

# **MINDPEACE PROJECT REPORT: MENTAL HEALTH**

**A PROJECT REPORT SUBMITTED TO THE FACULTY OF ENGINEERING, DESIGN AND TECHNOLOGY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE / BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY OF UGANDA CHRISTIAN UNIVERSITY**

**May, 2024**



**UGANDA CHRISTIAN  
UNIVERSITY**

*A Centre of Excellence in the Heart of Africa*

## Statement of Submission

This project report, titled "MindPeace Project Report" is submitted in partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science at Uganda Christian University.

## Declaration

Team MindPeace, hereby declares that the work presented in this report is solely ours. It is the culmination of our experience working on the project MindPeace, reflecting our insights, observations, and understanding of the project over these past 8 months.

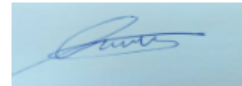
**MUKISA ISAIAH**

**Date:** 07/05/2024



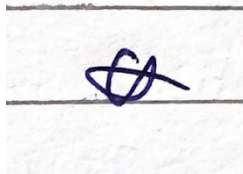
**NAMANYA DESIRE**

**Date:** 07/05/2024



**SEKAMATTE SOUL SOLOMON**

**Date:** 07/05/2024



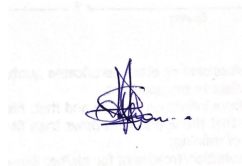
**JAMUGISA PETER PAUL**

**Date:** 07/05/2024



**MABIRA CONRAD WILLIAM**

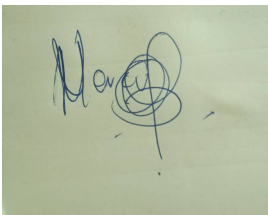
**Date:** 07/05/2024



## Approval

This report has been submitted with the approval of the following supervisors (Lecturers):

**Madam MERCY NEKESA**

A photograph of a handwritten signature in blue ink on a light-colored surface. The signature is stylized and appears to be 'Mercy Nekesa'.

**Date:** 07/05/2024

**Madam IMMACULATE KAMUSHIME**

Signed ..... 

Date ..... **08.05.2024**

## **Abstract**

1 in 5 people experience mental health challenges [6], the prevalence of mental health issues globally remains a pressing concern, with a significant proportion of affected individuals not receiving the necessary treatment due to barriers such as stigma, cost, and a shortage of skilled professionals. This report presents the MindPeace project, an online application designed to address these challenges by providing a user-friendly platform that connects working-class individuals aged 20 to 65 with skilled mental health practitioners. MindPeace aims to bridge the gap in access to mental health care, focusing on specific demographics and offering an alternative to informal support and self-medication. The project encompasses a comprehensive suite of features, including booking of sessions, an emergency helpline for crisis support, and a compatibility quiz for personalized counseling experiences. By leveraging technologies such as Cal.com integration for efficient appointment management, secure video chat for confidential sessions, and a robust emergency response system, MindPeace seeks to reduce the reliance on self-medication and improve mental health outcomes for its users. This report outlines the project's objectives, scope, and the functionalities it offers, highlighting its potential to significantly impact the accessibility and quality of mental health care for underserved populations.

# Contents

<b>1</b>	<b>Introduction</b>	<b>8</b>
1.1	Background . . . . .	8
1.2	Problem Statement . . . . .	8
1.3	Objectives and Goals . . . . .	8
1.3.1	Main Objective . . . . .	8
1.3.2	Specific Objectives . . . . .	8
1.4	Project Scope and limitations . . . . .	9
1.4.1	Project scope . . . . .	9
1.4.2	Features and Functionalities . . . . .	9
1.4.3	Technologies used for functionality . . . . .	10
1.4.4	Deliverables . . . . .	10
1.4.5	Exclusions . . . . .	11
1.4.6	Timeline . . . . .	11
1.4.7	Success Criteria . . . . .	11
1.5	Importance and relevance of the project . . . . .	11
1.5.1	Core System Functionalities . . . . .	12
1.5.2	Detailed Explanation . . . . .	13
<b>2</b>	<b>Literature review</b>	<b>14</b>
2.1	Customized Matching and Improved Results . . . . .	14
2.2	MindPeace: A Personalized Approach. . . . .	15
2.3	The Landscape of Mental Health Apps . . . . .	15
2.4	Conclusion . . . . .	15
<b>3</b>	<b>Methodology</b>	<b>16</b>
3.1	Research Phase: . . . . .	16
3.2	Market Analysis and Requirement Gathering: . . . . .	16
3.3	Design Phase: . . . . .	16
3.4	Backend Development: . . . . .	16
3.5	Frontend Development: . . . . .	16
3.6	Version Control and Collaboration: . . . . .	16
3.7	Quality Assurance and Testing: . . . . .	17
3.8	Deployment and Maintenance: . . . . .	17
<b>4</b>	<b>System Design</b>	<b>18</b>
4.1	Architectural Design . . . . .	18
4.2	Data flow diagrams . . . . .	18
4.3	Component breakdown . . . . .	18
4.4	Database Design . . . . .	20
4.5	Human Interface Design . . . . .	20
<b>5</b>	<b>Implementation</b>	<b>22</b>
5.1	Research and Conceptualization: . . . . .	22
5.2	Define Features and User Stories: . . . . .	22
5.2.1	Features . . . . .	22
5.2.2	User stories . . . . .	22
5.3	Design and Prototyping: . . . . .	22
5.4	Backend Development: . . . . .	23
5.5	Frontend Development: . . . . .	23
5.6	Continuous Improvement: . . . . .	24

<b>6</b>	<b>Testing and Evaluation</b>	<b>25</b>
6.1	Overview of Testing Methodologies: . . . . .	25
6.2	Test Results and Metrics: . . . . .	25
6.3	Evaluation Against Project Requirements and Objectives: . . . . .	25
6.4	Results and Discussion . . . . .	26
6.4.1	Results . . . . .	26
6.4.2	Presentation of the project outcomes. . . . .	26
6.4.3	Discussion . . . . .	26
6.4.4	Implications . . . . .	26
6.5	conclusion . . . . .	28
6.6	Summary of Key Findings . . . . .	28
6.6.1	Reflection on the Project’s Success in Meeting Objectives . . . . .	28
6.6.2	Areas for Continued Improvement . . . . .	28
6.7	Recommendations and Future Work . . . . .	29

## List of Figures

1	Architecture diagram . . . . .	18
2	Data flow diagram . . . . .	18
3	Mindpeace ERD . . . . .	20
4	Sign up page . . . . .	20
5	Landing Page . . . . .	20
6	Dashboard . . . . .	21
7	Login page . . . . .	21

# 1 Introduction

## 1.1 Background

Mental health concerns have developed as an urgent concern for individuals globally, with serious consequences for personal well-being, productivity, and society's health. Despite increased awareness and advocacy efforts, many people still struggle to get access to mental health care [4], especially working-class people aged 20 to 65.

