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Development of a Web-Based Stress Screening and Counseling Referral System for Early Intervention

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Abstract
Student mental health has become an increasingly important issue in higher education due to the rising prevalence of stress and psychological distress among university students. Limited accessibility to mental health services and the lack of integration between early detection and intervention systems often hinder timely psychological support. This study aimed to develop and evaluate an integrated web-based stress screening and counseling referral system as an early mental health intervention model for university students. The study employed a research and development approach involving needs analysis, system development, instrument validation, pilot testing, implementation, and evaluation. A total of 180 university students participated in the study. Data were collected using a web-based stress screening instrument integrated with an automated scoring and adaptive referral mechanism. The findings revealed that most participants were categorized within moderate to high stress levels, indicating the urgent need for preventive mental health services in higher education settings. The developed system demonstrated effective identification of stress levels and facilitated students' engagement with recommended counseling services. These results suggest that the integrated system provides a scalable and technology-driven framework for improving early mental health intervention and promoting help-seeking behavior among university students.

Keywords: *counseling referral, early intervention, student mental health, web-based stress screening*

Introduction

Student mental health has become a critical issue in recent decades, as reflected in the increasing prevalence of stress, anxiety, and depression among this population (March-Amengual et al., 2022; Ramón-Arbués et al., 2020; ul Haq et al., 2018). University students are in the developmental stage of emerging adulthood, which is characterized by academic demands, identity exploration, and complex social transitions (Matud et al., 2020). These conditions place students in a particularly vulnerable position to psychological distress. High academic pressure, social expectations from family and the surrounding environment, and the need to adapt to the dynamics of campus life significantly contribute to students' psychological burdens (March-Amengual et al., 2022). In the digital era, these pressures have become increasingly complex due to excessive information exposure, social comparison through digital platforms, and heightened expectations of productivity, all of which further exacerbate students' mental health issues (Abi-Jaoude et al., 2020; Cho, 2020).

The growing prevalence of mental health problems among university students not only affects individual well-being but also has broader implications for academic performance, social relationships, and study persistence. Students experiencing high levels of stress are more likely to suffer from decreased concentration, emotional exhaustion, and an increased risk of academic dropout. In more severe cases, these conditions may develop into suicidal ideation or suicide attempts, which represent some of the most alarming indicators of student mental health problems (Horgan et al., 2018). Evidence further indicates a rising trend in suicidal ideation among university students across higher education institutions, highlighting the urgent need for more systematic and sustainable intervention strategies (Horgan et al., 2018; Kaur et al., 2024; Kukoyi et al., 2023).

In Indonesia, student mental health has become increasingly concerning, as reflected in the high prevalence of psychological distress among university students. Several studies have reported that approximately 37% to 53% of students experience high levels of stress, while around one-quarter show symptoms of depression (Kotera et al., 2022; Surachman et al., 2024). These findings indicate that university students constitute a vulnerable population facing significant psychological challenges related to academic demands, social adjustment, and future uncertainty. Furthermore, the rapid development of digital technology and the increasing pressure to maintain academic productivity may further intensify students' emotional burden (Upadhyaya & Vrinda, 2021). This condition highlights the urgent need for accessible and preventive mental health support systems within higher education institutions.

In addition to structural limitations, psychosocial barriers contribute to the low utilization of mental health services among students. Stigma surrounding mental health issues remains a major factor preventing students from seeking professional help. Many students are reluctant to access counseling services because of fear of negative judgment, perceptions that their problems are not severe enough, or a lack of awareness of their psychological condition (Arnaez et al., 2020; Schnyder et al., 2017). This suggests that student mental health problems are characterized not only by high prevalence but also by persistently low levels of help-seeking behavior.

In this context, early detection is a crucial strategy for preventing and managing mental health problems. Early detection enables the identification of students' psychological conditions before they develop into more severe disorders. However, existing detection systems in many universities remain largely reactive and have not yet been comprehensively integrated with follow-up intervention mechanisms (Lattie et al., 2019). Counseling services are typically accessed only when students actively seek help, resulting in many cases remaining undetected in the early stage. This highlights the need for more proactive, systematic, and accessible detection systems to address this issue.

