RUN TOGETHER: EXPLORING THE RELATIONSHIP BETWEEN MOTIVATION AND SOCIAL INTERACTION FEATURES OF ACTIVITY-TRACKING APPS

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

BATUHAN ŞAHİN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
INDUSTRIAL DESIGN

FEBRUARY 2022

Approval of the thesis:

RUN TOGETHER: EXPLORING THE RELATIONSHIP BETWEEN MOTIVATION AND SOCIAL INTERACTION FEATURES OF ACTIVITY-TRACKING APPS

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ABSTRACT

RUN TOGETHER: EXPLORING THE RELATIONSHIP BETWEEN MOTIVATION AND SOCIAL INTERACTION FEATURES OF ACTIVITY-TRACKING APPS

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February 2022, 192 pages

Physical activities are beneficial for physical and mental health and overall wellbeing. Physical activity engagement and performance are strongly linked with motivation. Mobile activity-tracking apps target various physical activities and provide features, including social interaction, to increase users' motivation and engagement. Among these, running is one of the activities that does not require any special equipment, facility, or partner. This research aimed to understand the relationship between the activity-tracking apps' social interaction features and runners' motivation. The features providing social interaction were identified from three popular mobile activity-tracking apps. Relevant data were collected from 120 runners through an online survey. The findings show that the social interaction features of apps positively influence runners' motivation. Moreover, one-to-one interviews were conducted to examine the causes motivating runners to run and interact with others through social interaction features. In addition, factors affecting runners' experience with social interaction features were also examined. The findings of the study are presented as recommendations for future researchers and designers. Using these findings, the design of activity-tracking apps can be revisited to maximize runners' motivation and overall experience.

Keywords: Social interaction, mobile app design, user motivation, physical activity

ÖZ

BİRLİKTE KOŞU: MOBİL AKTİVİTE TAKİP UYGULAMALARINDAKİ SOSYAL ETKİLEŞİM ÖZELLİKLERİ VE MOTİVASYON ARASINDAKİ İLİŞKİYİ KEŞFETMEK

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Şubat 2022, 192 sayfa

Fiziksel aktivite yapmanın insanların vücut ve mental sağlığı ve aynı zamanda genel iyi oluşları üzerinde faydaları var. Fiziksel aktivitelere katılım ve aktivite performansı, insanların motivasyonu ile büyük ölçüde ilişkili. Mobil aktivite takip uygulamaları, birçok farklı aktivitede kullanıcıların motivasyonunu ve katılımını artırmak için birtakım özellikler sunuyor. Bu özelliklere kullanıcıların sosyal etkileşimini artırmalarını sağlayanlar da dahil. Bu aktivitelerden biri de koşmak. İnsanların koşmak için herhangi bir özel ekipman, mekan ya da partnere ihtiyaçları yok. Bu araştırmada, aktivite takip uygulamalarında sunulan sosyal etkileşim özellikleri ile koşucuların motivasyonu arasındaki ilişki incelendi. Sosyal etkileşim sağlayan özellikler, üç popüler aktivite takip uygulaması incelenerek belirlendi. İlk aşamada 120 koşucudan çevrimiçi bir anket yoluyla ilgili veriler toplandı. Sonuçlar, uygulamalardaki sosyal etkileşim özelliklerinin koşucuların motivasyonu üzerinde olumlu bir etkiye sahip olduğunu gösteriyor. Ayrıca, koşucuları sosyal etkileşim özellikleri aracılığıyla koşmaya ve başkalarıyla etkileşime girmeye motive eden nedenleri incelemek için birebir röportajlar yapıldı. Bu sırada, sosyal etkileşim özelliklerinde koşucuların deneyimlerini etkileyen faktörler de incelendi. Çalışmanın çıktıları, gelecekteki araştırmacılar ve tasarımcılar için öneriler olarak sunuldu. Bu bulgular kullanılarak, aktivite takip uygulamalarının tasarımı

koşucuların motivasyonunu ve genel deneyimini en üst düzeye çıkarmak için yeniden gözden geçirilebilir.

Anahtar Kelimeler: Sosyal etkileşim, mobil uygulama tasarımı, kullanıcı motivasyonu, fiziksel aktivite

To my beloved family

ACKNOWLEDGMENTS

First and foremost, I would like to express my heartfelt gratitude to my supervisor Prof. Dr. Bahar Şener-Pedgley. I can't thank her enough for her limitless patience with me from the very beginning. What made this research possible was her insightful guidance, positive attitude, and motivational feedback. It was an excellent opportunity to be supervised by her.

I am thankful for the members of the thesis committee: Assist Prof. Dr. Sedef Süner Pla Cerda and Assist. Prof. Dr. Armağan Karahanoğlu for their valuable time, feedback, and suggestions.

I would like to thank my thesis buddy Zeynep for being the greatest companion. The whole process felt much easier with her encouraging comments and valuable contributions.

I would also like to thank my dearest friend Koray. Even though there was a long-distance between us, he was always there for me throughout the process.

I'm grateful for having my beloved partner Bahar and our fluffy friends Duomo, Kivi, and Mercan by my side. They always cheered me up and tried their best to support me.

Lastly, and most importantly, I would like to thank my family for their endless support and love. I feel blessed to have them.

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CHAPTER 1

INTRODUCTION

Regular physical exercise is one of the activities that can help us build a daily routine and stay in contact with family and friends. It is good for our mental health as it reduces the risk of depression, cognitive decline, and delays the onset of dementia, and improves overall feelings (WHO, 2020). Although physical activities are strongly related to physical health, mental health, and overall wellbeing, only a small proportion of people exercise regularly. According to a global study conducted between 2001 and 2016 that consists of 1.9 million participants across 168 countries, the level of inactivity in adults was 27.5% (Guthold et al., 2018). To address this issue and increase physical activity levels, various criteria that affect engagement have been studied. Amongst many, motivation is considered a significant predictor of physical activity (Choi et al., 2017).

Social influence has also been linked with physical activity and increased performance (Consolvo et al., 2006). This social influence is caused by social interaction, which can be described as a dynamic, changing sequence of social actions between two or more people (Heatherton & Walcott, 2009). Social interaction has an effect on human behavior, including subjective wellbeing and the emergence of individual or collective actions (Antoci & Sabatini, 2018). For example, some activities, like going to the cinema or eating out in a restaurant, may become more appealing when our friends join us. In this study, the term social interaction is considered the combination of direct or indirect interactions that people can experience with each other.

However, the COVID-19 pandemic and the restrictions brought by it means that many of us now may have to stay at home and sit down more than we usually do. Depending on the restrictions, it is hard to perform outdoor exercises that we usually do with or without accompanying friends. It is also harder to motivate people who do not usually carry out physical exercise.

Current mobile physical activity apps or activity-tracking apps offer various features to increase users' motivation and engagement in physical activity with the help of technology integration. Previous studies have linked increased engagement levels and the use of mobile activity-tracking apps (Wang et al., 2019, Kirwan et al., 2012). Similarly, a recent study revealed the connection between the use of the social interaction features of mobile activity-tracking apps (app-specific communities and existing social media platforms) and the significantly high level of engagement in the activity (Petersen et al., 2020). However, as Middelweerd et al. (2014) mentioned, apps are relatively new tools in physical activity interventions, and very little research on the content and effectiveness of physical activity apps has been published. Therefore, this research focuses on the social interaction features of mobile activity-tracking apps and their effects on users' motivation.

For this research, 'running' is selected as a physical activity to focus on since the researcher has a personal interest, and reaching out to potential participants (non-professional runners) with different demographics (e.g., different age groups, running levels, etc.) was possible. Running was less restricted relative to other sports branches during the COVID-19 pandemic. It can also be said that running is one of the most feasible branches of sports/physical activities, which does not require any special equipment (apart from a pair of trainers), facility, or even team gathering. People can run on any surface, distance, with or without any partner. Additionally, there is a number of mobile activity-tracking apps with different social interaction features that can be taken as a reference point in the study.

During the pandemic breakout, people, who usually participate in sports and want to stay physically active, had to look for alternative solutions. Consequently, most sports brands/companies, running communities, and mobile activity-tracking apps have been promoting different social interaction features (e.g., virtual events, motivating hints for staying active during the pandemic, promotions for sharing in-home activity videos, etc.) to make existing and new users engage in activities through online media. This also creates an opportunity to study social interaction features of the mobile activity-tracking apps, their suitability for motivating users, and their relationship with the overall user experience for further development.

In fact, a very recent study by Mumcu (2021, p.7), carried out in Turkey during the COVID-19 pandemic, concluded that:

> *"... to protect and increase the level of physical activity of people under epidemics and similar conditions, the more comprehensive and encouraging applications to be produced on such digital platforms could prevent various physical, psychological, and mental negative effects of sedentary life."*

This conclusion also supports the relevance and the contemporariness of the research focus of this thesis.

1.1 Aim and Objectives of the Study

The main aim of this study is to understand the relationship between the runners' motivation and the social interaction features of existing activity-tracking apps. Additionally, this study aims to present design recommendations according to the needs and expectations of runners to improve their experience with social interaction features.

To fulfill these aims, the following objectives are set for the research: i) to understand the motivational influence of social interaction features on runners, ii) to reveal runners' needs and expectations in social interaction features, iii) to offer design insights to further develop and enhance runners' experience in social interaction features.

1.2 Research Questions

Research questions are formed keeping the aims and objectives mentioned above in mind. The main questions and related sub-questions are listed below.

- What are the features in activity-tracking apps that promote social interaction between runners?
- How do the social interaction features affect runners' motivation?
    - Are there any patterns amongst the motivation of different types of runners (e.g., age, activity level, etc.)?

- What motivates runners to run and to interact with others through social interaction features?
    - What are the factors affecting runners' experience regarding social interaction features in activity-tracking apps?

- What design insights can be gathered for social interaction features of activity-tracking apps?

1.3 Scope of the Study

This study focuses on the effects of social interaction features in running apps on runners' motivation. Fieldwork includes amateur runners from Turkey who run regularly. The fieldwork is carried out during the COVID-19 pandemic breakout when the sports facilities were fully shut down (from March 2020 to June 2021) as part of the precautions. Participants' motivation level is not measured since the only perceived influence of social interaction features on motivation is investigated.

1.4 Structure of the Thesis

The thesis structure includes five main chapters formed according to the flow of the research. Details of each chapter are presented below.

Chapter 1 presents brief information about the study background as well as the aim and objectives of the study, research questions, and thesis structure.

Chapter 2 discusses related literature. This chapter starts with a brief introduction to physical activity and motivation. Then social interaction and its relationship with physical activity motivation are examined. The second part of the chapter analyzes activity-tracking apps, persuasive/motivating strategies, and social interaction features in apps. Finally, the effects of COVID-19 on physical activities and fitness apps are presented.

Chapter 3 explains the methodological structure of the research. Overview of the fieldwork set-up, details, and procedures followed in three phases of the fieldwork (review of existing activity-tracking apps, online survey, semi-structured interviews), data collection tools and methods, and data analysis stages are explained in the chapter.

Chapter 4 presents the results and analysis of the fieldwork with design insights and recommendations of the researcher. Following these, a discussion on: i) social interaction features and motivation relationships, and ii) factors affecting the user experience in social interaction features are presented.

Chapter 5 concludes the research. After revisiting the research questions, reflections of the researcher, limitations of the research, and suggestions for future studies are presented.

CHAPTER 2

LITERATURE REVIEW

The literature review consists of two main parts. Physical activity is briefly described with featured health benefits in the first part. Then motivation concept in general and the relationship between physical activity motivation and social interaction is discussed by going through related studies. Specifically, running motivation and previous research focusing on social interaction and running is also examined. The second part of this chapter is structured around fitness/activity-tracking apps. After introducing the fitness apps and running apps in general, factors affecting the use of apps are discussed. Then, persuasive features and strategies implemented by the fitness apps are presented with special interest to socially-oriented ones. Following that, studies focusing on the social interaction features and motivation in fitness apps are briefly introduced. Finally, the effects of the COVID-19 pandemic on fitness apps are examined.

2.1 Physical Activity

At the beginning of this part, before going into details of motivation toward physical activity, definitions and the influence of physical activity over health are discussed. The name "physical activity" itself already leads to an understanding of the movement or motion of the body. In parallel with that, one of the oldest definitions in the literature covers a similar meaning. Epidemiologists Dr. Caspersen and his colleagues defined physical activity as "any bodily movement produced by skeletal muscles that results in energy expenditure" (Caspersen et al., 1985, p.126). This definition and variations of it are widely accepted in the academy and have been used by different organizations. One recent example is that in the 'Global Action Plan on Physical Activity', World Health Organization (WHO) referred the physical activity as "any bodily movement which requires an energy expenditure" (2018, p. 14).

Recently, another definition for physical activity has also been suggested. Piggin (2020) argued about the narrowness of the previously mentioned definition, emphasizing that it is being focused on and therefore is constrained by epidemiology discourse. In order to create a broader definition, he discusses the inherent qualities of physical activity; i) psychological, ii) social, iii) cultural and, iv) political. Following these, he defines physical activity as follows "Physical activity involves people moving, acting and performing within culturally specific spaces and contexts, and influenced by a unique array of interests, emotions, ideas, instructions, and relationships." (Piggin, 2020, p.5).

Among these two definitions, the latter is more extensive and contemporary. Because instead of focusing only on the physiological characteristics of physical activities, it also takes into account the social, cultural, and political characteristics. In today's world, where it is much easier for people to reach each other than in the past, such features should be taken into account.

2.1.1 Health Benefits of Physical Activity

Physical activities have been proved to have many health benefits and are strongly related to overall well-being. Being active reduces the risk of many non-communicable health problems such as cardiovascular diseases, diabetes, obesity, hypertension, arthritis (Dahn & And, 2005; Miriam. et al., 2013), and accordingly, participating in physical activities regularly has been linked with reduced risk of premature mortality (Warburton & Bredin, 2017). Health benefits associated with regular physical activity in the physical activity guidelines prepared by the Department of Health & Human Services of USA can be seen in Figure 2.1.

Moreover, improvement of psychological well-being is also in relation to physical activity through reduced anxiety and stress (Dunn et al., 2001). Saxena et al. (2005) suggest that participation in physical activity has positive effects on emotional well-

being in the long-term and also argue that being active is an effective treatment for anxiety and depression.

On the other hand, lack of physical activity or staying inactive bring many health risks together. Previous studies show that physical inactivity is a risk-increasing factor for many health conditions, including major non-communicable diseases such as coronary heart diseases, hypertension, type 2 diabetes, several cancers (e.g., lung, breast, colon, others), and dementia (Knight, 2012; I. M. Lee et al., 2012) and it has been identified as one of the highest (4^{th}) leading risk factor for global mortality, being part of 9% of annual deaths (Finkelstein et al., 2016).

Although many studies reveal the relationship between physical activities, physical health, mental health, and overall wellbeing, the worldwide ratio of inactivity is high. According to a study conducted with nearly 2-million participants worldwide by Guthold et al. (2018), more than 25% of adults globally are not participating in enough physical activity and are at the risk of developing health problems related to inactivity.

Previous studies have focused on the barriers leading to physical inactivity in the past to address this issue. Several barriers, including lack of time, lack of support, fear of injury, lack of skill or resources, lack of energy, lack of motivation, and social influences, have been linked to not engaging with physical activity in literature (Rosselli et al., 2020; Tai-Seale, 2003; Zelenovic et al., 2021). Moreover, the influence of motivation is considered to be a significant factor over engaging with physical activity (Choi et al., 2017). Since it is one of the main focuses of this study, the concept of motivation towards physical activity will be further reviewed in the following headings.

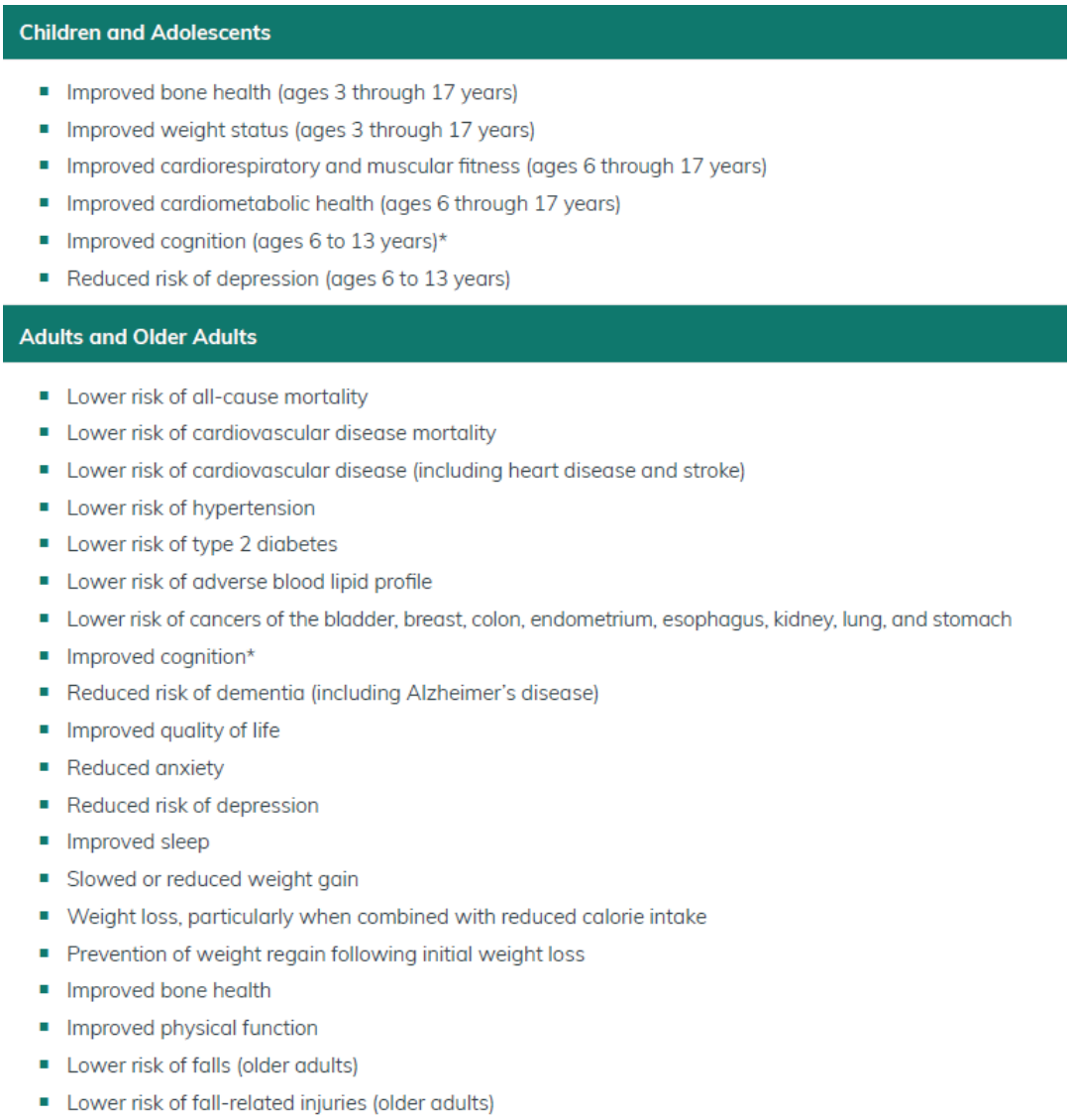

Figure 2.1 Health benefits of regular physical activity (taken from https://health.gov/sites/default/files/2019_09/Physical_Activity_ Guidelines_2nd_ edition.pdf#page=39)

2.2 Motivation towards Physical Activity

In this part of the chapter, motivation concept in general, approaches and tools used in the studies related to motivation in physical activities, and finally, previous research focused on motivation and running relationship are reviewed respectively.

Motivation is the process that makes people act in certain ways. It is the initiative cause in our actions, and it helps maintain our behavior through. Segar (2017) claims that motivation is the factor that energizes people to follow their goals since it fuels the behavior. Accordingly, it also has an essential role in long-term exercise behavior and overall well-being. Most people find motivation to be a necessary element for starting and sustaining physical activity. It has been stated to be one of the significant factors in athletes' success in sports as well (Gould et al., 2002).

One of the most popular theories that are used to explain and analyze the relationship between motivation and physical activities is the Self Determination Theory (Deci & Ryan, 1985). This theory consists of several sub-theories, and through those theories, it highlights the psychological needs that cause motivation (Brunet & Sabiston, 2011). As significant elements of SDT, motivation can be divided into two categories as intrinsic and extrinsic, according to Ryan and Deci (2000). They can be considered to have an important role in engagement in physical activities (Recascino & Smith, 2003).

i) Intrinsic Motivation

Intrinsic motivation can be simply defined as doing something without the external effects for its own sake. In other words, it refers to participating in an activity just for itself and experiencing pleasure and satisfaction through that participation (Vallerand, 2004). It consists of ego motives such as curiosity, competence, play, and autonomy (Reiss, 2012). A physical activity-related example might be someone going for a 5 km run just because they want or someone trying a new type of exercise

out of curiosity. The level of intrinsic motivation could be influenced by different aspects, such as the received feedback about a performance or the rewards of the activity (Recascino & Smith, 2003).

ii) Extrinsic Motivation

In contrast to intrinsic motivation, extrinsic motivation is caused by the pursuit of a goal. In extrinsic motivation, participation in activity has a purpose rather than its own sake. So, people may participate in activity although they do not seek any pleasure of participation (Vallerand, 2004). For example, a child might want to go to practice just to impress his coach, not because he or she wants to.

Reiss (2012) mentions the superiority of extrinsic motives for undermining intrinsic interests according to SDT. An example might be someone who starts to earn money for a physical activity that she or he enjoys doing. After a while, the extrinsic motive, money, goes in front of the enjoyment, which was the only intrinsic motivation in the beginning.

In self-determination theory, innate psychological needs (autonomy, competence, and relatedness) are conceptualized as being universally essential for optimal human development, motivation, and integrity (Deci & Ryan, 2000). Accordingly, these needs are also suggested to be drivers of goal-directed behaviors. Intrinsic motivation will increase when these needs are satisfied in a particular context. (C. K. J. Wang et al., 2019).

Martela and Riekki (2018) summarize these needs in their study according to previous research. Autonomy can be referred to as the need for feeling of ownership in behavior. Autonomous actions feel like they started from the self rather than being affected by external pressures. Competence, the need to reach desired outcomes and experience mastery, is about efficacy and capability to achieve goals in one's activities. Relatedness is about the need to feel connected to others and is more about having meaningful relationships or belonging to a community.

Another motivation scale used in previous studies related to physical activity is the exercise motivation inventory (EMI) (Markland & Ingledew, 1997). It is used to compare and assess motivation towards physical activity in different studies (Kilpatrick et al., 2005). The subscales included in the inventory are: psychological motives (stress management, revitalization, enjoyment, challenge), interpersonal motives (social recognition, affiliation, competition), health motives (health pressures, ill-health avoidance, positive health), body-related motives (weight management, appearance), fitness motives (strength and endurance, nimbleness.

There are more approaches and tools in literature which are used to examine motivation besides SDT and EMI, such as Motivation of Marathoners' Scales (Masters et al., 1993) or Motives for Physical Activity Measure (Frederick & Ryan, 1993). This variety of tools and approaches shows us the depth of motivation concept in general and the importance of motivation and physical activity relationship. To examine the studies in running motivation as well as physical activities in general, research specifically focused on runners are reviewed under the following heading.

2.2.1 Previous Research Related to Motivation towards Running

Among physical activities, running has gained popularity in recent years, and it has become one of the main ways of staying active. Running has become one of the main physical activities in recent years (Zinner & Sperlich, 2016). Accordingly, many studies have focused on examining the factors linked with running practice. Besides those factors included in the research, such as physical health benefits, physiology and nutrition, and psychological aspects, the motivation of athletes to run is also examined (León-Guereño et al., 2021).

However, a great amount of research related to running and motivation of running participants are focused on long-distance runners or professional runners only (Goose & Winter, 2012; Malchrowicz-mośko et al., 2020; Popov et al., 2019; Qiu et

al., 2020; Ridinger et al., 2012; Zach et al., 2017). Several studies focusing on the motivation of runners in general are presented now.

One of the recent studies by León-Guereño et al. (2021) is framed around the motivation behind running in older adult runners. An adapted version of the motivation of marathoners' scales (MOMS) was used in the research. There were nine dimensions which divided into four motivational groups: "Psychological motives (meaning of life, self-esteem), achievement motives (competition, personal goal achievement), social motives (affiliation, recognition) and physical health-related motives (general health orientation, weight concern)" (León-Guereño et al., 2021, p. 3). One of the significant results of the study was that the rate of motivation related to different dimensions was differed by gender. Men were getting motivated and started running due to competition-related motivation, whereas women were influenced by affiliation, life meaning, psychological coping, and self-esteem.

In another study, Aicher et al. (2018) focused on running events to examine the motives and constraints of participants in events. Self Determination Theory was used in the research to examine participants' motivation. Results of the study revealed differences in motives and constraints of participants according to their history of participation in events or distances covered. In runners with higher participation levels, autonomous motivation was greater, and they experienced fewer constraints than others with lower participation levels.

Effects of running level and ability on running motivation are examined by Bell and Stephenson (2014). Results revealed that competition and past participation in running activities are primarily motivated runners with high abilities. On the other hand, runners with low to medium abilities are primarily motivated by social affiliation and health-related goals.

Rocha and Gratao (2018) investigated the role of different motives towards commitment to running in their study. They used a revised version of Motives for Physical Activity Measure (MPAM), based on five dimensions: competence, appearance, enjoyment, health, and social relationship (see Figure 2.2).

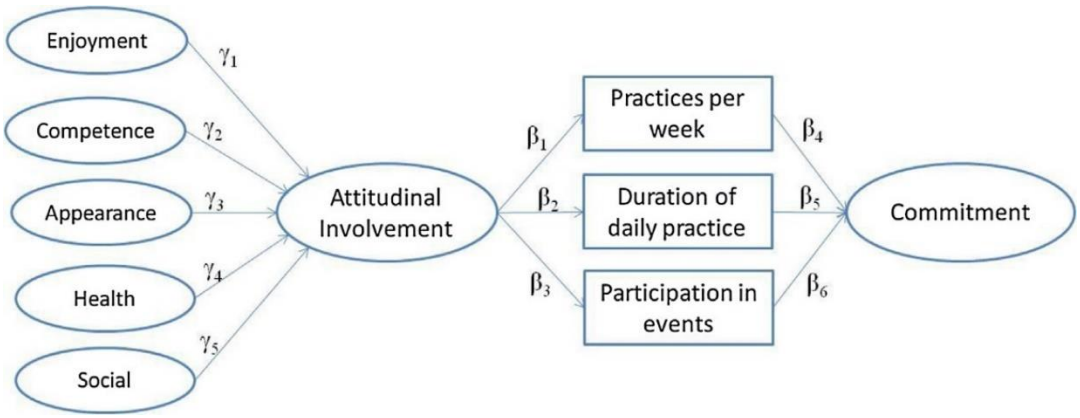

Figure 2.2 Structural relationships among motives, attitudinal involvement, behavioral involvement, and commitment with running (Rocha & Gratao, 2018)

Results showed that all of the measured dimensions were significant for motivating people towards running. Health and enjoyment-related motives led the way for motivating participants, whereas competence-related motives were at the bottom of the ranking.

