Using Social Support as Activity Support

Rajiv Kulkarni
937149

Project Dissertation submitted to Swansea University
in partial Fulfilment for the Degree of Bachelor of Science

Department of Computer
Science Swansea
University

Declaration

This work has not been previously accepted in substance for any degree and is not being con- currently submitted in candidature for any degree.

Signed Rajiv Kulkarni

Date 22/04/2021

Statement 1

This thesis is the result of my own investigations, except where otherwise stated. Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

Signed Rajiv Kulkarni

Date 22/04/2021

Statement 2

I hereby give my consent for my thesis, if accepted, to be made available for photocopying and inter-library loan, and for the title and summary to be made available to outside organisations.

Signed Rajiv Kulkarni

Date 22/04/2021

Acknowledgement

This project is being undertaken by myself Rajiv Kulkarni. Throughout this document, all of its content is work produced by myself, except otherwise stated.

I want to give big thanks to Dr. Matthew Roach for all the support that I have received throughout this project since day one.

I want to thank Darren Scott for his exceptional help testing the app and guiding me through the project.

Index Page

1: Introduction

Due to the covid-19 pandemic and lockdown in most countries, public places like the gym, swimming pool, etc., have all been shut, and people are asked not to prefer meeting others and working from home in many cases. The pandemic has turned many people into physically inactive and has caused a severe physical and mental impact on people's lives. Considering this situation and taking advantage of the rising smartphone and internet users, it would be an excellent opportunity to promote physical activity using an application.
In this project, I have designed an application that uses social support to encourage physical activity.
This dissertation intends to give you an understanding of a topic, the application, the result, and the conclusion.

2: Project Motivation

The Covid-19 pandemic and lockdown are having a profound effect on people's physical and mental health. It's hard for us to do exercise as we use to do in the gym since most of them are closed. Regular physical activity is one of the most important things you can do for your health. Regular physical activity can help you maintain your weight, strengthen your bones, muscles and increase your chances of living longer. Physical activity is estimated to be the primary cause of approximately 21-25% of breast and colon cancers, 27% of diabetes, and about 30% of ischemic heart disease, as reported by WHO ((Data and statistics, 2021) [1]).

WHO recommends at least 150 minutes of moderate-intensity aerobic physical activity throughout the week for adults between 16-64 years. Unfortunately, the Percent of adults aged 18 and over met the Physical Activity Guidelines for aerobic physical activity: 53.3% ((Data and statistics, 2021) [2]). Unfortunately, many people are being asked to work from home because of today's situation, so many people are turning lazier. There is a significant decrease in people's physical activities in their day-to-day lives.

Here is a study that concludes, "In addition to flattening the curve of viral transmission, priority needs to be given to the prevention of mental disorders (e.g., major depressive disorder, PTSD, as well as suicide)" ((Xiong et al., 2021) [3]).

With 2.71 billion people using smartphones, according to 2019 data ((39+ Smartphone Statistics You Should Know in 2020, 2021) [4]), the number of apps created is increasing simultaneously. As of Oct 2020, there are 2.56 million apps available on the google play store.

Taking advantage of the increasing number of smartphone and internet users globally, I could design an app that would promote physical activity through behaviour change techniques and develop resilience to mental health-related issues during the pandemic.

This is my primary motivation behind designing an app that promotes physical activity through behaviour change techniques because apps are readily available, cost-effective, and could help influence many people's lives. Along with this, many studies prove how much impact social support can have on a person's physical activity, which I will discuss in more detail later on in this document.

3: Project Aims

1: Go through papers online about the topic that I have chosen and figure out the feature I will implement.

2: Implement one type of virtual social support to promote behaviour change and promote physical activity among inactive.

3: add this feature to the pedometer provided by lead researcher Darren Scott who will then give out the app for testing.

4: test each feature of the app with separate groups of people who are not a part of the project.

5: Evaluate the data collected of the participant of users using the app and conclude the results.

Basic			
Goals		How would it be achieved	Outcome
1.	Study the type of social support that I will implement	See how a social support could be offered through an app	✓
2.	finish the coding of the layout	Use android studio	✓
3.	Complete the back-end code of the feature	This can be done on android studio using kotlin	✓
4.	Merge the BCT with the pedometer	To do this I have to study the code of the pedometer first and see how it can fit with mine	✓
5.	Test the final app	This is the part that would be done with lead researcher Darren Scott	✓
6.	Analyze the results	Study the data of the people who have used the app	✓

Table 1. Provides the basic goals of this project with the appropriate steps required to achieve them. Furthermore, the *Outcome* indicated whether or not the goal has successfully been completed.

4: Background

4.1: Importance of physical activity

Physical activity is the best way to keep our bodies healthy and our minds sharp. Achieving the recommended levels of physical activity can increase its strength, stamina, and ability to function correctly. Physical activity also helps one reduce their stress and tension to become more productive and live a happier life.

In 2005, Penedo and Frank J conducted research evaluating the relationship between exercise and physical health. They found that participants engaging in regular activity were happier, healthy, and more productive ((Exercise and well-being: a review of mental and physical...: Current Opinion in Psychiatry, 2021) [4]).

This research also concluded that "exercise and physical activity are associated with better quality of life and health outcomes. Therefore, assessment and promotion of exercise and physical activity may be beneficial in achieving desired benefits across several populations."

Mental health

Physical activity positively impacts mental health, which can help reduce stress, anxiety, and ADHD. Physical activity can also provide quality sleep, a sharper memory, and stronger resilience.

In 2012, Scott A. Paluska & Thomas L. Schwenk evaluated the impact of exercise on mental health and found that Physical activity was a simple, inexpensive, and most effective way to deal with mental health issues ((Paluska and Schwenk, 2021) [5]).

prevalence of physical activity

As I have mentioned above, physical activity has a positive impact on physical and mental health. It should be obvious that everyone should be doing the recommended amount of exercise as per age. However, unfortunately, that is not the case.

In 2016, WHO concluded from their study on levels of physical activity globally that Globally, 81% of adolescents aged 11-17 years were insufficiently physically active. Adolescent girls were less active than teenage boys, with 85% vs 78% not meeting the recommended physical activity levels ((New WHO-led study says majority of adolescents worldwide are not sufficiently physically active, 2021) [6]).

4.2 Behavioral change technique

In this section, I will discuss BCT, its importance, and what are the most commonly used techniques.

Changing health-related habits, addictions and behaviour is not an easy task for most of us, precisely what behavioural change techniques are mean to help us change. A behaviour change technique (BCT) is a strategy that allows an individual to change their behaviour to promote better health (e.g., setting goals, taking unhealthy foods out of the house, or packing your sports kit the evening before).

three of the most common and efficient behavioural change technique's are:-

1: goal setting: goal setting is the most common BCT. Doing the task without a target is of no point. There has to be something that would determine whether one has reached the daily, weekly, or monthly mark. Setting up small goals for a shorter time is usually preferred because it brings a sense of achievement in shorter periods.