With the advancement of digital technology, web-based approaches offer significant potential for enhancing early mental health detection. Web-based stress screening allows assessments to be conducted efficiently, flexibly, and on a larger scale without time and space constraints (Harrer et al., 2018). Moreover, such approaches can reduce psychological barriers, including stigma, by enabling students to complete assessments independently and anonymously. These systems can also provide immediate feedback and tailored recommendations based on identified risk levels

However, the implementation of web-based screening without a structured referral mechanism may limit the effectiveness of early intervention. Screening results indicating high-risk conditions often fail to lead to appropriate follow-up support when clear referral pathways to counseling or professional services are unavailable. Therefore, integrating web-based stress screening with a structured counseling referral system is essential to ensure timely and sustainable mental health interventions for students.

This need is particularly important for high-risk groups, such as final-year students, who commonly experience academic pressure, career uncertainty, and personal challenges that increase vulnerability to stress and depression. Despite the growing attention to student mental health, previous studies have generally examined stress screening and counseling services separately, with limited integration between early detection and intervention processes. In addition, existing digital mental health approaches often lack context-specific models suited to the Indonesian higher education setting and its psychosocial challenges, including stigma and low help-seeking behavior

To address these gaps, this study proposes an integrated early intervention model that combines web-based stress screening with a structured counseling referral system. The model applies a self awareness based approach and adaptive referral mechanisms based on students' risk levels, enabling more responsive and targeted mental health support. Therefore, this study aims to develop and evaluate an integrated web-based stress screening and counseling referral model as a preventive mental health intervention system for university students. The findings are expected to contribute both theoretically to the development of digital mental health intervention models and practically by providing an applicable framework for universities to strengthen preventive and sustainable mental health services.

Method

Research Design

This study employed a Research and Development (R&D) approach adapted from Gall et al. (2003) to develop and evaluate an integrated web-based stress screening and counseling referral model for early mental health intervention among university students. The R&D approach was selected to ensure that the developed system was theoretically grounded, empirically tested, and practically applicable in higher education settings.

Participants

Participants were selected using purposive sampling, with the criteria of being actively enrolled university students and willing to participate voluntarily. A total of 180 students participated in the main study, while 30 students were involved in the pilot testing phase. Prior to data collection, participants were provided with detailed information regarding the purpose of the study, research procedures, potential benefits, and data confidentiality. Only students who voluntarily agreed to participate and signed the informed consent form were included in the study and granted access to the web-based stress screening system. Participants were informed that their involvement was entirely voluntary and that they could withdraw from the study at any stage without any negative consequences. To maintain confidentiality, all participant data were stored

securely and were accessible only to the research team and authorized counselors responsible for follow-up referrals.

Measures

Data were collected using the Perceived Stress Scale (PSS-10) to assess students' perceived stress levels. The PSS-10 consists of 10 items designed to measure the degree to which individuals appraise situations in their lives as stressful during the previous month. Responses were recorded using a five-point Likert scale ranging from 0 (*never*) to 4 (*very Often*). Total scores ranged from 0 to 40, with higher scores indicating greater perceived stress.

The instrument was integrated into a web-based screening platform that automatically calculated the participants' scores and generated individualized feedback. Based on established PSS-10 guidelines, stress levels were categorized into three groups: low stress (0–13), moderate stress (14–26), and high stress (27–40). In addition to stress assessment data, the system recorded referral engagement indicators, including access to counseling recommendations and utilization of available mental health support resources.

Reseacrh Procedur

The research procedure consisted of four stages: (1) needs analysis and system design, (2) pilot testing and instrument validation, (3) implementation of web-based stress screening, and (4) evaluation of referral engagement and system effectiveness. Prior to analysis, data cleaning, coding, and categorization of stress scores into risk levels (low, moderate, and high risk) were conducted.

Stress levels were categorized based on the commonly used PSS-10 scoring guidelines. The referral process within the system was conducted automatically based on the results of the PSS-10 screening. Upon completion of the questionnaire, the system automatically calculated the total score and classified participants into predefined stress categories. Students identified as experiencing high levels of stress received recommendations to access university counseling services through the screening results page. In addition, the system automatically recorded the stress classification results in a secure database that could be accessed by authorized campus counselors.

The recorded data included the identities of participants who provided informed consent for referral purposes and their corresponding stress level classifications. Counselors can then review the information and initiate appropriate follow-up actions, including scheduling counseling sessions in accordance with institutional counseling procedures. This mechanism was designed to ensure that early detection, referral, and follow-up psychological support could be implemented in a timely and integrated way.