According to statistics, one in every four people suffers from a mental illness each year, but 65% go untreated. This treatment gap highlights the critical need for innovative approaches that may overcome obstacles such as stigma, expense, and a scarcity of trained professionals

In response to these problems, the MindPeace application was created as a breakthrough solution to make it simpler and faster for those suffering from mental illnesses to get in touch with certified mental health specialists. The program, which is based on research and insights gathered from thorough needs assessments, intends to empower users to take responsibility of their well-being and seek professional assistance using a readily available platform

MindPeace recognizes the limits of traditional mental health treatment practices, such as access restrictions, reliance on informal support networks, and risks associated with self-medication. By providing a range of new features such as appointment booking, compatibility matching, and crisis help, the application aims to give a comprehensive and individualized approach to mental health treatment.

The incidence of mental health issues is a major international problem. Despite figures suggesting that one in every four persons experiences a mental health illness each year, a whopping 65% go untreated. Limited access owing to stigma, expense, and a scarcity of skilled experts remains a significant obstacle to accessing necessary mental health care. This lack of access may have disastrous repercussions, forcing people to turn to potentially dangerous coping techniques and, ultimately, poor mental health outcomes.

## 1.2 Problem Statement

[6]1 in 4 adults has a mental health condition yearly, yet 65% go untreated. Limited access due to stigma, cost, and scarce professionals hinders mental healthcare. [7]The suicide rate globally counts for 77% of deaths globally for those between 15 to 29 years which is about 700,000 deaths on average per year. Access to mental health services is the main problem that people face. either they don't know where to find these services or they don't know how to find these services.

## 1.3 Objectives and Goals

### 1.3.1 Main Objective

The main objective of MindPeace is to address the lack of quick and easy access to qualified mental health professionals for working-class individuals facing mental health challenges (aged 20-65).

### 1.3.2 Specific Objectives

Increase access to mental health professionals: MindPeace aims to bridge the gap between individuals needing help and qualified professionals by providing a platform for easy and potentially faster connection.

Target a specific demographic: The system focuses on working-class individuals within a specific age range, suggesting a tailored approach to meet their needs and potential barriers to traditional mental health services.



Offer an alternative to informal support and self-help: While acknowledging the value of friends, family, and self-help materials, MindPeace highlights the limitations and emphasizes MindPeace as a solution for those seeking professional guidance

Reduce reliance on self-medication: By providing access to professionals, MindPeace aims to discourage individuals from using potentially harmful coping mechanisms like alcohol or substances.

## 1.4 Project Scope and limitations

### 1.4.1 Project scope

The objective of the MindPeace project is to develop an innovative and user-centric mental health platform that bridges the gap between clients seeking mental health support and professional counselors. MindPeace aims to offer a comprehensive suite of features to facilitate easy access, personalized matching, and timely assistance for individuals in need of mental health services.

### 1.4.2 Features and Functionalities

#### 1. Booking Of Sessions

- (a) Description:  
MindPeace provides a user-friendly interface for clients to schedule sessions with mental health professionals.
- (b) Implementation:  
The platform seamlessly integrates with Cal.com, a leading appointment scheduling tool, enabling efficient management of appointments.
- (c) Options:  
Clients have the flexibility to choose between online video chat sessions and in-person appointments based on their preferences and comfort levels.
- (d) **Benefits**
  - i. Streamlined Booking Process:  
Clients can view counselor availability, select preferred time slots, and receive instant confirmation of appointments.
  - ii. Reminders and Notifications:  
Automated reminders are sent to clients and counselors before scheduled sessions to ensure timely attendance.

#### 2. Emergency Helpline(Crisis Support)

- (a) Description:  
MindPeace offers a dedicated emergency helpline for clients facing immediate mental health crises.
- (b) Functionality:  
Upon accessing the emergency feature, clients are connected to an available standby counselor for immediate support
- (c) Emergency Contacts:  
Clients have the option to provide emergency contact information, enabling notifications to be sent to designated individuals during crises.
- (d) **Benefits**

- i. **Prompt Assistance:**  
Clients experiencing distress can access help quickly and receive guidance from trained professionals.
- ii. **Safety Net:**  
The inclusion of emergency contacts ensures that clients have a support network in place during critical moments.

### 3. **Compatibility Quiz**

- (a) **Description:**  
MindPeace features an interactive compatibility quiz designed to assist clients in identifying their counseling preferences.
- (b) **Purpose:**  
The quiz gathers information on factors such as counseling styles, areas of focus, and communication preferences
- (c) **Matching Algorithm:**  
Utilising a sophisticated matching algorithm, MindPeace pairs clients with counselors who align with their identified needs and preferences.
- (d) **Benefits**
  - i. **Personalized Counselling Experience:**  
Clients receive tailored counselor recommendations based on their quiz responses.
  - ii. **Improved Client-Counselor Fit:**  
The matching process enhances the likelihood of productive counseling sessions and positive outcomes.

#### 1.4.3 **Technologies used for functionality**

##### 1. **Cal.com Integration:**

MindPeace leverages Cal.com's API for seamless integration, enabling real-time synchronization of counselor availability and client bookings. The integration ensures a user-friendly experience for both clients and counselors, enhancing the efficiency of appointment management.

##### 2. **Secure Video Chat:**

MindPeace employs secure, HIPAA-compliant video chat technology for online counseling sessions. Clients and counselors can engage in confidential and seamless video sessions, ensuring privacy and convenience.

##### 3. **Emergency Response System:**

Through collaboration with emergency response partners, MindPeace has established a robust system for crisis support. The system includes trained standby counselors available 24/7 to provide immediate assistance during mental health emergencies

#### 1.4.4 **Deliverables**

##### 1. **Fully Functional Platform:**

- (a) **Web Access:** MindPeace is accessible via web browsers and is fully responsive for all screen sizes.
- (b) **Intuitive Interface:** The platform features a user-friendly interface designed for easy navigation and accessibility.

