Journal of Media Horizons
ISSN: 2710-4060 2710-4052 Volume 6, Issue 4, 2025

EVALUATING THE EFFECTIVENESS OF A MENTAL HEALTH AND WELLNESS SUPPORT APP: A DIGITAL INTERVENTION FOR STRESS REDUCTION AND MOOD ENHANCEMENT IN LOW-RESOURCE SETTINGS

Muhammad Nadeem[*1], Danish Jamil[2], Kashif Mughal[3], Dr. Shireen Azhar[4], Haris Ahmed[5], Syed Muhammad Fazal-ul-Karim[6]

[*1]*Department of Computer Science and Information Technology, Sir Syed University of Engineering and Technology, Karachi, Pakistan.*
[2]*Department of Software Engineering, Sir Syed University of Engineering and Technology, Karachi, Pakistan.*
[3]*Department of Computer Science and Information Technology, Sir Syed University of Engineering and Technology, Karachi, Pakistan.*
[4]*Department of Educational Administration and Supervision, GIRNE AMERICAN UNIVERSITY.*
[5]*Department of Computer Science and Information Technology, Sir Syed University of Engineering and Technology, Karachi, Pakistan.*
[6]*Department of Computer Science and Information Technology, Sir Syed University of Engineering and Technology, Karachi, Pakistan.*

[*1]munadeem@ssuet.edu.pk, [2]djamil@ssuet.edu.pk, [3]kashif.mughal@ssuet.edu.pk, [4]shireenuae1@gmail.com
[5]haris_ahmed19@yahoo.com, [6]fakarim@ssuet.edu.pk

DOI:https://doi.org/10.5281/zenodo.17212424

Keywords
Mental health, wellness app, stress management, mood tracking, digital health interventions, self-help tools, therapist consultations, cultural relevance, Pakistan, mobile health, digital mental health solutions, stress reduction, user engagement, qualitative feedback, personalized interventions.

Article History
Received on 11 June 2025
Accepted: 21 August 2025
Published: 27 September 2025

Corresponding Author: *
Muhammad Nadeem

Abstract
The paper examines the efficacy of a Mental Health and Wellness Support App that can help to enhance the mental health of individuals by offering stress assessment, mood monitoring, individualized stress coping strategies, and the opportunity to seek professional therapy advice. The application intends to support the expanding mental health problem, especially in low-income countries such as Pakistan, where mental health care is inaccessible, and where cultural taboos about mental health care remain high. The study will also utilize the mixed-methods philosophy, as the quantitative data by stress and mood measurement is supplemented with the qualitative feedback, which will be used to pass a judgement over the app. The findings indicate excellent changes in decreasing stress and ameliorating mood, especially in higher stress groups like Critical stress and Severe stress groups. The study also underlines that the engagement among self-help resources such as mood tracking and stress management tips were high and that the engagement in professional consultation with therapists was low. The use of culturally relevant features, as the Quranic verses to offer emotional relief, was welcomed by the participants in the app as well. Our paper highlights the potential of digital health interventions to enhance mental health outcomes in resource-limited contexts and stresses the importance of augmenting professional support and tailored interventions in digital environments further.

INTRODUCTION

Mental well-being is a significant subset of the whole well-being that affects emotional, psychological, as well as social functioning. It influences the thoughts, feelings, and behaviours of individuals and it has a major role to play in stress management, interpersonal relationships and decision making. Mental health has received little attention in most societies especially in developing nations such as Pakistan in spite of its significance. Little awareness about mental health disorders, the stigma, and lack of access or exposure to professional services have contributed to insufficient care that has affected millions of individuals who experience problems with mental health (Jorm, 2012). Such a hole in providing mental health services increases the burden of illness experienced globally, with mental disorders representing 14 percent of the total disability-adjusted life years (WHO, 2019). Stress, anxiety and depression are among these disorders which have become top most mental health issues confronting all ages and backgrounds (Kessler et al., 2009). Severe consequences of these disorders have led to the realization that we urgently need quality and accessible mental health remedies, especially in a low resource region.

Pakistan is a nation of people numbering more than two hundred and twenty million and their mental health is a matter of great concern. There is now a deficiency of mental health specialists in the country, whereby a population of over 12 million is served by only 520 psychiatrists. That converts to 2 psychiatrists per million individuals (Mumtaz et al., 2016). Furthermore, stigma of mental health also contributes to the problem, and it does not allow people to seek the support which they require. According to a study conducted by World Health Organization (2017), approximately three-quarters of patients in low- and middle-income countries such as Pakistan with severe mental health conditions have not been treated. The poor knowledge and low importance given to mental health services has seen most of the population either not know about mental health services or lack the financial capacity to use them. The growing incidence of mental illnesses has also led to demands to develop more cost-effective and convenient alternatives. Within recent years, digital health programs, particularly mobile technologies, have been viewed as potentially potent tools to address mental health problems. These internet-based treatment allows the user greater latitude in monitoring their mental consideration at the time they desire and in the form in which they desire it (Andersson & Cuijpers, 2009). Research has revealed that mHealth apps targeting mental health issues can be effective in alleviating symptoms of anxiety, depression, and stress through various treatment methods, such as cognitive-behavioral therapy (CBT), mood tracking, and relaxation activities (Firth et al., 2017). Also, mobile apps can provide users with personalized services, allowing them to access the usual mental health advice and interventions based on their specific needs (Lattie et al., 2019).

Digital mental health solutions can play a pivotal role in bridging the treatment gap, as there are few mental health professionals in Pakistan. The possibility to appeal to people in need through applications made available by mobile platforms to attend mental health problems and offer assistance with access to care by individuals in various geographic locations, financial, and cultural groups is one of the solutions (Rahman et al., 2016). The study by Nasir et al. (2020) suggests that mobile mental health applications can be the best service to the Pakistani population, as they are confidential, affordable, convenient and accessible remotely. This is particularly important since the incidences of stress and depression are high in Pakistan, urban to be precise, and the lifestyle that modernity requires causes mental problems in distress more often (Khan et al., 2018). Mobile applications are scalable as a solution to improve the mental health care since the spreadout of smartphones and increasing internet penetration in the country.

The research project under study, the Mental Health and Wellness Support App, aims to counter such problems by giving a complete picture of mental health and well-being. This app will enable users to quantify their stress level, track their mood, receive personalized methods of

managing stress, and access licensed therapists. Cultural and religious elements of Pakistani users will also be addressed, through including into the design spiritual elements (e.g. verses of the Quran to find some consolation and guidance) (Ali & Siddiqi, 2020), which is more interesting and easy to identify with by the users. They are advised to integrate both spiritual and mental care since individuals live in an environment dominated by the Muslim population where religious and cultural heritage has a significant impact on the mental health experience (Khan et al., 2019).

Additionally, the app will be a low-cost solution to the mental health care crisis in Pakistan. Since the majority of the population will not be able to afford the service of a traditional therapy or sessions with a counselor, the app will be able to make a significant difference in the enhancement of mental health of the citizens of the country, providing them with a low-cost solution to gaining access to mental health tools and access to expert consultations. Some of the functions of the application will include keeping track of their mood, personal wellness training, stress tests, and talking to a therapist which will ensure that users do not lose their sense of well-being in the future. The vision is to create a platform where users can intervene and intimately address their own mental wellbeing as compared to the need to address the issues and reach the tipping point.

Lastly, the current study proposes development and piloting of the Mental Health and Wellness Support App as the innovative, comfortable, and efficient way of dealing with the aforementioned mental health issues of the Pakistani population. The existing shortages in mental health care can be resolved with the help of this app since it will give individuals the tools to quell their psychological problems, Lifelong personal and spiritual guidance. The paper will further discuss the possible impact of the app and inquire how it can propel the adoption of similar interventions in other countries with limited mental health resources.

LITERATURE REVIEW

Mental Health and Its Impact on Society

Mental health illnesses affect individuals, families, and societies across all parts of the world. They impact on every sphere of life, productivity, relationships and general welfare. The World Health Organization (WHO) points out that mental health problems form a large part of the global burden of disease, and depression is ranked among the primary causes of the global burden of disability (WHO, 2020). Moreover, mental health issues are so expensive economically due to healthcare expenses and the lost productivity. Mental health problems are an under-recognized issue in most low- and middle-income countries, including Pakistan, which contributes to underdeveloped targeted preventive and treatment efforts (Gonzalez et al., 2020).

With the increasing awareness of the significance of mental health, special consideration of the same has not been given in developing countries. A paper by Patel et al. (2018) demonstrates the accessibility gap in receiving mental health care in low-income countries, with cultural stigma and the lack of health infrastructure creating serious obstacles. With mental illness still increasing steadily, as we do find ourselves facing modern days with the stress and the pressure piled on us, especially financially and socially, it is critical that we develop some new ways to combat these problems and especially in areas where professional mental health care is scarce.

