SI/HBHE 684: Prototyping and Evaluation of Consumer Health Technologies

Final Project Report

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Problem Statement

The graduate students at the University of Michigan should be able to get access the services that will help them to manage daily mental health challenges like stress, anxiety, and mood swings. A round-the-clock access to smart mental health and wellness services, without being restricted by the unavailability of a mobile platform or the additional waiting and plodding that a traditional care model necessitates.

CAPS currently provides traditional mental health services to thousands of wolverines. The demand for therapy among students and the supply of clinical therapists and counselors present a substantial issue for CAPS, making access to care difficult.

I intend to develop a mobile Platform-as-a-Service (Paas), that will help students access their wellbeing state and redirect to resources as needed depending on their mental health condition.

Intended Users

The target intended users are

1. Graduate students in a professional degree program
2. Domestic students who purchased Domestic Student Health Insurance or international students who purchased the International Student and Scholar Health Insurance.

Both insurances are provided by Blue Care Network, a division of Blue Cross Blue Shield of Michigan.

Three reasons support the inclusion of these two user groups. First, testing an application at a university is simpler because the programmers are enrolled there and have easy access to resources. Second, students have access to Counseling and Psychological Services (CAPS), Academic Advising Services and private therapy. Finally, compared to undergraduate, academic master's, and PhD candidates, students pursuing professional degrees tend to be more homogeneous in terms of demographics, program length, career-seeking intentions, type of insurance, and mental health difficulties encountered.

Approximately 18,000 graduate and professional degree students' study at the University of Michigan. These students come from a variety of intersectional identities, each one with unique needs.

Background

Mental Health Challenges at UM-

It can be concluded that graduate students experience a wide range of mental health challenges, including anxiety, depression, emotional management, stress, and academic performance among other issues, as identified by a counselor, using data from the 2018-2019 CAPS Annual Report as a proxy and combined with data from the general U.S. graduate student population. Counseling and Psychological Services (CAPS) at the University of Michigan works

in teaching and preventative initiatives to connect with students who might want to learn how to support others or who are looking for counseling for their personal advantages.

The demand from students seeking therapy and the quantity of clinical therapists provide a substantial issue for CAPS. About 55 clinical staff members and interns are employed by CAPS on the supply side of the equation. On the demand side, there were roughly 51,000 students enrolled overall in the Fall of 2021, of which 33,000 were undergraduates and 18,000 were graduates. For the first time ever, the total number of students on the Ann Arbor campus exceeded 50,000. (Jordan, 2021). As a result, if every student sought individual counseling, there would be 1 counselor for every 910 pupils. The large and unexpected demand for services during the first five weeks of Fall 2021 serves as an example of this mismatch. Fall 2021 saw a 51% increase in demand for CAPS services over Fall 2020 and a 36% increase over Fall 2019. (Fall 2021 First 5 Weeks Report, 2021). Even CAPS doubts whether this demand for its counselors is sustainable. The significant increase in demand in the early going delayed first appointments and had a significant impact on maintaining resources to meet demand for the rest of the semester.

The demands of students' various, multifaceted identities provide issues for CAP. In terms of supply, 67% of the employees at CAPS identify as White, while 20% identify as Hispanic, Black, or Asian (BIPOC) (Embedded Report Fall 2021, 2022). On the demand side, however, half of the customers identify as white, forty percent as BIPOC, two percent prefer to self-identify, and the remaining eight percent did not reply (Embedded Report Fall 2021, 2022). In fact, there are half as many BIPOC-identified counselors as there are BIPOC-identified students.

Strategy for Intervention

The Behavioral Change Theories (BCT) of Goal Setting, Social Support, and Scheduled Consequences will be applied by MHealthy. Users will be required to complete a wellness assessment survey after installing the app to establish a baseline and set goals for monitoring progress or regression. To develop a customized intervention strategy, it is essential to identify the consumer's potential mental health difficulties.

In conclusion, my mental health intervention tactics help graduate students reach their goals through BCTs including action planning, commitment, self-monitoring of behavior, self-monitoring of behavior's outcome(s), behavioral agreement, anticipated remorse, details on the health effects, Information regarding antecedents, nonspecific social support, practical social assistance, emotional social support, learning via association, reorganizing social interactions, avoiding or minimizing exposure to the behavior's cues, Distraction, creation of habits, assessed tasks, Non-specific incentives, non-specific rewards, social rewards, self-incentives, self-rewards, incentives for outcomes, rewards for outcomes, behavior costs, approximations of rewards, etc. Each component of the integration strategy was chosen to optimize the users' positive behavior change.