##### 2. **Comprehensive Compatibility Quiz:**

- (a) The quiz module offers an engaging and informative experience for clients, aiding in the identification of counseling preferences.
- (b) Detailed Match Reports: Clients receive personalized match reports outlining recommended counselors based on quiz responses

### **3. Integrated Emergency Helpline:**

- (a) The emergency helpline feature is seamlessly integrated into the platform, accessible with a single click.
- (b) Emergency Contact Notifications: Designated contacts receive instant notifications in case of client emergencies

#### **1.4.5 Exclusions**

The project scope does not include:

1. Development of custom mobile applications beyond the provided web access.
2. Extensive marketing campaigns or promotional activities
3. Integration with third-party payment gateways for financial transactions.

#### **1.4.6 Timeline**

- Start Date: 23rd September, 2023
- End Date: 19th April, 2024

#### **1.4.7 Success Criteria**

- Positive User Feedback: Evaluate user satisfaction through surveys and feedback mechanisms.
- Increased User Engagement: Monitor the number of booked sessions and active users on the platform.
- Successful Matches: Assess the effectiveness of the compatibility quiz by tracking client-counselor matches and feedback on counseling experiences.

## **1.5 Importance and relevance of the project**

In this section, we present the relevance of our software system named MindPeace. This system tackles the problem of lack of quick and easy access to mental health professionals by individuals facing mental health challenges. Currently, the most common approaches to this problem involve individuals with mental health challenges reverting to using distractions like alcohol and substances to help them forget about the challenges that they are facing. Another option is that these individuals resort to speaking to a trusted friend or relative. One other approach involves using self-help like videos and books to look for solutions to the problems being faced. However, these methods have several limitations such as the fact that the distractions tend to ignore the actual challenge being faced, and this leads to even worse relapses later on. Another common limitation with talking to trusted friends and relatives is that though these people are usually doing this with the best of intentions, they need to be properly trained and equipped to handle some of the challenges being faced by the individuals seeking help. This highlights the need for a professional to help overcome these challenges.

Our target audience for this system is working-class individuals aged between 20 and 65 facing mental health challenges and looking for professional qualified help to overcome these challenges. This section will first delve into the details of the problem, followed by a comprehensive explanation of the functionalities offered by MindPeace.

We will then analyze the system’s impact on solving the identified problem and discuss its potential for future applications.

The Problem that this system sets out to solve is the lack of quick and easy access to mental health professionals by individuals facing mental health challenges. Mental and substance use disorders are now the leading cause of disability worldwide. This documented global burden of disease associated with mental disorders is compounded by the widening “mental health treatment gap” where, worldwide, more than 70 percent of persons who need mental health services lack access to care [4]. According to the World Health Organization, 15 percent of working-age adults were estimated to have a mental disorder in 2019, and globally, an estimated 12 billion working days are lost every year to depression and anxiety for US dollars 1 trillion per year in lost productivity [7]. Furthermore, suicide is the fourth leading cause of death among 15-29 year-olds [6].

Many people struggling with mental health challenges turn to various coping mechanisms, some more effective than others. Informal support networks, self-help materials, and self-medication are common approaches, but it’s important to understand both their strengths and limitations.

Informal support networks, like friends and family, can be a valuable source of comfort and connection. Talking to trusted loved ones can provide emotional validation, a crucial element in reducing feelings of isolation and loneliness that often accompany mental health issues. The social connection offered by strong social networks fosters a sense of belonging and support. Additionally, friends and family can offer practical help with daily tasks, alleviating stress and allowing individuals to focus on managing their mental health.

However, informal support networks also have limitations. Loved ones, while well-meaning, may not have the training or knowledge to provide professional guidance for complex mental health challenges. Unintentional bias can creep in, with friends or family unknowingly reinforcing negative thought patterns or behaviors. Furthermore, constantly relying on loved ones for emotional support can strain relationships and leave them feeling overwhelmed.

Self-help materials, including books, websites, and videos, offer a readily available and often lower-cost alternative to traditional therapy. These resources can be a valuable source of psychoeducation, increasing understanding of mental health conditions and empowering individuals to take charge of their well-being. Some self-help materials even provide specific techniques for managing symptoms of anxiety or depression, such as relaxation exercises or cognitive-behavioral therapy (CBT) skills.

The limitations of self-help materials lie in the potential lack of quality control. The information available can vary greatly, with unreliable sources offering misleading or ineffective advice. Additionally, self-help approaches are not personalized and may not address the root causes of mental health problems. The lack of interaction with a qualified professional can also be a drawback, as accountability and motivation are crucial aspects of successful mental health management.

Finally, it’s important to address the potentially harmful practice of self-medication with alcohol or substances. While substances may initially provide a sense of relief by numbing emotional pain or anxiety, this is a dangerous and temporary solution. Self-medication can worsen symptoms in the long run and lead to addiction, creating additional problems on top of existing mental health challenges. It can also impair judgment and increase the risk of risky behavior.

In conclusion, informal support networks, self-help materials, and self-medication can all play a role in coping with mental health challenges. However, it’s important to be aware of their limitations. For comprehensive and effective support, professional mental health services are often necessary. MindPeace aims to provide these mental health services as quickly and as easily as possible to these individuals.

### **1.5.1 Core System Functionalities**

Our web application, MindPeace offers a variety of functionalities designed to empower individuals and connect them to certified mental health professionals to help manage their mental well-being and overcome the various mental health challenges that they face. Here’s a brief overview:

1. **Appointment Booking:** Users can search, find, and then schedule an appointment with a given mental health professional of their choosing at a time and place of convenience.
2. **Compatibility Quiz:** The system has a compatibility quiz that enables users to be matched with a therapist or counselor who matches their needs and goals for the highest chance of success of their treatment.
3. **Crisis Support:** The system has an emergency support system where users can reach out and ask for help and have emergency responders and a given support system notified about them.

### 1.5.2 Detailed Explanation

1. **Appointment booking:** This core functionality allows users to book sessions with their preferred mental health professional on our platform. The session can either be physical, and this caters to a location of the users' preference, be it the counselor's location, or one of the user's choosing. There is also a provision for online sessions, and these are held using secure video conferencing technologies like Zoom, Google Meet, or Cal Video. These enable the users to access telemental health services, and this breaks down the barrier of location, distance, and transport costs. A user also can reschedule a session to a time that is convenient for them.
2. **Compatibility quiz:** The compatibility quiz is a feature geared towards helping users find a mental health professional who is well-equipped to handle the needs of the user. Another use for this is it helps the user to be paired with a mental health professional with whom they will have the highest chance of success, someone with whom they feel comfortable and will be able to open up.
3. **Crisis support:** The crisis support feature is intended to help connect users to emergency services in case they need them. One of the implementations of this is that the user can send a request for emergency support and their information is sent to the application where members in their support system are notified about their need and encouraged to reach out. Another implementation is that the users' information is sent to the emergency personnel so that they can reach out to the user.

