturbance can develop into more serious disorders, including academic and social dysfunction, and in extreme cases, suicidal ideation [20], [21]. A compromised mental state has a direct impact on concentration, motivation to learn, and overall academic achievement. Conversely, students who have a healthy mental state tend to be more adaptable, productive, and are more likely to complete their studies on time. Several suicides on campus in recent years have been attributed to a lack of awareness of the importance of mental health, lack of access to psychological services, and delays in early detection [22]. In fact, rapid and appropriate detection and psychological support can prevent worsening conditions and even save lives. Intervening at an early stage not only requires fewer resources, but also provides a better chance of recovery from a psychological, social and economic perspective [23].

To address the need for rapid and efficient early detection, various instruments have been developed to identify depression symptoms at an early stage. One of the most widely used screening tools globally is the Patient Health Questionnaire-9 (PHQ-9). The PHQ-9 is a self-report based instrument designed to measure the severity of depressive symptoms based on the nine main criteria in the Diagnostic and Statistical Manual of Mental Disorders fourth edition (DSM-IV) [23]. It consists of nine items that assess symptoms in the past two weeks, such as low mood, sleep disturbance, fatigue, feelings of guilt or worthlessness, and thoughts of self-harm. The PHQ-9 has been shown to have high validity and reliability in various studies across cultures and populations, including among adolescents, adults, and the elderly [24]. In Indonesia, the PHQ-9 has been translated and validated in various studies, and used in primary healthcare settings and academic research. In addition, the integration of PHQ-9 into mental health-based digital platforms also further expands its accessibility, allowing users to self-screen through the app or official website. With its efficiency, simplicity, and reliability, the PHQ-9 is now a highly recommended standardized tool in the early detection of depressive disorders, both in clinical, community, and higher education settings.

The urgency of using the PHQ-9 as a screening instrument for depressive disorders is particularly relevant to the context of students at the National Development University “Veteran” East Java. These students face a combination of academic, social, and emotional pressures, which may trigger the appearance of symptoms of mental disorders, especially depression [24]. However, early detection of this condition has not been optimal. In fact, the PHQ-9 offers practicality as a screening tool that can be widely implemented in the campus environment, both manually and digitally [25]. This instrument is not only easy to use, but also has a strong scientific basis in systematically identifying symptoms of depression. The limited utilization of PHQ-9 in higher education institutions signifies a gap in the prevention and early detection strategies of student mental disorders. A more active and structured use of PHQ-9, both in new student orientation programs, campus counseling services, and periodic screening activities, can be a strategic step to recognize potential risks early on. By strengthening the role of PHQ-9 in the psychological support system in the university environment, students can get faster and more targeted interventions. This is very crucial, given the high rate of mental disorders in productive age that often go unnoticed because they are not detected early.

Despite the availability and validation of the PHQ-9, a research gap remains in its optimal implementation using digital applications that are accessible, adaptive, and tailored to the needs of Indonesian university students. Many studies emphasize the prevalence of depression and the usefulness of PHQ-9 separately, there is limited research that integrates this instrument into a user-friendly, technology-based platform specifically designed for this demographic. By adopting a technology-based and psychometric approach, this research not only presents an innovation mobile application that integrates the PHQ-9, offering a concrete solution to the need for the early detection of depressive disorders among university students. Combining technical aspects, including instrument validation, result classification, and data security assurance, with a user-centered design approach allows the creation of a system that is not only functional but also psychologically and practically accepted by its users. This application is envisioned as a foundational step toward building a more adaptive, accessible, and widely implementable mental screening system in higher education. This research is an important contribution in answering the challenge of the lack of effective, standardized, early detection tools based on the real needs of students in today's digital era. The strength

Corresponding author: Hendra Maulana, hendra.maulana.if@upnjatim.ac.id, Department of Digital Business, UPN "Veteran" Jawa Timur, Surabaya, Indonesia
DOI: https://doi.org/10.35882/teknokes.v18i2.31

e-ISSN: 2407-8964
p-ISSN: 1907-7904

of this research lies in its development of a digital-based mental health monitoring system specifically tailored for university students using the PHQ-9 instrument. Unlike traditional manual screenings, this system allows students to independently assess their mental health and instantly receive feedback on their condition. Furthermore, it enables academic advisors to monitor students' mental well-being over time through a centralized dashboard. This real-time monitoring approach provides a preventive and data-driven solution for addressing mental health issues in higher education institutions, especially in institutions such as UPN "Veteran" East Java, where such digital tools of this kind are still rarely utilized.

2. MATERIALS AND METHOD

A. Dataset

This study involved participants drawn from active students at the National Development University "Veteran" East Java, representing various study programs. The selection of participants was carried out randomly with a purposive sampling approach, which aims to obtain a diversity of academic backgrounds and a wider representation of the student population in the campus environment. A total of 100 participants were involved in the application validation phase, which was considered adequate to obtain an initial overview of application performance, especially in terms of the accuracy of the classification of depressive symptoms based on PHQ-9 and the quality of user experience. Inclusion criteria for participants included active university students aged between 18 to 25 years , willingness to participate in the entire study, and provision of informed consent. Data collection was done voluntarily by observing the principles of confidentiality and research ethics, and had obtained approval from relevant parties in the university environment.