With an aim to understand how to design technology for the motivation of runners, Knaving et al. (2015) examine the needs of amateur runners in their study. To better understand the runners' experience, they worked on five design themes of amateur runner experience (festival, competition, practicalities, togetherness, supporters). (See figure 2.3)

Their results emphasized that there are many different reasons for amateur athletes to run, and they have more than one strategy to feel motivated. Most of the participants in their study mostly talked about extrinsic motivations, whereas intrinsic motivations were mentioned briefly. At the end of the research, they provided design guidelines for future technologies according to the results from participants.

Figure 2.3 Design themes of the advanced amateur runner experience (Knaving et al., 2015)

Overall, through examining several studies on motivation in physical activities and running, it is seen that many different factors are affecting the motivation of athletes. Between the two main categories of motivation in SDT, the role of intrinsic motives are bigger compared to the extrinsic motives to maintain regular physical activity (Darin et al., 2015). However, according to Ingledew et al. (1998), in the initial stages of starting an activity, motivation from the physical results becomes more relevant with the participation in the activity. That makes the extrinsic motives more significant in the early stages of starting an activity, while intrinsic motives become more effective in maintaining the activity. One of the features providing extrinsic

motivation and the main focus of this study is social interaction. To understand the relationship between motivation and social interaction, previous studies examining the effects of social interaction on motivation are reviewed and presented with definitions in the following heading.

2.3 Social Interaction and Motivation

Social interaction can be defined as the dynamic social exchange between two or more individuals. In social interaction, people modify their reactions and actions according to their partner(s) of interaction Heatherton & Walcott (2009). Berger (2016) highlights the importance of social influence in his book. According to him, people's actions at every moment of their lives have been influenced by other people's behaviors without them noticing it. In social interaction, people understand what others are meaning and respond according to them. Moreover, social interaction affects different elements of human behavior, including the formation of opinions and tastes, the emergence of collective action, and subjective well-being (Antoci & Sabatini, 2018). Social influence occurs when an individual's behavior or attitude is affected by others. Almost all our behaviors can be shaped by the power of social influence.

However, in the scope of this study, the term social interaction is considered as the combination of direct or indirect interactions that people can experience with each other. These interactions can include direct communication, such as exchanging information or having a conversation. At the same time, indirect interactions such as sharing information in apps, following someone else's posts, making comparisons according to the information obtained are also included.

According to Munson and Consolvo (2012), through social support and social pressure, people have been motivated to become more active by sharing their physical activity levels. Previous studies show the positive effects of social media on activity engagement, including health behavior. (Maher et al., 2016). People feel

motivated to engage in activities longer through sharing their achievements and experiences on social media (Peters et al., 2013). For example, some people are motivated to spend more time working out at the gym for having great selfies posted on Instagram (Park et al., 2016). Furthermore, these activity-related posts might also lead followers/spectators to engage in physical activity by interacting with exercisers (Tsai et al., 2021). This social influence and its effects on motivation and engagement in physical activities have been examined in previous studies.

In one of the previous studies, throughout eight weeks of physical activity participation, it is revealed that participants were most likely to meet their physical activity goals when they were part of a competitive team more than when they did the activity individually (Buis et al., 2009).

In another study, Hodge et al. (2008) investigate the relationship between achievement goals, social goals, and motivation in masters sport. In the results, social affiliation has been linked with positive outcomes such as participation, enjoyment of the sport, and long-term commitment to the activity.

Stuntz and Weiss (2009) examine the role of social orientations in youth sport in their study. Results of the study highlighted the link between motivational outcomes and social orientations. Friendship, being accepted by a group, or receiving praise from the coach lead to enjoyment and preference of challenging tasks. Overall, social orientations positively relate to intrinsic motivation, enjoyment, and perceived competence.

Intending to increase engagement in physical activity, Lin et al. (2006) designed a computer game linked with the count of participants' daily steps. In the game, an animated virtual character (a fish in a fish tank) grows according to the count of the steps makes a virtual character grow. Also, to create a suitable environment for comparison, some participants' fish was in the same tank with other players. At the end of the study, the game seemed to increase the awareness of physical activity levels and motivation towards more activity in participants.

In a recent study, Diel et al. (2021) focus on the motivational and emotional effects of social comparison in sports. They mention social comparison as one of the fundamental aspects of sports. Outcomes of their study showed that athletes benefit from upward comparisons if the performance of the comparison standard is moderately better. When the difference in performances is extreme, comparison leads to a negative influence over motivation and increases the chance of disengagement. On the other hand, a downward comparison is related to lower performances in athletes since it is linked with the feeling that they deserve to rest because they have already achieved something. In the following heading, previous studies specifically focused on the relationship between social interaction and running are discussed.

2.3.1 Previous Research Related to Effects of Social Interaction on Running

Many studies focused on the relationship between social interaction and motivation towards physical activity in the past. In addition to those, albeit in small numbers, several studies examine the effects of social interaction on running.

Based on their argument that social support can enhance engagement with the activity, Mueller et al. (2010) tried to facilitate the social experience of participating in an activity through an application focused on jogging. Results showed that, with the help of voice communication, and feedback from the app regarding other runners' performance, the app makes users feel like they are running together at the same location. In conclusion, they provide future researchers and designers with guidelines to facilitate the experience of doing the activity together.

In another study, Xie et al. (2020) examined a self-organized running group to understand the effects of running together with others based on self-determination theory. The study's findings showed that running with others provided a great environment for developing intrinsic motivation (sense of autonomy, relatedness,

and competency). Also, participants of the study mentioned a variety of positive impacts of running with a group on their physical/mental health and running. In addition to that, the positive social environment of the group improved participants' enjoyment of running accordingly.

Heazlewood et al. (2016) examined the differences related to the gender on participation motivation in a running event. In the results, male athletes are reported to be more competition-oriented in contrast to female athletes being more affiliation-oriented.

Mahan et al. (2015) examined the effects of usage of social networking sites on running involvement and running behavior in their study. The findings of the study showed that the use of social network sites is related to involvement in the activity. Engagement levels are increased in runners using running-related social network sites. According to them, "SNS can act as both a ‘pull’ (i.e., directs engagement as a behavioral outcome) and a ‘push’ (i.e., facilitates engagement in physical activity) factor in a running context" (Mahan et al., 2015, p. 189)

In a recent study, (Tsai et al., 2021) designed a social exercise application (Gatherun) with an aim to increase motivation to participate in running events based on self-determination theory. In the application, while exercisers are running in existing races, spectators are able to watch and provide audio feedback simultaneously through a virtual avatar system. This provided participants with social interaction, and in the results, both exercisers and spectators find the app beneficial for enhancing their motivation towards exercise.

Overall, in this part of the literature review, the relationship between physical activity and motivation, as well as the studies focusing on social interaction and motivation, were examined. It has been observed that intrinsic and extrinsic motivations are significant for people to engage with and maintain regular physical activity. Some people do have intrinsic motivations for physical activities and do not need any external influence for engagement. However, people lacking intrinsic motives need more external support to participate in physical activities. In this sense, mobile

activity tracking apps or fitness apps offer various features to provide users with the extrinsic motivation they can benefit from. Social interaction features that allow users to interact directly or indirectly with others are one of them. In the next part, the strategies used by mobile fitness apps to increase users' motivation, the factors affecting the usage of the apps, and the studies focusing on social interaction features in fitness apps are reviewed.

2.4 Mobile Activity Tracking Apps

Through the improvements in mobile technologies, there has been an increase in the use of mobile applications in recent years (Bitrián et al., 2021). According to data presented in Statista (2021), the total number of mobile app downloads was around 218 billion in 2020. In parallel with this rapid development of mobile apps, more companies started to provide consumers with apps aiming to help them engage with physical activities (Edwards et al., 2016; Feng et al., 2020; Maher et al., 2016). These are called fitness apps or activity tracking apps, which are third-party applications that allow users to record their activity data and aim to lead them towards healthy lifestyles (Cai et al., 2022). For example, some apps help users to track their daily physical activities such as step counts, calories burned, and distances traveled, and notify them of their performance (Korinek et al., 2018; Walsh, Corbett, Hogan, Duggan, & McNamara, 2016).

According to Curry (2021), increasing interest in fitness apps is also reflected in the statistics. In total, fitness apps were downloaded over 400 million times in 2021 (through 31/10/2021). Download numbers of different fitness apps can be seen in Figure 2.4. Compared to 2019, the number of users using at least one fitness app also increased by 45% in 2020 (See Figure 2.5). Accordingly, the revenue of the fitness apps increased by 84% in 2020.

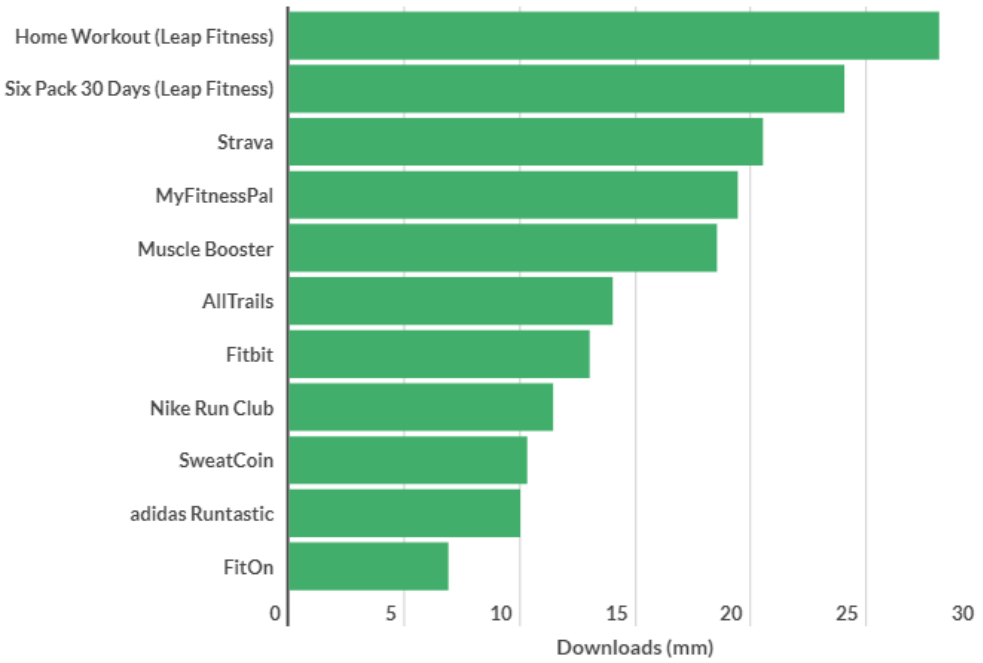

Figure 2.4 Download rates of different fitness apps (taken from https://www.businessofapps.com/data/fitness-app-market/)

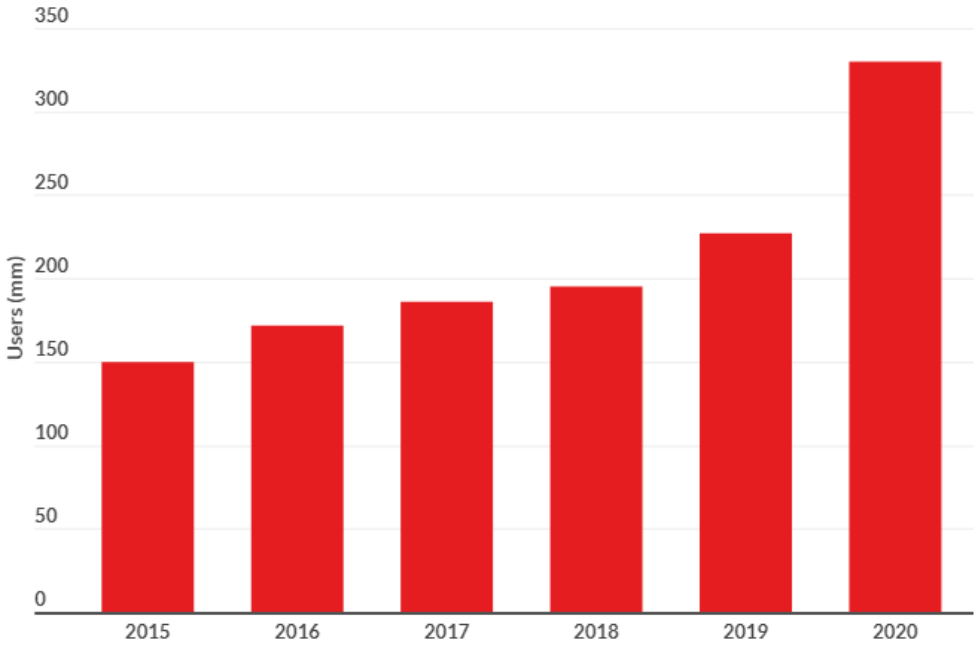

Figure 2.5 Number of fitness app users according to years (taken from https://www.businessofapps.com/data/fitness-app-market/)

This growth in numbers emphasizes the interest in physical activity during the COVID-19 pandemic. Apps reported higher usage ratios in 2020 and 2021 primarily through higher usage during lockdowns and restrictions preventing users from participating in physical activities as they used to.

Fitness apps use a variety of smartphone technologies such as GPS (Global Positioning System), microphone, accelerometer, and camera to be able to monitor physical activity. Through that technology, they can differentiate the type of physical activities (e.g., walking, running, cycling, or static activities) with great accuracy (Higgins, 2016).

Several studies investigating the efficacy of health technologies, including mobile applications, have linked those technologies with the promotion of physical activity and or better health outcomes (Hebden et al., 2014; W. Lee et al., 2010; Turner-McGrievy et al., 2013). For example, Glynn et al. (2014) have conducted eight-week-long research with 139 participants to evaluate the effectiveness of smartphone apps to increase physical activity. According to the results, the use of smartphone apps has been found to be effective in increasing physical activity.

In another study with 726 participants, the link between the use of fitness apps and increased levels of exercise is examined by Litman et al. (2015). The study revealed that fitness app users have been engaging with more physical activity compared to participants who are not using a fitness app or quit using the app after a while. In a more recent study, Barkley et al. (2020) also examined the association between fitness app use and physical activity behavior through exercise identity. Their findings showed that people who use fitness apps reported more participation in physical activities (by 25%) compared to people not using fitness apps.

2.4.1 Running Apps

In the *Global Running Apps Market Report* (2021), seven running apps are included as the leading actors regarding their present and potential revenue and popularity in

the global market: Nike+ Run Club, Strava, Map by Run by Under Armour, Runkeeper, Adidas Running, Garmin Connect, and Sports Tracker. Brief information about the apps and example screenshots from them are presented below.

Nike+ Run Club

Nike Run Club is a free-to-use running app available on iOS and Android. The app provides real-time feedback and audio cues with the "Guided Run" option throughout the run. Example screenshots from Nike Run Club can be seen in figure 2.6.

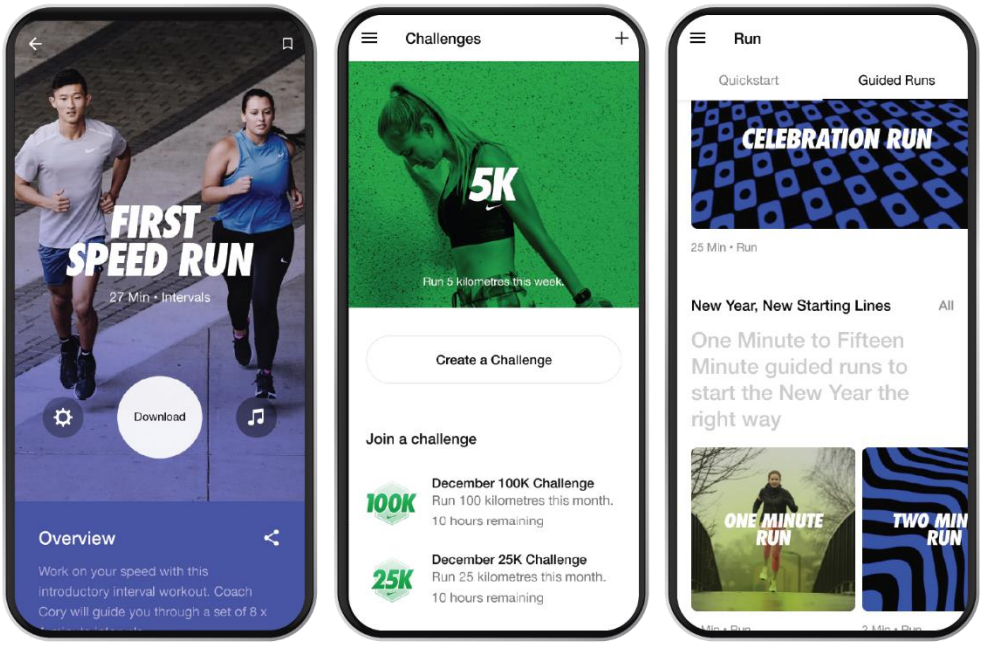

Figure 2.6 Example screenshots from 'Nike Run Club' app

Nike Run Club also includes several features to increase users' engagement with the app and physical activity. It encourages users to record and log their activity sessions. After the session is recorded, users can review all of the details about their activity, such as running pace, elevation, time, or calories burned. It also promotes organized

challenges for users to take part in with other runners. Moreover, users can set and share their personal goals, select a custom coaching plan or invite their friends to challenge.

Strava

Strava is a freemium activity tracking app mainly used for running and cycling. It is available on both iOS and Android markets. The app records the users' activity data, which can be shared with their followers or publicly. Example screenshots from Strava can be seen in Figure 2.7.

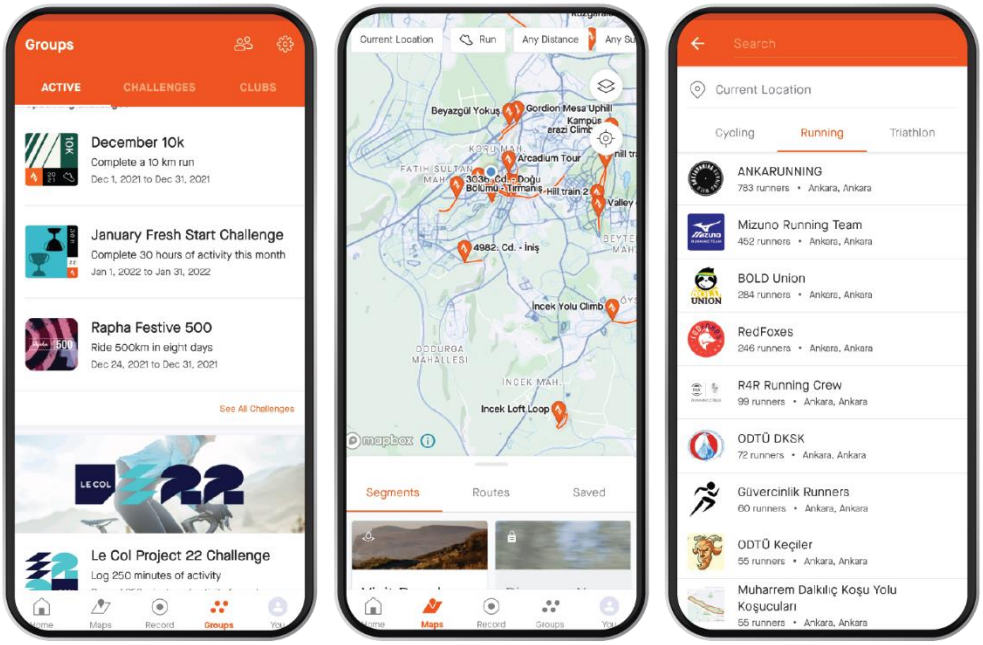

Figure 2.7 Example screenshots from 'Strava' app

Activity-related information, including route mapping, elevation, duration, and speed, are shared with the activity posts. Alongside this information, users can also post pictures, and their followers can comment on and give 'kudos' (likes) to their posts. During this process, the app automatically groups the activities if they are

recorded simultaneously at the same place. This allows users to be informed about other runners. Users can also participate in virtual running events on the platform.

Map My Run by Under Armour

Map My Run by Under Armour offers their users to keep track of several activity details such as pace, distance, calories burned, and time. It is accessible to both Android and iOS users. Similar to other running apps, users can share their activities with their followers in the app or through social networks. Example screenshots from Map my Run can be seen in Figure 2.8.

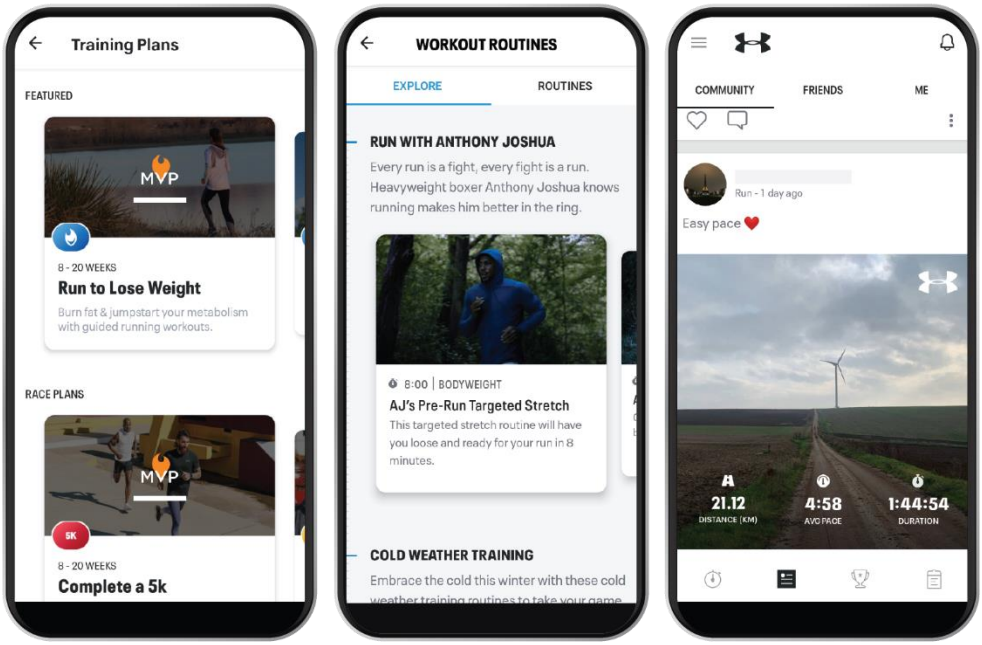

Figure 2.8 Example screenshots from 'Map My Run' app

It is compatible with different activity trackers and heart rate monitors. Before users start recording an activity, they can specify the type of run (e.g., trail, treadmill). This allows them to have detailed analysis when they look back at their performances. App also provides additional features to runners, including customizable training

plans, workout routines, information about nearby routes, personalized coaching tips or challenges to keep them motivated.

Runkeeper

Runkeeper is a fitness app created by ASICS, used for keeping track of several activities, including running. It is a freemium running app, available for iOS and Android devices, allowing users to track and plan their runs. Runners are able to analyze information about their activity, such as running pace, distance, and duration in the app. Example screenshots from the Runkeeper app can be seen in Figure 2.9.

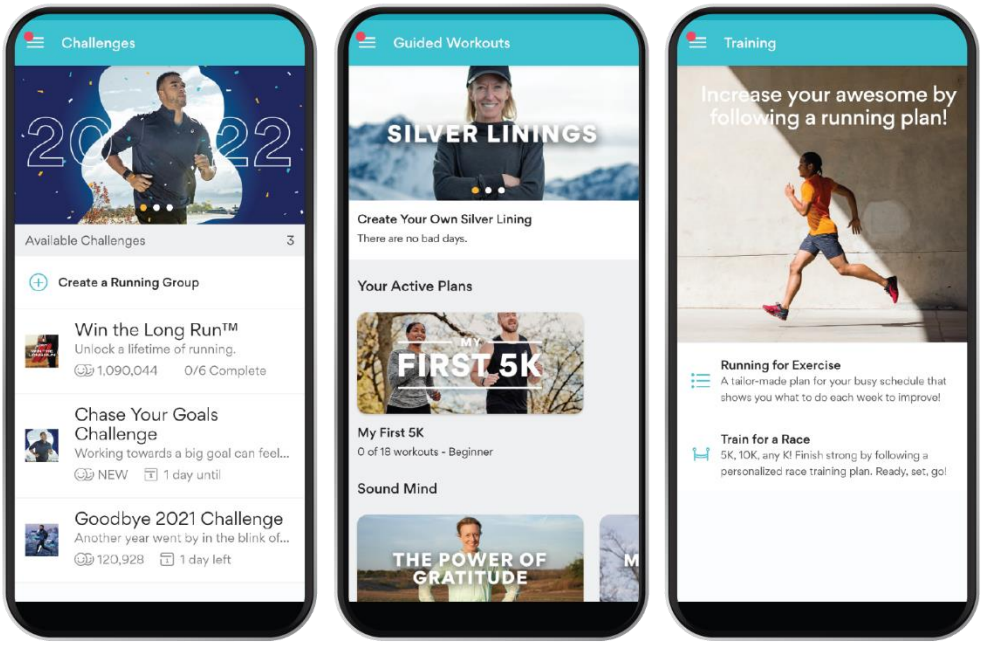

Figure 2.9 Example screenshots from 'Runkeeper' app

It also lets users set measurable personal goals and provides encouragement towards reaching them. Moreover, it offers several features, including training plans, audio cues, route creating options, global challenges, and virtual events for runners to participate. Users can also connect with their friends and share their activities and

goals with them or with the broader community members. Users can also share their progress on social media platforms they use.

Adidas Running

Adidas Running, previously owned by Runtastic, is an activity tracking app suitable for different types of activities such as running, cycling, hiking, and yoga. It is available at iOS and Android markets and is free to use, with in-app purchases providing more features. It keeps a log of duration, distance, and speed and provides users with graphs and charts about their progress. It also promotes challenges and virtual events to keep users motivated. Example screenshots from the Adidas Running app can be seen in Figure 2.10.

