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HelpMe: Early Detection of University Students' Mental Health Issues Using a Chatbot-Integrated Dashboard

Nadia Abdul Wahab[1*], Ahmad Asyraf Bin Zainudin[2], Aznoora Osman[3], Norfiza Ibrahim[4], Abdul Hapes Mohammed[5]

[1,3,4,5]*College of Computing, Informatics and Mathematics, Universiti Teknologi MARA (UiTM) Perlis Branch, Arau Campus, 02600 Arau, Perlis, Malaysia*
[2]*Human Resource Department, Perodua Manufacturing Sdn Bhd, Selangor Darul Ehsan, Malaysia*

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ABSTRACT

University students face increasing mental health challenges due to academic, social, and financial pressures, yet a shortage of mental health professionals limits early intervention. To bridge this gap, HelpMe—a web-based system with an interactive dashboard and chatbot—was developed for early mental health detection. The system provides a private space for students to monitor their well-being, with the chatbot guiding users through mental health screenings and offering conversational support, while the dashboard visualizes data for tracking emotional states over time. Developed using the Design Science Research Methodology (DSRM), HelpMe follows a structured process of problem identification, system design, and evaluation. The dashboard prioritizes simplicity and engagement, utilizing Power BI for data visualization, while the chatbot ensures a user-friendly mental health screening experience. User Experience Testing (UXT) with 30 university students assessed the system across six key scales, including attractiveness, efficiency, and dependability. Feedback was largely positive, especially regarding simplicity and visual appeal, though challenges were noted in chatbot responsiveness and dashboard efficiency, with occasional delays. This study highlights HelpMe's potential as an accessible mental health support tool and identifies areas for improvement. Future enhancements will focus on refining chatbot interactions and optimizing real-time dashboard functionality to better support student well-being.

1. INTRODUCTION

Globally, there is a significant shortage of mental health professionals, as the demand for mental health services far exceeds the available supply (Abdalrazaq et al., 2019). In Malaysia, the ratio of psychiatrists per 100,000 population is only 1.27 (Raaj et al., 2021). Currently, only 148 psychiatrists are working in the Ministry of Health (MOH), as stated by the Director-General of Health Malaysia (Bernama, 2020). This shortage highlights the critical need for alternative solutions to address mental health issues, especially

[1*] Corresponding author. *E-mail address*: nadiawahab@uitm.edu.my
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among vulnerable populations like university students. When students undergo mental health assessments, there remains a risk that their mental health status could deteriorate, even if initial results suggest stability.

Dashboards can play an essential role in monitoring and predicting students' mental health by providing a detailed analysis of collected data. However, current mental health dashboards face two major challenges (Yoo & De Choudhury, 2019). First, they are not accessible to everyone—particularly individuals with disabilities or limited digital skills. To address this, dashboards should incorporate features like larger text, multi-language options, and compatibility with assistive technologies. Second, these dashboards do not actively screen users for potential mental health issues, a vital feature for early detection and timely intervention.

Early detection of mental health problems is critical for effective treatment. Incorporating simple assessments into the dashboard could help identify mental health concerns in their early stages. These assessments must be user-friendly and provide valuable insights for both users and healthcare professionals. By making the dashboard more accessible and adding screening tools, the system can better support the mental well-being of all users (Bunyi et al., 2021).

Additionally, many patients hesitate to share their mental health struggles due to discomfort and mistrust. Mental health problems not only impact emotions but also affect physical health, leading to symptoms like loss of appetite, difficulty concentrating, low self-confidence, and even self-harm. Some patients avoid seeking treatment because they feel ashamed or do not believe they are ill (Subu et al., 2021). Others might hide their issues from family or friends until the pressure becomes overwhelming, sometimes resulting in self-harm. The lack of a sufficient workforce to identify patients with mental health problems further compounds the issue, as only qualified professionals like doctors or psychiatrists can confirm a mental health diagnosis.