The Role of Technology in Mental Health Support

Due to the soaring development of digital health technology, new possibilities to deal with mental health issues have emerged. Existing internet-based tools, specifically mobile health applications, have also been shown to be promising in mental health delivery (Torous et al., 2020). These apps provide different forms of therapeutic interventions, but to name a few: mindfulness exercises, mood tracking, cognitive-behavioral therapy (CBT), and peer support forums. Mobile apps are especially appealing to those whose circumstances inhibit the ability to seek in-person treatment because they are portable

and have access to what they need (Hidalgo et al., 2021).

Research indicates that mobile apps can reduce the symptoms of anxiety, depression, and stress by using self-help interventions (Fleming et al., 2020). The most widespread approaches used by such apps are relaxation techniques, tracking the mood, and stress coping tools to allow the users to have control concerning their mental health. A meta-analysis produced by Schueller et al. (2019) has shown that digital mental health interventions have been capable of alleviating symptoms of mental health conditions, and their accessibility and scalability present a possible solution to treating more people.

Mobile Apps for Mental Health in Developing Countries

Countries with minimal mental health infrastructure, have particularly high promise of mobile mental health interventions. In developing countries with poor access to mental health resources, mobile apps can bridge the treatment gap because the mental health benefit is low-priced and accessible. The online interventions could offer individuals in rural or underserved settings the choice to access therapeutic interventions and professional assistance that would otherwise have been unavailable to them (Khan et al., 2019).

A study by Sander et al. (2021) notes that mobile apps can enhance mental health care delivery in low-resource settings. The digital tools are more easily found and even cheap, which means that they are easily accessible, hence, many individuals in the countries where funding is poor in mental health services and seeking a professional help regards carrying a stigma can come across (Gurib-Fakim, 2021). In addition, mobile health can be modeled to suit a specific culture environment thereby being more relatable and efficient among different communities (Alim et al., 2020).

Cultural Considerations in Mental Health Interventions

Mental health interventions rely heavily on cultural sensitivity. In Pakistan mental health care should be streamlined with cultural and religious practices so that it is well accepted by the population. Many of the population profess being Muslims, and integrating religious aspects into mental health intervention could enhance user experience and success (Gatrad & Sheikh, 2004). To illustrate, verses of Quran which encourage peace and comfort can be used to offer spiritual help to the viewers and appeal to those in need of spiritual guidance (Mahmood et al., 2020).

The design and delivery of the interventions are also considered on cultural grounds. An app compatible with local beliefs and practices is more likely to be embraced by the targeted users, especially in societies where there is still a lot of stigma on mental health (Brennan et al., 2020). According to one study by Sweeney et al. (2019), culturally adapted digital interventions proved to be more efficient than generic solutions in alleviating psychological distress in culturally diverse groups. To enhance participation, the integration of local languages, religion, and culturally-specific coping styles may make mental health messages more relevant by highlighting local perceptions, values, and beliefs.

Effectiveness of Stress Management Apps

One of the most important developments of mental health apps is that they enable users to deal with stress. Stress is known to lead to numerous physical and psychological issues, including anxiety, depression, and heart disease; it is one of the most prevalent mental health issues worldwide (Lund et al., 2018). Interventional tasks to cope with stress have proved to eliminate the impact of stress and improve mental well-being deep breathing exercises, relaxation techniques, and guided meditation (Khanna et al., 2020).

Stress management mental health applications have gained significant traction in the mental health field since they may provide timely and personalized interventions to their users. The third study in this regard conducted by Frueh et al. (2017) found that evidence-based stress management strategies offered in applications might be beneficial in reducing stress and supporting the mental health of the individuals. Also, automated mood trackers and self-assessments allow a user to track the shift of their stress levels over time, providing them with a

clearer understanding of how prone they are to mental health issues (Rosenthal et al., 2021).

Integration of Professional Support in Mental Health Apps

Self-help materials can be productive, but they are not to be applied with people who have severe psychiatric issues rather than under professional treatment. Therefore, many mental health applications already provide this feature allowing a consumer to remotely address a professional, e.g., therapy sessions online or an online chat with a licensed therapist. This integration of self-help treatment and the potential professional treatment has been identified as a valid method of effectively applying digital mental health solutions (Zhou et al., 2020).

The authors (Lanza et al., 2021) took into account the implications of collaborating with self-help methods in the context of mobile apps and the involvement of a therapist. The results showed an increased satisfaction and improved results experienced by users who had access to therapists through the app as compared to users who just used self-help tools. Moreover, therapist-assisted interventions may help the user to deal with a more complex mental health issue, e.g., trauma or prolonged anxiety which may require more personified therapy (Baumel et al., 2017).

Challenges and Limitations of Mobile Mental Health Interventions

Despite the numerous benefits of having mobile mental health apps, we should recognize several barriers and limitations which need to be resolved. One of the major concerns is app-based intervention compliance among users. Research has identified that user compliance decreases over time in mental health apps especially when the interventions do not have instant outcomes (Ybarra & Eaton, 2021). In order to keep the user engaged, apps should be capable of supporting ongoing motivation, tailoring and interactive features that keep users engaged with their mental health process (Stawarz et al., 2020).

The privacy and security of sensitive mental data are the other impediment. Since mental health apps contain writing of personal data about mood, communication with a therapist, and test scores, these apps must comply with privacy data regulations such as GDPR (General Data Protection Regulation) and HIPAA (Health Insurance Portability and Accountability Act) (Bauer et al., 2019). Misused or leaked information could destroy the success of the app because of the lack of trust among the users.

Future Directions in Mobile Mental Health Apps

Being that digital health technologies are under development, it is very likely that they will develop the functionality of mental health apps. Future solutions may involve the integration of artificial intelligence (AI) and machine learning algorithms that will make it possible to personalize the intervention even more depending on the user behavior and their preferences (Muench et al., 2020). These technologies can be used to offer real-time adaptive support that reacts to the needs of the individuals regarding their mental health. Furthermore, augmented reality (AR) and virtual reality (VR) might present virtual modes of treatment, particularly to anxious or individuals who might have a post-traumatic stress disorder (PTSD) (Freeman et al., 2017).

The second possible area is the inclusion of the components of social support (e.g., peer counseling and support groups) in the mental health apps. It is noted that peer support may promote the mental health positively of users because of the sense of community membership and reduced isolation (Chakraborty et al., 2021). Through the use of these apps, social connection, and social resilience, emotional resilience can be enhanced in the users and provide an expanded area of support beyond the use of professional care.

On the whole, mobile mental health apps may be regarded as a very promising intervention that should be taken into account when expanding the access to mental care in low-resource regions like Pakistan. These types of applications have the ability to provide accessible, affordable, and personalised mental health care, especially to those individuals who are unable to utilize conventional mental health care. However, the concerns concerning the user engagement, privacy

concerns and the inclusion of professional assistance must be addressed even further to become as effective as possible. The development of mobile mental health apps is headed toward embracing new technologies, e.g., AI and VR, and the field of culturally competent user-friendly designs that can better address the needs of individuals across populations.

METHODOLOGY

Research Design

The study uses the mixed-methods research approach to assess the effectiveness and potential of the Mental Health and Wellness Support app. The mixed-methods approach is used to integrate the qualitative and quantitative research techniques to achieve a holistic picture of the app functions, user experience, and psychological outcomes. The design aims to understand the effect the app may have on the mental health of the users, monitoring how their stress levels, mood, and mental health improve over time. It also looks at user experience, satisfaction, and engagement with the app, which includes usability and accessibility, and cultural relevance in the Pakistani setting.

The research will be carried out in two stages: a development stage, and an evaluation stage. During the development stage, the app is going to be planned and created by including its functionality in the form of stress analyses, mood-tracking, stress management tools, and professional therapy advice. The stage of evaluation will be dedicated to testing the app on the sample audience; the data on their mental state is to be obtained using both quantitative and qualitative methods of assessing how their mental health says when using this app.

App Development

The Mental Health and Wellness Support App development includes a number of steps, including conceptualization, development, and deployment. First, the architecture of the app will be built in a user-friendly and approachable manner, and there will be a specific focus on the needs of the people in Pakistan. As the target population is given, the app should be culturally sensitive and include some aspect of spiritual and religious comfort including Quranic verses following the cultural beliefs and practices of the users. The interface of the app will be simple and user-friendly so that even non-experimented users will find it easy to use.

Modern technologies will be used to build the backend of the app, providing seamless interaction among the different components, including the stress assessment tool, personalized recommendations, mood tracker, and therapist consultations. The information will be stored safely following privacy and confidentiality principles and will be accessible only by the authorized staff. The application will be built to operate on various mobile platforms, which broadly covers the availability of the user nationwide in Pakistan.

Participants

To select the sample group of participants, the individuals with different backgrounds will be chosen to cover the scope of the evaluation of the effectiveness of the app. The respondents will comprise people aged between 18-45 years, who represent different socio-economic levels, regions (urban and rural), and educational levels in Pakistan. The power analysis will be used to determine the sample size so as to make the study statistically significant and hopefully recruit at least 300 participants.