Instrument reliability was assessed using Cronbach's Alpha. Content validity was evaluated through expert judgment involving three experts from different professional backgrounds: one psychologist with expertise in counseling and mental health assessment, one information technology specialist with expertise in web-based system development, and one linguistics practitioner with expertise in language clarity and readability. The psychologist evaluated the suitability of the screening content and referral procedures, the IT expert assessed system functionality, usability, and technical performance, while the linguistics practitioner reviewed the comprehensibility, clarity, and cultural appropriateness of the language used throughout the platform.

Recommendations from all experts were incorporated into the refinement of the system before implementation.

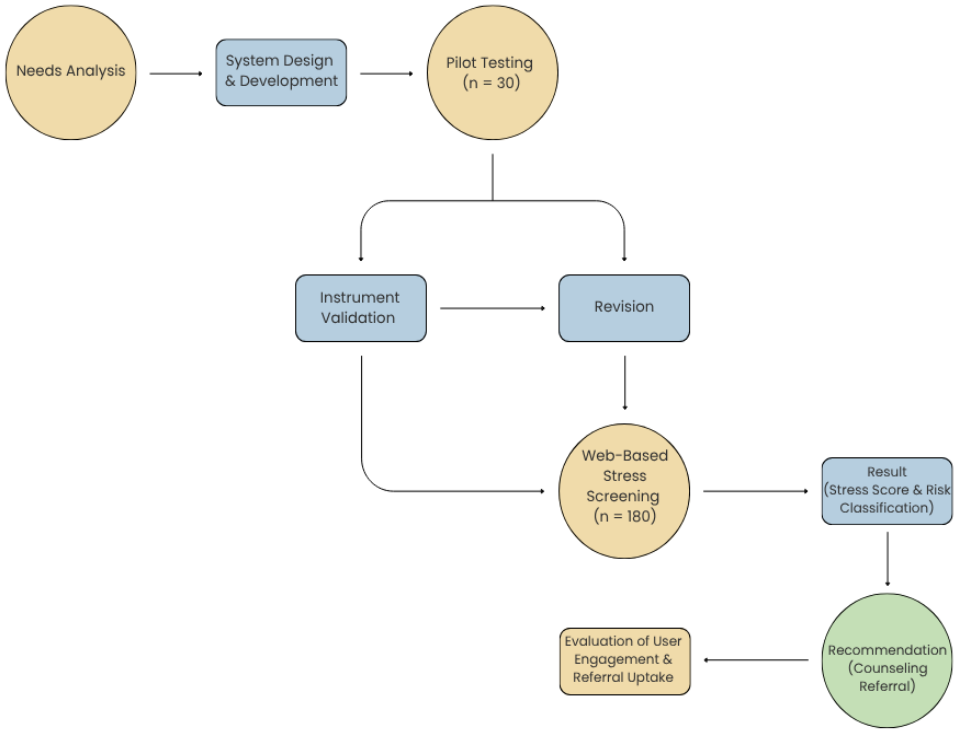

Figure 1.
Research Procedure Diagram

Data Analysis

Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the participant characteristics and stress level distributions. To evaluate the effectiveness of the referral system, referral engagement rates were calculated using system activity logs. Referral engagement was defined as participants' access to counseling referral information and utilization of recommended mental health resources provided by the platform. The engagement rate was expressed as the percentage of participants in each stress category who accessed the recommended referral services. The findings were then interpreted to assess the practicality and effectiveness of the integrated web-based stress screening and counseling referral system as an early mental health intervention model.

Results

A total of 180 university students participated in this study. All participants were involved in the main implementation phase, while 30 participants were included in the pilot testing phase. The participants were actively enrolled students from various academic years and study programs, representing a diverse range of academic backgrounds.

Table 1.
Demographic Characteristic of Participants

Variable	Category	Frequency	Percentage
Gender	Male	68	38%
	Female	112	62%
Academic Year	First Year	50	28%
	Second-Third Year	61	34%
	Final Year	69	38%
Stress Level	Low	58	32%
	Moderate	83	46%
	High	39	22%

Table 1 presents the demographic characteristics of the participants. The majority of respondents were female (62%), while 38% were male. In terms of academic level, the participants were relatively evenly distributed, with the largest proportion coming from final-year students (38%).

Regarding stress levels, most participants were classified as being in the moderate category (46%), followed by low (32%) and high stress levels (22%). This distribution indicates that a substantial proportion of students experienced notable psychological pressure, reinforcing the importance of early detection and intervention systems.