2: Self-monitoring: In this BCT, user can monitor their behaviour and changes in their behaviour with time. Self-monitoring brings encouragement to continue doing the task by seeing the little progress with time. For example, if one considers that his step count per day increases with time, he becomes more motivated to do it.

3: comparison: comparison is another way many people are motivated to continue doing a task because comparing oneself with others or his/her past self and seeing that his/her rank is good in the hierarchy of people gives a sense of achievement. A comparison could be with oneself or others, and each person has their preference.

4: Social support: This is another technique that helps someone change their behaviour. Social support itself has several types and is a vast topic. In this project, my main feature will be providing social support to discuss it in more depth in the next section.

4.3 Social Support

Social support is an essential aspect for maintaining physical and mental health. Positive social support can enhance resilience to many mental health-related issues such as PTSD, stress, loneliness. However, what is social support?

Social support is complex and does not have a set definition for it. It has many meanings from different perspectives. I will be using the one that is most apt to my representation of it in our project. "a network of family, friends, neighbours, and community members that is available in times of need to give psychological, physical, and financial help" can be defined as social support. This definition of social support is coined by The National Cancer Institute's Dictionary of Cancer.

Friends, family, and peers can provide social support. In today's society, support groups are prevalent in helping people manage chronic and behavioural conditions. A recent study examined the effectiveness of internet chat groups in providing social support and found that people who actively and passively participated in these groups were satisfied with the emotional support they received ((Ballantine and Stephenson, 2021) [8]).

There are four types of social support: instrumental, informational, appraisal, and emotional.
1: Instrumental support consists of the provision of tangible aid, such as financial assistance and transportation:

2: emotional support consists of the provision of caring, love, and sympathy.

3: informational support is the exchange of relevant advice or information; and

4: appraisal support provides feedback important to making decisions (Berkman, et al., 2000).

4.3.1 Positive impact of social support

Social support intervention has a significant impact on changing people's behaviour from addiction to promoting good behaviour.
Here is a paper on how social support promotes physical activity in adolescent girls by Yvonne Laird and team ((Laird et al., 2021) [9]). I will mention her conclusion in two points that will be relevant to my project too.
First, she and her team concluded that social support intervention had had a small but positive impact in promoting physical activity. Secondly, social support such as encouragement, instrumental support is all associated with adolescent girls' physical activity.

The second point is incredibly significant for my project because encouragement and instrumental support are the essences of my feature that will promote behavioural change.

Here is another research that signifies the impact of social support on mental illness by Steven Southwick and the team. They concluded that "It will be important for psychiatric researchers to conceptualize, test, and apply effective interventions specifically aimed at increasing social support for psychiatrically ill or at-risk populations" ((F et al., 2021) [10]).

4.3.2 Detrimental effect Impact of Social Support

Considering the positive change that social support can provide, there also has to be enough attention given to the negatives of social support.

There are two reasons why social support can have a detrimental impact that I have found online. In this section, I will mention the reasons with the backing of evidence.

too much or too less social support

The quantity of social support is capable of determining the quality of its effectiveness. Here is a study that talks about how couples who completed surveys looked at how support was provided and measured marital satisfaction.

It found that too much informational support (usually in the form of unsolicited advice) can be worse than no support at all. The same points out how many people in marriages received too little or too much support ((Social Support in Marriage: Translating Research into Practical Applications for Clinicians - Kieran T. Sullivan, Lauri A. Pasch, Kathleen A. Eldridge, Thomas N. Bradbury, 1998, 2021)) [11]).

Another study found that both partners are happier if the husband gets the types of social support he needs most. For women, it was enough that the husband was trying to offer support, even if he did not always provide the right kind ((Social Support in Marriage: Translating Research into Practical Applications for Clinicians - Kieran T. Sullivan, Lauri A. Pasch, Kathleen A. Eldridge, Thomas N. Bradbury, 1998, 2021)) [12]).

Right kind of social support

In the last section, I have discussed how social support could do more harm and benefit. This section will look at what could determine the right kind and correct quantity of social.

This point was emphasized when I explored content online about social support. The right kind of social support is something I have to pay attention to designing the feature.

What do I mean by the right kind of social support? The user himself can only determine the correct type of social support. It is up to the user to decide which kind of social support they prefer and what motivates them.

Some people prefer social comparison in which there are two subcategories—first, comparing themselves to others who are lesser than them.

Second, some people prefer to compare themselves to people who are better than them. It can also be the case that people do not like comparing themselves with others and would only be motivated by seeing their accomplishments.

These are examples of various kinds of behavioral change techniques that many fitness apps have imbibed. What is important here is that failure in results may not necessarily mean that the method is wrong. It can just be the case that the particular behavioral change technique did not suit the user's personality, which is precisely why all the major fitness apps offer multiple behavioral change techniques.

Therefore, the right kind of social support is essential and based on what the user prefers. As an app developer, one should provide all the available options to the user and let him/her determine which one they prefer.

4.4 Social Support offered through Apps or Internet

This section will discuss how social support is offered through the Internet or apps in smartphones and positively and negatively impact people's lives.
We are currently living in a world that is dominated by technology. A massive population widely uses the Internet and mobile apps globally, and it holds the capacity to share knowledge and information with others to bring a change in people's lives.

4.4.1 Positive impact of Social Support offered through Apps or internet

This section will discuss how many social media apps and websites have brought a change to our lives.
Everyone has heard of apps like Facebook, LinkedIn, and many other apps responsible for connecting people and forming groups/communities on one common thing everyone in the groups/communities share.

This could also be considered one form of social support. The category of social support that these apps provide could be Instrumental support, Informational support, etc.

Here is research that studied the impact of the PRISM (Personal Reminder Information and Social Management) system on older adults. This research reported a significant decline in loneliness and increased perceived social support and well-being at six months ((Czaja et al., 2021) [13]).

Here is another research on how getting people with a specific disability and forming a community could help change. This research indicated that users did receive advice and moral support through online communication ((Obst and Stafurik, 2021) [14]).

This study aimed to understand the benefits of membership of disability-specific online communities for people with a physical disability. The researchers shared an online survey to a sample of users of such sites (N = 160).
Results indicated that users did receive moral support and personal advice through participating in such online communities.

Another research done by Xinyang Sun identified the number of college students in Beijing that used an app that provided social support to promote physical activity ((Wang et al., 2021) [15]). The research concluded that "a high social support level and high self-efficacy score are associated with higher physical activity levels."

4.4.2 Detrimental impact of Social Support offered through Apps or internet

This section will discuss how many social media apps and websites can have a detrimental impact on people's lives.

