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## REVIEW AND DESIGN OF MENTAL HEALTH APPLICATION USING COGNITIVE BEHAVIOURAL THERAPY

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### ABSTRACT

In today's world, mental health has become a critical issue that affects people of all ages, and various approaches have been developed to improve mental wellness. One such solution is a mental health tracker, a digital tool that enables individuals to monitor their mental health and keep track of their mood, activities, and thoughts.

This mental health tracker, powered by Flutter and Firebase, incorporates the principles of Cognitive Behavioural Therapy (CBT), a widely used form of psychotherapy that focuses on changing negative patterns of thought and behaviour. The app enables users to track their moods and thoughts, and participate in CBT-based activities.

The app is built using Flutter, a modern and user-friendly cross-platform framework, Firebase, a cloud-based platform that provides real-time database and authentication capabilities. With its user-friendly interface, individuals can easily log their moods and thoughts and access CBT-based resources and activities.

In conclusion, this mental health tracker powered by Flutter and Firebase is an innovative solution that leverages technology to help individuals improve their mental health. The combination of mental health tracking and CBT-based exercises and activities provides a comprehensive approach to mental wellness, making it an effective tool for individuals looking to take control of their mental health.

**Keywords:** Mental Health, Cognitive Behavioural Therapy, Disorder, Issues, Goals, Anxiety, Depression, Flutter Application.

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### I. INTRODUCTION

Mental health is a critical aspect of an individual's well-being and is an essential factor in leading a healthy and productive life. In recent years, the prevalence of mental health disorders such as anxiety, depression, and stress has been on the rise, and the need for accessible and effective treatment options has become increasingly important. One of the most commonly used evidence-based treatments for mental health is Cognitive Behavioural Therapy (CBT). CBT is a form of psychotherapy that focuses on changing negative patterns of thought and behaviour to alleviate psychological distress[13].

The advancement of technology has brought about new opportunities for the delivery of mental health services, including the use of mental health applications. These applications use a combination of behavioural and cognitive techniques to provide users with an accessible, convenient and cost-effective treatment option for mental health issues. In this study, we propose the development of a mental health application that combines the principles of CBT and is built using the Flutter framework and Firebase as its back-end database.

Flutter is an open-source UI toolkit for building high-quality, native experiences for mobile, web, and desktop from a single code base. Firebase is a popular cloud-based real-time No SQL database service, providing a scalable and efficient solution for storing and retrieving data. The combination of these technologies allows us to create a responsive, user-friendly and secure mental health application[4].

The mental health application aims to provide users with a self-help tool that incorporates the principles of CBT to treat mental health issues. It will be designed to provide a range of modules, including mood tracking, cognitive restructuring, and behavioural activation. The application will be user-friendly, with a simple and intuitive interface, making it accessible to a wide range of users. The application will be designed to be a

standalone treatment option, but it will also be integrated with mental health professionals, allowing for easy referral and follow-up[11].

In conclusion, the development of a mental health application with CBT and built with Flutter and Firebase has the potential to provide a much-needed and accessible solution for the treatment of mental health issues. The application will provide users with an affordable and convenient option for improving their mental health, while also supporting mental health professionals in providing evidence-based care. The study will contribute to the existing body of knowledge in the field of mental health and technology, and will provide valuable insights into the potential benefits and limitations of this innovative approach to mental health treatment.

## II. LITERATURE REVIEW

Sr. No.	Existing Technology	Paper Details	Outcomes
1	Mental Health Tracking App	Evaluated impact on mood and stress[1]	Significantly improved mood and stress levels
2	Mobile applications	Systematic review of effectiveness[2]	Majority of studies reported positive results, but evidence limited by small sample sizes and short follow-up periods
3	Mental health tracking app	Evaluated effectiveness for improving mood and reducing stress[3]	App was effective in improving both mood and stress levels
4	Self-tracking	Investigated use for mental wellness[5]	Self-tracking can be a useful tool for monitoring mental health, but highlighted limitations such as lack of understanding of data and potential for self-criticism
5	Mood tracking app	Examined college student's experiences[6]	App was perceived as helpful for monitoring mood and identifying triggers, but highlighted limitations such as difficulty using app consistently and privacy concerns
6	Self-tracking technologies	Systematic review of literature[7]	Self-tracking can be a useful tool for monitoring mental health, but further research needed to determine most effective tools and strategies
7	Mobile technology-based CBT	Systematic review and meta-analysis[8]	Effective in reducing symptoms of anxiety and depression
8	Mobile app for depression management	Randomized controlled trial[9]	Effective in reducing symptoms of depression
9	Mental health apps for anxiety and depression	Randomized controlled trial[10]	Impact on symptoms of anxiety and depression