This study successfully developed an integrated web-based stress screening and counseling referral system designed to support early mental health intervention among university students. The system consists of several key components, including an automated scoring mechanism, risk level classification, personalized feedback, and an adaptive counseling referral pathway. These components function as an integrated framework that not only enables accurate identification of students' stress levels but also ensures that screening outcomes are directly translated into appropriate intervention strategies.

The implementation of this system demonstrates its potential to bridge the critical gap between early detection and access to mental health services, which has been a persistent limitation of conventional approaches. Furthermore, the model enhances students' self-awareness through immediate feedback while simultaneously facilitating timely engagement with counseling services, particularly for those in moderate to high-risk categories. From a practical perspective, this system offers a scalable and efficient solution for higher education institutions to strengthen preventive mental health services, reduce stigma-related barriers, and improve overall service accessibility. Consequently, the developed model has significant implications for advancing data-driven and technology-supported mental health interventions in university settings.

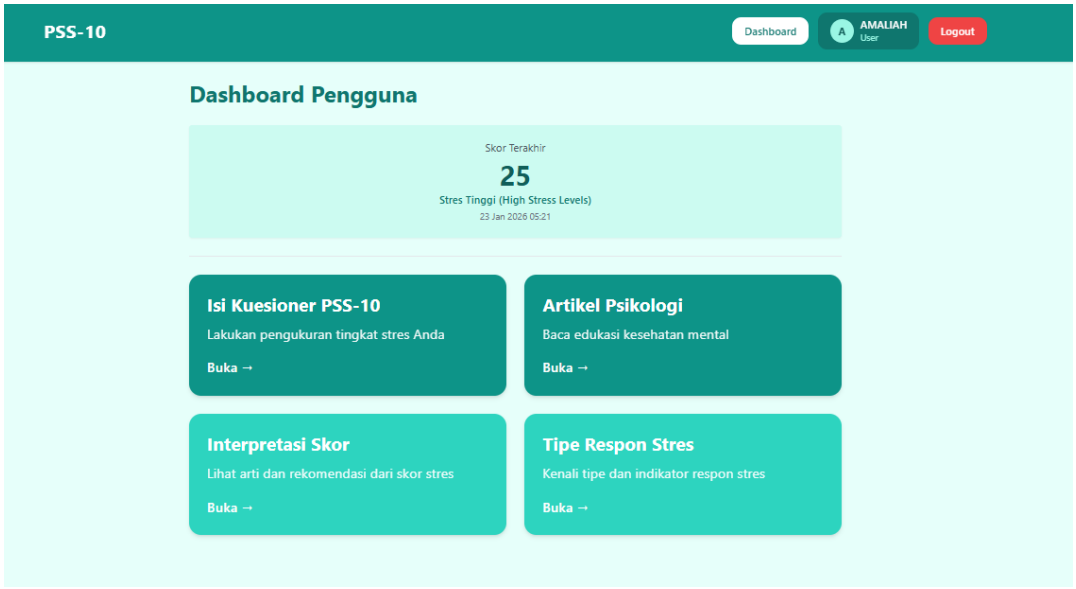

Figure 2.
User Dashboard of the Web-Based Stress Screening System (PSS-10) Displaying Stress Score, Interpretation, and Access to Mental Health Resources

As shown in Figure 2**,** the system interface allows users to access their stress scores, interpret their psychological conditions, and obtain recommendations for appropriate follow-up actions. The integration of these components enables the system to function as a screening tool and a decision support system for mental health intervention.