B. Research Instrument

This study employed the Patient Health Questionnaire-9 (PHQ-9) as the pimary instrument to measure the severity of depression symptoms in app users. The PHQ-9 was chosen because it has been proven as a valid and reliable screening tool in various contexts, including in clinical and non-clinical research, and can be used independently by respondents. The instrument consists of nine items that directly refer to the nine diagnostic criteria for major depression as listed in the DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition) published by the American Psychiatric Association [26], [27]. Each item in the PHQ-9 is designed to represent one core symptom of depression, such as sleep disturbance, loss of interest, fatigue, and thoughts of self-harm [5]. Respondents were asked to answer how often they experienced each of these symptoms over the past two weeks, using a 4-point Likert scale from "not at all" to "almost every day." This frequency assessment allows for early identification of depressive symptoms that can have a significant impact on a person's academic, social and emotional life, especially among university students. The integration of PHQ-9 into the mobile application in this study not only aims to facilitate an efficient and practical self-screening process, but also to support an interactive and responsive user experience. This approach aims to help users better understand their own mental state as well as be motivated to seek professional help if symptoms of depression of a certain severity are found. To provide a clearer understanding of the question structure and the symptom dimensions measured, **Table 1.** presents the nine PHQ-9 items along with brief descriptions of the symptoms represented by each.

0–4 : No or minimal depression
5–9 : Mild depression
10–14 : Medium depression
15–19 : Moderate-severe depression
20–27 : Major depression

The total PHQ-9 score is obtained by summing up all the scores of the nine questions that have been answered by the respondent. Each question is scored on a scale of 0 to 3, depending on the frequency of symptom occurrence over the past two weeks. Thus, the possible cumulative score ranges from 0 (no symptoms at all) to 27 (very frequent and high intensity symptoms).

C. Data Collection and Processing

The questionnaire feature in the application is used to determine students' mental health status during their academic activities on campus. Data collection is carried out digitally through the application, where students directly fill out the PHQ-9 questionnaire provided in the system. Each user's responses are automatically stored in the system database in JSON format and linked to the user ID for monitoring and analysis purposes. After students complete the questionnaire, the system automatically calculates the score by summing the values of all responses. The total score obtained is immediately analyzed by the system to determine the classification of mental health disorders:

1. Score 0–4 : No signs of depression.
2. Score 5–9 : Mild depression symptoms; recommended action: psychoeducation and monitoring.
3. Score 10–14 : Mild depression; recommended action: observation or short-term therapy.
4. Score 15–19 : Moderate depression; recommended action: psychotherapy or antidepressants.
5. Score ≥ 20 : Severe depression; recommended action: intensive treatment combination.

The results are securely stored in the system and can be accessed by academic advisors for follow-up and monitoring of student conditions. The system also provides a history of submissions so that instructors can track student's progress over time.

Corresponding author: Hendra Maulana, hendra.maulana.if@upnjatim.ac.id, Department of Digital Business, UPN "Veteran" Jawa Timur, Surabaya, Indonesia
DOI: https://doi.org/10.35882/teknokes.v18i2.31

e-ISSN: 2407-8964
p-ISSN: 1907-7904

Table 1. PHQ-9 Question

	In the past 2 weeks, how often have you been bothered by the following problems?	Never	A few days	More than half of the time	Almost every day
1.	Lack of interest or passion in doing anything	0	1	2	3
2.	Feeling moody, sad, or hopeless	0	1	2	3
3.	Difficulty sleeping/easy waking, or too much sleep	0	1	2	3
4.	Feeling tired or underpower	0	1	2	3
5.	Lack of appetite or eating too much	0	1	2	3
6.	Lack of confidence or feeling that you are a failure or have let yourself or your family down	0	1	2	3
7.	Difficulty concentrating on something, for example reading a newspaper or watching television	0	1	2	3
8.	Moving or speaking so slowly that others notice. Or the opposite; feeling restless or agitated so you move more than usual.	0	1	2	3
9.	Feeling better dead or wanting to hurt yourself in any way.	0	1	2	3

D. Application Architecture

The mobile application developed in this research is designed by considering the principles of modularity, efficiency, and scalability, as well as focusing on ease of use and user data security [28]. In its implementation, the application is built using the Kotlin programming language for the Android platform. The choice of using Kotlin is based on their ability to build responsive user interfaces as well as their compatibility with various backend services [29]. For data management, the backend architecture relies on Firebase as a cloud-based solution that supports user authentication, real-time data storage, and notification services. The app integrates several key features that support the goal of early mental health detection. The first feature is a user login equipped with a secure authentication system to maintain data privacy and confidentiality. The second feature is the PHQ-9 questionnaire which is organized interactively to make it easier for users to self-assess their mental state. Furthermore, there is a history feature that allows users to view previous evaluation results for reflection and periodic monitoring. Finally, the app comes with a professional advice feature, where users will receive initial recommendations based on their PHQ-9 score, including advice on accessing professional mental health services if needed. This architecture is expected to support widespread use of the app among students, as well as provide an optimal, interactive, and safe user experience in the mental health screening and monitoring process.

3. RESULTS

A. UWAYS Application

The UWAYS application, as shown in **Fig 1**., is a digital platform developed as a tool to support the mental health of UPN "Veteran" East Java students. This application is specifically designed to facilitate students in monitoring their psychological condition independently through features such as PHQ-9 questionnaire filling and visualization of evaluation results. With a user-friendly and informative design, UWAYS is expected to be an initial solution in managing symptoms of stress, anxiety, and depression among students. Here are some views of the UWAYS application. There is a main page display that contains features on the UWAYS application such as My Health, Counseling, and access to articles related to mental health.The My Health page is designed to provide convenience and comfort in monitoring students' mental health on a regular basis. On this page, students can access and view the history of filling out questionnaires that have been done before. This history includes detailed information about each questionnaire filling. In this feature, the results of the questionnaires that have been filled out by students will be accessible and checked by the guardian lecturer. This data supports advisors in identifying potential psychological issues that may affect academic performance or class participation. The interface of this feature is presented in Fig. 1. Application View.