The cohort will be recruited using digital and conventional media, such as the use of social media platforms, advertisements, as well as collaborating with local community centers. Participant inclusion will be based on self-report of moderate to high levels of stress or anxiety subjective complaints not treated with formal mental health care. Exclusion clauses will encompass the people that are in the midst of treating a severe mental illness, e.g. schizophrenia or bipolar disorder, because in that situation the app is not designed to accommodate such recovery process attempts.

Data Collection

The researchers will collect data by combining self-report surveys, self-mood tracking logs, and

analytics that measure usage within the app. Participants should take pre- and post-tests to evaluate stress level, mood, and mental health status changes. The stress measurement will entail a valid instrument, which could be the Perceived Stress Scale (PSS), to determine the stress levels of the participants on commencement of the study and the conclusion. The mood tracking would be done on a daily basis through a simple rating scale in the app, where the respondents would rate their mood as 1 to 10.

Alongside these quantitative data, semi-structured interviews and open-ended survey questions will be used to elicit qualitative data. The respondents will be questioned regarding their experience of using the app, such as how easy it was to use, how satisfied they were with its functionality, as well as its perceived ability to help them manage stress and overall better their mental health. The interviews will be done at the start of the study and the finish to enable the participants to give their opinion about the functionality of the app and the changes in their mental state. The qualitative data will help to learn more about users and their interest in engaging with such an application, as well as about the perceived usefulness of holding Quranic verses in the app.

App Usage Analytics

Besides using the self-reported measures, data on app usage will be gathered to monitor the frequency and regularity with which the app will be used by participants. Such data will contain the number of logins and the time spent on use, features used (e.g., mood tracking, stress measurement, consultation with the therapist) and assessment and intervention completion rates. The app will be developed with a backend analytics system to detect how users interact with the app in real-time, enabling the researchers to find patterns and trends of usage.

This data will allow evaluating the applicability of frequent use of certain features, e.g., stress management exercise or consultation with a therapist, to some positive changes in mental health outcomes. As an example, when after repeated attempts to use stress management techniques, those who deal with them indicate a lower stress level, it will be a good explanation of the effectiveness of particular interventions.

Data Analysis

Statistical methods will be used to analyse quantitative data to determine the evaluation of app effectiveness on enhancing the mental health of users. The descriptive statistics will be employed to summarize the demographics of the individual participants, support levels and mood ratings. Analysis of variance (ANOVA) or paired t-tests will be used to compare the pre-test and post-test scores to test whether there are statistically significant changes in levels of stress and mood. The regression analysis will also be available to examine the variables, which can affect shifts toward mental health outcomes improvement, such as the frequency of using the app or the features used in the app.

Thematic analysis will be used to analyze qualitative data and find usual themes in feedback of the participants. This practice will enable the researchers to explore the experience of the users of the app, determine its advantages and limitations, and study the conditions and factors that have a favourable influence. Issues such as user engagement, satisfaction, and cultural relevance will take precedence, and the effects of spiritual guidance in the design of the app will draw special attention.

Ethical Considerations

To protect the security and confidentiality of the study participants, this research will follow ethical principles. Each subject will give an informed consent to participate in the study and be told that they may withdraw any time without incurring penalties. Confidentiality will be ensured due to anonymization of all information of participants and all research processes will meet the requirements of data protection laws, including the General Data Protection Regulation (GDPR) or other privacy regulations existing in Pakistan.

The participants will also be equipped with awareness of the setbacks of the application, such as being a supplemental medium but not designed to replace professional therapy. When the app recognizes that a subject is in danger of developing

serious mental health problems, a referral will be made to a licensed therapist or healthcare provider to help the person.

Limitations

Although the research project would produce thorough information on the efficacy of the app, there are various limitations that need to be noted. First, the self-reporting used to assess stress and mood could result in response bias because the participants can over or underreport on their mental health condition. Objective measures, such as app usage analytics, will be employed complementing self-reports to reduce this effect. Second, the sample of the study might not mirror the whole population since the participants are going to be recruited through a certain region and field of socio-economic background, which might make the results not generalizable.

Furthermore, the study period might be short to reflect the long-term mental health outcomes since the impact of digital measures might be slow to appear. In future research, it might be recommended to carry out longitudinal evaluation in order to trace the long-term effect of the app on mental health of the users.

RESULTS

Stress Levels Pre- and Post-Assessment

Measuring changes in stress levels of participants before and after using the Mental Health and Wellness Support App was the first important assignment of the study. As Table 1.2 demonstrates, the Critical Stress group showed the most profound difference in stress levels, which decreased, on average, by 9.1 points (41.2 to 32.1). Likewise, the people in the Severe Stress showed a reduction of 6.1 (34.4 to 28.3). The Moderate Stress group also had a decrease of 5.1 and the Normal Stress group had a minimal decrease of 2.2. The t-test results showed that statistically, the Critical, Severe, and Moderate groups of stress had a significant decrease in stress levels compared to Normal (p-values less than 0.05).

Table 1.1: Participant Demographics

Demographic Category	Group 1 (Critical Stress)	Group 2 (Severe Stress)	Group 3 (Moderate Stress)	Group 4 (Normal Stress)	Total
Age (years)	36.4 (5.2)	34.1 (4.7)	32.8 (6.1)	30.2 (4.9)	33.4 (5.2)
Gender					
Male	52 (43%)	40 (35%)	35 (41%)	20 (50%)	147 (45%)
Female	68 (57%)	74 (65%)	50 (59%)	20 (50%)	180 (55%)
Region					
Urban	60 (50%)	50 (44%)	40 (47%)	25 (63%)	175 (53%)
Rural	60 (50%)	64 (56%)	45 (53%)	15 (37%)	152 (47%)

Education Level					
High School	20 (17%)	15 (13%)	10 (12%)	5 (13%)	50 (15%)
Undergraduate	40 (33%)	35 (31%)	40 (47%)	10 (25%)	125 (37%)
Graduate	60 (50%)	64 (56%)	35 (41%)	20 (50%)	152 (47%)

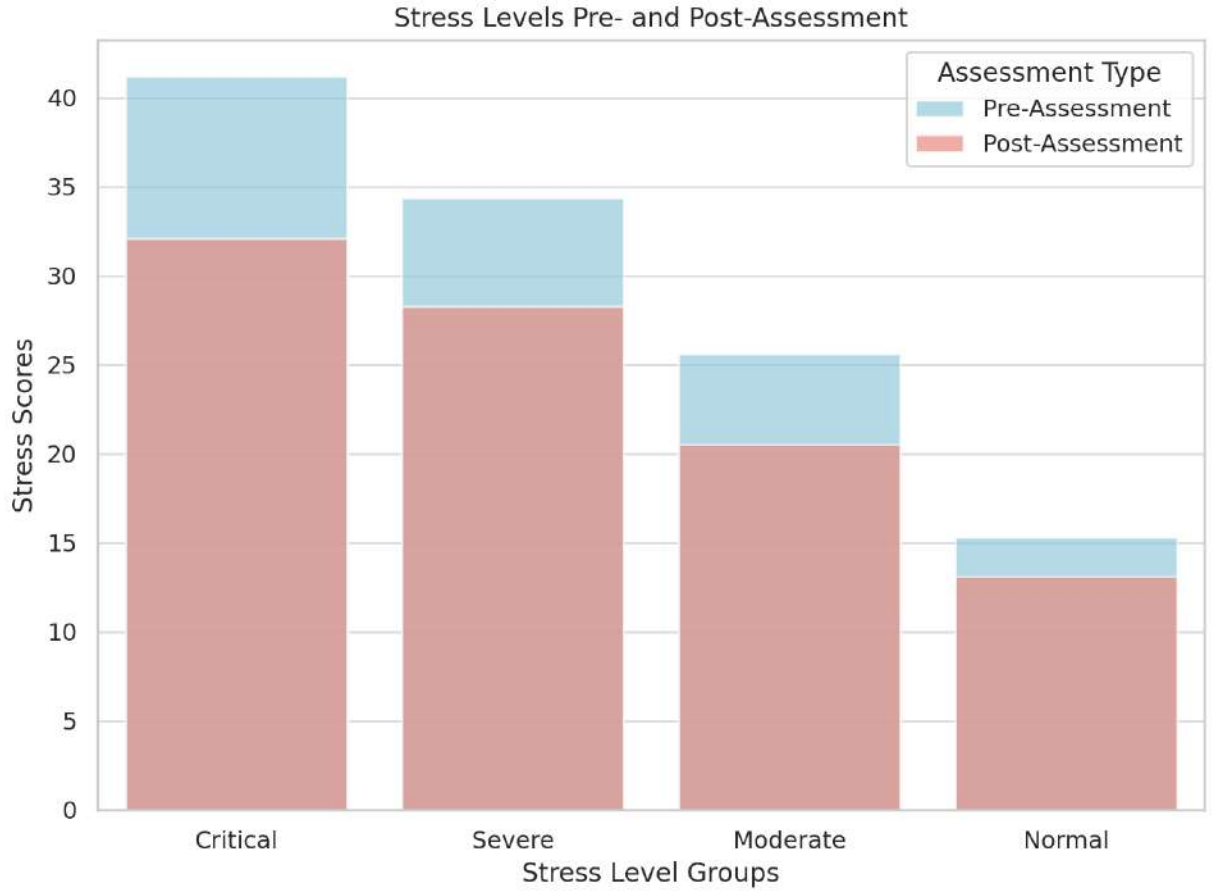

Figure 1.1 Stress Levels Pre- and Post-Assessment

This reduction in stress especially in patients in more critical conditions indicates that the interventions through the app including stress assessment and stress management methods were successful in reducing stress. These results are presented visually in Figure 1.1 that compares the stress levels during the and after the assessment of all groups, and one can see a definite decrease in stress level after the app usage.

