

# STRENGTH IN NUMBERS:

A Social Media Fitness App

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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:

- Group 1 will be people who exercise two times or less per week.
- Group 2 will be people who exercise three or four times a week.
- Group 3 will be people who exercise more than four times a week.
- Each group will be randomly split in half, giving one half access to the app and leaving the other half to be the control.
- After two more weeks from the application being rolled out, another recording of statistics shall be collected, and the data shall be 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.

## Table of Contents

# 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 obesity, coronary heart disease, stroke, breast cancer and many more (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 seeks to provide a source of motivation for anyone wanting 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.
- Research how to calculate a user's estimated calories burned, dependant on the type of exercise, effort and the user's statistics.
- Research ways to safely store a user's personal information and implement it.
- 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 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 (M. 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 (B. Kathrins and J. Turbow, 2010).

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)	$\chi^2$	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 1: Bivariate analysis of participant's characteristics to meeting or not meeting recommended levels of resistance training. (B. Kathrins and J. Turbow, 2010).

Although this study highlights the efficacy of intrinsic motivation in resistance training, it is discussed in section 2.4 how extrinsic motivation can be used to supplement and enhance intrinsic motivation.

## 2.2 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 (Statista, 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 (Running USA, 2017).

### Running Preferences

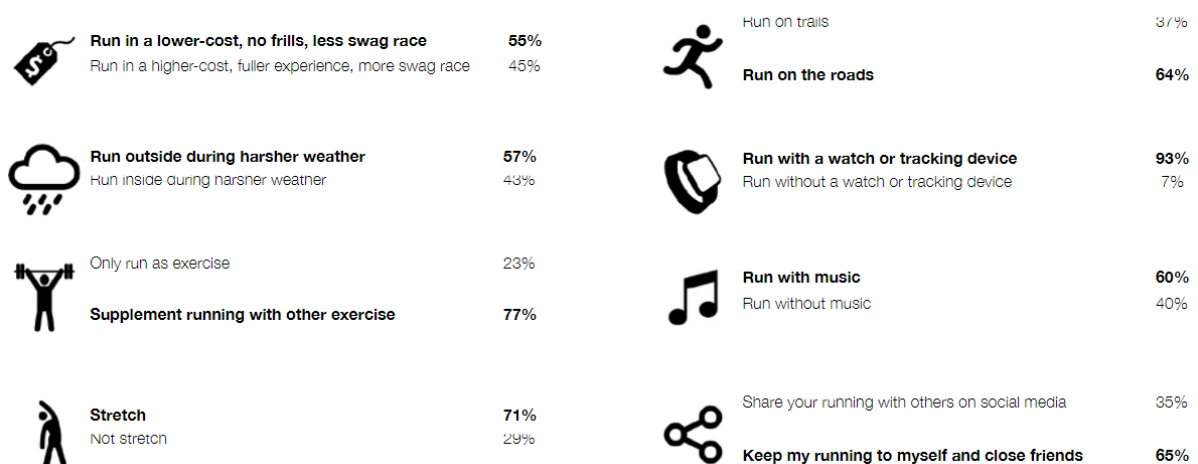


Figure 2: Running Preferences (Running USA, 2017).

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 (D. 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.



## 2.3 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 extrinsic motivation.

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 when increasing an individual's motivation to complete a task.

## 2.5 Fitness Applications

### 2.5.1 MyFitnessPal

MyFitnessPal (Under Armour Inc, 2015) is currently ranked at number 5 on the iOS App Store in the UK (Similarweb, 2021) making it one of the most popular health & fitness applications on the market. 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 (Google Play Store, 2021).

MyFitnessPal boasts features such as: Logging food and activity, setting goals, tracking your progress, learning from experts and a large database of exercises and recipes you can choose from (Google Play Store, 2021). From the reviews that can be found in Appendix 1, 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 sought out for.

In February 2018, MyFitnessPal suffered a data breach in which the hackers obtained usernames, hashed passwords and email addresses (IDStrong, 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 BMI Calculator

#### 2.5.3 Nutrition Coach

#### 2.5.4 Fitness Coach

#### 2.5.5 Strava: Run, Ride, Swim

### 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

<b>ID</b>	<b>Description</b>	<b>Priority</b>
<b>FR-1</b>	<b>User Profile</b>	
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
<b>FR-2</b>	<b>Log &amp; Track Exercises</b>	
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
<b>FR-3</b>	<b>Log &amp; Track Meals</b>	
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
<b>FR-4</b>	<b>Learn Exercises</b>	
FR-4.1	Choose an exercise to learn	Must 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	Should have

FR-4.4	Rank by user inputted sort function e.g. popularity, newest, etc	Could have
<b>FR-5</b>	<b>Learn Dieting</b>	
FR-5.1	Choose a recipe posted by the system	Must have
FR-5.2	Choose a recipe posted by the system	Must have
FR-5.3	Choose from dieting topics posted by the system	Should have
FR-5.4	Choose from dieting topics posted by users	Should have
FR-5.5	Rank by user inputted sort function e.g. popularity, newest, etc	Could have
<b>FR-6</b>	<b>Social</b>	
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
<b>FR-7</b>	<b>Competition</b>	
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
<b>FR-8</b>	<b>Gamification</b>	
FR-8.1	Reward users based on leaderboard performance	Must have
FR-8.2	Reward users based on personal achievements	Must have
FR-8.3	Have a progress bar that increases a user's rank	Should have
FR-8.4	Reward users based on social achievements	Could have
<b>FR-9</b>	<b>Motivation</b>	
FR-9.1	Send users a notification with motivational messages	Could have

### 3.2 Non-Functional Requirements

<b>ID</b>	<b>Description</b>	<b>Priority</b>
<b>NFR-1</b>	<b>Performance</b>	
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
<b>NFR-2</b>	<b>Aesthetics</b>	
NFR-2.1	Visual appeal	Must have
NFR-2.2	Ease of use	Must have
NFR-2.3	Functionality	Must have
<b>NFR-3</b>	<b>Data &amp; Security</b>	
NFR-3.1	Anonymise stored data	Must have
NFR-3.2	Store data safely	Must have

## 4. Design

## 5. Evaluation Strategy

## 6. Project Management



## References

## 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.



**Suzi Size more**

★★★★★ October 31, 2021



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



**Sage M**

★★★★★ October 31, 2021



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 exercise as well.



**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.