Patient Health-Centred Social Network
Final Report

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1 Introduction

This document outlines the final report for the HealthSpace project based on connecting users of similar health concerns. The first section of the document will describe the technologies used to develop the application, both frontend and backend. It will also contain some of the issues I faced while using these technologies but more so the successes they brought to the project. The following section will showcase all of the applications final screens and the functionality of each screen will be thoroughly explained. The document will then discuss how I adhered to the original specification and what I failed to achieve during the development phase. A final project evaluation will be included in the document's last section, describing how I felt the project went and what I would do differently if I had to start over.

2 Technologies

2.1 React Native

React Native definitely helped in terms of increasing productivity and by shortening the time to deliver the HealthSpace application. Generally, a company may opt to develop a native application in order to reap the myraid of benefits offered in comparison to a hybrid or web application. Larger companies can afford to hire a team of both Android and iOS engineers, however, for this solo-developed college project, react native was sufficient. React native is not able to use all the blessings and potential of a specific platform, but it lets you achieve a performance similar to a truly native app.

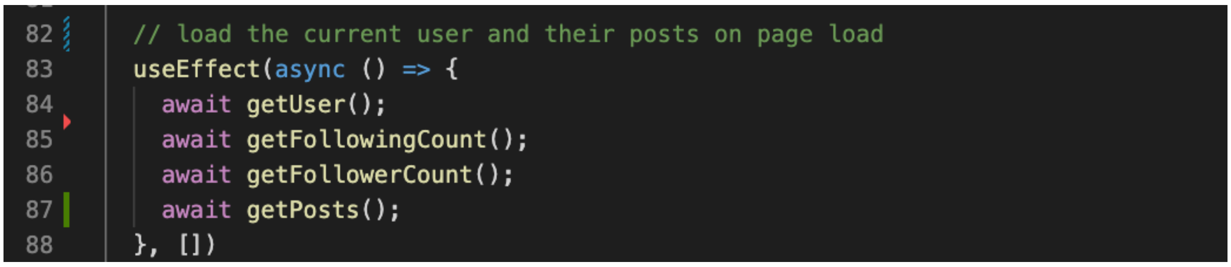
2.1.1 Successes

There were many features that proved beneficial to the project by reducing the devleopment time. To begin with, React Native supports fast refresh which means as a developer you can instantly see the changes you make to your code on either platform. This feature is very simple but also very useful. It provides real-time feedback and a great developer experience overall. Another benefit of using react native was it’s strong community. Since React Native is an open-source JavaScript platform, developers often contribute to the framework’s development. There are hundreds of open-source libraries that were very helpful to the project and allowed for both faster and more reliable development. These libraries proved beneficial as push notifications were needed to satsify the specification.

Since HealthSpace is a social networking site, state management was one of the most important React Native concepts to understand. This is as a result of the data constantly changing. Whenever you define a state, you need to provide an intial value for it. After that, you can use the setState function provided by React Native to change it whenever you want. Whenever setState is called and state changes, it will re-render the component in which it’s being used. This was necessary in all of the areas typical to a social networking site, including updating a user’s notifications, timeline and profile information, incrementing their follower and following count, as well as, providing a real time messaging service.

2.1.2 Challenges

The fact that JavaScript is asynchronous was one of the biggest challenges that ultimately ended up being a success in terms of performance and responsiveness. Async programming is infested with code-tangles, making it both harder to read and understand. This is simply because it does not follow the traditional linear sequential flow. For the HealthSpace application to work as intended, there were some functions that were needed to run before other functions. For example, when a user loads their own profile page a number of functions are called when the screen loads. It is important that these functions are called in sequential fashion.



```
// load the current user and their posts on page load
useEffect(async () => {
  await getUser();
  await getFollowingCount();
  await getFollowerCount();
  await getPosts();
}, [])
```

Figure 1. UseEffect Hook.

In the example displayed by figure 1, it is important that the current user's information is retreived in order to load the correct posts. If the async and await keywords were not used, the system would try and fetch the posts with undefined data. This proved to be a problem throughout the development phase. It was important that the functions were being called in the correct order.

2.2 Firebase

2.2.1 Success

The use of Firebase was definitely one of the best decisions I made when deciding on what technologies to use when constructing the HealthSpace application. The other option I considered was MySQL but Firebase was undoubtedly the best decision. It offered many tools and services that were beneficial to my application, including Firebase Authentication and Firebase Storage.

- **Firebase Authentication -** Firebase Authentication is a Google Authentication functionality designed specifically for Firebase-based projects. It allows you to register users using custom credentials, emails, or any social account including but not limited to Google, Facebook and Apple. It also ensures that both the registration and login are extremely secure.
- **Firebase Storage –** This service was used to store all of the application's images. I would have to use another third-party service to store images if it weren't for Firebase Storage.

2.2.2 Challenges

As I did have many successes with Firebase, I did also have some issues. Firebase storage hosts content up to 10GB at no cost. As that may seem like a lot of data, I used the 10GB very quickly during the development and testing phase. The reason for using up the data so fast was due to the large amount of images being read from Firebase storage. Almost every screen contained a huge number of images as profile pictures were rendered with almost every component, including: posts, comments, notifications and user profiles. If you are not on the upgraded plan, the data is no longer loaded from the database once you reach 10GB. For this reason, I needed to upgrade my plan. The upgraded plan, also known as Blaze, is a “pay as you go” plan and could be an expensive asset in the future if the user count was to increase significantly.

3 Final Application Screens

3.1 Mobile Screens

3.1.1 Loading Screen

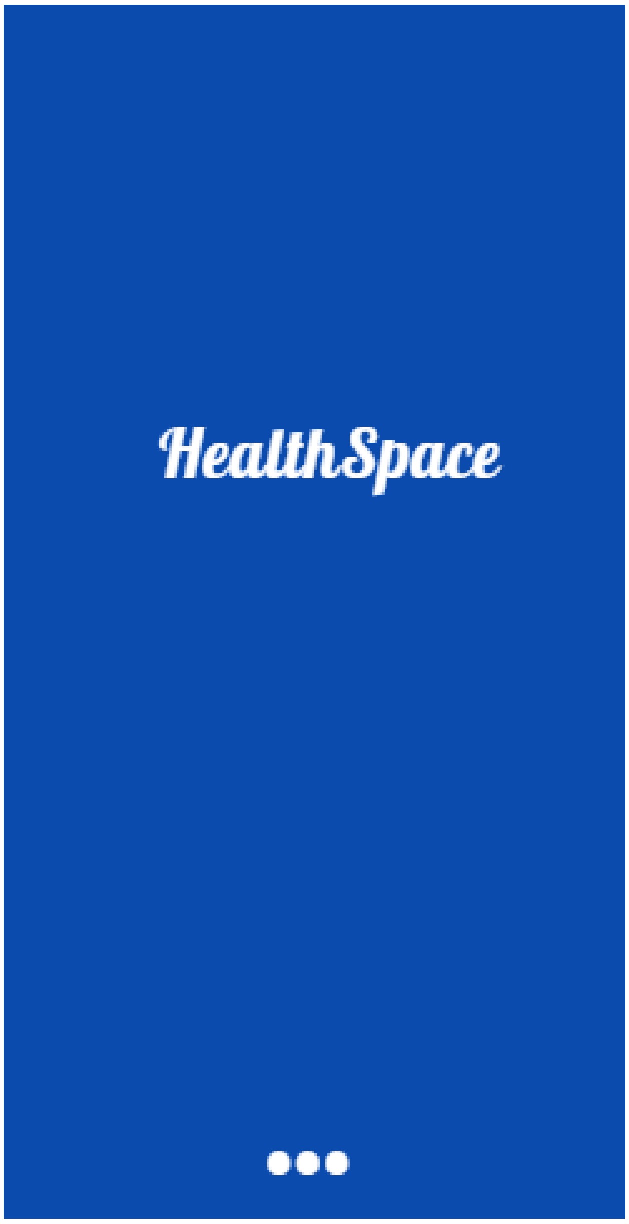


Figure 2. Loading Screen.

This is the applications loading screen which appears everytime the application is launched. It highlights the applications colour palette, as well as the name of the application.

3.1.2 Onboarding Screen One

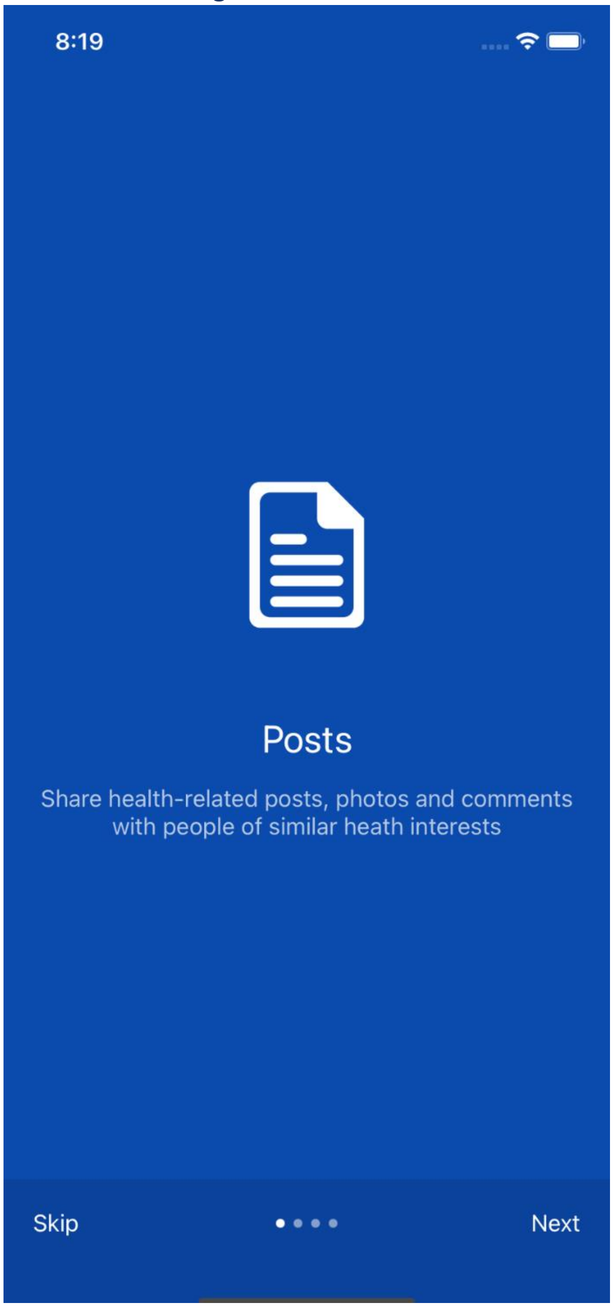

8:19
Posts
Share health-related posts, photos and comments with people of similar heath interests
Skip
Next

Figure 3. Onboarding Screen One.

The first onboarding screen is one of four screens that introduce the application to the users. These four screens will only be displayed the first time the user downloads the application. The first screen introduces the idea of creating and sharing health-related content in the form of plain text posts and photos. Users can also reply to each post with a comment.