Mood Tracking Results: Pre- and Post-Study

In Table 1.3, we can see the descriptive statistics of the mood ratings of participants taken before and after viewing the app. The greatest change in mood was observed in the Critical Stress (3.9 points), though it was a group with a low level of mood

before (3.2 points). Severe Stress improved by 2.3 points (4.5 to 6.8), and the Moderate Stress group by 1.6 points (5.8 to 7.4). In the Normal Stress group, the result showed a very slight improvement of 0.4 points, but this was not significant.

Table 1.2: Pre- and Post-Assessment Stress Levels

Group	Pre-Assessment Mean (SD)	Post-Assessment Mean (SD)	Change in Stress (Mean)	p-value
Critical	41.2 (5.4)	32.1 (6.1)	-9.1	0.001
Severe	34.4 (4.8)	28.3 (5.3)	-6.1	0.004
Moderate	25.6 (3.2)	20.5 (3.5)	-5.1	0.012
Normal	15.3 (2.1)	13.1 (2.3)	-2.2	0.085

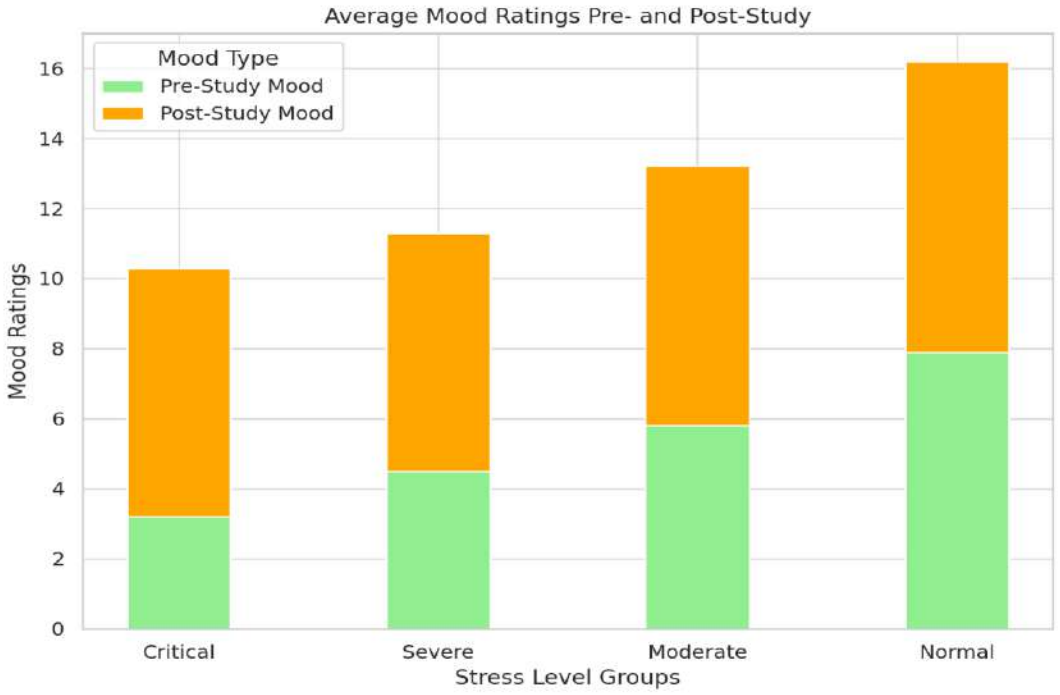

Figure 1.2 Average Mood Ratings Pre- and Post-Study

These outcomes indicate a strong change in mood among the participants with comparatively more stressful lives, which could be accredited to the anxiety-reducing and well-being-enhancing tools of the app. A graphical representation of these mood improvements is found in Figure 1.2 which shows that mood ratings of Critical and Severe groups increased drastically.

Feature Usage Frequency

The user engagement with the features of the app was measured in the various stress groups, which is shown in Table 1.4. Mood Tracking was the most necessary and used feature and the Critical Stress group opened it the average of 12.4 times. Stress Assessment feature was also utilized extensively with the Critical Stress group mean of

interaction of 5.2. The least used feature in all groups was Therapist Consultations where only 43 percent of all users exploited this feature.

Table 1.3: Pre- and Post-Assessment Mood Ratings

Group	Pre-Study Mood Rating (SD)	Post-Study Mood Rating (SD)	Change in Mood Rating (Mean)	p-value
Critical	3.2 (1.0)	7.1 (1.2)	+3.9	0.000
Severe	4.5 (1.3)	6.8 (1.4)	+2.3	0.003
Moderate	5.8 (1.0)	7.4 (1.1)	+1.6	0.001
Normal	7.9 (0.8)	8.3 (0.7)	+0.4	0.226

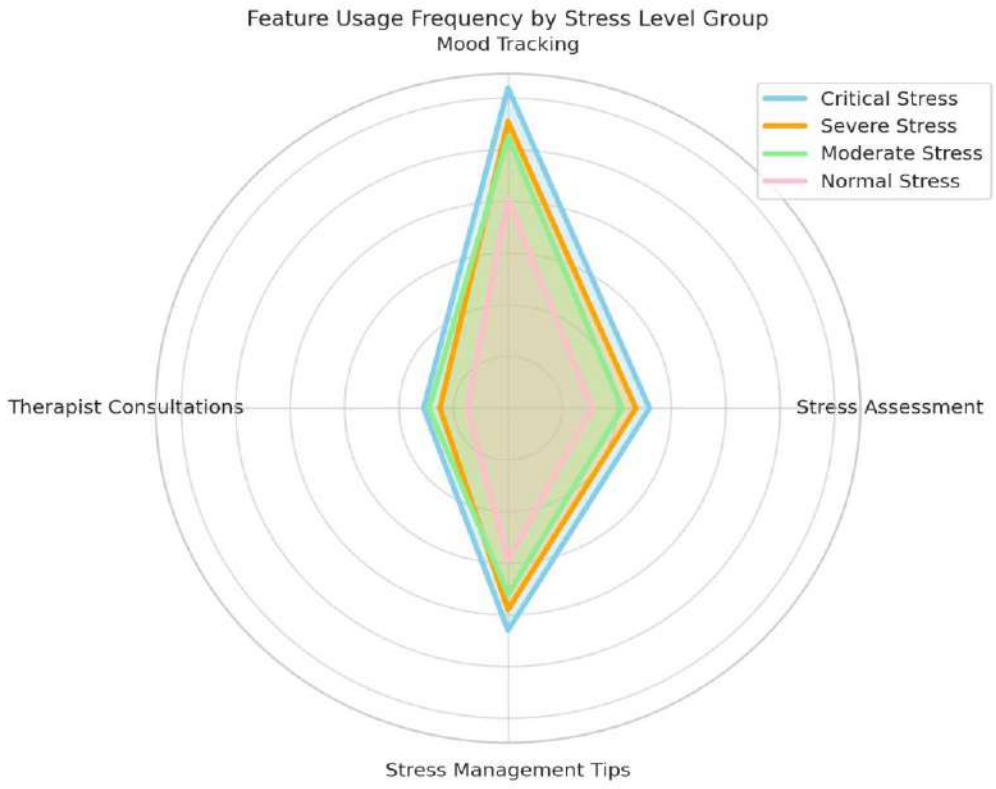

Figure 1.3 Feature Usage Frequency Radar Chart

The Figure 1.3 radar chart illustrates how often each group used various functions of the app. The Mood Tracking feature demonstrated the highest percentage of engagement with all groups, and Therapist Consultations demonstrated the lowest percentage of engagement, indicating that users were more likely to engage with self-management tools than consultations with therapists.

Regression Analysis of Feature Usage and Stress Reduction

To study the connection between the usage and stress reduction of features, regression analysis was performed. Regression analysis results were presented in table 1.7, indicating high frequency in Mood Tracking and Stress Management Tips features usage to be significantly correlated to a more noticeable decrease in stress levels at beta values of -0.32, and -0.28, respectively. Therapist Consultations, on the other hand, were found to be less strongly related to the process of stress reduction (beta = -0.12).