For instance, Alexander Plant's paper shows the negative effect of face-to-face communication because being in part of an online group or revealing your identity and exchanging information opens one to the fear of shame and anxiety. This is just one example of how the wrong kind of social support could reduce the positive effects that it is intended for. This study aimed to understand better and describe possible adverse effects of social support.

The results concluded that "The interviewees perceived social support as negative, especially if they felt overwhelmed or if they had not asked for it. Consequently, some of our interview partners developed strategies to prevent coming into social contact with others or stopped talking entirely about their disease."

This research takes us back to one thing I pointed out earlier in this documentation: each person has their preferences in social support. In this case, not everyone felt comfortable sharing their personal experience about their diseases, and some did.

The second thing that I noticed is, there was no paper online that says about the negatives or positives of the social support offered online specifically. All the distinct types of social support had the same pros and cons, whether online or offline. Anyone having to implement BCT through social support does not have to worry about whether it will work online or not.

This research of how social support can have its drawbacks is vital for me while designing my feature for the project because I want to make sure that my part does not carry this drawback while testing.

4.5 Online vs. offline social support

In the last section, I touched on whether social support offered online would have drawbacks of its own. I concluded that there nothing specific about it being offered online as such.

In this section, I will compare social support offered online vs. social support provided offline.

First that we need to see whether people perceive social support online the same as offline. One of the reasons many fitness apps suffer from a lack of retention of users is because there might be a case that people do not perceive online social support or BCT as similar to offline. I might be wrong about this, and it is just an assumption.

Here is an interesting survey that gives us an idea about this. This research aimed to compare the difference in the perception of social support in real life and through social media, focusing on the three social provisions attachment, reassurance of worth, and social integration.

The participants were asked to fill out the questionnaire consecutively two times but with different instructions. One time for the perception of offline social support and the other for the perception of online social support.

The results indicated that "This suggests that offline social support is more favored than online social support. Still, there was little to no difference found between the perception of social integration online and offline ((Online and offline relationships | Educating 21st Century Children: Emotional Well-being in the Digital Age | OECD iLibrary, 2021) [24]).

Another research was conducted called "Influence of Social Support Received in Online and Offline Contexts on Satisfaction With Social Support and Satisfaction With Life: A Longitudinal Study.". In that research, they studied the impact of every specific type of social support offered online vs. offline individually.

In results, they concluded that "As the SNS environment provides mostly informational, but less emotional and instrumental support, it lacks the necessary potential to offer the same positive social support outcomes as offline relationships." ((Granado-Font et al., 2021) [25]).

From the first research, I realized that offline social support is more effective than online, and in second, I realized that each type of social support is differently effective when it comes to online vs. offline.

The exciting part is that informational support is more effective when offered online, which is precisely what my BCT does. It provides informational support.

5: Related work

In this section, I will look at various paper's online that promote behavioural change by providing a specific type of social support through technology which might or might not be the same as what I have done. Still, it will help us get data about this field and how I can frame my solution.

1: Bojan Simoski, Michel Klein, Aart T. van Halteren and Henri Bal made a project together that designed an app that connects two people physically, one who wants to motivate (Motivator) and the other one who wants to be inspired ("Coachee"). Why they believe that this will work is because this includes a factor of "social accountability."

Social accountability refers to "a person's awareness of another person's goal and rendering himself/herself responsible to the goal's successful fulfilment," which is mentioned in their paper. To keep both the motivator and coachee accountable, they have introduced a "contract agreement," a virtual contract that both the members have to sign.

A goal settings feature is added to the app, which promotes behavioural change and social accountability, which is expressed by the number of meters weekly walked. This helps the user view his past accomplishments and further motivate the user to continue.

This project is similar to mine, but I will not be implementing a feature that necessitates two people to meet because the primary motivation behind my feature is the current ongoing pandemic where everyone is trying to stay at home and practice social distancing when outside, and also what if one does not prefer physical meeting. But the goal-setting feature is something that I will take away from this paper, which could be a use behavioural change technique that I could add to my project. ((Simoski, Klein, van Halteren and Bal, 2021) [17])

2: Here is another study conducted by Huong Ly and team, where they studied physical activity pre-and post-intervention of technology. "Participants enrolled in a 6-month feasibility study where they everyone was provided with a wearable physical activity tracker (Fitbit Flex 2) and a wireless scale (Fitbit Aria) integrated with a social networking mobile app (named "fit.healthy.me")" was the method they chose ((Tong, Coiera and Laranjo, 2021) [18]).

After data analysis, they concluded that "Self-regulatory techniques and social factors are important to consider when designing a physical activity intervention." This conclusion will be significant while designing my project.

How they implemented the self-monitoring, and social factors were in four ways-"My measures," "My team," "Social forum," and "Private message"—which directly supported different behaviour changes techniques (self-monitoring, social support, and social comparison).

"My measures" provided a summary of the number of steps, weight, and BMI. "My team" was a platform for participants to visualize and compare their steps with others. "Social forum" and "Private message" were designed for individuals to network with other users and provide and receive social support.

One important thing that I will take away from this paper is the "social forum" feature, as it could be something beneficial to my project. I consider it worthwhile will be addressed it later, but my social forum is not the same. It has its uniqueness and good reasons behind it.

3: Anouk Middelweerd, Julia S Mollee, C Natalie van der Wal, Johannes Brug, and Saskia J te Velde studied 64 apps that promoted physical activity through behaviour change technique. This study is critical because it concludes the most common behaviour change techniques used by top-used apps online.

The method by which they did this was that Sixty-four apps were downloaded, reviewed, and rated based on the taxonomy of behaviour change techniques used in the interventions. Mean, and ranges were calculated for the number of observed behavioural change techniques. Using nonparametric tests, they compared the number of techniques observed in free and paid apps in iTunes and Google Play.

They concluded that "the most frequently used behaviour change techniques in apps were goal-setting, self-monitoring and feedback on performance, which was similar to the ones most frequently used in other types of physical activity promotion interventions."

This research is beneficial because it is truly relevant to my project as it reviews all the apps that promote behaviour from the lens of behavioural change techniques.
This research is necessary because it points out all the commonly used techniques in the current scenario of apps that promote behavioural change. Also, it had saved a lot of my own time because I could just read through their research instead of doing my own((Middelweerd et al., 2021) [19]).

4: Cristina Rey-Reñones's paper on how online social support such as emotional and informational support was offered through online texting in group chats of the app and how It helps them quit smoking ((Granado-Font et al., 2021) [20]).

The Tobbstop app that they designed to support participants during the first three months of the smoking cessation progress, with three main goals in mind: -

1. to help individuals record their progress in the smoking cessation program,
2. to increase the user's knowledge about the problems related to smoking and the health benefits associated with smoking cessation, and
3. to provide a distraction for moments of craving.