Application Platform

Nearly every university student now owns a smartphone, and this trend is especially prevalent among college students. Only a smartphone application is intended to be used by consumers to deliver Platform-as-a-Service (PaaS) to them. All users with cellphones running an iOS or Android OS would have access to the application. There is no web version of this application that can be accessed on a laptop or tablet. Because of this, I feel that launching the platform entirely on smartphone devices is a wise move.

The application can access users' information services like their email account and further interacts with their calendar, which is quite useful for informing users of the latest developments like future appointment reminders. Such services emphasize dedicated usability from an application over a website and are more effective when performed on an application.

Content and Features of the Application.

1. *Screening:*
   Theoretical framework: The theoretical framework techniques that best describe this feature are action planning and self-monitoring of behavior.

   At initial stage of the MHealthy application the user should complete Wellness Questionnaire each time he logs into the application. The user must respond to a series of 7 questions for the program to offer a provisional diagnosis and suggested next actions or treatment alternatives. A user's present medical condition can be ascertained with the use of the screening tool, and depending on how severe their depression is, prompt treatment can be performed.

2. *Homepage:*
   Theoretical framework: The theoretical framework that supports the homepage is the prompt intention formation, with all the summarized feature windows on the app's homepage, the user will be able to navigate more easily the to the resources needed depending on current state of the user.

   The user will be presented by a homepage that serves as a central center for all the functions when they first launch the app, as they are with all other smart device applications. This is the primary location from where a user can branch to the app's many features and, if they so want, return to the homepage. The mood tracker and the appointment tracker are the most informative aspects on the site, which includes a menu featuring condensed versions of the app's capabilities.

3. *Mood Tracking:*
   Theoretical framework: The theoretical framework procedures of self-monitoring of behavior and self-monitoring of behavior outcome best capture this trait.

A user can monitor their daily mood using the application's mood monitoring feature. A graph displays insights on mood over day, months and a chosen time period is an effective tool for visualizing how a user has felt over time. The Mhealthy app make the mood tracking function easily accessible on the home screen.

4. *Resources:*
   Theoretical framework: The theoretical framework technique that can best be used with this feature is the providing instruction technique.

   Users of MHealthy can access the videos, audio, and reading materials at their convenience. These videos provide explanations of cognitive and emotional management frameworks as well as therapy techniques including cognitive behavioral therapy and dialectical behavior therapy. A few audio options are breathing exercises, podcasts on resilience-building, guided meditation, and emotional management.

5. *Social Platform:*
   Theoretical framework: The social support approach is the ideal theoretical framework for the social platform feature. Building a team around a pair or more can help you better develop the behaviors that will support transformation.

   Pertaining to social platform component of MHealthy, I intended to implement a function that was like social media platforms in terms of virtualizing social contact and creating a center for individuals to gather and create blogs, threads, and other types of social engagement through an online medium. This feature is available to users who require it and is available for therapists to utilize as a tool whenever they think it necessary as a treatment resource. External communication is a highly endearing technique that therapists use to help some patients come out of their shell to ease their treatment.

6. Journaling:
   Theoretical framework: The theoretical framework technique that can best be used with this feature is self-monitoring of the behavior by documentation of their feelings and expression.

   This feature of the Mhealthy application helps the users to document their thoughts and express their feelings. The user can tag his/ her journal and can save the entry for the future reference. Self -tracking their feelings plays a key role in progress and the user can edit the entry as per their liking. The application does not store the user data, so their privacy is secured. These journal writings can be shared with the therapist or counselor at the time of appointment to help them understand the case better.

7. *Scheduling:*
   Theoretical framework: The theoretical framework techniques that best describes this feature is goal setting (outcome) where the user has set the goal of attending their appointment.

