STRENGTH IN NUMBERS

A Social Media Fitness App

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Final Year Dissertation

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Declaration

I, Joshua Wan declare that this work submitted for assessment is my own and is expressed in my own words. Any use of other authors' materials are properly acknowledged and cited.

A list of the references used within this document have been included.

Signed: _____

Date: _____

Abstract

Background: Physical activity, a structured diet, and strong social connections are all extremely powerful tools that can be used to benefit a person's mental and physical health. During the Covid-19 pandemic, people have been confined within their own homes, leading to an increase in physical inactivity figures and a decrease in social interactions; over the course of this project, I shall present a possible solution in the form of an application. The purpose of the application will be to help people of every level of fitness reach their personal goals with social incentives and gamification. The application will also include tutorials and learning tools for exercising and dieting to teach beginners in a friendly, non-intimidating environment.

Methods: The participants will be males and females with ages ranging from 21-50 years old. The participants' frequency of exercise is to be recorded over the course of two weeks prior to being given the application whilst the statistics of each exercise shall be recorded at the beginning of the two weeks and at the end of the two weeks. The participants will then be split into three groups determined by their frequency of physical activity. Each group will be split in half, one half will be the control group; not given the application, whilst the other half will be given the application. At the end of the two weeks data will be collected and studied.

Expected Results: A two-way ANOVA will reveal that those in Group 1 with access to the application increase the frequency of exercise and their performance. It is expected that those with access to the application in Groups 2 & 3 increase their performance although the frequency of exercise may not vary. For those without access to the application, frequency and performance shall remain the same or decrease.

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1. Introduction

1.1 Motivation

Maintaining a regimen of exercise and a healthy diet are paramount whenever it comes to a person's overall health and wellbeing. Exercise plays an integral role in lowering the risk of coronary heart disease, stroke, breast cancer and even early death (NHS, 2021). In 2019 The Health Survey for England found that 28% of adults were obese and a further 36.2% were overweight (Baker, 2021).

Exercising and dieting can be a painstaking process that drives many people to quitting before seeing any real progress. A study was conducted to see if gamification and social incentives increased physical activity, it was found that people given incentives such as gamification, competition and support increased their physical activity when compared to those who had no incentives. (Jakicic and Rogers, 2020).

This project is of great importance to society as it seeks to tackle a lack of physical activity in the masses by providing a source of motivation for anyone willing to push themselves to attain their goal, allowing them to track their progress, learn and engage with their peers all at once. Relevant literature and applications will be reviewed to discover the successes and downfalls of current market dominators.

1.2 Aims

- This project aims to design and develop an easy-to-use social media fitness application with the purpose of creating a community that inspires each other to strive to reach their fitness goals.
- Provide a tool that users can utilise to track their progress, increase self-confidence and learn the essentials of fitness.
- Provide the user with in-app social incentives and rewards that will increase the user's desire to continue exercising.

- Provide a platform for users to keep in-touch with and make new friends who are interested in fitness.

1.3 Objectives

- Review literature relevant to the project and highlight successes and downfalls of applications with similar aims.
- Provide valid reasoning as to why this application is different to the other applications on the market and why it will be successful.
- Develop an iOS and Android compatible application.
- Develop a method to calculate a user's estimated calories burned, dependant on the type of exercise, effort and the user's statistics.
- Create a platform that allows users to interact with other users.
- Develop an application that users can track and log meals and exercises into.
- Develop an application that provides users with knowledge of physical activity and dieting.
- Develop an application that uses gamification as a way to allow users to compete against one another.
- Create an in-application economy with earnable points and rewards.

2. Literature Review

The purpose of this section is to provide an in-depth literature review of topics relevant to the project along with the strengths and weaknesses of current popular fitness applications on the iOS app store to establish the functional and non-functional requirements necessary in order to develop a successful application.

2.1 Wearable Technology

The development of smartphones in today's society has made them one of the most versatile handheld devices a person can own, 80.76% of the world's population have a smartphone (Turner, 2021) putting together a strong case for it to be classed as the most used electronic in the world. In 2017 a survey had found that 93% of runners preferred to have some sort of tracking device to collect their running data as seen in Figure 2.2 below.