To tackle these challenges, a web-based application can be developed using existing technologies. This system could detect early signs of mental health issues using a chatbot integrated with artificial intelligence (AI) to evaluate patients' emotional states before they are formally diagnosed by a psychiatrist. Studies show that online therapy helps alleviate initial difficulties faced in face-to-face therapy, where patients may feel judged or vulnerable. Online interactions can be less intimidating, providing patients with a more comfortable space to communicate their concerns effectively (Mason, 2023).

2. LITERATURE

2.1 Mental Health Among University Students

University students face various stressors that can lead to mental health issues, such as academic pressure, social expectations, financial stress, lack of sleep, homesickness, and substance abuse (Mofatteh, 2021). Academic pressure to perform well can result in stress, anxiety, and depression (Franzen et al., 2021). Additionally, the social pressure to fit in and maintain relationships can be overwhelming for some students. Financial stress, due to high tuition fees and living expenses, is another common factor contributing to anxiety and depression (Cuschieri et al., 2019).

Several factors are associated with mental distress among university students, including gender (with female students reporting higher levels of distress than males), disinterest in their field of study, lack of close friendships, and conflicts with peers. Other stressors include financial difficulties, family history of mental illness, substance abuse, limited social support, and demanding academic schedules (Mboya et al., 2020).

Mental health issues can have a significant impact on students' academic performance and overall well-being. First-year university students, in particular, often experience clinically significant symptoms such as anxiety, depression, and stress, which can persist over time and negatively affect their studies and quality of life (Duffy et al., 2020). Addressing these mental health challenges early through appropriate

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support and interventions is essential for fostering a healthy campus environment and promoting positive educational outcomes (Browning et al., 2021).

2.2 Initial Screening

Undergoing an initial mental health screening can provide valuable insights and help guide further evaluation or treatment. During this process, trained professionals assess an individual's mental well-being by asking questions about thoughts, emotions, behaviors, and overall functioning (Zader et al., 2019). Whether conducted in a doctor's office, mental health clinic, or through online platforms, these screenings help identify potential mental health conditions.

Early identification of mental health issues, particularly among university students, is crucial for timely intervention and support. By reaching out for help, students take an essential first step toward addressing their mental health concerns. Access to professional support can significantly enhance their well-being (Perez-Corrales et al., 2019). Detecting risk factors linked to stress, depression, and anxiety in university students early on can prevent these conditions from worsening and promote better mental health outcomes (Mofatteh, 2021).

2.3 The Importance of Early Detection

Screening for mental health disorders, such as depression and anxiety, is especially important for college students, as early detection can have a profound impact on their well-being and academic performance (Albasheer, 2020). Mental health disorders can affect various aspects of a student's life, including their social interactions, academic achievements, and overall quality of life.

By implementing early screening initiatives, universities can actively identify students struggling with mental health challenges and provide them with the necessary resources and support (Shepardson & Funderburk, 2014). Early detection allows for prompt interventions such as counseling, therapy, or medication, preventing mental health issues from escalating and facilitating recovery. Additionally, raising awareness and fostering a supportive atmosphere can reduce the stigma associated with seeking help, encouraging students to prioritize their mental health (Wong et al., 2019). Ultimately, early detection and intervention create a healthier learning environment for all students.

3. METHODOLOGY

Design Science Research Methodology (DSRM) was chosen to guide this study. DSRM is a structured approach designed to develop innovative solutions for real-world issues. The methodology encompasses five (5) phases (Figure 1).