B. Distribution of PHQ-9 Results on Respondents

After completing the PHQ-9 questionnaire through the UWAYS application, data was obtained to illustrate the severity levels of depressive symptoms among the respondents. Table 2 presents the distribution of responses from 100 students across the nine PHQ-9 symptom indicators, using a Likert scale ranging from 0 to 3. The table includes the number and percentage of respondents for each response category, along with the mean score and standard deviation for each item. These results form the basis for evaluating the extent of depressive symptoms in university students and identifying specific areas that may require further psychological attention or targeted intervention The detailed data distribution is shown in Table 2. Depression Indicators.

Corresponding author: Hendra Maulana, hendra.maulana.if@upnjatim.ac.id, Department of Digital Business, UPN "Veteran" Jawa Timur, Surabaya, Indonesia
DOI: https://doi.org/10.35882/teknokes.v18i2.31

e-ISSN: 2407-8964
p-ISSN: 1907-7904

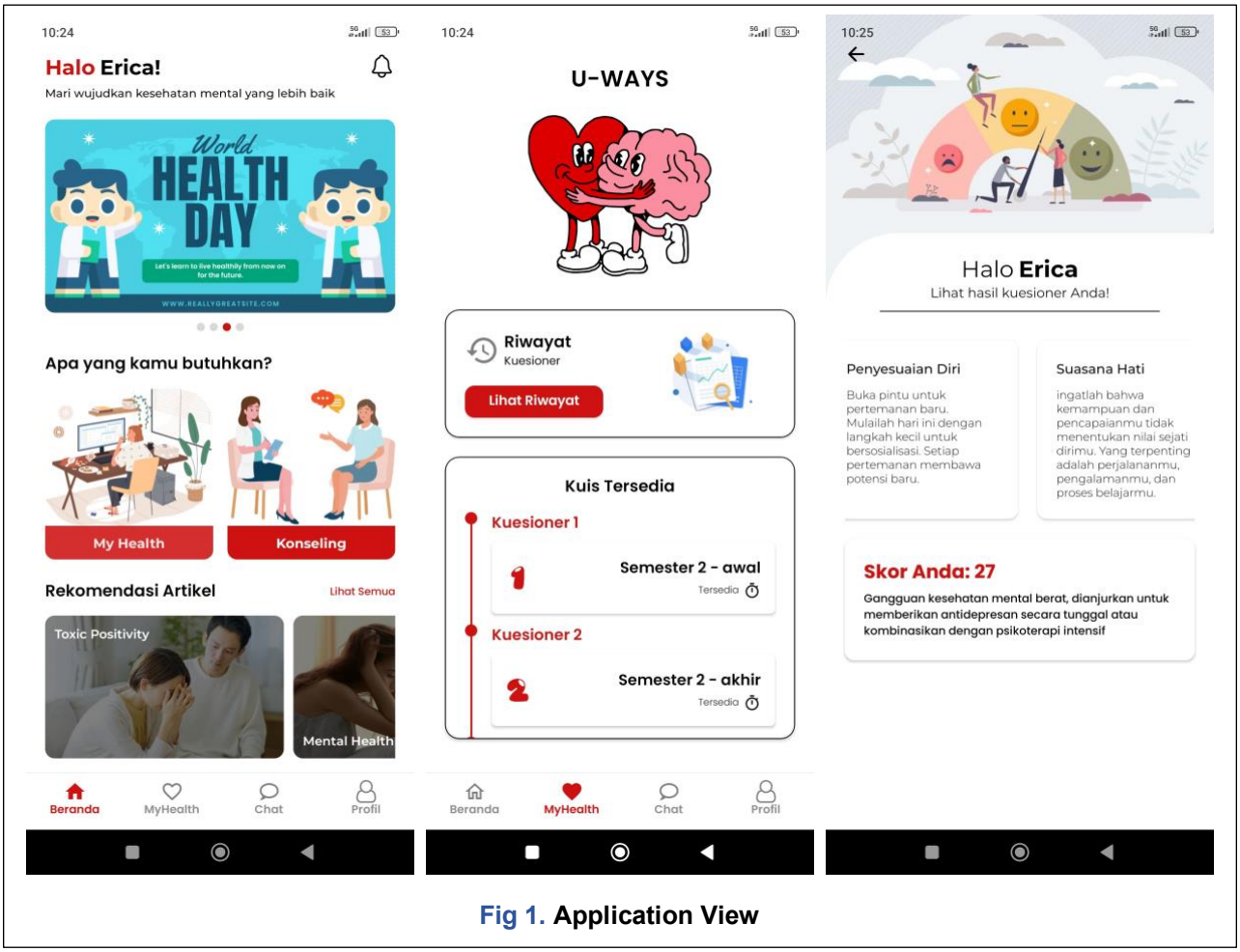

Fig 1. Application View

Table 2. Depression Indicators

No.	Indicators of Depression	Answer Categories	Total	Percentage (%)	Average Score	Standard Deviation
1	Lack of interest or passion in doing anything	Never (0)	52	52.0	0.80	0.75
		Several Days (1)	35	35.0		
		>½ Time (2)	10	10.0		
		Almost Every Day (3)	3	3.0		
2	Feeling moody, sad, or hopeless	Never (0)	30	30.0	1.10	0.71
		Several Days (1)	50	50.0		
		>½ Time (2)	15	15.0		
		Almost Every Day (3)	5	5.0		
3	Difficulty sleeping/easy waking, or too much sleep	Never (0)	25	25.0	1.30	0.80
		Several Days (1)	45	45.0		
		>½ Time (2)	20	20.0		
		Almost Every Day (3)	10	10.0		
4	Feeling tired or underpowered	Never (0)	40	40.0	0.90	0.78
		Several Days (1)	40	40.0		

