

An Accessible Mental Health App For Early Depression Management, Called "Support Sphere"

by

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A project submitted to the Department of Computer Science and Engineering
in partial fulfillment of the requirements for the degree of
B.Sc. in Computer Science and Engineering

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Declaration

It is hereby declared that

1. The thesis submitted is my/our own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. We have acknowledged all main sources of help.

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Abstract

This research paper presents the design, development, and preliminary evaluation of a mental health support application aimed at individuals experiencing mild to moderate levels of depression, specifically focusing on users in stages 1 and 2 of the condition. The project was conducted as part of the CSE400 Project course requirement for the B.Sc. in Computer Science program at Brac University, as a Project. This application seeks to provide users with a pressure-free, judgment-free space for self-care. The core features of the app include a gratitude journal, breathing workouts, a happiness-boosting to-do list, inspirational content, and progress tracking mechanisms, all built using the Flutter framework with cloud-based data storage. The motivation for the project stems from both personal and professional experiences of the author, who has dealt with Major Depressive Disorder and has previously worked at a suicide prevention helpline. Existing mental health apps often operate under freemium or premium models, making them inaccessible to many users, especially in developing regions. This app offers a free, simplified, and stigma-free alternative. Due to the sensitive nature of mental health, the application was evaluated through qualitative feedback from a small group of users rather than large-scale data collection. Their emotional responses, usage behavior, and suggestions helped validate the app's impact and informed the design adjustments. This paper also explores the societal, ethical, and environmental implications of such technologies and provides an extensive literature review and gap analysis of current mental health apps and studies. Due to the sensitive nature of the concept, the application went through a small testing phase. In general, participants found the application to be helpful, journaling, breathing and BMI modules were particularly praised to help with anxiety and body image.

Keywords: Mental Health, Depression, Mobile Application, Flutter Framework, Self Care Technology, Emotional Well Being, Digital Therapeutics, Motivation And Gratitude, Online Help, Journaling, Anti-Depression

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Chapter 1

Introduction

1.1 Preamble

About This Report

The project submission is needed by the university curriculum for me to earn my BSc. in Computer Science and Degree at Brac University. This report will be graded as part of the CSE400 course.

1.2 Background

Depression is an extremely pervasive and concerning mental health issue that has been significantly impacting people all across the globe ever since the beginning of civilization, in one form or another. According to recent statistics provided by World Health Organization (WHO), an estimated count of over 280 million (WHO, 2023) people are suffering from depression, making it one of the leading and major cause of infrastructure and lifestyle disability. If we specifically consider Bangladesh, we would see that the situation is very critical here as well, since more than 6 million people here are suffering from depressive disorders while almost 7 million people are suffering from anxiety disorders of some form (WHO, 2017).

Even with the vastly interconnected nature of the world, many people are still unaware of the profound repercussions that might happen if depression is left untreated for long. On a global scale, depression and anxiety related disorders seem to approximately result in the loss of 12 billion workdays annually, which is costing the global economy an yearly income of US\$1 Trillion (WHO, 2022). In Bangladesh, over 30 million people are assessed to be in need of mental health services, yet the country to this very day, faces an extreme shortage of mental health professionals, with less than 250 psychiatrist and psychologists, most of whom are primarily concentrated in more urban areas. So, in rural areas, the concept of depression itself is just a myth, even though thousands and thousands are being effected by it.

Perhaps one of the most significant barrier to this, is the fact that addressing the very notion of depression is still considered a sort of taboo and there is a large stigma against it in our society. Many individuals tend to avoid seeking help in fear of being seen as “Weak” or facing other forms of discrimination. A study in

UK revealed that around one out of three individual tend to refrain themselves from seeking out support for their mental health issues, due to fear of discrimination (The Sun, 2025). In Bangladesh, both backward cultural beliefs and lack of awareness further amplifies these issues, leading people to seek assistance from rural healers who more often than not label these problems as “Djinn” incidents, or avoid seeking treatment altogether, instead of consulting a professional.

Considering these circumstances and challenges, It is believed that innovating solutions are necessary to help these people who are in need. Therefore, my propose application aims to provide a completely stigma free, supporting and free platform for people who are suffering from mild to moderate depression. The application will have features such as a gratitude journal, motivation quotes, guided breathing exercise as well as a pre-defined to-do list, all of which are desired to boost mood by positive influencing the happy hormones. By providing the users with a private, non-judgmental safe space. The application hopes to empower users to take proactive steps towards mental well-being, potentially acting as a bridge to gaping the void in seeking mental support.

1.3 Rational Of The Study

The motivation for me to undertake this study, do the research and gradually develop this mental health assistance application, stems from a very deeply rooted and personal compassion to support individuals who are struggling on a daily basis to pass even a single day through the terrain of mild to moderate depression. Having personally experienced similar symptoms first hand, It is know very well how profound of an emotional impact depression takes on the individual. During my own journey, It was found that stigma free support was very limited, and the available digital tools at that time lacked the freedom of affordability or a sense of humane emotional resonance. All of these first hand experiences created a very strong sense of empathy of similar people, and created an internal commitment to develop tools and apps that can genuinely help people in who are going through such issues.

In addition to personal experience, the motivation for coming up with the idea of this application also stemmed from experience working at a Suicide Prevention Helpline, which provided a better understanding of all the different mental health issues, which people are suffering from. Even if some of these issues might seem very little from the perspective of a bystander, to the victim, these issues tend to feel very significant, which ends up forcing them to take the option of suicide as the only escape from the problem. Working at the helpline, further helped to understand the power of kind and understanding words, as they can potentially help a person in need and save them from inflicting self harm, or suicide. Even if kind words aren't able to always completely prevent them from attempting suicide, the words can indeed help to keep them alive and give them hope just for a little bit longer. Currently, the market of the mental health application is extremely saturated, but most of the good ones tend to require an expensive paid subscription or follow a freemium model, that seems to restrict a lot of core features behind the paywall

(Leigh & Flatt, 2015). While these application do have the power to provide good value, the monetization strategies behind them, alienates the people who are unable to afford access to them. In contrast, the application that is made developing through this study, is designed to be completely free, accessible, simple to use and inclusive.

1.4 Problem Statement And Objective

Considering everything, Mental Health is a very expansive and multifaceted domain that encompass a wide array of behavioral and psychological conditions. My study however, tries to narrow my focus down specifically to depression, particularly mild and moderate forms, which are referred to as level 1 or level 2 depression. While mental health challenges manifest in diverse ways, depression still remains one of the most debilitating and prevalent condition, which often remains unaddressed in early stages due to limited access, stigma and lack of awareness. (WHO, 2023)

The primary objective of this study is to design and propose a mobile application (Android OS at the moment), that offers an accessible and stigma free – non clinical support for people who are experience from the early stages of depression. Rather than “curing” depression, which is a process that requires long term and multi-dimensional treatment – my application aims to provide it’s users towards encouraging and empowering them to take first steps towards emotional relief. The core goal is to make the users feel a little bit better, more hopeful and more centered so that they can move on to seek further professional support instead of breaking down and giving up completely.

Small emotional improvements can serve as a very powerful catalyst for long term healing, and the different sectors of the application are designed so that the user is able to take smaller steps towards healing through an emotionally uplifting approach.

1.5 Methodology In Brief

Given the sensitive and deeply personal nature of mental health – more specifically depression, my study adopted a very user centered, qualitative and ethically cautious approach in both doing the academic research as well as developing the application. Rather than relying on a large dataset or taking an invasive and diagnostic assessment, my methodology focused more on seeking direct experience, reflecting feedback and emotional response from users, to assess the effectiveness of the application.

1.5.1 Testing The Application And Feedback Collection

Once the mental health support application was developed and the core features were up and running, the application was then introduced to small number of differ-

ent people who participated voluntarily. These people self-identified as experienced moderate or mild levels of depression, with a history of emotional stress.

These participants were given access to the application in a very non-judgmental and private pressure free environment, with a full assurance of confidentiality and anonymity. They were encouraged to use the application over a number of consecutive days – engaging with the features as authentically and organically as possible. No clinical questions or psychology assessments were administered during the process that could trigger trauma.

After they were done using the application, I asked the participants to share their personal emotional responses and reflections.

- How the application made them feel to use
- Which features of the application they found more supporting or comforting
- Whether the application made any difference in their mood or motivation level
- Any suggestions or criticism regarding the user experience and interface

Once we received, the feedback was then qualitatively analyzed to assess the application's emotional impact and user reception to better understand how it was doing. I focused on common feelings such as calmness, increasing motivation, self-reflection, emotional validation etc. and those were identified and noted. The areas that could be improved were also noted down, which ranged from language tone, feature design, usability.

The data that was gathered was not intended to assess the app's clinical effectiveness, rather it was to understand if the application was being able to help its users on a practical level and give a positive emotional impact in real life scenarios.

1.5.2 Academic Research

For the theoretical foundation of the paper, upon conducting a very thorough and extensive literature review using various databases such as Google Scholar, PubMed, JSTOR, ResearchGate and official reports from various organizations such as WHO (World Health Organization) and BMHS (Bangladesh Mental Health Society).

While doing the research, It was always kept in mind to only use peer-review journals, NGO and government reports and well recognized texts in the field of psychology and medical health to maintain credibility in my research. Relevant cases studies, application usage trends and behavior insights were also considered and incorporated during the process of contextualizing the importance of using mental health related tools in areas where such resources are low in availability.

1.6 Scopes And Challenges

Developing an application that is designed to act as a mental health support – especially one that focuses on depression is actually a pretty complex and meaningful effort. Depression is actually defined and classified in to four different stages : Mild (Stage 1), Moderate (Stage 2), Severe (Stage 3) and major depressive disorder with psychotic features (Stage 4) (American Psychiatric Association [APA], 2013). Each of this stage provides a very unique emotional and psychological challenge, which requires taking a different approach.

Given the emotional complexity and gravity of the different types of depression, my application intentionally limits itself to having a scope of dealing with people who are undergoing Stage 1 and Stage 2 depression. These are more characterized by persistent sadness, sleep disturbances, lack of motivation or feeling of low self worth, and in some serious cases, development of early feelings of suicidal tendencies.

The goal of this application, is to not replace clinical treatment or therapy, but rather to offer emotional outlet, small moments relief and a sense of structure for those who are at the early stage of depression. By attempting to do so, the application can seemingly act as a soft entry point into the world of healing, encouraging the users to seek further help as they needed, after stabilizing themselves and getting the strength to take further steps. This focus, enables the application to remain accessible, safe and simple, while at the same time making a significant impact in the user’s long term emotional wellbeing.

Apart from the scope of my application though, the challenges experienced:

- As this is a very sensitive and emotional topic, the creation of this application did not just require technical development but also a very strong emotional resilience. As the developer, I have personally been diagnosed with MDD (Major Depression Disorder). So, working on a project so close to my own living experience and daily fight, meant constantly confronting many of my own emotional struggles throughout the development process. While this did give me empathy and insight into the needs of the users, the journey at the same time was very mentally demanding and taxing.
- Since the application does not have the involvement of real-time professional support or diagnostics tools, there remains always a risk that some users with advanced stages of depression might try to use this application and have their issues resolved, instead of seeking medical care. Managing expectations and maintaining emotional support therefore, is a very delicate balance in this process.
- In case of Bangladesh and other similar societies, mental health is still very heavily stigmatized. This goes to the point that the “Taboo” is ingrained in the mind of people, and some might even feel hesitant just to download an application labeled “Mental Health”, in fear of judgement from community, peers and family. Designing the application in such a way that feels confidential, non-threatening and culturally appropriate was always an ongoing concern for me.

- During the limited testing phase that we had, it was very important for me to create an environment that did not trigger any trauma within the participants. This ethical challenge require me to approach in a very sensitive manner when collecting the data and interpreting them.

Chapter 2

Literature Review

2.1 Preliminaries

As the research is particularly based on a topic that is very closely related to the medical world, this section will provide some essential background information and foundational concepts that are required to better understand the scope of the study and the text itself. It covers some of the key definitions, models and theoretical framework related to depression, digital mental health intervention and mental health stigma that will be referring to thorough the paper.

2.1.1 The Different Stages Of Depression

These days, depression has become a very common but serious issue that comes in the form of a mood disorder that is often characterized by hopelessness, lack of interest, sadness or displeasure in activities that were previously enjoyable. (American Psychiatric Association [APA] 2013). It can affect an individual's behavior, thought pattern, physical health and overall day to day wellbeing. According to the Statistical Manual Of Mental Disorder, Fifth Edition (DSM- 5), depression ranges across a number of different stages based on the severity of the effects. These are often classified as being Mild (Stage 1), Moderate (Stage 2), Severe (Stage 3) and Major Depressive Disorder that comes with psychotic features (Stage 4) (APA, 2013). My study primarily focuses on individuals who are suffering from the early stages – namely mild and moderate levels of depression where there is a possibility to improve the mood without medical intervention and prevent progressing to later stages.

