Specialist Assignment 3: Brainstorming and Ranking Ideas

ECE 1778

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Field Description

For the last five years, I have been working as a physiotherapist in an in-patient stroke rehabilitation setting. As a physiotherapist, I help stroke survivors regain motor function, relearn movements and maximize independent function and mobility. Because of the focus on independence, a key part of stroke recovery that often gets overlooked is cardiovascular fitness. Most individuals after a stroke develop poor cardiovascular fitness; they have low endurance and cannot tolerate prolonged or sustained activity. When this poor cardiovascular fitness is not addressed, stroke survivors often develop sedentary habits that limit their recovery and put them at risk for further health complications. A safe and effective way to improve health, mobility and function outcomes after a stroke is through aerobic exercise. However, despite clear recommendations regarding the importance of aerobic exercise for individuals post-stroke, most stroke survivors do not meet these aerobic exercise recommendations.

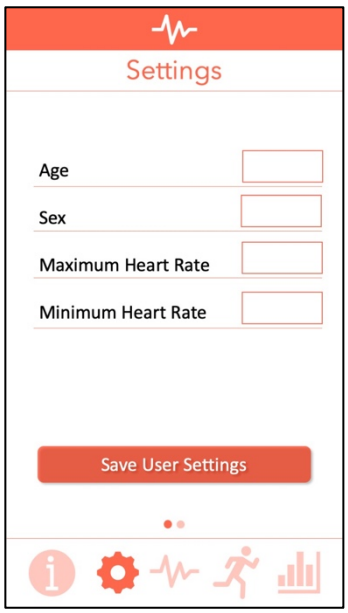
Buy-in and compliance to exercise prescriptions is something most physiotherapists struggle with in their practice. In stroke rehabilitation, though most stroke survivors will participate in aerobic exercise while in the rehabilitation hospital, once they are back in the community this participation typically ends. There is therefore a need for a tool to help stroke survivors to continue to engage in aerobic exercise safely, effectively and consistently when they are in the community. Considering the current obsession of our society with technology, and the ready availability of smart phones and wearables these days, a mobile application may be a good way to solve this problem and motivate stroke survivors to do aerobic exercise.

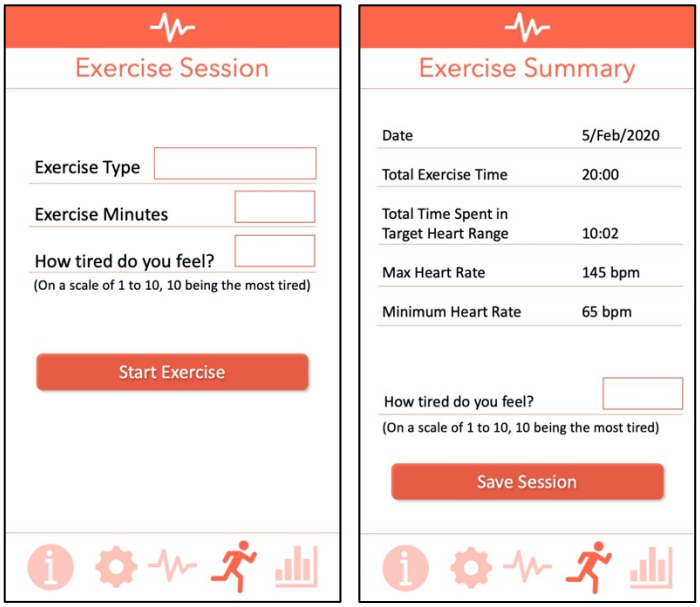
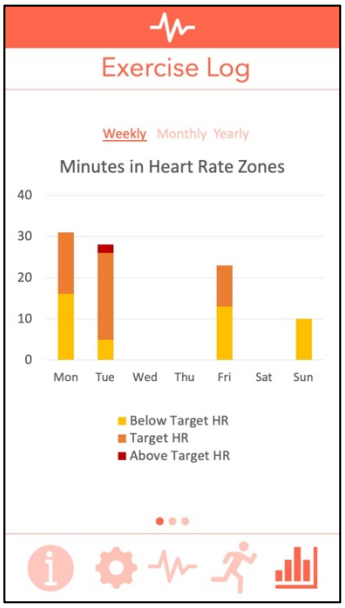
Project Description

