# AN INTELLIGENT MOBILE APPLICATION FOR DEPRESSION RELIEF USING ARTIFICIAL INTELLIGENCE AND NATURAL LANGUAGE PROCESSING

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## ABSTRACT

*"What is an simple yet effective method to improve the mental health of individuals?" is the question that we chose to tackle [7]. The solution that we came up with was having a deep conversation with another person. From personal experiences, having deep conversations with another person seemed to be one of the most effective ways to keep someone's mental health issues under control and maintain a more positive outlook on life. Sharing similar experiences with another person can demonstrate to people that they are not alone and there is always someone who can relate to them and lead them down the right path.*

*In order to provide people with an easier method to have deep conversations with one another, we decided to create an application called Affinity, which was developed using Flutter [8]. In this application, users with various mental health issues will be able to talk with other users who have shared similar experiences. Users can connect to each other based on similar mental health issues, and they can engage in deep conversations with one another through a chat messaging system. We tested the results by providing twelve participants with two surveys. One survey measured a self-given score regarding the participant's levels of stress and anxiety before using Affinity as well as after one week of using Affinity, and the other survey asks participants to tally the number of conversation partners that shared at least one mental health issue or experience with them compared to the total number of conversation partners. The results we have found are that daily usage of this application will generally reduce levels of stress and anxiety, and the majority of the individuals that the application will offer as conversation partners will be able to connect to a user through at least one additional similar shared experience or mental health issue.*

## KEYWORDS

*Artificial Intelligence, NLP, Mobile Application.*

## 1. INTRODUCTION

Our topic is mental health issues, which we address by creating an application dedicated to improving the mental health of its users [9]. Mental health is something that has been emphasized more in recent years, as therapy is becoming more commonplace. Unfortunately, mass shootings have appeared more frequently on the news as well, in which the perpetrators of these shootings were often mistreated and/or did not seek or receive proper mental care in time. The benefits to

having a healthy mind is clearer thinking, increased productivity, and finding more enjoyment and motivation in living and accomplishing daily tasks. Other benefits can include reductions in stress and anxiety, as well as a boost in self-esteem [10]. On the other hand, there are some major consequences to having poor mental health. A lack of attention and care to one's mental health could result in relationship difficulties, lowered productivity, and extreme mood changes. In severe cases, it could potentially lead to self-harm and suicidal thoughts.

This topic is essential in our current world situation, as people around the world lost their jobs, became unable to see their loved ones and friends, and suffered various other setbacks due to the pandemic. As a result, these people may become stressed and anxious, in which individuals with chronic forms of these symptoms are at increased risk to develop substance abuse, tendencies for self-harm, and medical conditions such as cardiovascular and gastrointestinal issues [2][3]. During a time when mental health should be emphasized more than ever, we hope that this application can inspire positive change in its users.

There are some mobile applications that tackle mental health issues and aim to improve the mental health of their users. Certain applications emphasize therapy to improve the mental health of its users, and many therapy applications involve dedicated therapists and coaches that connect with these users. Other applications rely less on human interaction and more on self-reflection in the form of mood journals and gratitude journals. These journals work by reaffirming one's values and internalizing one's emotions to inspire positive change. Breathing exercise applications focus on certain breathing patterns and techniques in order to manage anxiety. An example of a breathing technique to reduce anxiety is diaphragmatic breathing, which involves pulling your stomach in when exhaling and helps to regulate breathing when feeling panicky or unable to take deep breaths. Some applications, such as Moodfit, include all of the aforementioned features. Moodfit also incorporates other tools such as depression/anxiety assessments, medication logs, and summary reports [1]. Although most of these applications seem to be free of any major noticeable issues, a possible issue with those that don't involve therapy or any other human connection is that they may not be as effective for some users. While some will be perfectly content with the use of mood and gratitude journals, others may instead seek a conversation partner to share a deep conversation with. With applications that do rely on therapy, some of the users may find it hard to connect to the therapists and coaches due to differences in cultural background or a lack of shared similar experiences. If therapists and clients are unable to easily understand or relate with one another, the overall experience of the client could be reduced greatly. At worst, it could cause some therapy application users to view therapy in a negative light and actively avoid it.

