



Enhancing Mental Health through a Mobile Application: A Comprehensive Study

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Abstract : This study investigates the impact of a novel mobile application designed to improve mental health and well-being. With mental health concerns on the rise, innovative interventions are crucial. The application integrates evidence-based techniques and personalized interventions. Utilizing a mixed-methods approach, quantitative analysis and qualitative user feedback will be combined. Participants will engage with the application over a specified period, with mental health outcomes measured using standardized tools. Quantitative analysis will assess changes in stress, anxiety, depression, and overall well-being. Additionally, qualitative data from user surveys and interviews will provide insights into user experience and effectiveness. Addressing challenges such as user engagement and privacy will be paramount, with ethical considerations maintained throughout. The study aims to contribute valuable insights into the effectiveness of mobile applications in promoting mental health, thus informing future development and research in digital mental health interventions.

IndexTerms - Innovative interventions, evidence-based techniques, qualitative user feedback.

1. INTRODUCTION

In the contemporary digital era, where smartphones and technology permeate every aspect of our daily lives, innovative solutions are emerging to address pressing global challenges. One such challenge that has garnered increasing attention is the pervasive issue of mental health. The rising prevalence of mental health disorders, coupled with barriers to accessing traditional therapeutic interventions, necessitates a paradigm shift towards saleable and accessible solutions.

This research delves into the realm of mental health applications, seeking to understand the transformative potential of a cutting-edge mobile application designed to augment mental well-being. Harnessing the power of technology, this application integrates evidence-based therapeutic strategies, personalized interventions, and user-friendly interfaces to provide a comprehensive and user-centric approach to mental health support. As mental health continues to be a global public health concern, the need for accessible and effective interventions becomes more pronounced. Traditional barriers such as stigma, limited access to mental health professionals, and geographical constraints can impede individuals from seeking help. The ubiquitous nature of smartphones and the increasing digital literacy among diverse populations offer a unique opportunity to bridge these gaps and revolutionize mental health care delivery.

This study aims to contribute to the burgeoning field of digital mental health interventions by rigorously examining the impact of the proposed mobile application. By combining quantitative assessments with qualitative insights from user experiences, the research seeks to ascertain the application's efficacy, usability, and potential challenges. Additionally, ethical considerations surrounding user privacy and data security will be carefully addressed to ensure the responsible deployment of technology in the mental health landscape. As we navigate the intersection of technology and mental health, this research endeavors to shed light on the potential of mobile applications as transformative tools. By exploring the efficacy and user acceptance of such interventions, we aim to provide valuable insights that can inform the development of future mental health applications and contribute to the ongoing discourse on leveraging technology to enhance psychological well-being. In doing so, we aspire to pave the way for a more accessible, inclusive, and effective approach to mental health support in our interconnected world.

2. BACKGROUND

2.1 Flutter

Flutter is an open-source UI (User Interface) software development kit. Flutter provides a rich set of customizable widgets and tools that enable developers to create visually appealing and responsive user interfaces and by leveraging Flutter's framework for building cross-platform mobile applications with a single code-base. It is used for building natively compiled applications for mobile and web. Flutter allows developers to write code once and deploy it across multiple platforms, which can significantly reduce development time and effort. Flutter offers a wide range of pre-designed widgets that are customized to create an intuitive and user-friendly interface for the mental health app. Flutter's widget library is utilized to design screens for various features such as mood tracking, journaling, therapy sessions, relaxation exercises, etc. The mental health application may require integration with back-end services such as databases, APIs, or authentication systems. Flutter facilitates seamless integration with back-end services through packages and plugins, enabling to retrieve and store user data securely.

2.2 Firebase

Firebase is utilized for various functionalities ranging from user authentication and data storage to real-time communication and analytics. Firebase offers a real-time database called Firestore or the older Realtime Database. These NoSQL databases are ideal for storing and syncing data across client devices in real-time. Real-time updates ensure that users always have access to the latest information. Firebase Authentication provides ready-to-use UI libraries and back-end services for authenticating users to the app. This is crucial in a mental health app to ensure that user data remains secure and private. Users can sign up, sign in, and securely authenticate using methods such as email/password, phone number, or third-party providers like Google.

2.3 Python

Python, the language, serves as the backbone for implementing various components of the chatbot's functionality. Python offers powerful libraries such as NLTK (Natural Language Toolkit), and TensorFlow for processing and understanding human language. In the context of a mental health chat-bot, NLP techniques are used to analyze user input, extract relevant information, and generate appropriate responses. This involves tasks like tokenization, part-of-speech tagging, named entity recognition, sentiment analysis, and intent classification. Python's extensive ecosystem of machine learning and AI libraries, such as scikit-learn, TensorFlow, and PyTorch, is leveraged to enhance the capabilities of the chat-bot. This may involve training machine learning models for tasks like sentiment analysis, emotion detection, or personalized recommendation systems based on user interactions. Python is used to integrate the chat-bot with external APIs and databases to access relevant information and resources. For example, the chat-bot may need to retrieve data from mental health databases, access therapy resources, or interact with other services for authentication and user management.