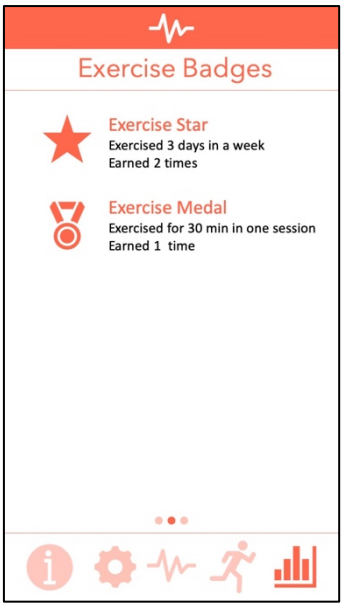
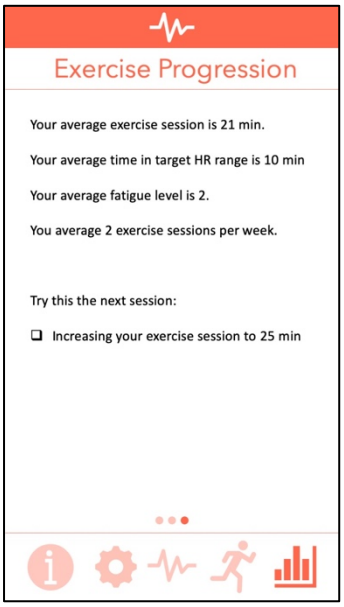
The app we hope to develop for this course, the MAX app, aims to help individuals who have had a stroke to meet the recommended aerobic exercise prescription set for them by their physiotherapist. As stated previously, stroke survivors have difficulty engaging in regular aerobic exercise in the community. This may be due to a variety of factors such as a lack of resources, lack of motivation, lack of knowledge and difficulty knowing what the right intensity of exercise should be. Though an app cannot address the lack of resources, the MAX app may be able to address issues around motivation to, information on and performance of aerobic exercise

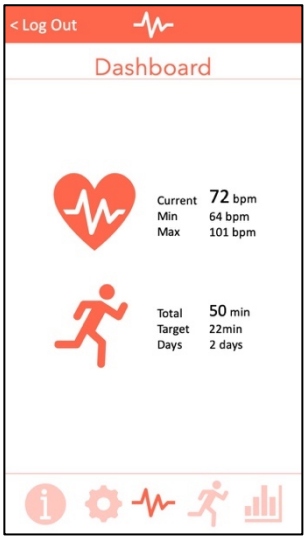
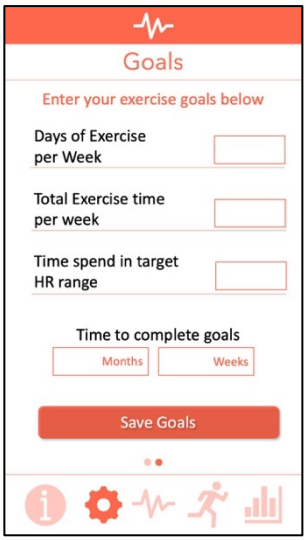
The main function of the MAX app would be to provide stroke survivors with feedback on intensity of their aerobic exercise. On setting up the MAX app for a particular user, the user will enter the heart rate (HR) range specified for them by their physiotherapist. The user can then use the MAX app, in conjunction with a HR monitor, when they exercise. As the user exercises, the MAX app will use HR information from the HR monitor to check if the user's HR fits within the pre-specified range. The MAX app will then provide feedback to the user regarding whether they are exercising below, above, or at the right intensity based on their HR. The user can therefore adjust their exercise accordingly to ensure they maximize the time they spend in the correct HR range and thus maximize the improvements in their cardiovascular fitness.

Features Generation

Feature	Description
User input System	Allows users to enter their personal data, including their HR range for aerobic exercise. This information will be the basis for the MAX app's ability to provide feedback to users when they are exercising. 
HR tracking and alert system	Compares HR captured from HR monitor to pre-set HR ranges and provides users with feedback regarding whether they are below, above or at the target hear rate range. This is the main aim of the MAX app. By providing users with instantaneous feedback regarding their heart rate and thus their exercise intensity, they can alter what they're doing to maximize the time they spend in the correct HR range and optimize their cardiovascular fitness. 

Exercise characteristics tracker	Allows users to input information regarding their exercise before and after the exercise session. This would include information on what aerobic exercise they are doing, how long they want to exercise for and how tired they are feeling before and after the session. This will provide additional metrics by which a user can determine their progress towards their aerobic exercise prescription or their own personal exercise goals. 
Exercise log	Compiles data from exercise sessions and presents them in a meaningful way to users so they can track their progress and see how well they've met the weekly aerobic exercise recommendation for stroke survivors. Most stroke survivors will not be able to the meet the weekly aerobic exercise recommendations right away. Having a way to track progress can help them feel like the goal is achievable, meaningful and sustainable. 