Corresponding author: Hendra Maulana, hendra.maulana.if@upnjatim.ac.id, Department of Digital Business, UPN "Veteran" Jawa Timur, Surabaya, Indonesia
DOI: https://doi.org/10.35882/teknokes.v18i2.31

e-ISSN: 2407-8964
p-ISSN: 1907-7904

No.	Indicators of Depression	Answer Categories	Total	Percentage (%)	Average Score	Standard Deviation
		>½ Time (2)	15	15.0		
		Almost Every Day (3)	5	5.0		
5	Lack of appetite or eating too much	Never (0)	36	36.0	1.00	0.74
		Several Days (1)	44	44.0		
		>½ Time (2)	15	15.0		
		Almost Every Day (3)	5	5.0		
6	Lack of confidence - or feeling that you are a failure	Never (0)	22	22.0	1.20	0.76
		Several Days (1)	50	50.0		
		>½ Time (2)	20	20.0		
		Almost Every Day (3)	8	8.0		
7	Difficulty concentrating on something	Never (0)	28	28.0	1.10	0.79
		Several Days (1)	50	50.0		
		>½ Time (2)	15	15.0		
		Almost Every Day (3)	7	7.0		
8	Slow-moving or excessive fidgeting	Never (0)	30	30.0	1.00	0.73
		Several Days (1)	50	50.0		
		>½ Time (2)	12	12.0		
		Almost Every Day (3)	8	8.0		
9	Feeling better dead or wanting to hurt yourself	Never (0)	60	60.0	0.70	0.70
		Several Days (1)	30	30.0		
		>½ Time (2)	5	5.0		
		Almost Every Day (3)	5	5.0		

Based on the table results, the most common symptom among respondents was sleep disturbance (average score of 1.30), followed by feelings of lack of confidence (1.20), and moodiness or sadness (1.10). In contrast, the indicator with the lowest average score was the desire to harm oneself or feel better dead (0.70). These findings suggest that the majority of respondents experienced mild to moderate symptoms of depression, with different variations in symptom intensity. This information can be used as a basis in designing mental.

health interventions that suit the needs of respondents. To provide a clearer picture of the distribution of the average score on each PHQ-9 question indicator, a visualization in the form of a bar chart is used. This diagram presents the average score of each question that has been calculated based on a total of 100 respondents. The horizontal dotted line indicates the average threshold value, making it easier to identify indicators that have scores above or below the overall average. **Fig 2.** Visualization of Average PHQ-9 Score illustrates the variation in the severity of depression symptoms among respondents, as reflected by the average score for each individual question on the PHQ-9 instrument. The PHQ-9 (Patient Health Questionnaire-9) measures the frequency of depressive symptoms over the past two weeks using a standardized Likert scale ranging from 0 to 3, where a score of 0 represents that the symptom is “not at all” experienced, while a score of 3 signifies the symptom occurs “nearly every day.” This scoring approach allows researchers to quantify the intensity and prevalence of each specific symptom across the study population.

A higher average score for a particular item suggests that the associated symptom is more commonly or more intensely experienced among the respondents. Notably, in this study, symptoms such as sleep disturbances and diminished self-confidence recorded higher mean scores compared to other symptoms, including those associated with suicidal ideation or self-harm. This indicates that while all symptoms in the PHQ-9 are clinically relevant, some are more frequently encountered in this particular cohort, potentially influenced by demographic, psychosocial, or environmental factors commonly faced by university students.

Corresponding author: Hendra Maulana, hendra.maulana.if@upnjatim.ac.id, Department of Digital Business, UPN "Veteran" Jawa Timur, Surabaya, Indonesia
DOI: https://doi.org/10.35882/teknokes.v18i2.31

