

Quality Evaluation on Emotion Management Support App: A Case on Early Assessment of Emotional Health Issues

Anitawati Mohd Lokman*, Muhammad Nur Aiman Rosmin, Saidatul Rahah Hamidi*, Surya Sumarni Hussein*, Shuhaida Mohamed Shuhidan*

anitawati@uitm.edu.my

Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA, 40450 Shah Alam, Malaysia

Summary

Emotional health is important for overall health, and those who are experiencing difficulties should seek professional help. However, the social stigma associated with emotional health, as well as the influence of cultural beliefs, prevent many people from seeking help. This makes early detection difficult, which is critical for such health issues. It would be extremely beneficial if they could assess their emotional state and express their thoughts without prejudices. On the market, there are emotional health apps. However, there was little to no evidence-based information on their quality. Hence, this study was conducted in order to provide evidence-based quality in emotional health mobile apps. Eleven functionality task scenarios were used to assess functional quality, while a System Usability Scale test (n=20) was used to assess usability, customer acceptability, learnability, and satisfaction. The findings show that the app for emotional health management is highly efficient and effective, with a high level of user satisfaction. This contributes to the creation of an app that will be useful and practical for people experiencing early-stage emotional health issues, as well as related stakeholders, in order to manage early-stage emotional health issues.

Keywords:

Emotional Health, Mobile app, System Usability Scale (SUS), Task Scenario

1. Introduction

Studies on mental health issues and detection is gaining more and more interest due to its significance to people's wellbeing. Mental health is defined as a state of being in which an individual realizes his or her own strengths, is able to deal with typical stresses, is productive, and makes a positive contribution to his or her community (World Health Organisation, 2018). Mental health must be regularly managed and maintained to ensure that every member of the community can make a positive contribution to society and live a stress-free life (Othman & Abdul Rashid, 2018).

Despite the importance of maintaining emotional health, many people are forced to deal with situations in which emotional stress is inevitable. As a result, individuals could develop mental health issues, which could lead to

chronic mental illnesses (Jani, 2010). Those who suffer from mental depression and emotional health problems must seek treatment from medical professionals. However, it is still difficult to predict whether someone will encounter mental health issues, as well as whether or not they will seek therapy (Boukhechba et al., 2018). According to the 2019 National Health and Morbidity Survey in Malaysia for instance, 500,000 people experienced depression symptoms and 424,000 children have mental health issues (Bernama, 2020). The situation is similar on a global scale and is becoming a cause for alarm as it affects productivity and quality of life (Hassan et al., 2018). Consequently, early detection is essential to prevent the issue from escalating (Kim et al., 2021). However, the stigma associated with emotional health in the society and the influence of cultural beliefs prevent many from seeking advice and treatment (Hassan et al., 2018; Kim et al., 2021), and going to the doctor is not something that everyone is comfortable with. This hinders early detection, which is crucial for such health problems.

Among solutions for early detection of mental health issues include an awareness campaign that promotes the importance of seeking help and listening to other problems (Yusof, 2020) and a helpline to provide assistance to those coping with the pandemic crisis (Karim, 2020). Despite the good initiatives, there are still individuals who are unsure how to describe their symptoms and problems (Crooks et al., 2020). According to Chandrashekar (2018), mobile apps have the potential to be an efficient tool for delivering mental health interventions to patients, and provide assistance to manage distress or specific symptoms. Despite the exponential growth in the number of mental health apps available on the internet, less than 5 percent have been scientifically evaluated (Lecomte et al., 2020). There is little to no evidence-based information about the quality available. Therefore, it is necessary to investigate the app's quality evidence.

Thus, in order to provide quality evidence for the app, this study was conducted to assess the functionality, usability, and learnability of a mobile app for early

assessment of emotional health issues. This article's aim is to report the quality evidence based on tests conducted using functionality task scenarios and the System Usability Scale (SUS) to evaluate the app's perceived quality among young adult respondents.

2. Literature Review

2.1 Mental & Emotional Health

Mental disorders such as depression, anxiety, and stress affect individual of all ages all over the world (Bibi et al., 2020; Boukhechba et al., 2018). It is dangerous because people who are more likely to attempt suicide are also more likely to have mental health issues (Alqahtani & Orji, 2019). Undiagnosed and untreated patients with mental health issues may experience delusions and engage in self-harm if they withdraw from the public, according to a study by Othman & Abdul Rashid (2018). Excessive and overwhelming negative thoughts, a sense of guilt and worthlessness (Ibrahim et al., 2014), and many others, are examples of causes of these issues.