3.1.3 Onboarding Screen Two

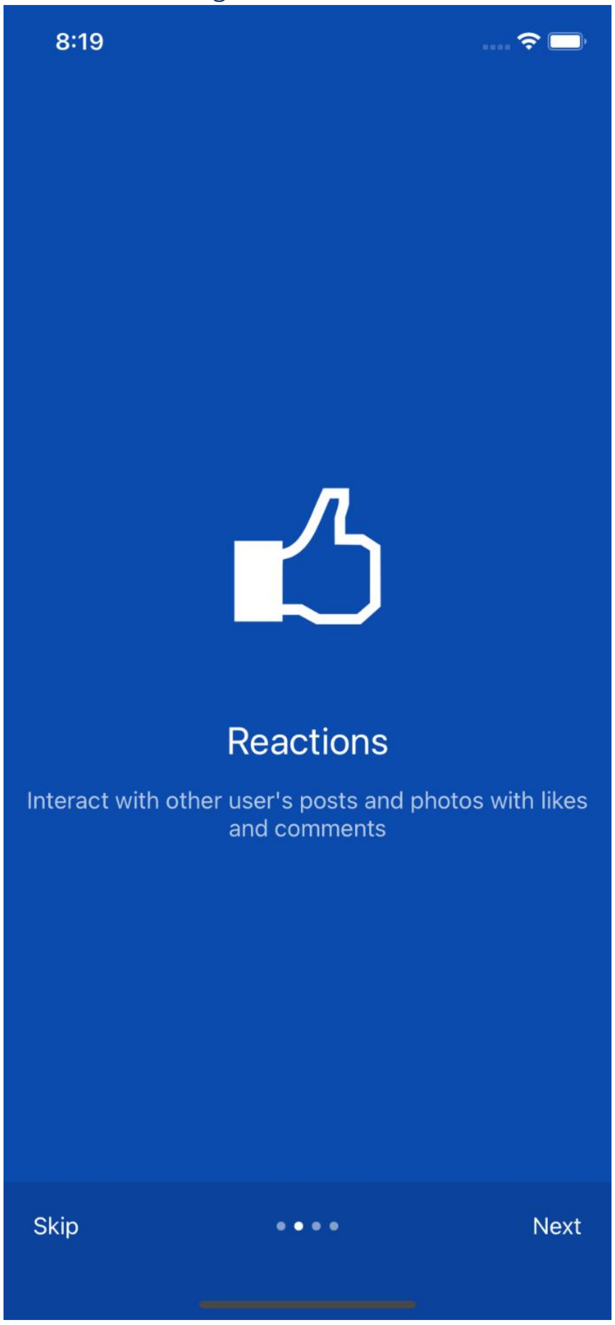
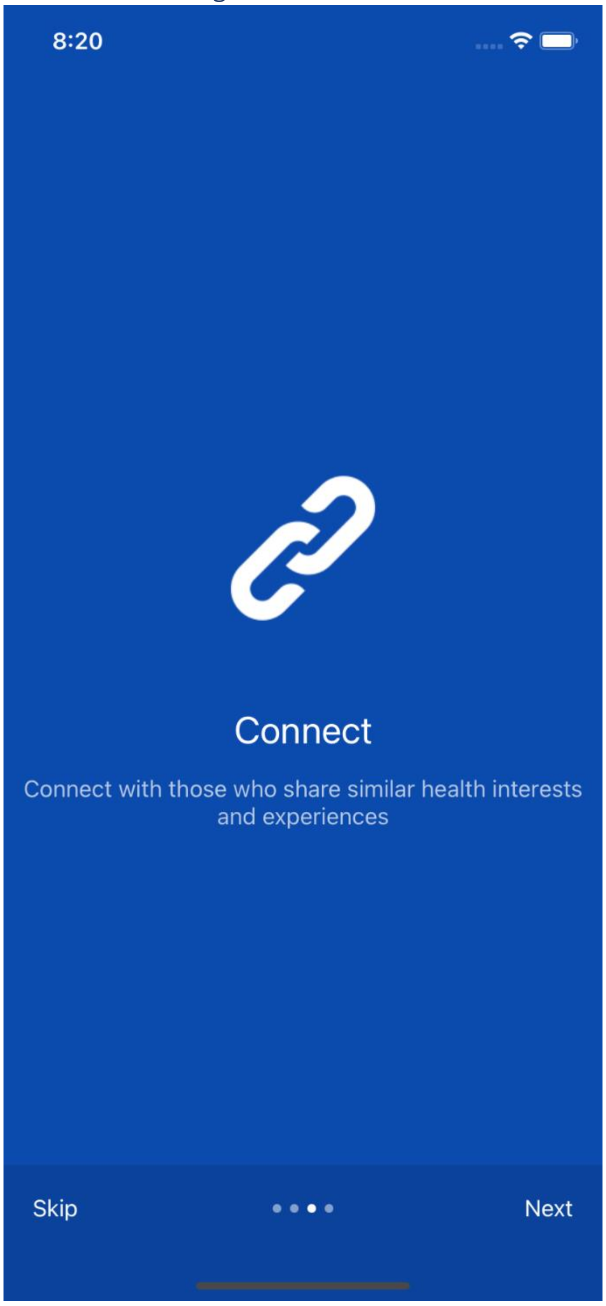

8:19
Reactions
Interact with other user's posts and photos with likes and comments
Skip
Next

Figure 4. Onboarding Screen Two.

The second onboarding screen highlights the ability to interact with other user's posts using the like functionality. Each post will be created and initialised with 0 likes. If a user finds a post of interest, they can increment that count by one by using the like icon.

3.1.4 Onboarding Screen Three



Connect

Connect with those who share similar health interests and experiences

Figure 5. Onboarding Screen Three.

The third onboarding screen highlights possibly the most important functionality of all: the ability to connect with others who share similar health concerns and who may have shared some similar experiences. By connecting and communication with others, you can talk about your experiences which can help you to stay in good mental health.

3.1.5 Onboarding Screen Four

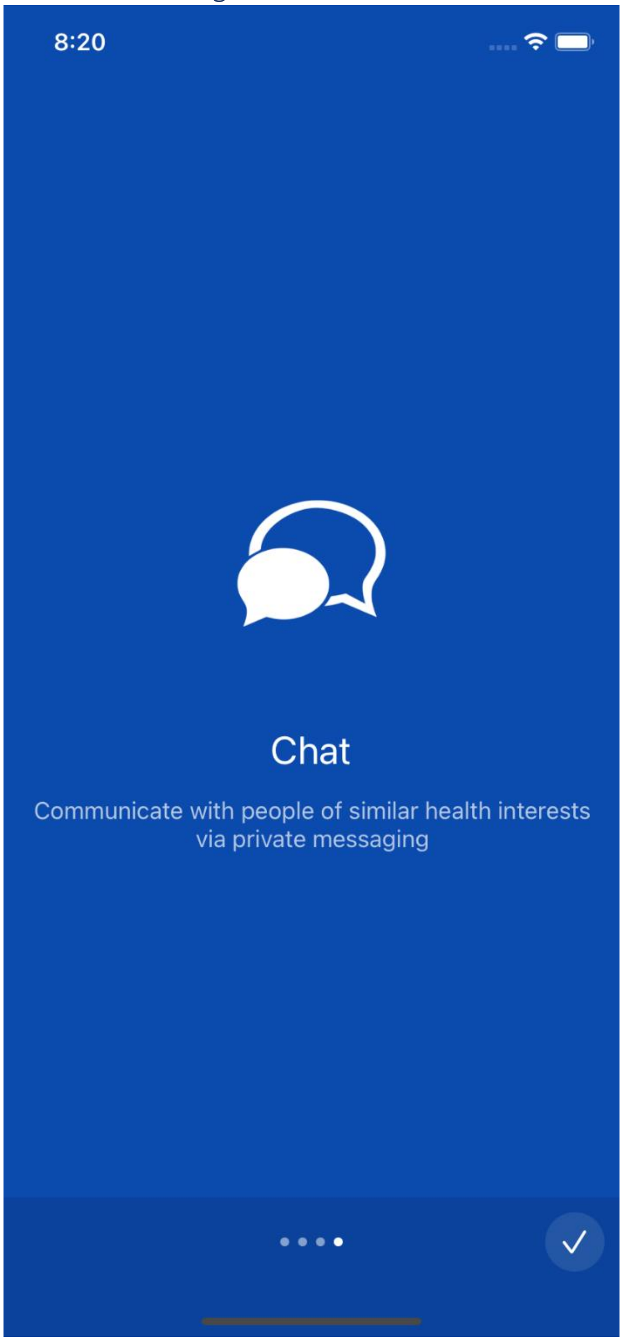

8:20
Chat
Communicate with people of similar health interests via private messaging

Figure 6. Onboarding Screen Four.

The final of the four onboarding screens demonstrates users' ability to privately message other users. Again, this is a very important functionality in order for users to share their feelings and experiences in a privacy preserving manner.

3.1.6 Login Screen

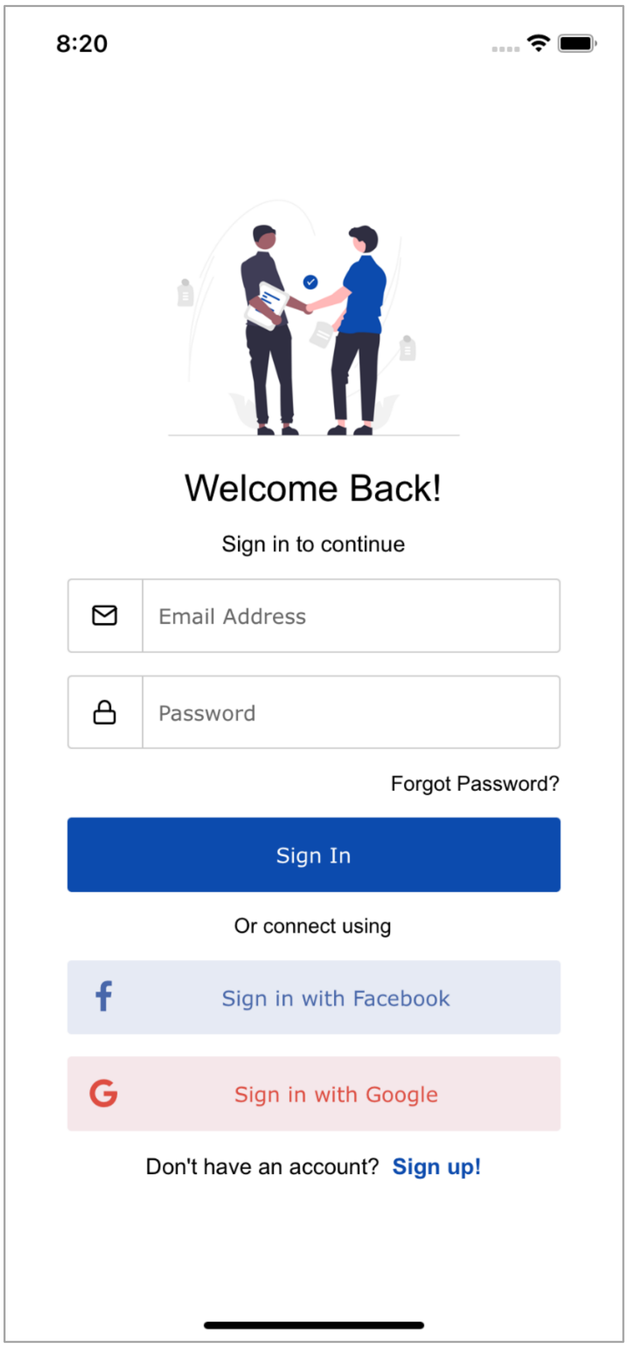


Figure 7. Login Screen.

This is the mobile application's login screen. As previously mentioned, when a user dwnloads the app for the first time they are present with the onboardings screens. However, every other time the user loads the application they will be presented with the login screen. If the user is a registered user, they can enter their email and password and attempt to login. The system will validate this information and redirect the user to the home screen if the information matches a registered user. If the attempted login fails, the user will be alerted that the email and passsword combination does not match a registered account If the user does not have an account yet, they can navigate to the sign up page.