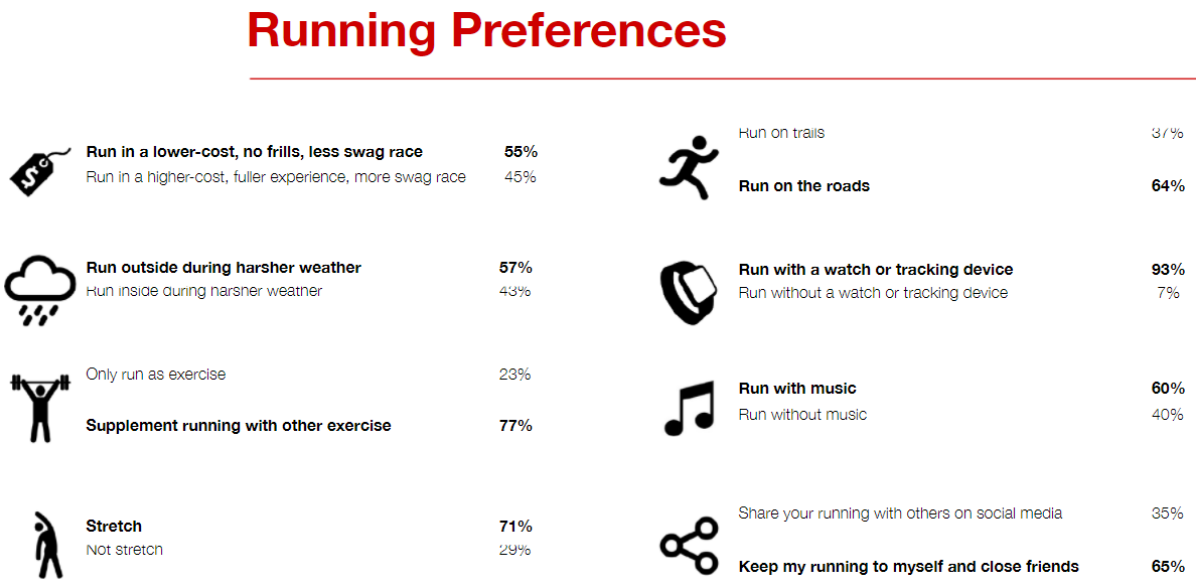

Figure 2.2: Running Preferences (Running USA, 2017).

A study was conducted on students using a blended learning model of fitness tracking applications and individualised teacher-coached running classes to find out if this affected the percentage of enrolled students that passed fitness assignments. It concluded that use of fitness tracking apps and coaching increased the passing rate by three times that of the control group without coaching or tracking applications (Chaloupský et al., 2019). This study and the aforementioned surveys emphasize the availability of mobile phones as wearable technology, the preferences of runners to always have

wearable technology when they run and also the effect tracking applications have on fitness performance.

2.2 Intrinsic and Extrinsic Motivation

When an individual is striving to reach a goal, having the knowledge of how to reach the goal will not achieve it single-handedly; the individual must also possess some form of motivation (Lindbloom, 2011). A study analysed the link between both intrinsic motivation and extrinsic motivation and levels of resistance training, concluding that intrinsically motivated participants performed significantly more resistance training than extrinsically motivated participants as shown in Figure 2.1 below.

Characteristics	Number of participants who meet recommended level of resistance training ($n = 126$)	Number of participants who do not meet recommended level of resistance training ($n = 59$)	χ^2	p
Gender				
Male	59	25		
Female	67	34	0.321	0.571
Marital status				
Married/living with other	71	26		
Single	41	22		
Widowed	1	1		
Separated or divorced	13	10	3.145	0.370
Education				
High school or less	16	11		
Vocational/technical degree	6	3		
2-y college degree	11	4		
4-y college degree	56	29		
Graduate school degree	37	12	2.600	0.627
Income				
<$25,000	9	8		
25,000–49,999	28	12		
50,000–74,999	24	7		
75,000–99,999	16	13		
100,000 and above	49	19	5.826	0.212
Race/ethnicity				
Caucasian, non-Hispanic	104	46		
Non-Caucasian and Hispanic	22	13	0.548	0.459
Health self-determinism				
Extrinsic motivation	6	1148		
Intrinsic motivation	120	48	9.280	0.002

Figure 2.1: Bivariate analysis of participant's characteristics to meeting or not meeting recommended levels of resistance training. (Kathrins and Turbow, 2010).

Figure 2.1 contains a typed error in the Health self-determinism rows where the number of participants who not meet recommended level of resistance training does not add up to n = 59. I believe the number 48 was duplicated onto the number 11, creating an entry of 1148.

The aforementioned study highlights the efficacy of intrinsic motivation in resistance training, whilst the study performed by Cerasoli et al. analysed how intrinsic motivation and extrinsic incentives jointly predict performance. They discovered that intrinsic motivation is a medium to strong predictor of performance and that when tied with extrinsic incentives that indirectly tied to performance this remained the case, in agreeance to the study conducted by Kathrins and Turbow, however when extrinsic incentives were directly tied to performance, intrinsic motivation became of less importance

(Cerasoli, Nicklin and Ford, 2014). The literature reviewed in this section outlines the importance of intrinsic motivation whilst also mentioning how extrinsic incentives can be used to increase performance, this is discussed further in sections 2.3 and 2.4.

2.3 Gamification

Gamification refers to the application of typical elements of game playing in non-game contexts. A positive gaming experience is posited to be primarily determined by the balance of skill and challenge (Corcos, 2018). A study was conducted giving the participants cognitive tasks, adding and removing game design elements to investigate their impact on performance and motivation. The results suggested that with more design elements, higher motivation and performance were observed, however, there was a potential threshold that had to be met for gamification to become effective. Once game design elements had removed from an ongoing task, performance did not decline (Groening and Binnewies, 2021). Gamification has become a popular tool used by companies to promote customer engagement (Eisingerich, Marchand, Fritze and Dong, 2019) and from the study reviewed can increase intrinsic motivation through the use of novel extrinsic motivators. Gamification is discussed further along with social incentives in section 2.4.