To address this worrisome issue, mental health awareness initiatives and mobile apps are being created. Self-diagnosis, monitoring, symptom management, and treatment are some of the tools. Technology advancements inspire people to believe that they should take personal responsibility for their health, in addition to making it easier for people to take care of their health (Li & Xu, 2021; Parker et al., 2018; Sayibu et al., 2022). Aside from that, given the high number of mobile users, it emphasizes the notion that mental health-related mobile apps may be an essential element in improving emotional health (Hwang & Jo, 2019) since they enable more convenient, earlier, and flexible access to treatment at a cheaper cost, and several of them are as reliable as face-to-face interventions (Ahtinen et al., 2013).

Emotional health may appear similar to mental health, but the key distinction is that emotional health relates to the capacity to control and convey feelings, whereas mental health is the degree to which the mind processes and comprehends knowledge and experiences (Pyramid Healthcare Inc., 2019). A person is in a state of emotional and psychological well-being when they view their surroundings realistically, manage daily stressors, interact with others, are aware of their potential, and perform successfully (Shaheen et al., 2014). It's critical to recognize emotional health indicators because they may point to mental health conditions. There is evidence that those who don't mention their symptoms are less likely to receive a depression diagnosis (Mitchell et al., 2017). Other than that, treating emotional health problems is expensive if they reach advanced stages.

2.2 Mental Health Mobile apps

Mobile app technology has evolved into a critical tool in the emotional health field throughout time. It is a unique chance to increase the accessibility and quality of emotional health treatment since it is a far more cost-effective and scalable solution to the treatment gap (Chandrashekar, 2018). When faced with the discouragingly low utilization rates discovered for traditional health promotion efforts directed at the general population, convenient and acceptable instruments are urgently needed, since there are people who do not have direct access to on-site outreach programs (Harrer et al., 2019). Emotional health-related mobile app technology provides a wide range of tools for self-diagnosis, monitoring, and symptom management, allowing people to be aware and accountable for their health (Boukhechba et al., 2018; Parker et al., 2018). Because technology allows users to self-monitor by reporting their thoughts and activities regularly, it can promote emotional self-awareness, reduce symptoms of emotional disease and improve coping abilities (Chandrashekar, 2018).

Over time, mobile app technology has developed into a crucial tool in the field of emotional health. Given that it is a far more affordable and flexible way to narrow the treatment gap, it presents a unique opportunity to improve the accessibility and effectiveness of emotional health care (Chandrashekar, 2018). Convenient and acceptable tools are particularly needed due to the fact that some people do not have direct access to on-site outreach programs, which has been revealed to have surprisingly low usage rates for traditional health promotion initiatives targeted at the general population (Harrer et al., 2019). Mobile app technology for emotional health offers a variety of tools for self-diagnosis, monitoring, and symptom management, enabling people to be conscious of and responsible for their health (Parker et al., 2018). Technology can enhance stress management skills, lessen the symptoms of emotional disorder, and promote emotional self-awareness since it enables users to self-monitor by regularly reporting their thoughts and activities (Chandrashekar, 2018).

2.2 Testing for usability and functionality

Testing for usability and functionality is a way to ensure that apps or systems are of good quality. Past research has employed a variety of observable and quantitative metrics, to evaluate efficiency, effectiveness, and satisfaction to evaluate the usability of a internet-based system (Harrer et al., 2019; Nik Ahmad et al., 2021) and internet-based app (Mohd Kamaruddin et al., 2021; Nik Ahmad et al., 2021; Samrgandi, 2021) were among the others. In addition, the System Usability Scale (SUS) and learning management systems (Alkinani & Alzahrani, 2021) as well as Nielsen heuristics (Samrgandi, 2021) were used to evaluate user interface design. The evaluation is

essential for all applications because it provides evidence of their quality and a strong justification for improving their usability, usefulness, efficiency, effectiveness, and user satisfaction, in order to ensure that the designed and developed applications will be useful to their intended users.

3. Methods

The aim of this study was to evaluate the quality of the emotional health mobile app, as well as to provide quality evidence concerning the app. The flow of research activities is illustrated in Fig. 1. It began with synthesizing design the functional and non-functional design requirements based on past related studies and off-the-shelf related apps for the development of emotional health mobile app focusing on early detection of emotional health issues. The functional requirements can be found in Table 1 and non-functional requirements can be found in Table 2.