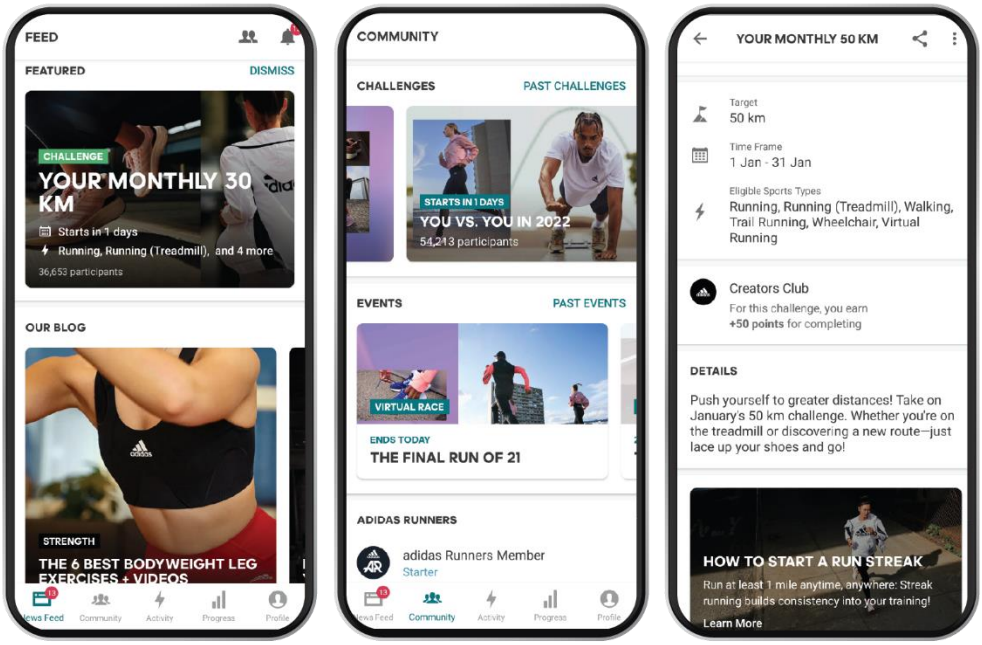

Figure 2.10 Example screenshots from 'Adidas Running' app

Runners are able to choose their personal goals inside the activity. Moreover, they can also join communities created by the app or create their own groups by inviting

their friends and followers. Encouraging stories of experienced community members are shared inside the app to inspire users. Through following other runners and reading these stories, users learn important information or tips about running.

Garmin Connect

Garmin Connect app is used for tracking, analyzing, and sharing activity and health data. The app is free to download and available for iOS and Android devices. However, the app is only compatible with a Garmin brand activity tracker, and without those trackers, users have to upload their activities manually. With a paired Garmin device, users can analyze their performance data, including distance, calories, time, and pace. Example screenshots from the Garmin Connect app can be seen in Figure 2.11.

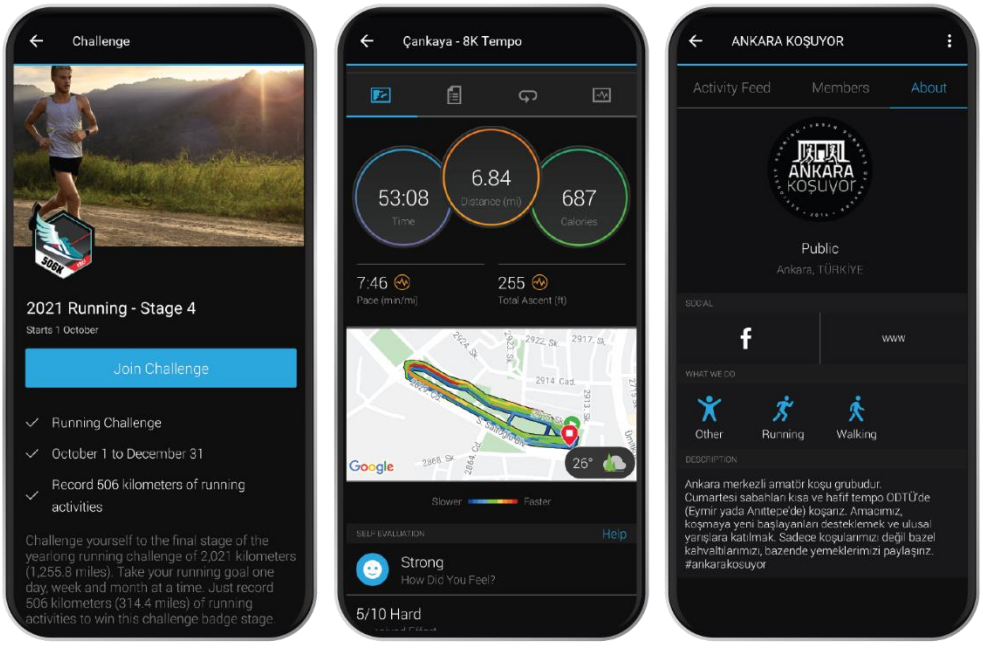

Figure 2.11 Example screenshots from 'Garmin Connect' app

The app provides coaching and training plans based on users' goals and performances. It is also possible to connect with friends and participate in challenges or online groups. Through the LiveTrack feature, users' activities can be tracked by their friends and followers in real-time.

Sports Tracker

Sports Tracker is a fitness app used for tracking different activities, including running, hiking, and cycling. It is free to use and available in iOS and Android markets. It keeps track of different measures such as duration, distance, elevation, running pace, average speed, and calories burned. The app provides voice feedback to the users during their training sessions to inform them about their performances. Like other running apps, users can connect with their friends, share their activities, and follow other runners in the Sports Tracker app. App also allows users to explore new routes and provide route-specific analysis. Example screenshots from the Sports Tracker app can be seen in Figure 2.12.

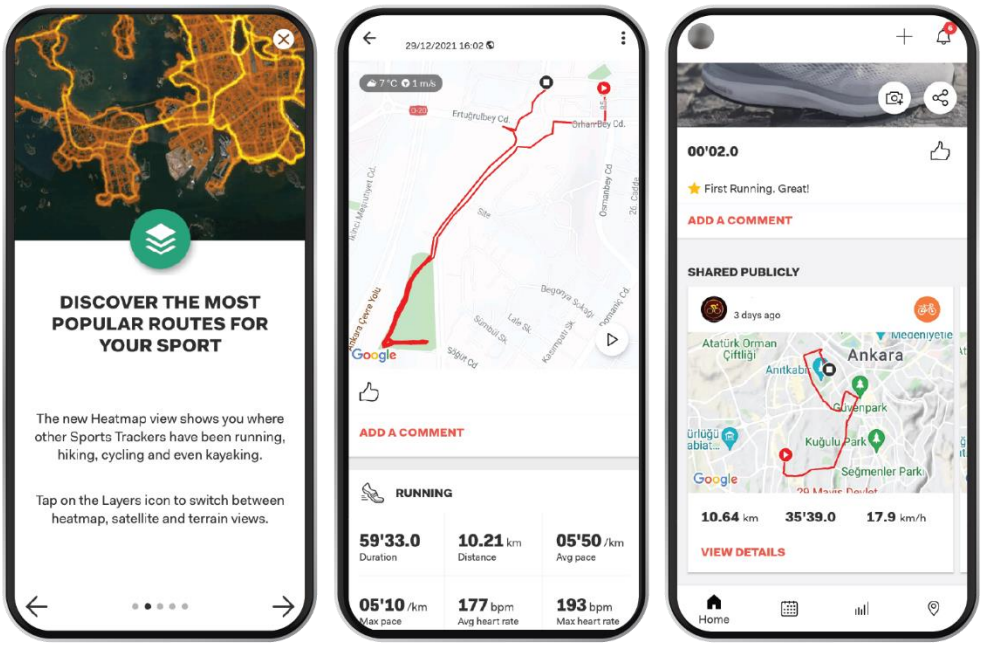

Figure 2.12 Example screenshots from 'Sports Tracker' app

2.4.2 Factors Affecting the Use of Fitness Apps

The popularity of fitness apps and, accordingly, running apps is increasing. Although their effectiveness is linked with increased physical activity in many studies in the past, it is still a problem for users to stop using fitness apps. Since continuous use of the fitness apps is critical for behavior change, it is important to understand the reasons affecting users' willingness to use the apps and factors that make them stop using the apps (Li et al., 2019).

In previous studies, features of technology acceptance model, perceived ease of use, and perceived usefulness have been linked with users' intention to continue using fitness apps (Beldad & Hegner, 2018; Cho, 2016; Cho et al., 2015; Koenig-Lewis et al., 2015; Lin et al., 2020). Davis (1989) defines the perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance" and perceived ease of use as "the degree to which a person believes that using a particular system would be free of effort" (p.320). An example supporting the importance of perceived ease of use might be the study of Wang et al. (2014). Their results show that the amount of time and effort needed to use health apps make users deter from continuing to use those apps. Similarly, according to the study by Gowin et al. (2015), users tend not to download and stop using health apps if the apps require complex procedures or if users need instructions to use the features in the app. Mastroianni (2015) also stated that because of the difficulty of using fitness apps, people stop using them. The perceived usefulness is also important because when users believe that their efficiency towards achieving their goals will improve through a technology system, their intention to use it will also enhance (Cheng et al., 2021). The primary goals of fitness apps are to encourage users towards participating in physical activities regularly and staying fit to be perceived as useful by them

Previous studies in this area have revealed the importance of social interaction along with other factors in the continuity of app use. In a recent study, due to the increasing number of apps allowing their users to share their information, including performance data and achievements, Cheng et al. (2021) investigated the effects of self-expression alongside perceived usefulness and perceived ease of use on users' continued use of running apps. Their findings show that self-expression has significantly and positively affected the intention of using the app continuously. Self-expression is also related to word-of-mouth advertisement of the apps and brand intimacy in the study.

Similarly, in a study by Zhang and Xu (2020), important factors affecting the continuous use of fitness apps are examined through a survey conducted with 379 participants. Social connection included in the research as a factor to be investigated and defined as the possibilities for users to communicate with other users in the app. Results revealed that alongside other factors (confirmed ease of use, confirmed usefulness, fitness achievement, and satisfaction), the social connection has a positive effect on participants' continuous intention to use fitness apps.

In another study, Li et al. (2019) investigated users' intention to continue using social fitness apps, and in the findings, they identified two motivating forces for continuous usage, which are social comparison and expectation confirmation. It is revealed that confirmation and expectation of users' rank in the social environment are directly related to using fitness apps. It is also highlighted that when participants evaluate their performances in rankings, the tendency towards upward comparison has a negative effect on the intention of using the app due to their expectations are not always being confirmed.

As can be seen from previous studies, in addition to ease of use, usefulness, and related subheadings, features related to social interaction also impact the continuous use of apps.

2.4.3 Motivating/Persuasive Features in Fitness Apps

Fitness apps are aimed at motivating people to stay fit and physically active. It is not an easy task since different users' needs and motivational requirements vary in different physical activity stages. Moreover, even the needs of an individual differ at the beginning of their engagement to exercise compared to later stages (Molina & Myrick, 2021). To overcome this, fitness apps include several persuasive features to reach different users. These features are supportive and have the capacity to motivate the behavior change in users (Oyibo & Vassileva, 2021). One of the well-known persuasive system designs relies on the works of (Oinas-Kukkonen and Harjumaa (2008). In their study, they proposed 28 persuasive system strategies under four main categories, which are: primary task support, dialogue support, system credibility support, and social support.

Among these strategies, some of them (goal-setting, self-monitoring, reward, cooperation, competition, social learning, and social comparison) become prominent since they are commonly examined in literature and implemented by most fitness apps. (Munson & Consolvo, 2012; Orji et al., 2019; Oyibo & Vassileva, 2020, 2021; Shih & Jheng, 2017) Moreover, in their study, Matthews et al. (2016) reviewed apps which are promoting physical activity. They presented the percentages of implementation of persuasive features in the apps in their findings. 70% of the applications had self-monitoring while social comparison, social learning, and competition are implemented by 25%, and 20% off the apps implemented reward. Also, considering users' intention of using fitness apps, self-monitoring has been found to be the strongest predictor (Oyibo & Vassileva, 2020). Similarly, (Middelweerd et al., 2014) also stated that self-monitoring is associated with greater effectiveness of fitness apps.

Since it is not in the scope of this study, details of each persuasive feature are not presented in this review. However, persuasive features including social interaction are examined in a more detailed way and presented below.

According to Orji et al. (2019), "The major distinction between socially-oriented strategies and other persuasive strategies is their ability to leverage the power of social influence to motivate behavior change" (p.4). Under the social support category in the persuasive system design of Oinas-Kukkonen and Harjumaa (2008), there are seven system strategies related to social interaction which are; social learning, social comparison, normative influence, social facilitation, cooperation, competition, and recognition. Definitions and examples of social strategies by Oinas-Kukkonen and Harjumaa (2008) can be seen in Figure 2.13.

The effectiveness and relationship of these socially-oriented strategies with each other are examined in previous studies. For example, in their study, Stibe et al. (2013) examined the social influence strategies in persuasive apps. The study's findings revealed that most of the social influence strategies, including social comparison, competition, cooperation, and social learning, are interrelated.

A previously mentioned study by Oyibo and Vassileva (2020) examined persuasive social features (cooperation, social comparison, social learning, and competition) have been found to be less effective in motivating behavioral change compared to personal features (self-monitoring and reward). However, when social features are compared with each other, they recommend that competition should be given priority in the design of persuasive systems over the other social features.

In contrast with their findings, in the study of Chen and Pu (2014) examining the effects of three social settings (competition, cooperation, and hybrid setting) on increased physical activity, competition is outperformed by cooperation and hybrid setting. Another interesting finding from the study is that the number of exchanged messages between users is also significantly associated with increased physical activity levels.

Principle	Example requirement	Example implementation
22. Social learning A person will be more motivated to perform a target behavior if he or she can use a system to observe others performing the behavior.	System should provide means to observe other users who are performing their target behaviors and to see the outcomes of their behavior.	A shared fitness journal in a mobile application for encouraging physical activity. [3]
23. Social comparison System users will have a greater motivation to perform the target behavior if they can compare their performance with the performance of others.	System should provide means for comparing performance with the performance of other users.	Users can share and compare information related to their physical health and smoking behavior via instant messaging application. [21]
24. Normative influence A system can leverage normative influence or peer pressure to increase the likelihood that a person will adopt a target behavior.	System should provide means for gathering together people who have the same goal and get them to feel norms.	Possibility to challenge relatives or friends to quit smoking from a web site via email or text message.
25. Social facilitation System users are more likely to perform target behavior if they discern via the system that others are performing the behavior along with them.	System should provide means for discerning other users who are performing the behavior.	A shared fitness journal in a mobile application for encouraging physical activity. [3]
26. Cooperation A system can motivate users to adopt a target attitude or behavior by leveraging human beings' natural drive to co-operate.	System should provide means for co-operation.	The behavioral patterns of overweight patients are studied through a mobile application, which collects data and sends it to a central server where it can be analyzed in detail. [10]
27. Competition A system can motivate users to adopt a target attitude or behavior by leveraging human beings' natural drive to compete.	System should provide means for competing with other users.	Online competition, such as Quit and Win (stop smoking for a month and win a prize).
28. Recognition By offering public recognition (for an individual or a group), a system can increase the likelihood that a person or group will adopt a target attitude or behavior.	System should provide public recognition for users who perform their target behavior.	Personal stories of the people who have succeeded in their goal behavior are published on a Web site. Names of awarded people, such as "quitter of a month", are published on a Web site.

Figure 2.13 Persuasive strategies related to social support category in PSD (Oinas-Kukkonen & Harjumaa, 2008, p. 173)

Gamification is another strategy commonly used by fitness apps to keep users engaged and motivated. Gamification can be briefly defined as using game elements in a nongame context. (Lister et al., 2014). It is widely used in fitness apps in different contexts (Lister et al., 2014; Mateo et al., 2015). Some fitness apps use game elements such as leaderboards, rewards, or achievement badges to make engagement with physical activities more fun (Johnson et al., 2016). Moreover, according to (Koivisto & Hamari, 2019), gamification is associated with experiences that are intrinsically motivating and satisfactory and hence, can lead to permanent behavior change.

In a recent study (Neupane et al., 2020), game elements that are utilized by commercial fitness apps are identified by examining several game element taxonomies. As a result of this review, selected game elements are: goals, challenges, leaderboards, collaboration, social influences, high scores, badges, plot, narrative, points, levels, unlockable content, and real-life incentives. Descriptions of these game elements can be seen in Figure 2.14. These game elements are used in many fitness apps to make apps more enjoyable and, hence, provide emotional value (Tu et al., 2019). For example, apps provide rewards to make users maintain their physical activity in a more fun way (Lee & Cho, 2017). That is because, through those rewards, users' experiences can be more enjoyable. That feeling of enjoyment can encourage users to engage with physical activity (Seaborn & Fels, 2015; Zuckerman & Gal-Oz, 2014). According to Yang (2017), besides making the experience more enjoyable, game elements can also be used to enhance social interaction. In a study by Lee and Cho (2017), social networking in fitness apps leads to significant changes in the intentions of users to use the apps. In another study, (Tu et al., 2019) compared the effectiveness of emotional and social values in long-term participation in physical activity. Their findings revealed that gamification focusing on social value is more effective in physical activity participation and intention to use fitness apps.

Game Element	Description
Goals	Measurable and well-defined target that a user has to achieve.
Challenges	They are like goals or competitions but short-lived. They are sometimes optional in the games (like a side quest) or could be a challenge that moves a story forward. Also, code for challenge when the app explicitly identifies something as a "challenge."
Competition/Leaderboards	Compete with other members directly or through leaderboards.
Collaboration	Work together towards a common goal or objective in the game.
Social Influences	Performance is publicly displayed. Code for this if game activities can be shared or there are elements of peer pressure and social nudging.
High Scores	Tracking of best attempts over a particular timeframe.
Badges	Visual recognition earned for completing specific milestones, tasks or when player completes a goal or challenge.
Plot	Includes a pattern of events (i.e., causal chain of events) related to an unfolding narrative.
Narrative	Includes a theme that ties to an alternate world distinct from the everyday experience of the players. If an avatar of any kind is included in an app, the app will also have the Narrative classification.
Points	Accumulates points that help progress through game and/or can be redeemed for rewards or be used in in-game economy.
Levels	Progress through parts of the game (e.g. level 1 to level 2) or gradients of status (e.g. bronze level to silver level).
Unlockable Content	Access to enhanced functionality (new levels, gameplay, etc) or content for accumulating experience or achieving a specific goal.
Real-life Incentives	Discounts, rewards, donations, or prizes in real-life.

Figure 2.14 Game elements and their descriptions (Neupane et al., 2020, p.524)

In previous studies, social interaction was associated with physical activity level, long-term use of apps, and users' opinions about the app. In the next chapter, studies focused on fitness apps and social interaction are presented, as they are the main focus of this research.

2.4.4 Previous Studies Related to Social Interaction Features in Fitness Apps

Although not many, there are studies examining the relationship between social interaction and motivation in fitness apps in the literature. In a recent study, Huang et al. (2021) examined the relationship between features affecting the social interaction in fitness apps (e.g., receiving likes, core network size, frequency of checking, social support, upward and downward comparison) and physical activity engagement. In the study results, core network size (number of people followed by participants in the fitness app) and frequency of checking the app are related to physical activity participation. Under the social comparison category, both upward and downward comparisons were linked with more physical activity, but only upward comparison seemed to have a significant effect. On the other hand, different types of social support (esteem support, companionship support, and informational support) are not associated with increased engagement with physical activity. Similarly, receiving likes is not associated with physical activity participation either.

In another study by Whelan and Clohessy (2021), the effects of social dimensions in fitness apps are examined regarding different types of runners. Their findings revealed that different social influence aspects are suitable for different users. They stated that there is an association between perceived reciprocal benefits and harmonious passion for physical activity. For example, reciprocal benefits such as giving kudos (likes in Strava) or commenting activities of others are more likely to lead to adaptive outcomes. On the other hand, perceived recognition from their

network in fitness app is found to be linked with an obsessive passion for physical activity. For example, experiencing social recognition through sharing activity data can lead to only sharing positive performances and photos and, thus, maladaptive outcomes.

Although it is more like a plugin to a social network rather than an individual fitness app, a study by Gui et al. (2017) focusing on WeRun (an addition to WeChat social network) is also included in this section. According to their findings, sharing fitness data in the social network promotes motivation towards self-tracking. However, users' concerns about sharing their data and their privacy are also mentioned by the participants in the research.

2.4.5 Physical Activities and Fitness Apps During COVID-19 Pandemic

Restrictions to go outside emerged as precaution measures against the spread of COVID-19. Accordingly, most physical activities also had to be stopped globally. Staying inside with limited social interaction and physical activity had negative outcomes, and some people started exercising in their homes to overcome these problems. In recent studies, exercise is associated with psychological well-being as a coping strategy during stay-at-home times. (Ejiri et al., 2021) Exercise is also reported to buffer the link between social frailty and depressive symptoms caused by limited social interaction (Hayashi et al., 2022). In parallel with these, home fitness products, including fitness apps, gained popularity in recent years (Nyenhuis et al., 2020). According to Criddle (2020), two million new users have registered to Strava for the first time in each month of 2020, and people who are already active users in the app increased their workouts by 13%.

Parker et al. (2021) state that digital platforms, including apps, might significantly support physical activity engagement when outside activity opportunities are restricted. In their study, Yang and Koenigstorfer (2020) examined the relationship

between physical activities and fitness apps during the COVID-19 pandemic. According to their results, frequency of app use has been associated with a smaller decrease in physical activity level. They also stated that the gamification-related app features might be particularly effective in this relationship.

In parallel with these findings, fitness apps tried different strategies to keep users motivated during lockdowns. For example, they promoted different virtual events and challenges which can be participated from home. They also send motivating messages, notifications, and e-mails, including tips for staying active and doing exercises considering the restrictions. Examples of different features promoted by fitness apps can be seen in figure 2.15.

2.5 Conclusion

In conclusion, previous studies focusing on physical activity, running motivation, social interaction, and fitness/activity tracking apps have been examined in this chapter. A great number of studies that focus on physical activity motivation and tools to measure and analyze motivation highlight the importance of these subjects. Moreover, the influence of social interaction on physical activity behavior and the effectiveness of fitness apps have also been researched and have gained popularity recently. However, very little research has been conducted focusing on the relationship between social interaction features of fitness apps and motivation, although the popularity of fitness apps has dramatically increased recently, especially during the COVID-19 pandemic breakout. Since the effects of social interaction features on runners' motivation are examined in this study, some theories for understanding motivation and factors affecting the use of fitness apps will be considered while revisiting the research questions in the conclusion chapter. Also, since product, service, and system designs are developed with a user-oriented approach, positive psychology and previously mentioned psychological needs should be taken into account in the design processes. Users want to see the reflections of these psychological needs in the products they use. For this reason, designers

actually utilize knowledge in the psychology field. Therefore, it would be relevant to discuss the results of the fieldwork to be conducted from the perspective of these physiological needs as well.

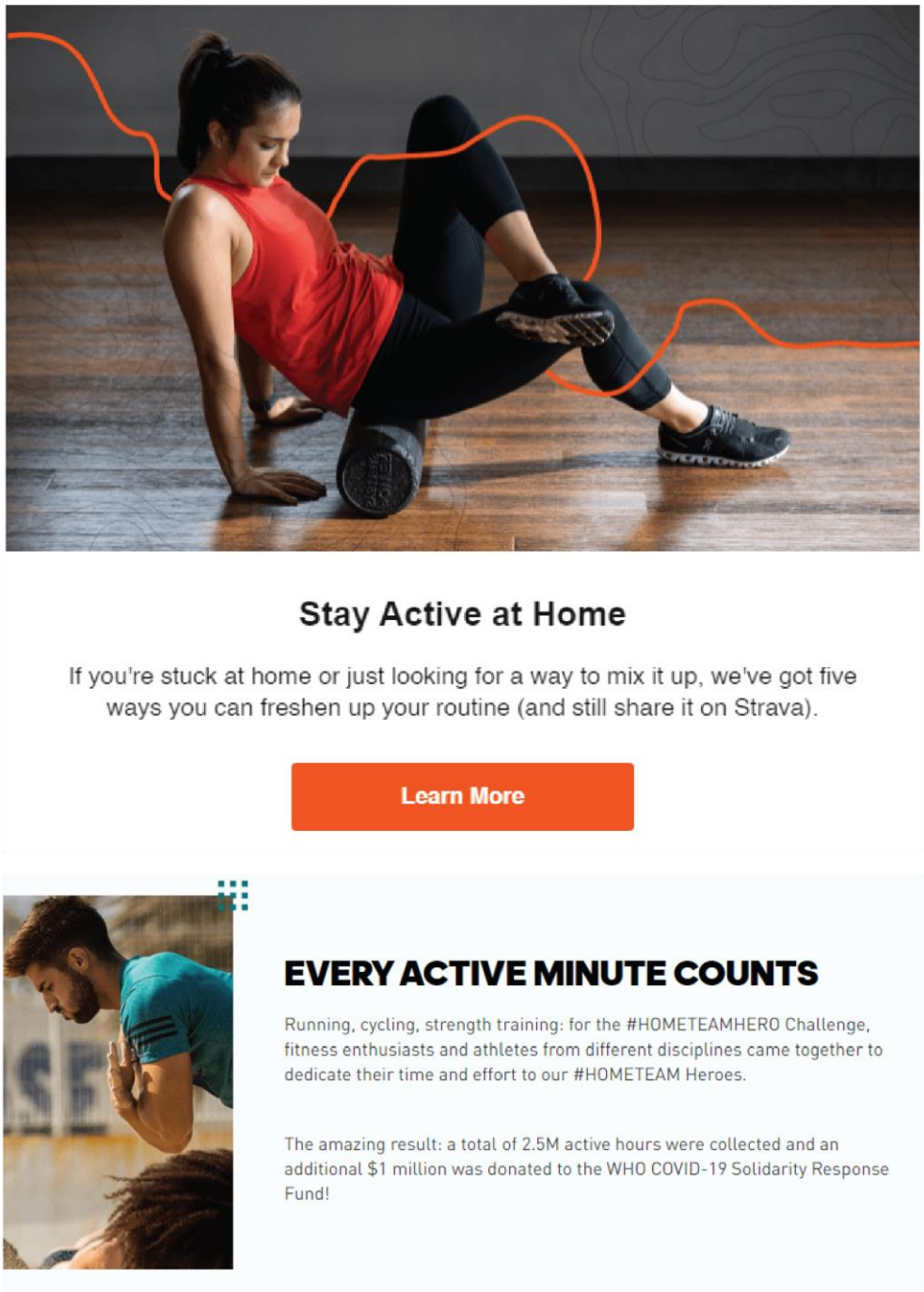

Figure 2.15 Example promotions from fitness apps during COVID-19 pandemic

CHAPTER 3

METHODOLOGY

In this chapter, the fieldwork set-up, exploring the relationship between runners' motivation and social interaction features of existing running apps, is presented. Accordingly, overview and aim of the fieldwork, data collection tools/methods, detailed explanation of different phases of the fieldwork, and participant gathering processes are introduced.

3.1 Overview and Aim of the Fieldwork

The fieldwork explores the effects of social interaction features of activity-tracking apps on runners' motivation and user experience with an aim to improve runners' overall experiences. The fieldwork consists of the following three phases.

In Phase 1 (Review of Existing Activity-Tracking Apps), existing mobile activity-tracking apps are reviewed to identify social interaction features available for runners. Since the review on literature did not uncover any studies focusing on the activity-tracking app features promoting social interaction, the outcome of this phase is planned to be used to inform the next phase.