2.1.2 Understand The Stigma Around Mental Health

The stigma around mental health still remains a very significant barrier worldwide when it comes to mental health care worldwide, even more so in developing countries such as Bangladesh. This stigma can be understood as having negative beliefs and attitudes towards mental illness that more often than not leads to discrimination and social exclusion of individuals who are suffering (Corrigan & Watson, 2002). This “Stigma” results in the underreporting of symptoms related to mental illness and gives rise to feelings of embarrassment or shame. More often than note, these

stigmas arise from religious, cultural or social belief systems that generally portrays the notion of depression or mental illness in such a way that it is represented as “Weakness” or moral failing. (Hossain et al. 2014). Understanding the concept of stigma was very critical for designing and understanding confidential, accessible and culturally sensitive means of developing a solution.

2.1.3 Digital Mental Health Intervention

The seemingly rapid growth of cellular technologies has given access to a wide array of different applications to anyone with a smartphone. Amongst these applications, a growing sector that aims to provide support to individuals with mental health are called mobile health (mHealth) or e-Mental Health solutions. But it does not stop there, apart from application, there are also a number of other digital means of intervention such as online therapy platform and various digital self help tools that are designed to improve psychological well being (Firth et. Al. 2017). These digital tools has the potential to increase accessibility, lower down the cost and overcome large geographic and social barriers in terms of providing mental health services. However, most of the apps tend to either operate on a freemium or premium model and lack personalized support or cultural relevance, which then limits their effectiveness for a diverse group of people who are unable to afford them or relate to them (Torous & Roberts, 2017).

2.1.4 Positive Psychology And Behavioral Activation

The fundamental design of the study that was approached, draws heavily from principles of behavioral activation and positive psychology. Positive psychology focuses largely on the cultivation of positive emotions, well being and strength rather than solely focusing on pathology or strict logical rules (Seligman & Csikzentmihalyi, 2000). Techniques such as gratitude journaling have been shown to increase optimism, mood while reduce various symptoms related to depression (Emmons & Stern, 2013).

Behavioral Activation on the other hand, is a serene therapeutic approach that is grounded in cognitive and behavioral therapy that encourages people to engage meaningful with activities that are rewarding while at the same time counteracting inactivity and negative mood (Lejuez, Hopko & Hopko, 2001). Incorporating simple and achievable daily motivational quotes and tasks, therefore aligns well with this model and supports the building of positive habits and sense of autonomy and agency in the user.

2.1.5 Conceptual Model

The study was to operate in a way that is user centered and does not have clinical intervention, aiming it more towards providing emotional support to individuals at the early stage of depression through a digital platform. So, unlike other clinical

therapy apps that or professional telepsychiatry services, my application is designed to have a very low barrier of entry to fascinate small but meaningful improvements in motivation and mood. The features that are implemented in this application corresponds to evidence based psychological practices and are further verified by my own experience in the field and referred by expert psychologists and psychiatrists who are working in this field.

2.2 Review of Existing Research

2.2.1 Research Paper Analysis

In a study by Firth et.al (2017), they reviewed a very comprehensive meta-analysis of the efficiency of smartphone based interventions that were targeting primarily symptoms of depression. The research attempted to synthesize data from a number of random controlled trials, revealing that mobile based mental health solutions do indeed provided moderate improvements in depressions symptoms, even more so when the elements of CBT (Cognitive Behavioral Therapy) are introduced. However, the study also noticed that most of these solutions tend to rely heavily on very rigid and structured therapy frameworks, that requires a lot of user engagement and professional oversight. If a person is already feeling very low or depressed, these requirements could end up acting as a large barrier to using these apps. While these apps show promise in making mental health care more accessible, the high demand of cognitive input could make the users feel very overwhelmed. This is something that the application tries to deal with, as it underscores the need for simpler and more accessible tools that offer a quick and hassle-free response for emotional comfort.

Consequently, a study by Torous et.al (2018) attempted to examine the landscape of digital mental health tools that are available globally, noting down their variability in quality, cost and user experience. Amongst the many findings, one major thing that was note was the premium or freemium pricing models of such apps, that seemed to create a significant barrier of entry in developing countries. The author argued that affordability is very critical when it comes to expanding the user based and making them more accessible, especially in places where professional mental health resources are limited. As it stands right now, apps with premium models are ending up helping people who already have access to professional physical therapy opportunities. The author also noted that most of the apps were designed based on Western Context. So, they did not cater to other cultures and did not provide any cultural relevance to individuals who were living in different parts of the world. This was another gap that was observed, and following this, the aim of designing the application to be completely free of any culturally sensitive issues and tries to directly confront the challenges of people, by providing them with a barrier free tool, which they can use regardless of societal stigma.

A similar study was also done by Mohr et. Al (2017), where he explored user engagement patterns with different types of mobile mental health applications, and highlighted that “Sustained” and “Continuous” use of the applications were a ma-

major factor of positive outcomes. The findings of the study showcased that apps that have more personalized contents, low pressure environment and approach, gentle reminders had longer engagement. On the flipside, apps that were too clinical or demanding in nature, had a larger rate of users falling out. This study raised a very interesting question, that was how to create a balance between making an effective intervention strategy while having a very friendly and accessible design, which encourages approachability. Given the sensitive nature of the issue, the author argued that users preferred apps that were not intrusive and did not make them feel judged. This was another issue that I followed, and therefore tried designing the application to create a very welcoming environment that would allow for constant and repeated engagement without making the user feel overwhelmed.

2.2.2 Application Analysis

Apart from the papers, It was also attempted to do a brief analysis of the different major apps in the field at the time of writing. The application “Headspace”, became a primary contender as it is one of the most popular. It focuses primarily on meditation and mindfulness, which immediately reveals its strengths and limitations when it comes to dealing with depression. See, Headspace does indeed provide an expertly designed environment with guided meditations and breathing workouts, however, the application operates largely on a pretty expensive subscription model. The free contents that are available is extremely limited. As mentioned in the previous studies, this ends up creating a huge financial barrier for many users, particularly in areas of low income. It should also be of note that while Headspace’s contents are undoubtedly of very high quality, it is not tailored to specifically deal with the different stage of depression or the specific needs of a person suffering from depression. It has a broader appeal towards advocating general wellness, rather than meeting the narrowed down needs of depression relief. My application therefore, provides free access to all the contents, and aims to fill this gap by providing support explicitly designed for users in early stages of depression, without cornering them into any sort of paywall.

During my research, the other major player that was seen was “Moodpath” (recently they changed their name to MindDoc”), which combines techniques of symptom tracking alongside psychoeducational contents, all while providing access licensed therapists. Moodpath is very notable for its comprehensive approach and services strongly backed up by clinical models, providing users with detailed feedback on their mental health. However, despite all these advantages, Moodpath requires the users to answer an extremely in-depth set of questionnaires. For a person who is already suffering from the common symptoms of depression, these intrusive requirements could end up feeling very cumbersome as they are already lacking the motivation and concentration to even do day to day tasks. Apart from that, the same issue of pricing presents itself in this case as well. While it does provide lots of facilities and professional therapy services, the expensive subscription based price ends up becoming an economic hurdle. In contrast, This application is able to provide passive emotional support rather than zeroing down on symptoms with pervasive questions and requirements, in turn, reducing the burden for those who

might feel overwhelmed.

2.3 Summary Of Key Findings

Based on my thorough research of the existing body of research that are available on Digital Mental Apps, It was noticed that there are several critical insights and persistent challenges in addressing the fundamental issue through mobile based interventions.

First of all, while smartphone-based applications targeting mental health have indeed demonstrated effectiveness in alleviating the symptoms of depression, many of the apps are designed following the structures of rigorous clinical framework, which creates a demanding load on the users. Individuals who are already suffering from first or second stage depression, having low motivation might not continue using the application or not use it in the first place, due to the cumbersome overhead. This indicates a gap for apps and tools that are more approachable, and provide immediate emotional relief rather than clinical intervention.

Amongst most of the apps, economic accessibility remains a prevalent issue and a significant barrier for those living in developing countries. Most of the popular mental health apps seems to be operating following a freemium or premium model, which greatly restricts access for a vast number of users. Additionally, most apps seem to provide their solutions from a Western Context. Which essentially means that when providing the solutions, they are more focusing more on the mindset, culture and behavior through the lens of a Western people. For example, In Western culture, the concept of Mental Health is often approached through a lense of clinical psychology, that has a big focus on individualism, self care routines, productivity and so on. On the hand, many non-western socieites view Mental Health through a largely spiritual or familial lens. This difference, might make it rather difficult for Westerners to grasp the concepts clearly and implement them in their own life.

So non-Western users have the tendency to end up feeling culturally excluded, as they might not be able to relate to the solutions. The need for apps that are culturally sensitive, catering to a large array of people, while at the same time being freely accessible is therefore still an empty ground to cover.

The concern of sustainability and engagement arises, as, from what was learned from the studies, these apps are mostly helpful whenever there is prolonged and consistent user engagement. This is indeed very challenging to achieve. Apps that are too clinical, demanding or intrusive tend to have very high dropout rate. Users suffering from first and second stage depression, more often than not prefer to have spaces that are non-judgmental, low pressure and personalized, encouraging longer use terms and better outcomes. Features such as gratitude journaling, motivational content and breathing exercises and achievable daily tasks provided by my application, align well with the preference of creating a welcoming and safe space.

And lastly, most of the apps in this field tend to focus more on general wellness,

as opposed to helping people with mild or moderate depression, who may not have access to therapy or clinical interventions. The offerings of most of the current apps therefore, is not fully satisfying this particular demographic of users, who are being underserved.

Chapter 3

Requirements, Impacts And Constraints

3.1 Specifications And Requirements

As a solo developer working without having any external funding, technical resource or having access to high-end testing equipment, various working efforts were a bit limited, which potentially hindered the scope of the project as I had to keep rather small. However, to mitigate the issue, I made the application using a lightweight framework (Flutter) and optimized to use low resources. The features at the same time were kept very minimal and functioning, making sure that it has large compatibility.

Feature Misinterpretation

Some users might end up using this application as a means of delaying their need to actually seek our professional help, and just keep using this application as a replacement. To assist with this, the application integrates gentle nudges throughout the improvement process, so that they use the application as a stepping stone towards healing rather than a cure.

3.2 Societal Impacts

The development and consequently deployment of a mobile application that is aimed towards supporting individuals with moderate depression has a vast potential of having a wide reach, and having a significant impact over society.

As my project is directly supporting public health by offering individuals with early-stage mental health issues with the support they need, by focusing on emotional self-regulation and mood enhancement, my application will try to act as a first line of emotional aid for people who are unable to either afford or seek out professional assistance at the very moment. Through my application, I will be promoting the need and effectiveness of being self-awareness, doing breathing practices, being more grateful and following a structure to feel motivated with the goal of helping the users develop better and healthier mental habits, that can prevent the symptoms of de-

pression from escalating.

Looking at it from a safety perspective, I have tried to keep the application as low-risk of a solution as possible, as to avoid any sort of intrusive invasions of privacy or diagnostics that would require therapeutic techniques of clinical prescriptions. Instead, my application offers supportive content, where users are not asked to disclose sensitive or personal information, ensuring that their mental well-being is prioritized without having them to compromise their privacy.

And from a cultural perspective, my application is trying to deal with an issue that is very deeply rooted in every society, and has a strong stigma around it in most societies. Not only Bangladesh, but also at a global level. By offering a discrete, accessible and easy to use platform that provides affirmation, my aim with this application to empower it's users and help them take the first step towards healing. As I aim to have the application open for everyone, the design has been kept very minimalist, while keeping cultural and religious sensitivity in mind.

Considering the larger picture however, the societal impact of this project extends beyond individual users. In the long run, it will contribute to a broader public image of mental health awareness, where it will try to normalize the concept of emotional self-care in terms of mental health, and contribute in creating a supportive digital ecosystem. As the application grows, it has the potential to become a valuable tool for not only victims, but also counsellors, educators, NGO's as well as community organizers who are trying to work and promote mental health awareness at a very root level.

3.3 Ethical issues

Developing a mental health applications that is targeted towards helping individuals with mild-moderate depression indeed comes with a number of ethical issues that I constantly had to bear in mind , and handle with utmost care. If I would pinpoint it though, I would say that the core ethical issue stems from maintaining the user's privacy, emotional safety, accuracy of content and maintaining professional boundaries.

Bearing that in mind and deeply personal nature of the concept of mental health itself, one of the very first ethical responsibility that I had to manage was that of user data, primarily talking about the entries in journals or sections of emotional reflection. As mentioned in earlier sections, the application itself is designed in such a way, so that it is able to help the user with very minimal data input. However, in cases where data are needed, the contents are saved locally on the user's devices, with the option of saving them on the cloud with their consent. To keep things even more transparent, no personal identifiable information is required when using the application, nor for any analytics. Anonymity is maintained at the highest level, and data protection methods are compliant with those outlined in digital privacy ethics of GDPR.