The Tobbstop app included four components: -

1. A library with information about tobacco
2. A private chat for study participants to ask for help, share concerns, or offer help to others.
3. A set of minigames explicitly designed to entertain and educate participants.
4. A progress registry to show the evolution of the participant's health throughout the treatment process.

The app also included a panic button and consultation with an expert.

The essence of this app that contributed the most was the social support provided through information about and the private chat through which one could ask for help, share concerns, and be accepted.

This paper is just another example of how social support is incorporated into an app in several types of features. It can bring on a positive change in people to cope with their negative compulsive patterns.

6: Project Context

This section will briefly explain the project I am a part of, led by our lead researcher Darren Scott. Physical activity is linked to heart disease and diabetes and can increase premature death by 59%. Our project is to come up with multiple intelligent approaches to behaviour change and implement these ideas.

Each team member has to come up with a unique design and implement their ideas. Later on, we will collaborate all the features into one app and test it in groups to see if our intervention has impacted behaviour change.

My part in this is to design a BCT that uses social support to promote physical activity.

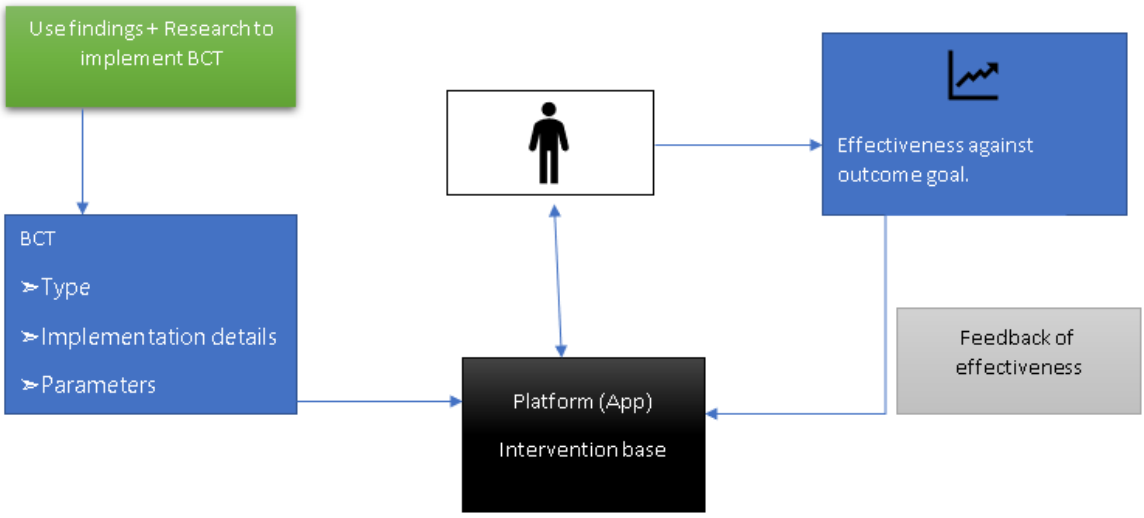

Figure 1: use case diagram explaining my role in the project.

6.1 The Social Support App

This section will discuss my App called "the social support app" that offers one kind of social support for the inactive and motivates them to do exercises.

My application will include: -

1: A pedometer that tracks users' step count, keeps their accomplishments recorded, and sets goals for each day.

2: A social networking forum allows users to enter messages, including information, motivation, or anything that they wish to share which is relevant.

In the coming section, we will discuss the social aspects of my App and the reasoning behind choosing so.

Pedometer and the social networking forum

In this section, I will discuss the social aspects of my features. First, I will discuss the Importance of the pedometer and then the social networking forum.

6.2 pedometer

The pedometer tracks the step count of the user. The Oxford dictionary defines a step as "an act or movement of putting one leg in front of the other in walking or running." This definition implies that action needs to be part of a sequence of similar events that make up a continuous walking or running bout.

A pedometer is something that everyone commonly uses, and I am sure almost every smartphone available today has an inbuilt pedometer.
There are several types of step counters based upon where they are worn. The earlier version step counter is meant to be worn at the waist, and people can wear some activity trackers in the pants pocket, and there are also wrist-worn activity trackers.

a pedometer is vital for multiple reasons, one of which is because, in the context of this project, the daily step count data of the users is essential to evaluate the effectiveness of the app. there also many other reasons why a pedometer is critical, such as

- a pedometer can measure steps efficiently and accurately.
- a pedometer can use steps to place people into less active and more active categories.
- pedometers are motivational, and they facilitate behaviour change.

The last point is significant. After all, it is related to my project because it talks about how a pedometer can promote behavioural change. Here is a study that aimed to assess the effectiveness of the pedometer. In this study, Over 46 participants were given a pedometer for six days.

They found that 93% of users think that pedometer is a valuable tool to promote physical activity. This study concluded that "A pedometer-driven walking intervention in the workplace setting is feasible and effective in increasing physical activity over a short term." ((Lakshminarayanan et al., 2021) [22]).

6.3 The social networking forum

The social networking forum is the part that I have built. I will later discuss the technologies and tools. Now I will discuss how it works and its importance.

The social networking forum is a platform for open discussion where people can share their ideas, experiences, and information in one place or seek assistance.

Apart from information support and sharing of ideas, Online social networking forums can provide social connections to people who have fallen into negative patterns and wish to change their lives.

A study aimed to better explore and understand user perspectives on connection, engagement, and support offered in such forums, information, and advice they gained, and what issues they encountered was done.

To understand users' experiences while using these forums, they conducted semi-structured interviews with 17 participants.
They found that participants sought out the forums to find a social connection lacking in their everyday lives. Participants used the online platforms to both find and provide information and practical advice.

This study also concluded that Forums might offer a way for individuals to develop their understanding of recovery through reflecting on the recovery experiences and peer support shown by others and individuals enacting peer support themselves ((Smith-Merry et al., 2021) [23]).

The study above is similar to what I did for my App, which provides a forum where multiple users can gather online on one platform, share information, experiences.

On this platform, people can help each other in this community and provide a social connection and a sense of belongingness. The combination of social belongingness and promoting physical activity will also help people get away from loneliness and many other mental health issues caused by this pandemic and lockdown.

While exploring content online, I found an interesting paper called "psychological mechanisms underlying the relationship between commercial physical activity app use and physical activity engagement." ((Petersen, Kemps, Lewis and Prichard, 2021) [16])

Their study aims to explore the psychological mechanisms underlying the relationship between commercial physical activity apps.

This paper talks about exactly are the social components or psychological factors which has the potential to bring on a behaviour change. I will point out two conclusions from the paper that are relevant to my project.

First, "Sharing posts and receiving encouragement provides the social support many people need to stay motivated with exercise programs, and this doesn't change across different age groups".

Second, "Engagement in comparisons was associated with lower self-efficacy and higher external regulation, and in turn, lower physical activity" is what the study had to say about the comparison, which is the reason why I preferred online forums over comparing oneself with others.