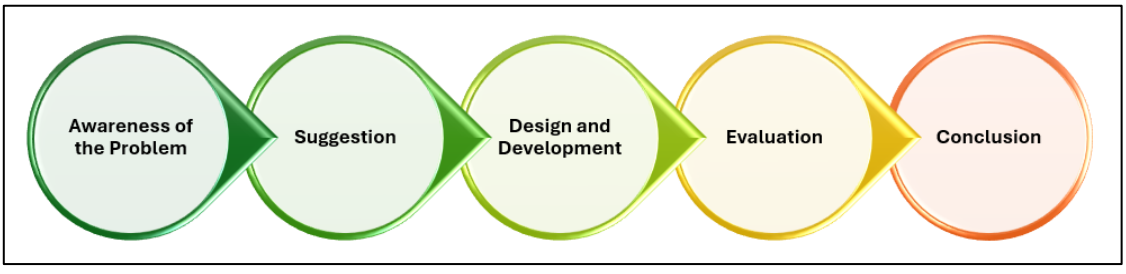

Fig. 1. Design Science Research Methodology

Phase 1: Awareness of the Problem involves identifying the problem, setting objectives, reviewing existing research, and selecting an appropriate methodology. It also includes consulting experts to refine the

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proposed solution and ensure it meets necessary standards, particularly in detecting mental health issues. Understanding user requirements and defining the problem statement are crucial in this phase.

Phase 2: Suggestion focuses on studying requirements for the proposed solution based on previous studies and expert consultations. This phase involves analyzing related research to identify essential components and define objectives and problems. Clear goal setting during this phase helps in developing targeted solutions.

Phase 3: Design and Development includes several key tasks. First, the system flow is designed using Entity-Relationship Diagrams (ERD) and Data Flow Diagrams (DFD) to map out how information and processes interact within the system. Next, the user interface is designed using Figma, a digital tool that facilitates user interface and user experience design. Data is processed through an ETL (Extract, Transform, Load) process, involving extraction from sources like Unit Kesihatan UiTM Arau and Kaggle, followed by cleaning and transformation in Jupyter Notebook. Data visualization is developed using Power BI to create interactive and insightful representations of the data. The source code for the website is written using PHP for server-side functionality, JavaScript for dynamic interactions, and CSS for styling. The database is created and managed using MySQL and phpMyAdmin, ensuring efficient and secure data storage.

Phase 4: Evaluation involves thorough testing of the system to assess its performance and user experience. User experience testing provides valuable feedback on usability and design flaws, which is used to refine and improve the system based on user interactions and satisfaction.

Phase 5: Conclusion entails preparing a comprehensive report that summarizes the research process, findings, and outcomes. This report includes a detailed analysis of objectives, research questions, and solutions, as well as highlights the research's significance, contributions, and potential future directions. The report is crucial for sharing knowledge and ensuring the research's impact in the field.

4. THE HELPME SYSTEM

The HelpMe system was developed with a minimalist design approach to ensure a simple and straightforward user experience. This design philosophy prioritizes a clean and uncluttered interface, allowing users to focus on essential features without distractions. The minimalist design also enhances the visual appeal and functionality of the system, making it easier for users to access the mental health resources and tools they need. Rooted in **user-centric design principles**, the HelpMe platform aims to create a seamless and positive user experience for individuals seeking mental health support. The minimalistic use of visual elements and ample white space ensures clarity and ease of navigation. The design encourages users to interact with the system in a stress-free environment, which is crucial for a platform dedicated to mental health.

4.1 Homepage

The homepage of the HelpMe system (Figure 2) employs a minimalist design for an aesthetically pleasing appearance, with a strong emphasis on content focus. Soothing blue tones are used throughout the homepage to provide a calming effect, helping regulate users' emotions and prevent feelings of discomfort. The content section on the homepage is carefully structured to display information in an organized and consistent manner. This organization ensures that important details are easy to find and read, contributing to a user-friendly experience.