Our tool to tackle mental health issues is a smart device application called Affinity, which requires users to complete their profile, select from three options to identify with (stress, anxiety, and family problems), and choose from a list of users to connect with that appear based on the selected options. Users can optionally write a description of their mental illness in their profile as well. After choosing a user from a list, the user will be able to initiate a conversation with the selected user. Some existing mental health mobile applications do not allow any interaction with other people at all, such as applications that are solely used as a gratitude journal. Others that do involve interaction with other people, such as therapy, may have certified therapists and life coaches that connect with the users to help them through their mental health struggles. What sets Affinity apart from most other mobile applications that use therapy is that users of the application can help other users by acting as conversation partners and talking through their issues. While therapy apps often need specifically assigned therapists or coaches to help users, Affinity can become completely self-sufficient without the help of these therapists, as long as there is an active and dedicated userbase that is willing to reach out to one another [11].

Our results were proven through two experiments. For each of these experiments, twelve participants were chosen. The first experiment that we used is a survey to test the effectiveness of the application at improving mental health. Each of the aforementioned participants would give themselves a score of 1 to 10 regarding their levels of stress and anxiety, with 1 meaning no stress/anxiety and 10 meaning unbearably high levels of stress/anxiety. The participants would register their account, complete their profile, and initiate conversations with anyone that shared the same mental health issues with them. The issues that participants were able to check off and identify with were stress, anxiety and family problems. Then, the participants would use the Affinity mobile application for a week, in which they would check on the application daily and respond to any messages they had received. They would all use the application during the same time period, ensuring that they would have active users to communicate with. After a week of using this application, each participant will do the survey again and record another self-given score of their stress and anxiety levels from 1 to 10. The self-given scores of stress and anxiety from both before and after using Affinity will be compared.

The second experiment was designed for testing the features of the application, and it takes place after the first experiment is completed. The main feature that was tested was the matching of the users through the checkbox options and how effective it actually was at matching conversation partners that share similar experiences. With all the conversation partners that the participants had formed in the previous experiment, the participants would list at least five mental health-related issues that they have had. If the participant has felt like they could empathize or relate with any of the issues that their conversation partner listed, they would record it and tally up the number of conversation partners that they could relate with out of their total number of conversation partners.

The rest of the paper is structured in sections, labeled 2 through 6. Section 2 explores the challenges that had to be overcome during the process of coding the application and coming up with new features. Section 3 analyzes our solution to tackle mental health issues, a mobile application that allows sending messages to others with similar experiences, and it goes over both the general system and the specific components. In Section 4, we explain the experiments that were performed on the application to prove its effectiveness in daily usage. Section 5 brings up a brief summary of three related works and how each one of them compares and contrasts with our project. Finally, Section 6 offers a summary of the paper and possible next steps for the application.

## 2. CHALLENGES

In order to build the project, a few challenges have been identified as follows.

### 2.1. Finding the best method

The first challenge we faced during the creation of our mobile application was finding the best method to get two users involved in a deep conversation with each other. An application that incorporated voice calls and video calls seemed like a possible solution, but voice and video calling would be a fairly difficult feature to implement. Furthermore, talking face-to-face with a complete stranger and immediately engaging in deep conversation could be off-putting and uncomfortable for some users. Therefore, we opted with the final implementation to be a chat messaging system [12]. The chat system allows users to still have deep conversations with each other, and this system comes with the added convenience of users being able to respond in their own free time. This eliminates the need to list out schedules and plan out a time period that works for both conversation partners, which simplifies the process of using the application.

## 2.2. Finding a system

The second challenge that we came across was finding a system that could specifically connect users with similar shared experiences together. At first, we wanted to include an AI in our application. Using the descriptions/bios that users type in their profiles to describe themselves, the AI would extract keywords and compare it with the extracted keywords of other users' descriptions in order to find the most compatible or similar conversation partners. However, with fairly little experience in using Flutter, implementing such a feature seemed far too ambitious. The connection of users as conversation partners was a vital part of our application, so we needed a simple yet reliable method to implement this. Eventually, we settled on the checkbox method, in which the user would be asked to choose multiple options out of a selection of mental health issues that they identify with when first completing their profile. Depending on which issues were checked off, the application would provide the users with a list of other users who have checked off at least one similar mental health issue to them.