In Phase 2 (Online Survey Among Runners), an online survey is conducted to examine the effects of social interaction features of the apps on the runners' overall motivation. Questions in the survey are also designed to find out whether there is any relation between social interaction features and motivation of different types of runners (e.g., based on their age, activity level, etc.).

In Phase 3 (One-to-one Online Interviews), a selected number of runners are interviewed to have a better understanding of user experience in social interaction features and to deeply investigate how these features affect users' running

motivation. Diagrammatic representation of three phases of the fieldwork can be seen in Figure 3.1.

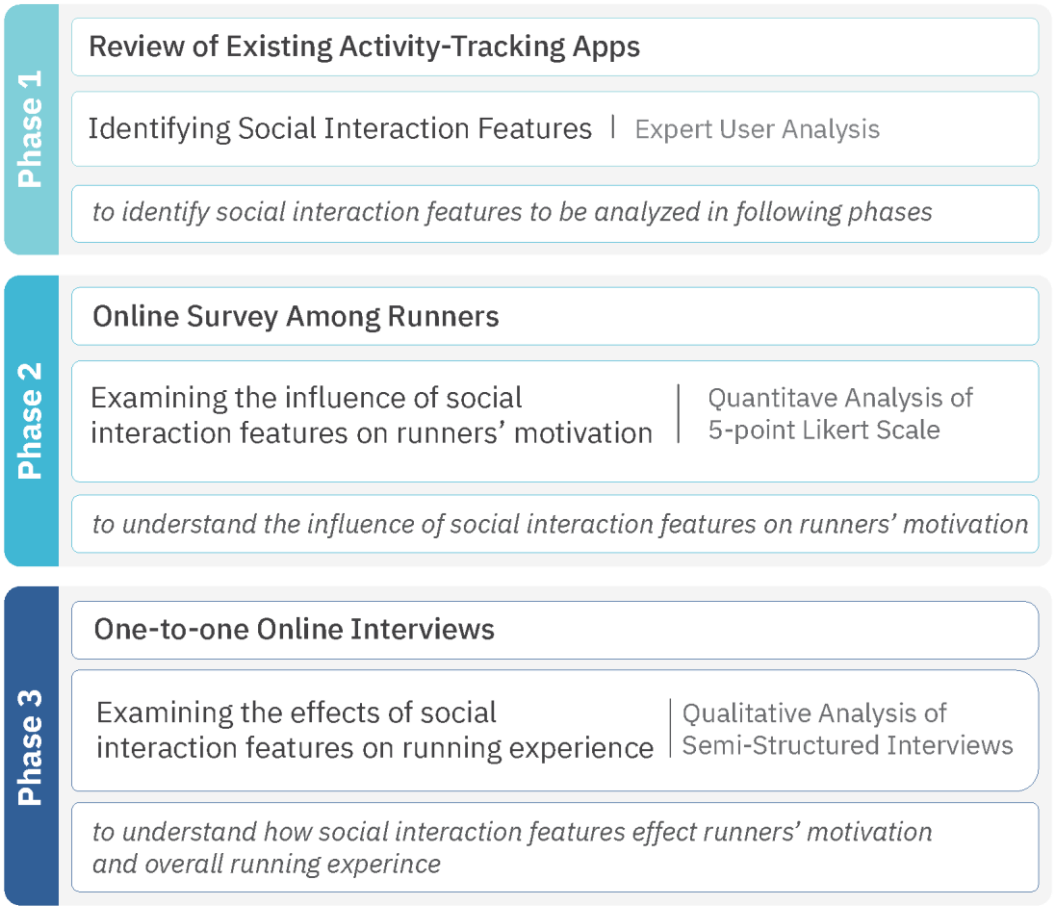

Figure 3.1 Overview diagram of the fieldwork

3.2 Data Collection Tools and Methods

The fieldwork aimed: i) to identify the influence of social interaction features of mobile activity-tracking apps on runners' motivation; ii) to examine the relationship between social interaction features and overall user experience. Accordingly, a combination of data collection tools and methods are used over three-phased fieldwork.

In Phase 1, a review is carried out by the researcher on existing activity-tracking apps from social interaction features point of view. In Phase 2 and Phase 3, data is collected through an online survey amongst runners and one-to-one online interviews. The use of the survey is to provide a standardized set of data (Jorgensen, 1989) about runners, whereas the one-to-one interviews are used to encourage the participants to reflect on their thoughts and expectations on social interaction features of the running apps in general (Cohen et al., 2009). Detailed explanation of each of the phases will be presented in the following section.

3.2.1 Phase 1: Review of Existing Mobile Activity-Tracking Apps

In Phase 1, mobile activity-tracking apps are reviewed in detail by the researcher in order to identify social interaction features available for runners. Activity-tracking apps generally keep a record of all the activities that a user does. While some apps are specific for an activity, many provide services for different sports branches, such as biking or swimming, but often the apps give an option to choose which activity you are going to do from a list. The app then creates a log of all the activities and the statistics associated with users' activity using GPS technologies and sensors (e.g., heart-rate, accelerometer). To obtain relevant data, these are located either on the smartphone or linked to an activity-tracking device, such as smartwatches and chest straps. For example, how many minutes you walked or whether your bicycle ride was as long as yesterday's.

3.2.1.1 Selection of Mobile Activity-Tracking Apps

During the selection of the apps, a brief evaluation is made based on pre-determined criteria. Since selected mobile activity-tracking apps would be used to identify frequently used social interaction features, their popularity was one of the most important criteria. For this reason, Google Play Store for the Android operating system was searched using the keyword "running" in November 2020. Then,

displayed applications are sorted based on their download rates, and the top five applications are included for the following evaluation stages. They are Adidas Running (+50 million), Strava Tracker (+10 million), Nike Run Club (+10 million), Runkeeper (+10 million), and Map my Run (+10 million), respectively. Next, these apps are evaluated according to their accessibility through compatibility with other devices. They were all compatible with different activity-tracking devices and could be synched with various activity-tracking apps.

Free accessibility. The shortlisted apps then were checked for their services being available for free. That is because some apps can be exclusive to the owners of a specific brand activity-tracking device, and therefore they may address to a relatively small target user group. Similarly, some apps may require a premium membership, and most features can only be accessible by paid membership. Although all the apps besides Nike Run Club offer premium membership options, they still provide social interaction features free of charge.

Social interaction features. For the final step of evaluation, all applications were studied for their ability to provide an option for online social interaction between different users. During this step, it is observed that all shortlisted apps included similar opportunities for online interaction. Therefore, only the top three ranked apps, 'Adidas Running,' 'Strava,' and 'Nike Run Club,' were selected to avoid repetition. Example visuals of selected mobile activity-tracking apps, 'Strava,' 'Nike Run Club,' and 'Adidas Running,' can be seen in Figure 3.2.

Figure 3.2 Entry-page screenshots of the three selected mobile activity-tracking apps: Strava, Nike Run Club, and Adidas Running

3.2.1.2 Strava

Strava is one of the most used activity-tracking apps, which is mainly used for running and cycling. It is primarily famous for its incorporated social network features and community-based interactions. It keeps track of users' activities and records their data, which can be shared with others, either privately with users' followers or with the public. Also, Strava automatically links activities that take place at the same time and nearby locations. This feature allows unacquainted users to be informed about each other and creates opportunities for further social interactions. While smartphones can be used for recording activities to Strava, third-party devices for activity-tracking such as Garmin and Polar, can also be linked/synched with the app for recording data. Example screenshots of Strava can be seen in Figure 3.3.

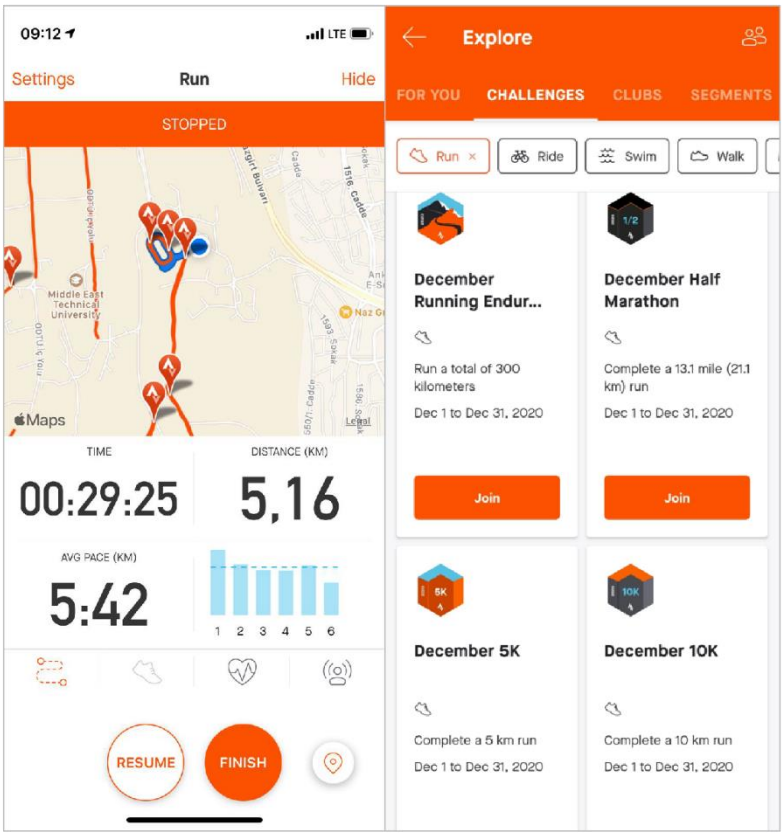

Figure 3.3 Example screenshots from Strava

3.2.1.3 Nike Run Club

Nike Run Club mainly focuses on building running habits and increasing engagement in running. One of the prominent characteristics of Nike Run Club is its "Guided Run" options with coaches. Users can select an activity from a pool of different running options, such as "5K" or a 30-minutes morning run. During the activity, coaches give users some tips on running and feedback on the physical process they are experiencing, which helps beginners get familiar with the activity while accompanying more experienced users through their run.

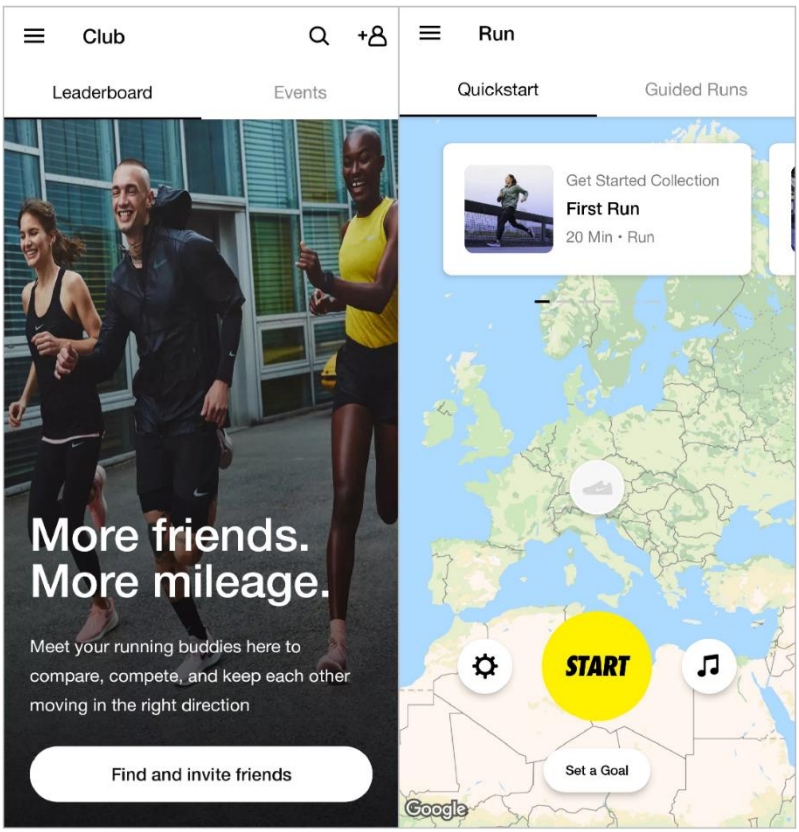

Figure 3.4 Example Screenshots for Nike Run Club

Nike Run Club app also includes several elements to increase user engagement. It constantly encourages users to record and log new sessions. Moreover, it promotes organized challenges, accessible for a limited time only, to keep users motivated while interacting with other runners. Example screenshots for Nike Run Club can be seen in Figure 3.4.

3.2.1.4 Adidas Running

Adidas Running app is a platform for tracking cardio exercises. It is one of the most popular applications in the market, with over 50 million downloads. It uses GPS technology for recording different activities such as running and cycling. Similar to Nike Run Club, Adidas Running offers an option called "Story Runs" that provides

coach guidance through runs. Adidas Running also offers a variety of challenges and special events for keeping users engaged.

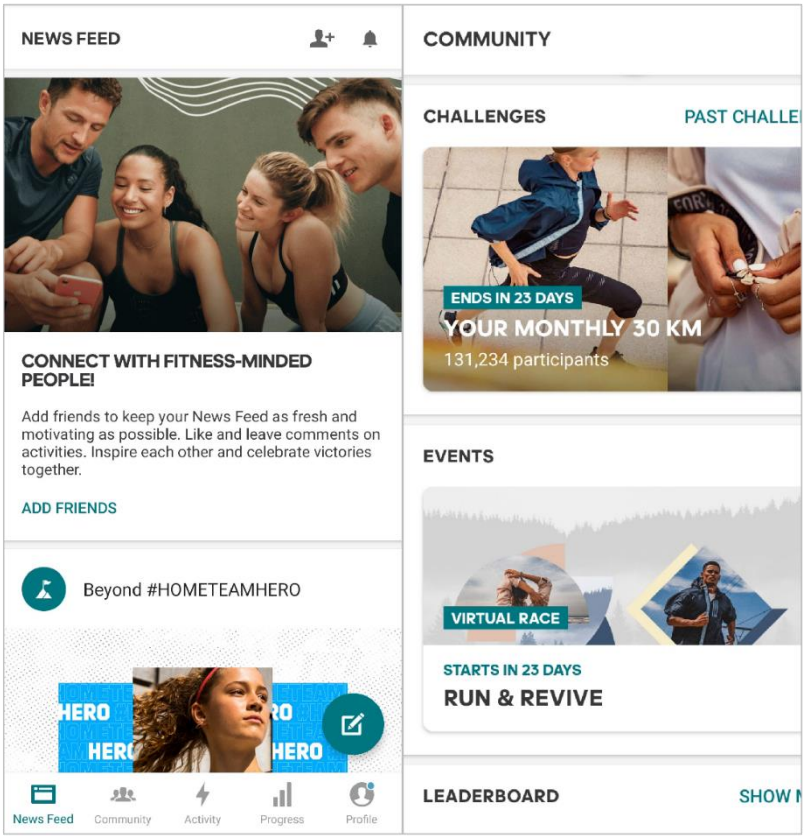

Figure 3.5 Example screenshots for Adidas Running

Also, experienced community members frequently share their own stories and inspirations with others. They also give information and tips about running. It is optional to follow different groups or create your own for interacting with followers. Example screenshots from Adidas Running app can be seen in Figure 3.5.

3.2.2 Phase 2: Online Survey Among Runners

In Phase 2, data is collected through a survey amongst runners. The use of the survey is to provide a standardized set of data (Jorgensen, 1989) about runners. Google Forms platform is used as an online survey questionnaire tool to examine the effects

of social interaction features of the mobile activity-tracking apps on runners' overall motivation.

3.2.2.1 Participant Selection for the Survey

To participate in Phase 2 of the fieldwork, the only requirement is to be running on a regular basis. Participants are recruited through the invitation posts sent to running communities' social media platforms (Facebook and Instagram) and through personal contacts. The participation call is on a voluntary basis, and the aim is to reach at least 50 runners.

3.2.2.2 Survey Procedure

The online survey consisted of multiple-choice, open-ended, and evaluation-based ones. 5-point Likert scale is used in the survey to learn the effects of social interaction features on participants' motivation.

- On the first page of the survey, all participants are informed about the aim of the questionnaire and research in general, and they are asked for their consent by adding a checkmark on the form. The participants are informed that their responses will be evaluated anonymously, and the information collected will be used for research purposes only. The consent form can be found in Appendix A. All participants gave their consent digitally before answering the questions.
- The participants then proceeded with the questionnaire.

3.2.2.3 Survey Questions

Online survey included 25 questions with the following sections: demographic characteristics, running activity details, social sharing habits, and effects of social

interaction features on runners' motivation (see Appendix B for the full set of questions)

Demographic characteristics: The participants are asked to indicate their age range and gender. Age range options are decided according to categories at running competitions [<25, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, >60] (USATF, 2020).

Running activity details: The participants are then asked to indicate their weekly running frequency [once in two weeks, once a week, 2-3 times a week, 3-5 times a week, almost every day, every day] to evaluate their activity level. The activity class chart based on the works of Jackson et al. (1990) was used. To understand participants' running preferences, they are also asked whether they are part of a running community, what (running) surfaces they prefer to run on, and if they record (and share) their activity data.

Sharing habits: Sharing habits of the participants are also questioned. They are asked to specify on a 5-point Likert scale how frequently [from never (1) to always (5)] they share information about their activity before and/or after their session. Reasons for sharing or not sharing information about their activity are also investigated. Moreover, to understand their tendency towards social interaction, participants are asked about their preferences about online media for sharing (app-based channels and/or social media platforms).

Effects of the social interaction features on runners' motivation: In the final part of the survey, participants are asked to indicate on a 5-point Likert-scale regarding how social interaction features of mobile activity-tracking apps affect [from strongly demotivating (-2) to strongly motivating (2)] their overall motivation level.

3.2.3 Phase 3: Interview with Runners

Interview with runners aimed at gaining insights about the relationship between social interaction features and their motivation towards and understanding how those

features affect the overall experience. The interview method is selected because it is important to analyze the experiences and thoughts of participants to have a deeper understanding. Also, interview is one of the most critical qualitative data collection methods, and it has been commonly used in field studies (Qu & Dumay, 2011). Therefore, in Phase 3, semi-structured interviews with open-ended questions are planned for collecting data.

3.2.3.1 Participant Selection for the Interview

Amateur runners are targeted as participants of the interview phase. Participants are recruited from people who conducted the survey via invitation e-mails and personal contacts. It is believed that amateur runners use social interaction features of the activity-tracking apps to build up a running habit or sustain their own running routine. They may interact with social interaction features to boost their motivation towards running and engaging in the activity. Considering these, amateur runners are suitable participants for the interview phase.

3.2.3.2 Interview Venue and Equipment

All interviews are conducted online using video conferencing tools Microsoft Skype or Zoom (Zoom Video Communications, Inc.) due to COVID-19 restrictions. These platforms are chosen because of their popularity and the researchers' familiarity and access. Interview sessions are recorded on both computer software and a smartphone application simultaneously to be used as a reference during analysis.

3.2.3.3 Interview Procedure

In this phase of the fieldwork, online meetings with participants are planned. All participants are from Turkey, and thus interviews are conducted in Turkish on a one-

to-one basis. Throughout the interviews, participants are encouraged to express their opinions, experiences, and ideas. The following procedure is followed in all sessions.

- Before starting the interview session, all participants are informed about the aim of the interview phase and study in general, and they are asked to sign and submit the consent form digitally (see Appendix C). In the consent form, participants are informed that their answers will be evaluated anonymously and for research purposes only.
- In the beginning, the participants are asked warm-up questions. Following that, topics regarding the usage of social interaction features of the apps and their effects on the participants' motivation towards running are discussed. The researcher conducted the interviews following a pre-prepared question guide. The guide contains questions and prompts to help the interviewer keep track of the subjects to discuss during the interviews. The question guide includes eight questions and follow-up prompts to reach detailed answers regarding them (see Appendix D).
- At the end of the questions, the participant was thanked for their contribution. The recording of the session then ended, and the same procedure was repeated for all participants.

3.3 Pilot Study

A pilot study containing the semi-structured interview in Phase 3 was conducted with a 26-year-old amateur runner. The participant was reached through personal contact and selected according to the willingness to participate in the session. The interview was conducted online via the Zoom Video Conferencing platform. Previously mentioned interview procedure is followed while conducting the pilot interview. The session was carried on under the guidance of the interviewer by following the pre-prepared question guide. Besides observing opportunities for the participant to express feelings, thoughts, and related information, the flow of the questions and overall conversation were checked in the piloting. Also, the estimated time for an

interview was settled at the end of this session. At the end of the pilot study, no adjustment was required, and the interview procedure was not changed. Consequently, the pilot study was decided to be included in the results and analysis of the fieldwork chapter.

3.4 Data Analysis Overview

In this section, an overview of the data analysis is introduced with approaches and tools to be used. For the quantitative analysis of Phase 2 of the fieldwork (Online Survey Among Runners), 5-point Likert Scale is used to examine the effects of social interaction features of the activity-tracking apps on runners' motivation.

Then, in Phase 3 (One-to-one Online Interviews), results will be thematically analyzed using a general inductive coding approach (Thomas, 2006) to obtain relevant information from the raw data. To do that, participants' recorded statements will be transcribed as keywords and phrases. Following that, these phrases will be reviewed and combined with each other to create thematic clusters. In the final step, themes will be revised and refined with multiple researchers to interpret key findings from interviews.

3.5 Ethical Considerations

"The necessary ethical approval was obtained from the Applied Ethics Research Centre of the Middle East Technical University, approval number 280-ODTU-2020 (See Appendix E).

CHAPTER 4

RESULTS ANALYSIS AND DISCUSSIONS OF FIELDWORK

In the fieldwork, the effects of social interaction features of the activity-tracking apps over runners' motivation and the relationship of these features and overall user experience were examined. Considering these, both quantitative and qualitative research methods were employed in the fieldwork, and their analysis was conducted accordingly.

This chapter presents results and analysis of the three phases of the fieldwork, accompanied by related discussions. In Phase 1 (Review of Existing Activity-Tracking Apps), social interaction features that are available to runners were identified with the review of existing mobile applications. Then, in Phase 2 (Online Survey Among Runners), an online survey was conducted with runners to examine identified social interaction features' effects on the runners' overall motivation. Following that, in Phase 3 (One-to-one Online Interviews), semi-structured interviews were conducted to further analyze the social interaction features-motivation relationship and effects of social interaction features on user experience.

4.1 Phase 1: Review of Existing Mobile Activity-Tracking Apps – Results and Analysis

In Phase 1, three selected mobile activity-tracking apps, Strava, Nike Run Club, and Adidas Running, were reviewed to identify their social interaction features. The outcome of this phase was also used to inform the content of Phase 2 (Online Survey Among Runners), as detailed in Chapter 3.

All three selected apps were reviewed by the researcher taking the role of a user. At first, user profiles were created for each of the apps. Then, the researcher navigated

through the apps' menu to study features where users can experience direct or indirect interaction with other users. Examples of direct interaction could be having a conversation through comments or sending likes to each other's posts, whereas indirect interaction could emerge as a competition as a consequence of ranking in leaderboards. Then researcher started to follow a number of other runners to see if there were additional features that are only available to users following each other. For the same reason, the researcher joined in online running communities (clubs, groups, etc.) of all apps to explore different ways of interaction in groups. Finally, the researcher recorded several runs using all three apps since some of the features would only appear after recording an activity and/or multiple activities. The resulted features that can be classified as 'social interaction' and decided to be included are as follow.

- Sharing activity related visuals or messages and receiving feedback (likes, comments),
- Participation in online communities,
- Leaderboards (general, or among followers)
- Challenges (created by the app or friends)
- Routes (created by the app or friends)
- Special Running Events (created by the app or friends)
- Notifications

All three apps require users to create a profile to access these features. Through that profile, users can subscribe to other athletes' activities (i.e., become followers), access others' profiles and activity data (if they do not restrict access to their profile), similarly, they can be followed by other runners. Details of these features are presented in the following headings.

4.1.1 Sharing

After setting up a profile, users can record and share their activity data. Activity data may include personal performance analysis features like heart rate zone, average pace, calories burnt; activity analysis features like route, elevation gain, pace; and/or workout analysis (mostly comparison of one's personal performance and activity analysis with past match activities). Activity data can be shared with a caption and/or an accompanying photo that is visible to followers. The selected apps also provide an option to share an activity through other social platforms (e.g., share using Instagram stories, Facebook). Others' activities will appear on the "Feed" screen, which is common in all three apps. In the Feed, users can see the data shared by the people they follow and exchange comments and likes (i.e., called 'Kudos' in Strava, a quick thumbs-up you can give to your fellow athletes to congratulate them on a noteworthy activity, achievement, post, badge or challenge milestone).

Users can receive messages not only from their followers but also from the app through different channels (e.g., notifications, e-mails, etc.) These messages may include invitations to physical activity, promotion of apps features, news from other users, etc. Example screenshots for 'sharing' can be seen in Figure 4.1.

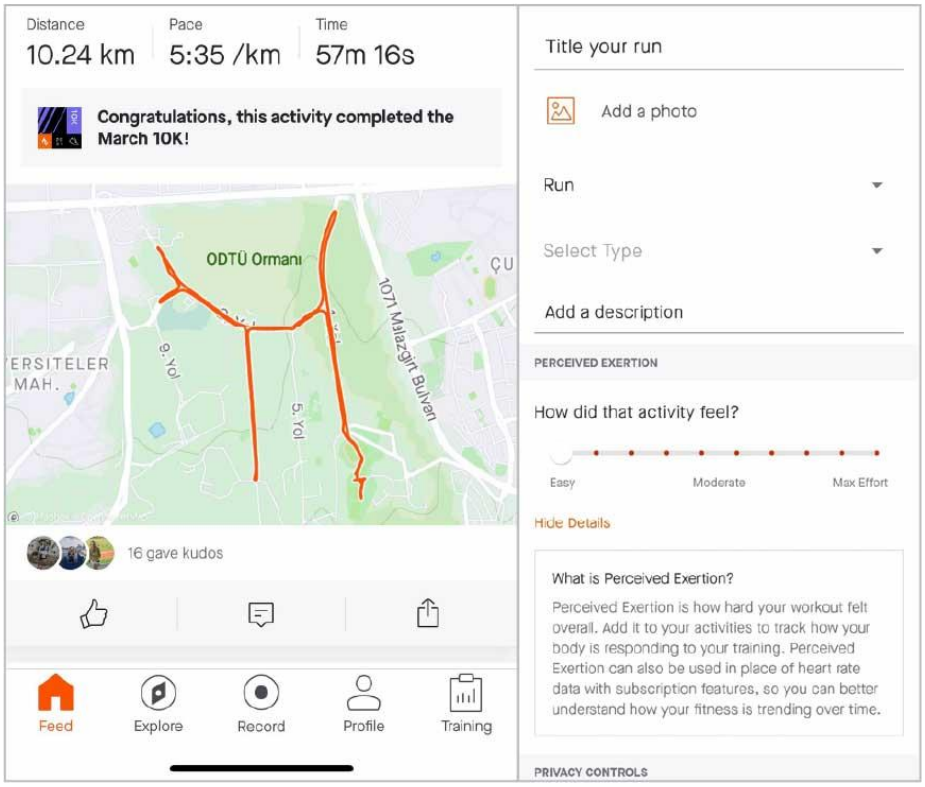

Figure 4.1 Example screenshots for 'sharing' (Strava)

4.1.2 Online Communities

All three apps are encouraging their users to participate in online communities and groups. While Strava focuses on local communities created by its users, accessible through GPS information, Nike Run Club and Adidas Running are promoting the communities created by the app. In both cases, participation in online communities can be considered important since it establishes a ground for increased interaction between the app users. Also, local communities provide opportunities for finding activity partners or groups for running together. Example screenshots for 'online communities' can be seen in Figure 4.2.