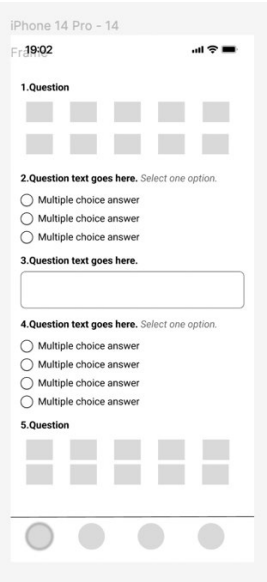
Users can make appointments with the CAPS services, a private therapist, or an academic adviser via MHealthy's scheduling option. Based on availability, users can select a date and time for an appointment. Users will also get reminders when their appointment time draws near. The application's home page displays information about the next appointment. Rescheduling an appointment as well as booking an emergency appointment are options.

Design Consideration

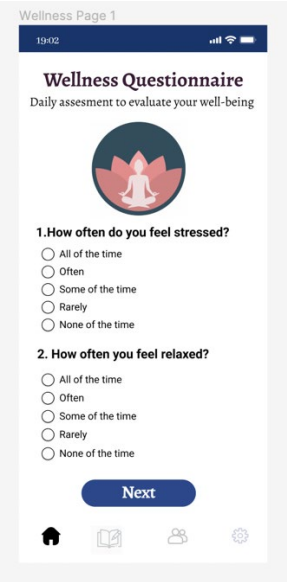
Screening Questionnaire: After the user completes the login in the application a pop-up will arise that will recommend the user to complete the daily wellness questionnaire. This questionnaire focuses on basic questions like the user's anxiety level, energy level, stress level and focuses if the user has any homicidal thoughts. The design consideration for this feature was to make this intuitive for the user and give them freedom of choice.

The initial iteration for screening questionnaire was to use the vertical slider and add the questions to the same frame. This would have made the frame lengthy, and the user was able to view all the questions at the same time. However, this design had drawbacks as the questions will bombarded to the user at same time and this will affect the psychology of the user and they would not be willing to fill the questionnaire. So, the second design was used where 2-3 questions were added to each frame so the user can easily fill the questionnaire without being overwhelmed by the questions. This helps the user to concentrate on one question at a time instead of worrying about answering all the questions at the same time. Also, the vertical slider can lead to selection of wrong options while sliding the screen and the this can lead to wrong recommendations as the user's well-being score will be affected by this action.

Below are the two iterations of the feature:



Design 1

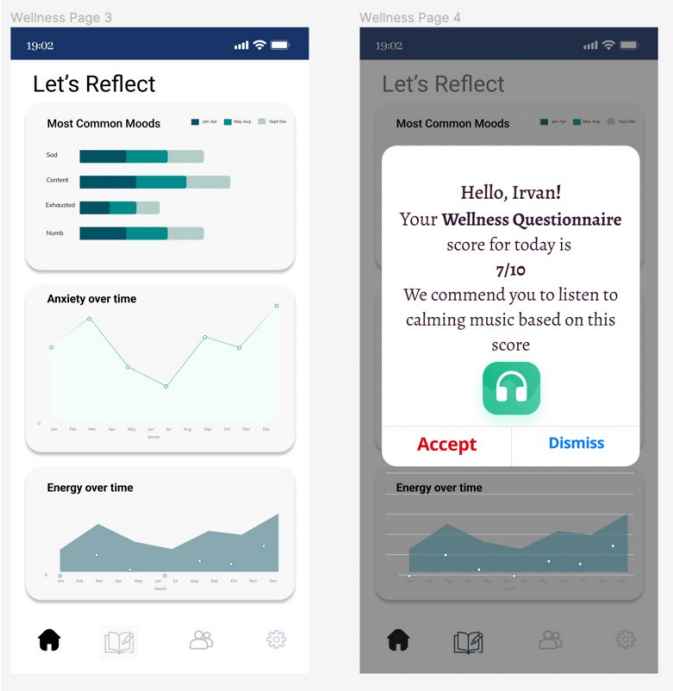


Design 2

Recommendation: After the questionnaire is complete the user will be provided with recommendation dependent of the current wellness status of the user. The user will be provided with a choice to accept or reject the recommendation that are provided. He will also be provided with a graphical overview of his energy level, anxiety level over the past year. This can motivate the user to continue working on his wellbeing and seek out for help if needed.

The design consideration for the Reflection screen was a horizontal slider and the user will be able to see each graph individually; however, that design was not used as it was tedious task for the user and does not provide a comparative view of all the data. So, a single screen view was used to visualize all the data based on answer provided by the user for wellness questionnaire.