## 2 Literature review

Mental health difficulties are a global issue that affects millions of people. Despite its widespread prevalence, finding trained mental health specialists remains difficult owing to reasons such as cost, remoteness, and stigma [7]. Mobile applications have emerged as a viable solution for closing this gap by providing easily accessible and convenient mental health treatments [3]. This review explores the possibilities of mobile applications in allowing tailored mental health connections, with a particular emphasis on MindPeace, an app that connects users with counselors based on their unique needs. We will look at relevant research on the effectiveness of app-based therapist matching and the role of technology in mental health access.

### 2.1 Customized Matching and Improved Results

Traditionally, finding a good therapist has sometimes required trial and error, thus delaying access to appropriate care. Mobile apps with matching algorithms can tailor the search process by taking parameters like:

1. The user's different mental health difficulties (e.g., anxiety, depression, trauma)
2. Preferred counselor features include gender, therapeutic style, and specialization.
3. User's location and availability.

According to research, therapist-client fit is an important element in good treatment results [5]. This study shows that a strong therapeutic relationship, established by a good match between therapist and client, is associated with improved treatment outcomes. Similarly, the American Psychological Association’s study, “The Heart and Soul of Change: What Works in Therapy” (2017), underlines the significance of therapist-client fit for effective psychotherapy [APA, 2017] [1] MindPeace and similar applications have the potential to:

1. Improve user satisfaction with the therapeutic experience.
2. Increase commitment to the treatment plans.
3. Lead to swifter improvement in therapy.

## 2.2 MindPeace: A Personalized Approach.

MindPeace tackles the difficulty of selecting an appropriate counselor by including a matching quiz.

This quiz assesses a user’s mental health requirements and preferences, resulting in a tailored list of appropriate counselors from the app’s network. This strategy is consistent with current research on the significance of therapist-client fit and seeks to link users with counselors who are most equipped to handle their individual needs.

## 2.3 The Landscape of Mental Health Apps

MindPeace is not the only app striving to enhance access to mental health services.

Established services such as BetterHelp provide similar functionality, connecting consumers with therapists via a mobile app. BetterHelp uses a user-preference-based matching method and provides therapeutic session options such as video conferencing, phone conversations, and texting.

Headspace, another popular app, takes a different approach, emphasizing self-guided mental health skills. Headspace offers guided meditations, mindfulness exercises, and educational materials to assist users manage stress and anxiety while also improving sleep. Research on app-based interventions, such as Jessica L. Nicholas et al.’s (2019) study “Delivering Cognitive Behavioral Therapy Through Mobile Apps: A Meta-Analysis” [Nicholas et al., 2019], suggests that these tools can be a valuable adjunct to traditional therapy or for people with mild to moderate mental health concerns [2].

## 2.4 Conclusion

The mobile app ecosystem provides a varied set of options for addressing mental health concerns. Apps like MindPeace, which focuses on tailored therapist matching, have the potential to transform how people interact with mental health experts. Integrating technology can enhance access, tailor treatment regimens, and possibly result in improved outcomes. However, programs like Headspace, which focus on self-management techniques, provide an additional beneficial approach to mental health.

## 3 Methodology

### 3.1 Research Phase:

During the research phase, we interviewed mental health professionals to learn about their problems, such as providing access to patients in need of counseling, managing workload, and patient care, and tackling the stigma associated with seeking mental health treatment. In addition, we interviewed people to learn about their perspectives on mental health, including awareness, attitudes, and personal experiences. To improve our understanding, we consulted reliable sources such as the World Health Organization (WHO) and scholarly articles for statistical data and insights into current mental health trends.

### 3.2 Market Analysis and Requirement Gathering:

We examined the acquired data to identify major market categories and user demands and then prioritized features based on market demand and feasibility. During this process, we identified counselor booking as the Minimum Viable Product (MVP) feature. We also carefully defined user stories and requirements, which served as guiding principles throughout the development process.

### 3.3 Design Phase:

We used UI/UX design approaches to create simple and visually attractive wireframes and prototypes, putting simplicity and professionalism first to improve user experience and accessibility. Throughout the design process, we actively conducted usability testing to iteratively improve the design. This adaptive strategy guaranteed that the final product not only satisfied user expectations but also followed close objectives and commercial standards.

### 3.4 Backend Development:

We created database designs that were well linked with the application's data and scalability requirements, resulting in effective user information management. We created powerful backend features using NestJS, leveraging TypeScript's inherent benefits in type safety and scalability. In addition, we improved the app's functionality by smoothly integrating third-party services such as Clerk for authentication and Cal.com for booking administration. This holistic approach simplified development resources and enhanced the application with sophisticated capabilities, resulting in a seamless and complete user experience.

### 3.5 Frontend Development:

We used Next.js for frontend development, utilizing its server-side rendering features to improve performance and search engine exposure. Working together with the UI/UX, we successfully transformed wireframes and prototypes into functioning frontend components that aligned with the desired user experience. Our dedication to quality extended to responsiveness and cross-browser compatibility, offering a smooth and consistent user experience across a wide range of devices. This complete front-end development strategy resulted in a polished and user-friendly interface that fulfilled the demands and expectations of our target audience.

### 3.6 Version Control and Collaboration:

We created Git repositories as a core piece for version control and smooth communication among team members, maintaining the codebase's integrity and accountability throughout the development lifecycle. Using agile approaches, we held regular sprints and scrum sessions to promote continuous improvement, sustain project momentum, and respond quickly to changing needs and input. We used project management systems like Jira and



Trello to precisely track tasks, monitor progress, and prioritize product development, allowing for effective collaboration and alignment of efforts throughout the team. This integrated project management strategy increased openness, accountability, and, ultimately, the effective delivery of our mental health application.

### **3.7 Quality Assurance and Testing:**

We thoroughly assessed both frontend and backend components, carefully detecting and correcting faults and issues to ensure the software's integrity and operation. Our testing strategy included the use of both automated testing frameworks and human methods, allowing us to thoroughly evaluate software quality and dependability across a variety of scenarios. In addition, we aggressively requested input from testers, using their insights to confirm the application's functionality and usability. This continual testing and feedback cycle was critical in producing a stable and user-friendly mental health application that met the requirements and expectations of its users.