## III. BACKGROUND AND MOTIVATION

Mental health has become a critical issue in today's fast-paced world, affecting individuals of all ages and backgrounds. Despite advances in mental health treatments, many individuals continue to struggle with mental health conditions, such as anxiety and depression, due to various barriers, including stigma, access to care, and cost[2,5].

To address these challenges, digital mental health tools have emerged as a promising solution, offering individuals an easy and convenient way to monitor their mental health and access resources to improve their

well-being. Mental health trackers, in particular, have gained popularity in recent years, as they provide individuals with a simple and user-friendly way to track their moods and thoughts, set goals, and participate in mental health activities[1].

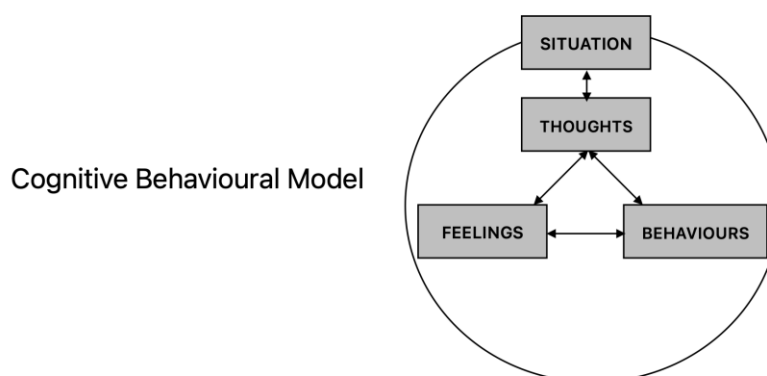
Cognitive Behavioural Therapy (CBT), a widely used form of psychotherapy that focuses on changing negative patterns of thought and behaviour, is a particularly effective approach for improving mental health outcomes. However, access to CBT can be limited, as it typically requires one-on-one sessions with a trained therapist, which can be time-consuming and costly. The integration of CBT into a mental health tracker powered by Flutter and Firebase presents a unique opportunity to address the challenges faced by individuals seeking mental health support. By combining the principles of CBT with the convenience and accessibility of digital mental health tools, individuals can improve their mental health in a way that is both effective and affordable. Flutter, a modern and user-friendly cross-platform framework, and Firebase, a cloud-based platform that provides real-time database and authentication capabilities, offer several advantages in building a mental health tracker. The use of Flutter enables the development of visually appealing and interactive applications, while Firebase provides real-time data management and secure user authentication, ensuring the privacy and security of users' data[4].

In conclusion, the motivation behind building a mental health tracker powered by Flutter and Firebase and incorporating CBT is to provide individuals with a comprehensive solution for improving their mental health. The app's combination of mental health tracking and CBT-based exercises and activities offers a unique and effective approach to mental wellness, making it an important tool for individuals looking to take control of their mental health[13].