2.4 Social Incentives

A person's fitness journey may sometimes fail before it even begins; this could be due to a number of factors, e.g. laziness, poor financial stability or even their own lack of belief in themselves. Overweight students were found to have lower intrinsic motivation during fitness testing than non-overweight students undergoing the same testing, leading to the conclusion that novel extrinsic motivators are necessary to improve perceived physical fitness in overweight students (Grao-Cruces et al., 2020). A study including participants that were overweight or obese was carried out using gamification and social incentives as novel extrinsic motivators to determine their effectiveness at getting participants to increase physical activity for a 24-week intervention period with a 12-week follow up period. The participants were given wearable devices to monitor steps per day and were then split into three groups, not including the control group:

- A support group that encouraged family members or friends to support their engagement in physical activity.
- A collaboration group that introduced a participant with three other participants in the study, the group worked collectively to meet their goals in physical activity.
- A competition group that introduced a participant with three other participants in the study once more, this time the group of participants competed with each other on a weekly basis based on their step-based activity (Jakicic and Rogers, 2020).

This study found that during the 24-week intervention period all three groups had significantly higher levels of physical activity when compared to the control group, however during the 12-week follow up period, the competition group was the only group to maintain this lead in physical activity. This study and the study mentioned in section 2.3 show that gamification and social incentives can be used as powerful tools to increase an individual's motivation to complete a task via the use of extrinsic incentives and motivators.

2.5 Fitness Applications

2.5.1 MyFitnessPal

MyFitnessPal (MyFitnessPal Inc, 2021) is currently ranked at number 2 in the UK on the iOS App Store when sorting for Health & Fitness apps (See *Figure 2.5.1.1 below*) making it the most popular health and fitness application on the market right behind Randox CertiFly, an AI driven application that certifies lateral flow tests for Covid-19. MyFitnessPal boasts a user base of 200 million members in addition to obtaining an overall rating of 4.4/5 stars with 2,449,181 reviews (MyFitnessPal Inc, 2021).

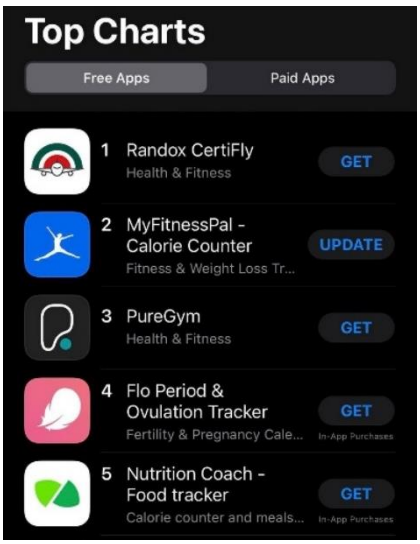

Figure 2.5.1.1: Top Charts sorted by Health & Fitness (iOS App Store, 2021)

MyFitnessPal carries features such as: Logging food and activity, setting goals, tracking your progress, learning from experts, a large database of exercises and recipes you can choose from and more (MyFitnessPal Inc, 2021).

From the reviews that can be found in Appendix 2, MyFitnessPal seems like an excellent application for tracking your macronutrient, micronutrient and caloric intake, a feature that is mentioned often in the reviews is the barcode scanner which easily allows users to input the ingredient they are consuming into each meal. The application has a user-friendly design for those who are focused on their dieting, however, the other features of the app seem to be crammed into one space without much thought and can be missed very easily if not searched for intentionally.

In February 2018, MyFitnessPal suffered a data breach in which the hackers obtained usernames, hashed passwords, and email addresses (Lukic, 2021).

The main takeaways from this application are:

- A large database of food and drinks users can access is a necessity.
- The barcode scanner is an extremely effective novel tool.
- Users enjoy ease of use when tracking their own data.
- A user-friendly interface is essential.
- Storing user data safely and responsibly is paramount.

2.5.2 PureGym

PureGym (PureGym, 2021) is currently ranked at number 3 in the UK on the iOS App Store when sorting for Health & Fitness apps (See *Figure 2.5.1.1 in Section 2.5.1*) proving it to be one of the most popular health and fitness applications available to the public. PureGym is the largest chain of commercial gyms in the UK promising customers perks such as 24/7 access to your PureGym, no rolling contract for memberships, a free PureGym app that holds an overall rating of 4.2/5 stars with 17,137 reviews and many more (PureGym, 2021).

PureGym's mobile app consists of features such as: contactless entry to the gym using a QR code, live attendance tracker, a database of workouts to choose from, tracking activity and more (PureGym, 2021). From the reviews that can be found in Appendix 3 *Figures 7.3.1-7.3.4*, the PureGym application, whilst very popular and highly rated, has been displeasing consumers as of recent with its sluggish performance and unnecessary splash screen on loading the application. However, as shown *in Figures 7.3.5-7.3.8 in Appendix 3*, some users enjoy using the application for it's ease of use, variety in workouts that it provides, and in person features such as: quickly scanning the QR code to enter the gym and checking how busy the gym is at any given time with the live attendance tracker.