The research then developed emotional health mobile app based on the functional and non-functional requirement. Fig. 2 shows instances of the app. The developed app was then analyzed for usability and functional quality based on user feedback. Utilizing task-based functionality assessments, the app's effectiveness and efficiency were evaluated. Effectiveness refers to the precision and thoroughness with which users achieve predetermined

objectives. While efficiency refers to the utilization of resources in relation to the precision and thoroughness with which users achieve their objectives. This study gathers user feedback and evaluates the efficiency and effectiveness using 11-session functionality test with young adults as respondents (n = 20).

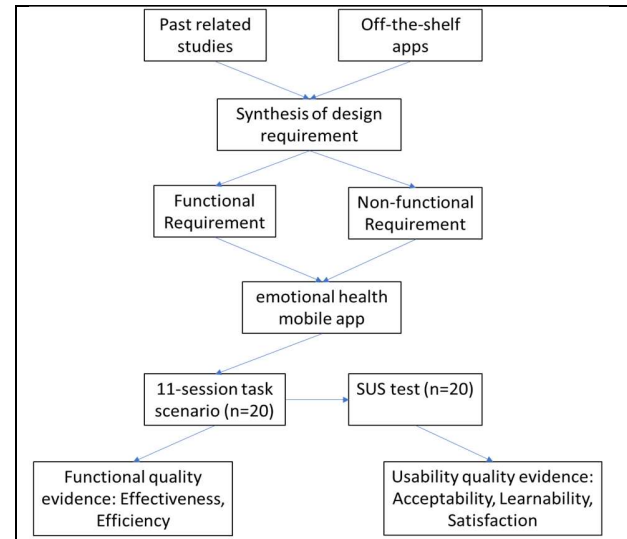


Fig. 1 The flow of research activities.

Table 1: The functional requirement

<i>Functional Requirements</i>	<i>Descriptions</i>
Sign-Up	Allow user to create an account before signing in to use the features of the mobile app.
Sign-In	Allow user to log into their account and use the features of the app.
Emotions Tracking and Monitoring	Allow user to log the current emotions they are feeling today, and users can view the total emotions they have logged, illustrated in the form of a pie chart.
Vent	Allow user to vent any struggles they are currently facing through writing, and users can view the history of previous vents made by the user, with an option to delete each vent.
Computerized pre-emptive screening using the DASS-21 test	Allow user to answer the DASS-21 test questions, and the results show the current emotional health, such as depression, anxiety, and stress level, the user is currently feeling, together with the options to view nearby health centres and hotlines directory and view a history of DASS-21 test results that were previously done.
Map of nearby health centres and hotlines directory.	Allow user to view maps of nearby health canters and can call any number of hotlines listed in the directory.
Sign Out	Allow user to sign out of their account when they are done using the mobile app.

Table 2: The non-functional requirement

<i>Item</i>	<i>Description</i>
Performance and Responsiveness	The app does a good job of processing user inputs and displaying the intended outcome.
Usability	Each of the app's components is simple to use and interact with.
Learnability	The app is simple to use whether you are a first-time user or an experienced one.
Security	To access the app, the user must first log into their account. If a user forgets their password, they can use the forgot password function.

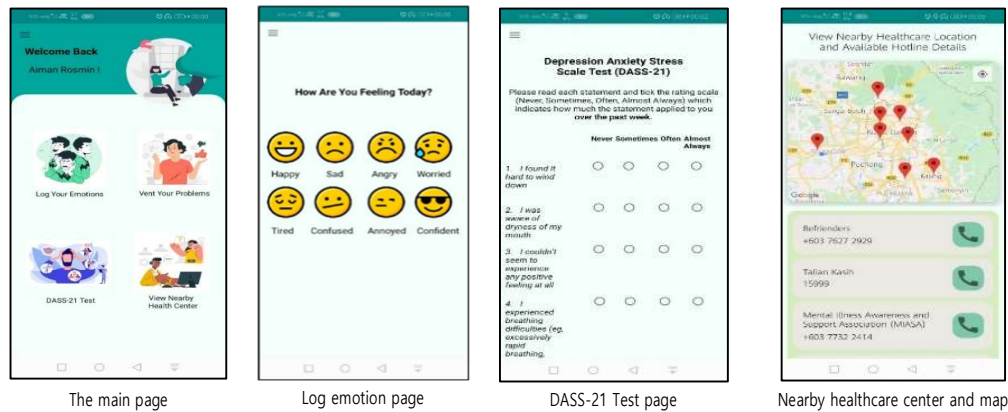


Fig. 1 Instances of the app.