3.1.7 Sign-up Screen

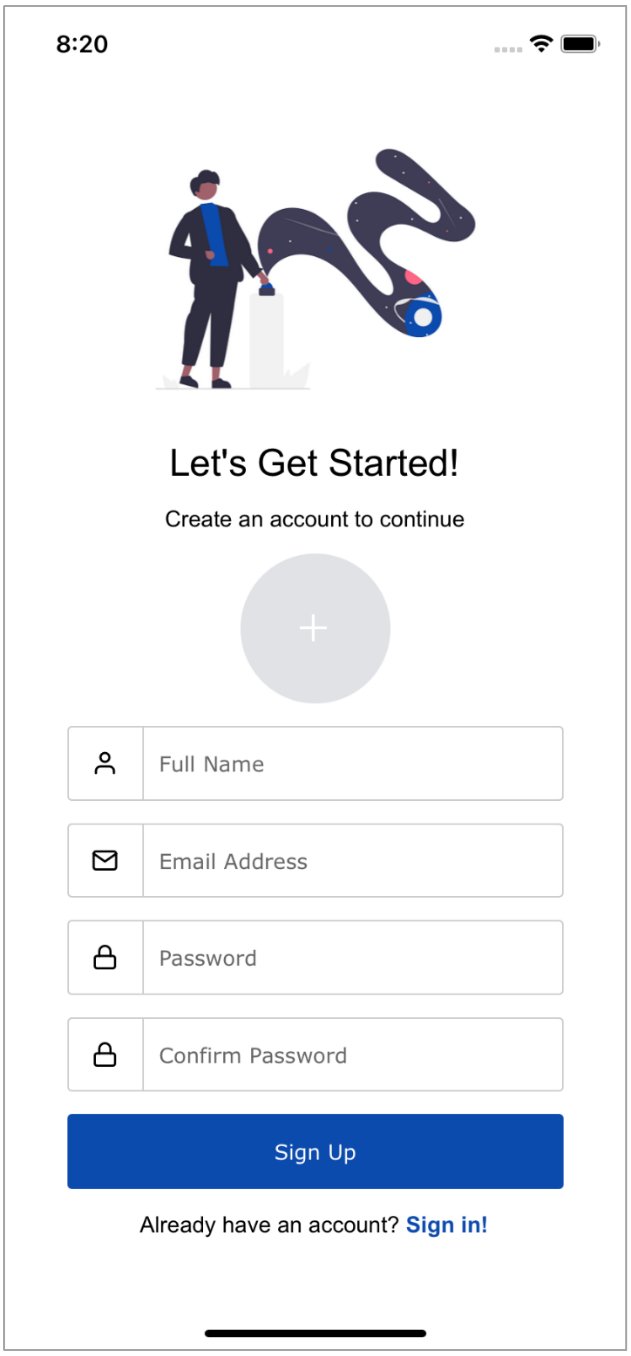
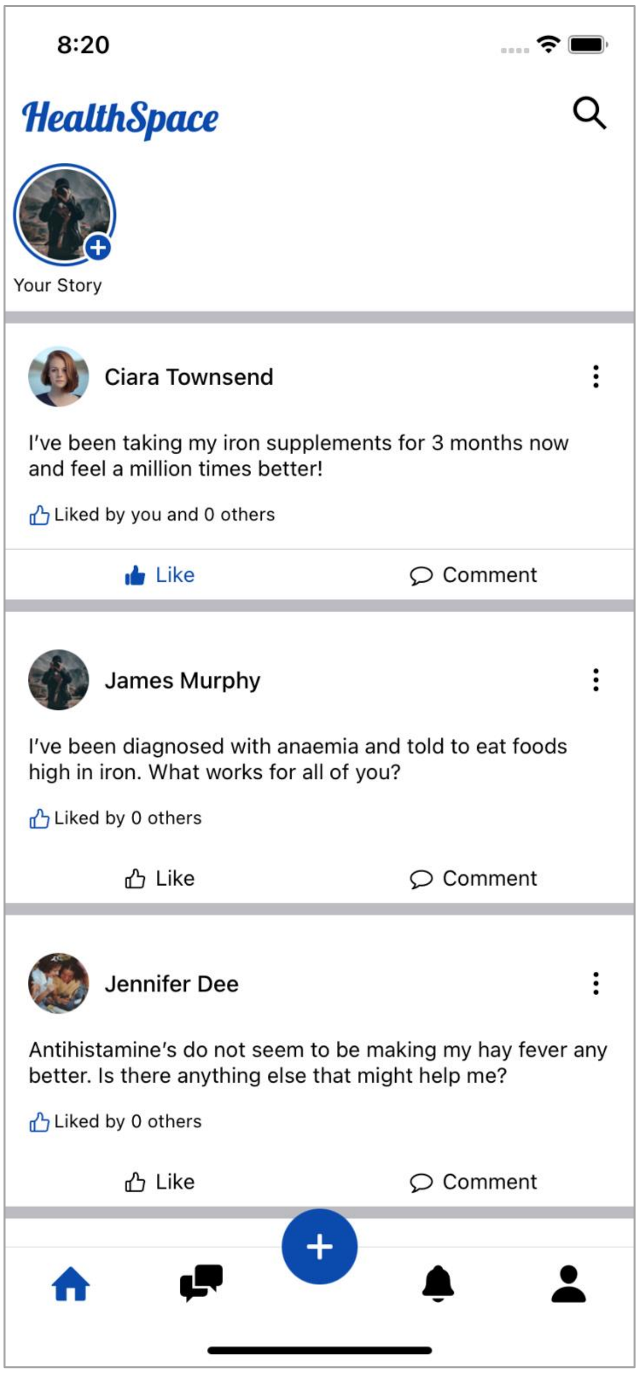


Figure 8. Sign-up Screen.

This is the mobile application’s sign-up screen. A user can resgister using a profile picture, their full name, email address and a secure password. The password combination must match, the email address must be uinique and all of the input fields are set to required. If these requirements are not met, the system will display an error message. Otherwise, the user will be redirected to the home page and their account will be created succesfully.

3.1.8 Home Screen


8:20

HealthSpace

Your Story

Ciara Townsend

I've been taking my iron supplements for 3 months now and feel a million times better!

Liked by you and 0 others

Like Comment

James Murphy

I've been diagnosed with anaemia and told to eat foods high in iron. What works for all of you?

Liked by 0 others

Like Comment

Jennifer Dee

Antihistamine's do not seem to be making my hay fever any better. Is there anything else that might help me?

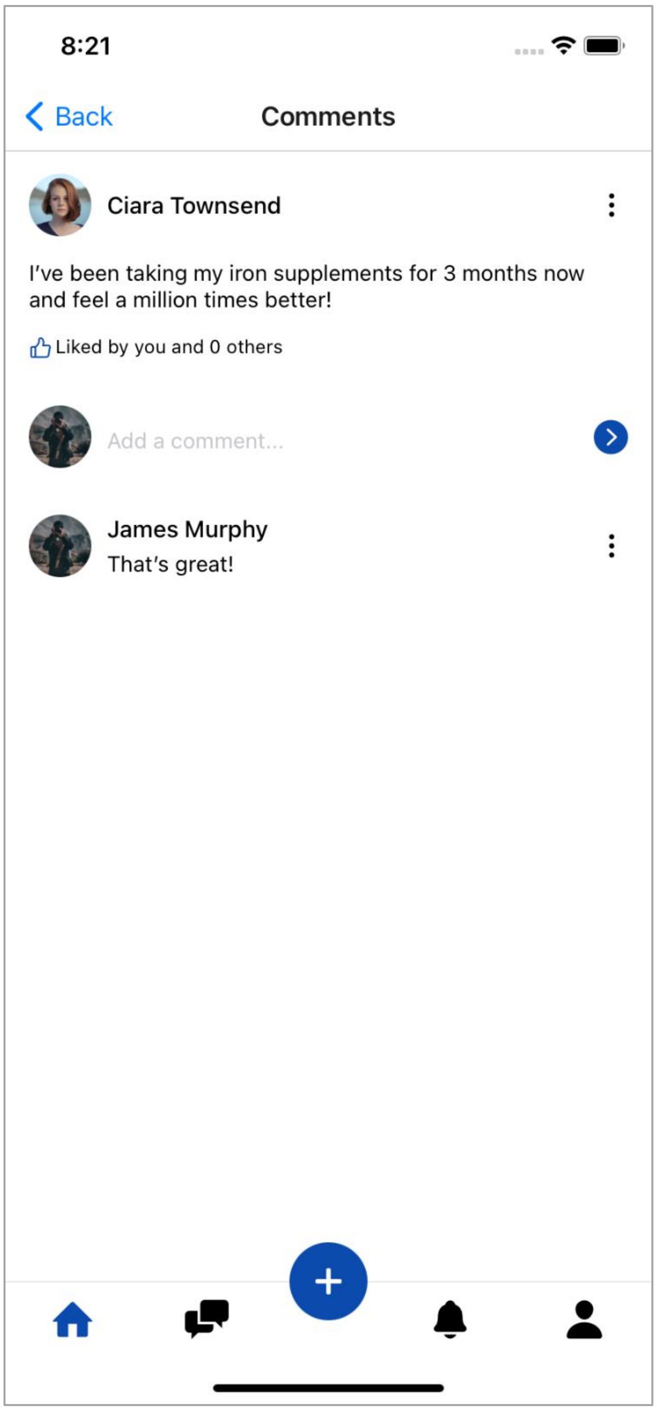
Liked by 0 others

Like Comment

Figure 9. Home Screen.

This is the home screen that appears after a succesful login attempt. The home screen displays the news feed which is common to all social networking sites. This is the primary area where users are exposed to all of the health-related content. Users can interact with posts by tapping the like icon or adding to the comment section of a post.

3.1.9 Comments Screen


8:21

Back

Comments

Ciara Townsend

I've been taking my iron supplements for 3 months now and feel a million times better!

Liked by you and 0 others

Add a comment...

James Murphy

That's great!

Figure 10. Comments Screen.

This is the applications comments screen. If a user finds a post that they may have something to add to, wether that be advice or a follow up question, they can do so tapping on the comments icon visible in figure 9. By doing so, the user will be navigated to the comments screen which will display the post of interest and any comments below it in order of the most recent first. The user can add to the list of comments by entering text into the placeholder and hitting the blue arrow icon.

3.1.10 Search User Screen

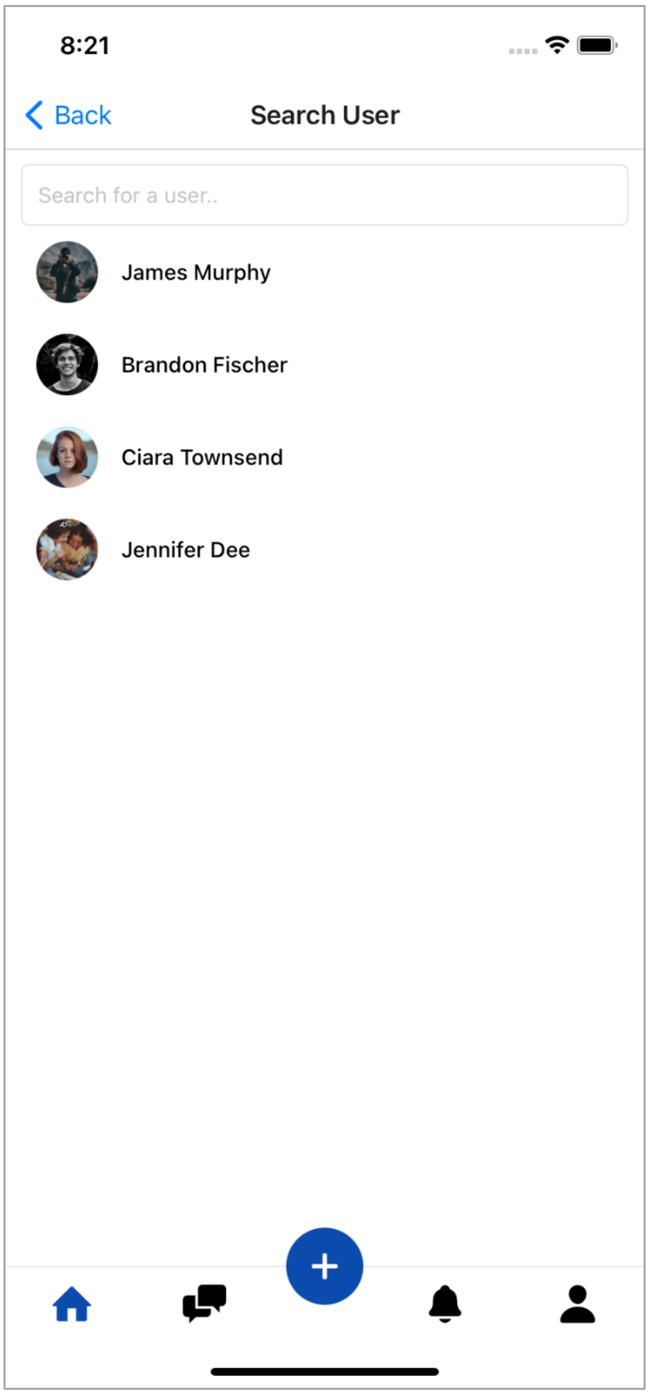
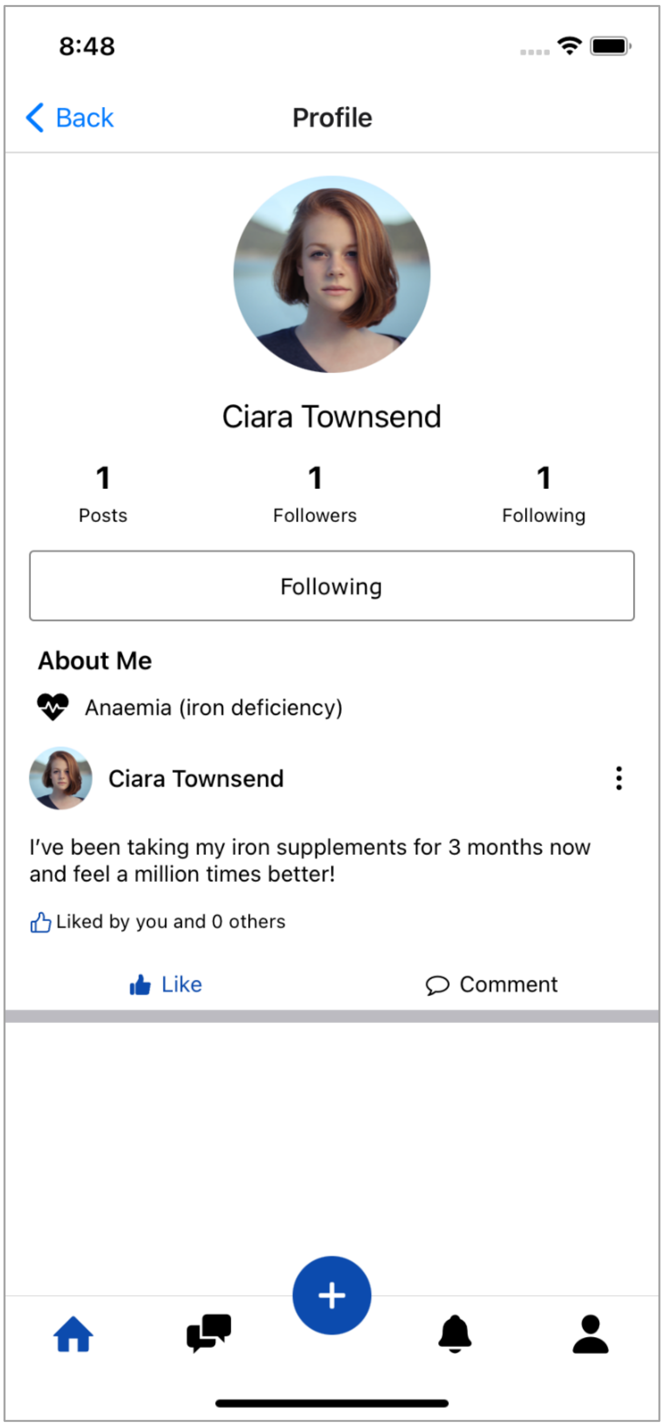