A pop-up design recommendation screen was used do the recommendation are highlighted to the user and the user has a choice to accept or dismiss the recommendation. This provides the user a control over their mental status, and he can understand what his needs are based on the recommendation.



The reflection and recommendation screen design.

Design Process Reflection:

When I think back on how the idea evolved, I can see that it was deeply influenced by individual experiences getting access to mental health care at the University of Michigan. Every experience

combined to build a solution that I would like to experience firsthand. All the design processes, however, were user-centered, with me acting in the role of possible users.

Phase 1: Needs Analysis and Design Guidelines:

By identifying the pain areas and optimizing them to become gain points, I carried out a user requirements analysis. The main issue I identified was the graduate students' inability to get mental health services because CAPS does not have a mobile application. Recognizing this, I set out to center my design around the technology I have access to constantly—my cell phone.

The competitor study revealed that, except for CAPS, most ecosystem companies offered mobile application-based services. Although there were several rivals seeking to market their student-focused applications, none of them were created to be incorporated into the current network of health services that is run by educational institutions, like CAPS @ UM. There were advisor counseling sessions available and other private practices that are covered by the health insurance. I planned to integrate all these features into a comprehensive platform-based model - A one stop solution for mental health care for graduate students at University of Michigan.

Phase 2: Mental Health in Graduate Students, Intervention Strategies

By examining various restrictions including anonymity, access to health applications, and social peer support, I attempted to fill the students' inadequacies in developing their mental fitness during this phase. I also realized that my user groups might be diverse, and they might be dealing with a wide range of problems. These problems might arise from a variety of factors, including moving away from home to attend college for the first time, leaving the country, being separated from loved ones, experiencing academic stress, being unsure of how to take advantage of the opportunities and resources available on campus, lacking close friends, etc. The college experience might be very overwhelming, which might lead to any problems in their mental health.

I thought of numerous intervention strategies to integrate various behavioral, affective, cognitive, and motivational elements of mental health after deciding to focus on the mental health of university graduate students when developing the Consumer Health Informatics application. I developed intervention techniques to encourage the target users to use the application and help them improve their mental health wellness.

Social support theory and socio-cognitive theory are the main focuses of my intervention efforts. These theories may serve as inspirations that alter how the user group perceives control and holds its beliefs. In addition to learning from others on social discussion boards and forming social support groups, they might be able to use the tools at their disposal to mold their knowledge and keep an eye out for antecedent trends. Through daily check-ins, mood monitors, and upvotes in social groups, the program encourages and keeps the behavior modification habits.

Phase 3: Workflows, Feature Variations & Final Design:

Workflow:

The main idea behind the application is to provide the graduate students at University of Michigan to receive care with regards to their mental health needs when needed without delay. The

intervention strategies that I decided upon for the application is social support, goal setting, positive feedback, journaling and finally content and resources.

I narrowed target audience from all students at University of Michigan to graduate students to create a refined user base which would be easier during the pilot testing of final application. Also, the needs and course of study for graduate and undergraduate students are different, which may lead to complexity in the design process.

Feature variation:

After identifying the user base and application use, I started brainstorming for the features that need to be included in the application. Initially I decided to focus the application for just appointment scheduling. However, after several brainstorming sessions and competitive analysis, I have decided to add additional features to enhance the user experience and to serve as a mental health and wellness platform for graduate students.

The Heaney & Israel (2008) paper on social networks and social which uses structural elements of social networks like homogeneity, reciprocity, etc. to illustrate the necessity and significance of social groups in behavior change. Learning about the many roles of social networks, such as their capacity to give emotional, informational, evaluation, and instrumental support, as well as social influence and support, I included several features, such as chat, discussion, and peer group meetups, to create buddy systems, facilitate self-help groups, and gather information on how to handle situations that others on the social forums are facing.

I've incorporated elements of the social support theory. I attempted to incorporate Jacob's law when creating the wire frame by ensuring knowledge with Reddit forums and MHealthy Peer Group Meetup so that they would be comparable. I chose Reddit specifically since most college students utilize it as a social media platform to share information and leave comments on others' posts. Users will be required to complete a session on improving their understanding of how to use the forums and when it might be advisable to seek help from providers and counselors before joining any social discussion groups or peer support groups. I have also been given a tutorial on additional tools on the application that the user might use for socializing, including guided meditation, reading, etc.