## 2.3. Deciding which mental health issues to include

The final challenge we faced was deciding which mental health issues to include in the application. Because of the way that the similarity between users was compared, users would be limited in what mental health issues we could identify with. We wanted to have a number of possible mental health issues that was large enough so that users would be able to have distinctly different profiles based on what they selected, yet small enough that the user would be able to complete that section of their profile within just a few seconds. We originally considered having numerous options in the checklist to choose from, but we soon realized that many of the options that we came up with overlapped with each other, and a new user might be overwhelmed by such a large number of options. For our application, we came to the conclusion that having three options would be the best choice. Using the original ideas for checklisted options of mental health issues that we had, we categorized them into the main mental health issues of stress, anxiety, and family problems [13].

## 3. SOLUTION

The name for this app is Affinity. It is an application that was developed through Android Studio [14]. The main purpose is to create a platform for patients with various mental health issues to find people that have similar experiences with them to talk to. The user will first create a profile in which they enter their information. Then they will select from the list of mental illnesses that they suffer from. The user will also provide a broad description of their illness to the best of their ability.

The app will match different users through the options they selected. I'm also developing an AI that will identify the descriptions of the users to better match them. Once users are matched they can begin to chat privately about what they are currently suffering from and support one another. I will be seeking advice from mental health professionals to further improve the app. The impact and success can be measured through user feedback and also through interviews with patients to discuss their improvements in their mental health. This project will be able to bring a positive impact to the community as it aims to reduce the problem of depression and anxiety.

The idea for this project came to me during the beginning of the pandemic. Last year alone, the number of people that reported having symptoms of depression increased threefold, and this trend is still continuing to this day. I was heavily affected as I suffered anxiety throughout last year due to a personal event. I never felt so lonely in my life, and it got me into the habit of overthinking.

Even if it was the most insignificant setback, I would think of all the worst possible scenarios, and anxiety took away all my ability to feel joy to the point where I thought there was no purpose to my life.  I don't know where I would've been if I continued down this path, but thankfully, someone noticed my abnormalities and had a deep conversation with me. I never knew how much it helps to talk with someone that shares similar experiences with you, and this person reignited my passion and love for life.

This gave me the idea to create an app that will help others that shared my past experiences but have not yet found anyone that they can talk to. Learning from my journey battling with anxiety, I know that the best medicine for someone suffering from mental health issues is to talk to a person that truly understands what they are going through. Hopefully, with this project, I will be able to provide comfort and further help those that are in need during these difficult times.
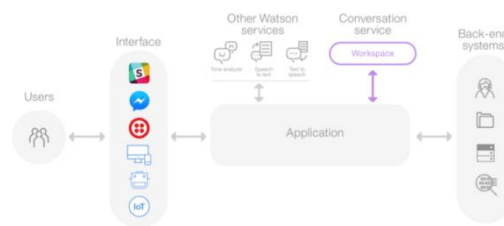


Figure 1. Overview of the project

The entire system of the Affinity application works through a combination of multiple Dart files. As Dart is the sole programming language of this application, Dart controls both the front-end and back-end. A major component of the application is a database called Firebase, which brings the users the feature of logging in and registering for an account. Firebase allows the storing of usernames and passwords, as well as all the information in user profiles and the messages inside conversations. Therefore, users are able to log in to their accounts and easily view the history of their conversations.

The first step that a user would have to complete upon downloading the application and opening it for the first time is registering an account. By moving to the register screen and filling out all the necessary information in the blanks, the user can create their account. The next step that users would take is completing their profile. The user profile asks for the user's birthdate, a bio/description about their mental health issues, and gender. Most importantly, the profile asks the user to select from a checklist of three issues (stress, anxiety and family problems). After users confirm their information, they would be able to update their bio and issues they are facing anytime in the settings. Finally, users will be able to interact with other users by having a list of users with at least one shared issue recommended to them as conversation partners. These conversation partners can be selected, which the users will be able to start conversations with through sending messages. Users will be able to see the usernames of their conversation partners in their home menu, view past messages in each of these conversations, and respond to these messages.
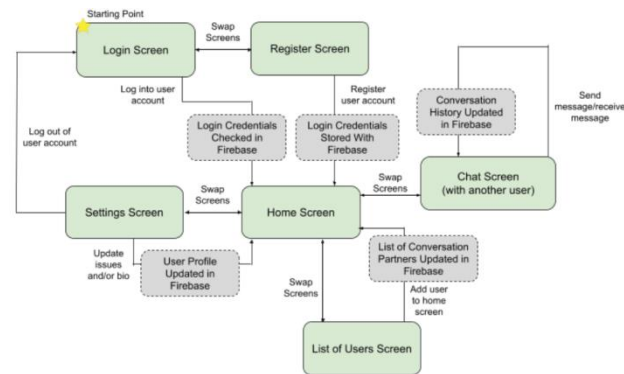
Figure 2. Overview of the progress