The application very closely adheres to the principle of non-maleficence or “Do No

Harm”, by avoiding the user or the developer (Me in this case) to add any kind of language, content or feedback that may worsen the condition of the user. The application offers emotional support without making any diagnostic claims or replacing professional therapy or methods. Bearing in mind that the users would be using the application at a very vulnerable state, all the visual and textual prompts are provided in a very compassionate and caring tone. It is very clearly marked that the application itself is to be used as a supporting tool, and not a substitute for therapy.

Since the goal of the application was to stand out from other similar apps that worked on a subscription based system, critical ethical decisions were taken to ensure that the application itself is completely free, without any intrusive ads blocking the user's experience. I want to put forward the fact that this project was made from a very empathetic standpoint, rooted with real life experiences of my own, so my focus was to ensure that I am able to win the user's trust by maintaining integrity, instead of exploiting them for profit.

Following up on that, It was made sure that the users are informed upfront about what the application offers to them and what it does not, as to maintain complete transparency. Even the UI is designed to ensure that it avoids manipulative UI patterns (often known as Dark UI patterns), so that the user never feels forced into anything, but rather has a strong sense of agency.

And lastly, even though I am not a clinical psychologist, It was tried to ensure that all of the contents that are found within the application, is thoroughly tested to work and inspected by professional expert in the field of psychology. So, from a professional standpoint, It was tried to ensure that the contents are safe, supportive and provide help and value to the user from a non-clinical perspective.

3.4 Project Management Plan

As a solo developer, during the whole project management routine, I had to assume multiple roles in order to ensure that the whole project was progressing well and in time. I had to think like the product owner, designer, scrum master and of course, the developer. The Agile-Scrum Framework, which I learned from CSE470 and CSE471 course was modified and adapted to suit the one person workflow , by breaking it down into smaller sprints, making sure that each spring lasted for two weeks, during which I worked on specific features. Each feature went through the phases of ideation, design, implementation and review. And after each sprint, I conducted a self- assessment and informal user feedback session to evaluate the progress and change as needed.

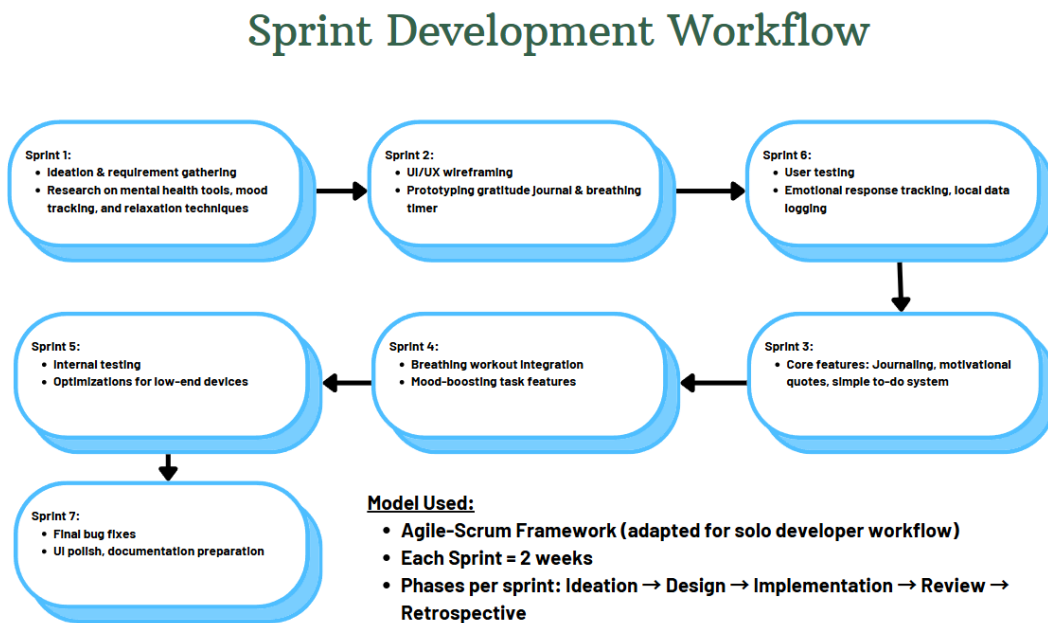


Figure 3.1: Sprint Diagram

A rough outline would go like:

Sprint Planning and Goals:

- **Sprint 1:** Ideation, requirement gathering, preliminary research on mental health tools, mood tracking, and relaxation exercises.
- **Sprint 2:** UI/UX wireframing and prototyping of the gratitude journal and breathing timer module.
- **Sprint 3:** Implementation of core features: journaling, daily motivational quotes, and simple to-do list system.

- **Sprint 4:** Integration of breathing workout timer and happy hormone-boosting tasks.
- **Sprint 5:** Internal testing, minor iterations, performance optimization for low-end devices.
- **Sprint 6:** User testing with a small group, feedback collection, data logging (local), and emotional response tracking.
- **Sprint 7:** Final revisions, bug fixes, polishing UI/UX, and preparing documentation.

Each sprint included a mini retrospective at the end to assess the different challenges that I faced, the emotional impact and feedbacks that guided the priorities of the next sprint.

3.5 Resource Allocation And Management

Managing resources as a solo developer meant that I had to allocate my time, energy and focus wisely – especially because the application itself is very emotionally charged. As I myself suffer from MDD, I had to maintain flexible work hours to prioritize mental health breaks to avoid breakdowns and burnout. I also tried incorporating mindfulness session in my routine, aligning my own healing process with the application’s ethos. Time on the other hand was tracked loosely using a Kanban Style – Board , where the tasks were divided into “To Do, Progress, Testing And Done”. The priorities were adjusted accordingly based on weekly feedbacks.

3.6 Risk Management

Being a solo developer working in this project, while suffering from MDD myself, was a pretty emotional tasking task for me, and throughout the life cycle of the project itself, there were a number of different risks assessments that I had to do and manage.

3.6.1 Emotional And Psychological Risk

Given the deeply personal nature of the project, there was a very running risk of experiencing emotional fatigue or burnout during the development process. Primarily as I myself had MDD. To manage this, I tried maintaining the development schedule flexible, putting in time for mindful breaks, mental health check-ins and journaling. I tried working following a minimal pressure and self-compassionate Agile routine that allowed for pauses whenever needed, without have me to derail the project

timeline.

3.6.2 Inadequate User Testing Sample

Due to the sensitivity of the topic and the ethical obligation to protect emotionally vulnerable individuals, it was not feasible to conduct large-scale testing. A limited user base might result in less generalizable feedback. Instead of going with quantitative surveys, I went for a more qualitative and empathetic testing approach. The volunteers were given to use the application in a very safe and non-judgmental environment. I went for quality over quantity, in the sense that I performed the test with a very small group of people, as opposed to a large group of unknown faces.

Chapter 4

Proposed Methodology And Design Process

4.1 Proposed Methodology And Design Process

The design and development of the my mental health wellness application was approached with a very clear and structured methodology, that was grounded with carefully planned object-oriented approach, which were based on specific time bound milestones, following a design principle that was centered around the user experience.

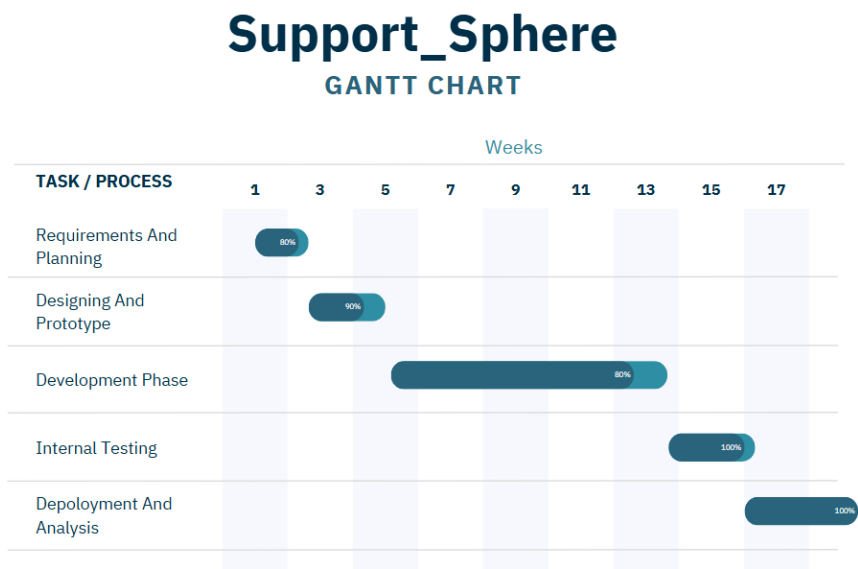


Figure 4.1: Gantt Chart

Given sensitive nature of the application’s subject matter, it was of paramount importance that I approached the whole process with a careful balance of empathy and functionality.

The total development lifecycle of the project was roughly around 4 months, and within these 4 months, I went the application went through the phases of ideation,

prototype development, testing and execution.

4.1.1 Phase 1 – Requirement Gathering And Planning (Weeks 1-2)

The very first step of the my development journey was to determine the very core objectives of the application itself. From the very beginning, my foundation for the application was to always make sure that it is a non-intrusive platform that was built and designed for individuals who were suffering from Level 1 and Level 2 depression. The goal was clearly set from the very beginning. Drawing from personal experience with Major Depressive Disorder and professional experience working at a mental health helpline center, I was able to articulate a number of user needs that governed how the whole process went – simplicity, safety, privacy, emotional care and consistency.

Based on that, the list of features that I wanted to include were:

- Breathing workouts with a visual timer
- Gratitude journal for expressive self reflection
- Predefined motivational and uplifting task lists
- A daily to-do list to boost mood uplifting hormones such as dopamine, serotonin, endorphin and oxytocin.
- A collection of motivational and inspirational quotes
- Light but meaningful analytics to reflect the mood or habit pattern of the user

Having the constraint of a 4 months deadline was already difficult, being a solo developer on top of that ultimately governed the smaller and private scope of the application.

4.1.2 Phase 2 – Designing And Prototyping (Week 3-5)

Once the initial planning was done, in this phase, I started creating a basic outline or wireframe of the UI/UX that was to be designed. I typically used pen and paper to plan out the workflow and UI. Throughout the process, the primary focus was always to create a calming, minimal interface that would allow users with mental stress to work with it. The visual design and color choices were based on different principles such as color theory , to ensure that the colors were soft, the buttons were larger to tap and provide clear navigation. For accessibility purposes, large font, low cognitive overhead and imageries that not trigger any sort of traumatic emotions were used.

By the end of this phase, the UI elements were prototyped, and I had a solid plan of what I was going to do and how I was going to approach it. The journaling module, task completion module and breathing modules were being worked on.

4.1.3 Phase 3- Development Phase (Week 6- 14)

It should be mentioned that application was developed using a Flutter Framework and on Android Studio, which enabled a high performance single codebase with native-like experience on Android devices during testing. Flutter's simple declarative UI allowed me to create modular and reactive components, which made it an ideal choice for the type of application that I had in mind.

The backend of the application alongside data handling was taken care by Fire Base, which allowed me to:

- Make the data for journal entries and task completion secure and scalable depending on the user load.
- Provide real-time updates for different user interactions.
- Potential for keeping the data of users completely anonymous, should the need arrive.

Each feature was then incrementally developed and tested individually:

- Daily Quotes: Implemented a set of static quotes, that were updated daily, with the open options to expand them in the future.
- Breathing Workout: Animated visual timer that allowed the user to sync their inhale/exhaling cycle with the rhythm.
- Motivational To-Do Tasks: A predefined task list, with tasks specifically chosen to improve mood. Alongside a completion tracker.
- Gratitude Journal: Local and cloud based text storage system, with optional time stamping feature.

4.1.4 Phase 4 – Internal Testing And Refinement (Weeks 15-16)

After the core of the application was ready, the next phase was to enter into a cycle of internal testing. With a group of selected individuals, I allowed them to use the application under natural conditions without any sort of intervention, as to allow the users to reflect their genuine thoughts and emotions.

The user emotions, feedback, technical issues were all noted down in the end. The minor bugs were addressed and the interface was refined to ensure clarity. The onboarding process was streamlined as well to avoid users from being overwhelmed.

4.1.5 Phase 5 – Deployment And Analysis (Week 17+)

Following feedback incorporation, a stable version was shared for result analysis. While the application remains in prototype phase, it was fully functional for the purpose of research evaluation and impact assessment.

4.2 Preliminary Design Model

This section focuses on outlining the early-stage design structure of the application that I have made, describing the key screens alongside their functionalities. Each of the screen in the application is created to be emotionally safe, mindful and user-friendly. Bearing that in mind, the following are the screens that give a birds eye view of the functional layout of the application.