Personal informatics helps in behavior change as the user self-records their behavior and can analyze it later through self-reflection (Li et al. 2011) The journaling feature is embedded in the MHealthy application through which the user can write journal notes upload picture and can store the previous notes. This will help the user to reflect on his previous thoughts and track the progress.

As the CHI application falls under non-HIPAA regulated entities, in addition to the features discussed in the social discussion forum, I also discussed the need to follow regulated guidelines. I also planned to get the application SOC2 and HITRUST certified so that the user group could trust and have more faith in it as it stands with the industry standards and regulations being followed.

I discovered proof that online interventions and tools considerably aid students in achieving their objectives for mental health and wellness (Ray, E. C.,2019). I created the homepage with the idea

that more comprehensive therapies, which incorporate a variety of behavior modification strategies and delivery modalities, would be more successful (Webb, T. L.,2010). Through this feature, I would be addressing BCTs that shape knowledge and have unavoidable effect.

Conclusion

For graduate students at the University of Michigan - Ann Arbor, MHealthy aspires to be a one-stop shop for wellness and mental health resources. The 18,000 graduate students will have access to local or international health insurance through MHealthy. Goal setting, anticipated consequences and rewards, social support, and behavior modification theories will all be implemented, in addition to a telemedicine feature that links patients with therapists who share their identities. I intend to create the application in accordance with user experience design standards in addition to preparing the workflow and framework to overcome the constraints and implementation challenges. Interacting with various stakeholders will help us better understand their demands and test the application's beta version.

Link for Application:

https://drive.google.com/file/d/1GBqFYP5adITNzfP5k18N-sEvWInJ0wgl/view?usp=share_link