This application involves a login screen, a register screen, a home screen, a settings screen, a screen showing the recommended list of users as conversation partners, and a chat screen. In total, there are six main screens that are incorporated into this application. The home screen shows the list of conversation partners that the user has selected or has interacted with, and the settings page allows users to update their profile information. All of these screens make use of a database, which helps to make all the features run as intended. The database is one of the most crucial parts of the Affinity application. Without an implemented database, the application would not be able to store any information, and users will be unable to message one another. Firebase was chosen as the database to use for the application, as Firebase is very compatible with Flutter. Furthermore, the cost of using Firebase is free as long as the amount of stored data remains below a certain limit. Many Dart files in this application, such as the ones responsible for implementing the home screen and creating a new chat with a user, involve creating instances of Firebase Auth and Firebase Database.

```
Future<String> login() async {
  String outcome = 'Unknown Error';
  try{
    UserCredential userCredential = await FirebaseAuth.instance.signInWithEmailAndPassword(email: _email, password: _password);
    outcome = 'Successfully signed in ' + _email;
  } on FirebaseAuthException catch(e){
    if(e.code == 'user-not-found'){
      outcome = 'Error: No user found for that email.';
    }
    else if(e.code == 'wrong-password') {
      outcome = 'Error: Wrong password provided for that user.';
    }
    else{
      outcome = 'Unknown Error.';
    }
  }
  return outcome;
}
```

Figure 3. Screenshot of log in code

```
    outcome = 'Successfully registered ' + email;
    Navigator.pushReplacement(context, new MaterialPageRoute(builder: (BuildContext context) => HomePage() ));
  } on FirebaseAuthException catch(e) {
    if (e.code == 'weak-password') {
      outcome = 'Error: The password provided is too weak.';
    }
    else if (e.code == 'email-already-in-use') {
      outcome = 'Error: The account already exists for that email';
    }
    else if (e.code == 'invalidEmail') {
      outcome = 'Error: The email provided is too invalid.';
    }
    else{
      outcome = 'Unknown Error.';
    }
  }
  print(outcome);
  Scaffold.of(context).showSnackBar(SnackBar(content: Text(outcome),));
```

Figure 4. Screenshot of successfully registered code

In the login screen, the user can fill out the email and password in the corresponding blanks. If the email has not been linked to an existing account or the password is incorrect, the application will send a corresponding message. In the register screen, the user would fill out the email, password, and username blanks. There are two password blanks, in which the second blank is to confirm the password. If the passwords do not match, the application will detect that the two variables holding the passwords do not hold equal values and will prompt the user to input matching passwords. If the email has already been used for a different account, the email is invalid, or the password is considered too weak (contains less than 6 characters), the Firebase authentication system will detect these cases and the attempt to register an account would be rejected. All of these checks for invalid input are accounted for in the Dart file responsible for handling the register page.



Figure 5. Screenshot of submit button code



Figure 6. Screenshot of selected options code

Once the user either successfully registers or successfully logs into the application, the application will move to the home screen. If the application detects that the user has not yet completed their profile, it will display a button labeled "Complete Profile" that brings the user to the settings screen to complete their user profile. In the settings page, the user can fill in their birth date, bio, gender, and issues. All of this user profile information will be saved using Firebase, so the user will not need to complete the user profile again if they logout and log back in. In particular, the selected issues are stored as a list, and a method loops through all the selectable options and only adds the ones that have been checked off. When the user hits the "Submit" button, the user will be sent back to the home screen. After the application detects that the user profile has been completed, it will consider the user as a returning user and unlock two buttons in the home screen. This works by having one Dart file that is specifically for the home screen of a new user, and the regular home screen of a returning user is implemented through a separate Dart file. One button that is represented as a gear icon leads back to the settings screen to update the bio or issues of the user, in which the updated information is also stored in Firebase after pressing the "Update" button from the settings screen. The second button that is labeled with the "+" symbol moves the application to another screen that features the list of recommended users when pressed. The users are recommended based on whether they share at