Figure 11. Search User Screen.

The user can navigate to the "Search User Screen" using the magnifying glass icon visible on the home page in figure 9. The search bar uses autocomplete functionality which displays the suggestions in real-time based on what the user is typing. This makes it much easier for a user to find their user of interest.

3.1.11 User Profile Screen


8:48

Back

Profile

Ciara Townsend

1	1	1
Posts	Followers	Following

Following

About Me

Anaemia (iron deficiency)

Ciara Townsend

I've been taking my iron supplements for 3 months now and feel a million times better!

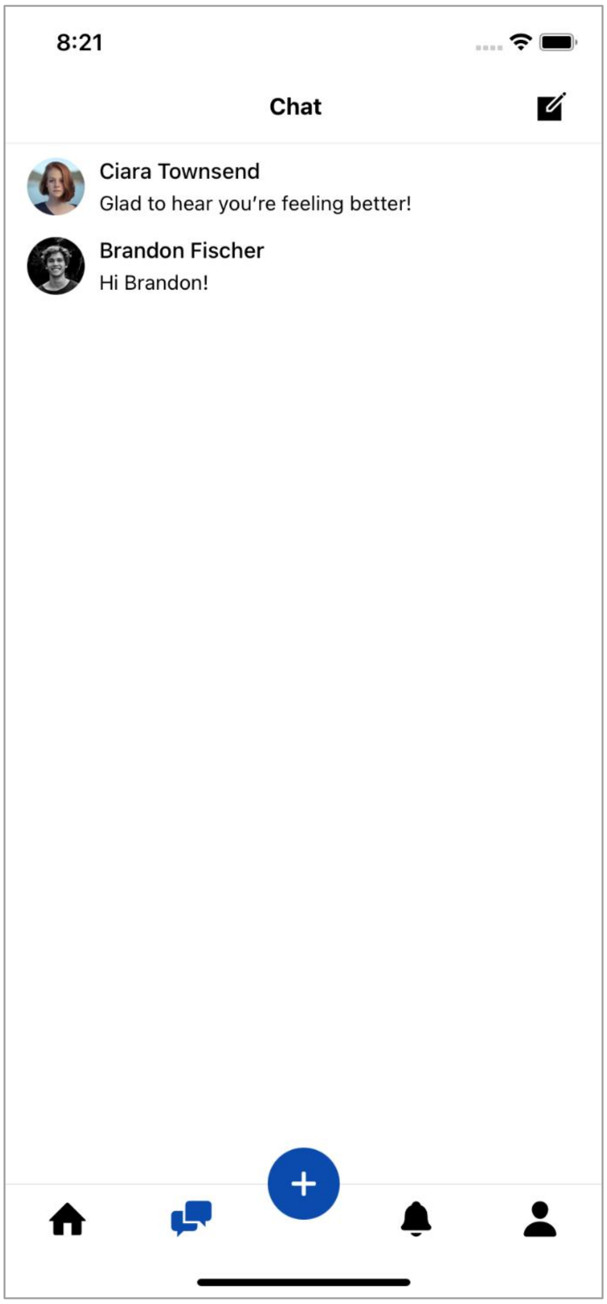
Liked by you and 0 others

Like Comment

Figure 12. User Profile Screen.

Once you find another user of interest, you can tap on their name which will bring you to their profile page. The profile page displays the user's number of posts, followers and the number of people they themselves are following. If the user has a registered bio or condition, that will also be visible on their page. All of the user's posts will be displayed below the about me section, in chronological order, starting with the most recent first. Finally, if the user is someone you can build a connection with, you can tap the follow button which will notify them that you have started following them.

3.1.12 Conversations Screen



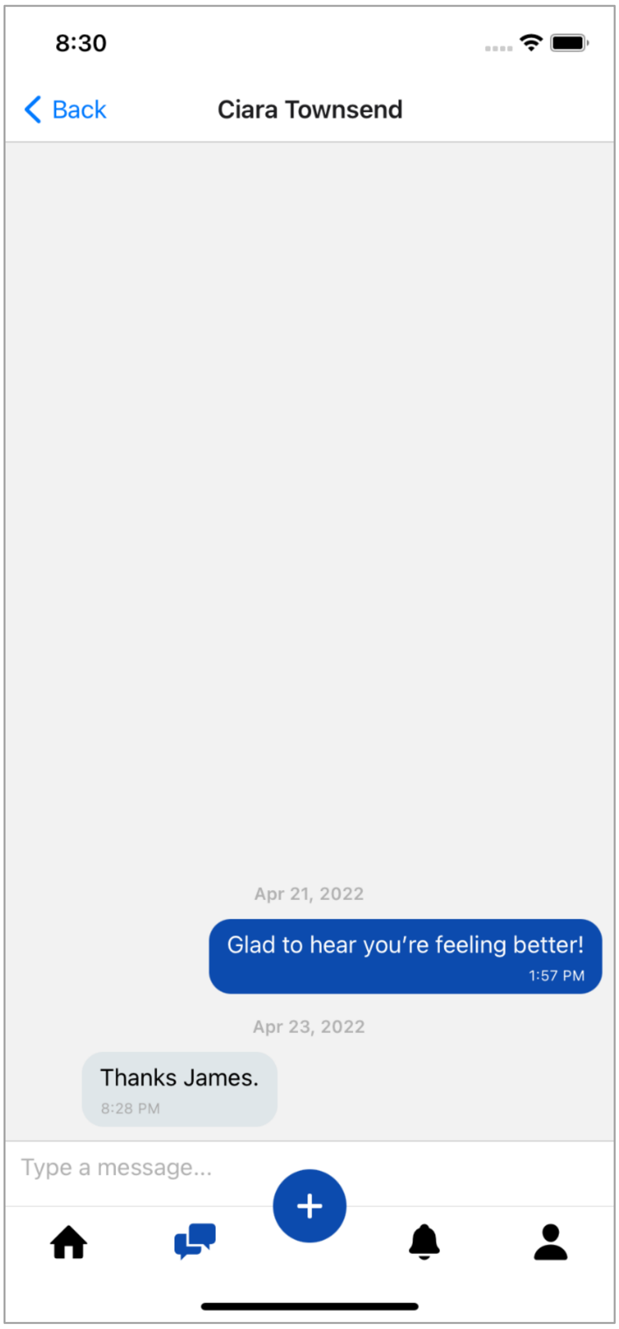
Ciara Townsend
Glad to hear you're feeling better!

Brandon Fischer
Hi Brandon!

Figure 13. Conversations Screen.

This is the initial screen displayed when the user taps on the chat icon in the bottom navigation bar. This screen displays a list of all the user's current conversations. The conversations are in order of the last message sent or received which is visible under the other user's name. A user can start a new conversation by tapping on the chat icon in the top right of the screen.

3.1.13 Chat Screen



Apr 21, 2022

Glad to hear you're feeling better!
1:57 PM

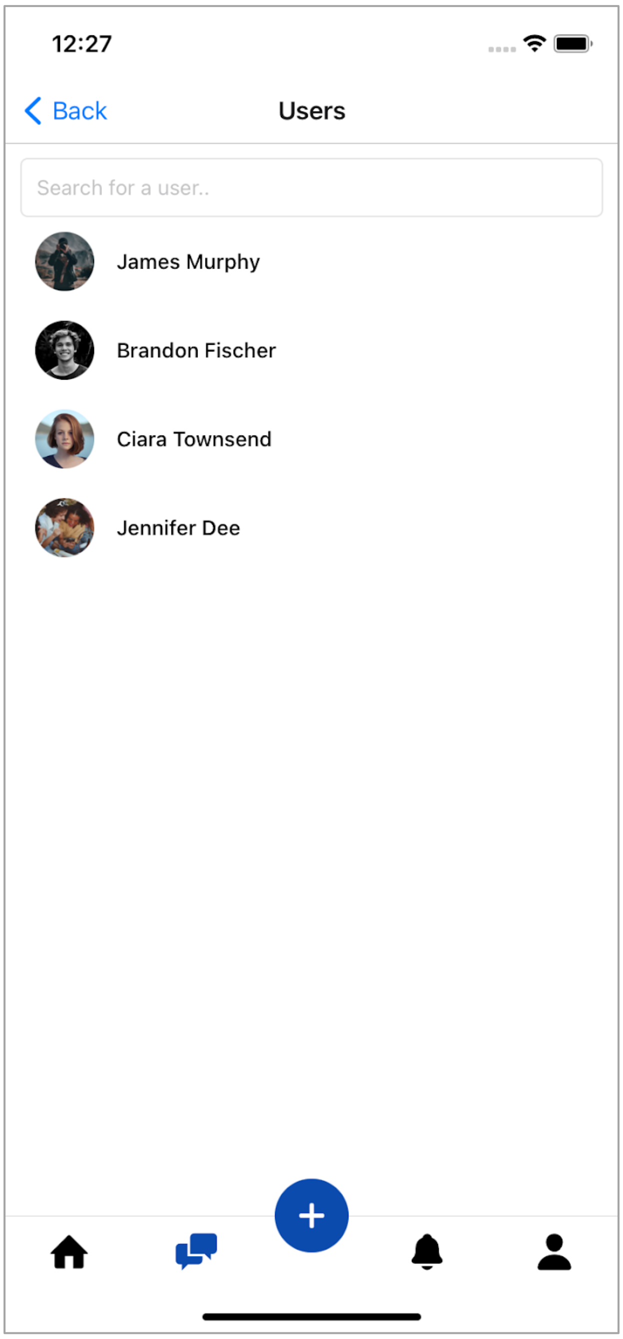
Apr 23, 2022

Thanks James.
8:28 PM

Figure 14. Chat Screen.