### **3.8 Deployment and Maintenance:**

After completion, we moved the application to a hosting environment with great attention to scalability and security measures, ensuring optimal performance and user data protection. We then developed monitoring and analytics tools to carefully follow app performance indicators and user interaction after launch, allowing for proactive modifications and improvements. We also built a robust maintenance strategy to address continuing upgrades, bug repairs, and feature additions, utilizing user input and market trends to constantly refine and improve the application's functionality and user experience over time. This holistic strategy guarantees that our mental health application remains successful and relevant in fulfilling our users' changing demands.

## 4 System Design

### 4.1 Architectural Design

Below is a diagram showcasing the architecture MindPeace was built with

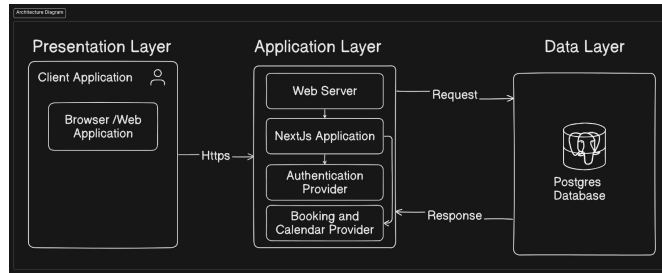


Figure 1: Architecture diagram

### 4.2 Data flow diagrams

Below is a diagram that shows the flow of data in the MindPeace application, from the Client to the data layer

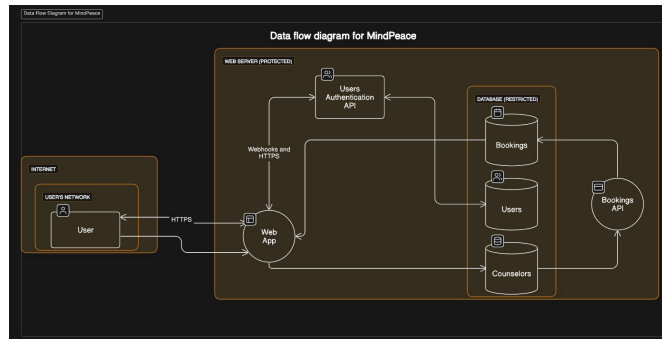


Figure 2: Data flow diagram

### 4.3 Component breakdown

The system has several components that work together to ensure that the user has a safe and wonderful experience with it.

#### 1. User Authentication Component:

This component acts as the gatekeeper, managing user logins and access permissions. It relies on a user database to verify credentials and issues temporary access tokens (like digital keys) when a user successfully logs in. These tokens allow users to interact with other parts of the system without needing to re-enter their login information every time.

#### Interfaces:

This component exposes functionalities through API endpoints (application programming interfaces). These endpoints allow other components to interact with it for tasks like login, registration, and logout.

**Responsibilities:**

Verify user credentials against the database. Issue access tokens upon successful login. Manage the lifecycle of access tokens (e.g., expiration, refresh).

**2. Counselor Management Component:**

This component acts as the central hub for all counselor information within the system. It depends on a database to store details like specialties, qualifications, and ratings/reviews.

**Interfaces:**

Similar to the User Authentication component, Counselor Management uses API endpoints to interact with other parts of the system. These endpoints allow functionalities like creating, updating, and deleting counselor profiles. Additionally, it might offer search and filter capabilities to help users find the right counselor based on their needs.

**Responsibilities:**

CRUD (Create, Read, Update, Delete) operations on counselor profiles. Provide search and filtering functionalities for counselors based on specific criteria.

**3. Appointment Scheduling Component:**

At the heart of the system, this component facilitates the booking process. It relies on information from the User, Counselor, and Calendar systems to manage appointments.

**Interfaces:**

This component uses API endpoints to interact with the other systems. These endpoints allow users to book, cancel, and reschedule appointments.

**Responsibilities:**

Checking counselor availability for requested appointment times. Creating new appointment records in the database when a booking is confirmed. Sending notifications to users and counselors about appointments (booking confirmations, cancellations, rescheduling notices).

**4. Notification Component:**

This component enhances communication by sending automated emails or SMS notifications to users and counselors. It relies on an external service like an email provider or SMS gateway to deliver messages.

**Interfaces**

This component interacts with the system through API endpoints for sending notifications. These endpoints allow sending confirmation emails, appointment reminders, and updates.

**Responsibilities**

Sending automated emails or SMS notifications based on triggers (e.g., appointment confirmation, cancellation, reminder). By working together, these components create a seamless experience for users booking appointments with counselors within the system.

## 4.4 Database Design

MindPeace was built using a relational database. Below is an Entity Relationship Diagram showcasing the relationships between the various tables.

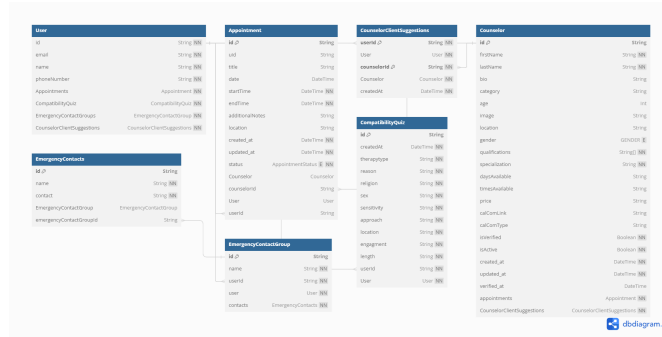


Figure 3: Mindpeace ERD

## 4.5 Human Interface Design

Below are the Interface designs showcasing MindPeace. They include the landing page, signup page, and the Dashboard