6.4 technologies and tools

This section will discuss the technical aspects of my app used to make "The Social Support app."

Exercise Type: -
Walking and running are chosen as physical activities because they do not require any specific equipment, are budget-friendly, and have significant health effects if performed regularly. The users could do other types of physical activity during their day.

A 2011 study found that healthy adults can take anywhere between approximately 4,000 and 18,000 steps/day and that 10,000 steps/day is a reasonable target for healthy adults. Taking this study in mind, I have kept a target of 10,000 steps every day (Yuenyongchaiwat, K., 2021. Effects of 10,000 steps a day on physical and mental health in overweight participants in a community setting: a preliminary study. [21]).

Pedometer

A pedometer tracks the number of steps one has walked or run. A graph keeps track of how many steps an individual has taken in the past days.

coding part: -

in this section, I will mention the elementary classes and their role.

1: “DailyReportFragment” is the main class for displaying information for the main screen

2: “StepCountDbHelper” and “StepCountPersistenceHelper” give an idea of how data is stored and retrieved

3: Looking at the activities in general and looking at the XML relating to important classes will also help

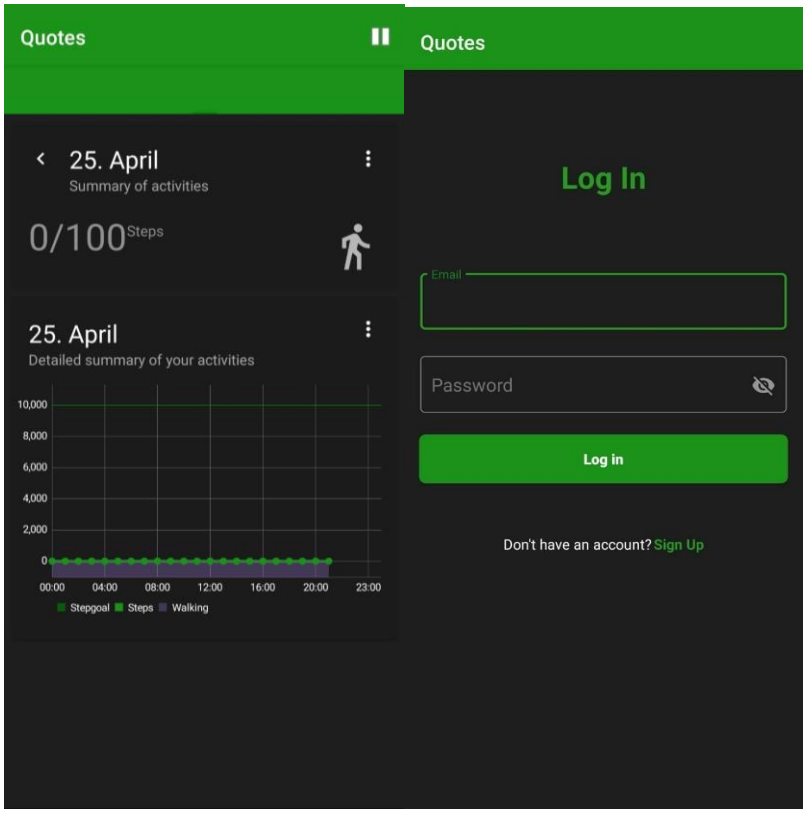

Figure 2: Screenshots of the pedometer and the login page.

Social network forum

In this section, I will discuss what my feature will look like and what its specifications are. This part of the app will be titled "Discussion forum," which would have two mini sections: -

discussion board

A Discussion board will be a platform where everyone can add their comments, share ideas, etc. Anyone can sign up with whichever email and get access to the discussion board.

Essential aspects of the discussion board: -

1: "Most liked": The users can like others' comments, ideas, etc. order of comments depends on the number of likes received by the comment.

2: "favourite": this feature will allow the user to save their favourite comments and view them at any time.

coding aspect

The way users can view each other's comments is because the app is connected to a server. I bought a server of my own where user's names and posts are stored. When you use the application on your mobile phone, the application connects to the Internet and sends data to a server. The server then retrieves that data, interprets it, performs the necessary actions, and sends it back to your phone. The application then analyzes that data and presents you with the information you wanted in a readable way. This is what an API is - all of this happens via API.

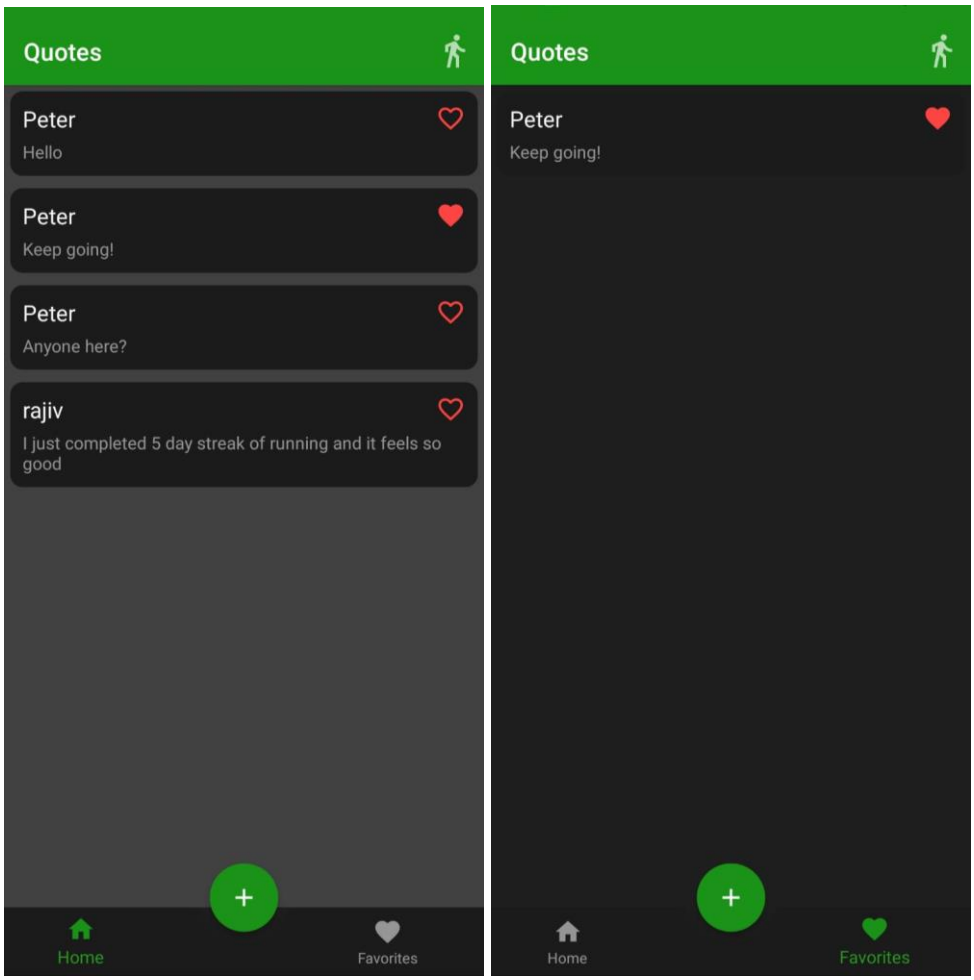

Figure 3: screenshots of discussion board and favorites

6.5 testing method

In this section, I will discuss how the application tests were conducted, and later we will talk about the results of the application. The tests were conducted by our lead researcher Darren Scott and me.