If you tap on any of the conversations displayed in figure 11, you will be navigated to a private chat room between you and the selected user. This is where users can communicate their thoughts, provide advice and share their experiences in a way that protects their privacy. The messages are displayed in order of the most recent first, along with both the time and date of the message sent.

3.1.14 Create Conversation



This is the application's create conversation screen. The screen provides an autocomplete search bar, similar to the search user screen, that allows you to find a user to interest to start a conversation with. When you tap on a user, a private chatroom between you and the selected user is created. The newly created chatroom will be visible on both users conversations screen.

Figure 15. Create Conversation.

3.1.15 Create Post Screen

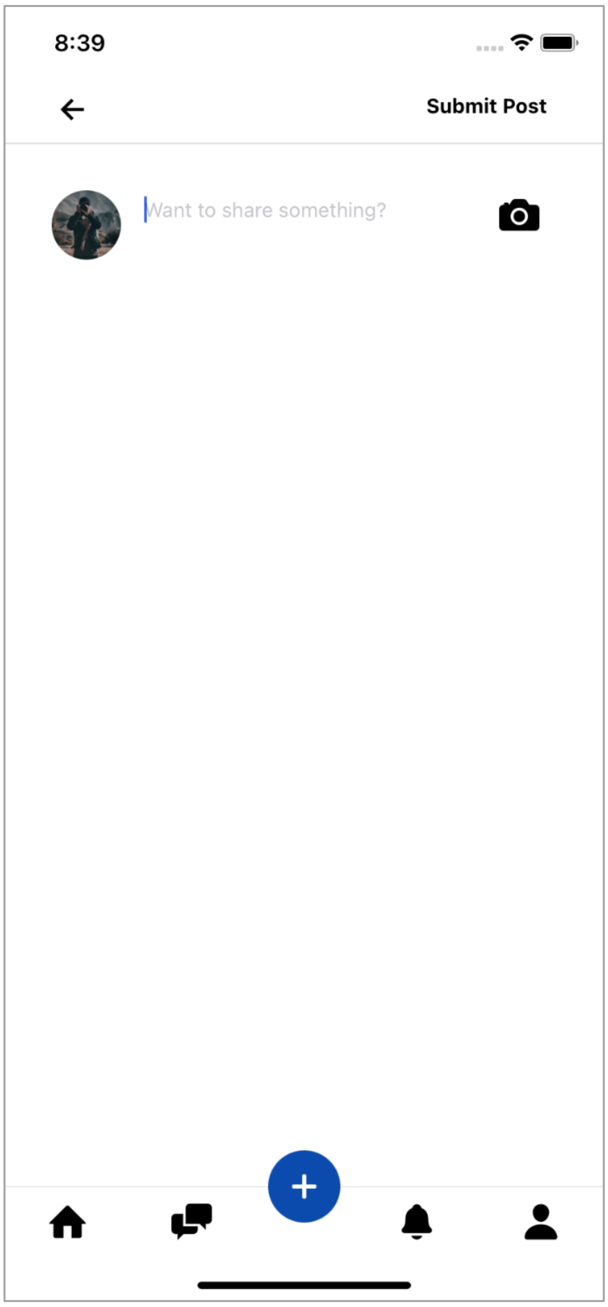


Figure 16. Create Post Screen.

This is the screen that allows users to create a health-related post. The user can navigate to this screen by tapping on the blue plus icon on the bottom navigation bar. While here, a user can create a health-related post using plain text or they can add a photo to their post by tapping on the camera icon. This is displayed by figure 17.

3.1.16 Create Post with Image UI

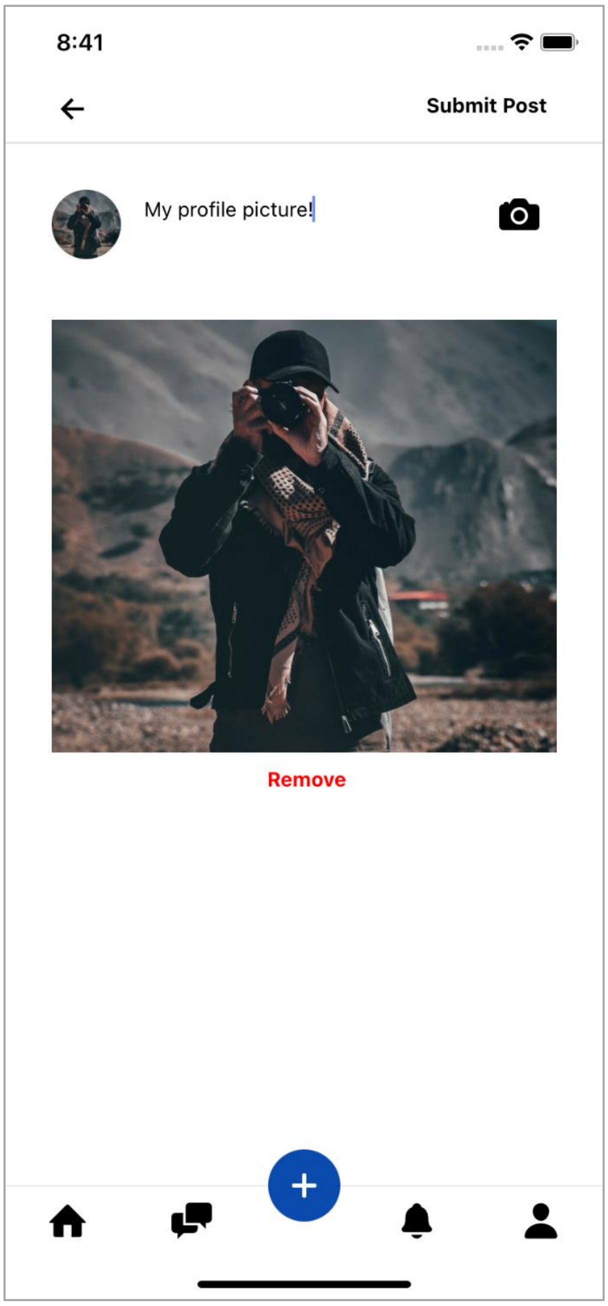
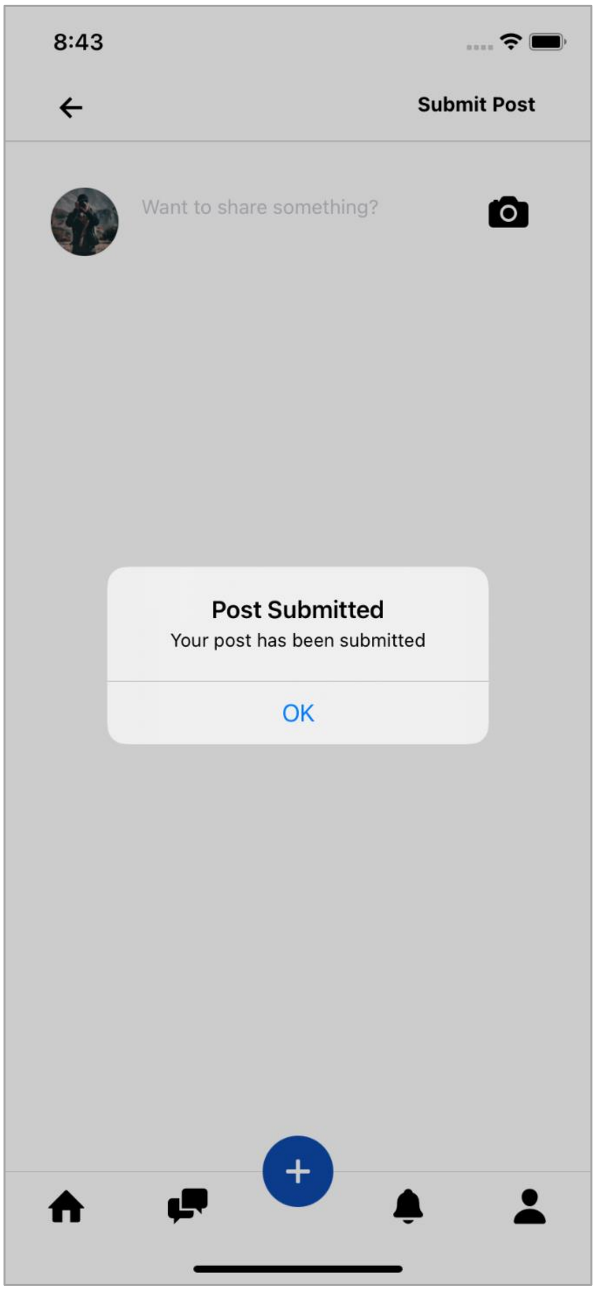


Figure 17. Create Post with Image.

This is how the create a post screen looks with the addition of both text and an image. If the user selects an image from the camera icon, the image is displayed on the screen and a text component saying “remove” is rendered. If the user isn’t satisfied with the image, the user can remove the photo by tapping on the remove text component. On the otherhand, the user can submit the post by tapping on the submit post text at the top right of the screen.

3.1.17 Successful Post Submission

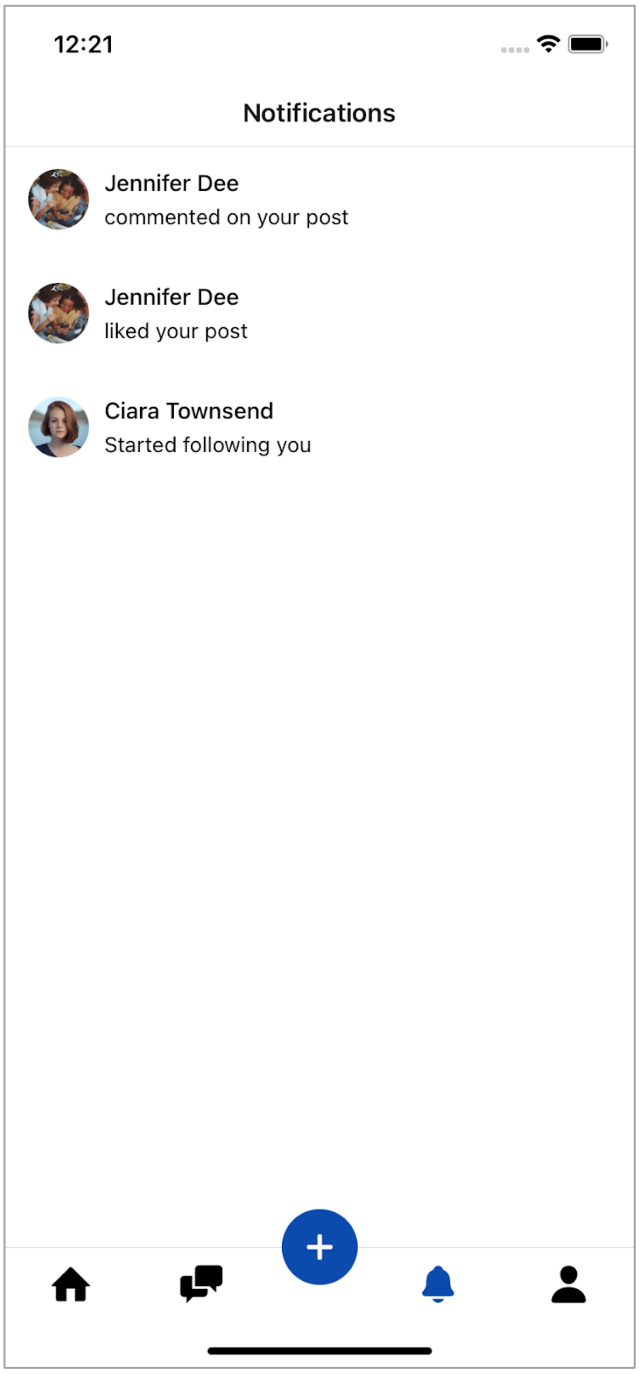


Post Submitted
Your post has been submitted

Figure 18. Succesful Post UI.

Once the user is satisfied with their post and their post is submitted, the system will store the post and display an alert box stating that the post has been submitted. The text input is then reset using react native’s setState() hook, where both the image and the text are set to null.