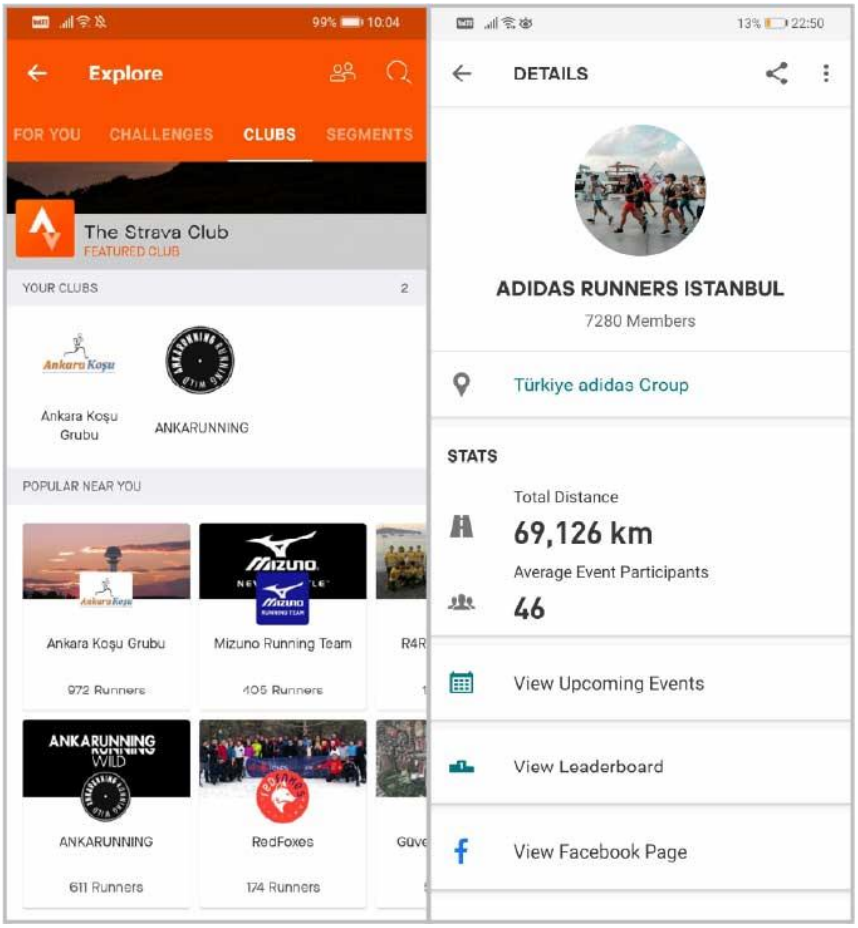

Figure 4.2 Example screenshots for online communities (Strava/Adidas Running)

4.1.3 Leaderboards

Another feature where users can interact with others is leaderboards. All three apps enable users to compare their stats with others through rankings in this feature. Leaderboards may include all global subscribers of the app or can be specific to certain criteria (e.g., regional, community, route-specific, age group, or gender-based). According to a previous study (Jia et al., 2017), while leaderboards are effective in motivating some users, others may get demotivated by them. Users can compare their performance stats with other users or among their followers. Example screenshots for 'leaderboards' can be seen in Figure 4.3.

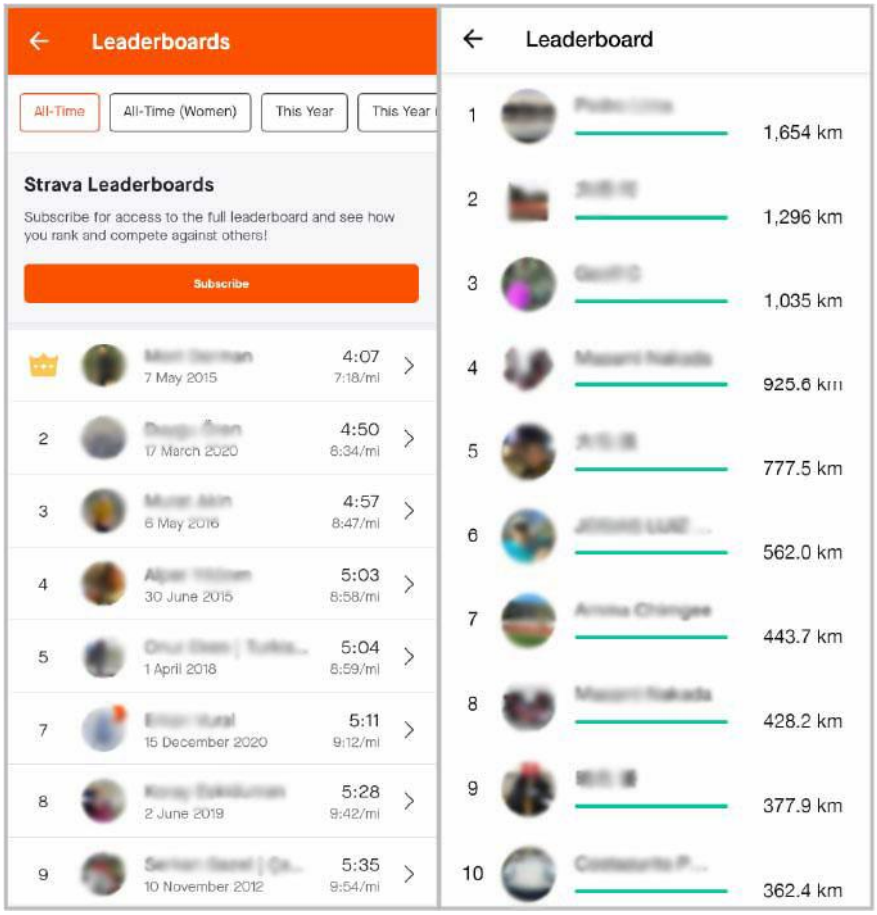

Figure 4.3 Example screenshots for leaderboards (Strava/Nike Running Club)

4.1.4 Challenges

In all three apps, users can participate in different types of challenges. The challenges can be generated by apps such as '100K November Running Challenge' in Strava or 'Your Monthly 30KM' in Adidas Running. They could be one-off challenges (e.g., Christmas 5K, World Global Running Day) or suggested on a regular basis (e.g., monthly 10K, monthly elevation gain, monthly distance completion). Also, users can create challenges and invite others to participate. Similar to leaderboards, the challenge feature enriches interaction among users. Example screenshots for 'challenges' can be seen in Figure 4.4.

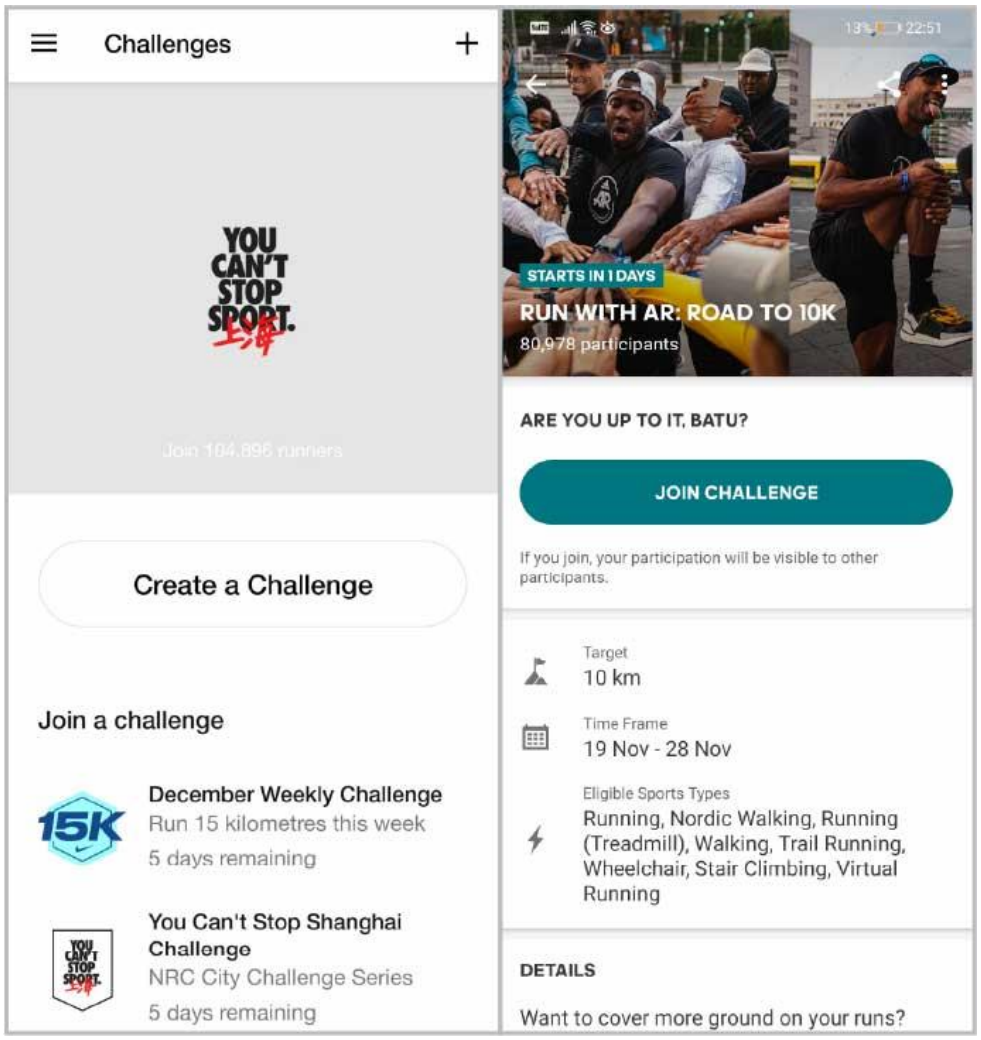

Figure 4.4 Example screenshots for Challenges (Nike/Adidas Running)

4.1.5 Routes

Running routes that are created by the apps or by other users can encourage runners to interact. In all three apps, the route where users run is automatically shared with activity data if it is not restricted by the user. This provides an opportunity for users to talk about or run together on others' routes. These kinds of user-generated routes might also make it easy for local runners to meet and run together. Moreover, when runners follow a pre-determined route, they can compare their activity stats with the

fellow athletes who ran on the same track. Strava's segment section can be given as an example of such a feature. Segments designate specific features or portions of a route, such as a climb or a tricky stretch of trail. Each time a subscriber completes a segment, the completion time is recorded. Then it will be possible to compare it to previous efforts and those of friends and other athletes. Example screenshots for 'routes' can be seen in Figure 4.5.

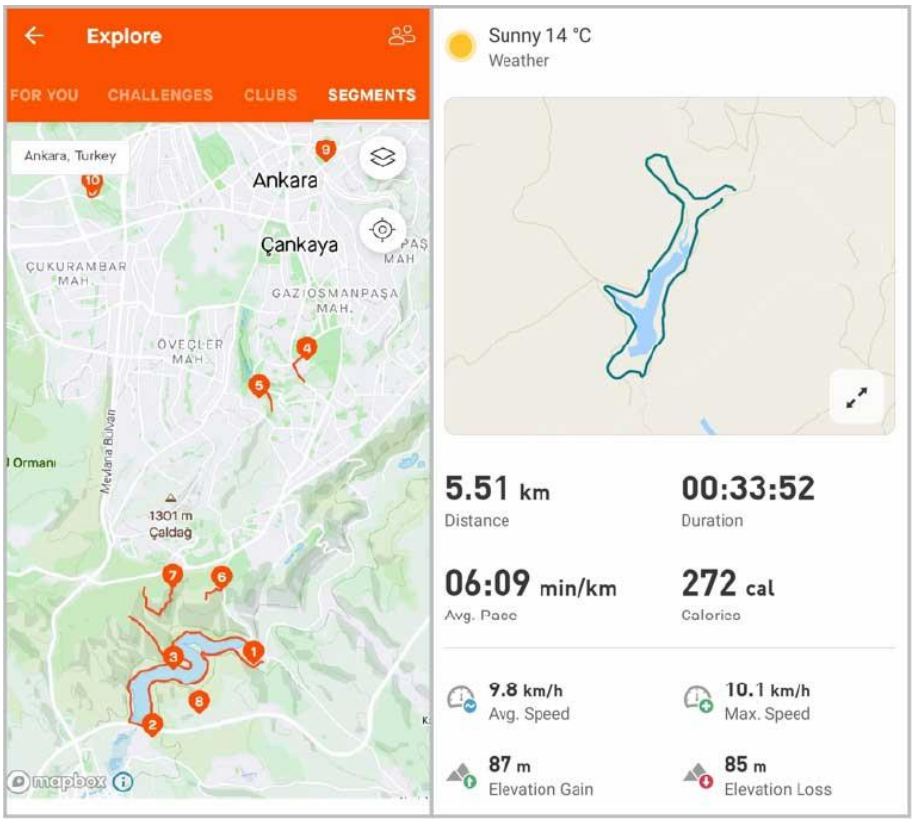

Figure 4.5 Example screenshots for Routes (Strava)

4.1.6 Running Events

Another feature analyzed in selected mobile apps is the special running events. Users can learn about special running events promoted by the apps to participate. These events include virtual races created by the app, where users participate in their own

location, or they might be created by an external organization and held in a special location. The events might be for a charity, for remembrance of a person, or a shared value. Such events can help to bring people who do not know each other, for the sake of a shared purpose. Example screenshots for 'running events' can be seen in Figure 4.6.

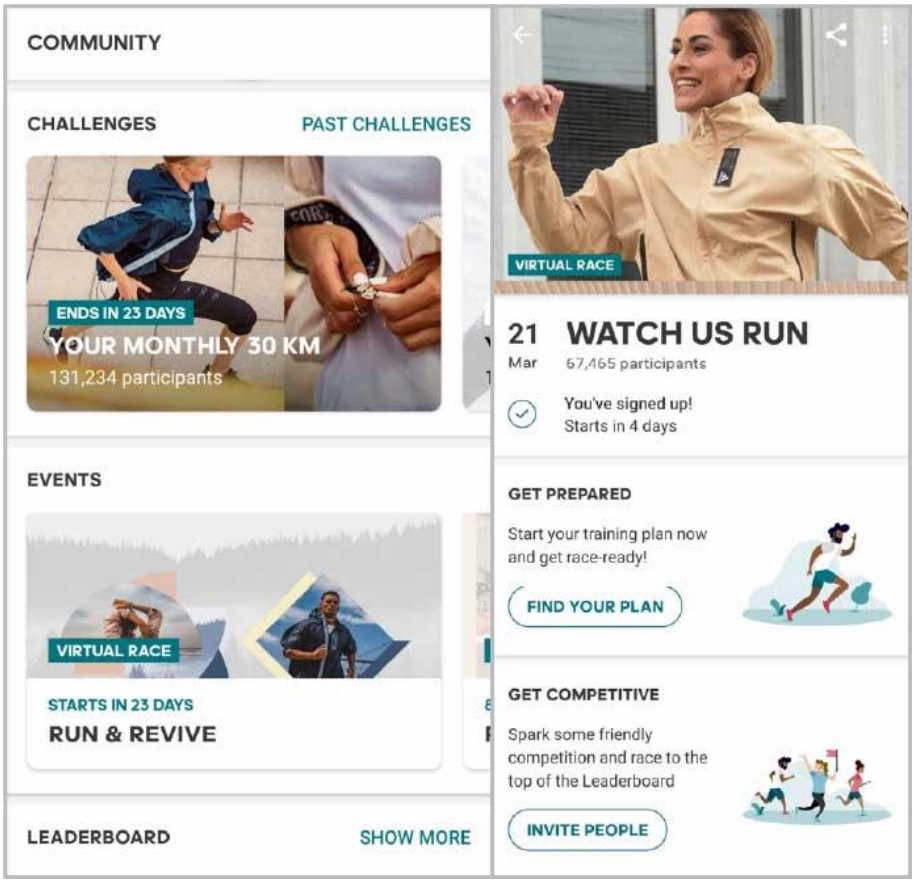

Figure 4.6 Example screenshots for Running Events (Adidas Running)

4.1.7 Notifications

Notifications are the final feature included in the fieldwork. Although they provide indirect interaction between users, they are also included in this research. All three apps use notifications to convey messages about running or other users. These messages may include helpful suggestions about running, invitations to physical

training, promotion of apps features, news from other users, etc. Example screenshots for 'notifications' can be seen in Figure 4.7.

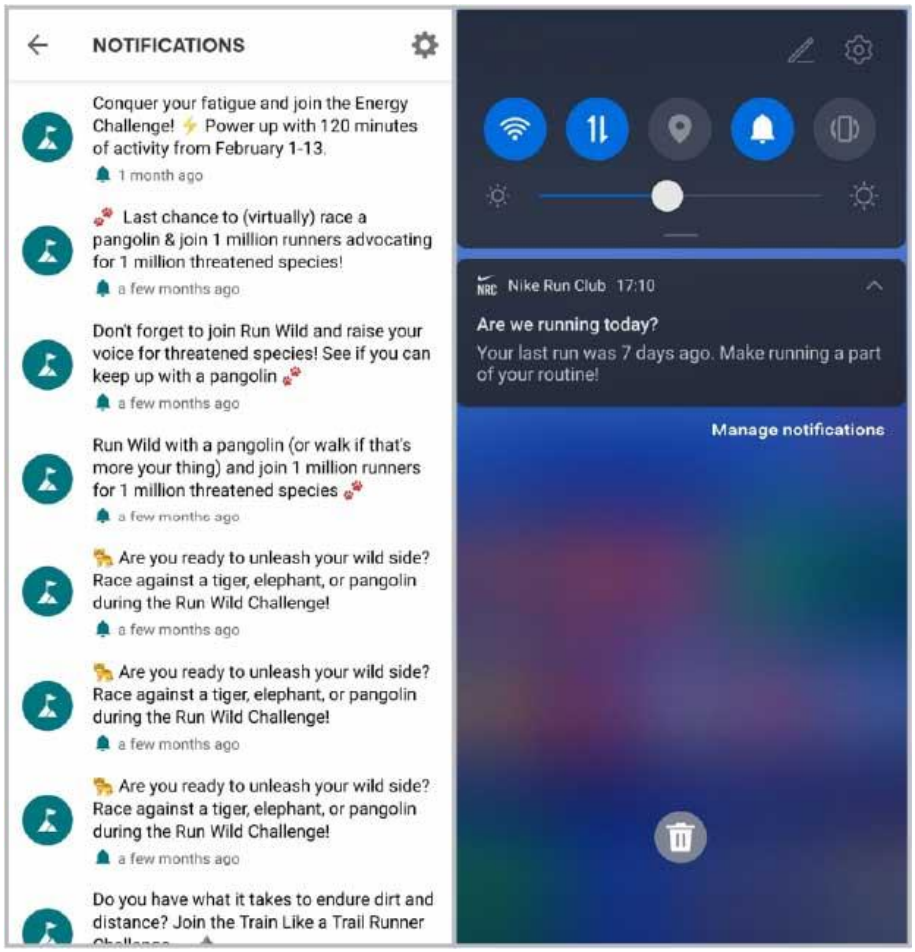

Figure 4.7 Example screenshots for Notifications (Nike)

Consequently, the abovementioned features informed the content of the following phases in the fieldwork. Results and analysis of Phase 2 (Online Survey Among Runners), examining the effects of these features on runners' motivation, now follows.

4.2 Phase 2: Online Survey Among Runners – Results and Analysis

In Phase 2 of the fieldwork, an online survey was conducted with 120 amateur runners to examine the effects of social interaction features of the apps on their overall motivation. The social interaction features of the apps resulted from Phase 1 used to form the survey questions.

The survey is conducted using Google Forms and consisted of 25 questions varying between multiple-choice, open-ended, and evaluation-based questions. The questions covered: 1) demographic characteristics, 2) running activity details, 3) social sharing habits, 4) effects of social interaction features on runners' motivation, and 5) any observable patterns amongst the motivation of different types of runners.

4.2.1 Demographic Characteristics

In the first part of the survey questionnaire, the participants were asked questions about their demographic information. Among 120 participants, there were 89 (74.8%) male and 31 (25.2%) female runners. Distribution of the age range categories are listed below.

- <25 9.2% (11)
- 25-29 %15.8 (19)
- 30-34 %8.3 (10)
- 35-39 %9.2 (11)
- 40-44 %14.2 (17)
- 45-49 %11.7 (14)
- 50-54 %11.7 (14)
- 55-59 %13.3 (16)
- >60 %6.7 (8)

Distribution among the age range categories and genders can be seen in Figure 4.8.

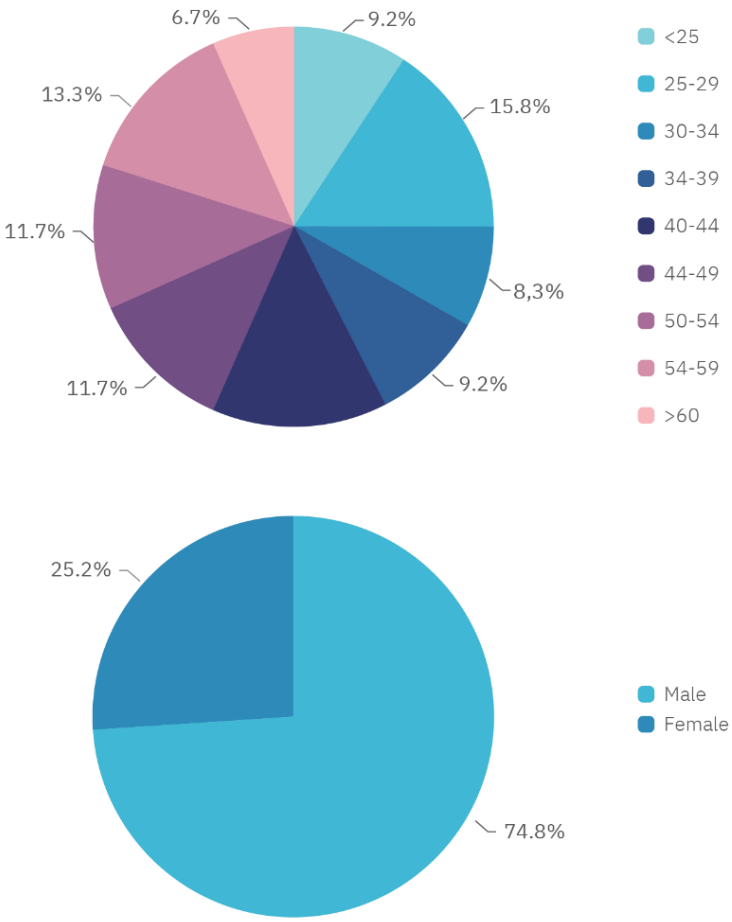

Figure 4.8 Age range and gender distribution of 120 participants

4.2.2 Running Activity Details

This part covered the questions related to the following headings: preferred choice of running surface(s); being part of an online/offline running community; recording activity data and preferences for a recording device; running frequency (number of times a week).

Running surface(s). The participants were able to choose from multiple surface options. All participants (120) answered this question, and their preferences were: 'trail' 66.9% (83/120); 'track' 57.2% (71/120), 'asphalt' 56.4% (70/120); 'grass' 8.9% (11/120), 'treadmill' 3.2% (4/120), and sand (none) (see Figure 4.9).

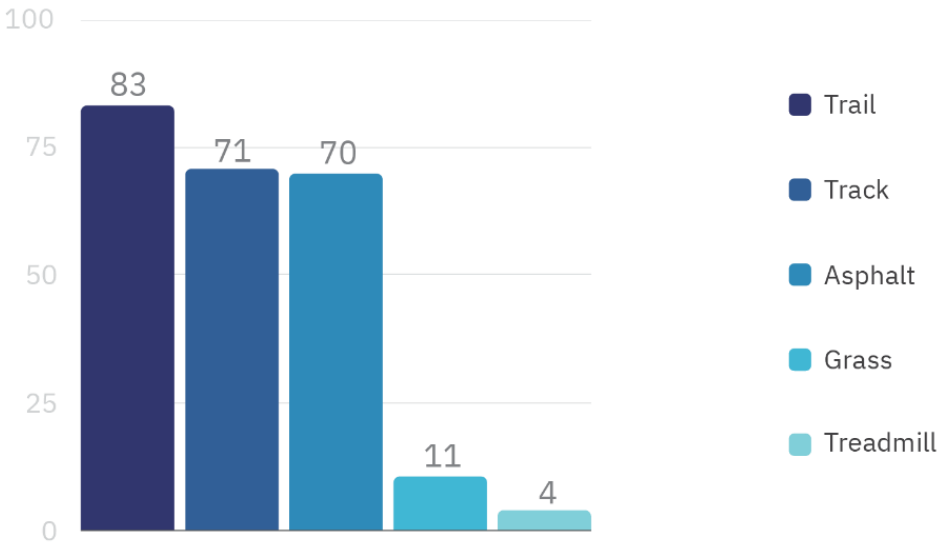

Figure 4.9 Running Surface Preferences of 120 participants

Activity Record Preferences. The majority of the participants (108 participants) stated using a device to record their running activity. Of the participants, 105 answered the question, and their preferred device types were: 41.9% (44/105) use smartwatches, 24.7% (26/105) use smartphones, and 33.3% (35/105) use both (see Figure 4.10).

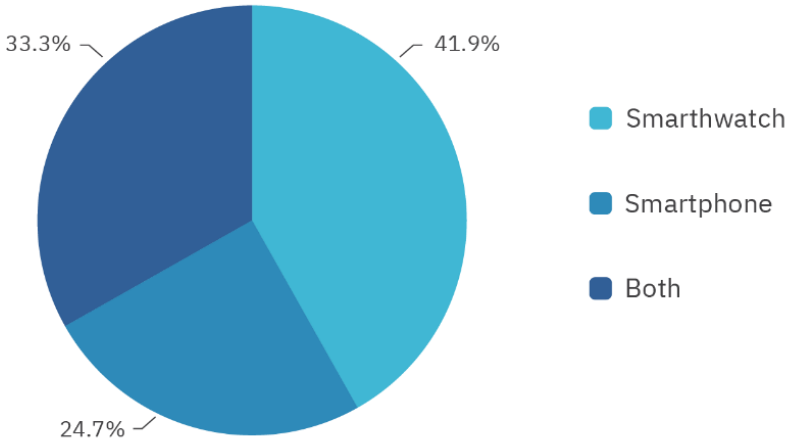

Figure 4.10 Distribution of Activity Recording Device of 105 participants

Participation in Running Communities. The participants were asked whether they were part of a running community or not. Among 119 participants who answered the question, 68,1% (81/119) of them stated that they are, while the remaining 31,9% (38/119) stated that they are not (see Figure 4.11).