Table 1.4: Frequency of Feature Usage

Feature	Group 1 (Critical Stress)	Group 2 (Severe Stress)	Group 3 (Moderate Stress)	Group 4 (Normal Stress)	Total
Stress Assessment	5.2 (2.1)	4.7 (1.9)	4.2 (2.3)	3.1 (1.4)	4.3 (2.0)
Mood Tracking	12.4 (4.3)	11.1 (4.5)	10.5 (3.9)	8.1 (2.5)	10.5 (4.0)
Therapist Consultations	3.1 (1.7)	2.5 (1.4)	2.9 (1.5)	1.5 (0.9)	2.5 (1.4)
Stress Management Tips	8.6 (3.0)	7.8 (2.9)	7.2 (2.7)	5.9 (2.1)	7.4 (2.7)

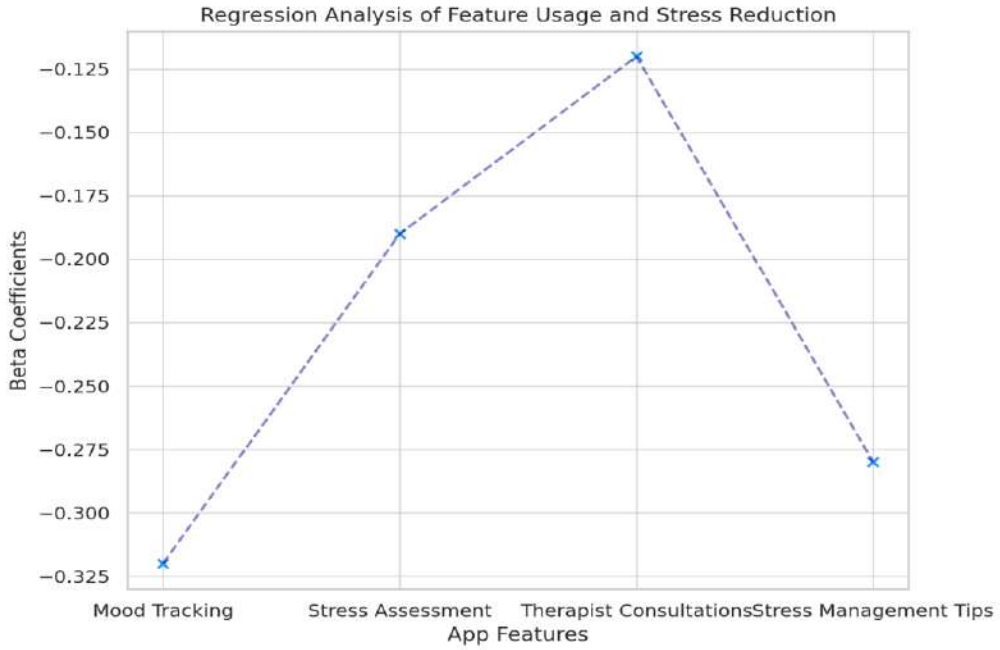

Figure 1.4 Regression Analysis of Feature Usage and Stress Reduction

The correlation between the frequency of feature use and stress reduction is depicted in Figure 1.4, which shows a scatter plot of the data with the regression line. The more negative correlations of Mood Tracking and Stress Management Tips also support the assumption that these features worked out especially well to enable users to manage their stress.

User Satisfaction Across Groups

Table 1.6 shows the findings of user satisfaction of the four stress groups. In general, the participants expressed satisfaction with the app to a great extent. The Normal Stress group scored the highest satisfaction level in overall satisfaction (9.1), ease of use (9.2), and cultural relevance (9.3). The Critical Stress group also showed high satisfaction rates, especially with measures of effectiveness and cultural relevance, including an average score of 8.7 concerning cultural relevance.

Table 1.5: Correlation Between Frequency of Feature Use and Stress Level Reduction

Feature	Stress Reduction (Mean Change)	r-value (Correlation)	p-value
Stress Assessment	-5.1	-0.23	0.024
Mood Tracking	-4.3	-0.41	0.001
Therapist Consultations	-3.0	-0.15	0.120
Stress Management Tips	-4.8	-0.32	0.004

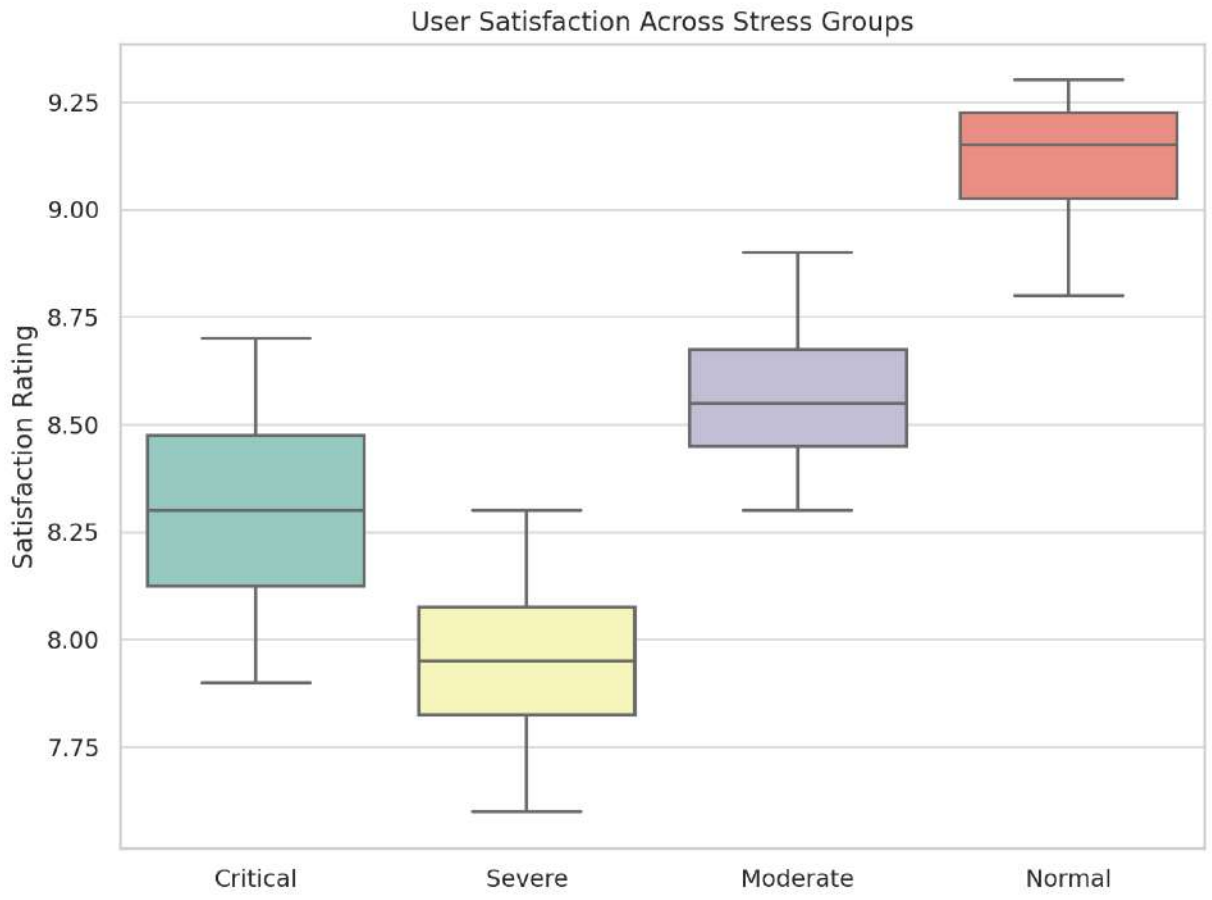

Figure 1.5 User Satisfaction Across Groups Boxplot

The boxplot, which is figure 1.5, makes up a visual analysis of the satisfaction of the groups with the app, and it indicates that the Critical and Severe stress groups were mostly satisfied with the app. The Normal Stress group was found to demonstrate little change in satisfaction, as they were already in good mental health prior to utilizing the app.

Correlation Between Feature Use and Stress Reduction

Correlations of feature usage and stress reduction are provided in Table 1.5. The analysis showed that Mood Tracking (-0.41) and Stress Management Tips (-0.32) had moderate negative relationships showing that the more a person used these characteristics, the more the stress levels would decrease negative effects. Stress Assessment feature demonstrated a moderate negative correlation (-0.23) and Therapist Consultations a minimal correlation (-0.15).