least one similar issue, and their issues are listed right under their usernames. For example, if a user chooses stress and anxiety as the issues, the user would be recommended other users that have also marked either stress or anxiety as one of their issues.

```dart
DatabaseReference databaseRef = FirebaseDatabase.instance.reference().child("chatIDs/$chatID");
databaseRef.set({ 'user1': FirebaseAuth.instance.currentUser.uid, 'user2': otherUserID });

databaseRef = FirebaseDatabase.instance.reference().child("userChats/${FirebaseAuth.instance.currentUser.uid}/$chatID");
databaseRef.set({ 'otherUser': otherUserID });

databaseRef = FirebaseDatabase.instance.reference().child("userChats/$otherUserID/$chatID");
databaseRef.set({ 'otherUser': FirebaseAuth.instance.currentUser.uid });

Navigator.pushReplacement(_context, new MaterialPageRoute(builder: (BuildContext context) => ChatRoomPage(chatID) ));


}


Future<Map<String, String>> GetUserProfiles() async{
  Map<String, String> userProfilesList = {};

  var userProfiles = await FirebaseDatabase.instance.reference().child("profiles").orderByKey().once();

  if(userProfiles.value != null) {
    var datapoints = Map<String, dynamic>.from(userProfiles.value);
    List<String> userTags = datapoints[FirebaseAuth.instance.currentUser.uid]['tags'].toString().split(',');
    print('UserSEDFSFJEOWJDLS');
    print(userTags);

    for (var entry in datapoints.entries) {
      print(entry.key);
      print(entry.value);
      if(entry.key == FirebaseAuth.instance.currentUser.uid){
        print('pass');
      }
```

Figure 7. Screenshot of Database reference code

Once the user is moved to this screen of recommended users, the user has the option to choose any of these users to start a conversation with by tapping on a user's username. This works within one of the Dart files responsible for handling new chat pages, where a method adds a data item to a snapshot in Firebase that corresponds to a user. After tapping on a username, the user is brought back to the home screen as well. The home screen shifts between having a widget that accounts for no available chats and a widget that creates a functional chat list, and the widget for no available chats is only used when the application detects from Firebase that there are zero data items in the Firebase snapshot. The home screen allows the user to enter a chat screen with a specified user by tapping on the corresponding user's username. In the chat screen, the user can send a message by typing in the text box and pressing the button with a triangle pointing to the right. A Dart file is responsible for building the user interface and the chat bubbles of the chat screen through widgets. When the user either sends or receives a message in a conversation, the updated information is stored in Firebase and the widgets allow for the user to view the conversation history in an easily readable manner.
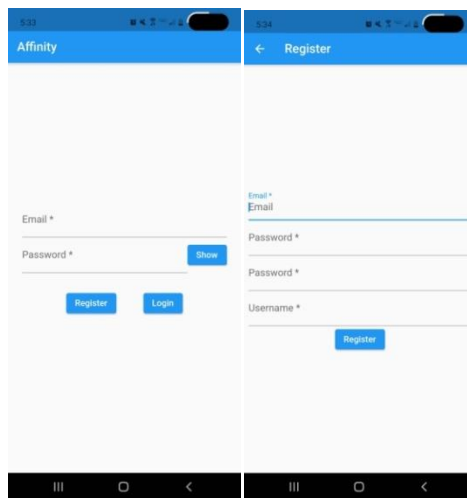
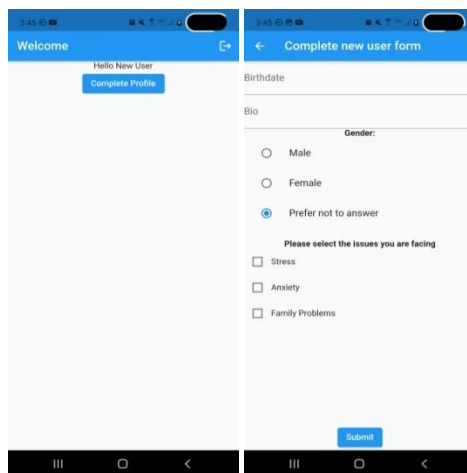Figure 8. Screenshots of the Login and Register screens



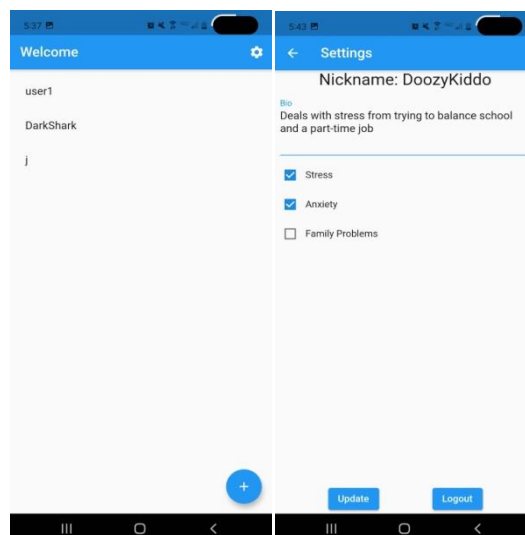Figure 9. Screenshots of the Home and Settings screens (for a new user)