e-ISSN: 2407-8964
p-ISSN: 1907-7904

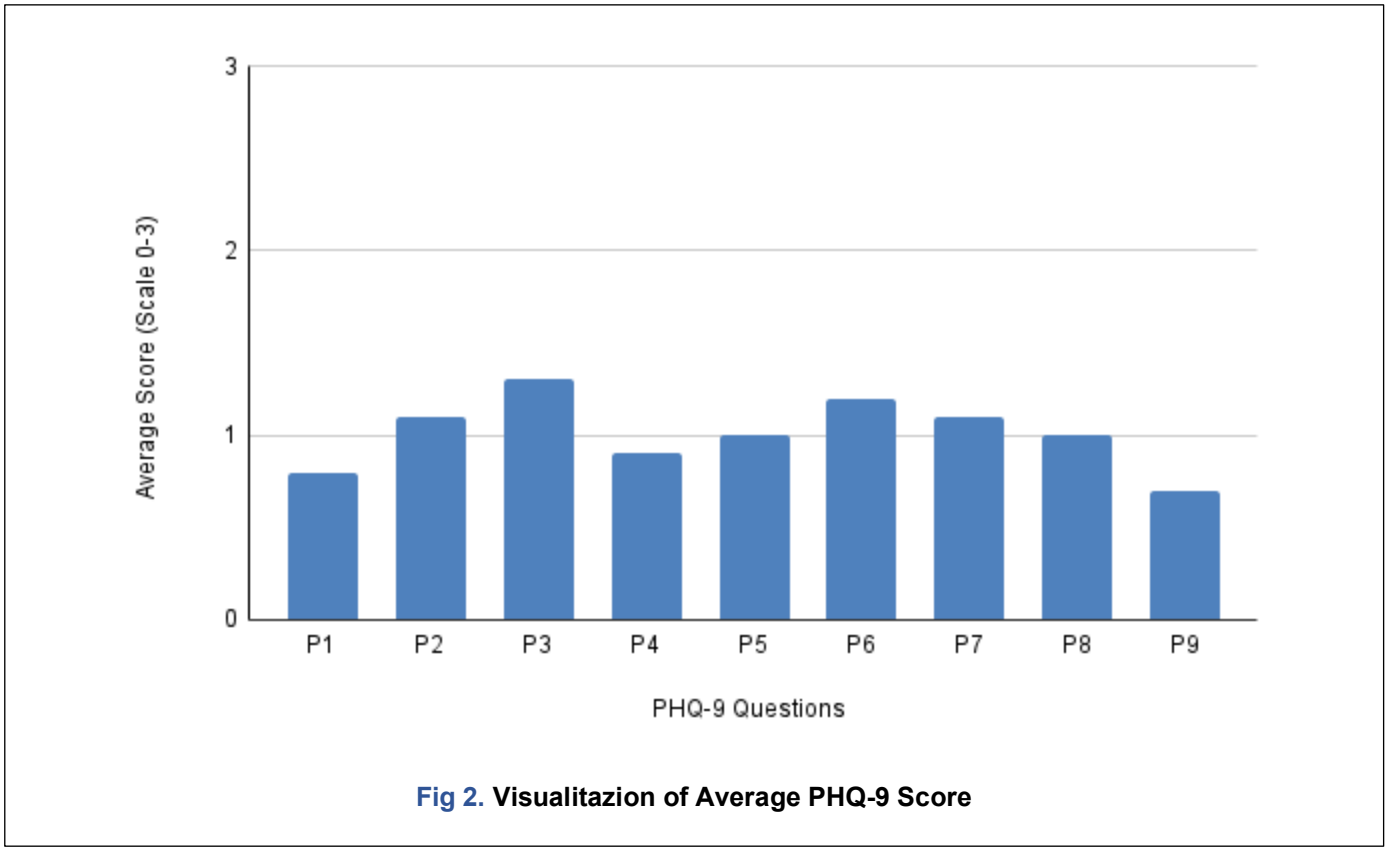

Fig 2. Visualitazion of Average PHQ-9 Score

These results offer valuable insights into which depressive symptoms are most dominant and may represent the most immediate areas for targeted mental health support. In particular, the prominence of sleep-related and self-esteem-related issues highlights the need for tailored interventions focusing on sleep hygiene, stress management, and confidence-building programs. Furthermore, although self-harm-related items yielded lower average scores, this does not necessarily indicate a lack of concern; rather, it may reflect underreporting or lower prevalence in this sample. Overall, the visualization serves as a critical analytical tool in identifying symptom patterns that can inform both preventive and therapeutic mental health strategies.

C. Depression Rate Diagram

The pie chart below shows the distribution of depression levels in 100 university students based on the total score results from the PHQ-9 questionnaire. Each depression category is defined using a clinically defined range of scores, ranging from minimal (scores 0-4) to severe (scores 20-27). This visualization provides a comprehensive overview of the proportion of respondents in each depression severity level. **Fig 3.** Distribution of Student Depression Levels show that majority of students were in the mild (35%) and moderate (25%) categories, while only a small percentage were in the severe (8%) and moderately severe (12%) categories. This finding shows that most respondents experience depressive symptoms at a level that can still be treated preventively. The PHQ-9 total score is derived by summing the responses to the nine items, each scored from 0 to 3. Therefore, higher total scores indicate more severe depressive symptoms . Thus, this distribution is an important indicator in designing appropriate psychological intervention strategies for student groups.

D. SUS Score of UWAYS Application

After analyzing the psychological condition of respondents through the PHQ-9 instrument, the next stage in this research is to evaluate the level of usability of the UWAYS application as a supporting tool. This evaluation was conducted using the System Usability Scale (SUS), which consists of 10 statements with a rating scale from 1 (strongly disagree) to 5 (strongly agree). The following figure displays a list of 10 SUS questions, the final SUS score obtained, and the interpretation of the SUS scale based on international usability standards.

Table 3. Results of Usability Evaluation presents the findings of the usability evaluation results using the System Usability Scale (SUS) method on 100 respondents, the average SUS final score is 77.3 Based on standard SUS interpretation guidelines, this score places the UWAYS application within the “good usability” category. This result suggests that the majority of users perceive the application as easy to use, has a clear interface, and supports a positive user experience in conducting mental health screening. The favorable usability score highlights the application's potential to support mental health interventions effectively by ensuring users can navigate and interact with its features without significant difficulty.

Corresponding author: Hendra Maulana, hendra.maulana.if@upnjatim.ac.id, Department of Digital Business, UPN "Veteran" Jawa Timur, Surabaya, Indonesia
DOI: https://doi.org/10.35882/teknokes.v18i2.31