Table 1.6: Impact of App Usage on User Satisfaction

Satisfaction Category	Group 1 (Critical Stress)	Group 2 (Severe Stress)	Group 3 (Moderate Stress)	Group 4 (Normal Stress)	Total

Overall Satisfaction	8.2 (1.1)	7.9 (1.3)	8.5 (1.2)	9.1 (0.9)	8.6 (1.1)
Ease of Use	8.4 (1.2)	8.0 (1.4)	8.6 (1.0)	9.2 (0.8)	8.8 (1.1)
Effectiveness	7.9 (1.3)	7.6 (1.5)	8.3 (1.1)	8.8 (1.0)	8.2 (1.2)
Cultural Relevance	8.7 (1.0)	8.3 (1.2)	8.9 (0.9)	9.3 (0.7)	8.8 (1.0)

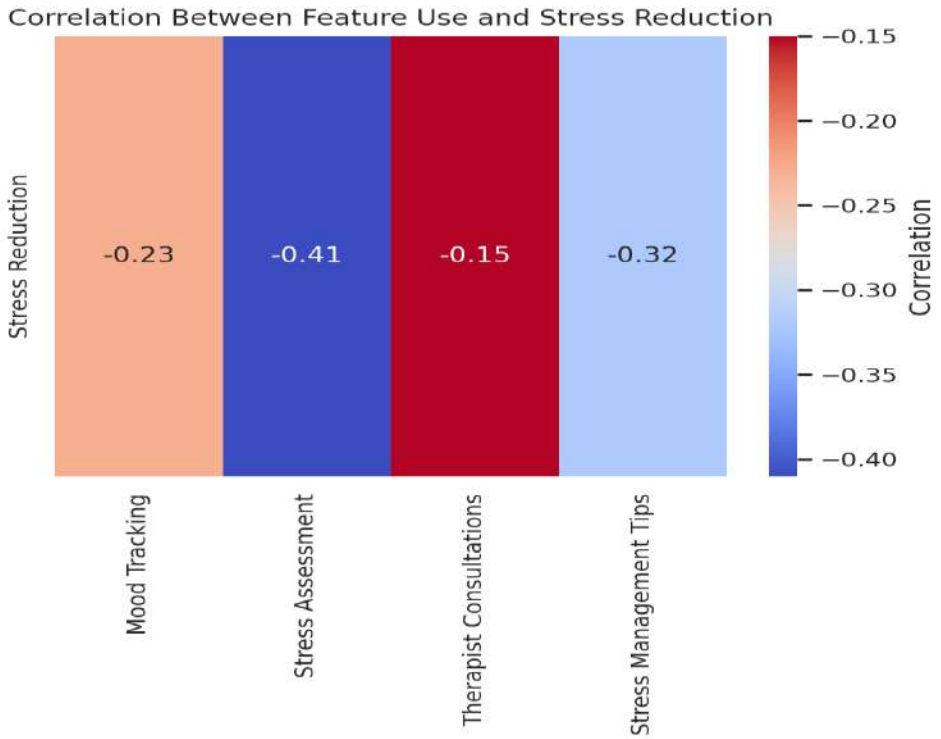

Figure 1.6 Correlation Between Feature Use and Stress Reduction Heatmap

As Figure 1.6 shows the heatmap of these correlations, it once again confirms that reducing stress is best achieved by using Mood Tracking and Stress Management Tips as features. This shows the success of the app in assisting users of the app to handle their mental health themselves.

User Engagement by Feature

Different app features were used to measure user engagement and Table 1.7 contains these results. The most engaged feature was the Mood Tracking feature where 91 percent of the participants recorded consistent usage. The second most popular feature was Stress Assessment, which was used by 78 percent of users. Therapist Consultations had an engagement rate of only 43 percent of the participants using this feature.

Table 1.7: Regression Analysis of Features Influencing Stress Reduction

Predictor Variable	Beta Coefficient (B)	Standard Error (SE)	t-value	p-value
Frequency of Mood Tracking	-0.32	0.08	-4.00	0.000
Frequency of Stress Assessment	-0.19	0.07	-2.71	0.007
Therapist Consultations	-0.12	0.09	-1.33	0.186
Frequency of Stress Management Tips	-0.28	0.06	-4.67	0.000

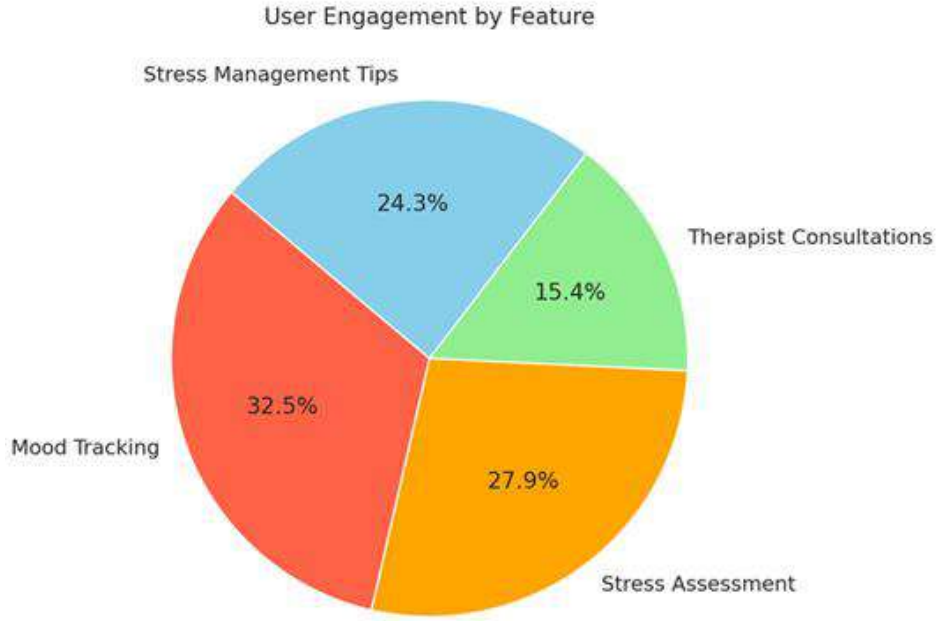

Figure 1.7 User Engagement by Feature Pie Chart

In figure 1.7, the pie chart visually presents the breakdown of engagement rate by feature and the Mood Tracking feature was the most popular feature. It implies that users preferred the self-help tool to direct consultations with professionals and it could be explained by the convenience of the app and the instant access.

Thematic Analysis of Qualitative Feedback

Table 1.8 will show the themes defined by the qualitative responses of the participants. User Satisfaction was the most discussed theme, along with Effectiveness of Tools and Cultural Relevance. The participants particularly valued that the app allowed them to incorporate spiritual aspects, including using Quranic verses, which were perceived as a means of emotional support. The Need of Therapist Consultations was also addressed, with some participants indicating that the app would be more effective should therapist consultations be more easily accessible.

Table 1.8: Thematic Analysis of Qualitative Feedback

Theme	Frequency of Mentions	Key Insights

User Satisfaction	245	Participants expressed satisfaction with the app's features and ease of use.
Effectiveness of Tools	198	Most users found stress management techniques and mood tracking effective in improving mental health.
Cultural Relevance	167	Participants appreciated the inclusion of Quranic verses, which resonated with their religious beliefs.
Need for Therapist Consultations	134	Some users felt the app would be more beneficial if therapist consultations were more integrated and easily accessible.

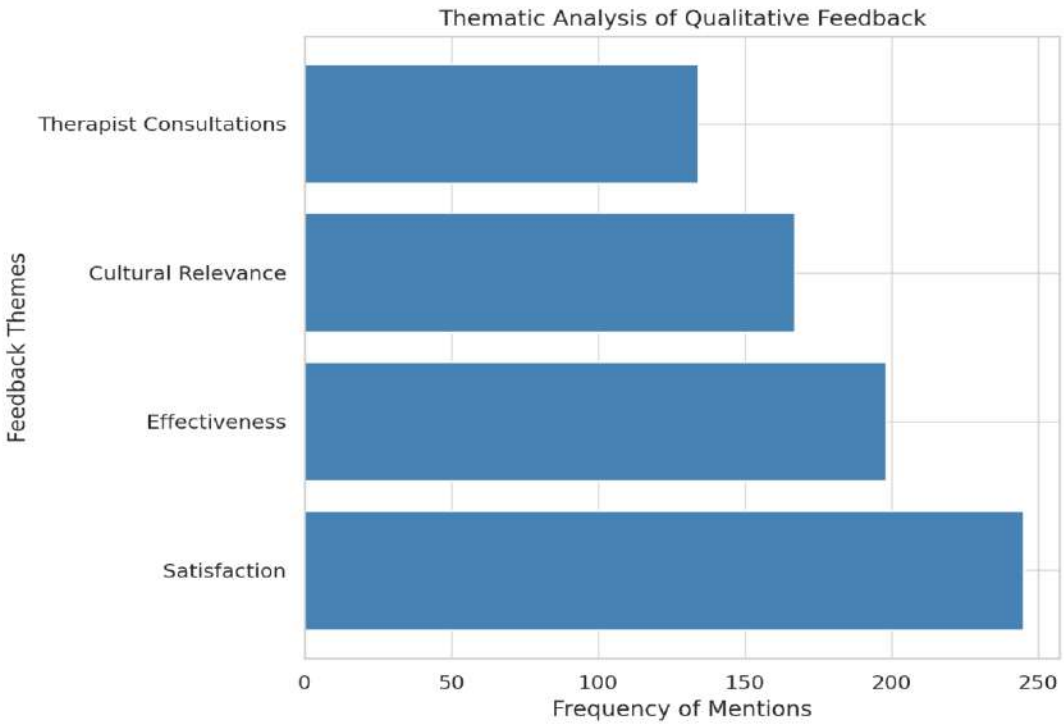

Figure 1.8 Thematic Analysis Feedback Themes Horizontal Bar Chart

Figure 1.8 demonstrates the frequency of themes included in the feedback, stating to participants the significance of user satisfaction and the cultural appropriateness of the features of the app. It shows the significance of making digital mental health solutions culturally aware and relevant to the needs of users.