Whilst the application is user friendly and contains some highly sought after features that a fitness application could benefit from, I believe the popularity of the application stems from the popularity of the brand; upon entering a PureGym a customer must enter their PIN number, for any customers that do not want to have to remember their pin number, they can simply download the application and use their QR to enter the gym contactless every time, leading it to be one of the most highly regarded features that the application contains.

The main takeaways from this application are:

- A large database of exercises is a necessity.
- Users will notice when an app does not perform quickly, therefore emphasizing the need for an optimised application.
- Do not add any splash screens or images that will hinder user experience.
- Novel features attract large audiences.

2.5.3 Fitbit: Health & Fitness

Fitbit (Fitbit, 2021) is a health and fitness application that works solely with the use of any model of wearable tracker produced by the company. Fitbit is an extremely popular application with a rating of 3.8/5 stars across 856,709 reviews (Fitbit, 2021) and 31 million active users (Vailshery, 2021).

The Fitbit application and wearables have evolved greatly over the past decade introducing revolutionary ideas to the health and fitness industry, with features such as: tracking your steps, calories burned, floors climbed, active minutes, your sleep, the quality of each sleep, tracking and analysing your heartrate and allowing you to join a community, connect and compete with other users (Fitbit, 2021).

Relative to the reviews pictured in *Figures 7.4.1-7.4.4 in Appendix 4*, Fitbit has successfully implemented many of it's features touching on many of the topics aforementioned in this literature review; the implementation of social incentives to build a community and make users accountable for their own physical activity, the use of gamification with challenges and rewards, and fundamental health and fitness features such as tracking progress, learning tools to educate the user about their body and setting goals. However, as seen in *Figures 7.4.5-7.4.7 in Appendix 4*, Fitbit has been having some issues as of recent allowing users to sync their wearable devices to their mobile phones, stopping all functionality of the application. This is a major flaw that renders the Fitbit app unusable for those it affects and leaves Fitbit at risk of redundancy if the flaw is not fixed completely.

The main takeaways from this application are:

- Building an app that must sync with any external hardware can lead to syncing problems and unhappy users.
- Community building and other social incentives are very effective in increasing user engagement.
- Gamification is essential to provide users with novel extrinsic motivators.

2.5.4 Application Review

Following the review of three highly popular health and fitness applications, MyFitnessPal, PureGym and Fitbit, it was made apparent that there certainly are some features that a successful health and fitness application cannot go without. It was also outlined that along with these key features, a health and fitness application must contain a key novel feature that differentiates it from others to avoid

being generic. With each application reviewed, amidst their successes, there were also downfalls, these came in the form of complicated user interface that was hard to navigate, slow performance, unnecessary features that hinder use of the application and syncing issues with external hardware.

As discussed in sections 2.1 and 2.4, motivation is a crucial element to increase physical performance of individuals, whether it be intrinsic or extrinsic and as shown in Appendix 5, there is strong evidence to support that user experience increases whenever the user begins to see real world results whilst using an application.

The following is a list of features obtained from reviewing the literature above that have proved to directly impact physical performance and user experience:

- Tracking and logging meals and exercise
- Fast performing, easy-to-use user interface
- Variety in the form of a large database of meals and exercises to choose from
- Novel extrinsic motivators (Social incentives, gamification, etc)

3. Requirements

The functional and non-functional requirements listed in this section have been sorted using the MoSCoW prioritisation technique. Requirements from this section have been inspired from the literature review and will be compartmentalised into different functionalities for the application.

3.1 Functional Requirements

ID	**Description**	**Priority**
FR-1	**User Profile**	
FR-1.1	Create account	Must have
FR-1.2	Edit Account Details	Must have
FR-1.3	Personalise Profile	Should have
FR-1.4	Allow links to other social media	Could have
FR-2	**Log & Track Exercises**	
FR-2.1	Choose an exercise to perform	Must have
FR-2.2	Log & store the number of sets and reps of the chosen exercise	Must have
FR-2.3	Compare performance of new and old exercises	Must have
FR-2.4	Calculate the number of calories burned per workout/exercise	Should have
FR-2.5	Track phone during cardio exercises to measure distance	Should have
FR-2.6	Create new exercises/workouts	Could have
FR-3	**Log & Track Meals**	
FR-3.1	Log & store each meal	Must have
FR-3.2	Calculate calories for each meal	Must have
FR-3.3	Compare calories from day to day/week to week	Should have
FR-3.4	Include a barcode scanner to load any foods into the application for tracking	Should have
FR-4	**Learn Exercises**	
FR-4.1	Choose an exercise to learn	Should have
FR-4.2	Choose from exercise topics posted by the system	Should have
FR-4.3	Choose from exercise topics posted by a user	Could have
FR-4.4	Rank by user inputted sort function e.g. popularity, newest, etc	Could have
FR-5	**Learn Dieting**	
FR-5.1	Choose a recipe posted by the system	Should have
FR-5.2	Choose a recipe posted by a user	Could have
FR-5.3	Choose from dieting topics posted by the system	Could have
FR-5.4	Choose from dieting topics posted by users	Could have
FR-5.5	Rank by user inputted sort function e.g. popularity, newest, etc	Could have
FR-6	**Social**	
FR-6.1	Allow users to add friends	Must have