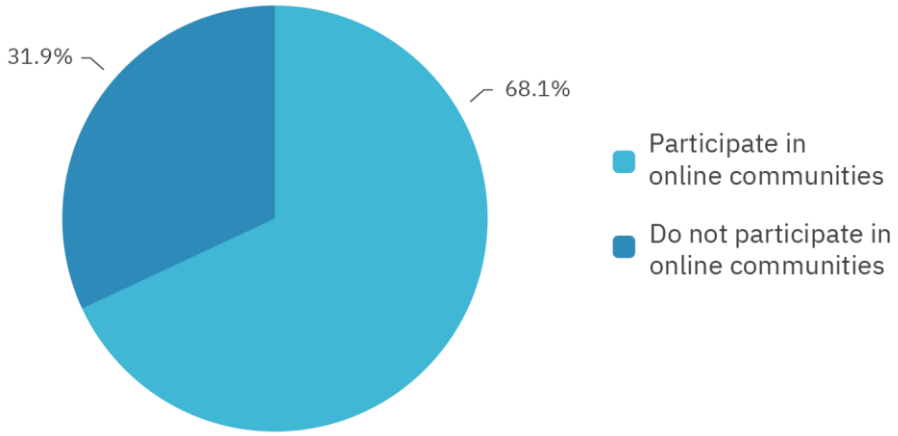

Figure 4.11 Distribution of Participation in Running Communities of 119 participants

Running Frequency. The participants were asked to indicate their weekly running frequency (e.g., once a week, 2-3 times a week) to evaluate their activity level. The activity class chart based on the works of Jackson et al. (1990) was used (See Appendix F). All exercise types in the adapted chart were defined by running times per week. Thus, exercise types in the chart were interpreted as follows; "light exercise - occasional runner", "regular exercise – regular runner", "daily exercise – daily runner". 119 participants answered this question. The results were: 'regular runner' 63.9% (76/119); 'daily runner' 22.7% (27/119), and 'occasional runner' 13.4% (16/119) (see Figure 4.12).

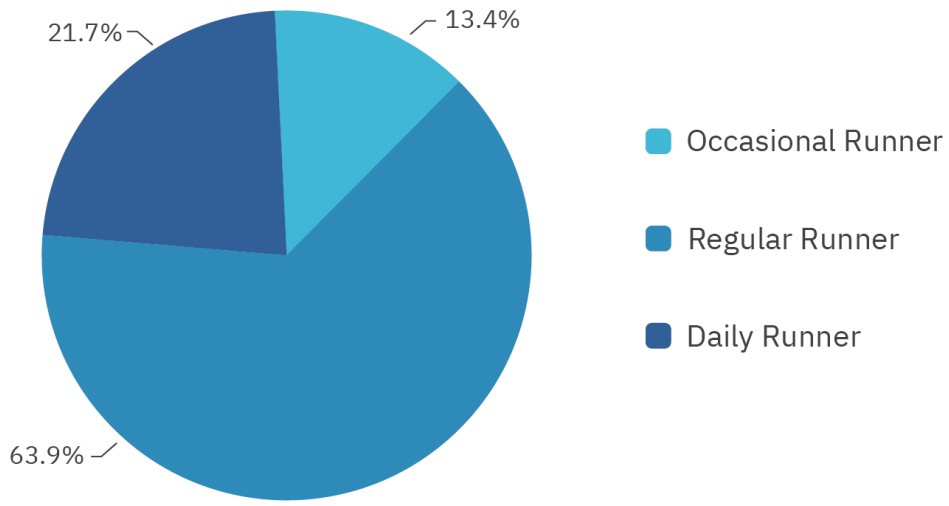

Figure 4.12 Distribution of Weekly Running Frequency of 119 participants

4.2.3 Social Sharing Habits

This part of the survey covered the questions related to runners' frequency of sharing activity-related information through online media; their preferences for online activity medium; and their reasons for sharing/not sharing.

Sharing Frequency. The participants were asked to specify on a 5-point Likert-scale how frequently [from never (1) to always (5)] they share information about their

activity before and/or after their session. All 120 participants answered the question. Distribution of the answers was: 'always' 25.8% (31/120); 'most of the time' 20,8% (25/120); 'half of the time' 20% (24/120), 'rarely' 20,8% (25/120), and 'never' 12.5% (15) (see Figure 4.13).

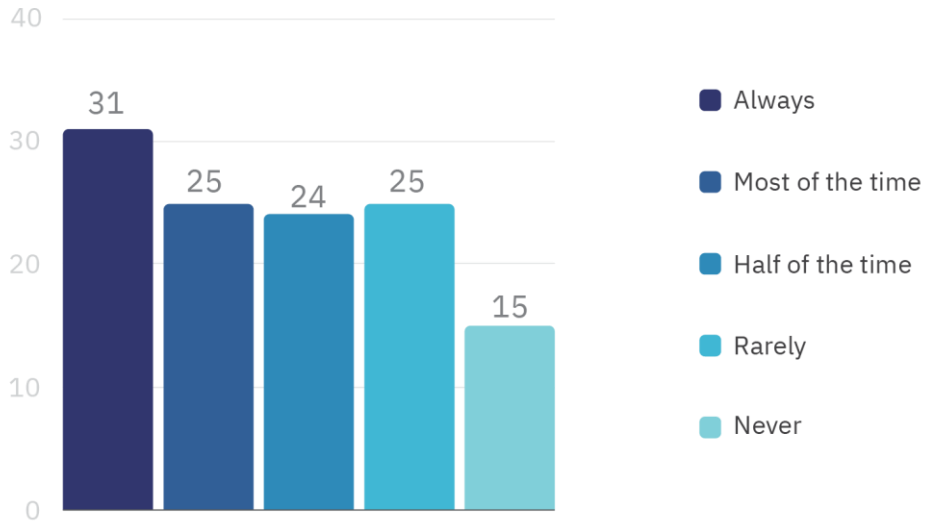

Figure 4.13 Sharing Frequency Differences of 120 participants

Preferences for Online Activity Sharing Medium. The participants were asked their preferences of online media for sharing (app-based channels and/or social media platforms). The answers by 103 participants are as follows: 'social media platforms' 27.2% (28/103); 'mobile activity-tracking apps' 30.1% (31/103); and 'both' 42.7% (44/103). The distribution of sharing medium preferences can be seen in Figure 4.14.

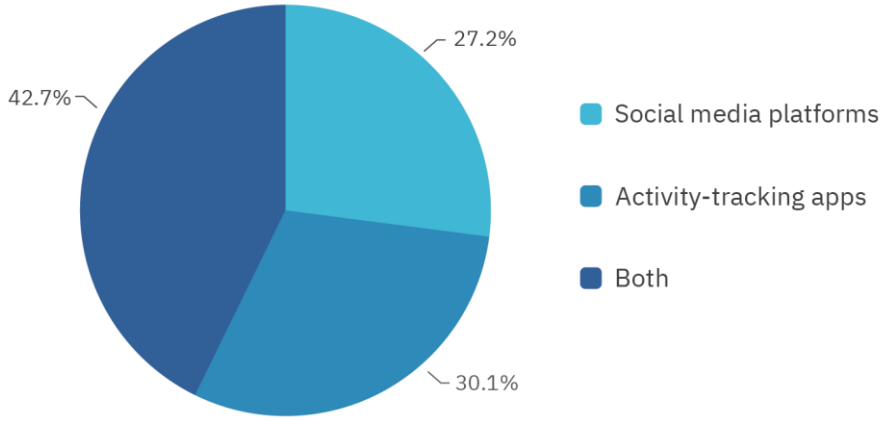

Figure 4.14 Distribution of Sharing Medium Preferences of 103 participants

Reasons for Sharing or Not Sharing. Reasons for sharing or not sharing information about their activity were also investigated. 102 participants answered this question, their answers from the most popular reasons to least are as follows: 'sharing with others motivates me' 54,9% (56/102), 'sharing information on a regular basis motivates me for upcoming days' 44,1% (45/102), 'being able to act together with my running group motivates me' 44,1% (45/102), 'received likes and comments motivates me' 41,2% (42/102), 'competing with others through my activity data motivates me' 17,6% (18/102).

Eleven participants offered additional reasons as": 'motivating and influence other runners' (5/11), 'sharing as a backup for activity data' (3/11), 'sharing when capturing a good picture (2/11), 'collecting fund for charity' (1/11). Additionally, 8 out of 15 participants stated that they 'never share information' with the following reasons: sharing information online is unnecessary and nonsense (5/8); concerns about security and privacy breaches (2/8), keep away from bothering others (1/8).

4.2.4 Effects of Social Interaction Features on Runners' Motivation

In the final part of the online survey, the participants were asked to indicate on a 5-point Likert-scale [Strongly demotivating (-2), Slightly demotivating (-1), Neither

motivating nor demotivating (0), Slightly motivating (1), Strongly motivating (2)] regarding how social interaction features of mobile activity-tracking apps affect their overall motivation level. Social interaction features included in this part are sharing the activity with photographs or messages, receiving feedback via comments or likes, leaderboards including all users or only friends, challenges created by the app or other users, special running events, and notifications from the app or other users. The number of participants who answered the questions (N), the percentage and corresponding number of participants who do not use the described features (E), and the distribution of answers through number and percentage among participants using related features are presented in Figure 4.15.

		N	E	-2	-1	0	1	2
Sharing activity with	Photographs	103	(9) 8.7%	-	-	(28) 29.8%	(35) 37.3%	(31) 32.9%
	Messages	102	(11) 10.8%	-	-	(27) 29.7%	(37) 40.6%	(27) 29.7%
Receiving feedback via	Comments	100	(4) 4%	-	-	(19) 19.8%	(42) 43.7%	(35) 36.5%
	Likes	101	(4) 4%	-	-	(25) 25.8%	(41) 42.3%	(31) 31.9%
Leaderboards including	Global Users	100	(11) 11%	(2) 2.2%	(4) 4.5%	(33) 37.1%	(30) 33.7%	(20) 22.5%
	Followers	99	(15) 15.1%	(2) 2.4%	(3) 3.6%	(32) 38.1%	(26) 30.9%	(21) 25%
Challenges created by	The App	101	(32) 31.7%	-	(1) 1.4%	(18) 26.1%	(31) 44.9%	(19) 27.6%
	Other Users	99	(30) 30.3%	(1) 1.4%	-	(17) 24.6%	(26) 37.7%	(25) 36.3%
Routes suggested by	The App	101	(29) 28.7%	-	-	(37) 51.4%	(22) 30.5%	(29) 18.1%
	Other Users	102	(17) 16.7%	-	(1) 1.2%	(29) 34.1%	(34) 40%	(21) 24.7%
Notifications from	The App	101	(16) 15.8%	-	(1) 1.2%	(45) 52.9%	(31) 36.5%	(8) 9.4%
	Other Users	102	(10) 9.8%	(1) 1.1%	-	(25) 27.2%	(41) 44.6%	(25) 27.2%
Events from	Other Users	102	(15) 14.7%	(1) 1.1%	-	(22) 25.3%	(37) 42.6%	(27) 31%

N Number of participants who answered the questions

E Percentage and corresponding number of participants who do not use the described features

Figure 4.15 Distribution of Sharing Medium Preferences of the participants

Sharing Activity. A total of 103 participants responded to the question about the '"Sharing activity with images"' feature. Among them, 9 participants stated they do not use the feature. Distribution of the remaining answers: 'Neither motivating nor demotivating' 29.8% (28/94); 'Slightly motivating' 37.3% (35/94); 'Strongly

motivating' 32.9% (31/94). When "'Sharing activity with messages"' feature was questioned, 102 out of 120 participants answered the question. 11 participants (10.6%) chose the option indicating that they do not use the feature. Distribution of the remaining answers: 'Neither motivating nor demotivating' 29.7% (27/91); 'Slightly motivating' 40.6% (37/91); 'Strongly motivating' 29.7% (27/91).

Receiving Feedback. 100 participants answered the question regarding "'Receiving feedback via comments"' feature. 4 of them (4%) stated they do not use the feature. Distribution of the remaining answers: "Neither motivating nor demotivating' 19.8% (19/96); 'Slightly motivating' 43.7% (42/96); 'Strongly motivating' 36.5% (35/96). Among 101 participants who answered the question regarding "Receiving feedback via likes", 4 (4%) participants stated they do not use the feature. Distribution of the remaining answers: 'Neither motivating nor demotivating' 25.8% (25/97); 'Slightly motivating' 42.3% (41/97); 'Strongly motivating' 31.9% (31/97).

Leaderboards. The question about the "'Leaderboards including global users"' feature was answered by 100 participants. 11 (11%) of them stated they do not use the feature. Distribution of the remaining answers: 'Strongly demotivating' 2.2% (2/89); 'Slightly demotivating' 4.5% (4/89); 'Neither motivating nor demotivating' 37.1% (33/89); 'Slightly motivating' 33.7% (30/89); 'Strongly motivating' 22.5% (20/89). 99 participants responded to the question about the "Leaderboards including follower" feature. This feature is not used by 15 (15.1%) of them. Distribution of the remaining answers: 'Strongly demotivating' 2.4% (2/84); 'Slightly demotivating' 3.6% (3/84); 'Neither motivating nor demotivating' 38.1% (32/84); 'Slightly motivating' 30.9% (26/84); 'Strongly motivating' 25% (21/84).

Challenges. A total of 101 participants responded to the question about the "'Challenges created by the app"' feature. Among them, 32 participants (31.6%) stated they do not use the feature. Distribution of the remaining answers: 'Slightly demotivating' 1.4% (1/69); 'Neither motivating nor demotivating' 26.1% (18/69); 'Slightly motivating' 44.9% (31/69); 'Strongly motivating' 27.6% (19/69).

30 out of 99 participants (30.3%) who responded to the question about '"Challenges created by other users"' said that they do not use the feature. Distribution of the remaining answers: 'Strongly demotivating' 1.4% (1/69); 'Neither motivating nor demotivating" 24.6% (17/69); 'Slightly motivating' 37.7% (26/69); 'Strongly motivating' 36.3% (25/69).

Routes. 101 participants answered the question regarding 'Routes suggested by the app"' feature. 29 (28.7%) of these participants indicated that they do not use this option. Distribution of the remaining answers: 'Neither motivating nor demotivating' 51.4% (37/72); 'Slightly motivating' 30.5% (22/72); 'Strongly motivating' 18.1% (29/72).

Following question about the '"Routes suggested by other users"' feature was answered by 102 participants. 17 of them (16.6%) stated they do not use the feature. Distribution of the remaining answers: 'Slightly demotivating' 1.2% (1/85); 'Neither motivating nor demotivating' 34.1% (29/85); 'Slightly motivating' 40% (34/85); 'Strongly motivating' 24.7% (21/85).

Running Events. Among 102 participants who answered the question regarding "Events created by other users", 15 participants (14.7%) stated they do not use the feature. Distribution of the remaining answers: 'Strongly demotivating' 1.1% (1); 'Neither motivating nor demotivating' 25.3% (22/87); 'Slightly motivating' 42.6% (37/87); 'Strongly motivating' 31% (27/87).

Notifications. The question examining the "Notifications initiated by the app" feature was answered by 101 participants, and 16 of them (15.8%) stated they do not use the feature. Distribution of the remaining answers: 'Slightly demotivating' 1.2% (1/85); 'Neither motivating nor demotivating' 52.9% (45/85); 'Slightly motivating' 36.5% (31/85); 'Strongly motivating' 9.4% (8/85). A total of 102 participants responded to the question about the " Notifications initiated by other uses" feature. This feature is not used by 10 (9.8%) of them. Distribution of the remaining answers: 'Strongly demotivating' 1.1% (1/92); 'Neither motivating nor demotivating' 27.2% (25/92); 'Slightly motivating' 44.6% (41/92); 'Strongly motivating' 27.2% (25/92).

To understand the effects of social interaction features on runners' overall motivation, answers to questions (27 to 40) were analyzed quantitatively based on the average scores of 5-point Likert scale. The questions in the survey were also arranged to find out if there were any relations between those features and motivation of different types of runners (e.g., based on their age, activity level, etc.) To do that, percentages of answers indicating positive influence over motivation were also examined. Accordingly, options "1 - Slightly motivating" and "2 - Strongly motivating" were both considered to indicate a positive influence over runners' motivation. On the other hand, options "-1 – Slightly demotivating" and "-2 – Strongly demotivating" were considered to indicate a negative influence over runners' motivation. Analysis of the results are now presented in following headings.

Social Interaction Features Effects on Runners' Motivation

Analysis of the answers with 5-point Likert scale revealed that all social interaction features of the mobile activity-tracking apps have positive influence on runners' motivation. The overall score of every social interaction feature can be seen in Figure 4.16

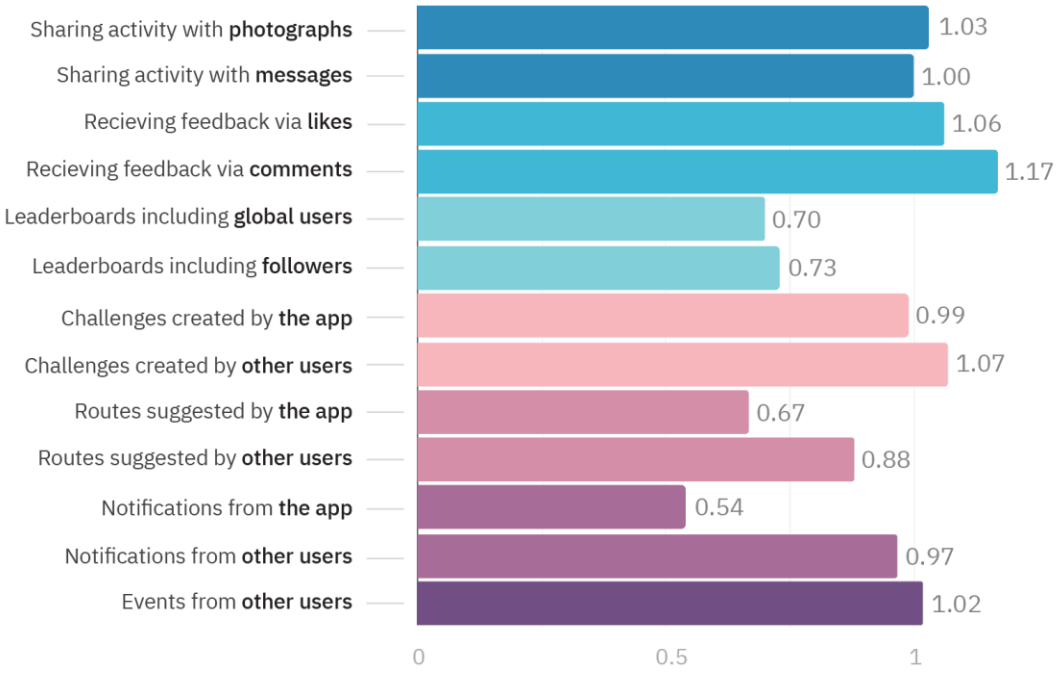

Figure 4.16 Average Likert scale scores of social interaction features

Among the investigated social interaction features, the top five with the highest positive influence were respectively 'Receiving feedback via comments', 'Challenges created by other users', 'Receiving feedback via likes', 'Sharing activity with photographs' and 'Events from other users'. While sharing activity-related information, the influence of using photos or messages over motivation was almost the same. However, when it comes to receiving feedback, comments were seemed to be favored over likes. These show us that participants are motivated by the exchange of running experience with other users. The fact that they are getting more motivated by comments than likes emphasizes the importance of in-depth interactions.

On the other hand, 'Notifications initiated by the app', 'Routes suggested by the app' and 'Leaderboards including global users' features were at the bottom of the ranking with the lowest percentages of positive influence over runners' motivation.

4.2.5 Additional Findings

'Furthermore, results were also revealed additional findings: i) relations in between social interaction features and motivation among different types of runners; ii) most and least used social interaction features; iii) comparison of initiative source in features. These findings are presented in the following headings.

Relations Between Motivation and Different Types of Runners

In addition to the main aim of the survey, questions were also directed at identifying the factors that may affect the relationship between social interaction features of the activity tracking apps used by the runners and their motivation.

When answers were compared according to demographic characteristics and sharing habits of runners, there were not any observable changes in results. However, when the running activity details section is compared, running frequency was observed to have a remarkable influence on the relationship between social interaction features and runners' motivation. The distribution of the participants by their exercise levels, the four abovementioned features, and the changes in the participants' positive influence levels can be seen in Figure 4.17 and Figure 4.18. The same set of data is visualized in different figures to present in a clear way.

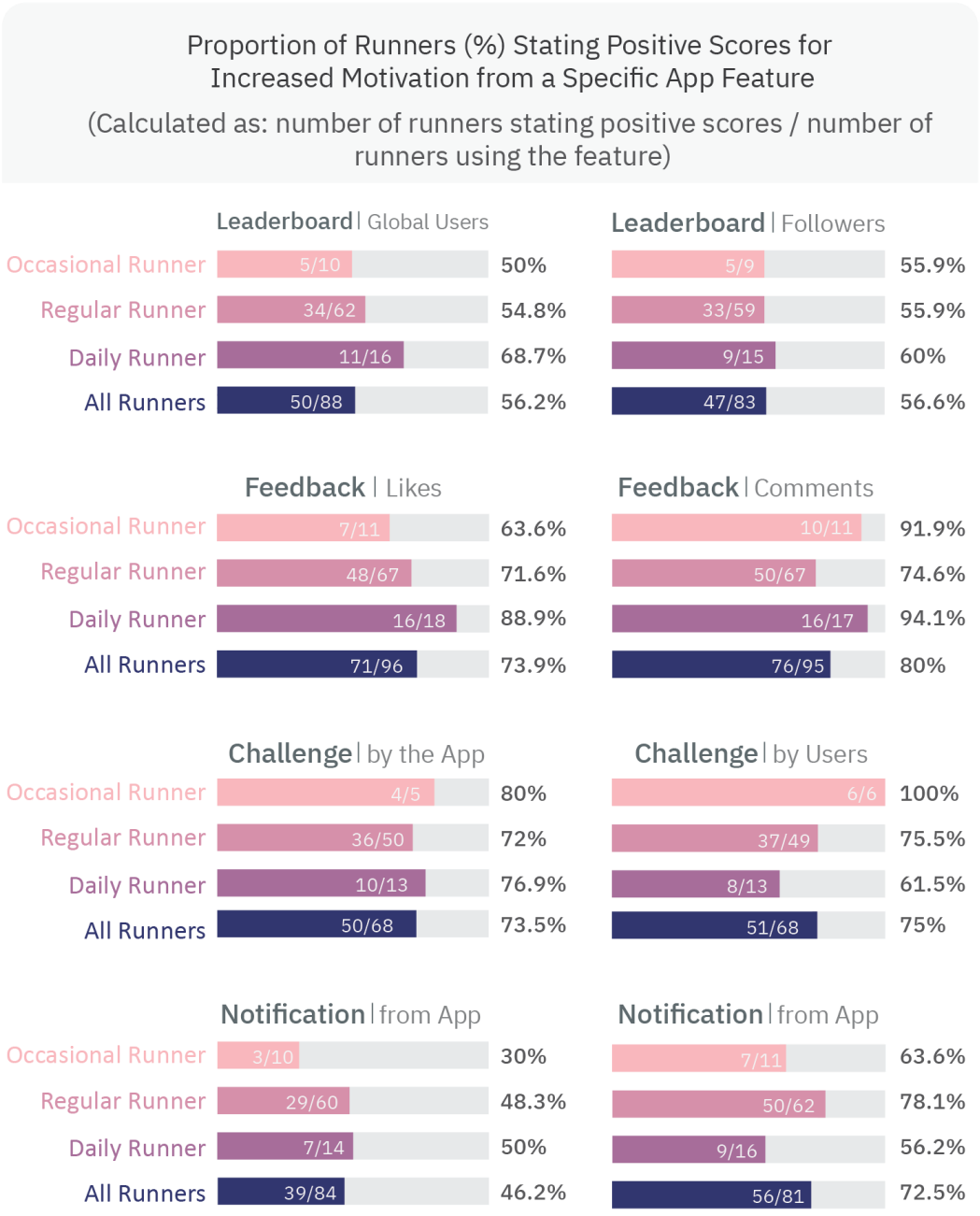

Figure 4.17 Positive influences of social interaction features on runners' motivation compared against running frequency

Figure 4.18 Positive influences of social interaction features on runners' motivation compared against running frequency

All of the comparisons in the figure illustrate the pattern between users' running frequency and features' influence on their motivation. For example, as the running frequency increases, the leaderboard's positive effect on runners' motivation increases too. Since the participants with higher running frequency have more potential to be in higher ranks, the comparison between users' running statistics in leaderboards results in higher percentages of positive influence on motivation. Also, participants with higher running frequency were positively affected by receiving feedback with likes and comments more than participants with lower running frequencies. Another example might be that although the percentage of having a positive influence is higher in features created by users than the app, as the frequency of running increases, differences in percentages of positive influence are observed to alter in favor of features created by the app. These show us that understanding user profile and their expectations in social interaction features would be beneficial to achieve effective interaction with users.

Social Interaction Features' Usage Rate

The usage rate of the features was also examined to find out about the least and most used features. Mostly used feature was receiving feedback by comments or likes with 96% (96/100) usage ratio. This shows that most of the runners look for other users' opinions about their shared activity data. Together with previous findings where receiving feedbacks via comments and likes from others was found to have the highest percentages of positive influence on motivation, it can be said that runners frequently seek other runners' feedback and get influenced by them significantly.

On the other hand, challenge features, both generated by the app or other users, have the least usage rate, respectively 68.3% (69/101) and 69.7% (69/99). This might be related to the character type of the runners. People with competitive ambitions can

be influenced by challenges meanwhile, uncompetitive users simply prefer not to engage with the feature.

Comparison of Initiative Source in Features

When a certain feature has two possible sources to be initiated (by the app or by other users), in all cases, the percentage of having a positive influence on runners' motivation was higher in the options initiated by other users (e.g., routes suggested by other users, notifications from other users, challenges created by users). Comparison of overalls scores can be seen in Figure 4.19

This indicates that runners tend to get motivated by interacting with other users more than receiving information/feedback from the app itself. This means improving user-to-user-interaction features have an important role in increasing runners' motivation and overall experience.