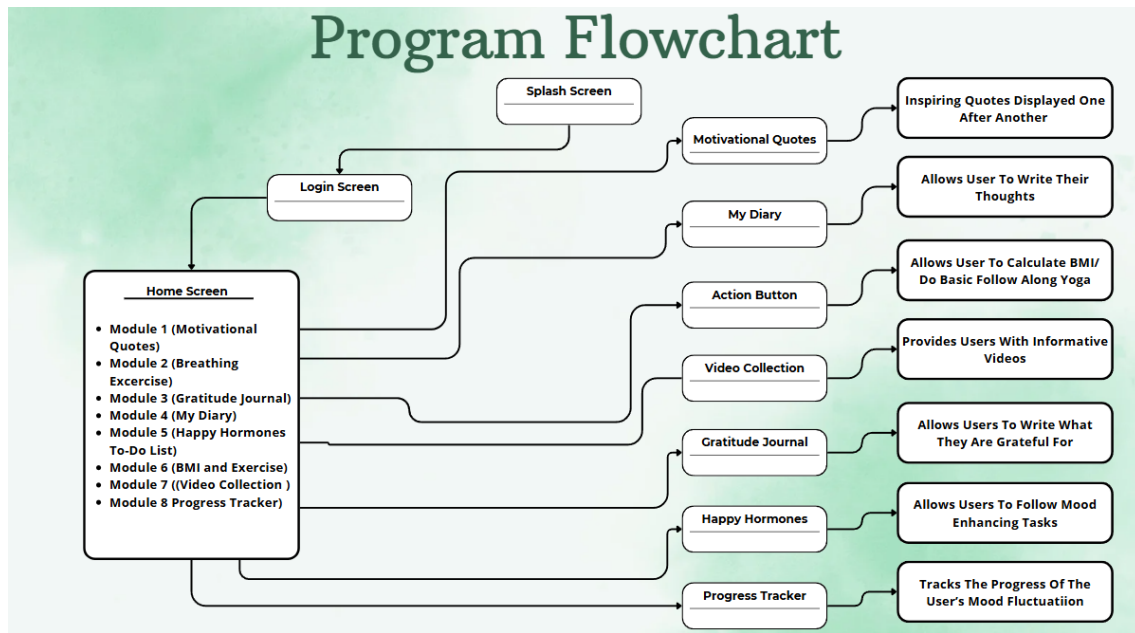


Figure 4.2: Program Flowchart

4.2.1 Splash Screen

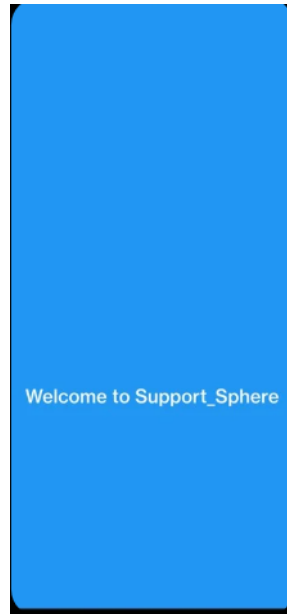


Figure 4.3: Splashscreen

The splash screen of the application serves as a traditional experience of showing the logo while the application loads all the required backend information. It's not functional, but rather is something that users expect. The splash screen will also portray a therapeutic tone.

Features And Working Method:

- The splash screen will show the branding animation of the application, showcasing the name alongside a calming tagline.
- Behind the scene however, the application will load all the information from the backend and establishes connection with the Firebase server.
- The splash screen will be optimized to be visible for a very short time, and it will allow everything to be loaded in under 3 or 5 seconds.

4.2.2 Login Screen

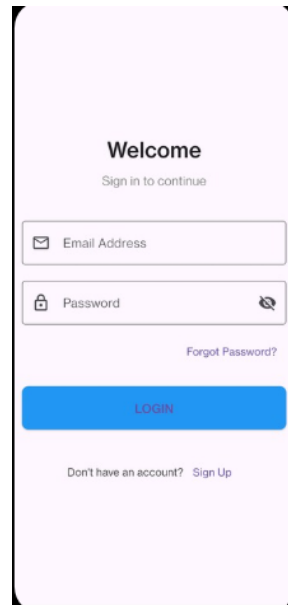


Figure 4.4: Log-In Screen

The login screen is the very first thing that the users will see after opening up the application. It will act as a gateway to the application and will be designed with simplicity and privacy in mind. Users will have the option to login with either email or phone number as a guest. This dual option method would allow the users to login without sharing any information at all, minimizing any psychological barrier.

Features And Working Methods

- The email based login will be using a Secure Firebase Authentication, to allow the user to login using password and email. The credentials will be stored and encrypted for security.

- Apart from that, if the user chooses to login anonymously, they have the option for that as well. They would be able to continue and use the application without any log in information. The data will be stored only temporarily, and will be deleted upon the user's session ends.
- Should the users forget their password, there will be an option to recover the password.
- Following the soothing theme of the application, the background and UI will be very soft, will have optional animations and gentle colors to portray the calming theme.

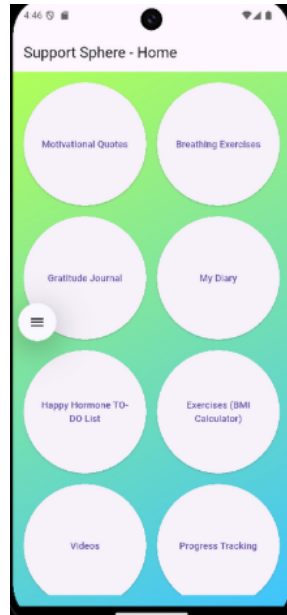


Figure 4.5: Homescreen

4.2.3 Home Screen

The Home Screen of the application is the central dashboard of the application. This is like the hub of the application, and from here, there are seven distinct buttons for the user, each linking to a different section or module of the application. Each button use a different iconography and color -coding to pleasantly represent the different functions of the modules as clearly as possible.

Design Philosophy

- The Home-Screen is made following a very simple layout of a either a Grid or a Vertical List, with soft shadows and rounder corners. If possible, it will have micro level animations.
- The UI will have very minimal texts, the fonts of the buttons are large and the meaningful icons will easily and quickly help the users understand everything.

4.2.4 Module 1 – Motivational Quotes

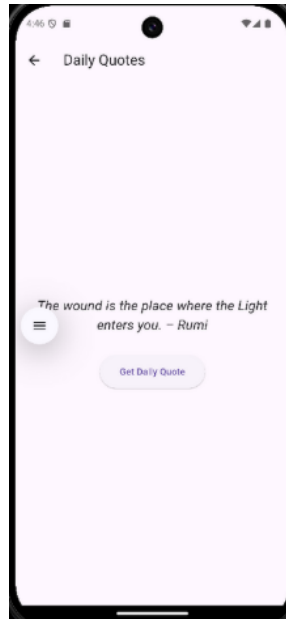


Figure 4.6: Module-1 Motivational Quotes

The purpose of this section is to provided uplifting contents to the users that would create boosts of positivity during moments of difficulty.

Features:

- Calm background transitions to help the users and gentle fade-in for the texts.
- Option to share the quotes (Optional)
- A feature to “Save Favorite” quotes
- Daily auto generated quotes that are pulled and shown from a curated data set, saved locally in the application.

Underlying Method:

- The quotes are fetched from Firebase or bundled as a JSON on launch.
- The display itself uses PageView swiper to allow the user to make navigation easier.

4.2.5 Module 2 -Breathing Exercise

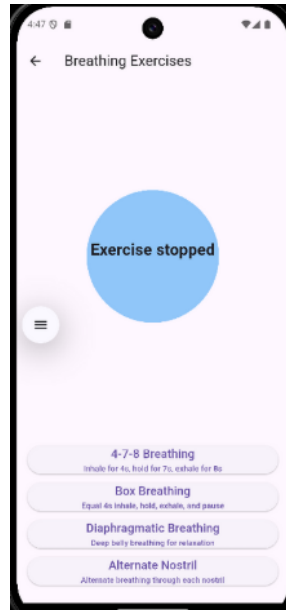


Figure 4.7: Module-2 Breathing Exercise

The main purpose of the breathing exercise module is to provide the users an outlet for stress relief and anxiety regulation through controlled breathing workouts.

Features:

- This provides a visual guide through which the user will be able to inhale/exhale following a expanding/contracting animation that will be synced with timing, based on the type of breathing (4-7-8 methods for example)
- Optional sound cues
- Customizable option for how long the user wants to engage with this.

Underlying Method:

- The Data is taken from task completions, journal entries and application usage to provide the user with an estimate.
- This is optional, but the plan was to create graphs or bar chart using Flutter Packages alongside Firebase as the data source.

4.2.6 Module 3- Gratitude Journal/Diary

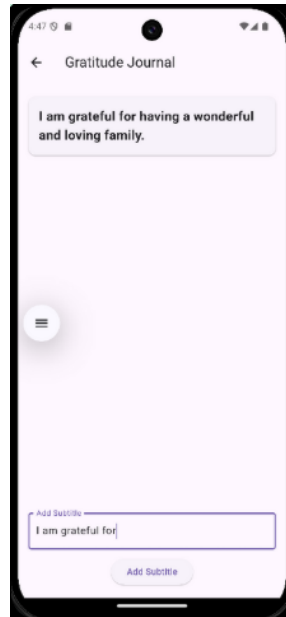


Figure 4.8: Module-3 Gratitude Journal

The gratitude journal provides a private space for the users to reflect upon things that have been going on in their mind. They would write what they are grateful for, or track their emotions. Alternatively, they would also have the option to offload their burden or just write freely about whatever comes to mind in the diary option.

Features:

- Daily journaling prompt (This is optional, but the prompts will be provided for users who prefer a more directed approach)
- Text editor with date stamps
- Option to scroll through and re-read all entries by date
- Secure cloud backup (should the user choose), or locally encrypted storage to maintain anonymity of users

Underlying Method:

- Optional PIN or Lock feature for further privacy (Optional)
- Each journal entry is timestamped and saved locally or in the user's firebase.

4.2.7 Module 4- My Diary

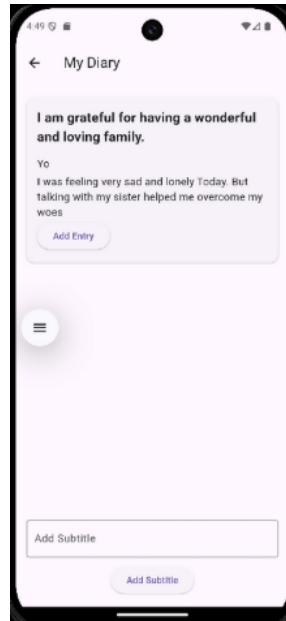


Figure 4.9: Module-4 My Diary

The purpose of this module is to reflect upon the user's emotional journey give them an overview of how they are doing, in order to help reinforce positive behavior.

Features:

- Provides the user with a safe space to write down all of their thoughts without any prompts.
- The idea here, is the encourage the user to write down their worries, so that they can feel a bit relaxed.
- The diary features are similar to gratitude journal, in the sense that it allows the users to store, read or scroll through the entries on their own.

4.2.8 Module 5- Happy Hormones To Do List

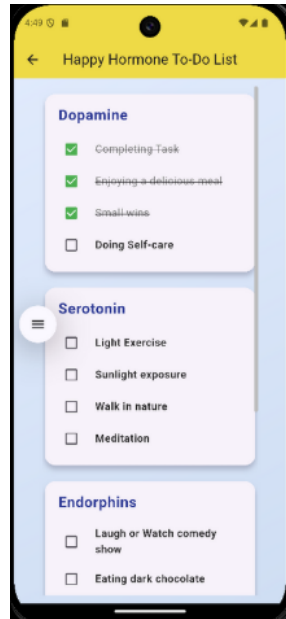


Figure 4.10: Module-5 Happy Hormones To-Do List

The main purpose of this screen, is to encourage different mood elevating activities that would boost dopamine. serotonin, oxytocine and endorphin to increase happiness and decrease the feelings of sadness.

Features:

- A daily checklist a small and easy to follow activities designed to improve mood (simple tasks may include taking walk, calling a friend, drinking water etc.)
- Checkboxes ticking animation to reinforce satisfaction and positivity within the user.

Underlying Method:

- A number of different data sets will be provided and the pre-defined tasks will be loaded from these data sets. The completion status will either be stored locally or in Firebase.
- Successive completions of tasks will be reflected in the progress tracker section, as to ensure that the user is doing well.

4.2.9 Module 6 -BMI And Exercise

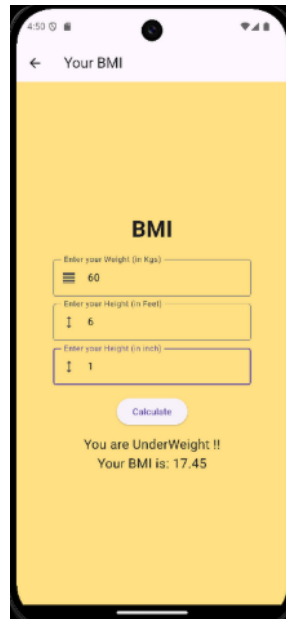


Figure 4.11: Module-6 BMI

This module offers some practical tools like BMI calculate, motivational workout videos and beginner friendly exercise routines.