Table 3: Functionality task scenario

<i>Tasks</i>	<i>Scenario</i>
Sign Up	From the splash screen page, the user goes to the login page by clicking the Get Started button. The user clicks the Sign-Up button to create an account, fill in name, phone number, email, password and confirm password, and click the sign-up button.
Sign In	The user logs into his/her account by filling in email and password, and then click the sign in button.
Log Your Emotions	The user clicks the Log Your Emotions image, and then click on one of the emotions to represent his/her feeling.
Vent Your Problems	The user clicks the Vent Your Problems page and express anything that is bothering him/her into the text box, and click the save button.
DASS-21 test	The user clicks the DASS-21 Test image, answer the 21 questions by clicking on one radio button for each question and then clicking the Submit button. The user views the result of the DASS- 21 test. The user view healthcare location and click the Seek Help button. The user click View button to view previous test results.
Map and directory of hotlines	The user clicks the View Nearby Health Centers image, and view the map of nearby health centers and a hotline directory. The user clicks the Call image to call any of the hotlines.
Emotions history	The user clicks the sidebar navigation button on the top left of the screen, and then clicks on the Emotion History button, and view the visualization of the previously recorded emotions and its frequency.
Vents History	The user clicks the sidebar navigation button on the top left of the screen, and then clicks the Vents History button, and view the previously recorded vents. The user clicks the Delete button to delete the vent.
DASS-21 test result history	The user clicks the sidebar navigation button on the top left of the screen, and then clicks the DASS-21 Test History button. The user views the previously recorded test results.
User Profile	The user clicks the sidebar navigation button on the top left of the screen, and then clicks the User Profile button. The user updates name and phone number by clicking the Update button, and clicks Reset button.
Log out	The user clicks the sidebar navigation button on the top left of the screen, and then clicks the Logout button.

The participants were chosen based on purposive sampling among university students seeking assistance for emotional difficulties. University students were selected as respondents as there were reportedly high rates of social anxiety and depression among young adults (Boukhechba et al., 2018), and because their age group is crucial for the formation and maintenance of social and emotional behaviors that are good to their emotional health (World Health Organisation, 2018). Employing young adults at a university as respondents will ensure coherence as they are homogenous in terms of life stage, typical psychological stressors, and life experiences, thereby minimizing potential noise (Boukhechba et al., 2018).

The mobile app is intended to be beneficial to young adults who seek assistance to overcome their emotional

challenges, as it offers a tool for them to track and understand more about their psychological state thus enable them to manage their issues. Besides, the functionalities of the mobile app will help them in forming and maintaining their social and emotional behaviors. Table 3 contains the functionality tasks and their respective scenarios. Respondents were asked to test the app by completing the tasks on their smartphone. The time limit for each scenario was two minutes. The accomplishment of a task and the time required for its completion were recorded.

The developed app was then analyzed for usability and functionality based on user feedback. Utilizing task-based usability measures, the app's efficacy, efficiency, and user satisfaction were evaluated. Effectiveness refers to the precision and thoroughness with which users achieve

predetermined objectives. While efficiency refers to the utilisation of resources in relation to the precision and thoroughness with which users achieve their objectives. Satisfaction, on the other hand, relates to the ease and acceptability of use. This study gathers user feedback and evaluates the efficiency, effectiveness, and satisfaction using 11-session functionality test with young adults as a case study (n = 20). The participants were chosen based on purposive sampling among young adults seeking assistance for emotional difficulties. Young adult is selected as a case study because their age (15 to 24) is crucial for the formation and maintenance of social and emotional behaviours that are good to their emotional health (World Health Organization, 2021). The mobile app is intended to be beneficial to adolescents and young adults who seek assistance to overcome their emotional challenges, as it offers the initiative for them to track and understand more about their psychological state and to tackle their issues. Besides, the functionalities of the mobile app will help them in forming and maintaining their social and emotional behaviours. Table 3 contains the functionality tasks and their respective scenarios.