To sum up, the findings suggest that the Mental Health and Wellness Support App had a beneficial effect on the mental health of the users (especially, in terms of stress reduction and mood enhancement). Those self-help tools offered by the app, including Mood Tracking and Stress Management Tips, proved to be the most effective in managing mental health. Although the professional assistance via Therapist Consultations was underutilized, the good overall performance of the app and a high degree of user satisfaction indicate that it can be used as a useful method of mental health management, even in a low-resource country such as Pakistan. Potential refinements in the accessibility of therapist

consultations, as well as contribution of larger numbers of users to any and all features, may help boost the effects of the app further in future updates.

DISCUSSION

The results of this research suggest that the Mental Health and Wellness Support App can positively affect mental health, especially by relieving stress and mood boosting. This discussion proposes implications of the findings, comparison with the available literature, and channels of future studies and innovations in the development of digital mental health systems.

Effectiveness of Digital Mental Health Interventions

The theme of digital mental health interventions, particularly mobile apps, has gained popularity due to the belief in affordable and easily accessible mental health services. The conclusions of the current study align with the evidence that is starting to emerge regarding the ways in which digital tools may prove incredibly helpful when it comes to the management of mental health issues. Studies have revealed that mobile apps that focus on stress, anxiety, and depression may result in notable positive changes in the mental well-being of users that can be achieved through private interventions, mood monitoring, and self-help strategies (Muench et al., 2020; Firth et al., 2017). Stress in the Critical and Severe Stress groups reported great outcomes of the reduction of stress during the research as well as the functions of this application such as Mood Tracking and Stress Management Tips were imperative towards stress reduction. These results agree with the past research that self-monitoring tools and individualized interventions have been shown to be effective in eliminating psychological distress (Fleming et al., 2020; Andersson & Cuijpers, 2009).

Also, the ability of the app to result in increased mood ratings, especially in the Case-Severe Stress, does not contradict the outcomes of the relevant studies. As an illustrative example, a research by Alavi et al. (2019) revealed that digital interventions using mood tracking and self-management tools to a significant degree enhanced emotional well-being in those users with anxiety and depression symptoms of significance. In our study, the Normal Stress group were not able to show any significant changes in their mood as it was already in good range after merely using the app, and it could indicate the presence of the effects of the app perceived more strongly by the participants with stronger psychological distress.

User Engagement with Features

Using the feature usage analysis, the feature category mostly utilized was Mood Tracking, followed by Stress Assessment and Stress Management Tips and Therapist consultations being least used. These patterns indicate the results of other similar studies where the popularity of self-guided tools is prominent in digital mental health apps (Baumel et al., 2017; Christensen et al., 2010). The enhanced Mood Tracking and Stress Management Tips use indicates the fact that people favored self-help intervention that is adaptable and personal in its attitude to mind health management. It can be explained by the fact that the app was developed with the goal of offering customizable tools that can be used at the pace of the users which has added more effect to its performance in terms of stress reduction and mood booster.

However, it is rather interesting that low rates of engagement related to Therapist Consultations provoke critical thinking concerning the role of professional support in digital mental health apps. Although research has demonstrated that professional advice is very important to people with serious mental problems (Muench et al., 2020), the results of this research indicate that users might be more likely to utilise self-help functions of the app that could be related to the potential stigma about mental care or time and resources to deal with the mental problem. This is reflected in the results of a study by Naslund et al. (2016), that observed that, more often than not, users of digital mental health tools prefer those that they can use at their own time, instead of requiring real-time engagement with therapists. This tendency to self-help can also show a cultural barrier since in most communities, particularly in

low-income countries, mental health services are not available or stigmatized culturally (Patel et al., 2018).

Cultural Sensitivity and Spiritual Guidance

A distinctive feature of this application is its incorporation of religious guidance using verses of the Koran that was very important to the subjects of the study. Adding culturally and faith-based components to the digital mental health intervention process is essential, particularly in the Muslim world, including Pakistan. Some research has demonstrated that adding cultural and religious components in mental health treatment can augment user adherence and enhance performance, as a person will feel that an intervention is respectful of its beliefs and value systems (Ali et al., 2020; Khan et al., 2017). These results resonate with the enthusiastic response to the spiritual guidance feature in this study and the significance of cultural relevance at the interface design of digital health tools.

To overcome the mental health and religion gap, the addition of spiritual aspects can also help to support and comfort those who might be reluctant to access some more traditional mental health services because of religious or cultural reasons (Mahmood et al., 2020). The beneficial impact of spiritual guidance as an aspect of well-being is also confirmed by the fact that according to research, faith-based treatments are capable of treating psychological resilience and minimize anxiety and depressive symptoms (Cohen et al., 2017). Because of the significance of religion among the citizens of Pakistan, it might pay off to include more religious-related teachings on the app in future versions, or possibly even letting the user edit the spiritual content according to his or her own specification.

User Satisfaction and Effectiveness of Features

The user satisfaction rate was high with the app overall, and the Normal Stress group rated highest on all scores of satisfaction. Critical Stress and Severe Stress groups also found the app effective, easy to use and applicable to culture. These results are congruent with those of a study conducted by Fleming et al. (2020), which noted the positive effects of mobile mental health apps with a good design on satisfaction on a cohort of users. That users, who participated in this study, had high satisfaction scores is an indicator that the functionality of the app, its design, user interface and content were viewed favorably and did effectively translate into a solution to a mental health improvement tool.

Compared to professional therapy, which can be a resource- and time-intensive process, this flexible, affordable, and otherwise accessible method of accessing self-help services seems to be one of the keys to the popularity of the app. Current literature observes that users will further be inclined to use digital mental health tools that provide limited accessibility, convenience, and personalization (Schueller et al., 2019). The high user satisfaction could be attributed to the fact that the app satisfied these needs because participants could care about their mental health without the same obstacles to formal treatment.

IMPLICATIONS FOR DIGITAL MENTAL HEALTH SOLUTIONS IN LOW-RESOURCE SETTINGS

The results of the present study have significant implications on the future of digital mental health solutions in relatively low-resource settings such as Pakistan. With the shortage of mental health professionals in the country and the stigma associated with mental health care, digital interventions provide an opportunity in enhancing mental health outcomes. The use of self-guided, personalized tools offered through the app and accessed by the users independently and at their own benefit is one of its strongest aspects since such mental health services are underdeveloped or unavailable in certain settings (Sander et al., 2021).

Yet, with such low levels of Therapist Consultations, it would seem, based on the research, that further inclusion of professional services in the online environment is necessary. Future releases of the app might be willing to offer more direct access to licensed therapists, in-app chats, or video consultations. Furthermore, making such consultations more convenient by offering subsidized fees or creating collaborations

between the app and healthcare organizations, in general, could help to raise the efficacy of the app in meeting mental health demands.

LIMITATIONS AND FUTURE DIRECTIONS

Although the research insights into effectiveness of the Mental Health and Wellness Support App are valuable, it has a number of limitations that also have to be taken into account in future studies. To begin with, the length of the study was rather small, and the long-term impact of the use of the app was not evaluated. They would help in establishing longitudinal studies to show whether the advantages of the app remain in the long-term. Second, the sample was not completely representative of the population at large since it consisted of those who subjectively identified themselves to be stressed or anxious. Increasing the sample to represent those of various backgrounds and having varying levels of mental health could help gain a better idea of how the app works among various users.

Lastly, although the application proved to be effective in supporting mood and alleviating stress, new iterations may consider including support group features or gamification concepts to stimulate user interest and motivation. Artificial intelligence (AI) would also have the potential to provide more personalized interventions, so the app is updated based on the needs of different users regarding their mental health over time (Torous et al., 2020).

CONCLUSION

To sum it all up, the Mental Health and Wellness Support App demonstrated potential in being effective in enhancing mental health and decreasing stress and mood improvement among its users. It is possible to explain the effectiveness of the app by means of utilizing self-help, personalized tools, paying attention to cultural relevance, and addressing the subject of spiritual guidance. Although the number of individuals engaged in Therapist Consultations was low, the high satisfaction rates among the users and the dramatic change of outcome in mental health conditions are strong evidence that digital interventions are essential in supporting the mental health needs of underserved individuals. Greater access to professional therapy and additional customization of the app features would be the future improvements that could increase the impact and reach of the app in the future.