Features:

- BMI Calculator
- A library of embedded Youtube videos or short audio guided workouts.
- Simple yoga poses or stretches that are designed to improve mood.

Underlying Method:

- The BMI is calculated locally using simple functions and input from the user.
- The videos are embedded by using the Youtube API or locally stored links.
- The data's are cached within the application, for offline viewing.

4.2.10 Module 7- Video Collection

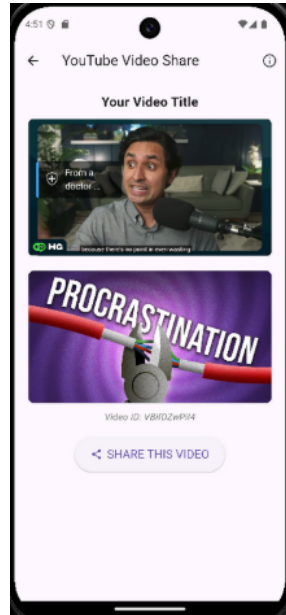


Figure 4.12: Module-7 Videos

The purpose of this module is to reflect upon the user's emotional journey give them an overview of how they are doing, in order to help reinforce positive behavior.

Features:

- The videos section contains a number of carefully curated videos, that showcases information regarding the different features of the application.
- User can explore these videos if they wish, so that they can get a better understanding of the working principles behind them.

4.2.11 Module 8- Progress Tracker

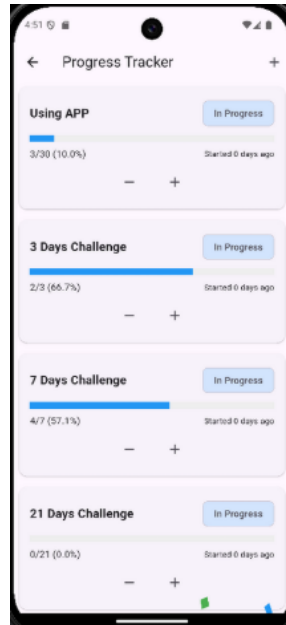


Figure 4.13: Module-8 Progress Tracker

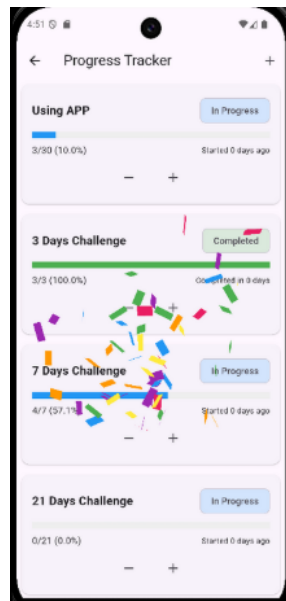


Figure 4.14: Module-8 Progress Tracker (Confetti Demo)

The purpose of this module is to reflect upon the user's emotional journey give them an overview of how they are doing, in order to help reinforce positive behavior.

Features:

- Visual feedback on tasks that are completed over time
- Journal entry streaks

- Mood input history (if the user chooses to)

Underlying Method:

- The Data is taken from task completions, journal entries and application usage to provide the user with an estimate.
- This is optional, but the plan was to create graphs or bar chart using Flutter Packages alongside Firebase as the data source.

Chapter 5

Software Development Life Cycle

5.1 SDLC

The development of the application "Support Sphere", which is a mobile based mental health application, designed to support people who are experiencing Mild to moderate levels of depression was carried out following a methodical and structured approach known as the Software Development Lifecycle (SDLC).

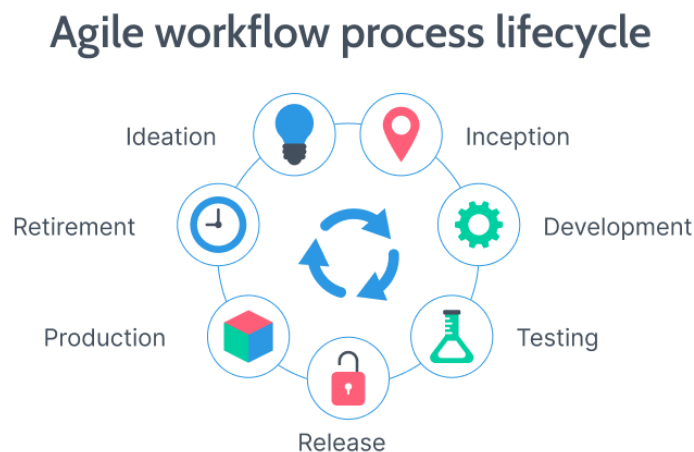


Figure 5.1: Agile Workflow

The SDLC framework itself is a very disciplined approach that breaks down the whole process into manageable segments, each of which separately contributes to the creation of a dependable and high quality software.

Given the sensitive nature of my application, a traditional six-phase SDLC model was adopted and tailored carefully to align with both the technical and ethical considerations of my project.

The phases are as follows:

- Requirement Analysis
- System Design

- Implementation
- Testing
- Deployment
- Maintenance

Each of the stage mentioned above was executed with very careful planning, taking an empathetic understanding of the target user demographic. Always making sure to include communities who are struggling with early stage depression or are underserved.

5.2 Requirement Analysis

The requirement analysis phase laid the framework for the development process, providing as the strategic starting point for thoroughly exploring and defining the target audience's needs, expectations, and problems. Because Support Sphere is intended to help people in Stages 1 and 2 of depression, which are characterized by symptoms like sadness, fatigue, loss of interest, low motivation, and sleep disturbances, the application needed to include features that were emotionally supportive, psychologically safe, and practical.

To guarantee that the product fulfilled actual user demands, a user-centered requirement gathering approach was used. This procedure included informal interviews and consultations with a variety of stakeholders, including professional psychologists, mental health helpline volunteers, and those who identified as having personal experiences with depressed symptoms. These interactions, while not clinical, provided essential qualitative insights that influenced the formulation of both functional and non-functional requirements.

5.2.1 Functional Requirements

As I myself am going through Major Depressive Disorder (MDD), while making this application, several key functions and requirements were identified that had to be taken into account:

- **Breathing Exercise With Visual Aids:** This module helps the users to engage in different types of guided breathing practices that are designed to help the users manage anxiety and stress. The simple animation helps the users synchronize their breathing, and ultimately provide a very calm and intuitive session.
- **Gratitude Journal Interface:** The gratitude journal is designed to give the users a private and secure area to allow the users to reflect on their positive thoughts throughout the day. The purpose of this module, was to promote cognitive reframing of mindful thoughts and enhance mood through appreciation and constantly mindfulness.
- **Motivational Quotes Module:** This is a feature that delivers the users with uplifting and encourage quotes. These serves the users with emotional reinforcements, helping them to feel motivated and seen, even during difficult challenging periods.
- **Daily Task List To Enhance Mood:** This module is also considered as a the "Happy Hormones" checklist. This module offers the users small, achievable task that are closely linked to the natural release of mood-enhancing hormones such as endorphins, oxytocin, serotonin and dopamine. These tasks are very simple such as "Drink Water", Smile At Someone" or "Take A Short Walk".
- **User Progress Tracker:** A lightweight tracking module that helps the users view their engagement, with the application over the time, providing positive

reinforcement to the users allowing them to go in a positive feedback loop and develop good habits, without being overly clinical or diagnostics.

5.2.2 Non-Functional Requirements

Beyond the tangible features of the application, it also had a set of non-functional requirements that were needed to be directly supported and ensure the user experience and ethical considerations of what a mental health program should entail.

- **Data Privacy And Anonymity:** The concept that is being dealt with the application is extremely sensitive, even more so in Bangladesh. Therefore, the application was designed to collect minimal data, offer anonymous login option and make sure that the user's data was encrypted locally.
- **Low Cognitive Load:** Given that the users who are operating the program might already be going through something difficult, it was essential to ensure that the application gave very low cognitive load to the user. Therefore, it was designed to reduce clutter, fatigue and allow for effortless navigation.
- **Offline Functionality:** Since the goal of the application is that it can be used by everyone and everywhere, even in places where internet access is not available. Therefore, the application has been designed accordingly.
- **Accessibility:** It was importance fo the application to be as accessible as possible, and to function across a broad range of different android devices, such as low -end smartphones as well as high-end tablets.

5.3 System Design

Once the requirements of the application were clearly established, the system design phase began, where the conceptual ideas were transferred into an actionable blueprint. This phase included both a high level and a low-level architectural planning of the application and low-level prototyping. This served as a technical bridge between the implementation and conceptualization of the program.

5.3.1 Design Philosophy And Approach

A very user centered design (UCD) methodology was implemented to ensure that the application's layout, aesthetics and interaction flows was aligned with the mental states of the users who were experiencing depressive symptoms. Sketches and wire frames were created and first through using different types of hand-drawn diagrams, which were then transferred into digitized visual mockups. These different mockups helped validate assumptions about the user flow, content presentation and feature placement.

Bearing that in mind, the design decisions were primarily governed by three principles:

- **Modularity:** Each feature of the application was then designed as a modular component, allowing for the development and updating of the different modules separately. This kind of modular approach ensured that all future enhancements such as AI based mood detections, sleep tracking could be implemented without going through any complete system overhaul.
- **Calmness and Safety:** Heavy color psychology was used to create an overall soothing and visually pleasing experience for the user. Soft and pastel colors were used alongside simple animations to create an pleasing environment.
- **Simplicity:** All of the different navigation and interactions of the program were designed to be as much straightforward as possible, minimize the number of taps required by the user to go their destination. The home screen offers very clear access to all of the different modules.

5.3.2 Technical Design

From a technical perspective, the application was built using the Flutter framework, which was chosen for it's ability to generate good native performance on Android devices, through a singular codebase. The frontend of the application was structured using Flutter widges.

- Real time database syncing for the motivational quotes content
- Optional cloud-storage for secure journal backups (Planned for future)

- Cloud Firestore for journaling and task tracking -data (Planned for future)
- Locally based user authentication (email-based or anonymous login)

Key architectural decisions that were made:

- **Minimal State Management:** A lightweight state management libraries were used to ensure that the application responsiveness and maintainability was ensured.
- **Privacy-First Design:** The system was configured in a such way, it would minimize data persistence unless explicitly enabled by the user. The local storage encryption were added for confidentiality.
- **Error Resilience:** Basic exception handling and fallback systems were applied for a more seamless experience, even when no internet is available or if the application experiences unexpected input.

Each of the different screens, breathing module, gratitude journal or the motivational quote page were all constructed with the intent of being therapeutic, having icons, text layouts and animations, making sure that the navigation and transitions were kept to avoid overstimulation, and rather create a sense of ease in the user.

5.4 Implementation (Coding Phase)

The implementation phase, also referred to as the "Coding Phase", involved translating the design of the application and functional specifications into an actual working code. It marked a very crucial step and a tangible realization of the vision that I had in my mind for the project - where the user-centered designs were converted into fully functional software system.

Given that the application was developed completely solo, and with strong resource limitations, the Flutter framework was selected as the primary technology stack. Flutter's widget based architecture and hot-reload capability made it ideal for a very iterative development process allowing for rapid prototyping and real-time testing of UI. The compatibility with Android, which is the target platform for the application, ensured high performance, and almost native like feel when testing it. Even in lower-end smartphones that are commonly available in more economically constrained regions.

5.4.1 Front-end Implementation

The Front-End layer of the application was designed with a strong focus on clarity, emotional safety and responsiveness. Each of the different feature module such as the gratitude journal, exercise tool or even the motivational quote generator was implemented first as standalone flutter widgets. These modules were then combined together in the end. This modular approach of the code, allows the code to be reusable, making the process of debug more simplified and allowed for independent feature-level updates without disrupting the overall structure of the application.

The implementation of the Gratitude Journal module involved a custom text field component with auto-saving functionality, timestamping and optional encryption for privacy. Flutter's built-in "TextEditingController" and "SharedPreferences" (Allowing for local storage), allowed for a method of lightweight and secure data handling.

The Breathing Exercise Module on the other hand, has custom animations that were implemented using the Tween class and AnimationController. This allowed the module to show a very smooth contracting and expanding animation, representing the exhale and inhale cycles, with optional sound cues included using the Flutter's audio package. The predefined breathing techniques, such as the 4-7-8 method, were programmed in the application for broader accessibility.

The Motivational Quotes model, had a JSON database that would read asynchronously upon launch. This allowed the app to remain functional, even without the usage of internet. The Quotes were displayed using the PageView swiper, and gentle fade transitions were used to reduce the cognitive load.

The To-Do Task list, implemented with checkboxes and animated confirmations utilized the CheckBoxListTile widget and was backed by ListView for a scalable display system. The tasks were pre-selected based on studies and were backed up

by behavioral activation research.