Respondents were asked to test the app by completing the tasks on their smartphone. The time limit for each scenario was two minutes. The accomplishment of a task and the time required for its completion were recorded.

Participants were then asked to perform a SUS test. SUS has been demonstrated to be as successful as, if not more effective than, proprietary surveys in distinguishing between useless and useful systems. It also provides subscales for usability and learnability. The dimension of learnability is represented by items 4 and 10, and the dimension of usability by the remaining eight items.

Respondents were asked to experience the app and provide ratings based on SUS items. They were instructed to report their immediate reaction to each item, as opposed to thinking it for a long time. The gathered SUS data were then subjected to descriptive analysis to determine satisfaction, usability, and learnability and to create relevant recommendations. The SUS was given to participants to rank based a 5-point scale ranging from 1-Strongly Disagree to 5-Strongly Agree.

4. Results and Discussions

4.1 Test of Usability and Functionality

The test results for task completion, errors, and average time to complete each user task scenario given to respondents are displayed in Table 4. Twenty young adults participated in the user testing, and the findings are used to determine the app's efficiency based on task completion and

time spent, as well as its effectiveness based on the success rate.

Table 4: Functionality test

No.	Task Completion	Errors	Average Time Taken (second)
1	20	0	47
2	20	0	17.4
3	20	0	7.5
4	20	0	51.45
5	20	0	90.95
6	20	0	28.75
7	20	0	8.5
8	20	0	8.35
9	20	0	6.75
10	20	0	10.8
11	20	0	4.45

According to the result, all respondents were able to complete each activity without difficulty, having a success rate of one hundred percent. Additionally, the result demonstrates that all of the app's features are functional and fulfil user expectations. Respondents are required to complete the System Usability Scale after completing the functional task scenario and app testing (SUS). Table 3 indicates the SUS scale range, which ranges from 1 (strongly disagree) to 5 (somewhat agree) (strongly agree).

4.2 SUS-based usability, acceptability, learnability and satisfaction

Table 5: Respondents Ratings by Percentage (%)

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	0	5	20	35	40
2	60	10	20	10	0
3	0	0	5	30	65
4	40	15	25	15	5
5	0	0	0	40	60
6	65	30	0	5	0
7	0	0	0	15	85
8	55	40	5	0	0
9	0	0	0	30	70
10	60	10	15	10	5

Conventionally, a 10-item SUS was used to evaluate the mobile app in terms of its respondents' acceptability, learnability and satisfaction. The percentage ratings given by respondents for SUS items are displayed in Table 5. Learnability is represented by items 4 and 10, whereas usability is represented by the remaining eight SUS components. The ratings for item 4 – "I believe I would need the aid of a technical person in order to utilize this app" – indicate that more than 50 percent of respondents either strongly disagree or agree that they would need technical

assistance to use the mobile app. In addition, under item 10 – "I needed to learn a lot of things before I could use this app" - 70% of respondents either strongly disagree or disagree that they needed to learn many new things before using the mobile app. These indicate that the app is self-explanatory and requires no training to operate.

In terms of usability, the majority of respondents (>=70 percent) disagree or strongly disagree that the app was overly complicated, inconsistent, and difficult to use. On the other hand, the majority of respondents (>=75 percent) either strongly agree or agree that they frequently use the mobile app, that it is easy to use, that many of the functionalities are well integrated, that they believe the majority of people would learn to use the mobile app very quickly, and that they feel very confident using it.

Table 6 provides a summary of SUS dataset statistics. The result indicates that the average score is 84.75, which exceeds the criterion of 68 in Bangor et al. (2009). This indicates overall good satisfaction across users. The result demonstrates acceptable variation from a minimum of 62.5 to a maximum of 100, resulting in a range of 37.5 points.

On the other hand, Fig. 3 depicts how participants rated the mobile app's usability (score 84.75, SD 2.7) in relation to grades, adjectives, acceptability, and the Net Promoter Score (NPS) by Jeff Sauro (2011). The score indicates that the app is classified as A grade, excellent, acceptable, and achieves promoter level, indicating that respondents are more likely to recommend it to a friend.