The goal of our experiment is to investigate the feasibility of real-life social support via an app. To test the app's effectiveness, we tried to gather people who were willing to participate in the testing process. Unfortunately, we could only get four people to participate.

All participants were given an anonymous account and encouraged to interact with other participants using the app. Social support features included a discussion forum where users could add comments and likes someone else's comments. BCT's were included in the pedometer, such as goal setting(10,000 steps per day), self-monitoring.

6.6: Results

Participants one, two, three, and four have a step count of 3287,7360,1067,125 per day when the expected step count per day is 10,000. Interestingly, participants one, two, and three have increased their step count per day, whereas participant 4 has just tried the application only for the first day.

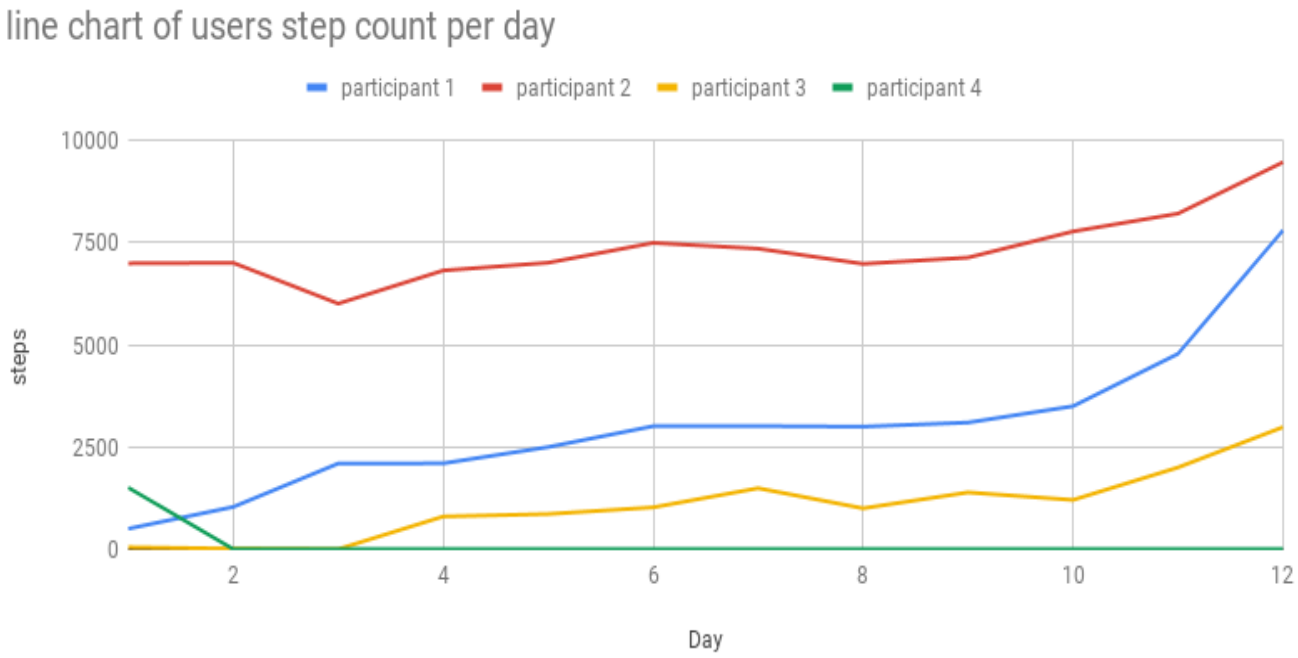

Figure 4: line chart that shows the increase/decrease of step count per day

7: Risk analysis

In this section, I will look at all the problems that could occur in this module and develop a preplanned strategy to reduce its impact.

There are three types of risks possible. One is a personal risk, project risks, and milestone-specific risk.

Personal Risks

RISK	DESCRIPTION	LIKELIHOOD	SEVERITY	MITIGATION STRATEGY
Poor time management	Lack of time management skills will make it hard to keep the quality of work top notch and interfere with other modules too	1	5	Make a schedule, add it to google calendar and stick to it
Difficulty Learning Kotlin	Unable to understand kotlin clearly could make It hard to make the project and could cause inconvenience to everyone in the research project	2	4	Study kotlin in summer vacation and pay most attention to 306 module to understand better
Unforeseen illness	N/A	2	5	Let the mentor and research team members know about it and discuss what happens Later.

Table 2: Personal Risks

Project Risks

RISK	DESCRIPTION	LIKELIHOOD	SEVERITY	MITIGATION STRATEGY
Hardware failure	If anything happens to device because of which all my data is lost	1	5	Make sure to store all the code in a pen drive or just add the code to Git Lab every time you finish working
Requirements change	My XML layout and kotlin code is not in line with other researcher's views	3	3	Schedule regular meeting with other team member to clear ambiguities.

Table 3: Project Risks

Risk associated with different tasks

RISK	DESCRIPTION	LIKELIHOOD	SEVERITY	MITIGATION STRATEGY
Unable to implement feature	Risk associated with not being able to implement the feature that I have decided, or it is not working the way I want I to.	3	4	Make sure I understand everything in 206 modules ask doubts to another team member if needed
Difference in layout & back end design	What if my design is different from the main project repository	2	3	Store the project in Git Hub and make sure to stay connected with throughout the implementation and design.
Dissertation page limit crossed	More than 30 pages included in the dissertation document	2	5	Bespecificwith needs to be added to the document before starting. Secondly, polish the contents to make itsmall and precise

Table 4: Risk associated with different tasks

8: Software Life Cycle and project schedule

I used the Agile (generic) model since it has appeared to be far more suitable than the Waterfall model.

Since everyone on the project decided earlier that my app would merge with the pedometer and there is a possibility of changes in code and layout later on in the project, I have chosen the agile model.

Furthermore, Agile methodology requires frequent meetings of the team during the realization of the project, which will allow for detection of the requirements change much earlier than it would in case the project using the Waterfall model.