5.4.2 Backend Integration

This is a future implementation plan, but Firebase will be used in the backend due to its serverless architecture, ease of integration with flutter and support for secure and seamless real-time data exchanges. Firebase authentication will be used to handle the user sign-ins, that would allow for anonymous login- email-passwords login and logins based on user state management.

The Firebase Cloud Firestore will be used to store different user specific contents such as journal entries and completed task logs. The plan is to have the data categorized using different identifiers for each of the session, maintaining their privacy and allowing users to return their data without any permanent login credentials, should they chose to.

Apart from that, the analytics suite of Firebase would provide different optional insights on feature usage, frequency and allowed tracking of the anonymous behavioral patterns of the users, that would greatly help in the refinement process.

5.4.3 Libraries Used

The Flutter libraries that were used during the making of this project are as follows. The code uses several Flutter and third-party libraries. Here's a list of all the libraries imported and used in the code:

Flutter Core Libraries:

1. `dart:async` - For asynchronous programming (e.g., `Timer`, `Future`).
2. `dart:convert` - For JSON encoding/decoding (e.g., `jsonEncode`, `jsonDecode`).
3. `dart:math` - For mathematical operations (e.g., `pi`).

Flutter Framework Libraries:

1. `package:flutter/material.dart` - For Flutter's Material Design widgets and core functionality.
2. `package:provider/provider.dart` - For state management using the Provider package.

Third-Party Libraries:

1. `package:shared_preferences/shared_preferences.dart` - For persistent local storage (e.g., saving gratitude journal entries).
2. `package:confetti/confetti.dart` - For displaying confetti animations (used in the Progress Tracking screen).

3. `package:youtube_player_flutter/youtube_player_flutter.dart` - For embedding and controlling YouTube videos.
4. `package:share_plus/share_plus.dart` - For sharing content (e.g., YouTube video links).
5. `package:cached_network_image/cached_network_image.dart` - For loading and caching network images (e.g., YouTube video thumbnails).

Summary of Libraries:

- State Management: `provider`
- Persistence: `shared_preferences`
- Animations: `confetti`
- YouTube Integration: `youtube_player_flutter`
- Sharing: `share_plus`
- Image Caching: `cached_network_image`
- Core Flutter: `material`, `async`, `convert`, `math`

These libraries collectively enable features like state management, local storage, animations, video playback, and sharing functionality in the application.