e-ISSN: 2407-8964
p-ISSN: 1907-7904

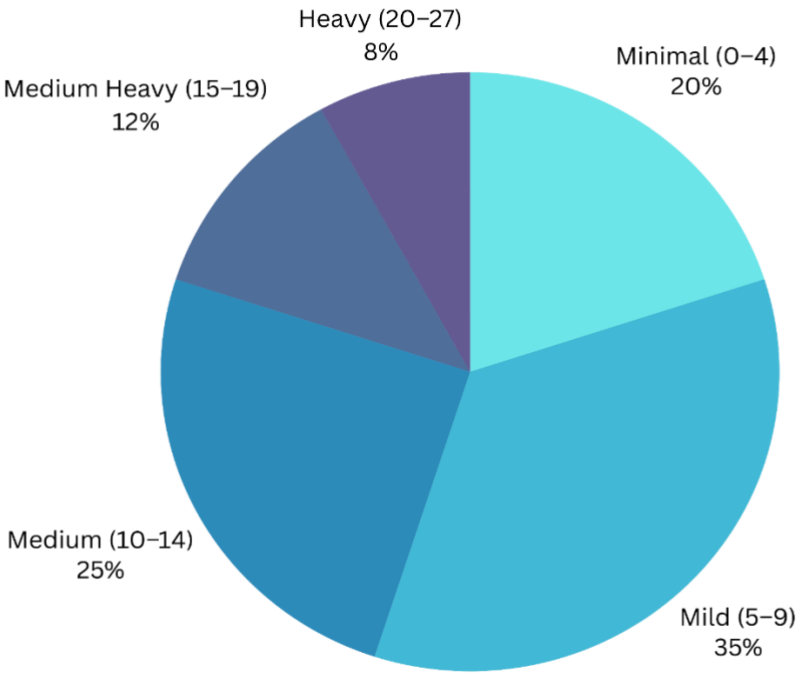

Fig 3. Distribution of Student Depression Levels

Table 3. Results of Usability Evaluation

Calculated Score										Total SUS Raw Score	SUS Final Score
Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	10		
4	2	5	2	4	2	4	2	5	4	30	75
5	1	4	3	3	2	4	1	4	3	30	75
4	2	5	2	4	1	5	1	5	3	34	85
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
4	2	4	2	5	4	4	2	5	2	34	85
4	1	5	1	5	3	4	1	4	3	31	77.5
5	1	4	3	4	2	5	2	4	1	31	77.5
Average Score (Final Result)											77.3

4. DISCUSSION

A. PHQ-9 Results Analysis

The results of this study indicate that the UWAYS application has significant potential in helping the early detection process of depressive disorders in students of UPN "Veteran" East Java. By integrating the PHQ-9 questionnaire, this application is able to identify the tendency of depressive symptoms experienced by users based on the total score and distribution of responses to nine indicators. Most respondents are in the mild to moderate depression category, with the most dominant symptoms being sleep disturbances, lack of self-confidence, and a gloomy or sad mood. These results indicate that UWAYS is able to provide an accurate initial picture of the psychological condition of students practically and independently. When compared to previous studies, such as those conducted at Airlangga University and Diponegoro University, which also recorded high levels of depression among students, these findings show a similar trend. This strengthens the validity of the finding that students are a group at high risk of experiencing emotional mental disorders. The availability of applications such as UWAYS is important to provide wider access to psychological screening without having to wait for symptoms to develop to a more serious stage.

This study directly answers the primary research question regarding the effectiveness of the UWAYS application in supporting the early detection process of depressive disorders. With features such as displaying PHQ-9 score results, severity categories, and follow-up recommendations, this application not only facilitates the self-identification process but also encourages user awareness to take appropriate preventive steps. The usability evaluation through the System Usability Scale

Corresponding author: Hendra Maulana, hendra.maulana.if@upnjatim.ac.id, Department of Digital Business, UPN "Veteran" Jawa Timur, Surabaya, Indonesia
DOI: https://doi.org/10.35882/teknokes.v18i2.31

(SUS) also showed positive results with an average score of 77.3, indicating that the application is easy to understand and use by its target users. The strengths of this study lie in its digital approach, which is responsive to the needs of modern students, with complete, accessible, and user-friendly features. The UWAYS application also provides data visualization that helps users understand their condition. Meanwhile, the limitations of this study include the population coverage which is still limited to one institution and there has been no longitudinal test of the application's effectiveness in the long term. Further research could include the development of advanced features such as connecting to campus counseling services, integration with academic systems, and expanding trials to other universities.

5. CONCLUSION

This study concludes that the UWAYS application has been successfully developed as a self-screening media for early detection of depression symptoms among students of UPN "Veteran" East Java. The integration of the PHQ-9 instrument into the application allows users to identify the severity of depression practically and informatively. Based on questionnaire responses from 100 respondents, the results showed that the majority were categorized as experiencing mild to moderate depression, with the most dominant symptoms including sleep disturbances and low self-confidence. In addition, the usability evaluation using the System Usability Scale (SUS) showed an average score of 77.3, indicating that this application has a good level of usability and is accepted by users. The purpose of this research is to design and develop a mobile-based self-screening application that integrates the PHQ-9 instrument, with the goal of enabling university students to detect early symptoms of depression independently and access information that encourages timely psychological support. This finding directly answers the purpose of the study, which is to create an application that can help students recognize their mental condition independently and encourage awareness to seek professional help if needed. For further development, it is recommended that the UWAYS application be tested on a broader and more diverse student population and integrated with campus counseling services to strengthen the effectiveness in facilitating ongoing psychological interventions.

REFERENCES

[1] D. Nazira, M. Mawarpury, A. Afriani, and I. D. Kumala, "LITERASI KESEHATAN MENTAL PADA MAHASISWA DI BANDA ACEH," *Seurune : Jurnal Psikologi Unsyiah*, vol. 5, no. 1, pp. 23–39, Jan. 2022, doi: 10.24815/s-jpu.v5i1.25102.

[2] J. Eberle and J. Hobrecht, "The lonely struggle with autonomy: A case study of first-year university students' experiences during emergency online teaching," *Comput Human Behav*, vol. 121, p. 106804, Aug. 2021, doi: 10.1016/j.chb.2021.106804.