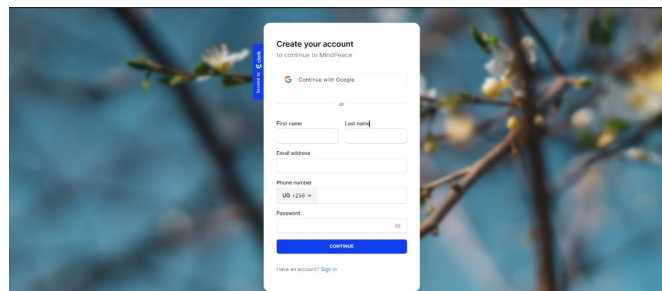


Figure 4: Sign up page

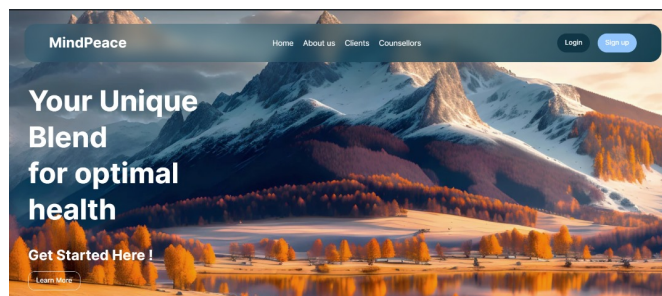


Figure 5: Landing Page

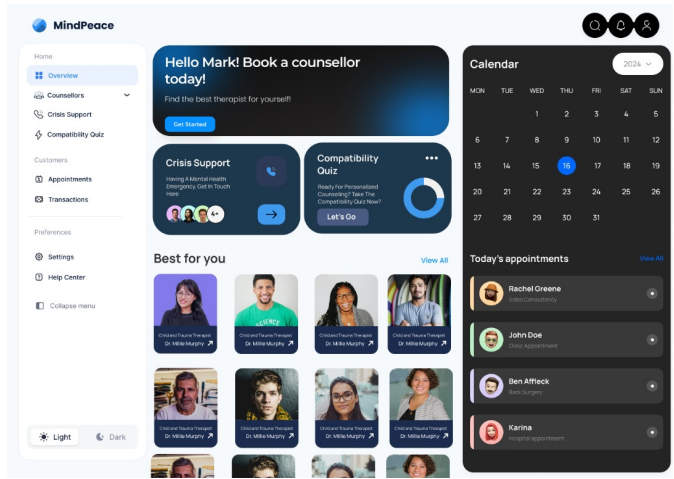


Figure 6: Dashboard

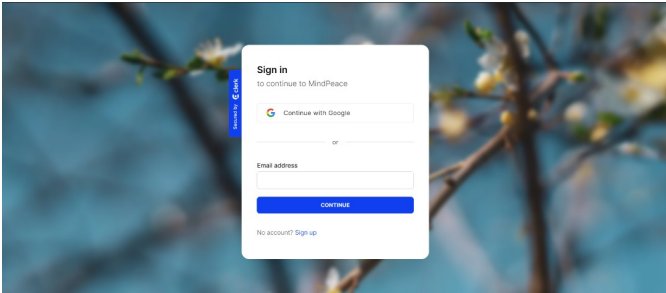


Figure 7: Login page

## 5 Implementation

### 5.1 Research and Conceptualization:

In the initial stages of the project, extensive research was conducted to understand the mental health challenges faced by individuals, including stigma-related barriers to seeking professional help. We majorly engaged with students and mental health professionals to gather insights into their experiences and needs. It was through this extensive research that we identified the need for a mental health platform that provides accessible, personalized counseling services.

### 5.2 Define Features and User Stories:

During this process, we sat down as a team after conducting of market research and ideated features that would make the most sense to our targeted market. Initially, the very first feature we had was online booking, and that was the first one that came up and was implemented first But we realized that we needed more than just ease of booking, so we came up with 2 more features to add to the application. That is to say;

#### 5.2.1 Features

1. **Compatibility Quiz:** This is a feature where a client answers a set of questions based on their preferences and using their responses we give a set of counselors that we believe would match their preferences
2. **Crisis Support:** The Crisis Support feature in MindPeace addresses the urgent need for immediate assistance during mental health crises. Users can easily access this feature by clicking a designated button, triggering an alert to a standby counselor for immediate response. Simultaneously, message alerts are dispatched to the user's designated emergency contacts, informing them of the situation. This real-time communication ensures that users in distress receive prompt support from professionals while also notifying their trusted contacts to provide additional assistance or support if needed

#### 5.2.2 User stories

3. **Challenges faced:** During this process, it was really difficult to come up with feature ideas that were unique and not out in the market, but at the same time the features had to align with the project goals and objectives. Finding the balance was a bit hard.
4. **Solutions:** We had different sessions within the team, everyone brought their unique ideas and most of these features were a combination of two or more ideas giving birth to what we believe are unique solutions. Working closely with users and counselors out there also helped refine these ideas

### 5.3 Design and Prototyping:

After figuring out the features to be implemented. We started with designing the user interface (UI) for a seamless and intuitive user experience. We developed wireframes and prototypes to visualize the navigation flow and key functionalities.

**Challenge Faced:** Coming up with designs that were professional, user-focused and also easy on the eye while maintaining a balance of usability proved a challenge.

**Solution:** Involving users in our design sprints enabled us to get an edge and come up with overall great designs

## 5.4 Backend Development:

### **Phase 1: Established User Authentication and Signup System**

We initially embarked on developing a secure signup and login system, starting with the creation of an in-house authentication system. However, as the project progressed, we encountered challenges with the system's speed and its impact on system resources. Recognizing the need for a more efficient solution, we seamlessly integrated Clerk into our platform. This integration proved invaluable in managing user authentication, enhancing security measures, and streamlining the signup and sign-in processes. Clerk's features, such as Google OAuth, significantly contributed to an improved user experience by providing faster and more user-friendly authentication options.

### **Phase 2: Implemented Counselor Profile Management**

Following authentication and onboarding. The focus shifted to data retrieval of the counselors on the platform as well as handling their profiles such that users would be able to get all the information they need on a counselor at the front end. Because the platform does not have a counselor management side as yet. counselors are manually onboarded by us the MindPeace team.

### **Phase 3: Integrated Compatibility Quiz and Matching Algorithm**

First, we had to come up with a set of questions for the compatibility quiz to gather user preferences. We had to make sure the questions were relevant and would give us the necessary data to feed the algorithm. An algorithm to match clients to suitable counselors was then made. The way it would work is that it would find in our database a set of counselors who at least met 70

### **Phase 4: Integrated Crisis Support with Twilio**

Implemented Twilio integration for crisis support, enabling users to reach emergency counselors in case of a crisis. There had to be restrictions implemented to prevent abuse of the service, allowing users to trigger emergency calls only once per hour and not more than thrice a day

### **Phase 5: Integrated Cal.com for Appointment Booking**

Initially, the platform managed booking processes from scratch, which, similar to authentication, proved to be slow and challenging to maintain as the system grew. The increasing complexity and numerous scenarios to account for resulted in a cumbersome and bloated codebase. Recognizing the need for a more efficient solution, we sought the assistance of a third-party service to streamline the booking process. Our first choice, Calendly, presented limitations on its free plan and posed some complexity in integration. Subsequently, we discovered Cal.com, offering more comprehensive features on its free plan. We seamlessly integrated Cal.com into the backend of MindPeace, enabling users to experience seamless booking, rescheduling, and cancellation of appointments. This integration not only simplified the booking process for users but also enhanced the overall efficiency and user experience of the platform.