5.4.4 Use Case Diagram

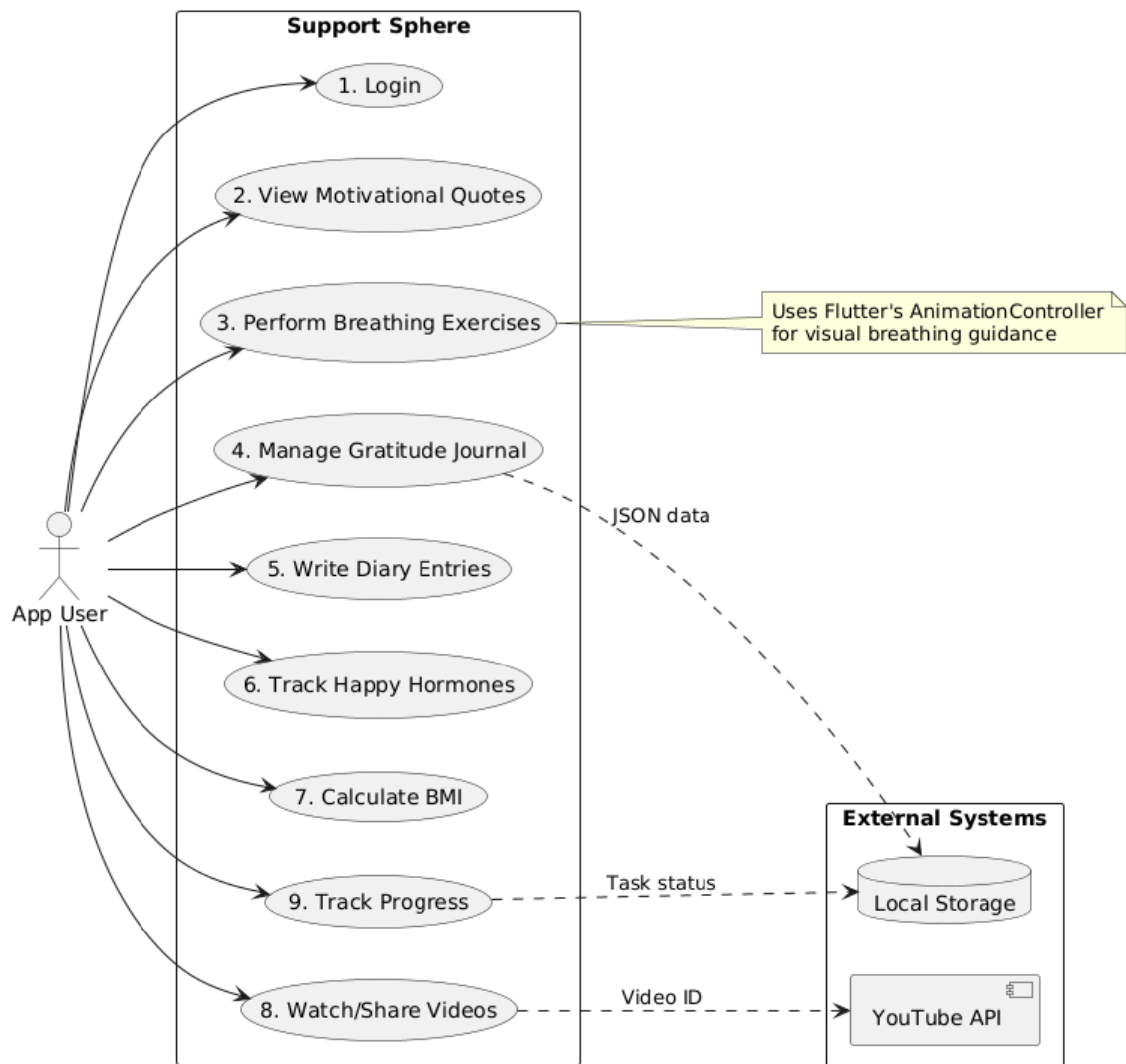


Figure 5.2: Use Case Diagram - 1

5.4.6 Data Flow Diagram Level 0

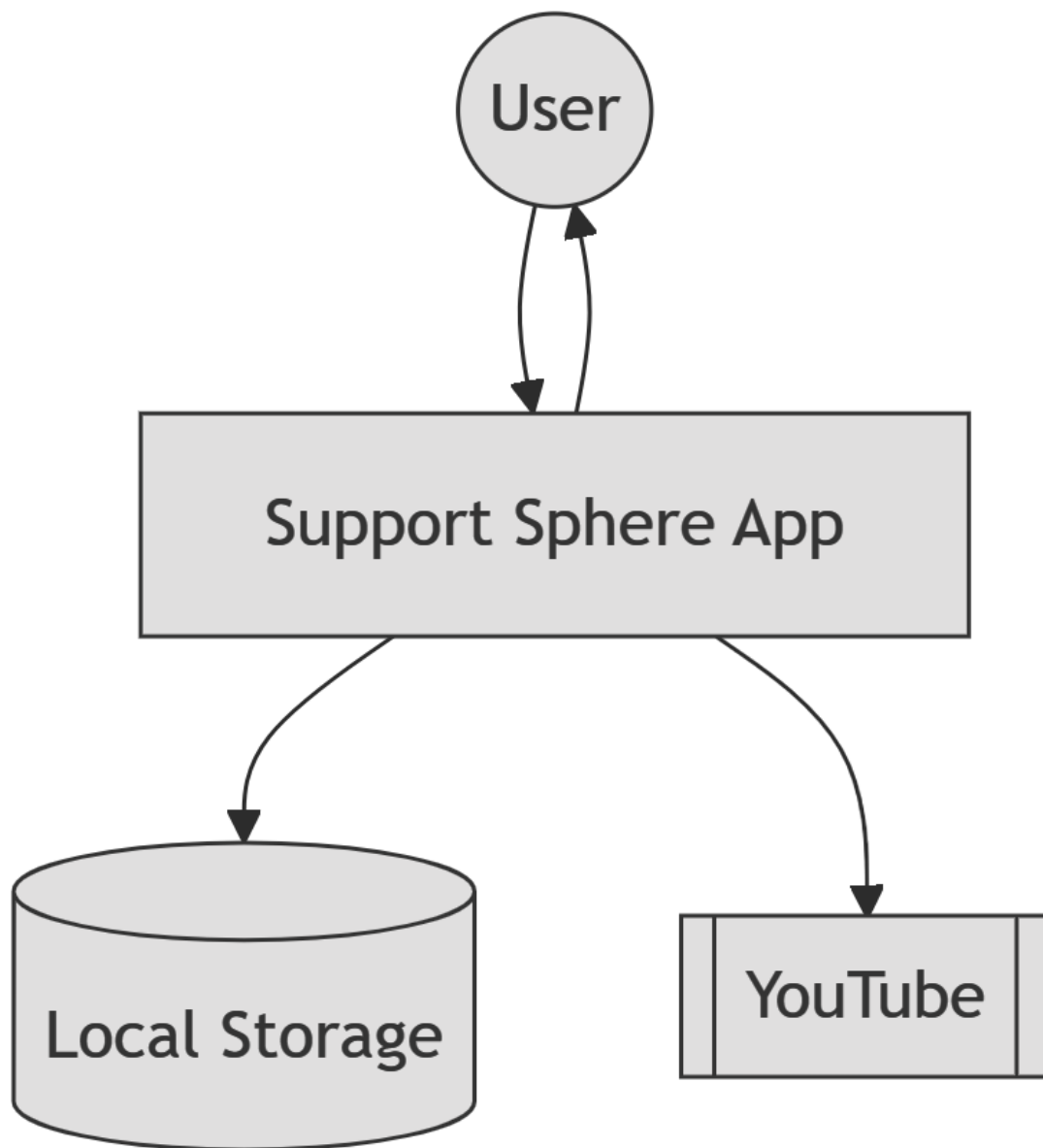


Figure 5.5: Data Flow Diagram 0

5.4.7 Data Flow Diagram Level 1

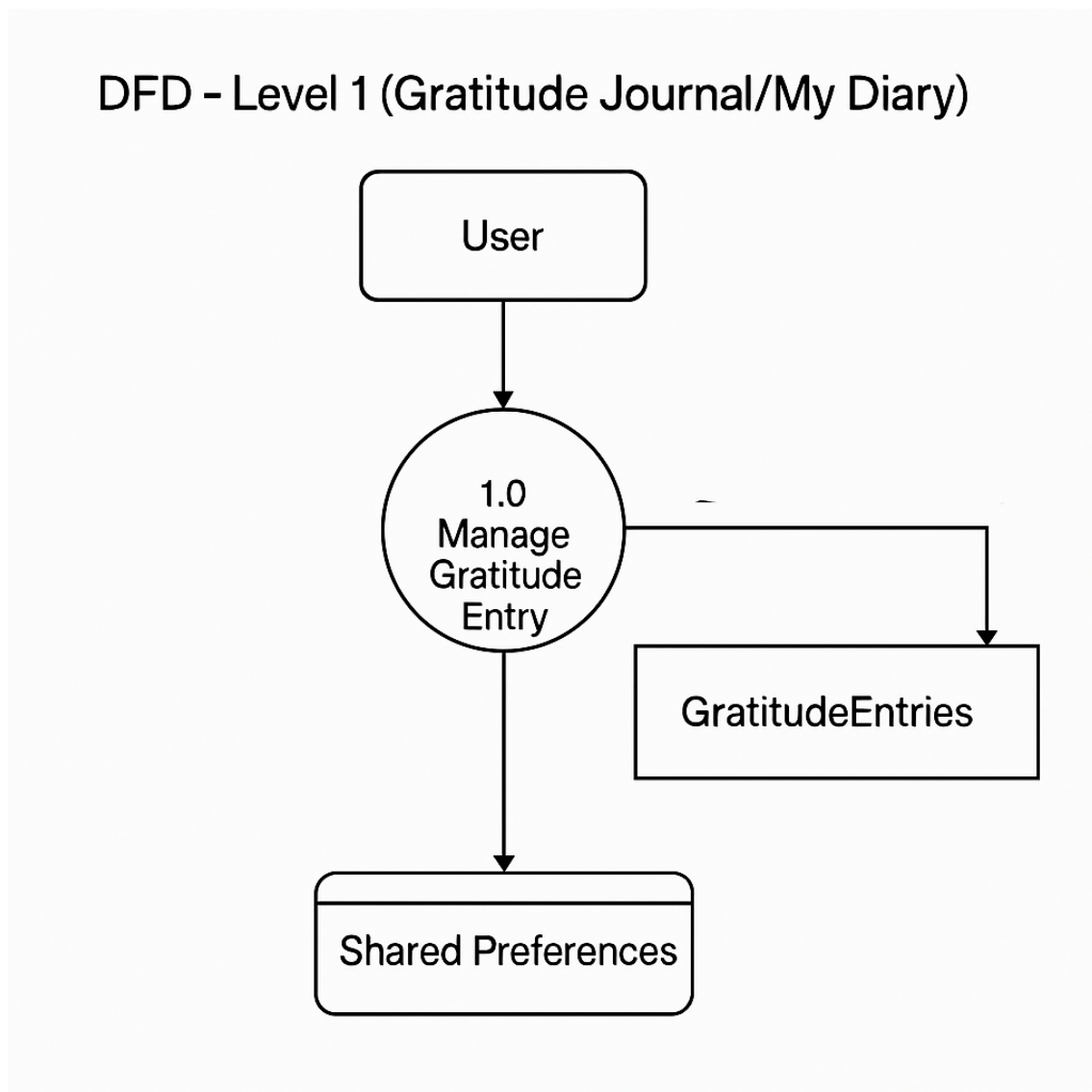


Figure 5.6: Data Flow Diagram Level 1

5.4.8 Data Flow Diagram Level 2

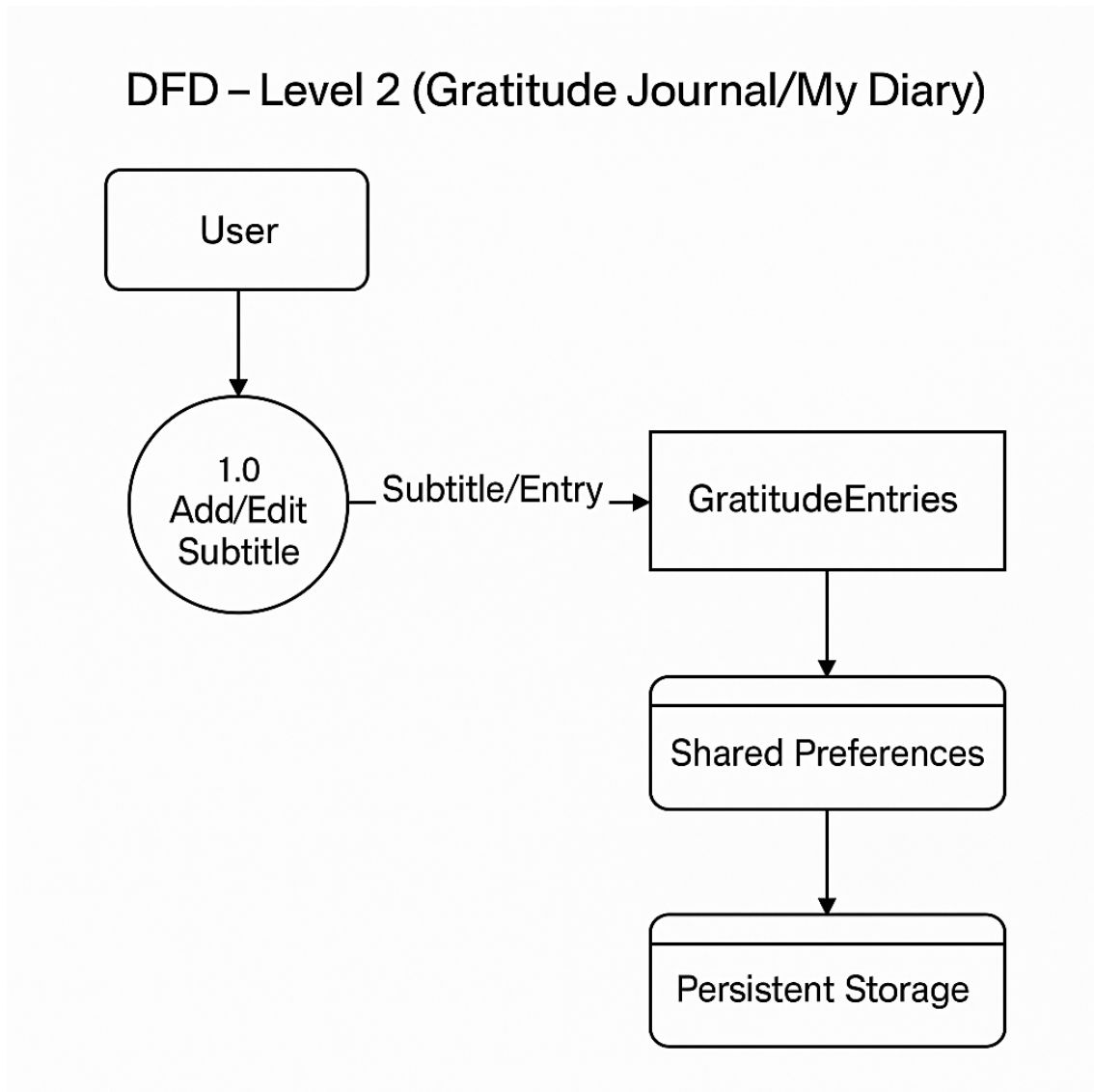


Figure 5.7: Data Flow Diagram Level 2

5.5 Testing

The testing phase of Support Sphere was very carefully guided and designed by ethical sensitivity and had a strong focus on qualitative evaluation rather than quantitative going through quantitative metrics. Due to the personal and vulnerable nature of the user demographics, straightforward methodologies such as A/B testing or randomized control trials felt inappropriate. Instead, multi-layered and empathetic testing approach was considered, encompassing both technical validation and emotional response analysis.

5.5.1 Internal Unit And Integration Testing

Initially, internal unity testing by me, to ensure that the different components of the application behaved as expected in isolation. Flutter's testing tool allowed writing widget-level tests to validate the inputs, UI render behavior and state changes. For instance:

- The journal module was thoroughly tested to ensure that the entries were saved, retrieved and timestamped properly
- The motivational quote module tested for accurate retrieval and display order from the JSON file
- The breathing animation modul was carefully tested to ensure the frame consistency and timing alignment properly worked with the breathing patterns

5.5.2 Usability Testing

Following internal testing, using a very small group of users who willingly participated in a carefully designed informal usability testing environment were encouraged to test it. The group included people who had previously identified themselves as having suffered or experienced moderate or mild levels of depressions. They were provided open access to the application in a very judgment-free and private environment, and no information was collected to maintain anonymity.

The participants were then encouraged to use the application for one-week period, and were not given any diagnostic tools of mood survey that might end up triggering the distress. Instead, after their session, they were informally interviewed to reflect upon their emotional experience while using the application.

The main feedback themes included:

- Breathing excercises that provide real-time stress relief
- Increased mood awareness through the checklist
- Positive emotional resonance with gratitude journaling

- A fine sense of calm from the color scheme and minimal design fo the application

During the testing phase, no major bugs of feature failures were reported, although minor improvements were suggested.

5.5.3 Ethical Testing Consideration

Given the concept of metnal health that we are dealing with here, especial care was taken to ensure that the testing environment did not inadvertently contirbute to psychological harm. Participants were breifed on the application's purpose as a supportive tool - and not a a therapeutic or diagnostics tool. The users were also reminded to consult professionals if they faced serious symptoms. The test scripts were reviews careful before assessing them.

5.6 Deployment

Once the different core features were refined and validated properly, the project then moved to the deployment phase. As the application was still in a prototype stage, the deployment was conducted as a form of "Soft Launch", limited to a very close and small number of participants, to get real - world feedback. Through this deployment phase, the goal was to check and observe if the application's behavior stands strong in diverse environments and different devices, while collecting meaningful experiential data and that were to be used in future development.

5.6.1 Platform Targeting And Optimization

The application was deployed as an APK file, optimized for devices with low to moderate hardware specifications. The code optimization included:

- Use of const constructors and minimal widget rebuilds to ensure that it has better performance
- Deferred loading for non-critical modules
- Applying compression to animation and images

The flexibility of Flutter allowed the application to adapt it to different screen sizes, making sure that the application is usable accross different android based phones and tablets.

5.6.2 User Access And Communication

The test users were given very clear installation instructions and were informed with consent documents. Clear communication highlighted that this was a non-commercial, prototype application that was intended for emotional support and self-reflection.

The feedback channels were provided via secure forms, emails or even taken personally for taking experiences, raise concerns or suggests improvements.

5.6.3 Post Deployment Evaluation

After several weeks of using the application internally and collecting data, all the information were review. In general, the application remained mostly stable across different devices with no major bugs or crashes reported. The most accessed modules were the breathing timer and gratitude journal, which reaffirmed their emotional utility.

Users did report their willingness to maintain their daily emotional needs were increased, and the application felt "Comforting", "Non-Judgmental" and "Lightweight".

These different findings helped to validate the core hypothesis of the application, of it being a small, digital companion to positively influence early-stage depressive symptoms.

5.7 Maintenance And Future Improvements

The final stage of the Software Development Lifecycle (SDLC) for Support Sphere involves the excruciating ongoing process of maintenance of the software and planning for future development. Although, the current version of the application still remains in the prototyping and research phase, the maintenance strategy has been conceptually developed in mind to ensure that a long term support system is established based on innovation, usability and sustainability.

5.7.1 Maintenance Strategy

As is the case with any digital health related tool, especially on that is aimed towards users who are vulnerable, maintaining the software after development is very critical. For this reason, a continuous maintenance model was outlined to carefully keep on addressing the feedback and system performance of the program, following all the ethical and technical standards.

Bearing that in mind, the first priority in the maintenance process is the monitoring and analysis of user reported feedback.

This includes both considering both the functional feedback (feature bugs/performance issues), alongside the emotional responses (How the user felt while interacting with the feature). Since the application itself is used by people who are going through mild depression, the feedback from the users was not just treated as a technical report, but also as a strong emotional signal. An empathetic review process towards this application allows to ensure that the difficulty or discomfort of the user is promptly identified and addressed in the subsequent versions of the program.

It was also considered how software bugs, usability issues and interface glitches are considered and checked up. These corrections are approached with constant urgency, as any kind of instability in the user experience could negatively affect the trust of the user - which is a very serious issue when dealing with an application of such sensitive nature. As time goes on, the modular architecture of the application allows for the implementation of Hotfixes and update patches, based on the severity of the issue.

Apart from that, privacy compliance and data security were also considered. Since the application has a number of sensitive modules such as task logs, journals, which store different types of stored data, it's always of paramount importance that these data are kept safe, and are in compliance with privacy standards such as the GDPR and are encrypted. The data therefore, requires constant protection regulation, and the security and permission protocols will be updated as needed.

5.7.2 Considering Future Improvements

Part of making sure that the project remains relevant is to keep looking ahead, and envision how it can be expanded upon iterative extensions and releases, while

maintaining the foundational values of the application aligning with cultural relevance, safety, simplicity and accessibility. All of the new features that will be added are carefully vetted and designed to respect emotional appropriateness and preserve user autonomy.

Considering that, there are a number of modules that are kept in mind for the future. One of the first one, is Sleep Tracking Module, which will allow the users to record their sleep patterns to give them a better understanding of how sleep quality correlates with the emotional wellness. By incorporating different passive metrics, users can get a better insight of their sleep quality, without any manual input, preserving the low-pressure environment of the application itself.

An enhanced integration of Artificial Intelligence (AI) for prediction mood and journal insights, is being considered. Using natural language processing (NLP), the application will analyze different touch typing patterns or the sentiment of written texts in the journal to assess emotional shifts in the user, to later provided the user with encouragement or personalized support.

A Gamification element is considered in hopes of increasing long-term user engagement. These would include non-competitive achievements such as "journaling streaks", "breathing session milestones" , or even provide the users with gratitude badges that are designed to motivate the users through gentle positive reinforcement rather than pressure.

Down the line, there are plans for having integrating a professional level support system that would include a vetted directory of mental health professionals, or have a secure messaging portal to contact counselors. However, if this feature is eventually implemented, heavy ethical safeguards and filtering will be considered to protect privacy and ensure voluntary participation of the users.

Chapter 6

Result Analysis

6.1 Procedure Of Evaluation

To evaluate the effectiveness of the application itself, I attempted to do a sort of “Soft Launch” of the application, within a very small selected group of people, each of whom were carefully chosen to have reportedly been through early stages of depression or chronic stress. They were all invited to take a look at the application and use it over a period of several days. These individuals were given the opportunity to work with the application in a completely judgement free environment and private environment. The core aim was to assess whether their interaction garnered a positive uplift in their mood, even if it was in very small levels.

Rather than going for invasive data collection or quantitative scoring system, that would ultimately end up pressuring or alienating the users, the evaluation that I did was based on subjective mood reflections, qualitative self reports and observational analysis.

The key performance metrics that I considered were:

- **Accuracy:** Thought emotions are not predictive in nature, the application did consistently deliver appropriate and relevant content to the users (e.g. motivational quotes, breathing guides, mood lifting tasks etc.) without errors, that seemed to resonate well with the users.
- **Efficiency:** The application ran smoothly, and upon testing it within multiple android devices, it had very minimal load times and the intuitive design and UI scaled really well. Users did not report any slowdown or crashes during the testing period.
- **Reliability:** Across all sessions, the features of the application behaved as expected. The gratitude entries were saved properly, the breathing timer worked well and the quotes updated without any hassle or delay.