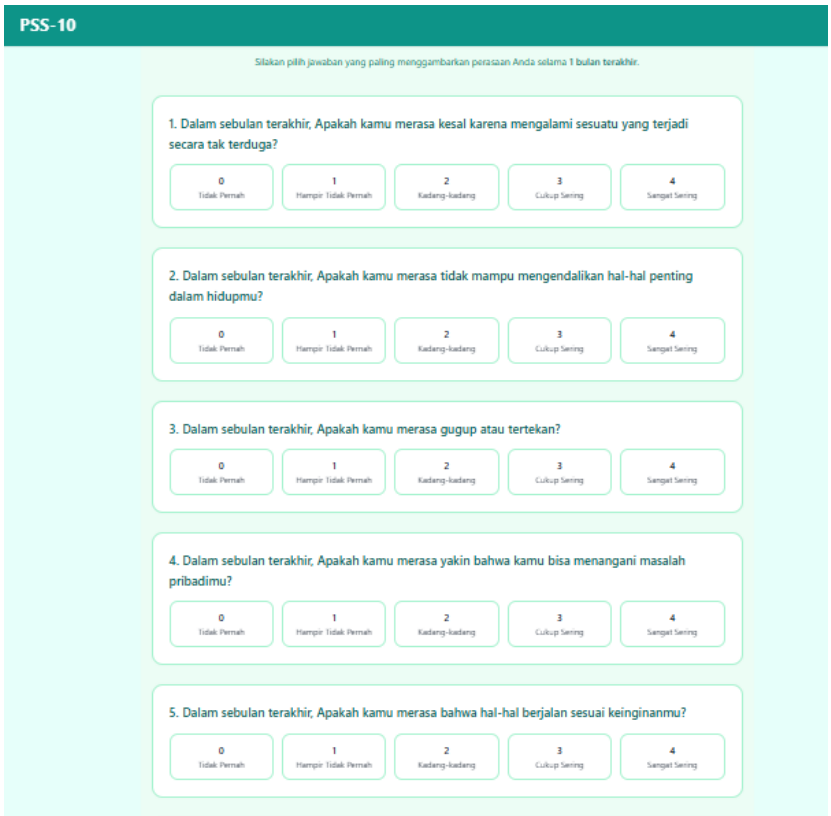

Figure 3.
Web-Based PSS-10 Questionnaire Interface for Assessing Students' Perceived Stress Levels

Furthermore, the questionnaire interface presented in Figure 3 demonstrates how data were collected using the web-based Perceived Stress Scale (PSS-10). The use of a Likert scale format allows for efficient data input and supports automatic scoring.