3.1.17 Notifications Screen


12:21

Notifications

Jennifer Dee
commented on your post

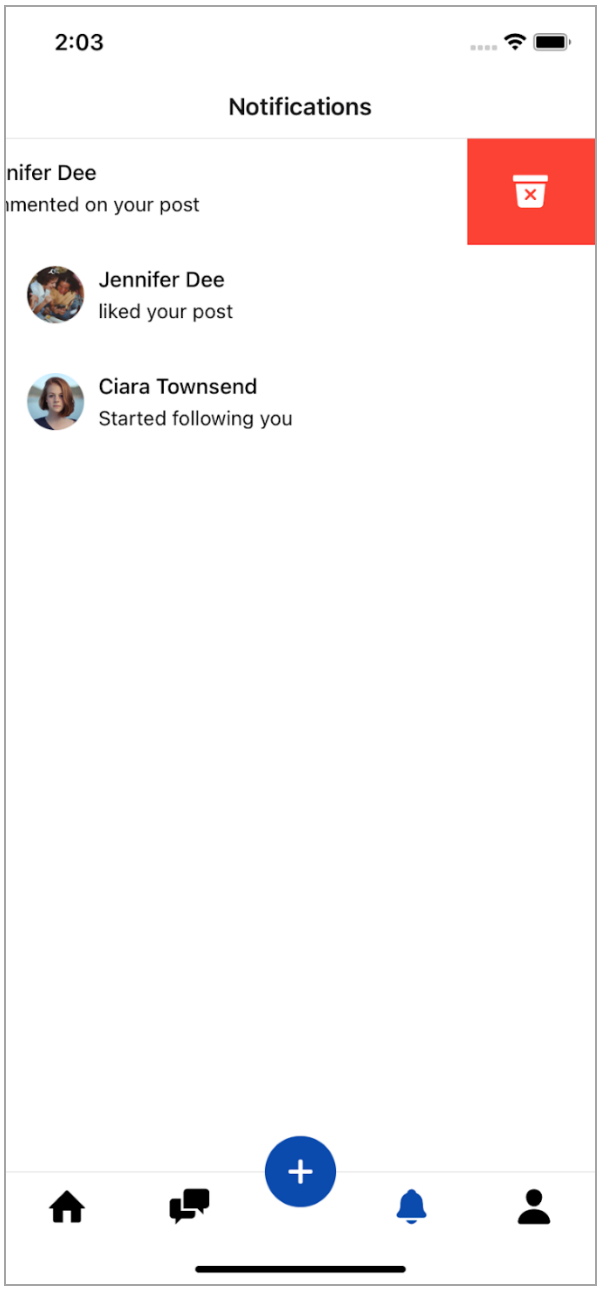
Jennifer Dee
liked your post

Ciara Townsend
Started following you

Figure 19. Notifications Screen.

This is the notifications screen that appears after the user taps the bell icon within the bottom navigation bar. The users notifications are displayed in order of the most recent first. A user is notified when another user interacts with their post by either liking the post or adding a comment to it. A user is also notified when another user adds them to their following list. Notifications allow you to track how users are engaging with your content.

3.1.18 Delete Notification UI



2:03

Notifications

nifer Dee
mented on your post

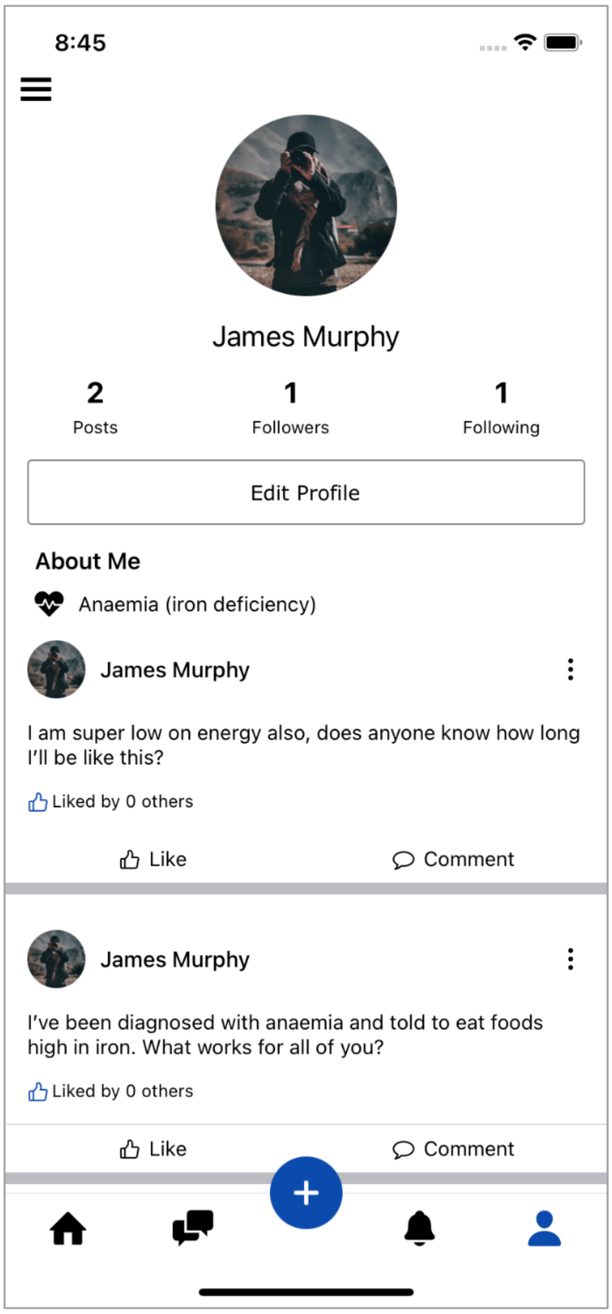
Jennifer Dee
liked your post

Ciara Townsend
Started following you

Figure 20. Delete Notification UI.

This is the user interface for when a user wants to delete a notification. As the userbase grows, it is a possibility that a user's notification's may become very clustered. To help with that problem, a functionality has been provided to remove a notification.

3.1.19 Profile Screen


8:45

James Murphy

2 Posts 1 Followers 1 Following

About Me

Anaemia (iron deficiency)

James Murphy

I am super low on energy also, does anyone know how long I'll be like this?

Liked by 0 others

James Murphy

I've been diagnosed with anaemia and told to eat foods high in iron. What works for all of you?

Liked by 0 others

Figure 21. Profile Screen.

This is the current user's profile screen that can be navigated to using the user icon in the bottom navigation screen. Similar to above, the current user's profile screen displays the current user's number of posts, follwers and the number of people they are following. If the user has a registered bio or condition, that will also be visible on their page. All of the user's posts will be displayed below the about me section, in chronological order, starting with the most recent first. Finally, the user can edit their profile by tapping on the edit profile button.

3.1.20 Edit Profile Screen

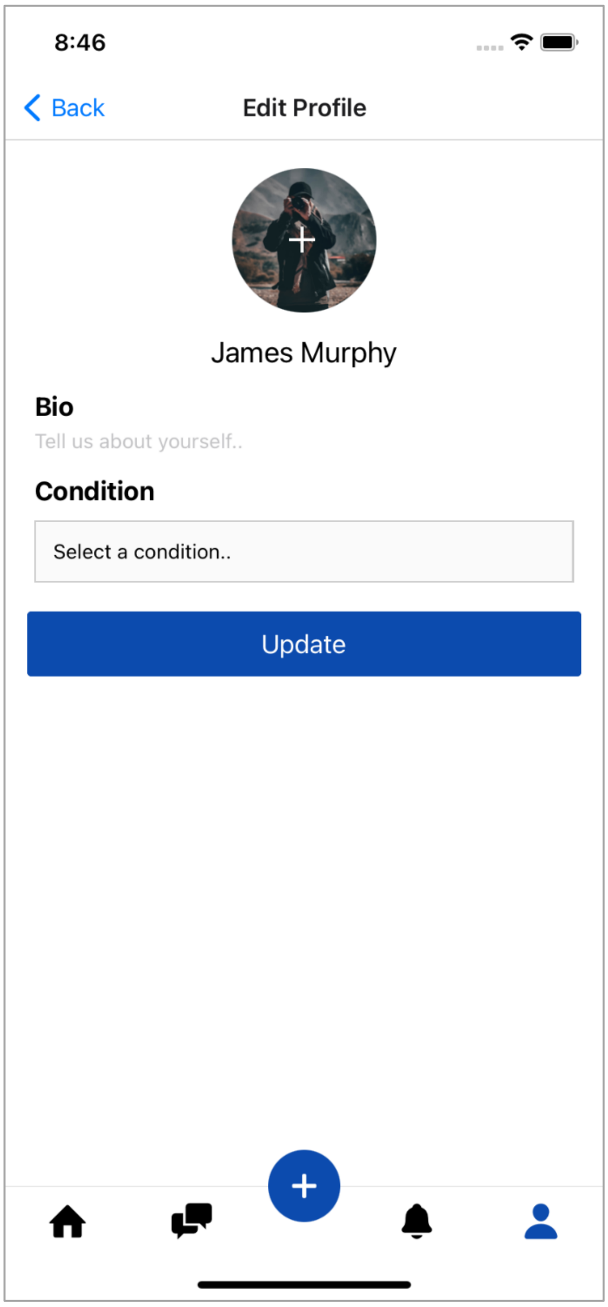


Figure 22. Edit Profile Screen.

The is the edit profile screen that appears when a user taps on the edit profile button visible in figure 21. From here, a user can edit their profile picture, bio and health condition of interest. When the user is satisfied with their changes they can tap on the update button. The system will store their changes and navigate the user back to their profile page.

3.1.21 Sidebar Screen

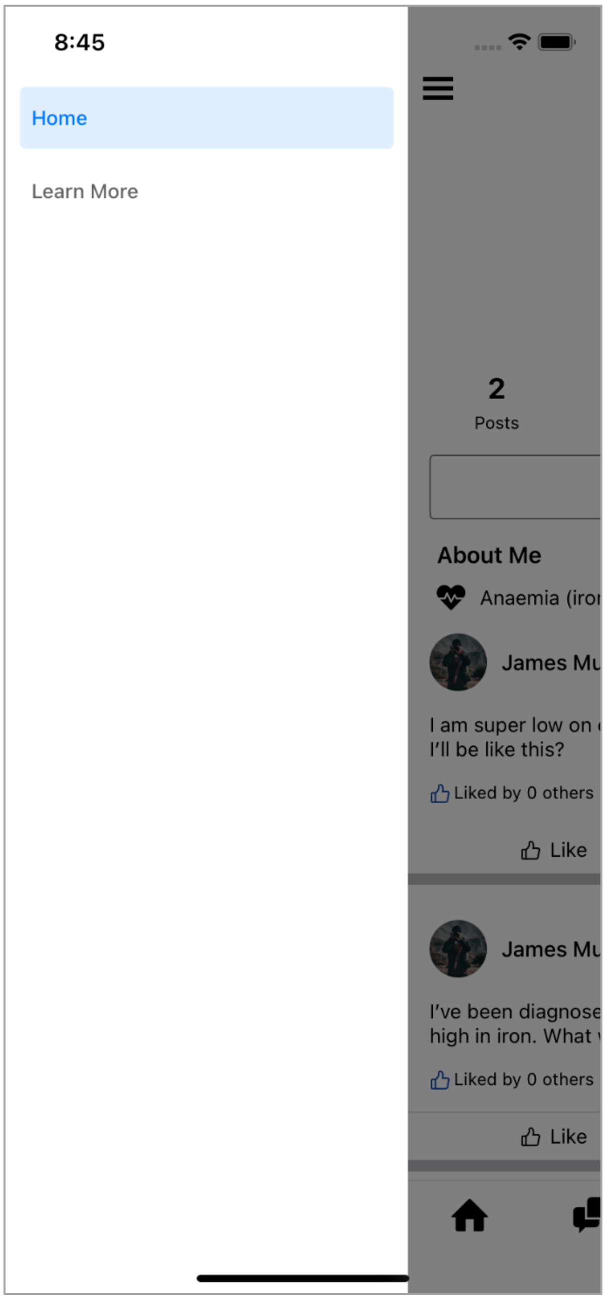


Figure 23. Sidebar Screen.