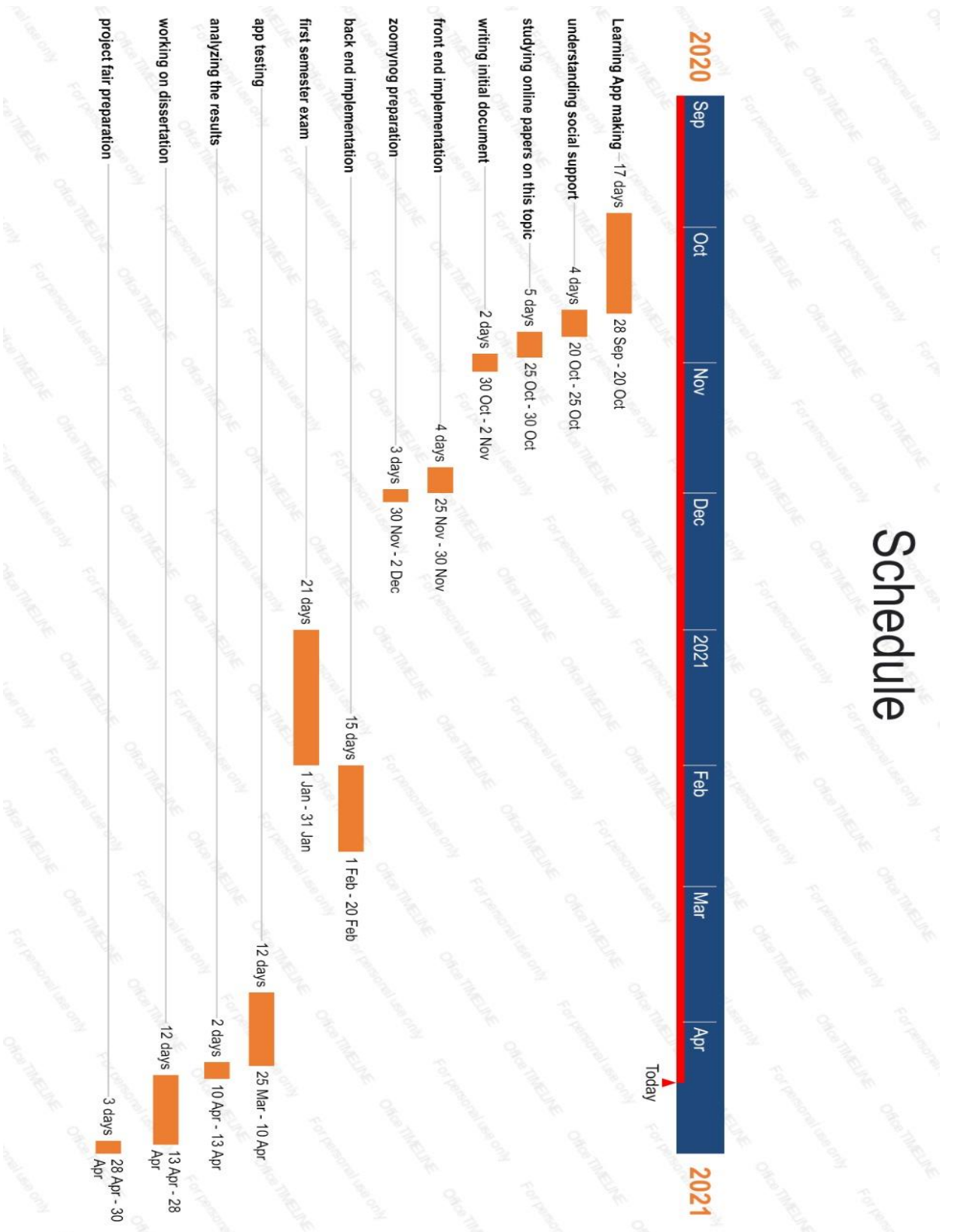

Figure 5: Gantt chart explaining the schedule.

9:Reflection

In this section, I will reflect upon my thoughts on the results of the application.

I am happy to see that participants step is increasing with time even though they did not reach the target, I suppose that if they continued using the application, they might get their daily target.

The one person that did not participate in the application could be because of multiple reasons:-.

1:It could be maybe because the application and social support could not outweigh the inactiveness of a person.

2: it becomes easier not to take the application's features not seriously.

3: as I discussed earlier, each person has their preferences in social support suitable for them.

There is one thing that I want to add, and I am not sure if it has influenced the results of tests. The nature of trials actively works against the app's essence because it is meant to form big groups and communities. In contrast, when we tested my application, we could only 4 participants volunteer.

I am not sure whether this has influenced the results. I have mentioned in the future work what are changes that one could make to the application.

Overall, multiple factors can influence the results, as I mentioned earlier. But by Occam's razor, I can conclude that the results suggest that my application has had a positive impact on bringing change in people's behaviour.

10: Challenges

This section will mention all the challenges I faced while working on this project and resolving it.

While making the application, coding in Android Studio is hard, especially on my laptop, which has a poor spec. It takes a lot of time to get the virtual machine running and testing the app at various stages of coding.

This is one thing that I could not predict earlier because I did not know about it until I started working on my app-making module's coursework. Because of this problem, I was getting late on my project's submission. I spoke to our lead researcher about it, and he understood it and gave me an extra week, which was enough.

The second problem I faced was taking someone else's posted message and bringing it to someone else's app. At that time, I did not know how to make and use a server. I spoke to Darren Scott about it, and he mentioned that it would be okay if I am adding comments with the application, but I chose not to do that because I wanted it to be as I intended.
So, I eventually learned how to work with a server and connect it to the application.

11: Future Work

The problem I have discussed in this document is exciting and challenging for a computer scientist. In the following subsections, I have included my thoughts on what can be done in the coming month and year.

One-Month plan

In the coming month, I will look for flaws in the system and address them. I can change the current state a bit to make the user's experience more comfortable than it is right now. Also, I can make some minor changes to filter out messages and show which is relevant for the user based upon which stage of exercise they are in to make messages more suitable.

The second thing that I would do is change is the testing method of the application. One of the issues last time was limited participants. The essence of this app's forum is that it necessitates many participants that can form a group or community and add messages to the forum.
Along with the data collection by a pedometer, I would add another method by which I would test the app's quality by sending out a questionnaire to all the participants to understand the acceptability and UX of the app.

Long term Plan

Future research should adopt innovative research designs to develop and evaluate multi-component personalized interventions for physical activity promotion.

12: Conclusion

Smartphones and social media have become embedded within everyday life and offer a promising platform for physical activity intervention. In this project, I have discussed the importance of physical activity, social support, how social support is provided online, the positive and negative impact of social support, and social support offered online vs offline. It also provides modest evidence supporting the effectiveness of smartphone apps to increase physical activity.

I have proposed my idea of how we can promote physical activity using social support. In making this, I went through many already existing apps and what the BCT they offered to help them bring behavioural change.