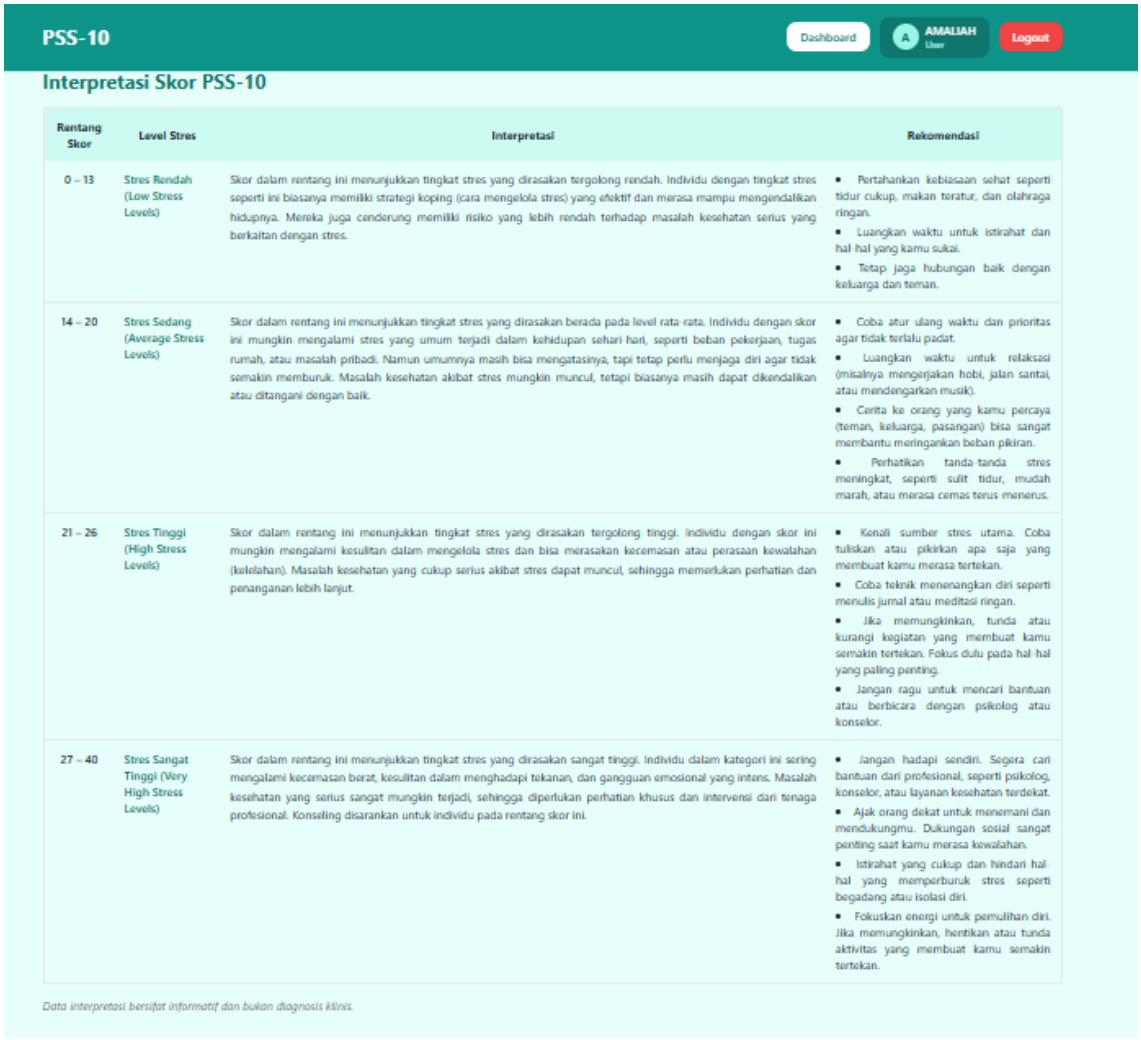

Figure 4.
Interpretation Framework of PSS-10 Stress Scores Showing Classification Levels, Psychological Descriptions, and Corresponding Intervention Recommendations

The interpretation framework shown in Figure 4 provides a structured classification of stress levels (low, moderate, high, and very high), along with psychological explanations and corresponding recommendations. This framework serves as the basis for generating tailored intervention strategies within the system.

Reliability and validity analyses were conducted to evaluate the measurement quality of the web-based PSS-10 instrument. The reliability test yielded a Cronbach's Alpha value of 0.87, indicating a high level of internal consistency among the questionnaire items. Furthermore, all item-total correlation coefficients exceeded the minimum threshold of 0.30, confirming that each item was valid and capable of accurately measuring students' perceived stress levels. These findings demonstrate that the web-based PSS-10 instrument is both reliable and valid for use in the present study.

Table 2.
Referral Engagement Rate

Risk Level	Engagement Rate	Interpretation
Moderate	78%	High adherence to recommendations
High	64%	Significant engagement with services

In addition to instrument testing, the effectiveness of the integrated system was evaluated based on students' engagement with the recommended counseling referral. As shown in Table 3, students in the moderate-risk group demonstrated a referral engagement rate of 78%, indicating strong adherence to the recommended interventions and psychoeducational support. Meanwhile, students classified within the high-risk category showed an engagement rate of 46%, suggesting that nearly half of the high-risk participants actively accessed the recommended counseling services.

These findings indicate that the integrated web-based screening and referral system is effective in encouraging help-seeking behavior among university students. The relatively high engagement rates suggest that the system successfully facilitates the transition from early psychological detection to actual intervention uptake, thereby reducing barriers associated with stigma, accessibility, and delayed mental health support.

Discussion

The results of this study demonstrate that the integration of web-based stress screening with a structured counseling referral system provides a comprehensive approach for early mental health intervention. Unlike conventional systems that primarily focus on assessment, the developed model ensures that screening results are directly translated into actionable intervention pathways. This finding is consistent with previous studies, indicating that digital mental health interventions are more effective when screening procedures are integrated with follow-up support and referral mechanisms rather than functioning solely as diagnostic tools (Graham et al., 2020; Lattie et al., 2019; Sin et al., 2020). Furthermore, web-based and mobile mental health platforms have been shown to improve accessibility, promote help-seeking behavior, and reduce psychological distress among university students and young adults, particularly in contexts where face-to-face services are limited (El Morr et al., 2020).

This study extends previous findings by emphasizing the importance of an integrated referral pathway within the screening system. Previous research has largely focused on the effectiveness of digital screening or self-help interventions independently (Amos et al., 2020; El Morr et al., 2020; Sin et al., 2020), whereas the current model combines assessment, monitoring, and referral into a single web-based ecosystem. This integrated approach potentially increases continuity of care and accelerates early intervention for individuals experiencing stress-related symptoms. In addition, the incorporation of counseling referral features supports findings from online counseling studies, suggesting that digital counseling services can improve user engagement, accessibility, and perceived psychological support among students (Amos et al., 2020). Therefore, the developed model contributes to the advancement of digital mental health

services by providing a more responsive and intervention-oriented framework for stress management and psychological support in educational settings (Amaliyah et al., 2026).