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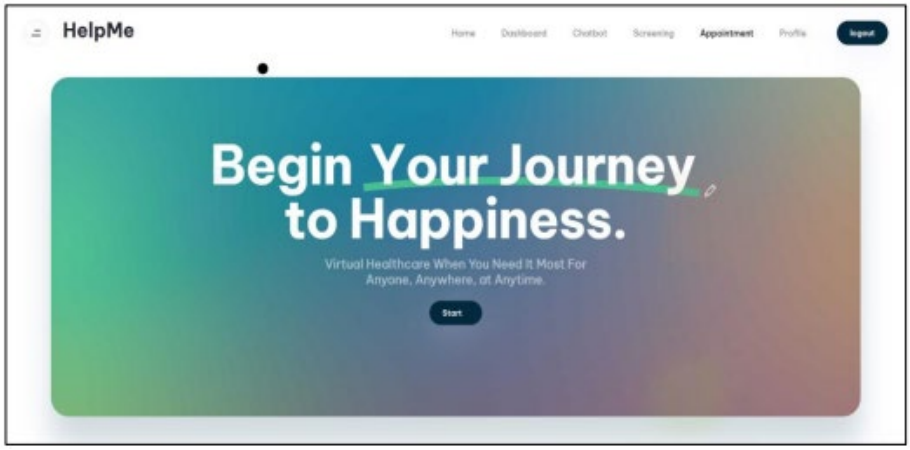

Fig. 2. HomePage of HelpMe System

4.2 Appointment Page

The **appointment page** (Figure 3) was designed with simplicity and user comfort in mind, especially given the sensitive nature of mental health concerns. The ease of scheduling appointments is critical for users who may already feel overwhelmed, so the layout is straightforward and intuitive. Users can quickly create appointments without any hassle, recognizing that this feature is a vital tool in seeking mental health assistance.

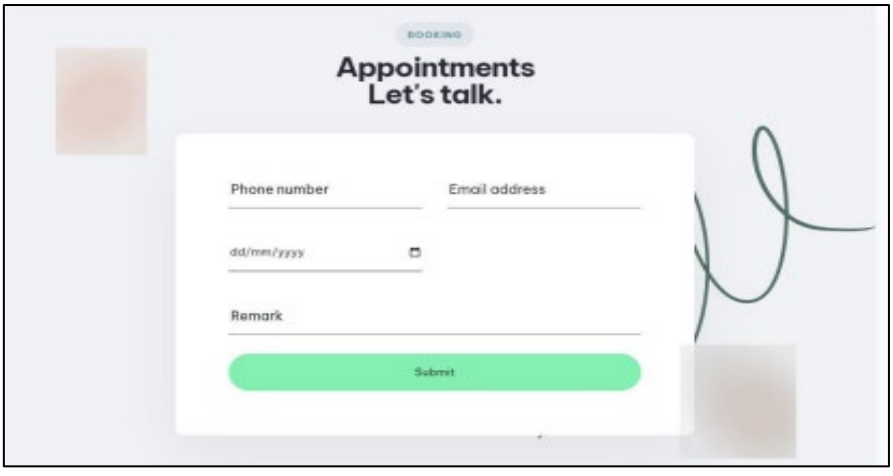

Fig. 3. Appointment Page of HelpMe System

4.3 Chatbot Page

The **chatbot feature** (Figure 4) follows the same minimalist design philosophy, with a focus on enhancing users' concentration during interactions. The simplicity of the design ensures that users can focus entirely on their conversations with the chatbot, which is meant to assess their emotional state. By eliminating unnecessary distractions, the chatbot interface encourages effective and focused communication, allowing users to express their thoughts and emotions clearly.

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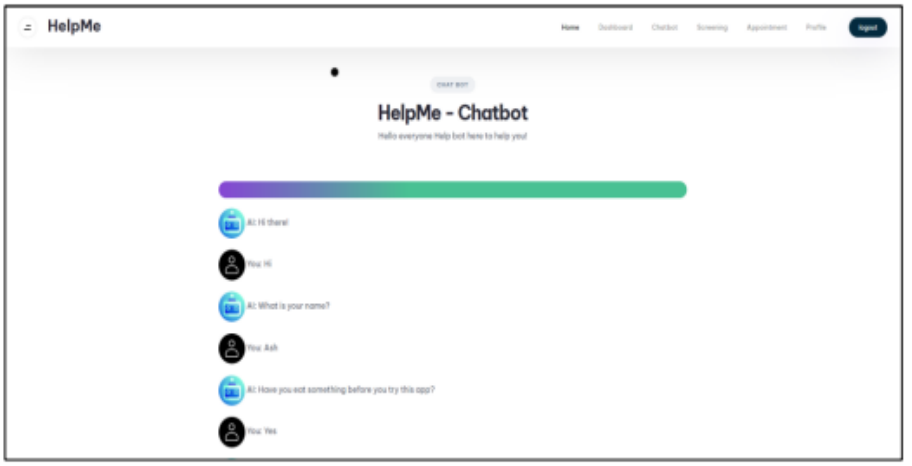