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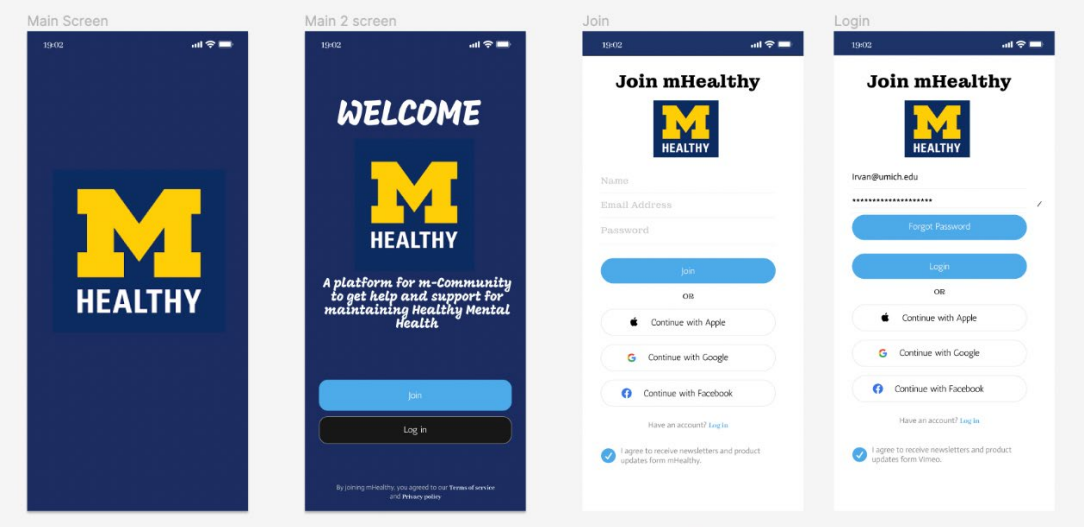
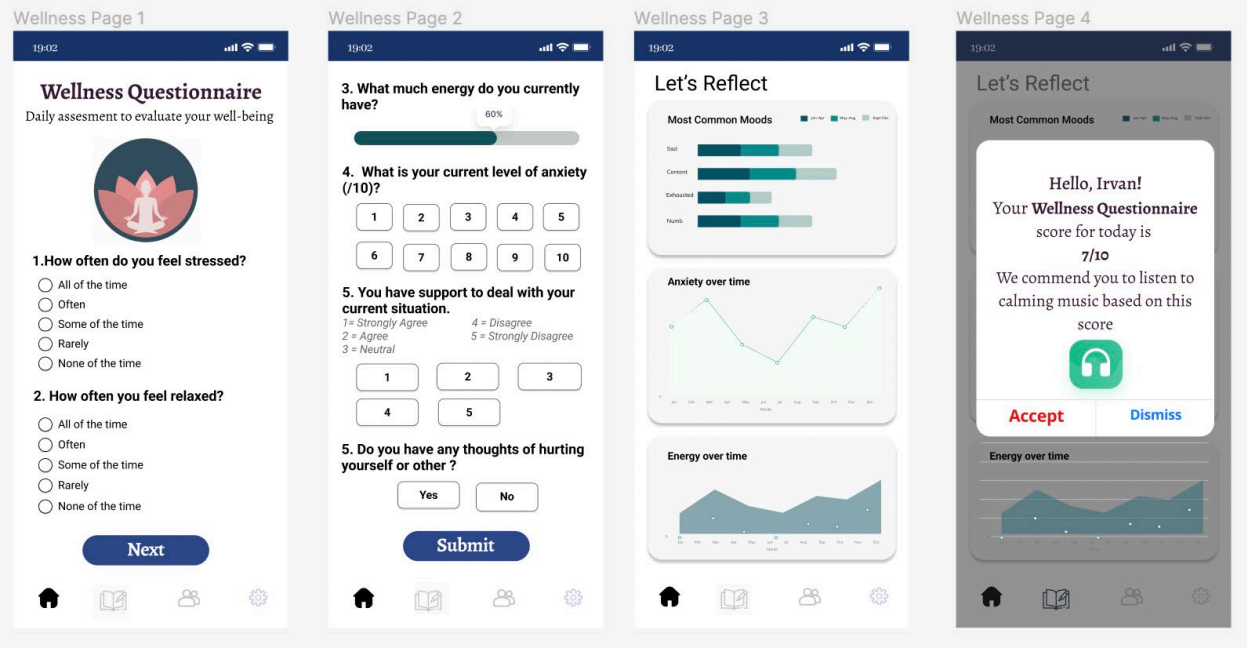
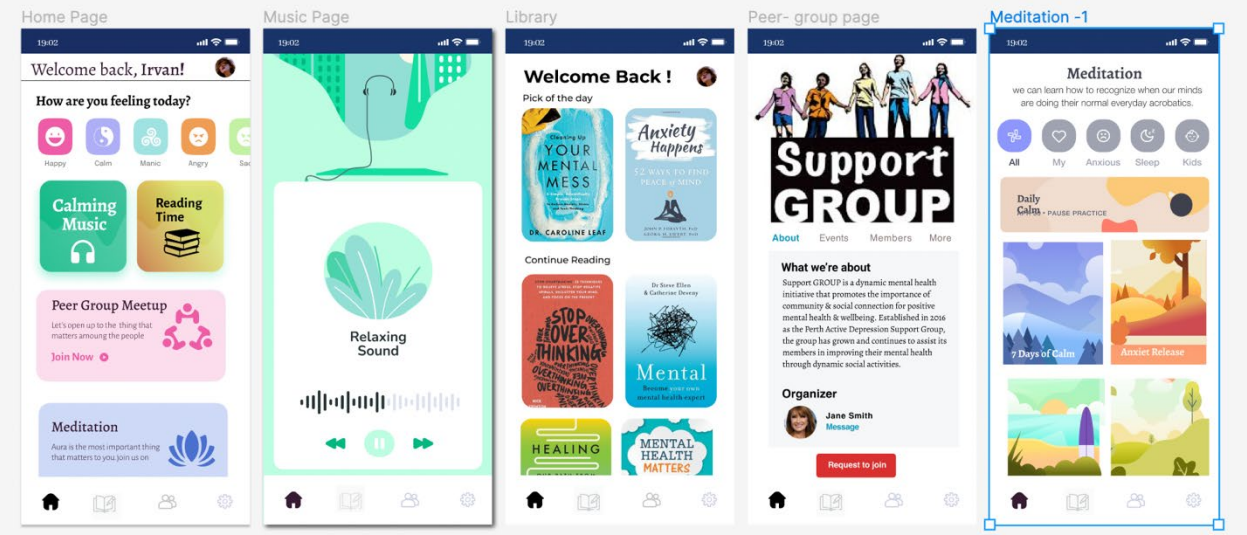
Appendix