This is the sidebar screen, which is visible when the user taps on any of the hamburger icons at the top left of the screen. Originally, the idea was to have more than one available screen here. However, it still proves to be a useful component allowing for further updates to the application. Also, it provides navigation to the learn more screen which contains one of the application's primary features.

3.1.22 Learn More Screen

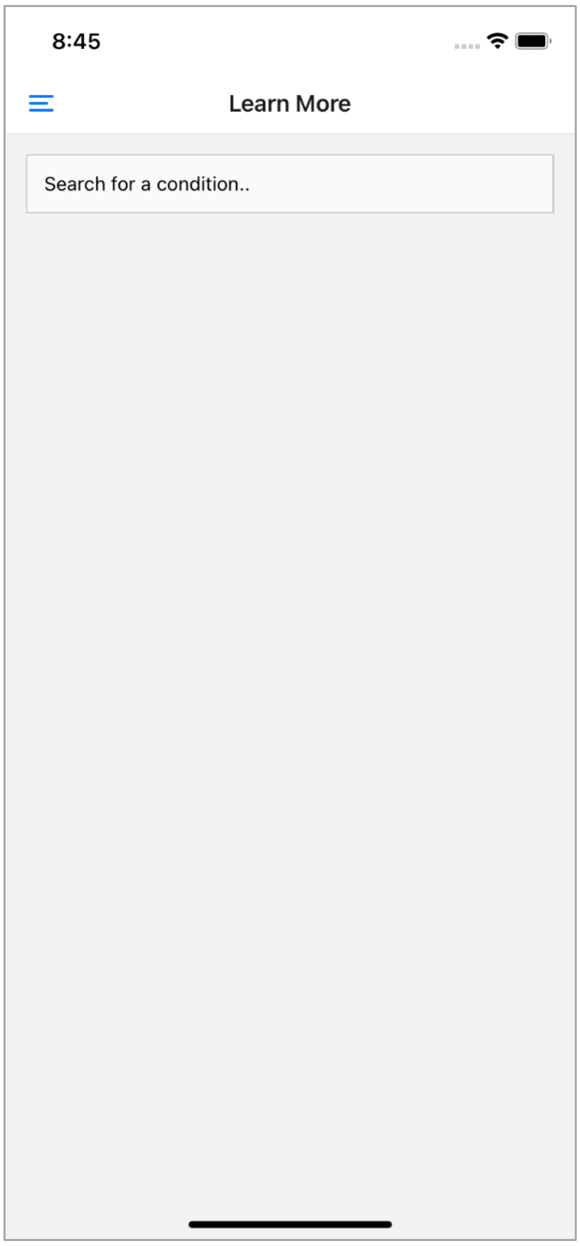
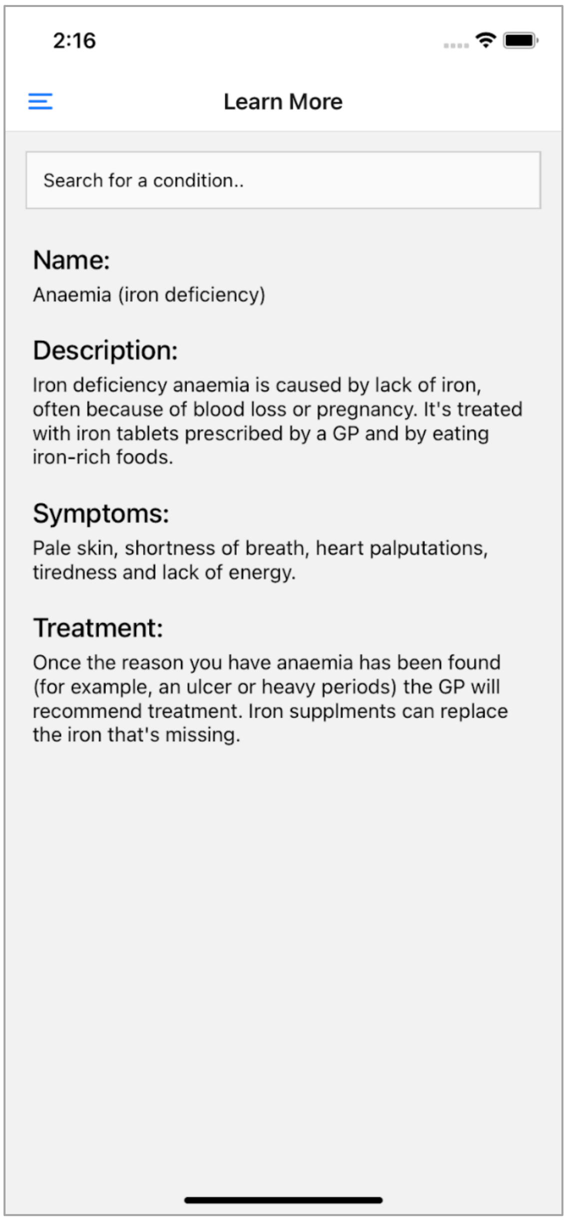


Figure 24. Learn More.

This is the learn more screen that appears when you click on “learn more” using the application’s sidebar. An autocomplete searchbar is provided for users to search for a condition of interest. The application has a dropdown list of 340 conditions and once a condition is selected, a description, treatments and symptoms of the condition are all provided to the user. This is demonstrated by figure 25.

3.1.23 Condition Information UI


2:16

Learn More

Search for a condition..

Name:
Anaemia (iron deficiency)

Description:
Iron deficiency anaemia is caused by lack of iron, often because of blood loss or pregnancy. It's treated with iron tablets prescribed by a GP and by eating iron-rich foods.

Symptoms:
Pale skin, shortness of breath, heart palputations, tiredness and lack of energy.

Treatment:
Once the reason you have anaemia has been found (for example, an ulcer or heavy periods) the GP will recommend treatment. Iron supplments can replace the iron that's missing.

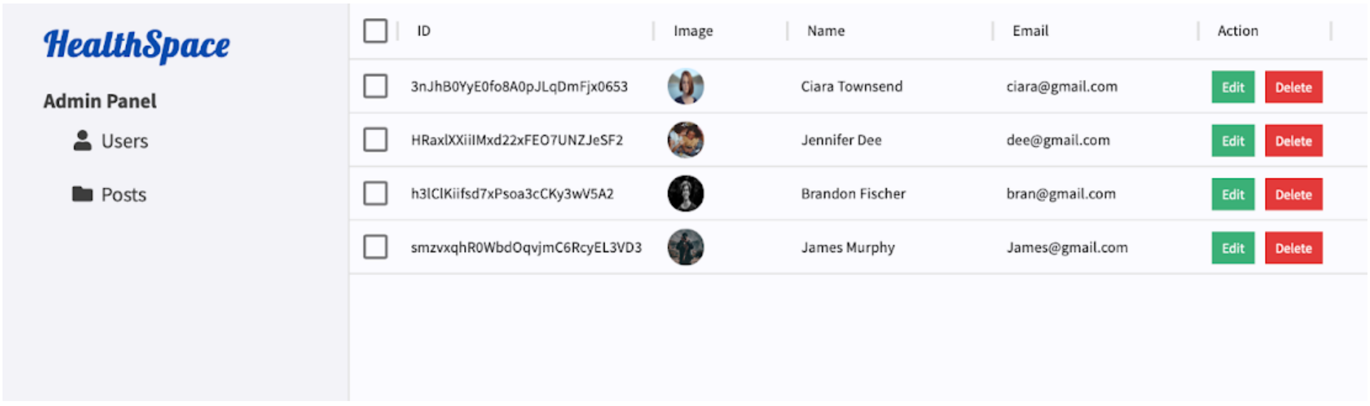
Figure 25. Condition Information UI.

Following on from figure 24, once a user has selected a condition of interest, the application will display the name of the condition, a short description, the accompanying symptoms and the possible treatments. This can prove to be an informational tool to get an understanding of what some of the application's users may be dealing with.

3.2 Admin Site

The admin site was developed to deal with users who may be spreading misleading health information. The website has a side panel where you can navigate to both the users and posts tab displayed in figures 26 and 27 below. Both of the screens provide similar functionality in the sense that they were developed to remove either a user or post from the application. The admin can sort the posts by the number of reports, that way the admin can deal with the posts that were more likely to offend or annoy the application's users. Once the admin has reviewed each post, he or she can choose to reset the report count to 0 or delete the post depending on whether or not it followed the application's guidelines.

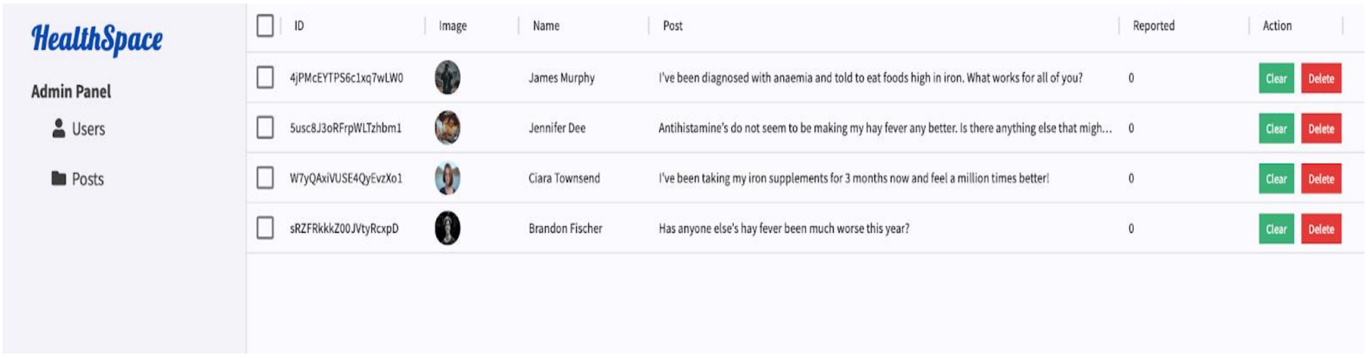
2.3.1 Users Screen



☐	ID	Image	Name	Email	Action
☐	3nJhB0YyE0fo8A0pJLqDmFjx0653		Ciara Townsend	ciara@gmail.com	Edit Delete
☐	HRaxlXXiiIMxd22xFEO7UNZJeSF2		Jennifer Dee	dee@gmail.com	Edit Delete
☐	h3lClKiifsd7xPsoa3cCKy3wV5A2		Brandon Fischer	bran@gmail.com	Edit Delete
☐	smzvxqhR0WbdOqvjmC6RcyEL3VD3		James Murphy	James@gmail.com	Edit Delete

Figure 26. Users Screen.

2.3.2 Posts Screen



☐	ID	Image	Name	Post	Reported	Action
☐	4jPMcEYTPS6c1xq7wLW0		James Murphy	I've been diagnosed with anaemia and told to eat foods high in iron. What works for all of you?	0	Clear Delete
☐	5usc8J3oRFrpWLTzhbm1		Jennifer Dee	Antihistamine's do not seem to be making my hay fever any better. Is there anything else that migh...	0	Clear Delete
☐	W7yQAxiVUSE4QyEvzXo1		Ciara Townsend	I've been taking my iron supplements for 3 months now and feel a million times better!	0	Clear Delete
☐	sRZFRkkkZ00JVtyRcxpD		Brandon Fischer	Has anyone else's hay fever been much worse this year?	0	Clear Delete

Figure 27. Posts Screen.

4 Libraries

The following are a list of the main libraries that sped up the development time, improved the user experience and helped complete the project's final user interface.

4.1 React Native Searchable Dropdown

The React Native Searchable Dropdown proved to be beneficial in both searching users and searching for a specific health condition. A traditional search bar was not sufficient and the autocomplete, also known as predictive search, was crucial as it leads users to better search results. The searchable dropdown always lead to results and reduce the odds of a no results page being displayed. It also reduced the user search time which provided a better overall experience.

4.2 React Native Gifted Chat

React-Native-Gifted-Chat is the most complete chat ui for react native applications. It contains multiple built in props to handle the loading of messages, localised dates, a text input tool which avoids the keyboard and a typing indicator. The main benefit of the react native gifted chat was the time saved, as developing a messaging service is a large enough task to be considered a final year project on its own.

4.3 Keyboard Aware Scroll View

The keyboard aware scroll view is a library that was used to increase the user experience significantly. It provides a ScrollView component that handles the screens appearance once a user taps on a text input field. This issue is demonstrated by figures 28 and 29 below. Figure 28 is the application without the library in use, and figure 29 makes use of the library as is evident by the available space.