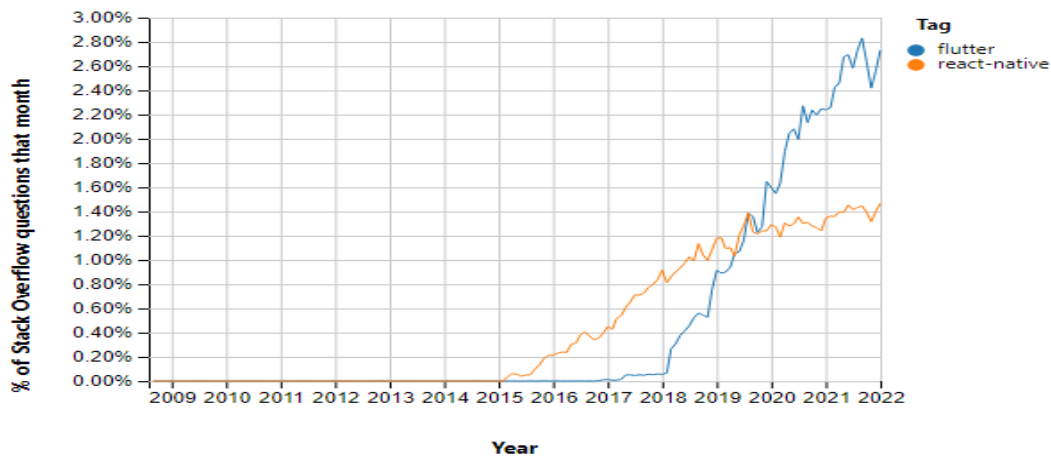
#### IV. PROPOSED SYSTEM

A Flutter application will be developed to monitor the mental health of individuals by employing Cognitive and Behavioural Therapy, which has strong empirical evidence in treating mood, sleep, chronic pain, and anxiety disorders.

Cognitive Behavioural Therapy:- Cognitive Behavioral Therapy is a widely researched and widely used form of psychotherapy that has been proven to be effective in treating a wide range of mental health disorders. CBT works by helping individuals to identify negative and irrational thoughts and beliefs, and to change these thoughts to improve their overall mental well-being. The therapy is structured, time-limited, and can be delivered in a variety of settings. CBT has been shown to be effective in treating depression, anxiety, phobias, and a range of other mental health disorders, and the effects of CBT can be long-lasting and more sustainable than medication.



Feasibility Therapy:- According to our feasibility study we have determined that Flutter is the best option to develop such kind of an app so the user will have the freedom to use it on any device. Normally, we have to write different codes/programs every time we need to run our app on a different platform. Flutter completely eliminates this problem as it uses DART programming language. Using DART programming language we can write a single standardized piece of code that can run on Android, iOS as well as Windows. Flutter comprises of an advance feature that is HOT RELOAD and HOT RESTART which allows us to test our changes in our app almost 10 times than the standard reload/refresh rate.



➤ When to use Flutter?

1. When you want a full-fledged mobile application
2. When you want to create an app for retail business.
3. When you want to create an app for fin-tech and bank.
4. When the app is to be made with tighter deadline and budget restraints.

➤ Why Flutter is the most popular cross platform mobile-SDK?

1. It is platform-agnostic.
2. It simplifies and speeds up application development.
3. It is easy to learn and use.
4. It scales well.
5. Flutter apps offer an excellent user experience.

### V. MAJOR MODULES

This section elaborates about the methodology and modules to be used in proposed app. The below flowchart shows the proposed flow of the application.

Questionnaire - This task focuses on making the app friendly to its target audience. We have to remember that potential users of this app would be suffering from mental illness. So, we have to assume that asking a lot of questions won't be the best choice. Rather than asking for subjective answers we would provide objective questions to the users which would help them answer the questions easily. On the basis of the response to these questions provided by the user we would analyse the mental state of the user and provide feedback and recommendations.

Daily Journal - Daily journal is a critical aspect of CBT that plays a crucial role in helping individuals understand and manage their thoughts, emotions, and behaviors. By providing a space for self-reflection and tracking progress over time, journaling can support individuals in their journey towards positive change and improved mental health.