**Challenges faced during backend development:** Coming up with a robust matching algorithm proved difficult. Making it match a user to a counselor was the hardest thing to implement. Ensuring seamless integration with third-party services like Twilio and Cal.com presented technical complexities that required meticulous testing and debugging.

## 5.5 Frontend Development:

**Phase 1: Implemented User Authentication and Onboarding UI** Developed frontend components for user signup, login, and account settings. Ensured a responsive and intuitive design for a user-friendly experience.

**Phase 2: Designed and Implemented Counselor Profile Viewing UI** Created UI components to display counselor profiles with detailed information. Enabled users to browse and search for counselors based on specialties and availability.

**Phase 3: Developed Compatibility Quiz UI and User Interaction** Designed a user-friendly interface for the compatibility quiz. Implemented quiz functionalities to gather user preferences and generate personalized counselor matches. This included adding multi-step functionality and sectioning the questions in the right way

**Phase 4: Implemented Appointment Booking UI and Functionality** Developed intuitive UI components for users to view available appointment slots. Enabling seamless booking, cancellation, and rescheduling of appointments using Cal.com integration.

**Phase 5: Designed and Implemented Crisis Support UI** Created an interface for users to access crisis support services. This included Integrating Twilio functionalities for users to connect with emergency counselors and notify contacts in crises.

**Challenges faced while developing the front end:** Creating a multi-step sequence for the questions in the compatibility quiz was challenging. Ensuring that the entire platform was responsive and user-friendly across different devices required continuous refinement of front-end components.

**Solution:** We chose to do the task of responsiveness last as it was one that we anticipated to take time, So we chose to do it together as a team and took the approach of making one page responsive at a time.

- And as for the Quiz, we sought out different resources to help better understand how to handle that kind of state in the application. This included reading blogs on how other developers have achieved similar functionality or watching YouTube tutorials until we found one that fit.

## 5.6 Continuous Improvement:

Even after implementation, MindPeace was constantly still being developed and improved based on user responses.



## 6 Testing and Evaluation

### 6.1 Overview of Testing Methodologies:

Throughout the development process of MindPeace, a user-centric testing approach was adopted to ensure the platform met the needs and expectations of its intended users. The testing methodologies primarily included user feedback sessions, where students were given access to the application to provide real-time insights on usability, functionality, and overall user experience.

### 6.2 Test Results and Metrics:

1. User Feedback Sessions: Students were encouraged to interact with MindPeace, book appointments, take the compatibility quiz, and explore the crisis support features. They reported their experiences, highlighting both positive aspects and areas for improvement.
2. Iterative Changes: Based on the feedback received, iterative changes were made to the platform. This included adjustments to the user interface, enhancements to the compatibility quiz algorithm, and refining the crisis support functionalities to make sure that the user would feel entirely comfortable.
3. Response Metrics: Metrics such as user engagement and successful appointment bookings were tracked to gauge user interaction with the platform and ensure all was working smoothly on the platform

### 6.3 Evaluation Against Project Requirements and Objectives:

1. User Satisfaction: The response from user feedback sessions was predominantly positive, indicating that MindPeace resonated well with its target users. Students found the platform intuitive, easy to navigate, and helpful in connecting with mental health resources.
2. Alignment with Objectives: The iterative changes made based on user feedback ensured that MindPeace aligned closely with the project's initial objectives. Key goals such as providing accessible counseling services, personalized matching through the compatibility quiz, and reliable crisis support were effectively implemented.
3. Enhanced Usability: By incorporating user suggestions and addressing reported challenges, MindPeace evolved to offer an enhanced user experience. This iterative process led to a platform that was not only functional but also user-friendly and engaging.

The testing and evaluation phase of MindPeace played a crucial role in refining the platform to meet user needs effectively. The iterative nature of incorporating user feedback ensured that MindPeace evolved into a robust and user-friendly mental health platform, meeting the project's objectives and receiving positive responses from its intended users.

## 6.4 Results and Discussion

### 6.4.1 Results

#### 6.4.2 Presentation of the project outcomes.

- Increased access to mental health professionals: MindPeace aims to simplify the process of finding and connecting with qualified counselors. By offering an online platform and eliminating geographical barriers, we expect to see a rise in the number of individuals seeking professional help for their mental health needs.
- Improved user experience: The user-friendly interface, appointment booking system, and compatibility quiz are designed to streamline the user experience. We anticipate positive feedback from users regarding ease of use, efficiency, and satisfaction with the platform's features.
- Enhanced therapist-client fit: The compatibility quiz aims to match users with counselors who align with their preferences and requirements. This could lead to more effective and productive therapy sessions, ultimately improving client outcomes.

#### Analysis of results concerning project goals.

- Increase access to mental health professionals. MindPeace has been able to increase access to mental health professionals by adding them to the platform and anyone who is registered with MindPeace be able to access them.
- **Offer an alternative to informal support and self-help:** mind peace gives you a space to share and be happy away from friends and family by giving you professional guidance and a listening ear.
- **Target a specific demographic:** MindPeace's interface is aligned to be most beneficial to working-class individuals since most of them don't have who to talk to and work environments often offer a lot of stress and disturbance to our mental health.  
**Reduce reliance on self-medication:** MindPeace reduces the reliance on people looking for alternatives like music, clubbing, and alcohol among others, and gets actual help by connecting them with professionals and having a profession compatible with their needs.

### 6.4.3 Discussion

### 6.4.4 Implications

MindPeace, as a mental health app, has undergone thorough evaluations to assess its effectiveness, professionalism, and user-friendliness. MindPeace leverages technology to connect you with the right counselor for your needs. Here's a closer look:

#### Strengths:

- **Accessibility and Convenience:** MindPeace allows you to connect with licensed counselors from anywhere with an internet connection, eliminating geographical barriers to accessing quality mental healthcare.

- **Matching Algorithm:** A brief initial evaluation helps match you with counselors specializing in relevant areas, potentially leading to more effective therapy.
- **Security and Privacy:** MindPeace prioritizes user privacy. The platform utilizes Clerk Authentication and User Management for secure encryption to safeguard your information, fostering trust in its professionalism.