The high proportion of students categorized as moderate and high-risk confirms previous findings regarding the prevalence of stress among university students and underscores the importance of proactive detection systems. This finding is consistent with studies showing that university students are particularly vulnerable to psychological distress due to academic demands, social adjustment difficulties, financial pressures, and uncertainty about future careers (Horgan et al., 2018; Ramón-Arbués et al., 2020; ul Haq et al., 2018). The results also indicate that many students may not fully recognize their psychological condition until it reaches a more serious level, highlighting the importance of early screening and continuous monitoring systems in preventing the escalation of mental health problems (Sumantiawan et al., 2024). These findings support the need for accessible and systematic mental health interventions in higher education settings to facilitate the early identification and timely support of at-risk students.

Moreover, the findings support previous evidence suggesting that early identification through digital mental health screening can facilitate timely intervention and improve psychological outcomes among young adults (Harrer et al., 2018; Sin et al., 2020). Web-based screening systems allow students to access mental health assessments privately, efficiently, and with reduced stigma compared to conventional counseling services (Akbar et al., 2024; Amaliyah et al., 2026). This accessibility increases the likelihood of help-seeking behavior and enables institutions to identify at-risk students before severe psychological symptoms emerge (Setiawan & Gazali, 2025). Previous studies have also demonstrated that digital screening and monitoring platforms are effective in detecting stress, depression, and anxiety symptoms among university students while simultaneously increasing mental health awareness and engagement with support services (Harrer et al., 2018; Ramón-Arbués et al., 2020). Therefore, the current study contributes to the growing body of evidence supporting the implementation of technology-assisted mental health services as preventive strategies in higher education settings.

The findings demonstrate that the integrated web-based stress screening and counseling referral system is effective in supporting early mental health intervention among university students. The high proportion of students identified in the moderate and high-risk categories indicates the importance of accessible and proactive screening systems within higher education settings. The web-based platform enabled efficient, flexible, and confidential mental health assessment, allowing students to access screening services more comfortably and increasing the likelihood of early identification of psychological distress. These findings are consistent with previous studies showing that digital mental health platforms can improve accessibility, early detection, and engagement with mental health services among university students (Amaliyah et al., 2026; Harrer et al., 2018; Lattie et al., 2019).

In addition, the integration of automated screening, risk classification, and counseling referral mechanisms demonstrated the practical effectiveness of the developed model. Unlike conventional screening approaches, which primarily function as assessment tools, the present system directly connects screening outcomes with appropriate intervention pathways. The relatively high referral engagement rates

suggest that web-based systems can reduce barriers such as stigma, limited accessibility, and delays in help-seeking behavior. This finding supports previous research emphasizing that integrated digital mental health systems combining screening and follow-up support are more effective in promoting continuity of care and timely intervention (Cross et al., 2023; De Witte et al., 2025; Kaka et al., 2026).

However, this study was conducted within a single institutional setting and relied on self-reported data, which may limit the generalizability of the findings and introduce response bias. Future studies should involve broader samples and longitudinal designs to further evaluate the long-term effectiveness of integrated web-based mental health intervention systems in higher education contexts.

Conclusion

In conclusion, this study demonstrates that the integrated web-based stress screening and counseling referral system is an effective early mental health intervention model for university students. The system successfully facilitates stress identification, psychological risk classification, and adaptive referral recommendations while improving accessibility and engagement with mental health services. The findings highlight the importance of integrated digital approaches in supporting preventive, scalable, and timely mental health interventions within higher education settings. Furthermore, the developed model contributes to bridging the gap between early psychological detection and appropriate follow-up support. Therefore, the system may serve as a practical framework for universities seeking to strengthen student mental health services through technology-assisted interventions.

Future research is recommended to examine the effectiveness of this web-based stress screening system using experimental or quasi-experimental designs with control groups to comprehensively assess its impact on reducing stress levels and improving students' psychological well-being. Further development could also explore the integration of artificial intelligence–based features and personalized intervention strategies to enhance the accuracy of recommendations and user engagement. Additionally, future studies should expand the target population across different educational levels and cultural contexts to strengthen the generalizability of the findings.

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