Fig. 4. Chatbot Feature of HelpMe System

4.4 Screening Page

On the **screening page** (Figure 5), the design centers on the question section. This page adopts a minimalistic layout to prevent distractions, ensuring that users can engage with the mental health screening questions with full concentration. Proper spacing is used to help users focus, allowing for a smooth and effective screening process. The goal is to make the experience as seamless as possible so that users can complete the screening without confusion or interruption.

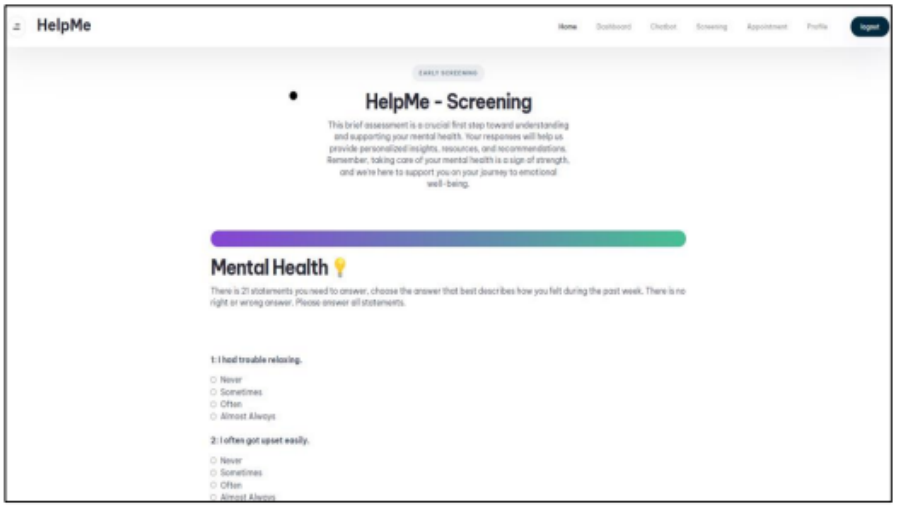

Fig.5. Screening Page of HelpMe System

4.5 Results Page

The **results page** (Figure 6) presents users with the outcomes of their screening tests. It uses a color-coded system to simplify the interpretation of results, helping users understand their mental health status at a glance. The system categorizes results into three colors (i) **Green**: Indicates a normal mental health condition, (ii) **Yellow**: Suggests mild to moderate mental health issues and (iii) **Red**: Represents severe to

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extremely severe mental health concerns. This visual system helps users quickly assess the severity of their mental health condition and encourages them to seek appropriate help based on the color-coded indicators.

Fig. 6. Result Page of HelpMe System

4.6 Frontend Dashboard

The **frontend dashboard** serves as a web-based interface that visually represents the data collected and analyzed by the system. The dashboard was designed to offer a smooth user experience by presenting data in a visually appealing and meaningful manner. **Data visualization** is a key feature, as it helps users understand patterns and insights derived from the analyzed data. Different types of charts and graphs are used to ensure that the data is conveyed clearly and effectively, for example the dashboard in Figure 7.