#### Areas for Improvement:

- **Enhanced Counselor Matching:** Refining the algorithm for counselor-client matching to ensure better compatibility and alignment of user needs with counselor expertise.
- **Expanded Service Offerings:** Diversify the range of mental health services offered within the app to cater to a broader spectrum of user needs, including group therapy sessions, specialized support for specific mental health conditions, and access to additional resources like self-help tools and educational materials.
- **Effectiveness of Matching Algorithm:** To optimize the compatibility quiz's matching algorithm, we will go through a thorough refining and validation procedure to improve its accuracy and efficacy in connecting users with compatible counselors. This endeavor entails evaluating current data to find patterns and trends in counselor-client matches, and then continuously fine-tuning the algorithm accordingly. In addition, we will do extensive research into the aspects that lead to successful matching, such as therapist skill, therapeutic approach, cultural competency, and user preferences. By looking into these vital drivers, we want to get a more comprehensive knowledge of what makes a good counselor-client pairing and incorporate these findings into the algorithm to ensure optimal matching results. Through this continual refining and validation process, we attempt to enhance the quality and efficiency of counseling.
- **User Experience Optimization:** We are devoted to consistently gathering user input and performing usability tests to identify opportunities for improving the MindPeace platform's user experience and interface design. By requesting direct feedback from users and studying usage trends, we want to uncover pain spots and areas for development, ensuring that the platform stays intuitive, user-friendly, and in line with user expectations. In addition, we will investigate additional features and functions to improve the MindPeace experience and increase user engagement and satisfaction. This includes looking at the use of AI-powered chatbots to give individualized assistance and guidance.
- **Usability and Inclusion:** We are devoted to studying solutions targeted at expanding the accessibility and inclusion of the MindPeace platform for various groups, emphasizing the significance of accommodating those with impairments, language problems, and poor digital literacy.

This project entails doing comprehensive assessments of present platform accessibility features and finding opportunities for improvement, such as introducing screen reader compatibility, language translation choices, and user-friendly interfaces. By stressing accessibility and inclusion in our design and development processes, we hope to guarantee that all users can efficiently browse and use the platform to get mental health help and resources.

## 6.5 conclusion

## 6.6 Summary of Key Findings

- User feedback highlights the strong positive impact of the in-app community forum, fostering feelings of support and connection.
- The launch of real-time counseling has been met with enthusiasm, providing users with immediate access to professional help.
- The new compatibility quiz is proving valuable by matching users with counselors who best suit their needs.

### 6.6.1 Reflection on the Project's Success in Meeting Objectives

Mindpeace is making significant strides in achieving its core objectives. Here's how we're meeting our goals:

- Increased access to professional help: Real-time counseling connects users directly with licensed professionals for immediate support and guidance.
- Enhanced crisis intervention: Our crisis support feature ensures users can get help in emergencies, promoting safety and well-being.
- Improved sense of community and belonging: The forum fosters connection and provides a safe space for peer support.
- Matching users with compatible counselors: The compatibility quiz personalizes the counseling experience by matching users with counselors who understand their specific needs and preferences.

### 6.6.2 Areas for Continued Improvement

We're constantly working to make Mindpeace even better for our web app users. Here are some of the areas for improvement based off the testing phase as per user feedback:

- Content expansion: Users have expressed concerns about the limited range of educational resources and tools available to address mainly various independent needs. This was based of user interaction by all our team members with different users mainly my Question and Answer physically. We're actively developing a wider array of content to better meet your requirements.
- Community support: Users complained about the lack of integration of a support forum, citing difficulties in receiving responses to their questions and finding relevant examples thus making it difficult for them their concerns to be addressed. We're exploring features to enhance user interaction and peer support within the forum.

## 6.7 Recommendations and Future Work

1. **Personalized Health Tracking:**Based on feedback gathered through user interactions, there is a notable demand for features that enable mental health tracking. Users have expressed a desire to monitor aspects such as mood swings and stress levels over time, and would appreciate tools that allow them to log and visualize this data effectively.Developing functionalities that support the logging and visualization of mental health data, like mood and stress levels, through a personalized dashboard. This will enable users to track their mental health metrics more accurately and intuitively.
2. **Integration with Other Health Apps:**Feedback indicates that users frequently utilize multiple health or wellness applications and are interested in a more integrated health management system. They have suggested enhancements that would allow for the synchronization of data across different platforms to create a cohesive tracking environment. Investigating and implementing integration solutions with other health apps to facilitate data synchronization and account usability across platforms. This could include developing APIs or establishing partnerships with existing apps to ensure a seamless user experience in health data management.
3. **Expanded Service Offerings:** Diversifying its mental health services to cater to a wider range of user needs. This includes specialized support for specific conditions, access to self-help tools, and educational materials, empowering users to address their mental health challenges more comprehensively.
4. **Adding Community Forum:** Introducing a community forum where users can discuss their mental health experiences and share helpful strategies. This forum would foster peer support, reduce isolation, and promote mental health awareness and understanding within the community.
5. **Blog Posts:** Creating blogs to address mental health challenges, share insights, and highlight the benefits of addressing mental health issues. This platform will serve as a resource for users to access valuable information, gain perspective, and find inspiration on their mental health journey.

## References

- [1] *The Heart and Soul of Change: What Works in Therapy*. 2017.
- [2] Delivering cognitive behavioral therapy through mobile apps: A meta-analysis. 2019.
- [3] National Institutes of Health (.gov). Evaluation of mental health mobile applications. <https://www.ncbi.nlm.nih.gov/books/NBK580948/>, December 17 2018.
- [4] Milton L. Wainberg, Pamela Scorza, James M. Shultz, Liat Helpman, Jennifer J. Mootz, Kirsten A. Johnson, Yuval Neria, Jean-Marie E. Bradford, Maria A. Oquendo, and Melissa R. Arbuckle. Challenges and opportunities in global mental health: a research-to-practice perspective. *Current Psychiatry Reports*, 19(5):28, 2017.
- [5] Frank B. Wambach et al. The therapeutic alliance and outcome of psychotherapy: A meta-analysis. 2002.
- [6] World Health Organization (WHO). Mental health of adolescents. <https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health>, November 17 2021. Retrieved March 27, 2024.
- [7] World Health Organization (WHO). Mental health at work. <https://who.int/news-room/fact-sheets/detail/mental-health-at-work>, September 28 2022. Retrieved March 27, 2024.