FR-6.2	Allow users to search for other users	Must have
FR-6.3	Allow users to join and create groups	Must have
FR-6.4	Allow users to message friends or groups	Should have
FR-6.5	Allow users to share personal bests or workouts with friends or groups	Could have
FR-6.6	Allow users to comment or like shared personal bests or workouts of friends, if shared	Could have
FR-7	**Competition**	
FR-7.1	Allow users to view a leaderboard of friends and groups, ranked on personal performance	Must have
FR-7.2	Allow users to opt-in and opt-out of leaderboards	Must have
FR-8	**Gamification**	
FR-8.1	Reward users based on personal achievements	Must have
FR-8.2	Reward users based on leaderboard performance	Should have
FR-8.3	Have a progress bar that increases a user's rank	Could have
FR-8.4	Reward users based on social achievements	Could have
FR-9	**Motivation**	
FR-9.1	Send users notifications with motivational messages	Could have

3.2 Non-Functional Requirements

ID	**Description**	**Priority**
NFR-1	**Performance**	
NFR-1.1	Application must perform operations quickly	Must have
NFR-1.2	Application must be robust	Must have
NFR-1.3	Portability	Must have
NFR-2	**Aesthetics**	
NFR-2.1	Visual appeal	Must have
NFR-2.2	Ease of use	Must have
NFR-2.3	Functionality	Must have
NFR-3	**Data & Security**	
NFR-3.1	Anonymise stored data	Must have
NFR-3.2	Store data safely	Must have

4. Testing Strategy

Software testing is an essential part of any software development lifecycle, it's purpose is to ensure that the application is fully functional and presents no errors or bugs at runtime and also to confirm that the application contained the functionality of the proposed requirements. During the development of the application, I shall deploy several stages of testing to ensure that the application runs as intended once in the user's hands.

Unit testing will be the initial stage of testing deployed. A unit refers to a requirement and the application will be divided into each unit and each unit shall be tested to ensure it functions as expected. This will outline any errors or bugs at runtime within the smaller units of code before continuing onto the next stage of testing.

Integration testing will follow after the unit testing stage. This will group several units together to test their interactions with each other when combined and help to discover any errors or bugs that occur during runtime.

The final stage of testing will be system testing. System testing will consist of tests run on the entire application once each requirement is fulfilled. The purpose of system testing is to find any errors or bugs at runtime when the application is compiled and will conclude the software tests.

5. Evaluation Strategy

Evaluation of a product is as necessary as software testing is when developing an application that will be used by the general public. In the late stages of development an evaluation will be carried out with the purpose of collecting feedback that will be examined and acted upon to develop a final product. All feedback and data collected will be stored and processed according to GDPR guidelines.

Participants will be recruited via email and must fill out a short questionnaire containing demographic information and a consent form. The participants of the evaluation will be required to have an android device as a prototype application is easier to produce as a .apk file than an iOS application live on the app store. Participants will then be given a set of tasks to complete to ensure that they are evaluating the full functionality of the application. They will then be given an evaluation form to fill out to provide feedback for the application. This information will be written up and categorised in order of requirements mentioned, evaluated, and then discussed.

Considering that the application is a social one, accounts shall be created to give the users evaluating the app an accurate representation of the social features that the application has to provide.

6. Methodology

7. Project Management

7.1 Project Timeline

The Gantt chart below in *Figure 7.1.1* details the timeline of the Deliverable 1 document. The Gantt chart aided in meeting self-made deadlines in order to meet the set deadline of Deliverable 1. Each task has been allocated a certain time according to the importance of the task according to the "Dissertation Handbook" and the complexity of the task.

PLANNING STAGE				Semester 1											
Supervisor Meetings				Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Supervisor Meeting 1	30 minutes	21/09/2021	21/09/2021												
Supervisor Meeting 2	30 minutes	28/09/2021	28/09/2021												
Supervisor Meeting 3	30 minutes	05/10/2021	05/10/2021												
Supervisor Meeting 4	30 minutes	12/10/2021	12/10/2021												
Supervisor Meeting 5	30 minutes	19/10/2021	19/10/2021												
Supervisor Meeting 6	30 minutes	29/10/2021	29/10/2021												
Supervisor Meeting 7	30 minutes	02/11/2021	02/11/2021												
Supervisor Meeting 8	30 minutes	09/11/2021	09/11/2021												
Supervisor Meeting 9	30 minutes	16/11/2021	16/11/2021												
Supervisor Meeting 10	30 minutes	19/11/2021	19/11/2021												
Deliverable 1															
Choose Topic & Initial Research	1 Week	13/09/2021	20/09/2021												
Abstract, Aims & Objectives	1 Week	20/09/2021	27/09/2021												
Literature Review	5 Weeks	27/09/2021	01/11/2021												
Requirements	1 Week	01/11/2021	08/11/2021												
Strategy for Testing & Evaluation	1 Week	08/11/2021	15/11/2021												
Methodology & Project Planning	1 Week	08/11/2021	15/11/2021												
Deliverable 1 Proofing	1 Week	15/11/2021	22/11/2021												