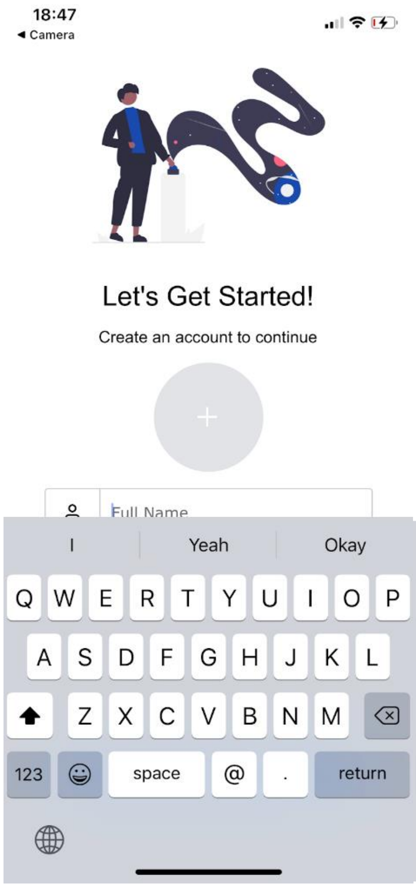


Figure 28. Scroll View (no library).

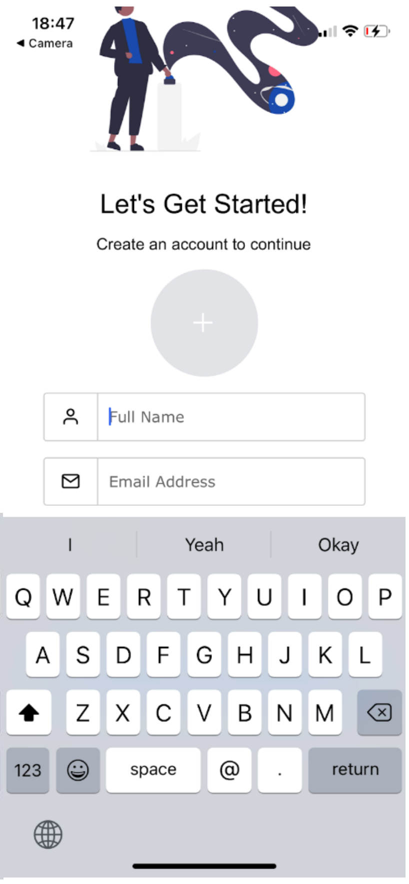
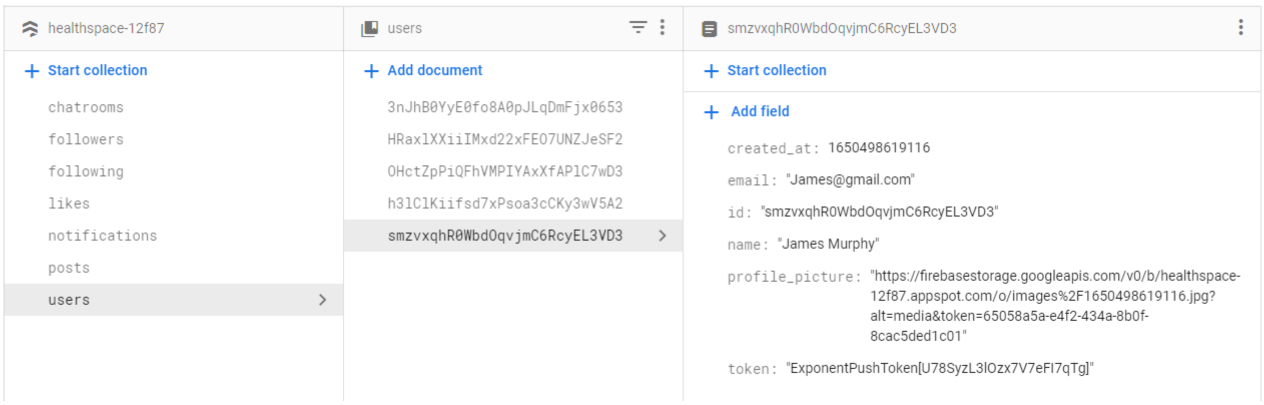


Figure 29. Scroll View (with library).

4.4 Expo Notifications

Expo provides an API to fetch push notification tokens and to present, schedule, receive and respond to notifications. Upon registering with the application, the user will be presented with an option to enable or disable push notifications. If they hit enable, the user's unique push notification token is store within the Firebase database. This is demonstrated by figure 30 below.



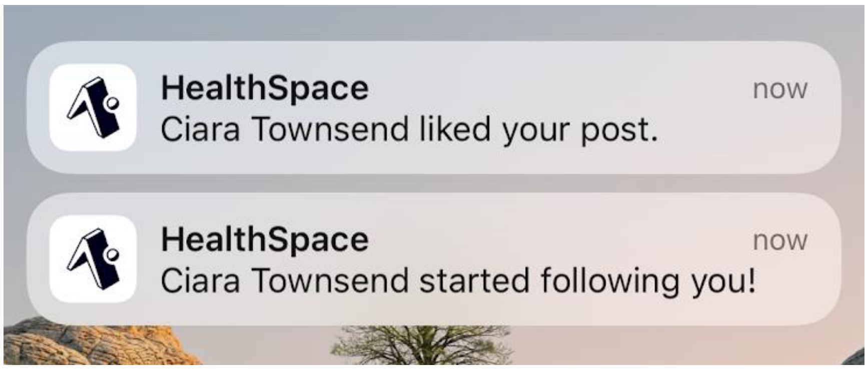
```
chatrooms
followers
following
likes
notifications
posts
users
```

```
3nJhB0YyE0fo8A0pJLqDmFjx0653
HRax1XXiiIMxd22xFE07UNZJeSF2
OHctZpPiQFhVMPIYAxXfAP1C7wD3
h31ClKiifsd7xPsoa3cCKy3wV5A2
smzvxqhR0Wbd0qvjmC6RcyEL3VD3
```

```
created_at: 1650498619116
email: "James@gmail.com"
id: "smzvxqhR0WbdOqvjmC6RcyEL3VD3"
name: "James Murphy"
profile_picture: "https://firebasestorage.googleapis.com/v0/b/healthspace-12f87.appspot.com/o/images%2F1650498619116.jpg?alt=media&token=65058a5a-e4f2-434a-8b0f-8cac5ded1c01"
token: "ExponentPushToken[U78SyzL3lOzx7V7eFI7qTg]"
```

Figure 30. Notification Token.

This push notification token is then used whenever the user receieves a like or comment on their post or if they receive a follow from another user. This is illustrated by figure 31 below.


HealthSpace now
Ciara Townsend liked your post.

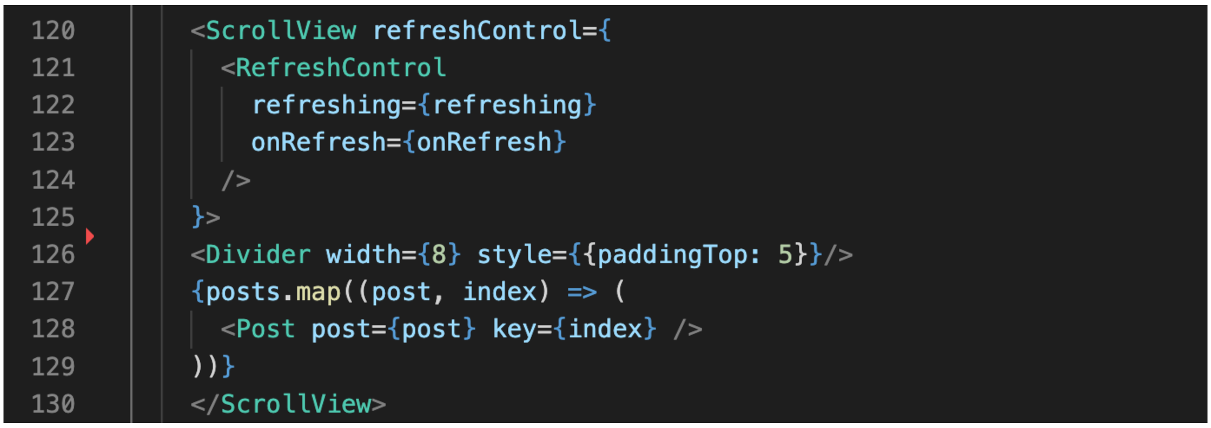
HealthSpace now
Ciara Townsend started following you!

Figure 31. Notifications Received.

5 Key Data Structures

5.1 Maps

The map data stucture was probably the most used data structure within the source code. The user interface for a lot of screens including notifications, comments and post all made use of the map data stucture. This is due to the same component needing to be rendered multiple times. The map object holds key-value pairs and was used to iterate over the posts, comments and notifications and display within a view. This is demonstrated by figure 31 below.



```
<ScrollView refreshControl={
  <RefreshControl
    refreshing={refreshing}
    onRefresh={onRefresh}
  />
}>
<Divider width={8} style={{paddingTop: 5}}/>
{posts.map((post, index) => (
  <Post post={post} key={index} />
))}
</ScrollView>
```

Figure 32. Map data structure.

6 Project Review

6.1 Achieved

At the beginning of the project, I was presented with a specification to create a social network app like Facebook and LinkedIn focused on connecting those with similar health interests. Throughout the development phase I achieved most of the original goals set for the project. In the beginning, all of the intended functionalities were displayed using a use case diagram with the aim to eventually implement them all.

To begin with, I believe a lot of the core functionalties included within the specification has been achieved during the development phase. The application allows users to customise their profile by adding a profile picture, a short bio and a health condition of interest. A user is provided with the option to modify these over time. The application also allows users to connect with each other by providing both a following functionality and a messaging service. All of the chatrooms are private, keeping both user's converstations secure. All of the application's users are able to create health-related content in an effort to receive some guidance or provide some for those in need. Users can engage with these posts by leaving comments in an attempt to establish a relationship. These relationships can prove beneficial to both parties by sharing their own experiences. The aim is to improve both user's mental or physical health by connecting them with like-minded people.

The list below contains all of the features that I have achieved to create and make fully functional.

- Develop an iOS application
- Register
- Login
- View Timeline
- Create Health-Related post
- Report Post
- View Messages
- Message User
- Push Notifications
- View Notifications
- View Profile
- Edit Profile
- Search User
- Follow User
- Search Health Condition
- Register Health Condition

6.2 Not Achieved

This section of the document talks about things I did not achieve that I had originally set out to. Despite the fact that there were just a few things I didn't do, they were nevertheless significant. The major reason for them not being achieved was a lack of time. The list below contains all of the features that I did not achieve and make fully functional.

- A Succesful Deployment
- Android Application

- Groups

Towards the end of development, I neglected the Android application as there were features listed above that I could not test. This was as a result of not having an android physical device. For example, push notifications are not possible to test on an emulator. Despite my Android app being close to a fully functioning application, it was not ready for deployment. This proved troublesome when I tried to deploy my iOS version of the application and was unable to. This is due to a lack of understanding of Apple's app approval process. I was simply unaware it existed, however, I registered for the Apple Developer Program and prepared a submission in an an attempt to deploy the application. The submission was rejected as a result of being unresponsive on iPad devices. I searched for other ways to deploy the application for iOS but was met with more problems. Even with an iPA file, which is iOS' equivalent of an Android APK file, a user still needs a laptop and a USB connection to download the application.

Secondly, a group feature where a number of people with similar interests could communicate their thoughts and experiences was not implemented. I had the option of creating either a one-on-one private conversation or the opportunity to join a group based on a health condition of interest as the deadline approached. I thought the idea of communicating privately with one other user would be a bigger benefit to the application's users. This is as a result of user's being unwilling to share their experiences and issues in a group setting.

6.3 What I would do differently if starting again

If I was starting the project again, I would definitely focus more on Android development. I would make sure I I had an Android smartphone during the development period, either by purchasing one or borrowing one. This is for a few reasons, including much easier deployment with the use of APK files. Other than that, I would try and manage my time better to ensure that all of the functionalites mentioned in the "not achieved" section were implemented.