[3] M. A. Martinez, K. Lewis, and J. Marquez, "College Ready at a Cost: Underrepresented Students Overwhelmed, Scared, Increasingly Stressed, and Coping," *Educ Urban Soc*, vol. 52, no. 5, pp. 734–758, Jun. 2020, doi: 10.1177/0013124519887713.

[4] C. Yang, A. Chen, and Y. Chen, "College students' stress and health in the COVID-19 pandemic: The role of academic workload, separation from school, and fears of contagion," *PLoS One*, vol. 16, no. 2, p. e0246676, Feb. 2021, doi: 10.1371/journal.pone.0246676.

[5] M. Tlachac *et al.*, "StudentSADD," *Proc ACM Interact Mob Wearable Ubiquitous Technol*, vol. 6, no. 2, pp. 1–32, Jul. 2022, doi: 10.1145/3534604.

[6] X.-Q. Liu, Y.-X. Guo, and Y. Xu, "Risk factors and digital interventions for anxiety disorders in college students: Stakeholder perspectives," *World J Clin Cases*, vol. 11, no. 7, pp. 1442–1457, Mar. 2023, doi: 10.12998/wjcc.v11.i7.1442.

[7] A. Arshad and M. Taiyyib, "Understanding depression and suicide rates in the UK in comparison to Pakistan," *Eur J Environ Public Health*, vol. 8, no. 2, p. em0155, Apr. 2024, doi: 10.29333/ejeph/14470.

[8] R. Mehta, V. Pareek, S. Kumar, L. Sharma, and R. S. Rathore, "Depression and Tension Type Headache: Untangling the Cause and Effects Relationship through HSQ-EV and PHQ-9 in Medical students: A Pan India Study," *Journal of Pharmaceutical Research*, vol. 22, no. 3, pp. 165–171, Dec. 2023, doi: 10.18579/jopcr/v22.3.23.67.

[9] Y. F. Wardhani, Z. K. Nantabah, E. D. Machfutra, S. D. Lestyoningrum, Oktarina, and M. A. Nurjana, "The prevalence and distribution of risk factors for depression and emotional mental disorders in the elderly in Indonesia," *International Journal of Social Psychiatry*, vol. 70, no. 4, pp. 763–771, Jun. 2024, doi: 10.1177/00207640241227381.

[10] M. D. Pham *et al.*, "Mental Health Problems Among Indonesian Adolescents: Findings of a Cross-Sectional Study Utilizing Validated Scales and Innovative Sampling Methods," *Journal of Adolescent Health*, vol. 75, no. 6, pp. 929–938, Dec. 2024, doi: 10.1016/j.jadohealth.2024.07.016.

[11] J. B. Kirkbride *et al.*, "The social determinants of mental health and disorder: evidence, prevention and recommendations.," *World Psychiatry*, vol. 23,

Corresponding author: Hendra Maulana, hendra.maulana.if@upnjatim.ac.id, Department of Digital Business, UPN "Veteran" Jawa Timur, Surabaya, Indonesia
DOI: https://doi.org/10.35882/teknokes.v18i2.31

no. 1, pp. 58–90, Feb. 2024, doi: 10.1002/wps.21160.

[12] M. Dzildan Zaffa, G. Dwiani, T. Tinovella, R. Effendi, and A. Syafruddin, "Prosiding Seminar Nasional Penelitian LPPM UMJ Website: http://jurnal.umj.ac.id/index.php/semnaslit E-ISSN:2745-6080 Gambaran Kesehatan Mental Pada Mahasiswa Angkatan 2020 Program Studi Kedokteran Fakultas Kedokteran dan Kesehatan Universitas Muhammadiyah Jakarta." [Online]. Available: http://jurnal.umj.ac.id/index.php/semnaslit

[13] D. A. Izzah, S. Yitnamurti, and N. M. Rehatta, "PREVALENCE OF DEPRESSION IN FIRST-YEAR MEDICAL STUDENTS AT AIRLANGGA UNIVERSITY, INDONESIA," *Journal of Community Medicine and Public Health Research*, vol. 2, no. 1, p. 18, Jun. 2021, doi: 10.20473/jcmphr.v2i1.26477.

[14] R. First Trasia, N. G. Yamin, P. Kedokteran, F. Kedokteran, U. Sultan, and A. Tirtyasa, "NARRATIVE REVIEW Factors related to achievement, interaction in learning groups and depression levels in students of the Faculty of Medicine." [Online]. Available: https://jurnal.untirta.ac.id/index.php/iclc/index

[15] N. N. Faizah, S. Sulistiawati, E. Y. Nugrahayu, J. Mualimin, and A. Ibrahim, "Gambaran Gejala Depresi pada Mahasiswa Fakultas Kedokteran Universitas Mulawarman," *Jurnal Sains dan Kesehatan*, vol. 3, no. 5, pp. 654–660, Oct. 2021, doi: 10.25026/jsk.v3i5.545.

[16] A. M. Natasya *et al.*, "THE RELATIONSHIP BETWEEN THE INTENSITY OF SOCIAL MEDIA USE AND THE LEVEL OF ANXIETY AND DEPRESSION IN MEDICAL STUDENTS", doi: 10.24843.

[17] J. C. Fruehwirth, M. E. Mazzolenis, M. A. Pepper, and K. M. Perreira, "Perceived stress, mental health symptoms, and deleterious behaviors during the transition to college," *PLoS One*, vol. 18, no. 6, p. e0287735, Jun. 2023, doi: 10.1371/journal.pone.0287735.

[18] M. F. Fauzi *et al.*, "Stress, Anxiety and Depression among a Cohort of Health Sciences Undergraduate Students: The Prevalence and Risk Factors," *Int J Environ Res Public Health*, vol. 18, no. 6, p. 3269, Mar. 2021, doi: 10.3390/ijerph18063269.