Figure 7.1.1: Deliverable 1 Timeline

7.2 Risk Analysis

7.2.1 Risk Identification

This section details the identification of possible risks to the development of the application. The risks listed has been classed by levels of severity via the table shown in *Figure 7.2.1.1.* Risks are ranked according to their likelihood of occurring and the severity of the impact the risk brings. Risks are ranked as follows:

- **Low:** Risks that are unlikely to impact the project
- **Medium:** Risks that have the possibility to impact the project and require mitigation
- **High:** Risks that are likely to impact the project drastically that must be mitigated immediately

	Impact				
Likelihood	Very Low	Low	Moderate	High	Very High
Very Likely	L	M	H	H	H
Likely	L	M	M	H	H
Possible	L	L	M	M	H
Unlikely	L	L	M	M	M
Very Unlikely	L	L	L	M	M

Figure 7.2.1.1: Risk Analysis Key

The following table in *Figure 7.2.1.2* contains all possible risks related to this project:

ID	Risk	Description	Type	Severity
1	Project deadline is missed	Gantt chart dates are not followed and the project is not finished	Project	H (Possible – Very High)
2	Requirements are changed	Unforeseen circumstances lead to User Requirements being altered	Project	M (Very Likely – Very Low)
3	Files become corrupted	During the development of the application, project files become corrupted	Project	H (Possible – Very High)
4	Scale of project miscalculated	Deliverable 2 Gantt chart fails to grasp the complexity of tasks	Project	M (Likely – Moderate)
5	Errors hosting	The application encounters issues with hosting service	Technology	M (Unlikely – Very High)
6	Incapable software	The language used to develop the application provides ceilings to the application's features	Technology	M (Unlikely – High)
7	Participants drop out	During the evaluation or collection of results, agreeing participants drop out of the study	People	M (Possible – High)
8	Confidential data obtained by outside source	An outside entity attacks the database maliciously and obtains confidential data	Project	H (Possible – Very High)
9	No users consent to participating or evaluating	No users agree to participate in the study or the evaluation process	People	H (Possible – Very High)

Figure 7.2.1.2: Identified Risks

7.2.2 Risk Mitigation

The table below in *Figure 7.2.1.3* provides mitigation methods for each risk identified in *Figure 7.2.1.2*:

ID	Risk	Mitigation Methods
1	Project deadline is missed	Follow the workflow of the Gantt chart precisely
2	Requirements are changed	No mitigation needed; If requirements are changed simply amend the project as described by the new requirements
3	Files become corrupted	Save the project to multiple spaces on a hard drive and use online version control tools such as: GitHub
4	Scale of project miscalculated	Follow the workflow of the Gantt chart precisely and if any tasks become overbearing or too complex, amend the requirements and detail why
5	Errors hosting	Have multiple choices that can be relied upon if one hosting service does not meet the standard expected

6	Incapable software	Use widely trusted and proven languages and libraries
7	Participants drop out	Provide incentives to participants to complete the study
8	Confidential data obtained by outside source	*******GUIDANCE NEEDED*********
9	No users consent to participating or evaluating	Attempt recruiting participants at every given opportunity and make the entire process as painless as possible

Figure 7.2.1.3: Risk Mitigation Methods

7.3 Professional, Legal, Ethical & Social Issues

7.3.1 Professional Issues

7.3.2 Legal Issues

7.3.3 Ethical Issues

7.3.4 Social Issues

7.3 Software Selection

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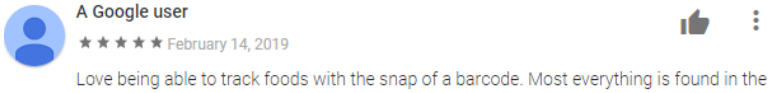
Appendices

Appendix 1



A Google user
★★★★★ February 14, 2019

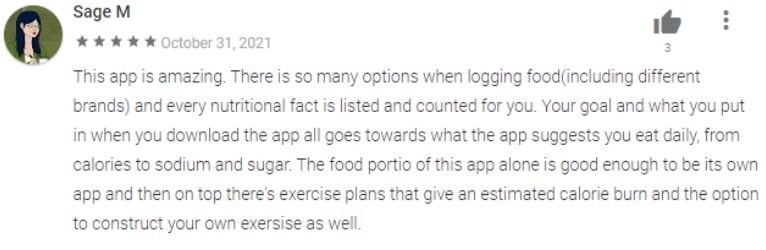
Love being able to track foods with the snap of a barcode. Most everything is found in the database. Charts are a great visual.

Figure 7.2.1 (MyFitnessPal, 2019)

Suzi Size more
★★★★★ October 31, 2021

I like that you can log food, water and exercise all in one place.