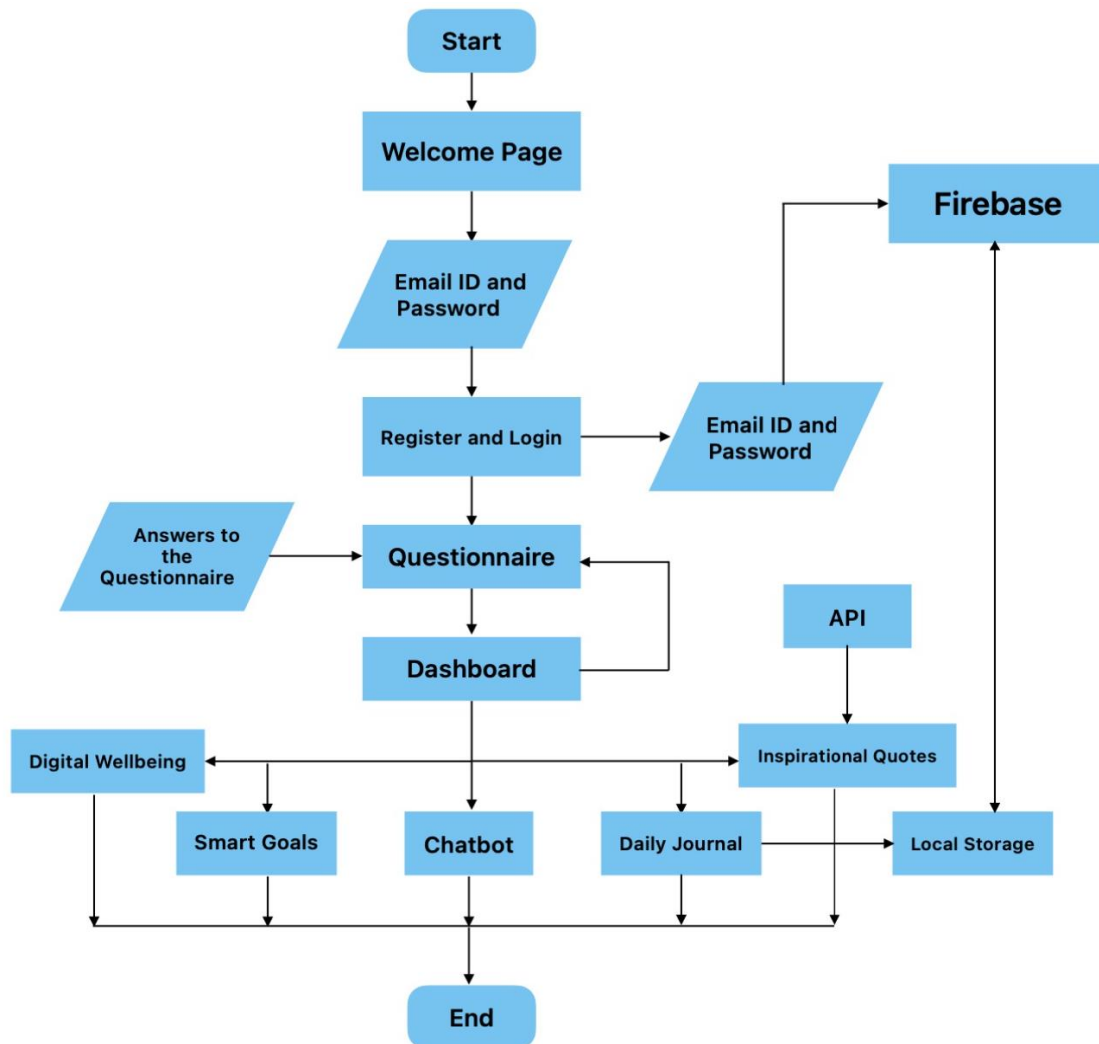
Positive Activities - This feature will recommend specific activities to the user that will help the user to socialise and improve their mental stability. Some of these activities are:-Meditation, exercise, proper Diet plan, stories from recovered patients, Inspirational Quotes.

Smart Goals - Smart goals play a critical role in the success of CBT. They provide individuals with a clear, tangible way to measure their progress and stay motivated, while also helping therapists track the effectiveness of therapy and make necessary adjustments to the treatment approach. By setting smart goals and tracking progress, individuals can feel a sense of control over their mental health and feel confident about their ability to overcome their challenges.

Digital Wellbeing - Digital Wellbeing in CBT provides individuals with a convenient, accessible, and efficient way to manage their mental health. The integration of digital technology into therapy provides individuals with the

tools and resources they need to track their progress, receive feedback from mental health professionals, and achieve their mental health goals. The use of digital tools and applications in CBT can significantly improve the therapeutic process, making it easier for individuals to work through their therapy and achieve better mental health.

Chat bot - It will act as a digital companion that will provide instruction to the user on how to use the application to the best of their interest. It is a simple chat bot that will allow the user to provide feedback directly to the developers and also give suggestions on how to improve the user experience.



## VI. CONCLUSION

The research paper focuses on the development of a mental health tracker powered by Flutter and Firebase, incorporating the principles of Cognitive Behavioural Therapy (CBT). The aim of the mental health tracker is to provide individuals with a comprehensive solution for improving their mental Health and Wellbeing. The combination of mental health tracking and CBT-based exercises and activities offers a unique and effective approach to mental wellness. The literature review also supports the positive impact of mental health tracking apps on mood and stress levels, and the effectiveness of mobile applications in improving mental health. The use of Flutter and Firebase in the development of the mental health tracker ensures a user-friendly and secure platform for users to manage and track their mental health. The mental health tracker presents a promising solution to the challenges faced by individuals seeking mental health support and can serve as an important tool for individuals looking to take control of their mental health.