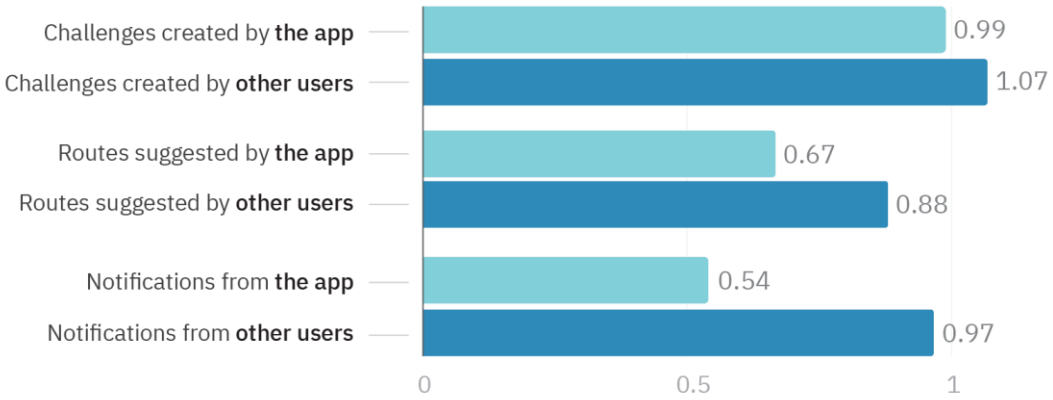

Figure 4.19 Overall scores of features different sources of initiation

This phase of the fieldwork revealed the influence of social interaction features on the motivation of runners and the potential factors affecting this relationship. Following phase, "One-to-One Online Interviews with Runners", are conducted to

understand and develop better user experience for social interaction features. Results and analysis of that phase are now presented in the following headings.

4.3 Phase 3: One-to-One Interviews with Runners - Results and Analysis

Since the fieldwork aimed to have a better understanding of social interaction features of the activity-tracking apps from a user experience perspective, semi-structured interviews were conducted at the final phase.

In total, 17 interviews were conducted. Before starting the interviews, all participants were informed about the aim of the interview and the research in general, and they were asked to sign and submit the consent form digitally. The interview protocol described in Chapter 3 (see Section 3.3.3.1) was followed for each interview session. Besides the questions and prompts from the interview guide, follow-up questions were asked based on the participants' answers.

Phase 3 participants varied in demographic aspects such as gender, age, profession, etc. All of them are amateur runners with different running frequencies. Number of the days they run in a week, the duration range of each running process, and the weekly time spent on running are presented in Table 4.1.

As the analysis of the interviews aimed to reveal the effects of social interaction features on runners' motivation and their overall user experience, data was analyzed considering these aspects in 'participants' responses.

Table 4.1 The participants running frequency and duration

	Weekly Running Frequency (Days)	Time Spent Each Session (Minutes)	Time Spent in a Week (Hours)
P01	2-3	45-60	2-3
P02	2-3	60-120	3-6
P03	2-3	60-90	3-5
P04	3-4	60-120	3-7
P05	3-5	45-60	3-5
P06	2	60-90	2-3
P07	3-5	30-45	2-4
P08	3	60-75	3-5
P09	6	45-60	4-6
P10	2-3	45-60	2-3
P11	2-3	90-120	3-6
P12	2-3	60-90	3-5
P13	2-3	90-120	3-6
P14	3-4	45-60	3-4
P15	2-3	45-60	2-3
P16	3	60-150	3-7
P17	2-4	60-90	3-6

The duration of interviews varied from 19 to 47 minutes, averaging at 29 minutes. All audio files recorded during the sessions were transcribed into Microsoft Word for further analysis. Consequently, analysis was carried out in several steps to extract key ideas from the transcribed data. Since the interviews were carried out in a semi-structured manner and the questions were open-ended, the participants gave varied responses. First, the researcher examined the transcribed data to reveal repeating expressions. Following that, relevant codes were assigned accordingly (e.g., feeling responsible towards other runners, feeling of accomplishment, having fun with friends, competition fueled motivation, seeking information about others, and proof of success). At the end of this stage, the resulting codes were transferred to Microsoft Excel and divided across different spreadsheets according to their relevance with

social interaction features. Ten social interaction features were identified, and ten different spreadsheets were created to include the following headings: sharing; following; likes; comments; online communities; leaderboards; challenges; routes; special events; and notifications.

At the second stage of the interview analysis, for every social interaction feature, listed codes were reviewed to clarify their meanings. Following that, some codes were reconsidered and rearranged to avoid repetition and to reveal relations between them. In this stage, four categories emerged for social interaction features and participants statements listed under the following headings: Motivation Towards Running, Triggers for Usage, Demotivational/Discouraging Factors, and Needs.

"Motivation Towards Running", statements related to the factors leading to engagement in activity were listed. "Triggers of Usage" consists of the codes relevant to reasons for participants to use that feature. "Discouraging/demotivating Factors" covers negative aspects of the features that demotivate the users towards running or deter them from using that feature. "Needs/Expectations" includes users' suggestions for improving the feature and their needs from it. These four categories were also used in all spreadsheets for the identified social interaction features of the activity-tracking apps.

In the final step of the analysis, statements that are listed under emerged categories for different social interaction features, were revisited to interpret key findings. These findings were used by the researcher to propose design insights for enhancing the effects of social interaction features on runners' motivation and improving their overall user experience.

In the following headings: sharing; following; likes; comments; online communities; leaderboards; challenges; routes; running events; and, notifications, the findings are tabulated for each of the social interaction features under four categories: i) motivation towards running; ii) triggers of usage; iii) discouraging/demotivating factors; and iv) Needs/Expectations. The categories are divided into sub-categories relevant to specific social interaction feature, and each of them have lists of the main

topics arosed from the analysis. In the text, example quotations from the participants' statements and the design insights proposed by the researcher are also presented.

4.3.1 Sharing

Sharing feature refers to where users can share their activity data (e.g., sharing automated activity related posts with runners in the app, sharing posts in social media through the app) with additional activity analysis (e.g., route, elevation gain, pace) and performance analysis (e.g., heartrate zone, average pace, calories burnt). Categories and sub-categories for sharing feature can be seen in Figure 4.20.

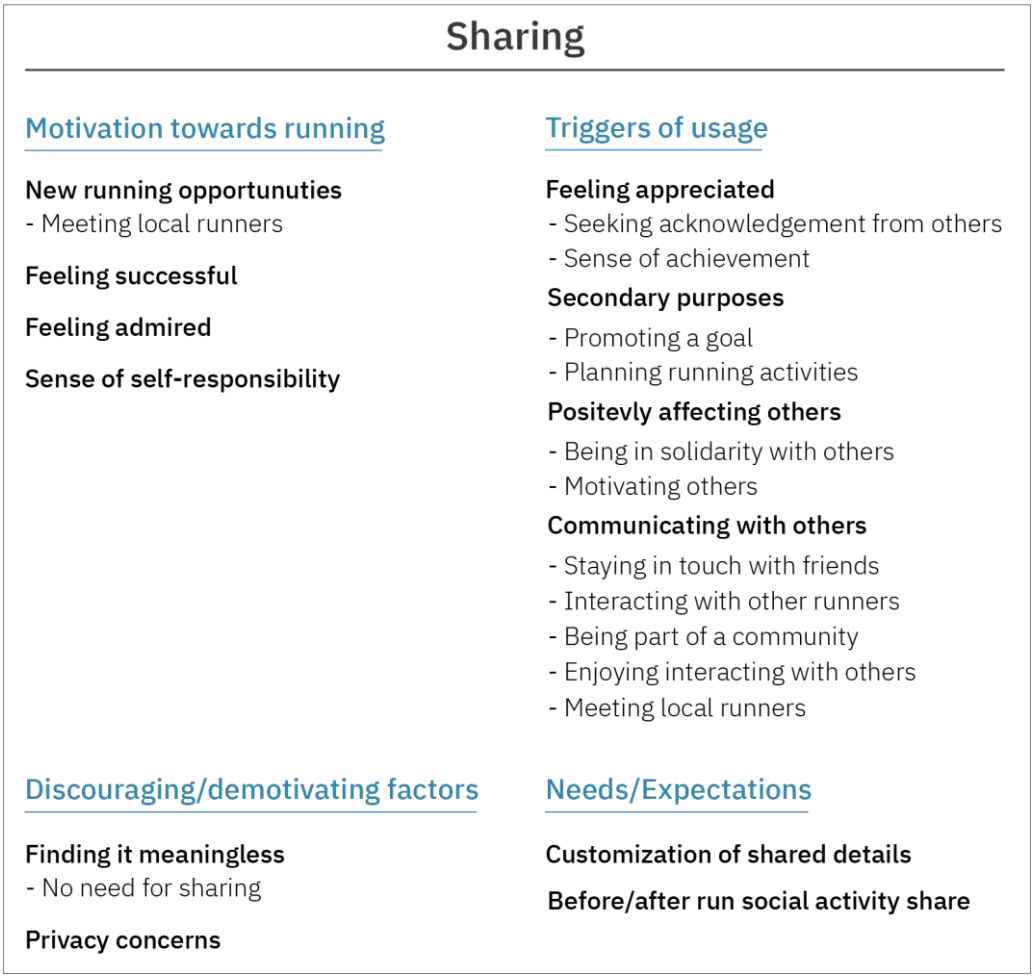

Figure 4.20 Categories and sub-categories related to 'sharing' feature

i) Motivation towards running_ some participants mentioned that through sharing their activity they feel successful and admired. The desire for re-experiencing these feelings motivates them for upcoming running activities.

> *"It's a way of saying 'Look, I achieved this'."* (P11)

For some runners, sharing also creates a sense of responsibility towards their followers. The feeling of obligation leads to an engagement in the running activity.

> "*Sharing is like saying to others 'Here see, I also run today. I didn't skip it",*
>
> *"It also feels like a duty after a while. You will start to consider yourself lazy if you don't do it (share)."* (P02)

Sharing also creates new running opportunities for people. Making their activities visible for others, helps them to meet local runners and possibly, plan activities together. Meeting local runners and accompanying each other through activities motivates them for more running sessions.

ii) Triggers of Usage_ one of the reasons for the participants to use sharing feature was their desire for being acknowledged by others towards their good performance. Some participants mentioned that they feel appreciated and experience a sense of achievement through the feedback they receive for their posts.

> *"I mostly share when the results are good."* (P05)
>
> *"I share one of my activities out of four, if it was a successful one."* (P03)
>
> *"In addition to the purpose of the training, it (sharing) is way of saying I succeeded."* (P11)

Although it includes personal data only, runners also share their activity related posts to positively affect other runners. Some participants indicated that they try to motivate their friends and other followers by sharing their activities. It is a way of supporting each other.

> *"I share what I did that day at least once a week to encourage my friends in our running group."* (P16)

Besides, majority of the participants mentioned that they use sharing mostly as a way of communicating with others. They enjoy interacting with their followers and friends through their posts.

> *"Since we are away now (with their friends), seeing each other's posts in app feels like a conversation."* (P12)

Strava's sharing feature is also mentioned as being *"'very successful for interacting with other runners."* (P05)

Sense of being part of a community is another reason to share the activities, and this is also related with the previously mentioned factors that provide motivation towards running (e.g., sense of responsibility, feeling acknowledged) as nicely put by (P12):

> *"Sport is good when you do it together. Running especially is a lonely sport so the solution for me is Strava, that's why I share.".*

Secondary purposes of sharing the activity data also revealed during the analysis. Some of the participants indicated that they use sharing feature to plan upcoming running activities. Also, some of the participants said that they promote their charity, their running groups and personal trainers or they try to create awareness through their posts.

iii) Discouraging/demotivating Factors_ some participants mentioned the factors that discourages them in sharing feature of the apps. Two participants talked about privacy concerns while explaining their hesitations about sharing posts in an app.

> *"Sometimes, a male runner from another faraway city can send likes to my posts without even following me. I don't understand why and how someone I don't know search for me on app and reach my post. It is very strange."* (P08)

Since sharing feature is partly an automated process provided by the apps, by default an activity is recorded (unless specifically set otherwise) on its completion, hence some participants unintentionally use this feature although they find it unnecessary.

> *"It does not matter for me whether other people see my activity or not. I just don't want to deal with making it private. Unfortunately, in order to do that I need to click some other options."* (P01)

iv) Needs/Expectations_ one of the expectations regarding the sharing feature was sharing information about supporting activities rather than about the running activity itself.

> *"I believe that seeing our after-run social activities would provide extra motivation to others. They will think like 'It is not about running, there is also socializing'. I'm sure about that. For example, after running in marathons, we go out at night for having fun with our group and we share this. These types of interactions increase motivation."* (P10)

Another need mentioned by one of the participants was increased customization of performance analysis features in the activity posts. P01 indicated that although the information can be customized in the activity record post, it should be done more easily and there should be different types of information options to include in the post such as speed of wind during activity.

Design Insights in Relation to 'Sharing' Feature

Analysis of the sharing feature shows that the sense of being part of a community is related to most of the usage triggers and factors that motivate people towards running. People get motivated when they feel successful and get acknowledged for their performances by fellow runners. For runners, sharing activities is way of communicating with others to support others through their posts or to stay in touch with their friends living afar.

This shows that interacting with other runners is very important for the app users, and, enhancing the interaction options in sharing feature in the apps would be helpful for increasing motivation and usage. This can be achieved by:

- Allowing users to add pre-prepared expressions and/or phrases (e.g., recreational run, pushing-hard, social run) to their activity posts to let express their feelings about the activity in a simple way.
- Increasing the visibility of customization options 'would help users with privacy concerns to set their sharing preferences easily.
- Enabling additional types of information (e.g., weather forecast, speed of wind) to be included into the posts can help runners to highlight their achievement (during for example challenging conditions) and to promote their goals in activity posts.
- Adding before-run and after-run categories within sharing feature so that users feel less pressurized to share only performance related posts and this way attract followers' attention and motivate them towards running as well. For example, while the before-category can include nutrition tips or warm-up sessions, after-category, can include social activity related information (e.g., drinking coffee with others or going for lunch).

4.3.2 Following

Activity-tracking apps allow runners to follow other runners as well. Through that feature, they can see others' posts in their feeds, and interact with them via 'likes' (or 'kudos' called in some apps) and comments. Participants' responses regarding the 'following' feature are listed in Figure 4.21.

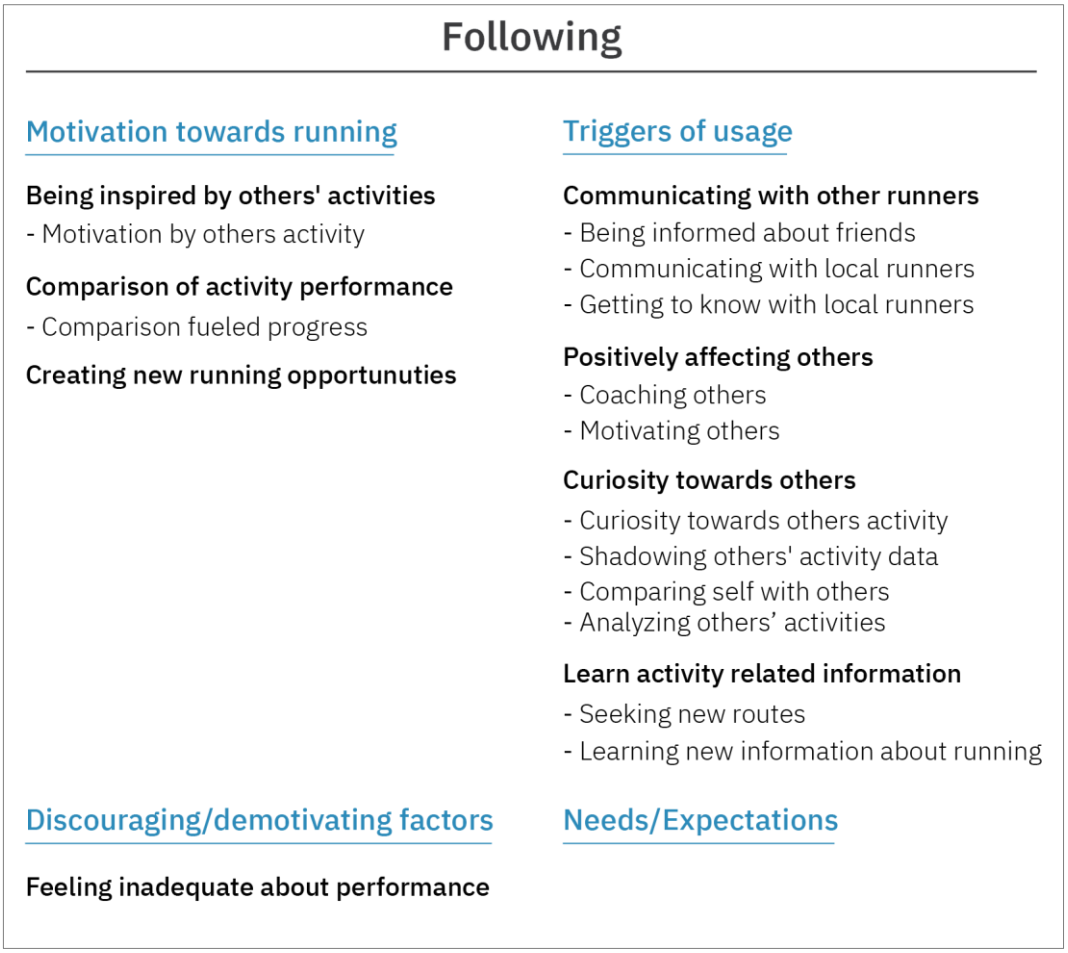

Figure 4.21 Categories and sub-categories related to 'following' feature

i) Motivation towards running_ some participants stated that they are inspired by 'follow runners' activities. When they follow other users in the app, they come across with different runners and seeing their activity posts motivates them to run.

> *"I follow one of the lecturers from my department. Seeing her activities although her busy schedule makes me feel motivated. Seeing active people leads me to be more active as well."* (P03)

> *"For example, when I feel lazy during a week, if I see that a running friend of mine continues her activity and does not interrupt her exercises, I force myself as well."* (P16)

> *"At first, we were scared of pandemic. We didn't go out. But seeing my friends being able to run was a motivation for me."* (P04)

Participants also mentioned that they compare their performance with others when they see their activities. Some said that they feel motivated and achieve a progress through this comparison.

> *"When I look at the posts of people with a similar pace with me, I say 'Oh, he did it, why wouldn't I do it'. If he achieved a goal that seemed distant to me, it motivates me."* (P16)

> *"Sometimes I look at running performances of the people at the top. To see how much difference there is between us."* (P06)

Finally, similar to sharing, people come across with new runners and running opportunities when they follow others. They hear about regular local activities or see their friends' posts and have the opportunity to plan their next run together.

ii) Triggers of Usage_ several reasons were revealed during the analysis related to the usage of 'following' feature. Two of them were common with 'sharing' feature, communicating with other runners and positively affecting others. Participants use following feature to be informed about their friends' activities. Also, it is a way of communicating and getting to know local runners.

> *"I met most of the people running at school there (in the app). For example, there are people that I have not met face to face, but I am familiar with them from the app."* (P15)

> *"For example, although I do not know him personally, I know him because I have come across with him in app. I can say that although it does not provide one-to-one interaction, it provides an awareness"* (P03)

Some participants indicated that they follow others to positively affect them with coaching tips in the comments or just to let them know that their activities are seen.

Following feature is also used to learn about activity-related information from others, such as tips about preventing injury or increasing running performance. They also seek new routes in others' activity posts.

> *I follow elite athletes to learn something from them, like how they did it, how they practiced, etc."* (P02).

> *I follow people to find new routes, both in cycling and running. Especially if I was interested in the places they went and the locations they ran"* (P07).

Finally, it is observed that participants were using following feature for their curiosity towards fellow runners' data. Some participants mentioned that they analyze others' activities and compare the results with their own performances.

> *"I follow her in Strava to see what she did in this week. For example, I immediately understand what my friends are doing, what they are preparing for"* (P04)

> *"There is such a thing called 'feed' in Strava. While I am looking at myself there, I look at where others have run and how much they have run"* (P03)

iii) Discouraging/demotivating Factors_ For some runners, seeing others' activities can also be a demotivating aspect as mentioned by P15. This is mostly caused by the feeling of inadequacy when compared to others' performance, especially if their opponents were older than them or if there was no obvious reason to perform less than them.

> *"Some of my friends was like 'I will no longer use this program. The old woman ran in that pace, how is it possible for me? I cannot run ' I had friends who lost their motivation like this."* (P15)

iv) Needs/Expectations_ the participants' responses did not reveal any needs or expectations regarding following feature.

Design Insights in Relation to 'Following' Feature

One of the prominent reasons for using 'following' feature is to indirectly interact with others, similar to 'sharing' feature. This interaction can sometimes serve as an outgoing purpose, such as coaching other runners through comments or making them know that their activities are seen. When they are at the receiving side of interaction,

participants also feel inspired to run by seeing other runners' activities. They also get motivated by comparing their performances with others. In relation to this context, the apps should be designed to suggest runners to follow others matching to their levels. In this way, users can follow and compare their own progress by observing them.

Besides these, runners follow other runners to learn about activity-related information. Learning new routes, examining different training types, getting information about running equipment are some of the examples for this type of information. One way to make this more beneficial can be to verify experienced users in the app on a voluntary basis (based on variables such as active app usage time or the number of activity records). This verification may use an indicator similar to the verified accounts in social media platforms (white tick icon on blue background). As verified users share activity-related information in their posts, runners who want to learn more about running can easily notice and follow reliable sources of information. Adidas Running has a similar feature. Links to their web page are shared in the app for promoting selected stories and suggestions by experienced community members. However, it can be more exciting and motivating for both actors of communication (post owner/follower) to turn this feature into an interaction between app users rather than being controlled by the app. So, followers can choose from various verified runners as they like, whereas volunteers would be motivated to run more and share activity-related information frequently in their posts to get verified or sustain their influence on others.

4.3.3 Likes

App users can give feedback to each other's activity-related posts through 'likes' (called 'kudos' in some apps like Strava). Number of likes that a post receive can be seen by the followers of the post owner. Analysis of the participants' responses regarding 'likes' feature is presented in Figure 4.22.

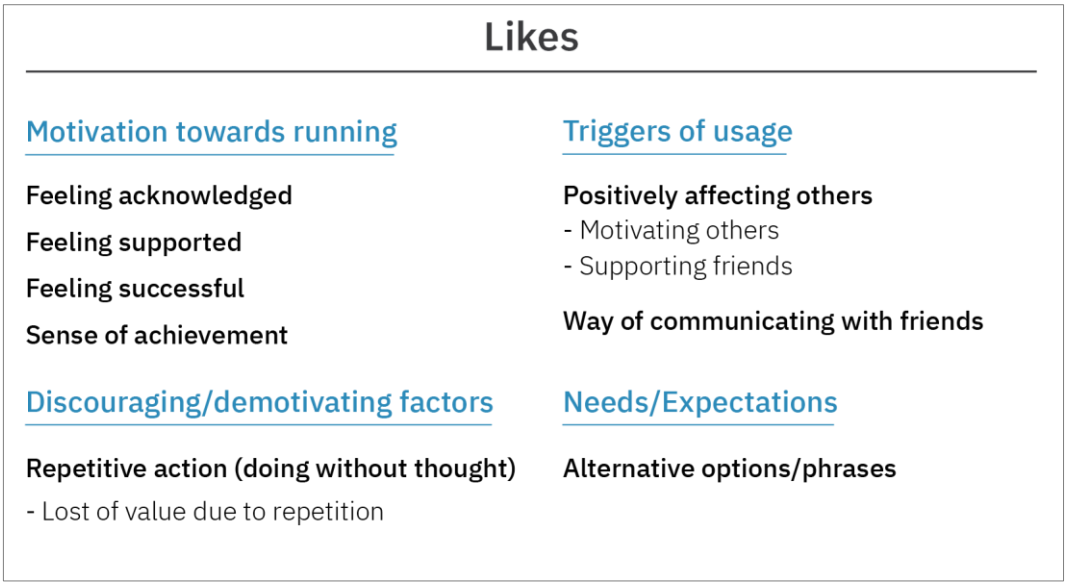

Figure 4.22 Categories and sub-categories related to 'likes' feature

i) Motivation towards running_ when they are talking about the likes their activity-related posts get, the participants mentioned that they feel successful and appreciated by others. Although likes do not have tangible value in real-life, they are observed to arise sense of achievement and motivated the participants to run and share their activity in the future.

> "*When I post, I receive likes and applauses generally. Of course, seeing this, I consider it a success, after all. It also provides a positive motivation"* (P10), "*I know I ran well but it's always nice to get someone's likes."* (P15)

The participants also mentioned that they feel other runners' support and be in solidarity with them when they receive likes. Similar to feeling successful and appreciated, getting supported also keeps runners motivated.

> *"If I think I've accomplished a difficult run, I really like to think that those who like it support me"* (P02). *"Because I think it as they are supporting me."* (P08)

ii) Triggers of Usage_ in addition to receiving likes, the participants stated their reasons for giving likes to fellow runners as: to give positive affect on others, 'to motivate them, and to support their friends.

> *"When I see a friend's running post, I always give him feedback. Because I think they are affected in a good way when I do this."* (P10)

> "*I try to support people who have just entered this path, or who I feel that they care about such interactions, especially with comments or kudos (likes in Strava). At the same time, I try to make them feel that I'm observing them."* (P14)

Some participants also stated that they give likes as a way of communicating with their friends: it feels like they stay in touch even if they do not see each other in real-life.

iii) Discouraging/demotivating Factors_ the only reason that discourages some participants towards likes was revealed in the analysis. They stated that, likes they receive feel like they are given by others as part of a reflexive action which is done without even thinking and thus, loses its value through repetition.

> *"Likes do not motivate or demoralize me. Because they are the likes we give to each other as friends by heart." (*P01)

> *"Obviously, comments motivate the most. Because the likes are very standard.…When you are swiping down, you automatically give likes to everyone."* (P09)

iv) Needs/Expectations_ alternative ways for giving feedback rather than just 'likes', such as in the form of short message phrases are suggested by the participants.

> *"Apart from kudos, maybe if there is a post about poor performance, there might be something like "Oops" "Ouch". These kinds of effects can be fun."* (P09)

Design Insights in Relation to 'Likes' Feature

The analysis show that receiving likes from other runners has positive effects on participants' moods. They both feel appreciated and acknowledged by others. Since the number of likes creates a sense of achievement, they feel successful and get motivated to run. Also, similar to sharing feature, giving likes is a way of interacting and staying in touch with friends without conversing or writing comments.

However, some participants mentioned giving likes can also be a standardized action and done without thinking. For some runners, the repetition decreases its value in the eyes of receivers. In parallel with that, the participants suggested alternative ways of feedback to giving likes such as short ready-made messages or icons generated by the app to make it more fun and thoughtful. For example, sending a "Welcome Back" phrase/icon as a response to the first activity post for someone, who recovered from an injury, could mean much more than giving a like. Another example, when someone runs better than their usual performance, sending a "Well Done" or "Wow" phrase/icon would emphasize the support more clearly than a like.

In this way, alternative ways of giving feedback rather than just 'likes' can strengthen the appreciation and acknowledgement of others and by others.

4.3.4 Comments

Similar to likes, comments feature is another way for providing (written) feedback to other runners. Outcomes of the analysis of the participants' statements about 'comments' feature can be found in Figure 4.23.