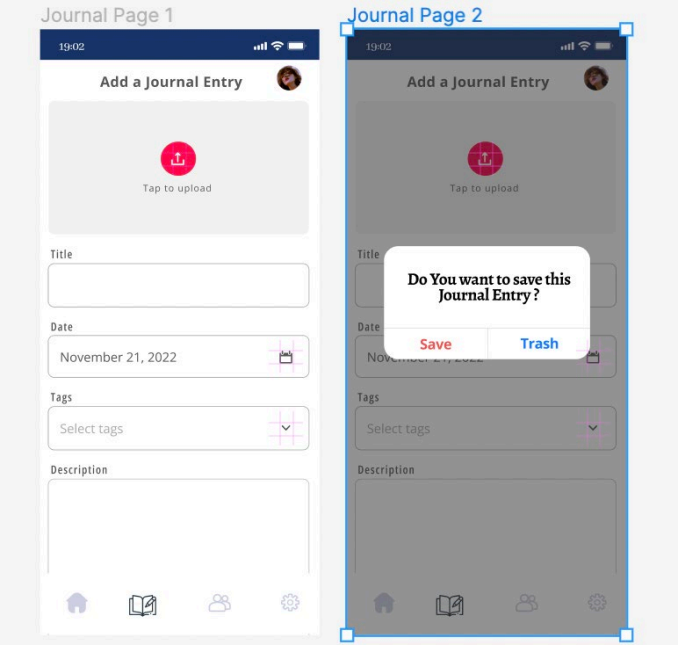
Main screen and Login screen.



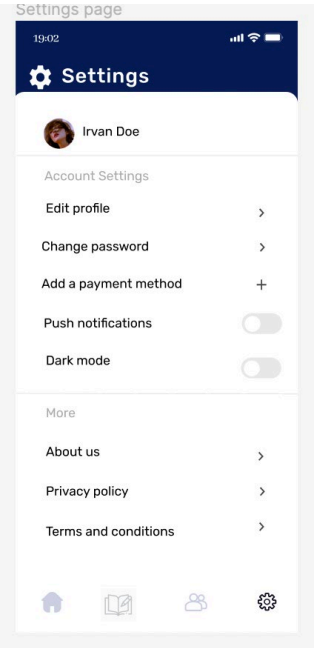
Wellness Questionnaire and Recommendation screen.



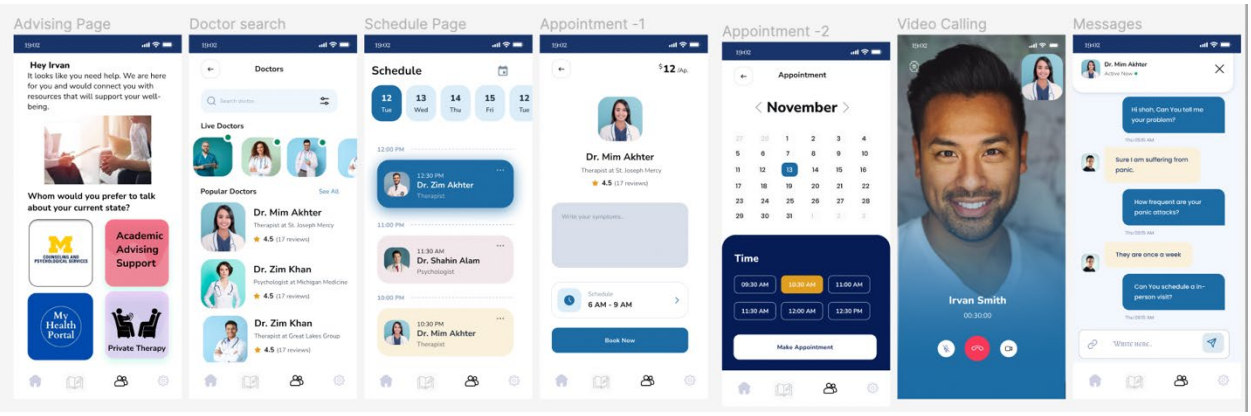
Home page with music, library, peer-group, and meditation feature.



Journal Page screens



Settings Screen



Appointment scheduling screens