## VII. REFERENCES

- [1] Kai Wang et al "A systematic review of the effectiveness of mobile apps for monitoring and management of mental health symptoms or disorders", *Journal of Psychiatric Research*, Volume 107, 2018, Pages 73-78, ISSN 0022-3956
- [2] Elisha London et al "Empowering 8 Billion Minds: Enabling Better Mental Health for All via the Ethical Adoption of Technologies" *NAM Perspect.* 2019, PMID: 34532674; PMID: PMC8406599.
- [3] Richard A. Brown et al, "Rationale, design and pilot feasibility results of a smartphone-assisted, mindfulness-based intervention for smokers with mood disorders: Project mSMART MIND", *Contemporary Clinical Trials*, Volume 66, 2018, Pages 36-44, ISSN 1551-7144
- [4] Apoorva Bagul et al, "A Mental Health Tracker Built using Flutter and Firebase", *International Journal of Scientific Development and Research*, Volume 7, Issue 1, 115-118, ISSN: 2455-2631
- [5] Christina Kelley et al "Self-tracking for Mental Wellness: Understanding Expert Perspectives and Student Experiences". In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17)*. Association for Computing Machinery, New York, NY, USA, 629–641
- [6] Schueller SM, "Understanding People's Use of and Perspectives on Mood-Tracking Apps: Interview Study", *JMIR Ment Health* 2021;8(8):e29368, doi: 10.2196/29368, PMID: 34383678, PMID: 8387890
- [7] Maria Ntouvaleti et al "Validity of the Open Card Sorting Method for Producing Website Information Structures". In *Extended Abstracts of the 2022 CHI Conference on Human Factors in Computing Systems (CHI EA '22)*. Association for Computing Machinery, New York, NY, USA, Article 374, 1–7.
- [8] Dilys Yan-wing Chow et al, "Information technology-based versus face-to-face cognitive-behavioural therapy for anxiety and depression: A systematic review and meta-analysis", *Journal of Affective Disorders*, Volume 310, 2022, Pages 429-440, ISSN 0165-0327
- [9] McCloud T et al, "Effectiveness of a Mobile App Intervention for Anxiety and Depression Symptoms in University Students: Randomized Controlled Trial", *JMIR Mhealth Uhealth* 2020; 8(7):e15418, DOI: 10.2196/15418
- [10] Oliveira Carla et al, "Effectiveness of Mobile App-Based Psychological Interventions for College Students: A Systematic Review of the Literature", *Frontiers in Psychology*, Volume 12, 2021, DOI:10.3389/fpsyg.2021.647606, ISSN: 1664-1078
- [11] Greenberg, P.E., Fournier, AA., Sisitsky, T. et al, "The Economic Burden of Adults with Major Depressive Disorder in the United States" (2010 and 2018). *Pharmacoeconomics*,39, 653–665 (2021)
- [12] Liu Q, He H, Yang J, Feng X, Zhao F, Lyu J. "Changes in the global burden of depression from 1990 to 2017": findings from the Global Burden of Disease Study. *J Psychiatr Res.* 2020;126:134–40
- [13] Rothbaum, B. O., Meadows, E. A., Resick, P., & Foy, D. W. (2000). "Cognitive-behavioral therapy". In E. B. Foa, T. M. Keane, & M. J. Friedman (Eds.), *Effective treatments for PTSD: Practice guidelines from the International Society for Traumatic Stress Studies* (pp. 320–325). The Guilford Press.
- [14] Kessler RC, Chiu WT et al, "Prevalence, Severity, and Comorbidity of 12-Month DSM-IV Disorders in the National Comorbidity Survey Replication", *Arch Gen Psychiatry*, 2005;62(6):617–627. doi:10.1001/archpsyc.62.6.617
- [15] Andrews, G et al, "Exploring the feasibility of a meta-structure for DSM-V and ICD-11: Could it improve utility and validity?: Paper 1 of 7 of the thematic section: 'A proposal for a meta-structure for DSM-V and ICD-11'", *Psychological Medicine*, 39(12), 1993-2000. doi:10.1017/S0033291709990250