3. LITERATURE REVIEW

In 2020, Han H, Wang S, Zhang K, et al. [1] This systematic review and meta-analysis examine the effectiveness of mobile health (mHealth) technologies, including mental health applications, in improving healthcare service delivery processes. The study evaluates various outcomes such as patient engagement, treatment adherence, and clinical outcomes.

In 2017, Sucala, M., Cuijpers, P., Muench, F., Cardoso, R., Soflau, R., & Dobrean, A. [2] The review evaluates the potential role of mobile applications in mental health care delivery. The authors discuss the features and functionalities of existing mental health apps, their effectiveness in improving mental health outcomes, and considerations for integrating apps into clinical practice.

In 2017, Firth J, Torous J, Nicholas J, et al. [3] This meta-analysis evaluates the efficacy of mobile applications for anxiety and depression. The study synthesizes findings from randomized controlled trials to assess the effectiveness of app-based interventions in reducing symptoms of anxiety and depression and improving overall mental well-being.

In 2014, Enock, P. M., Hofmann, S. G., & McNally, R. J. [4] This randomized clinical trial evaluates the effectiveness of a mobile app intervention for reducing symptoms of anxiety and depression in college students. The study demonstrates significant reductions in anxiety and depression symptoms among participants who used the mobile app compared to those in the control group.

In 2017, Firth, J., Torous, J., Nicholas, J., Carney, R., Rosenbaum, S., & Sarris, J. [5] This meta-analysis evaluates the efficacy of smartphone-based interventions for depressive symptoms. The study finds that smartphone apps targeting depression can be effective in reducing depressive symptoms, particularly when incorporating evidence-based techniques such as cognitive-behavioral therapy (CBT) and mindfulness.

4. PROPOSED SYSTEM

The proposed system is a simpler and merged version of all the 4 different most accessed modules related to the problem. These are- talking to a professional, talking to a chat bot that will give suggestions on seeking self-help or professional help, interacting with the social world to freely express the users' thoughts and get help, making it pocket friendly. The system solves all the problems of the user by providing them with different medical professionals and facilities to track their health. Users may choose the slot and time as and when needed. The user can plan and book a fully-private interactive session with any professional available. The user may even cancel his booking using his login credentials. After a successful booking, user can make payment via a demo credit card and gets an acknowledgement email too.

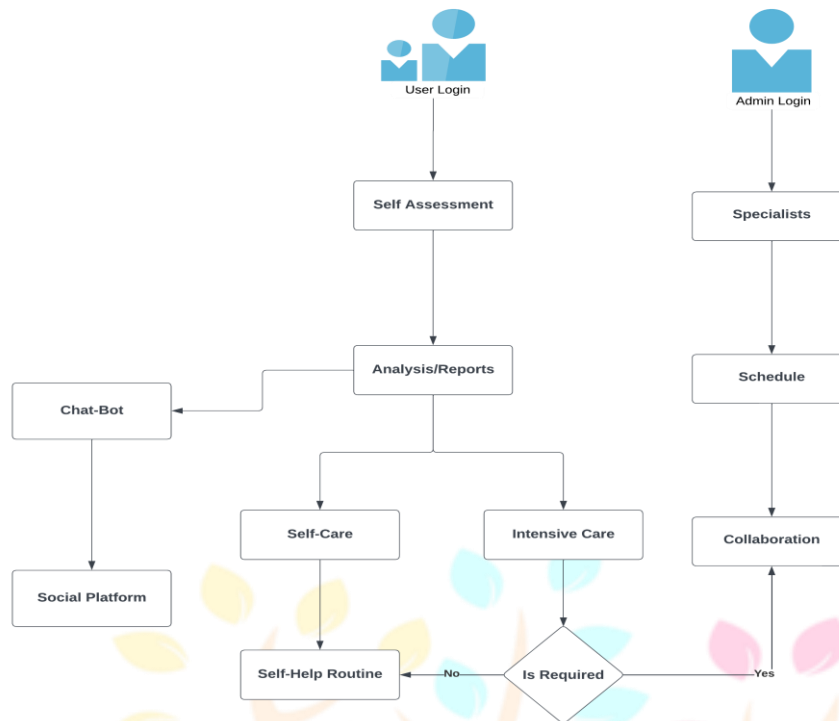


Fig.1. Use Case Diagram

The use case diagram, outlines a series of steps for road mapping an interactive application using application development techniques, particularly with the help of Flutter and Firebase. Here's a breakdown of the Use Case Diagram:

- i. **User Registration:** Users have to first create an account in the system by registering themselves and then can login into the system to access the services.
- ii. **Login:** Login to access the app features.
- iii. **Take assessment:** Enables the system to understand the user's requirements related to their mental health and provide help accordingly.
- iv. **Get Results:** Gives the user knowledge about their mental health status and helps them to know what type of help they actually really require.
- v. **Monitoring:** In this step there are different types of monitoring where user can monitor their sleep, heart rate, oxygen, etc depending upon the availability of wearable trackers.
- vi. **Professional/Self Help:** After getting assessment results user gets the options to seek professional help or self-help depending upon the severity of the situation. With Professional Help it further provides an option to talk to the medical professionals by selecting the doctor according to their performance and rating.
- vii. **Chat-bot:** Chat-bot provides suggestions related to the type of questions asked for help. Chat-bot can suggest professional help or self-help measures for the user.
- viii. **Social Platform:** The user can login to the social platform using the same credentials like they did to login to the application and then interact with the social world post, share, like and comment.
- ix. **Slot Cancellation:** Users may even cancel their slot booking if they wish.
- x. **Cost Calculation & Credit Card Payment:** They can make payment online via credit card.
- xi. **Receipt Emailing:** Every user gets an instant email notification regarding the payment being made.
- xii. **Reviewing/Feedback:** Users can even provide feedback into the system by filling up feedback form.

Summary: Overall, the use case diagram provides a visual representation of the functionalities and interactions within the mental health application, helping to clarify user requirements and system behavior. It serves as a valuable tool for communication between stakeholders, including developers, designers, and end-users, during the application development process.

4.1 Implementation

The different stages of the application and the features along-with it are shown in the below Fig.2 login screen from the first page to the last page in the application. Every feature comes with a different uses and all of these are discussed below:

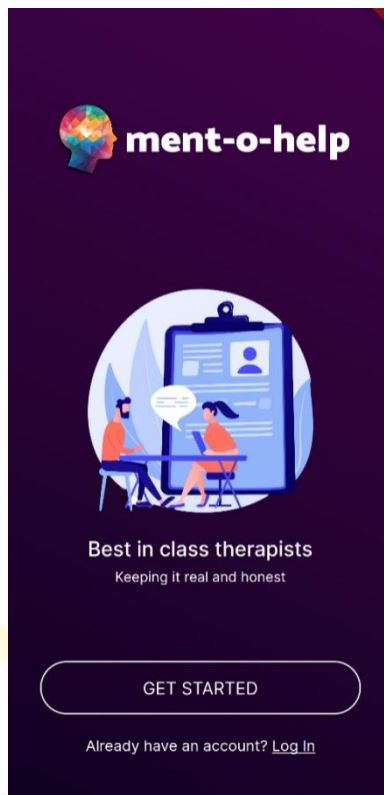


Fig.2. Ment-o-Help Application Home Screen

- i. **Users:** The end-users that use the mental health application are directed to the home screen and then have to create an account by logging in to the application or by registering into the application using their credentials or using Google login or email as shown in Fig.3.
- ii. **User Profiles:** Inside the application, when a user first registers, a profile of the user is made that consists of a few details about the user like their user identification, and name (if not kept discreet). This user profile is also a way to keep in check of their medical history, like a personal file.
- iii. **Creating a Profile:** While creating a profile, details such as name, email, phone number, and password are recorded. These details are essential for a user to log into the application for further assistance.