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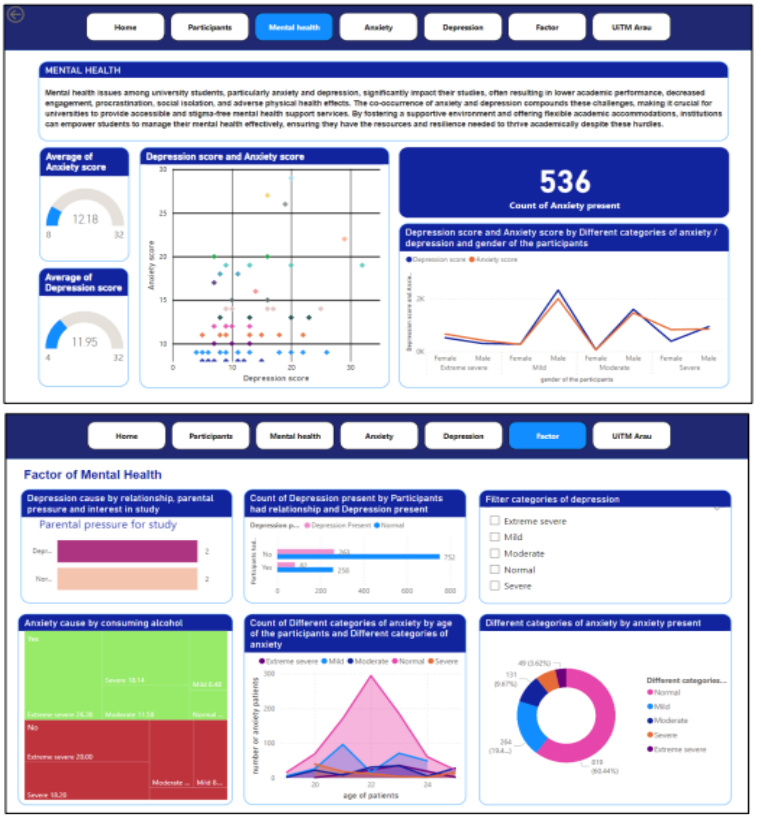

Fig. 7. Dashboards of HelpMe System

5. RESULTS AND FINDING

The **User Experience Testing (UXT)** for the *HelpMe* system was conducted with **30 university students** to evaluate its usability, functionality, and overall user satisfaction. The primary objective of the testing was to assess how well the system aligns with user expectations and to identify key areas for improvement. A structured evaluation approach was adopted, utilizing the **User Experience Questionnaire (UEQ)**, a well-established tool for measuring user experience across multiple dimensions (Hinderks et al., 2019).

The UEQ framework assesses six fundamental user experience scales:

i. **Attractiveness** – Measures the overall appeal and visual design of the system.

ii. **Perspicuity** – Evaluates how easy it is for users to understand and navigate the system.

iii. **Efficiency** – Examines how quickly and effectively users can accomplish tasks.

iv. **Dependability** – Assesses the reliability and stability of the system during usage.

v. **Stimulation** – Reflects how engaging and enjoyable the system is for users.

vi. **Novelty** – Determines the perceived innovativeness of the system.

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The UEQ consists of **26** contrasting **attribute pairs**, where participants rated their experiences using a **7-point Likert scale**, ranging from **-3 (most negative)** to **+3 (most positive)** (Hinderks et al., 2019). After data collection, responses were systematically analyzed to determine the system's overall performance across these six categories.

The results of this evaluation provided valuable insights into the strengths of the *HelpMe* system and highlighted potential areas for refinement. Specifically, the analysis helped gauge how well users responded to the system's interface, functionality, and overall user engagement. A detailed breakdown of the scores and their implications is presented in Table 1, offering a comprehensive overview of user feedback and system performance.

Table 1. Result for the User Experience Testing

UEQ Scale	Mean	Variance
Attractiveness	2.87	0.09
Perspicuity	2.861	0.09
Efficiency	2.694	0.26
Dependability	2.125	0.57
Stimulation	2.847	0.17
Novelty	2.139	0.83