Figure 10. Screenshots of the Home and Settings screens (for a returning user)
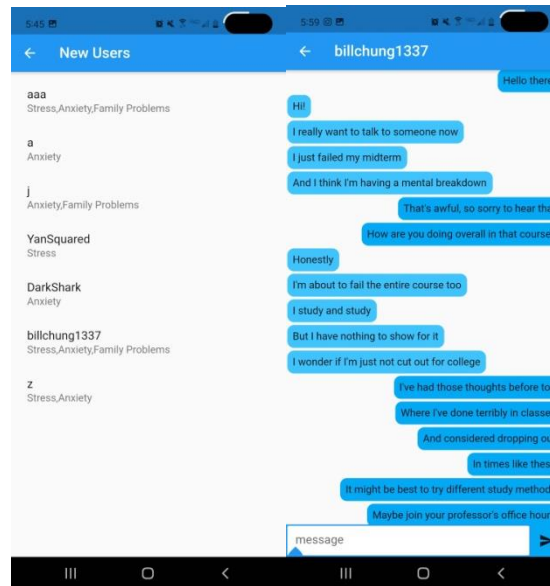
Figure 11. Screenshots of the list of users and chat screens

## 4. EXPERIMENT

### 4.1. Experiment 1

We aim to solve the problem of untreated mental health issues among people globally, especially those that have been greatly negatively affected by the pandemic, by having users of the Affinity application engage in deep conversations with one another. In doing so, these users can improve their mental health and lead happier lives. The main mental health issues that were focused on in this experiment were stress and anxiety. Our sample size of twelve participants allows us to account for any variability. In this experiment, the participants would first give their stress and anxiety levels a score from 1 to 10, with a lower score meaning less stress/anxiety and a higher score meaning more stress/anxiety. The levels of stress and anxiety are measured as separate statistics. The participants would then download the Affinity application, register their accounts, and complete their profile. During profile completion, they would choose from a checklist of mental health issues (Stress, Anxiety, and Family Problems) that they identified with, and they had to choose at least one. The participants would then initiate conversations with all users that the application recommended as conversation partners. The application recommends any user that shares at least one common mental health issue from the checklist of options in the user profile. For one week, the participants will check the application daily and respond to any messages they receive. After this week, they will give their stress and anxiety levels another score from 1 to 10.
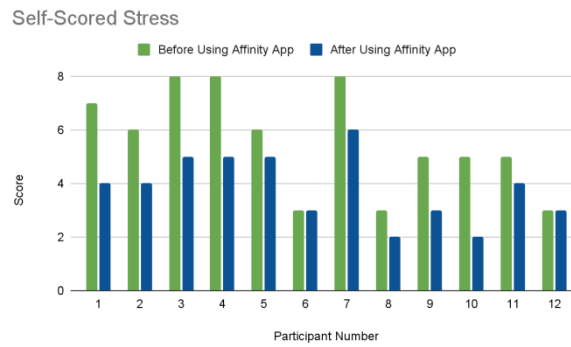
Self-Scored Stress



Figure 12. Result of self-scored stress
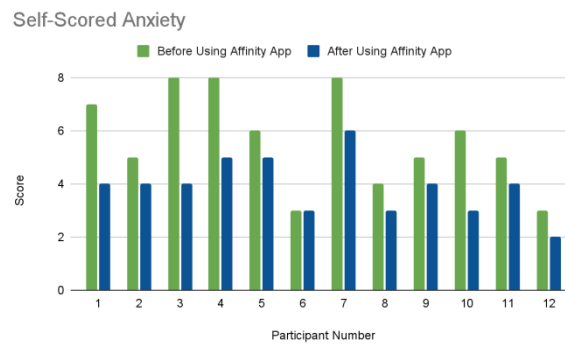
Self-Scored Anxiety



Figure 13. Result of self-scored anxiety

The results from this experiment revealed that all the participants' stress and anxiety levels were very similar. In the statistics from both before and after using the Affinity Application, the self-scored stress and anxiety levels were at most 1 apart for each participant. Although the results would have been very similar if the statistics of stress and anxiety levels had been collected together rather than separately, the participants were provided with more freedom to express themselves. A noticeable pattern in the results were that those with higher initial stress and anxiety levels tended to have greater reductions in stress and anxiety after a week of using Affinity. While participants with initial stress and anxiety levels of 7 and 8 were met with score reductions of 2 or greater, the majority of those with initial levels 5 and below only faced reductions of at most 1. Every participant's stress and anxiety levels either stayed the same or was reduced after one week of using the application.