Notifications feature	Uses data compiled by the exercise log to create targeted notifications for users who have not yet met the aerobic exercise recommendations for that week. This notification reminders will help build more regular habits and hopefully encourage and motivate stroke survivors to meet the aerobic exercise recommendations by making them feel less daunting and more doable.
Rewards feature	Provide badges to users who have met certain aerobic exercise related recommendations/goals to provide additional motivation. 
Exporting and Social Media integration	Allows users to be able to export and/or share their log with their physiotherapists, family or friends to keep them motivated and accountable to continue engaging in aerobic exercise.
Exercise progression feature	Uses data compiled by the exercise log and rules around exercise progression to provide targeted advice to users on how to progress their aerobic exercise to help users meet their exercise goals. 

Dashboard feature	Provides an overview of user's heart rate (current, max and min) for the day and an overview of their exercise activity for the week. From the dashboard they can go on to easily access other features of the Max app. 
Goal Entry feature	Allows users to input specific goals regarding number of exercise sessions per week, total time spent exercising per week or time spent in the target heart rate zone per week that would result in personalized badges when achieved. It would also allow users to input a time frame to achieve these goals. 
Vibration notification feature	In conjunction with the HR tracking and alert system, the vibration notification feature can let users who are not able to view the screen to know if they are below or above the target heart rate range.

Features Rank

Rank	Feature	Rationale
1	HR tracking and alert system	This feature addresses the main purpose of the MAX app and is what will allow users to check that they are exercising at the correct intensity to improve their cardiovascular system.
2	User input system	Input from users regarding their target HR range will be vital in personalizing the HR tracking and alert system so that users will receive appropriate feedback on whether they are exercising at the correct intensity for their abilities.
3	Exercise log	Providing users with a way to view their exercise history helps them to determine if they are meeting their recommended aerobic exercise prescription in a more concrete way.
4	Dashboard feature	Getting access to right information quickly is a high priority for most individuals. Having the dashboard feature provides relevant information on HR and exercise statistics in an efficient and effective manner.
5	Exercise characteristics tracker	Valuable for giving users a better understanding of their exercise performance, and provide another way for them to track their progress.
6	Notification feature	Providing reminders to users regarding how much longer they need to exercise for to meet the recommended weekly amount may motivate them to engage in aerobic exercise on days they might not have originally planned to exercise.
7	Rewards feature	Motivation for engaging in aerobic exercise after stroke can be quite low. Gamifying the experience of exercise can provide additional motivation for users to regularly engage in exercise.
8	Exporting and Social Media Integration	The sharing of goals and celebrating of successes with friends and family are inherent parts of human nature. The ability of the MAX app to support these activities can further motivate users to meet their aerobic exercise goals and facilitate sustained aerobic exercise engagement.
9	Vibration notification feature	A good feature to have in conjunction with the HR tracking and alert system, especially for users who would not be able to look at their phone during exercise. Diversifies who can use the MAX app.
10	Goal entry feature	While it's important to give users a sense of being able to customize their exercise goals, most users may not know how to create a meaningful and achievable exercise goal. The built-in exercise goals may be enough for most users.
11	Exercise progression feature	May be valuable in continuing to engage individuals who may be plateauing in their aerobic exercise sessions but may not be necessary for most users.

Order of Creation

The most difficult and most important feature to build would be the HR tracking and alert system. The whole functionality of the MAX app hinges on its ability to pull HR data from the wearable HR monitor and then compare this HR to pre-determined HR ranges. Based on discussions with Felipe and Ritam, getting the wearable and the MAX app to communicate will require the most programming time from their end. The next feature that we would focus on would be the Dashboard feature. This was prioritized over the other features as it would be a good way to show what the MAX app is capable of before investing more resources in the other features. This Dashboard feature would be a medium difficulty build. Once the dashboard feature has been built, we would then work on the User input System which would be one of the least difficult features to build but would really improve the functionality of the MAX app. This would be followed by the Exercise characteristics tracker which would be another low difficulty build with big impact. The Exercise log would then be the next focus. Despite its relatively high importance, the Exercise log will be the last main feature to be built as it depends on the previously developed features for the information that it would display. The Exercise log would be a medium difficulty build.

Once these core features are built, we will work on the additional features that will increase the functionality and usability of the MAX app. The build order of these additional features is not as concrete and may depend on the interplay between the features. Currently, the build order of the additional features would be to start with the Vibration notification feature, followed by the Exercise progression feature, the Goal entry feature, the Rewards feature, the Notification feature, and lastly the Exporting and Social Media integration. Depending on the actual complexity of these features, we may need to re-work the order. All these additional features were classified to be of a low to low-medium difficulty. There is debate as to whether the Vibration notification and the Notification features may be more difficult than originally anticipated but overall, Felipe and Ritam believe that these additional features may be reasonable to tackle within the timeframe of the course.