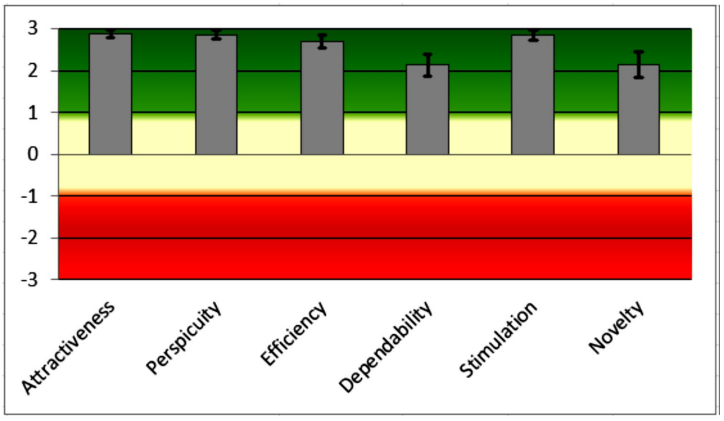

Fig. 8. Mean Score for each Scale from User Experience Testing

5.1 Attractiveness

The **attractiveness** scale measures the overall appeal of the system, including users' emotional responses and their enjoyment in using the interface. A mean score of **2.87** indicates that users generally found the HelpMe system visually appealing and enjoyable to use. The low variance (0.09) suggests consistency in user responses, meaning most users had similar positive impressions of the system's design. Participants appreciated the minimalist design, calming blue hues, and well-organized layout, which contributed to a stress-free and pleasant user experience, particularly important for a mental health platform. However, some minor aesthetic improvements could further enhance visual engagement.

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5.2 Perspicuity

Perspicuity refers to how easy it is for users to understand and learn to use the system. A score of **2.861** shows that the HelpMe system was mostly intuitive and easy to navigate. Users were able to understand the system's functionality with minimal guidance, finding features like the chatbot, appointment system, and screening tool relatively straightforward. The low variance (0.09) also reflects uniformity in user experiences. However, a few participants highlighted the need for clearer instructions in certain areas, such as the screening page, which could benefit from improved tooltips or onboarding instructions to further simplify the learning curve.

5.3 Efficiency

The **efficiency** scale assesses how quickly and effectively users can accomplish tasks using the system. A mean score of **2.694** indicates that the system allowed users to complete tasks without significant delays, but some challenges were noted. While many users found the chatbot and appointment features functional, others experienced slight difficulties in navigating between different sections. The relatively higher variance (0.26) suggests varied user experiences, with some users encountering delays or confusion, particularly during data input or navigating the dashboard. Streamlining transitions between key features and enhancing load times could improve the system's efficiency.

5.4 Dependability

Dependability evaluates users' perceptions of the system's reliability and consistency in behavior. A score of **2.125** indicates that while the system performed adequately, some users experienced inconsistencies in performance. The higher variance (0.57) points to a range of experiences, with some users finding the system dependable and others encountering occasional glitches, particularly in the chatbot's response accuracy or when retrieving past data from the dashboard. Enhancing the system's stability and ensuring more predictable interactions, especially in real-time features like the chatbot, would address these concerns and improve user trust in the system's functionality.

5.5 Stimulation

The **stimulation** scale measures how exciting or motivating the system is for users. A score of **2.847** suggests that most users found the system engaging and stimulating, particularly through interactive elements like the chatbot and the clear visual feedback from the mental health screening results page. The variance of **0.17** indicates relative consistency in how users experienced stimulation, with most agreeing that the system maintained their interest. However, while the system was engaging, some participants suggested that additional interactive features, such as personalized insights or gamified elements, could further enhance user motivation and long-term engagement with the platform.

5.6 Novelty

Novelty assesses the innovativeness and uniqueness of the system's features and design. A score of **2.139** indicates that while users appreciated the system's core functions, they did not perceive it as particularly groundbreaking or novel. The relatively high variance (0.83) reveals a wider range of opinions, with some users finding features like the integrated chatbot useful but not particularly innovative, while others viewed the system as offering a new approach to mental health support. To improve the novelty score, incorporating more cutting-edge AI-based features, like predictive analytics or advanced emotion recognition, could make the system stand out more as an innovative solution in the mental health space.