## 4.2. Experiment 2

Through having people relate and empathize with one another mental health issues, our application tackles the problem of increased stress and anxiety during a difficult global situation. The Affinity application is capable of achieving this through its profile system, in which new users are asked to select from a checklist of three possible mental health issues when they first register their accounts. The application uses the selected options in the checklist to recommend other users as conversation partners. This experiment involves twelve participants in order to account for variability. Before this experiment, the participants will have already spent a week in the application engaging in conversations with all other active users who shared at least one common mental health issue as selected in their profile. Each of these participants would send a

list of at least five mental health issues/experiences that they most strongly identified with to all of their conversation partners. This list would exclude any of the selectable options of mental health issues in the user profiles, which tests if the participants can empathize with one another beyond the base application options. The participants would then view all the lists they have received, tally up the number of conversation partners that had at least one mental health issue or experience they could empathize with, and report this number along with the number of total conversation partners. Each participant also listed which options they chose in the user profile's checklist of mental health issues.

| Participant # | Number of conversation partners that could be related with | Number of total conversation partners | Percentage of conversation partners that could be related with |
|---|---|---|---|
| 1 | 9 | 11 | 81.8% |
| 2 | 8 | 8 | 100% |
| 3 | 10 | 10 | 100% |
| 4 | 11 | 11 | 100% |
| 5 | 7 | 8 | 87.5% |
| 6 | 3 | 3 | 100% |
| 7 | 10 | 10 | 100% |
| 8 | 6 | 7 | 85.7% |
| 9 | 9 | 10 | 90% |
| 10 | 10 | 11 | 90.9% |
| 11 | 7 | 7 | 100% |
| 12 | 8 | 8 | 100% |

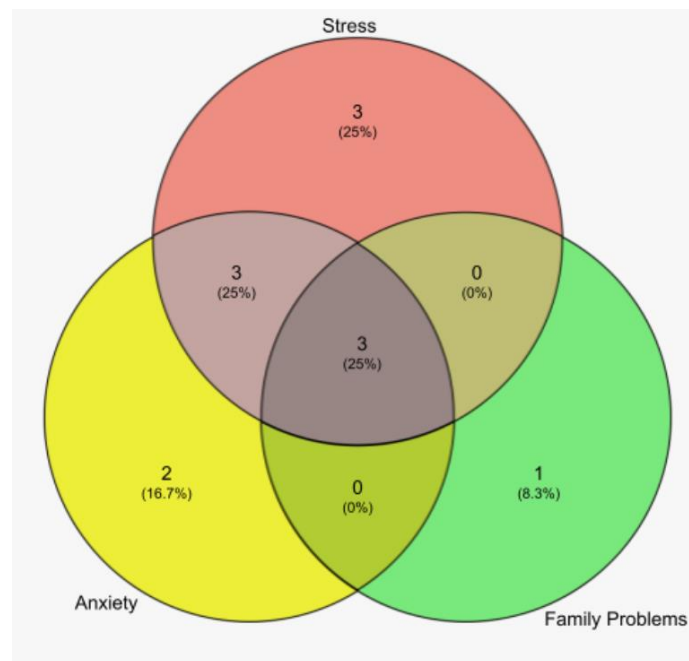Figure 14. Result of experiment 2



Figure 15. Distribution of mental health issues among participants

The results table of this experiment indicates that the majority of participants could relate to all of their participants in at least two mental health issues or experiences. One mental health issue comes from the list of at least five mental health issues that each user provided their conversation partners with, and the other mental health issue comes from the checklist options in the user profile that allowed the users to connect with each other in the first place. The lowest recorded percentage of conversation partners that could be related among all participants was 81.8%. Besides one participant that only had 3 conversation partners, all the other participants had at least 7 conversation partners. Therefore, each participant had a decent number of conversation partners they could relate with. According to the three-way venn diagram, the most common mental health issue was stress, followed closely behind by anxiety. Family problems were the least common mental health issue.