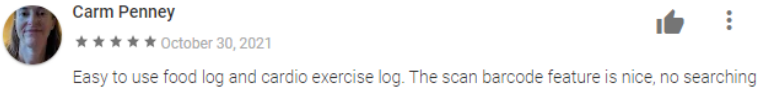
Figure 7.2.2 (MyFitnessPal, 2021)



Sage M
★★★★★ October 31, 2021
3

This app is amazing. There is so many options when logging food(including different brands) and every nutritional fact is listed and counted for you. Your goal and what you put in when you download the app all goes towards what the app suggests you eat daily, from calories to sodium and sugar. The food portio of this app alone is good enough to be its own app and then on top there's exercise plans that give an estimated calorie burn and the option to construct your own exersise as well.

Figure 7.2.3 (MyFitnessPal, 2021)

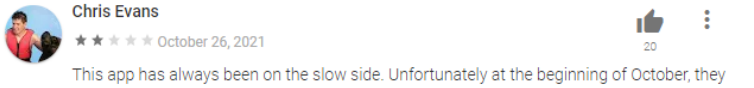


Carm Penney
★★★★★ October 30, 2021

Easy to use food log and cardio exercise log. The scan barcode feature is nice, no searching from food lists, but it can't provide any calories burned count for resistance training, like 1/2 hour free weights.

Figure 7.2.4 (MyFitnessPal, 2021)

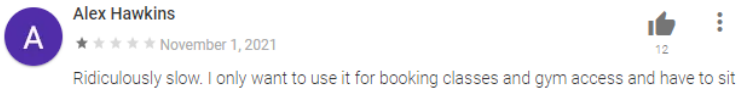
Appendix 2



Chris Evans
★★☆☆☆ October 26, 2021
20

This app has always been on the slow side. Unfortunately at the beginning of October, they updated it to force you to look at 4 pictures of people doing workouts in the gym before you can access anything. Absolutely no excuse, not even as a cover for a loading screen. Just open the app and delay sho...

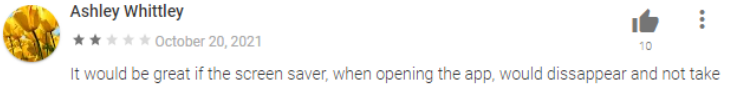
Figure 7.3.1 (PureGym, 2021)



Alex Hawkins
★☆☆☆☆ November 1, 2021
12

Ridiculously slow. I only want to use it for booking classes and gym access and have to sit through 2 minutes of loading screens to get there every time. Also glitches and refuses to display the QR code half the time. Just memorise your pin, book classes in a browser and don't bother with this piece of junk

Figure 7.3.2 (PureGym, 2021)



Ashley Whittley
★★☆☆☆ October 20, 2021
10

It would be great if the screen saver, when opening the app, would dissappear and not take ages to fade and move onto its functional use. Makes the point of using an app to do something quickly, redundant. Very annoying.

Figure 7.3.3 (PureGym, 2021)

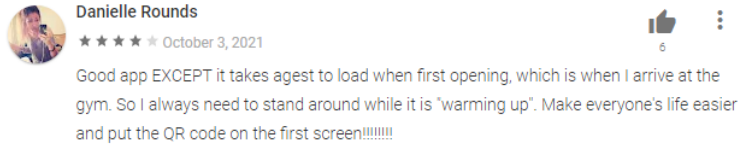


Figure 7.3.4 (PureGym, 2021)

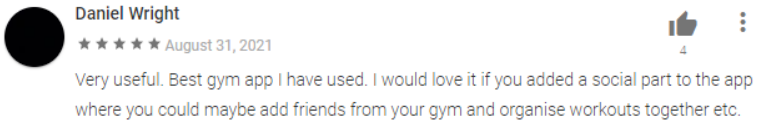


Figure 7.3.5 (PureGym, 2021)

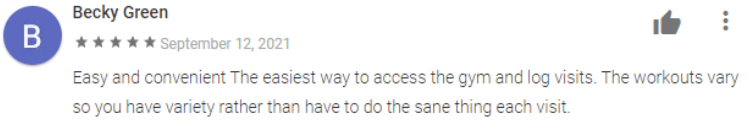


Figure 7.3.6 (PureGym, 2021)

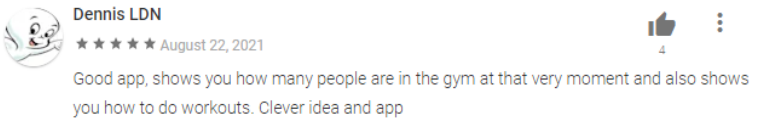


Figure 7.3.7 (PureGym, 2021)

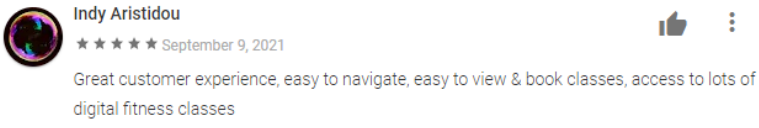


Figure 7.3.8 (PureGym, 2021)