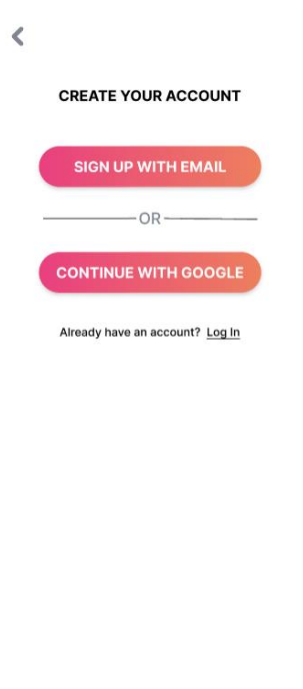


Fig.2. Create Account Screen

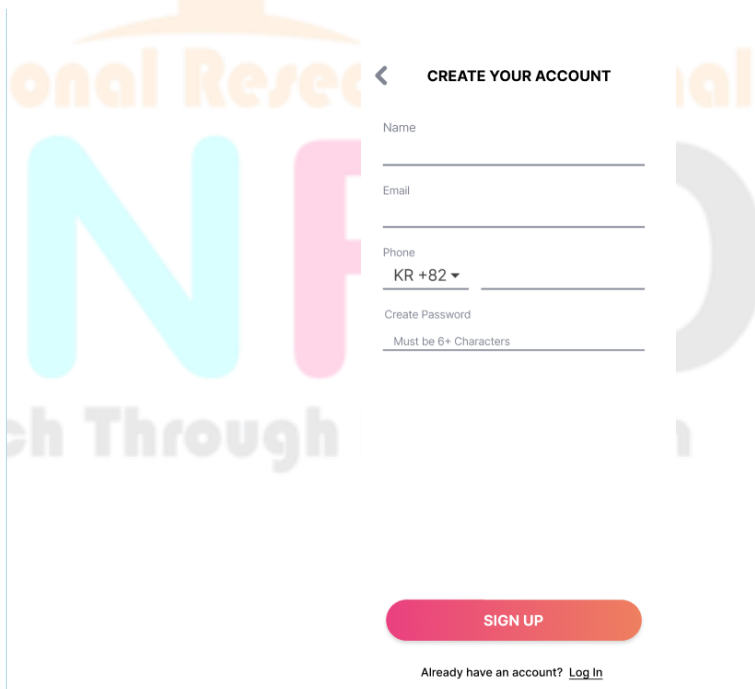


Fig.3. Signup Screen

5. RESULTS AND DISCUSSION

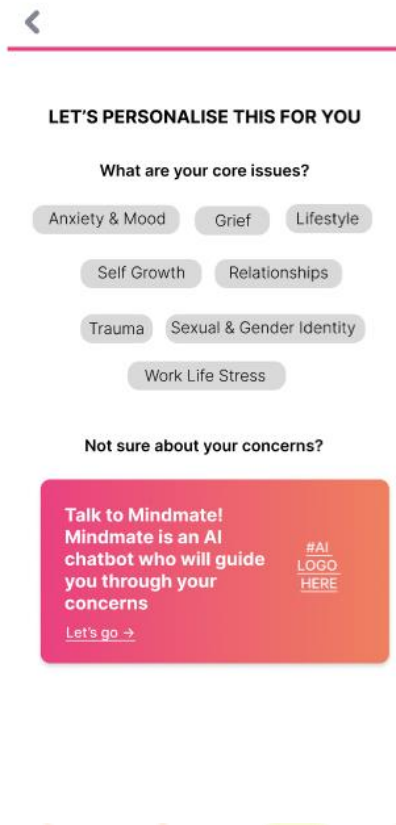


Fig.5. UI of the Application



Fig.6. Appointment Booking Screen

The result of a mental health application project would be a software application or system that allows users to interact with specialists like psychologists, psychiatrists, wellness coaches, etc. by taking a mental health assessment and then getting necessary help from the results, like getting self help or consulting a doctor by booking an appointment. The system would use an advanced questionnaire PHQ-9 and GAD-7 and assigning scores and weightage to every question and then depending upon the score providing the suggestions for necessary help.

6. CONCLUSION & FUTURE SCOPE

A mental health application is a digital tool designed to support and improve mental well-being. These apps offer a range of features and resources to help users manage their mental health, reduce stress, and enhance their overall emotional and psychological well-being.

In summary, mental health applications play a crucial role in promoting well-being and providing convenient tools and resources for individuals seeking to manage their mental health. They offer self-help solutions, educational materials, and a sense of community, making them a valuable complement to traditional mental health care. However, it's important for users to choose reputable and evidence-based apps and to consult with healthcare professionals when needed, as these apps are not a substitute for professional treatment in all cases.

To implement and also include mental health tracking for users to track their mental health by means of interactive mental health questionnaires and mental health games to determine the status of mental well-being of individuals. Mental strength testing software which will determine mental strength by measuring mental strength. Mental Health clubs and events to be held in the future to draw engagement and to create awareness. Developing a social media platform for users to feel free to talk about their problems and share their experiences is the main focus of the application. By keeping the user identity anonymous users can make anonymous social media posts and share their problems openly and take feedback from other users in the application who might've had a similar experience in the past or might want to add some suggestions to the situation of the user. Social media is a growing industry and integrating it into the mental help application would prove to be of great use. According to the surveys conducted on campus, the maximum number of people have shown a need for such a platform that has all the help under one roof, which is this application focus. With this application, users can make friends, talk to people online, consult professionals about their problems and seek help for free. The concept of this application could prove useful to save the lives of many people and create a community where people are openly talking and show up for each other when in need.

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