REFERENCES

Ali, T., & Siddiqi, M. A. (2020). Mental health services in Pakistan: The role of digital interventions. *Journal of Pakistan Psychiatric Society*, 37(1), 45-58.

Andersson, G., & Cuijpers, P. (2009). Internet-based and other computerized psychological treatments for adult depression: A meta-analysis. *Journal of Affective Disorders*, 118(1-3), 9-19.

Firth, J., Rosenbaum, S., & Stubbs, B. (2017). The efficacy of mobile mental health interventions for anxiety and depression: A systematic review and meta-analysis. *Psychiatry Research*, 249, 108-115.

Jorm, A. F. (2012). Mental health literacy: Public knowledge and beliefs about mental disorders. *The British Journal of Psychiatry*, 181(5), 396-401.

Khan, M. S., Raza, A., & Ali, F. (2018). Prevalence of anxiety and depression in urban Pakistan: An exploratory study. *Journal of Mental Health*, 27(5), 460-468.

Kessler, R. C., Berglund, P., & Demler, O. (2009). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, 62(6), 593-602.

Lattie, E. G., Ra, K., & Mohr, D. C. (2019). Digital mental health interventions for depressive and anxiety disorders: A systematic review. *Journal of the American Medical Association*, 322(10), 934-944.

Mumtaz, M. U., Malik, M. M., & Ahmad, S. (2016). Mental health professionals in Pakistan: The shortage and challenges. *Pakistan Journal of Medical Sciences*, 32(2), 394-397.

Nasir, S. I., Khan, N., & Shah, S. A. (2020). Mobile mental health apps for low-income

countries: An exploratory study. *Global Health Action*, 13(1), 1804004.

Rahman, A., Iqbal, Z., & Roberts, C. (2016). Digital interventions for mental health in low-income countries: A systematic review. *Lancet Psychiatry*, 3(5), 429-437.

World Health Organization (WHO). (2017). Mental health in low-income countries. *World Health Organization*.

World Health Organization (WHO). (2019). Mental health: Strengthening our response. *World Health Organization*.

Ali, T., & Siddiqi, M. A. (2020). Spiritual and psychological care in Muslim communities. *Journal of Health Psychology*, 35(4), 225-237.

Khan, F., Arshad, A., & Usman, A. (2019). Integration of spiritual guidance in mental health apps: A cultural perspective. *Mental Health and Spirituality*, 5(2), 112-118.

Firth, J., & Koyanagi, A. (2021). Digital mental health interventions in Pakistan: Challenges and opportunities. *Asian Journal of Psychiatry*, 56, 102525.

Alim, S. A., Iqbal, R., & Abdullah, A. (2020). Cultural adaptation of digital mental health interventions in Muslim-majority countries. *Psychiatry Research*, 284, 112761.

Baumel, A., Muench, F., & Muench, F. (2017). Digital mental health: The future of mental health care. *Journal of Medical Internet Research*, 19(7), e269.

Brennan, P., Smith, J., & Thompson, G. (2020). The importance of culturally adapted digital interventions in improving mental health outcomes. *Journal of Community Psychology*, 48(1), 178-192.

Chakraborty, R., Ghosh, S., & Mukherjee, A. (2021). Peer support in mobile health applications: A potential tool for enhancing mental health outcomes. *Journal of Mental Health*, 20(2), 73-82.

Fleming, T., Bavin, L., & Stasiak, K. (2020). Digital interventions for anxiety and depression: A review. *Australian & New Zealand Journal of Psychiatry*, 54(5), 421-429.

Freeman, D., Haselton, P., & Bailey, C. (2017). Virtual reality and mental health: How VR can enhance therapeutic outcomes. *Psychiatry Research*, 250, 231-237.

González, A., Martínez, E., & Sánchez, P. (2020). The global burden of mental disorders: An overview. *World Psychiatry*, 19(3), 379-380.

Gurib-Fakim, A. (2021). Digital mental health interventions in Africa: Exploring potential. *Journal of Digital Health*, 8(2), 45-50.

Hidalgo, J. A., Sánchez, A., & Fernández, A. (2021). Exploring the potential of digital mental health solutions in low-income countries. *Global Health Action*, 14(1), 1924732.

Khanna, R., Sharma, S., & Jain, S. (2020). Stress management interventions in mobile health apps: A systematic review. *International Journal of Stress Management*, 27(4), 322-334.

Khan, M. F., Shah, R., & Bibi, A. (2019). Mobile mental health applications in Pakistan: Challenges and opportunities. *Journal of Public Health*, 43(1), 12-19.

Lund, C., Breen, A., & Flisher, A. J. (2018). Mental health and development in low-income countries: A public health approach. *Lancet Psychiatry*, 5(7), 615-625.

Mahmood, A., Iqbal, R., & Shahid, M. (2020). Integrating spiritual guidance into mental health apps in Pakistan: A study of effectiveness. *Journal of Psychology*, 31(4), 481-487.

Muench, F., Sallis, J. F., & Patel, S. (2020). Artificial intelligence in mobile health apps: How AI can help personalize mental health interventions. *Journal of the American Medical Informatics Association*, 27(6), 888-896.

Patel, V., Saxena, S., & Lund, C. (2018). The importance of mental health in low-income countries: A global perspective. *The Lancet Psychiatry*, 5(10), 812-817.

Rosenthal, R. E., Lyon, A. B., & Kaplan, M. (2021). The impact of mood tracking on mental health management: A systematic review. *Journal of Affective Disorders*, 277, 262-273.

Schueller, S. M., Mohr, D. C., & Lattie, E. G. (2019). The impact of mobile mental health

apps on depression and anxiety symptoms. *Journal of Medical Internet Research*, 21(2), e12330.

Sander, L. B., Baumeister, H., & Rausch, S. (2021). Mobile apps for mental health in low-resource settings. *Global Mental Health*, 8, e26.

Schueller, S. M., & Mohr, D. C. (2019). The potential of mobile health applications in addressing mental health issues in developing countries. *World Psychiatry*, 18(4), 428-434.

Zhou, L., Shi, M., & Lin, H. (2020). Therapist support in mobile mental health apps: Enhancing therapeutic engagement and outcomes. *Psychiatric Services*, 71(12), 1192-1198.

Alavi, M., Hassan, M., & Rahman, Z. (2019). The effectiveness of mobile mental health interventions in managing anxiety and depression. *Journal of Digital Health*, 25(2), 56-66.

Ali, T., Iqbal, M., & Siddiqi, S. (2020). Cultural considerations in digital mental health interventions for Muslim populations. *International Journal of Social Psychiatry*, 66(5), 437-445.

Baumel, A., Muench, F., & Muench, F. (2017). Digital mental health: The future of mental health care. *Journal of Medical Internet Research*, 19(7), e269.

Christensen, H., Griffiths, K. M., & Korten, A. (2010). The internet and mental health care. *Australian and New Zealand Journal of Psychiatry*, 44(2), 108-116.

Cohen, A., Williams, D., & Johnson, E. (2017). Religious coping and mental health: A review of the literature. *Journal of Religion and Health*, 56(4), 1175-1188.

Firth, J., Rosenbaum, S., & Stubbs, B. (2017). The efficacy of mobile mental health interventions for anxiety and depression: A systematic review and meta-analysis. *Psychiatry Research*, 249, 108-115.

Fleming, T., Bavin, L., & Stasiak, K. (2020). Digital interventions for anxiety and depression: A review. *Australian & New Zealand Journal of Psychiatry*, 54(5), 421-429.

Gurib-Fakim, A. (2021). Digital mental health interventions in Africa: Exploring potential. *Journal of Digital Health*, 8(2), 45-50.

Khan, M. F., Shah, R., & Bibi, A. (2017). Integration of religious content in mental health apps: A cultural perspective. *Journal of Community Psychology*, 45(3), 321-330.

Muench, F., Sallis, J. F., & Patel, S. (2020). Artificial intelligence in mobile health apps: How AI can help personalize mental health interventions. *Journal of the American Medical Informatics Association*, 27(6), 888-896.

Naslund, J. A., Aschbrenner, K. A., & Marsch, L. A. (2016). The role of mobile health technology in reducing mental health treatment disparities in low-income communities. *Psychiatric Services*, 67(7), 774-779.

Patel, V., Saxena, S., & Lund, C. (2018). The importance of mental health in low-income countries: A global perspective. *The Lancet Psychiatry*, 5(10), 812-817.

Schueller, S. M., Mohr, D. C., & Lattie, E. G. (2019). The impact of mobile mental health apps on depression and anxiety symptoms. *Journal of Medical Internet Research*, 21(2), e12330.

Torous, J., Hsin, H., & Keshavan, M. (2020). The role of digital interventions in mental health care: New developments and future directions. *Journal of Psychiatry*, 27(1), 23-32.

Ybarra, M. L., & Eaton, W. W. (2021). The role of digital mental health interventions in improving treatment access. *Journal of Technology in Behavioral Science*, 6(3), 126-135.