Appendix 3

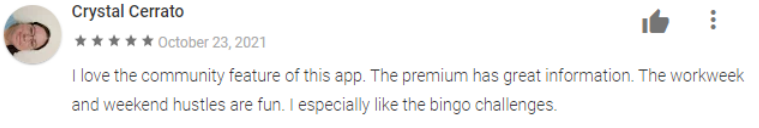


Figure 7.4.1 (Fitbit, 2021)

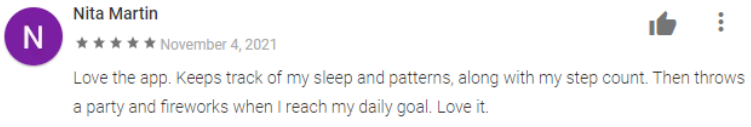


Figure 7.4.2 (Fitbit, 2021)

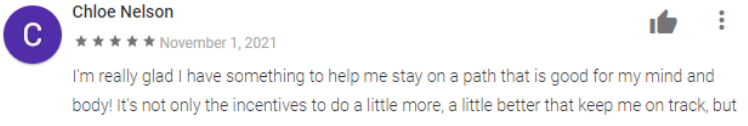


Figure 7.4.3 (Fitbit, 2021)

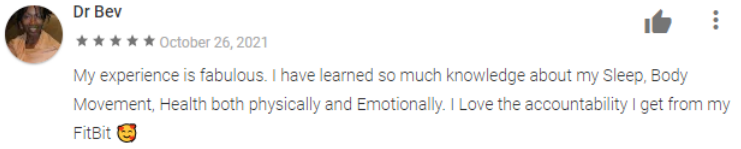


Figure 7.4.4 (Fitbit, 2021)

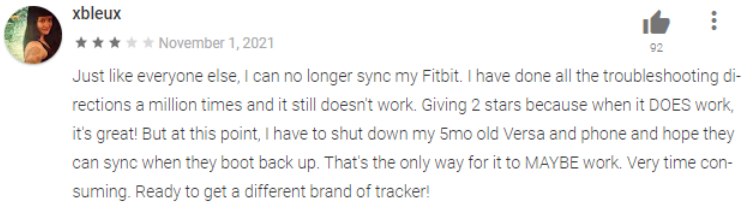


Figure 7.4.5 (Fitbit, 2021)

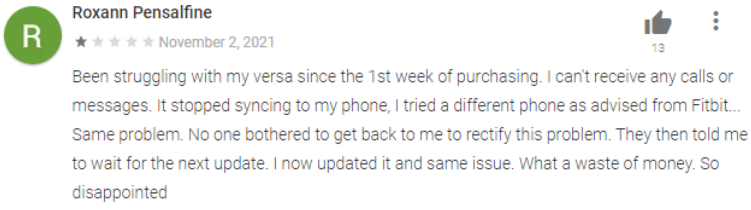


Figure 7.4.6 (Fitbit, 2021)

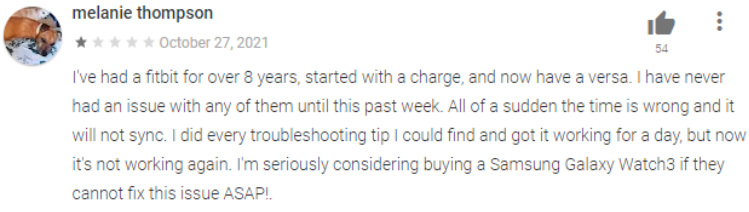


Figure 7.4.7 (Fitbit, 2021)

Appendix 4

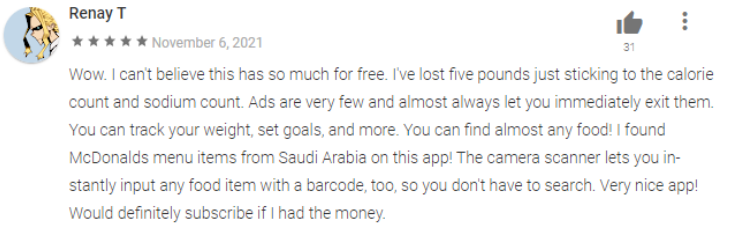


Figure 7.5.1 (MyFitnessPal, 2021)

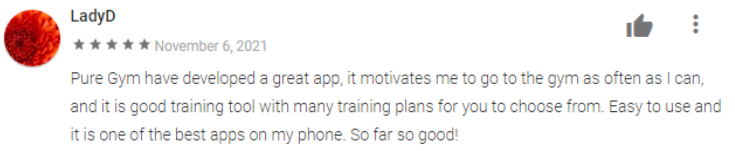


Figure 7.5.2 (PureGym, 2021)

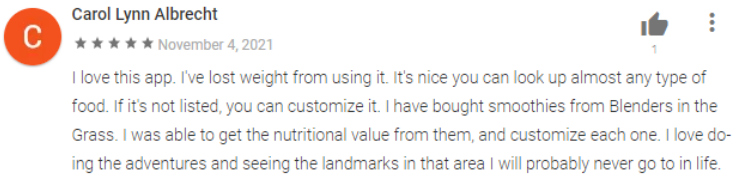


Figure 7.5.3 (Fitbit, 2021)