The project has also developed a fully working android application that takes step count of users and provides them with several types of social support using a forum. This application would later be made publicly accessible.

I have also evaluated my proposed techniques by collecting participants' data using the application over 2-3 weeks and analyzing the results. Overall, my app has shown decent performance in bringing on a behavioural change.

In today's world, mobile phones and smartwatches have become an extension of our bodies. Adding features that promote good behaviour using social support could make the world a better place.

References

1: Euro.who.int. 2021. *Data and statistics*. [online] Available at: <https://www.euro.who.int/en/health-topics/disease-prevention/physical-activity/data-and-statistics> [Accessed 26 April 2021].

2: Euro.who.int. 2021. *Data and statistics*. [online] Available at: <https://www.euro.who.int/en/health-topics/disease-prevention/physical-activity/data-and-statistics> [Accessed 26 April 2021].

3: Xiong, J., Lipsitz, O., Nasri, F., Lui, L., Gill, H., Phan, L., Chen-Li, D., Iacobucci, M., Ho, R., Majeed, A. and McIntyre, R., 2021. *Impact of COVID-19 pandemic on mental health in the general population: A systematic review*.

4: LWW. 2021. *Exercise and well-being: a review of mental and physical... : Current Opinion in Psychiatry*. [online] Available at: <https://journals.lww.com/co-psychiatry/Abstract/2005/03000/Exercise_and_well_being__a_review_of_mental_and.13.aspx> [Accessed 26 April 2021].

5: Paluska, S. and Schwenk, T., 2021. *Physical Activity and Mental Health*.

6: Who.int. 2021. *New WHO-led study says majority of adolescents worldwide are not sufficiently physically active*. [online] Available at: <https://www.who.int/news/item/22-11-2019-new-who-led-study-says-majority-of-adolescents-worldwide-are-not-sufficiently-physically-active-putting-their-current-and-future-health-at-risk> [Accessed 26 April 2021].

7: Lepp, A., Barkley, J., Sanders, G., Rebold, M. and Gates, P., 2021. *The relationship between cell phone use, physical and sedentary activity, and cardiorespiratory fitness in a sample of U.S. college students*.

8: Ballantine, P. and Stephenson, R., 2021. *Help me, I'm fat! Social support in online weight loss networks*.

9: Laird, Y., Fawkner, S., Kelly, P., McNamee, L. and Niven, A., 2021. *The role of social support on physical activity behaviour in adolescent girls: a systematic review and meta-analysis*.

10: F, O., DC, J., E, D., CA, M., D, C. and S, S., 2021. *Social support and resilience to stress: from neurobiology to clinical practice*. [online] PubMed. Available at: <https://pubmed.ncbi.nlm.nih.gov/20806028/> [Accessed 26 April 2021].

11: SAGE Journals. 2021. *Social Support in Marriage: Translating Research into Practical Applications for Clinicians - Kieran T. Sullivan, Lauri A. Pasch, Kathleen A. Eldridge, Thomas N. Bradbury, 1998*. [online] Available at: <https://journals.sagepub.com/doi/10.1177/1066480798064002> [Accessed 26 April 2021].

12: SAGE Journals. 2021. *Social Support in Marriage: Translating Research into Practical Applications for Clinicians - Kieran T. Sullivan, Lauri A. Pasch, Kathleen A. Eldridge, Thomas N. Bradbury, 1998*. [online] Available at: <https://journals.sagepub.com/doi/10.1177/1066480798064002> [Accessed 26 April 2021].

13: Czaja, S., Boot, W., Charness, N., Rogers, W. and Sharit, J., 2020. *Improving Social Support For Older Adults Through Technology: Findings From The PRISM Randomized Controlled Trial*.

14: Obst, P. and Stafurik, J., 2020. *Online We Are All Able Bodied: Online Psychological Sense Of Community And Social Support Found Through Membership Of Disability-Specific Websites Promotes Well-Being For People Living With A Physical Disability*.

15: Wang, T., Ren, M., Shen, Y., Zhu, X., Zhang, X., Gao, M., Chen, X., Zhao, A., Shi, Y., Chai, W., Liu, X. and Sun, X., 2021. *The Association Among Social Support, Self-Efficacy, Use of Mobile Apps, and Physical Activity: Structural Equation Models With Mediating Effects*.

16: Petersen, J., Kemps, E., Lewis, L. and Prichard, I., 2020. *Psychological Mechanisms Underlying The Relationship Between Commercial Physical Activity App Use And Physical Activity Engagement*.

17: Simoski, B., Klein, M., van Halteren, A. and Bal, H., 2021. *Integrating Person-to-Person Social Support in Smartphone Apps for Promoting Physical Activity*.

18: Tong, H., Coiera, E. and Laranjo, L., 2021. *Using a Mobile Social Networking App to Promote Physical Activity: A Qualitative Study of Users' Perspectives*.

19: Middelweerd, A., Mollee, J., van der Wal, C., Brug, J. and te Velde, S., 2021. *Apps to promote physical activity among adults: a review and content analysis*.

20: Granado-Font, E., Ferré-Grau, C., Rey-Reñones, C., Pons-Vigués, M., Pujol Ribera, E., Berenguera, A., Barrera-Uriarte, M., Basora, J., Valverde-Trillo, A., Duch, J. and Flores-Mateo, G., 2021. *Coping Strategies and Social Support in a Mobile Phone Chat App Designed to Support Smoking Cessation: Qualitative Analysis*.

21: Yuenyongchaiwat, K., 2021. *Effects of 10,000 steps a day on physical and mental health in overweight participants in a community setting: a preliminary study*.

22: Lakshminarayanan, S., Mathew, V., Akkilagunta, S., Kumar, D. and Kar, S., 2021. *Effectiveness of pedometer-based walking program to improve physical activity of workers in a software industry: An experimental study*.

23: Smith-Merry, J., Goggin, G., Campbell, A., McKenzie, K., Ridout, B. and Baylosis, C., 2021. *Social Connection and Online Engagement: Insights From Interviews With Users of a Mental Health Online Forum*.
24: Oecd-ilibrary.org. 2021. *Online and offline relationships | Educating 21st Century Children : Emotional Well-being in the Digital Age | OECD iLibrary*. [online] Available at: <https://www.oecd-ilibrary.org/sites/11f6c5b4-en/index.html?itemId=/content/component/11f6c5b4-en> [Accessed 26 April 2021].

25: Granado-Font, E., Ferré-Grau, C., Rey-Reñones, C., Pons-Vigués, M., Pujol Ribera, E., Berenguera, A., Barrera-Uriarte, M., Basora, J., Valverde-Trillo, A., Duch, J. and Flores-Mateo, G., 2021. *Coping Strategies and Social Support in a Mobile Phone Chat App Designed to Support Smoking Cessation: Qualitative Analysis*.