[19] A. E. Halliburton, M. B. Hill, B. L. Dawson, J. M. Hightower, and H. Rueden, "Increased Stress, Declining Mental Health: Emerging Adults' Experiences in College During COVID-19," *Emerging Adulthood*, vol. 9, no. 5, pp. 433–448, Oct. 2021, doi: 10.1177/21676968211025348.

[20] O. Fraile-Martinez *et al.*, "Understanding the basis of major depressive disorder in oncological patients: Biological links, clinical management, challenges, and lifestyle medicine," *Front Oncol*, vol. 12, Sep. 2022, doi: 10.3389/fonc.2022.956923.

[21] G. Savarese, L. Curcio, D. D'Elia, O. Fasano, and N. Pecoraro, "Online University Counselling Services and Psychological Problems among Italian Students in Lockdown Due to Covid-19," *Healthcare*, vol. 8, no. 4, p. 440, Oct. 2020, doi: 10.3390/healthcare8040440.

[22] S. Tang *et al.*, "Predictors of not receiving mental health services among people at risk of suicide: A systematic review," *J Affect Disord*, vol. 301, pp. 172–188, Mar. 2022, doi: 10.1016/j.jad.2022.01.054.

[23] J. Gruber *et al.*, "Mental health and clinical psychological science in the time of COVID-19: Challenges, opportunities, and a call to action.," *American Psychologist*, vol. 76, no. 3, pp. 409–426, Apr. 2021, doi: 10.1037/amp0000707.

[24] Z. F. Negeri *et al.*, "Accuracy of the Patient Health Questionnaire-9 for screening to detect major depression: updated systematic review and individual participant data meta-analysis," *BMJ*, p. n2183, Oct. 2021, doi: 10.1136/bmj.n2183.

[25] A. Errazuriz, R. Beltrán, R. Torres, and A. Passi-Solar, "The Validity and Reliability of the PHQ-9 and PHQ-2 on Screening for Major Depression in Spanish Speaking Immigrants in Chile: A Cross-Sectional Study," *Int J Environ Res Public Health*, vol. 19, no. 21, p. 13975, Oct. 2022, doi: 10.3390/ijerph192113975.

[26] P. Limone and G. A. Toto, "Factors That Predispose Undergraduates to Mental Issues: A Cumulative Literature Review for Future Research Perspectives," *Front Public Health*, vol. 10, Feb. 2022, doi: 10.3389/fpubh.2022.831349.

[27] C. A. Cassiani-Miranda *et al.*, "Validity of the Patient Health Questionnaire-9 (PHQ-9) for depression screening in adult primary care users in Bucaramanga, Colombia," *Revista Colombiana de Psiquiatría (English ed.)*, vol. 50, no. 1, pp. 11–21, Jan. 2021, doi: 10.1016/j.rcpeng.2019.09.002.

Corresponding author: Hendra Maulana, hendra.maulana.if@upnjatim.ac.id, Department of Digital Business, UPN "Veteran" Jawa Timur, Surabaya, Indonesia
DOI: https://doi.org/10.35882/teknokes.v18i2.31

e-ISSN: 2407-8964
p-ISSN: 1907-7904

[28] K. Lukaček, M. Mikac, and M. Horvatić, "Implementation of a Location Services Based Android Application and Accompanying Server Backend," *Tehnički glasnik*, vol. 15, no. 3, pp. 310–317, Sep. 2021, doi: 10.31803/tg-20191219144338.

[29] T. R. Valentine, K. N. Alschuler, D. M. Ehde, and A. L. Kratz, "Prevalence, co-occurrence, and trajectories of pain, fatigue, depression, and anxiety in the year following multiple sclerosis diagnosis," *Multiple Sclerosis Journal*, vol. 28, no. 4, pp. 620–631, Apr. 2022, doi: 10.1177/13524585211023352.

AUTHOR BIOGRAPHY

Hendra Maulana received his Bachelor's degree in Computer Science program from the Faculty of Computer Science and earned his Master's degree from the Sepuluh November Institute of Technology. He is currently a lecturer in the Digital Business Program at UPN "Veteran" Jawa Timur. His areas of expertise include software engineering, digital image processing, the Internet of Things (IoT), and digital business. His research focuses on hardware and software applications in agriculture, tourism, and small and medium-sized enterprises (SMEs), particularly as a member of the "Appropriate Immersive Technology for SMEs" research unit.

Delia Citra Kurniasari is a student in the Informatics Study Program, Faculty of Computer Science, Universitas Pembangunan Nasional "Veteran" East Java, Surabaya, Indonesia. Her academic interests focus on Machine Learning development and user interface design (UI/UX).

Lintang Sari Putri Wardhani is a student in the Faculty of Computer Science, Informatics Study Program, National Development University "Veteran" East Java, Surabaya, Indonesia. Her academic focus includes Machine Learning and Interface Design.

Tsabita Safana Mustofa is currently pursuing her studies in the Informatics program at the Faculty of Computer Science, National Development University "Veteran" East Java, Surabaya, Indonesia. She has a strong interest in Machine Learning and UI/UX design.

Erica Aprilia Sutrisni is currently pursuing her studies in the Informatics Study Program at the Faculty of Computer Science, National Development University "Veteran" East Java, Surabaya, Indonesia, with a particular interest in Machine Learning (ML).

Corresponding author: Hendra Maulana, hendra.maulana.if@upnjatim.ac.id, Department of Digital Business, UPN "Veteran" Jawa Timur, Surabaya, Indonesia
DOI: https://doi.org/10.35882/teknokes.v18i2.31