In summary, the **HelpMe** system received positive feedback in several areas, particularly in terms of **attractiveness**, **perspicuity**, and **stimulation**. Users appreciated the clean design, ease of use, and engaging features. However, the system could benefit from improvements in **dependability**, **efficiency**, and **novelty**.

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Addressing these areas—by enhancing the system's reliability, making task completion more efficient, and introducing innovative features—would create a more robust and satisfying user experience.

6. DISCUSSION

The HelpMe system developed for early detection of mental health issues among university students demonstrates several strengths and areas for improvement. The results of the User Experience Testing (UXT) suggest that users generally appreciated the minimalist design, simplicity of the interface, and the soothing visual elements, such as the calming blue hues, which enhanced the user experience. These elements align with the goal of providing a stress-free, easily navigable environment for users facing mental health concerns, who may already feel overwhelmed by their circumstances.

One of the system's most significant strengths lies in its accessibility and user-centered design. Features like the chatbot and screening tools made it easier for students to assess their emotional well-being. However, the results revealed certain challenges, especially regarding dependability and efficiency. Users reported occasional glitches with the chatbot, specifically in response accuracy, and there were some delays in navigating between sections. These issues, though not detrimental to the overall function of the system, highlight the need for optimization to enhance performance, reduce latency, and ensure a seamless experience across all features.

Another key finding pertains to the balance between usability and novelty. Although the system was well-received in terms of its ease of use (perspicuity) and visual appeal, it did not score highly in terms of innovation (novelty). This suggests that while the current iteration is functional and user-friendly, there is room to incorporate more advanced, cutting-edge technologies, such as enhanced AI capabilities or more interactive tools that could provide personalized insights or predictive analytics. These enhancements could increase the system's overall value and user engagement.

Additionally, while users found the visual feedback from the screening results page effective, there is an opportunity to improve the system's novelty by integrating more sophisticated diagnostic tools, such as advanced emotion recognition technologies, which could provide a more in-depth analysis of users' mental health conditions. This could strengthen early detection and contribute to more personalized mental health care for students.

7. CONCLUSION

The HelpMe system represents an important step toward addressing the growing need for mental health support among university students. Its accessible, user-friendly design provides a valuable tool for early mental health detection, empowering students to assess their emotional well-being in a non-intimidating, private environment. The results from the user experience testing suggest that while the system is well-received in terms of attractiveness and usability, there are areas where further development is necessary. Enhancements in system dependability, efficiency, and the integration of more innovative features could increase the platform's utility and appeal, making it a more robust solution for mental health support.

Future iterations of the HelpMe system should focus on incorporating advanced AI-driven diagnostics and improving real-time system interactions to enhance the user experience. Additionally, the system should be further tested in larger, more diverse populations to evaluate its long-term effectiveness and scalability. Despite the current limitations, the HelpMe system has the potential to become a vital resource in supporting mental health care, particularly within the university context, where early detection and intervention are critical to students' overall well-being and academic success.

8. ACKNOWLEDGEMENTS

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9. CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

10. AUTHORS' CONTRIBUTIONS

Nadia Abdul Wahab: Conceptualization, methodology, formal analysis, investigation, and writing – original draft. Led the research framework design, conducted the investigation and data analysis, and was responsible for drafting the initial manuscript.

Ahmad Asyraf Bin Zainudin: Conceptualization, methodology, and formal analysis. Contributed to the development of the research framework, assisted in data collection, and participated in data interpretation and analysis.

Aznoora Osman: Conceptualization, formal analysis, and validation. Provided input on the research framework, supported the validation of findings, and contributed to refining the data analysis process.

Norfiza Ibrahim: Conceptualization, supervision, writing – review and editing, and validation. Oversaw the research process, ensured methodological rigor, provided critical feedback during manuscript revisions, and validated the research findings.

Abdul Hapes Mohammed: Conceptualization, software development, resources, and visualization. Led the technical development of the HelpMe system, implemented the dashboard and chatbot, and contributed to data visualization and system evaluation.

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