Table 6: SUS Summary Statistics

<i>Statistic</i>	<i>Score</i>
Mean	84.75
Standard Deviation (SD)	2.70
Range	37.5
Minimum	62.5
Maximum	100
N	20

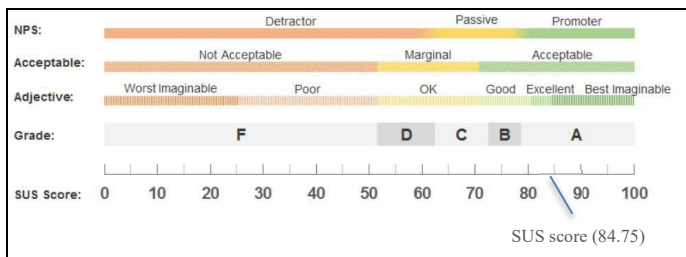


Fig. 3. SUS scores are associated with grades, adjectives, acceptability, and NPS categories (Sauro, 2018).

4.3 Analysis of SUS Means

For grade scale and adjective rating, 65 percent of respondents rated the app as outstanding (grade A) with SUS scores exceeding 80.3. Subsequently, 20% assessed it as good (B) with SUS scores between 68 and 80.3, and 15% rated it as okay (D). With an overall mean SUS score of 84.75, the majority of respondents (85%) assessed the app's adjective and acceptability rating as excellent and good. An examination of the extremely low and high SUS ratings revealed that just 15% of users deemed the program okay (D) with a SUS score between 51 and 68. This indicates that the app has room for improvements.

As shown in Table 7, all users were able to perform each scenario task during the functionality test. During the task scenario, no errors were recorded, and all tasks were completed within two minutes. The app's effectiveness is measured by the rate of task completion success. As previously indicated, all tasks have attained a completion rate of 100 percent, and the data indicates that all users were able to complete the tasks. This shows that the app can be deemed effective, by a benchmark of 78% as the average successful completion as the threshold.

Moreover, the SUS score of 84.75 indicates that the app is evaluated as excellent, acceptable, and has a high probability of being promoted to usage. Based on the quartile ranges, the result suggests that the app falls under the 70th percentile, indicating that its perceived usability is higher than 70 percent of other apps.

Table 7: SUS Means and Scores

<i>User</i>	<i>SUS Raw Score</i>	<i>SUS Final Score</i>
1	35	87.5
2	35	87.5
3	25	62.5
4	34	85
5	32	80
6	34	85
7	34	85
8	40	100
9	40	100
10	37	92.5
11	28	70
12	38	95
13	34	85
14	26	65
15	31	77.5
16	30	75
17	40	100
18	27	67.5
19	39	97.5
20	39	97.5
Mean	33.9	84.75

A majority of respondents agreed that the program is self-intuitive and easy to use, as indicated by the results. Almost all respondents claimed they would recommend the app to other people and were satisfied with it. A minimal number of users (15%) indicated a D grade for the apps with 51-68 SUS scores, which suggests that the app has room for improvement.

6. Conclusion

This study has determined the functional and non-functional requirements and produced an emotional health mobile app based on past research work and similar apps available over the shelf. The app was then tested for usability and functioning utilising task scenarios (n=11), and a SUS test was performed to measure usability and learnability (n=20).

The analysis suggested that the implementation is highly efficient and effective, with a high degree of user satisfaction. The findings give empirical evidence that the emotional health mobile app is a successful, with good scores for usability, functionality, acceptability, learnability, and satisfaction. The app could be useful for young adults who seek assistance to manage their emotional challenges, as it provides the opportunity to track and understand more about their mental state and overcome limiting issues. Aside from that, the app's features assist them in forming and maintaining social and emotional behaviours.

Nevertheless, based on the SUS evaluations, there was considerable evidence that the app could be improved. Although the programme has received positive scores and reviews, it was designed with certain limitations. Because it was developed for the Android operating system, for instance, it cannot be utilised on other systems, such as iOS. Another drawback is that it was created for individual use by the owner of a smart phone and does not allow people with similar concerns to share their experiences or knowledge. These limitations provide opportunities for more research on alternative platforms and the enhancement of services such as information exchange and notification.

The study provides evidence that the mobile app for early detection of emotional has good acceptance and needed by users. However, the test of the app was limited to the usability and functionality assessment based on an experimental task scenario, and the SUS assessment tool. Extensive field experiments including a wider population and test settings could be suggested to offer more precise analysis of the observations. In addition, the test was conducted exclusively with young adults, which limits the applicability of the results to the age groups. A greater

understanding of the app's usability and utility could be gained through demographic and age-specific studies.

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