In the first experiment, there is an overall significant reduction in self-scored stress and anxiety levels among all participants after using the Affinity application for one week. Since having deep conversations with other people was believed to improve the mood and mental health of people, these were our expected results. These results of greatly lowered stress and anxiety levels prove the effectiveness of the application at improving the mental health of its users. In the second experiment, over half of the participants reported that every conversation partner had at least one shared mental health issue or experience outside of the options in the user profile. All participants shared a common mental health issue or experience, excluding the user profile options, with at least 80% of their conversation partners. This experiment proved the effectiveness of the application at bringing people with shared similar experiences together, as having one mental health issue in common seems to generally indicate having another mental health issue or experience in common as well. When combining the results of the two experiments, a significant correlation between the percentage of conversation partners that could be related with and change in stress and anxiety levels after one week could not be concluded.

## 5. RELATED WORK

This work focuses on a mobile application that acts as a mental health assessment, which includes the monitoring of stress, substance usage, sleeping, exercise, and diet. Information from the assessment is delivered to general practitioners for medical review [4]. This paper also chose to place a focus on a mobile application dedicated to the mental health of its users, and the experiments of this paper also resulted in the participants having overall improved mental health. The strengths of this related work lies in the ability of the application to record many different mental health symptoms, along with the expertise of general practitioners, to improve the mental health of the application's users. On the other hand, our work emphasized on our application users having deep conversations with other people that share the same issues or experiences in order to improve their mental health.

The primary focus of this work was to analyze the downloads and activity of mental health mobile applications during the pandemic and to view how they have changed from before the pandemic. The results of these analyses are that mental health mobile application downloads had a significant growth during the pandemic and applications were found to have no clear correlation between app quality and app popularity [5]. While the related work provided a greater emphasis on already existing applications, our work involved the creation of a new mobile application. The related work also spread its focal points across the quality, popularity, and clinical effectiveness of the tested applications, whereas our work focused solely on the effectiveness of the created application.

This related work explores the effectiveness of mental health services in mobile applications in preadolescents and adolescents. The results concluded that there was not enough evidence to

prove that these mental health services had a significant impact on mental health. The related work, just like our work, chooses to place its primary focus on the effectiveness of the mental health mobile applications. The related work, however, observes multiple preexisting mental health applications and how these kinds of applications will continue to grow in number over time. On the other hand, our work focuses solely on the effectiveness of our newly created application at improving its users' mental health and what can be done in the future for the application to become even more effective.

## 6. CONCLUSIONS

We propose a mobile device application called Affinity. The purpose of this application is to help those who may be suffering from mental health issues. Users would use Affinity by registering an account, selecting their mental health issues from a checklist of options, and engaging in conversations with other users that deal with similar mental health issues over a chat messaging system. By having deep conversations with other individuals, we believe that people can greatly improve their mental health and live happier lives.

In order to test our application, two experiments were conducted, in which both experiments involved the same twelve participants. One experiment involved a survey that required the participants to give their stress and anxiety levels a numerical score, initiate conversations and use the application daily for a week, then give another numerical score for their stress and anxiety levels after a week of using the application. A second experiment involved the participants sending all their conversation partners a list of at least five mental health issues or experiences they have suffered, then tallying how many conversation partners had at least one mental health issue or experience that they could relate with out of the total number of conversation partners. The results from the first experiment indicate that, in the majority of users, using the Affinity application would reduce the levels of stress and anxiety. The results from the second experiment prove that the current system that recommends other users as conversation partners is effective at bringing those with shared similar experiences together.

Currently, the most limiting factor of our application is the accuracy in which users are matched with other users as conversation partners. At the moment, we only have three possible mental health issues to match users with and would like to have more options to match users with. However, the current implementation of check boxes is far too inefficient to use as the sole long-term solution. There are a myriad of mental health-related issues to take into account, and even after adding as many options as possible, users may still not find issues that they can identify with. Because of this, we are seeking a more flexible way to implement the matching of users.

In the future, we hope to create an AI to add to Affinity that will be able to better match a user to other users [15]. We currently have users choose the checkbox options of stress, anxiety, and family problems as a simple yet effective implementation to match users who have checked similar options. However, we want to match the keywords in users' bios/descriptions using an AI so that we can offer users the best possible conversation partners.

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