Following that, the users were given time to use the application accordingly, and after which, they were presented with a questionnaire which they would complete at their own pace. Instead of taking a quantitative approach, a qualitative approach was taken.

6.2 Evaluation Questionnaire

The questions that were used to evaluate the experience of the users are as follows:

1. What Is Your Phone Model?
2. Was The application Easy To Navigate?
3. Was The application Visually Appealing?
4. Did The application Make You Feel Emotionally Safe?
5. Did You Find The application To Be Intrusive At Any Point?
6. Before Using The application, What Was Your Emotional State?
7. After Using The application, Did You Notice Any Change?
8. Which Of The Module Did You Think Affected Your Mood The Most, And How?
9. Did Any Part Of The application Help You To Reduce Feelings Of Anxiety, Sadness Or Stress
10. Do You Think Making Journal Entries/Gratitude Entries Would Be Helpful For You?
11. Someone Who Is Going Through A Similar Experience, Would You Recommend That?
12. Assuming That You Use This application During Your Daily Routine, How Do You Think It Might Affect Your Habits/Feelings/Emotions?
13. Do You Think The application Might Be Helpful To You During An Anxiety/Stress/Sadness Episode?
14. If You Were Given The Opportunity To Improve Upon The application, What Would Be Your Advice?
15. Is There Anything Else That You Would Like To Add?

6.3 Analysis Of Collected Data

The testing of Support Sphere, due to the sensitive nature of mental health and the ethical considerations involved, was conducted on a very small scale with only three people. These three people willingly consented to participate. Each participant was then given the time and opportunity to interact with the application itself in a very safe and judgment environment. After that, they were provided with the questionnaire above, and they were then asked to answer them at their own convenience. Ultimately, it helped to evaluate the emotional resonance, usability and therapeutic impact of the application.

Based on the reports, the a brief discussion of the results that was collected:

Usability And Interface Experience

All three participants agreed that the program was simple to use and intuitively designed. The adoption of Flutter as the development framework resulted in a responsive and clear user interface, allowing users to switch between modules with little cognitive strain. Participant 1 characterized the navigation as intuitive, but Participant 2 found it simple but felt the entire design lacked professional polish. Participant 3 indicated total delight, describing the interface as "perfect."

In terms of visual appeal, all three participants agreed that the color scheme was peaceful and non-triggering. However, one participant commented that the UI appeared slightly "amateurish" and suggested changes to make it more visually sophisticated and commensurate with professional mental health tools.

Emotional Safety And Intrusiveness

A primary goal of the application was to make users feel emotionally safe and not overwhelmed. All participants agreed that the application was emotionally secure, citing the lack of triggering language, unwanted advertisements, and superfluous notifications. This is consistent with the application's basic design philosophy: to provide a nonjudgmental, relaxing digital experience.

Importantly, all users said that the software was not invasive in any way. The lack of data collecting, adverts, or pop-ups helped to foster a sense of privacy and respect for the user's mental condition, which is especially important for people suffering from anxiety or depression.

Mood Impact And Psychological Response

The different participants were asked to reflect on their emotional state before and after using the application. Each individual reported entering the session in a state of sadness, stress or low mood, often due to different types of internal or work related stress. Following the usages of this application, all of the three users were noted with a noticeable positive shift in mood, thought two of the participant mentioned that the short duration of the application usage time limited their ability to properly test the different parameters of the application.

Participant 1 expressed that the application made them feel "a bit better", while participant 3 remarked that "It Helped Me", and praised the satisfaction from the UI elements such as confetti animation upon completing the achievements. This sentiment was consistent, and even during short frames, the application helped to be emotionally uplifting.

Most Impactful Features

The users were asked to verify and identity which of the modules had the most

emotional impact. The response varied based on the individual preferences, but the some common themes do emerge:

- Breathing Exercise: Two participants highlighted that these were helpful in reducing anxiety.
- Even the BMI calculator was a smaller module, participants mentioned that it helped them improve their body positivity.
- Gratitude journaling and Diary were highly appreciated by Participant 1, who described them as long desired habits that were made accessible through the application.

Participant 3 on the other hand, said that each and every component of the application helped, mentioning that each module has their own merit and values, depending on the user's emotional context.

Potential For Longer Term Use And Behavioral Impact

All the participants indicated that if the application were part of their daily routine, it had the potential to leave a long lasting and positive impact. This aligns well with the application's goal of providing a gentle and non-invasive daily support for people with early stage depression.

Effectiveness During Mental Health Episodes

Responses on where the application could help during episodes of emotional distress (such as anxiety/sadness), were a bit mixed, yet insightful. Participant 1 rightly pointed out that in cases of severe episodes, immediate medical support would be more preferable, and application usage might not suffice. Participant 2 mentioned that it "Depends on the severity" of the episodes, indicating that while mild distress could be eased, it would not be a good replacement for clinical care. Participant 3 on the other hand, stated that it "helped me", showing that for some people, even basic tools like journaling or breathing can serve as meaningful interventions.

6.4 Summary Of Results

Aspect Evaluated	Findings
Usability & Interface	All 3 participants found the app easy to navigate and intuitive. One participant suggested improvement in visual polish for a more professional appearance.
Visual Appeal	Participants found the color scheme calming and non-triggering. One user noted a need for more refined UI elements. Others described it as "perfect."
Emotional Safety	All users felt emotionally safe using the app. No triggering words or aggressive prompts were reported.
Intrusiveness	The app was seen as non-intrusive. Users appreciated the absence of ads, data collection, and pop-ups.
Mood Change After Use	All participants reported feeling somewhat better after usage. Effects were limited by short testing duration.
Most Impactful Features	- Gratitude & Regular Journaling (User 1) - Breathing Exercises (Users 1 & 2) - BMI Calculator (Users 1 & 2) - All features (User 3)
Potential for Long-Term Use	All participants believed regular use would result in a positive impact on emotions and habits.
Mental Health Episode Usefulness	- User 1: Not suitable for acute episodes, professional help is required - User 2: Depends on severity - User 3: Felt it helped
Suggestions for Improvement	- Add personalization options - Improve visual layout polish - Include guided meditations - One user felt no changes were needed
Overall Reception	The app met its core goals: simplicity, emotional safety, and accessibility. Feedback confirms strong potential with room for focused improvements.

Figure 6.1: Summary Of Reports

6.5 Discussion On Feedback

Based on the patterns that I observed and the self-reported user inputs, there were several areas that I found were interesting and considered for improvements. A basic summary is as follows:

- While the users were happy with the features that were present, the absence of a "Mood Tracking" mechanism made it a bit hard for the users to track their emotional trends and mood over time. Even just a simple basic system that would track "How Are You Feeling Today"? would suffice. No written

response would be needed, just a simple emoji or color coded response would suffice.

- Some users felt that the lack of personalization options was a bit limiting to them. Even though the motivational quotes were inspiring, some felt that they were a bit generic. So, having a system that would allow the users to tag their favorite quote, or even add their personal ones could help in improving the emotional impact.
- Some users also felt that a reminder notification for daily-to-do actions could be helpful at times.

6.6 Design Improvements Considered

Based on the different participant feedback that were gathered during the small-scale testing, several improvements were identified that could be implemented to improve Support Sphere. Even though the application itself was generally well-received for its intuitive navigation, and emotionally environment, calm aesthetics, users did point out that there were certain areas that could be improvement.

- **Visual Design Refinement:** One participant mentioned that the UI felt amateurish. The UI components could there be polished, such as having improved buttons, icons and fonts. To give a more professional and cohesive looking aesthetic.
- **Enhance Personalized Options:** A participant expressed interest in customizing the application experience. They proposed features that included color changing options, themes, emoji, tags and so on.
- **Content Expansion: Guided Sessions:** One participant mentioned that having follow along meditation or audio breathing guides could be helpful.
- **Optional Feedback Features:** Including subtle in-application prompts or achievement notifications such as the confetti were seen as positives, and users really enjoyed the little visual touch and thought they add positive reinforcement.

Chapter 7

Conclusion

7.1 Closing Thoughts

The study that I undertook was done with the goal of addressing the growing need for accessible and stigma free access to mental health support. Especially for people who are experiencing depressions of mild to moderate levels (Stage 1 or Stage 2 in particular). Bearing in mind the understanding that many suffers are unable or are unwilling to seek out professional help due to cultural or social stigma, financial issues or the fear of being judged by the society, my project aims to develop a mobile application that would offer completely anonymous and supportive outlet for the users and provide them the opportunity for self-emotional regulation.

The software was conceptualized and created using both theoretical knowledge and personal experience. Drawing on own experience with depression and previous volunteer work at a mental health helpline, the study discovered a critical vacuum in the existing ecosystem of mental wellness apps—many of which are either unnecessarily sophisticated, paywalled, or clinically designed. In contrast, the proposed application focusses on simplicity, accessibility, and free access.

The methodological approach that was involved while developing the application using Flutter and Android Studio, require to orient a Agile And Scrum development cycle to accommodate it for a solo developer like myself. The whole process allowed me to incorporated features such as breathing exercises, gratitude journal, motivational quotes, hormone boosting task list, BMI calculator and a few others, even with the time constraints and resource constraints that I had. The Data collection that was done post-development was done in a completely non-intrusive and judgement free environment. Qualitative feedback and emotional responses were analyzed thoroughly to asses the application's performance and then used to update the application based on the perceived usability, daily mood improvement and emotional support of the user.

Very deep and extended analysis of existing literature was also done, alongside different similar mobile applications that try to support mental health. However, through review, I found that while there are a lot of applications that focus on general well being, very few of them actually focuses on helping people with Level 1 or Level 2 depression, especially with zero intervention. Most applications in this field work

on a subscription based system, where major features are blocked behind a paywall. My project aims to fill this gap by offering a solution that is not intended to replace professional therapy, but rather serves as a preliminary step to encourage the user from taking the first step towards emotional recovery.

The findings of my analysis with a small group of people, showcased that my application is indeed working as expected, and the users who have operated the application, explicitly reported that they felt better upon using the application. While the judgement free environment and eye soothing color scheme and theme of the application, gave them a sense of soothing sensation and calmness.

7.2 Contributions To The Field

Based on my studies, I believe that there are a number of different key-contributions that my application has the potential to portray:

- **Low Barrier Support System:** By prioritizing simplicity and anonymity , my application serves as a truly accessible tool for individuals who might feel hesitant to look for professional help due to financial issues or social stigma.
- **Design Informed By Experience:** Drawing on both personal experience with depression and hands on work in the field, the application's architecture is designed from the ground-up and is based on real life human needs, rather some theoretical framework. I should also mention that the program was made through discussion and approval by my psychologist Maksud Sir.
- **Free And Open Use Framework:** Unlike most of the similar applications out there that seem to block most of the major features behind a subscription-based paywall, my application models how compassion driven design can exist in an open access format without compromising privacy and functionality. My application does not have any paywall, and anyone can use it at their own pace, minimizing the financial barrier.
- **User Centric Validation:** Through real world usage by test users in a safe setting, the application has demonstrated that even small interventions- such a gentle motivation reminder or breathing sessions, can meaningfully assist in improving the well being of users.

7.3 Limitations

- Only Deals With Individuals Of Stage 1 And Stage 2 Depression
- The UI Is Still A Work In Progress, Could Be Improved
- Firebase Is Not Connected As Of Now
- Does Not Have Any Self-Made Content
- Currently No Personalization Option Is Provided

7.4 Plans For The Future

There are a number of different features that I have in mind for the future, which I was unable to include in this iteration, due to resource and time constraints. The following are some of the ideas that I have in mind:

- **Sleep Tracking Module:** Having a sleep tracking mechanism would allow the application to monitor patterns that would significantly influence depression. This would help the application to correlate the sleep quality with the mood date and provide actionable activities.
- **AI Based Mood Detection System:** Implementation of machine learning models would allow the application to assess the emotional state of the user through passive data, such as keystroke speeds, typing patterns, sentiment analysis in the journal entries and so on.
- **Voice Analysis Using NLP:** Future updates might include voice input or voice-operated diary entries, which will be analyzed using the a NLP (Natural Language Processing Model), to assess the mode of the user based on tone , pacing of the user.
- **Performance Metrics And Analytics:** Enhancing the analytics of the dashboard could help users see their progress over weeks or even months. Through visual feedback of emotional trends, users might feel positively reinforced.
- **Gamification and Achievement System:** Implementing some gentle and non-competitive elements of gamification similar to getting milestones or some kind of gratitude streaks would encourage the user to keep using the application for longer.
- **Community Integration (Optional):** A highly moderated anonymous peer support forum or messaging system could be added, allowing anonymous users to share and interact with others.
- The function of directly consulting professionals through the application.

Chapter 8

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