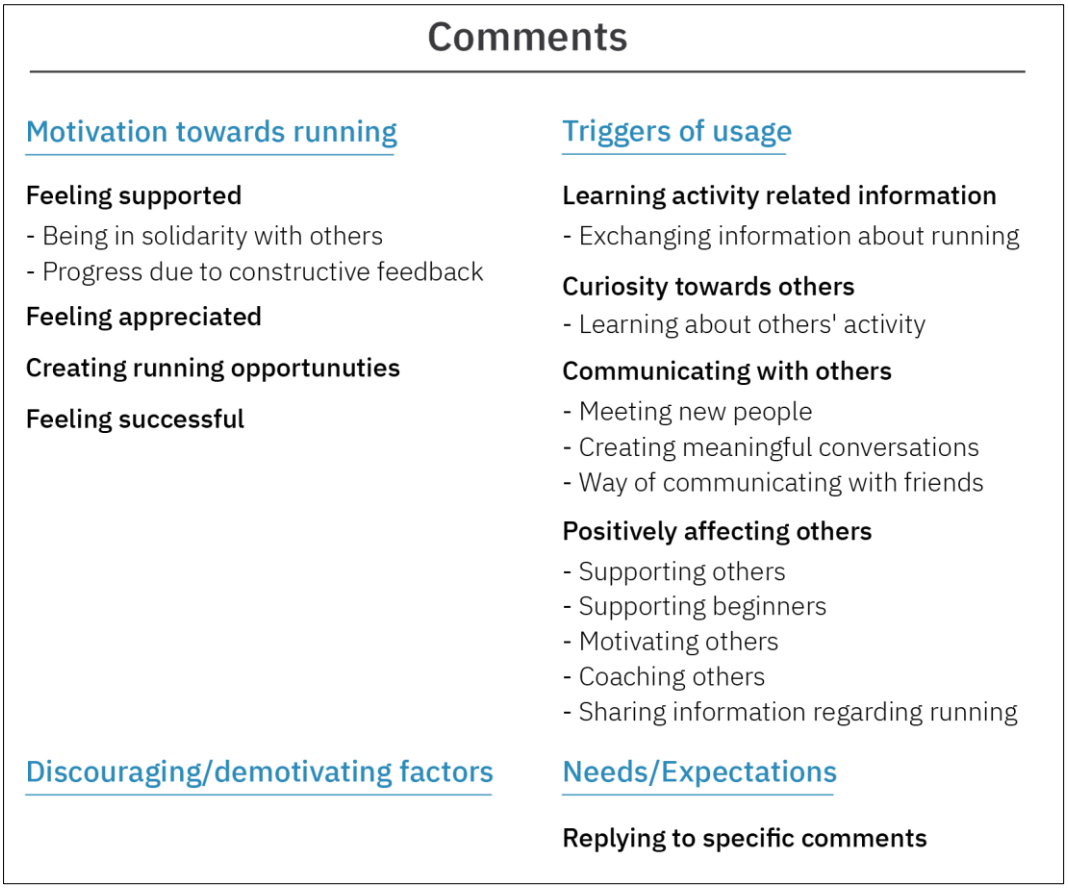

Figure 4.23 Categories and sub-categories related to 'comments' feature

i) Motivation towards running_ as with likes, the participants expressed that they feel successful, appreciated, and supported by others' comments. Getting feedbacks from other runners motivates them to run.

> *"It motivates me more when I have one-on-one interactions, it also triggers me to run the next day."* (P07)

> *"When you receive a comment, it touches you more and it stays in your mind. Sometimes I even open the comment from an old run and read it. I like it."* (P09)

> "*What motivates me most in sports is people's reactions and likes in general."* (P15)

In addition to feeling supported, some participants stated that they achieve better by reading constructive words from others, including comments encouraging the progress or technical information improving the performance.

> "It *motivates me when my coach writes a comment about me. I like the feedback he gives."* (P05)

> *"I like it when my friends see me and say encouraging things like 'Wow you ran well, you can do better."* (P15)

Some participants mentioned that they find new running opportunities by interacting with people through the comments. They schedule running activities using comments under their or in other runners' posts.

> *"...rather than the number of incoming kudos, someone makes a special comment, and another conversation emerges from there. Maybe there is a conversation like 'Let's run together over there that day'."* (P07)

ii) Triggers of Usage_ the results show that besides receiving comments, runners give feedback to fellow runners through their comments and read the comments given to that runner by others. Comments are made to positively affect others. For example, coaching others by sharing activity related information through comments; supporting and motivating others by giving positive feedback – especially, when they feel like the other person would benefit from their support (e.g., beginners struggling to find motivation, people who recently recovered from an injury).

> *"I always write something appreciative and supportive to people I know who have just started running."* (P02)

Other than these, runners use comments feature to communicate with their friends, to meet new runners or simply to have conversations about various subjects.

> *"... some of the people I follow in the app are my friends. If I haven't spoken to them for a long time, following them or conversing in the app makes me happy."* (P17)

Comments also provide an opportunity to learn information about other runners or running in general. As in following feature, the participants mentioned that they were curious about other runners and that when they read other runners' comments, they learn about their performances, goals, or training routines. It is also a way to exchange different kinds of activity-related information. This helps both parties to improve their knowledge and performances in general.

> *"I'm looking for comments under the posts. If there are messages like congratulations, etc., I understand that he participated in a run. Then I look at the GPS data and can see where he ran. I am learning information about events, like the date of the run, through their data."* (P01)

iii) Discouraging/demotivating Factors_ the participants' responses did not reveal any discouraging/demotivating factors about comments, showing that the participants were satisfied with the experience provided by comments.

iv) Needs/Expectations_ an expectation was mentioned by P06 about having an opportunity to replying to specific comments to prevent potential misunderstandings and to help carrying on a conversation.

Design Insights in Relation to 'Comments' Feature

Both 'likes' (see Section 4.3.3) and 'comments' are tools for providing and receiving feedback. As can be seen from the findings, their positive effects over the participants were quite similar: both make users feel successful and appreciated, and both are indicators of solidarity between the app users. However, 'comments' were favored by majority of the participants over 'likes'. This emphasizes the importance of other runners' influence on users and efficacy of comments as a tool of interaction. Naturally, comments provide more detailed interaction opportunities. Examples include writing encouragement messages to people who are new to running or greeting people with uplifting messages when they recover from an injury.

Besides getting motivation or supporting others, the participants also see other runners' comments as a source of information to learn different types of information about other runners', running events or running in general. In this way, comments provide interaction opportunities.

4.3.5 Online Communities

Apps provide community features for users to join in or create new groups that create opportunities for increased interaction between the users. Runners use these for finding activity partners or groups for running together. This feature might be referred to with different names in different apps. For example, in Strava, and Nike Run Club, it is called "Clubs" whereas, in Adidas Running "Groups". 'Findings about online communities based on the participants' responses can be seen in Figure 4.24.

Figure 4.24 Categories and subcategories related to 'online communities' feature

i) Motivation towards running_ some participants pointed out effects of other runners within their online communities over their motivation. When they see the activity posts of others, they feel inspired and motivated to run.

> *"It is like 'Oh, people are training, let's do it too'. I think it's definitely motivating with the community."* (P03)

Some participants highlighted their competitive nature and that they feel like running more to outperform other community members when they see their activities.

> *"Running with a crowd is motivating. You don't feel tired, or you don't bring yourself to accept that you are tired."* (P12)

Another factor motivating the participants is feeling part of a community. Some of the participants expressed that they enjoy running with others., They experience a sense of belonging to their community, they support other members, and try to get them motivated through comments.

> *"I really want to run with a group from time to time. I also train alone. But, when I find out that a friend whom I like would be running as well, it really motivates me."* (P05)

> *"Togetherness is always good. Exercising alone is boring anyways. If you normally run 5k by yourself, you can run 10k with the group there."* (P17)

> *"If I have a friend with a similar capacity who achieves a goal that we could not achieve before, it is more motivating. Or when you see where they came from, it makes you happy."* (P16)

The sense of being part of a community also brings a sense of responsibility towards others. Since they schedule runs together, concerns about disappointing others act as a driving force and motivates them to participate in the activities.

> *"It's like going there because you declared that too. It can be difficult to get up and run on the weekend. But when you write that you will do something, when you make it visible, it drives you more."* (P04)

> *"I think of it like making a promise to someone. And I feel more willing and almost obligated to do so in order to keep my word."* (P13)

ii) Triggers of Usage_ online communities create an opportunity for socialization through sport. They provide chances for users to meet runners with similar interests

for local runners to gather for the activities. Participants also mentioned that they've made new friends in their online communities.

> *"A great strength came from seeing people who think like me. I have made very good friends that I still talk to. It (her online community) has a very, very big place for me."* (P04)

The participants' curiosity towards other runners was revealed from their statements. Accordingly, as in '"following"' feature, runners use online communities to observe and analyze others" activity data, they also learn activity related information from other group members.

> *"...and since there will be different levels of people in the group, I think you can have an idea of how you can run better when you join the group."* (P06)

Another trigger of usage stated by the participants is the feeling of togetherness. They use the online community feature because they enjoy being with other runners, support each other in activities, and feel like they belong to a community.

iii) Discouraging/demotivating Factors_ some of the participants expressed their disappointment about limited app features for interacting within online communities, which is focused on activity posts.

> *"But it (online community feature) has one downside. You can only share what you do on the run. Or when you select the community, it just shows only their (community members) activity data."* (P11)

The participants also mentioned that they feel uneasy because of competitive runners in the group They get annoyed by others if they think they are bragging or showing off their performance in their activity posts. Some participants added that in their online communities, they sometimes get exposed to information not related to running (e.g., political conflicts, ideological expressions etc.). Such posts discourage them to participate in communities.

> *"Some of my friends were influenced negatively. There are those (community members) who are very ambitious and take it very seriously and expect*

everyone to follow them. It should not be forgotten that this (running with a group) is a social activity, for everyone's inner peace." (P05)

iv) Needs/Expectations_ participants expect online communities to allow them to interact with other runners not only through activity posts, but also with group conversations or private messages. They want to hear more about their community and other group members rather than seeing only activity posts. For example, P10 stated that it would be motivating for him to get 'real-time activity notifications' when a group member starts running.

> *"...chat feature in the community. If there is such a feature, everyone can share their views on Strava instead of talking on WhatsApp, etc."* (P11)

> *"Actually, I wish the clubs were a little more prominent on my home page. I would also like the clubs to share more. Maybe not only activities but also posts supported with text or images would be good."* (P07)

A need for organizing/setting in group events/challenges/goals is also revealed in the analysis. There was a mention by the participants that they would like to create in-group events and invite other group members through online communities, also would like to challenge other group members or members of other communities to have friendly competitions.

> *"In fact, let's say, there is a group of Metu runners. You say that you are planning a group activity, on Monday at 7 o'clock. But nobody knows that because there is not an interaction for it on Strava."* (P09)

> *"We can say that: "We have an event this week at this time'. That's the goal, that's the pace'. This can be discussed in the application instead of writing it on WhatsApp."* (P17)

Finally, one participant stated that online communities can be categorized according to app users running level to make them feel less overwhelmed by more experienced runners.

> *"For example, it would be nice to see people running at my pace and run together with them. Because right now I just go and see the best runners of*

all time. I can't invite them to run together, they are sprinting, I'm running in my own tempo." (P08)

Design Insights in Relation to 'Online Communities' Feature

In online communities, similar to 'following' feature, the rate of being motivated by the activities of others is quite high. Some runners get inspired by others" activities, whereas some runners feel motivated through comparing their data with others. But, the most prominent feature of online communities in motivating users is the sense of belonging to a group. Thus, users are in solidarity with other group members and even feel responsible towards them about activities. This encourages them to participate in activities with the motivation to not to disappoint others, even when they feel lethargic. On the other hand, the participants stated that they find interaction options provided by the apps for online communities limited. For this reason, they can only use communities to see each other's activities and give feedback, but this causes users to lose interest in the online community feature over time.

To further engage users with online communities, it can be beneficial to increase and diversify interaction options provided in the apps. For example, users can create in-group challenges or events and receive attendance confirmation from other users. In this way, instead of using third-party messaging apps or social media, they can communicate within the activity-tracking app itself. Invitations to events and challenges can motivate users who openly declare that they will participate, with a sense of responsibility.

Not being able to control the content of discussion in large groups appear as a discouraging factor for some runners. Users who are exposed to unrelated/unwanted information or discussion start to feel distant from the group. To prevent this, apps can be designed to give users an opportunity to label their shares within the group with tags (e.g., #route suggestions, #training tips, #planning after-run events, #other). In this way, users can filter the feeds they want/do not want to read. To increase in

group interaction, apps can provide a discussion board, where users can easily express their ideas on set topics, or they can initiate their own discussion.

This type of interaction options would enable users to be more engaged and feel motivated in online communities provided within activity-tracking apps.

4.3.6 Leaderboards

Leaderboards allow app users to compare their activities with fellow runners through various types of rankings. The ranking may include global app users or just followers of that specific runner. In-group leaderboards for online communities are also available in some apps. Findings about leaderboards based on the participants' responses can be seen in Figure 4.25.

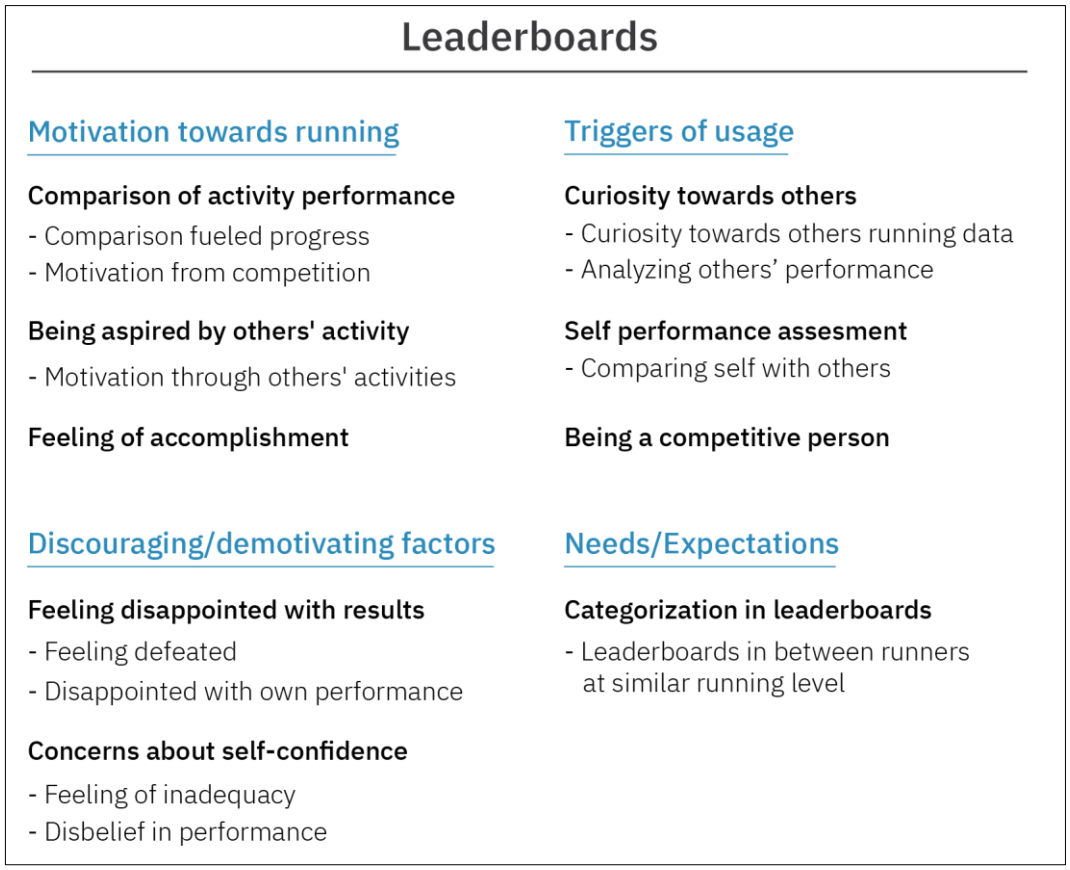

Figure 4.25 Categories and sub-categories related to 'leaderboard' feature

i) Motivation towards running_ for leaderboard feature, some participants emphasized the role of competition over their motivation. Accordingly, they compare their performance with others' and get motivated by this, such comparison also fuels their progress. As their performance increases, they feel more motivated towards the activity.

> *"I'm looking at where my running rank corresponds to in my age category. I am wondering how far I could go next year in this ranking if I get better at training."* (P13)

> *"But when I look through my friends, I make a comparison like how good they have run and how much I run.*" (P12)

Feeling of accomplishment when they outperform their competitors or when they get a good rank in the leaderboards also highlighted by the participants as a motivating factor. Since they feel successful, they want to maintain their performances, and this motivates them to run.

> *"Although I haven't been training for a long time, I have achieved a good rank. I was the third. I was intrigued and I looked at the details of my activity right away."* (P05)

> *"Although I don't have good ranks on the leaderboards, it has a positive effect on me. Even if I'm not at the top, it's nice to get into something, especially if I ran for it."* (P07)

Some participants mentioned that they get inspired by the performances of others in the leaderboards. Seeing that a good performance can be achieved, makes them want to run more towards their goals.

ii) Triggers of Usage_ comparing activity performance was revealed to be a trigger of usage, besides its being a source of motivation towards running. Participants stated that they compare their data with others in the leaderboards to be able to make self-performance assessment. They evaluate their data with best performances in the leaderboards to have an idea of their running level.

> *"My stat graph in my own activities affects my motivation more than comparing it with others. I can follow the results more easily from there (leaderboards)."* (P07)

Some participants mentioned about their competitive nature as a reason to care for leaderboards. To them, all sports contain the element of competitiveness, and it is only natural for them to compare themselves with others.

> *"I look at people in my age group, I look at people at my weight, they always provide motivation. I think this applies to anyone with a competitive spirit."* (P17)

On the other hand, some participants mentioned that they are using leaderboard feature as they are curious about other runners and their performances. They analyze fellow runners' performances and user profiles for running-related information, such as their training methods or competitions they participated in, for getting insights.

> *"It motivates me to follow people I see at the same level as myself and to rise above them."* (P15)

> *There are some races, for example, I looked at the previous years' grades in those races to see who did what."* (P16)

iii) Discouraging/demotivating Factors_ some participants mentioned that they do not use leaderboard feature because they have disbelief in themselves and feel inadequate about their performances, hence they would not have a chance to be ranked high.

> *"Because, for example, I see a man running 20 km with 4 pace, it's not motivating at all,"* (P12)

> *"Since I don't go head-to-head in leadership in neither age group nor other groups, I automatically focus on myself,"* (P14)

Sometimes, when the participants see others' good performances in leaderboards and compare them with their own, this may lead to a disappointment about themselves. In a way, they feel defeated and get demotivated for running.

> *"...and there are measures like the first, second, third, for whoever ran that place the fastest. Being down there [at the bottom] in the rankings demotivates me."* (P01)

Some were not interested in leaderboard feature at all, because of their uncompetitive nature, and that only interested in their own performances and the benefits of running.

> *"But I don't look at my own ranking there (in leaderboards) because I don't have that much ambition."* (P08)

iv) Needs/Expectations_ categorization in leaderboards based on running levels were put forward by the participants. They would like to reach other runners at similar running levels (e.g., by distance, by speed, by duration, etc.) and compare each other's activities in a more equal ground.

> *"It would make more sense to see the development of people at similar levels to me in certain periods."* (P14)

> *"The app can detect your level, classify you accordingly, and assign you to a group in leaderboards."* (P12)

Design Insights in Relation to 'Leaderboards' Feature

As 'leaderboard' ranks runners' performances, it arouses competitive feelings by its nature. It makes users to feel motivated and achieve progress through comparing their performance with their fellows. Users analyze performances of others, especially high-ranked runners, and use the data to evaluate their own running level.

However, such comparisons do not necessarily result in positive influence for all. Some app users feel defeated and demotivated when they cannot outrank others, whereas some think that they will never be able to get good ranks. This may lead them losing interest in using leaderboards. When designing leaderboard feature in apps, to be inclusive for all types of runners, different ranking categories taking into consideration their level and ability can be created. Users can be placed in these

categories (or they can choose to take part) according to their performance along with runners who are close to their rank. In this way, they can observe their progress much easily and experience the feeling of accomplishment, hence get motivated. Users can also evaluate their own performance more realistically, as there will be more categories for users to refer to for comparison with other runners.

These categories can also provide collective interaction by means of bringing users at similar running levels together and provide them the opportunity to meet each other. In addition to that, when users see the performance and progress of runners at their level, they would be less likely to feel inadequate. In this way, leaderboards can potentially be used by non-competitive users.

4.3.7 Challenges

Challenges is another feature that enrich the interaction between users. They can be generated by the app or by other users. The challenges can be set for various criteria, for example the distance or elevation covered, duration of the activity, running pace, and so on. Findings about ‘challenges’ based on the participants’ responses can be seen in Figure 4.26.

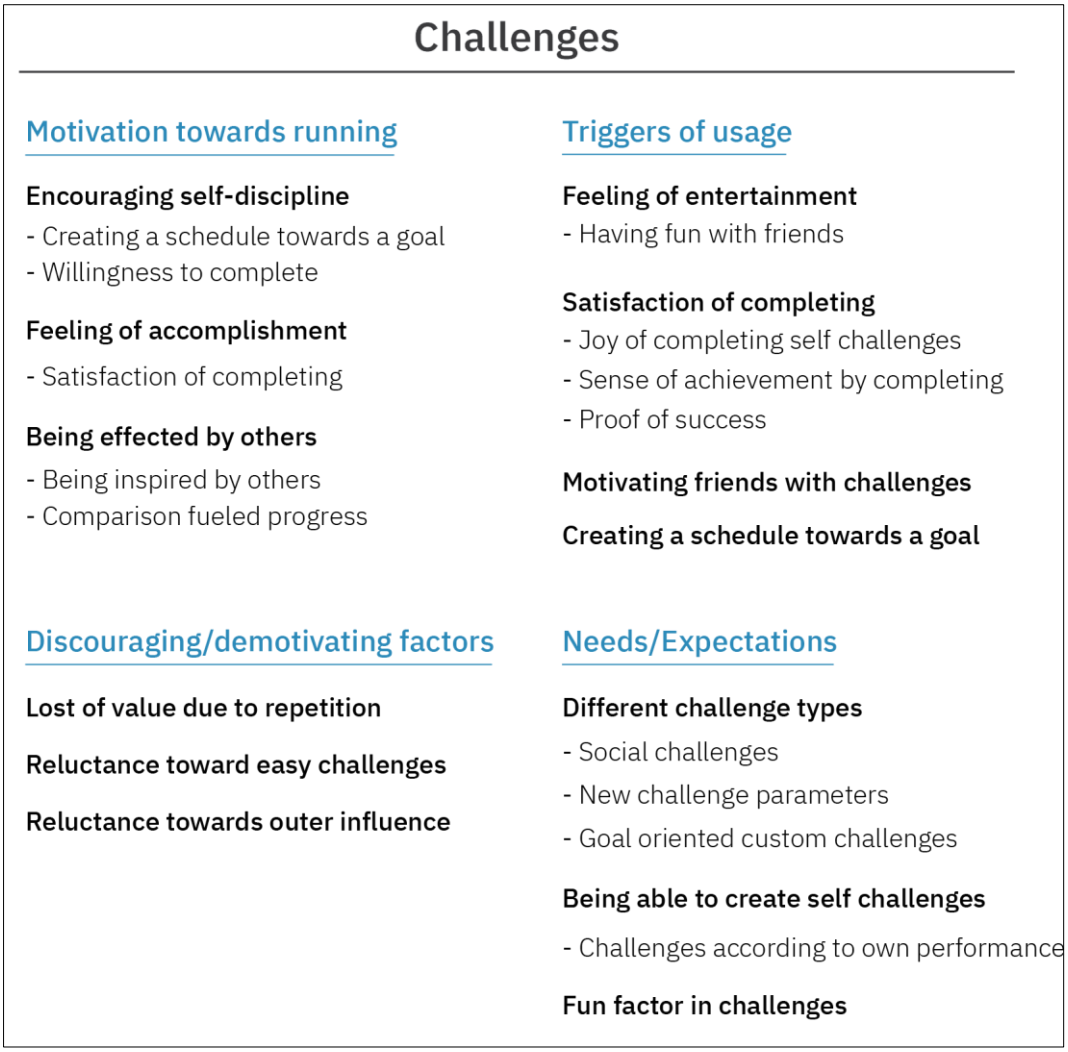

Figure 4.26 Categories and sub-categories related to 'challenges' feature

i) Motivation towards running_ similar to 'leaderboards', sense of accomplishment, when participating in challenges, is mentioned by the participants. Challenges are found to be satisfying to complete and treated as a success story by the participants. Also, participating in challenges encourages runners' self-discipline towards running. Some participants stated that challenges become like a goal for them, and they schedule their training to achieve that goal because when they take part in a challenge, they are most likely to complete it. This willingness motivates them in their activities.

> *"When I don't want to run, at least you can do the challenge and fool yourself into running. I have observed that it has a positive effect."* (P07)

> *When I don't feel like running, I ran a little more saying "oh look, this challenge is good, let's finish this."* (P17)

Some participants said that they observe their progress by analyzing the results in challenges. When they see that they get better in a challenge, which used to look impossible earlier, they get motivated by their own progress.

As with several other features, the participants are affected from other runners' performances in challenges as well. Seeing the followers completing a challenge inspires them to repeat the same. Also, some participants mentioned that they feel competitive to compare their progress in a challenge, which motives them to achieve a progress.

> *"Every month has 5K, 10K challenges. If someone completes them before me, seeing that actually motivates me."* (P01)

ii) Triggers of Usage_ some participants highlighted the satisfaction they get from completing a challenge as a reason to participate in. They enjoy completing challenges as they lead to sense of achievement. It is also seen as a way of proving their success, when there is a completed challenge information in their profile.

> *"Strava's challenge feature gives badges according to how long you ran in different months. Those are motivating."* (P08)

Besides the sense of achievement and success, some participants highlighted the entertaining side of challenges. When they take part in a challenge, it is fun to compete with other runners or friends. Challenges are also used as means for interacting and supporting friends. Some participants said that they invite their friends into the challenges to motivate them for running.

> *"I always invite my friends (to challenges). 'Let's run together so we can get motivated'."* (P08)

> *"But since there is a competition among our friends, when you show your performance to your friends in the challenges, and it motivates them as well. It makes them think like, ' We are running together, the man has done these things, I can do it if I push a little'."* (P11)

Last trigger of usage revealed in the analysis is that the participants use challenges to create a running schedule for themselves. They perceive challenges as their goals and thus, organize their training program around achieving the goals.

> *"Especially the fact that it (challenge) is planned seriously motivates you to do it. Otherwise, it's not as effective when you run by yourself."* (P06)

iii) Discouraging/demotivating Factors_ some participants stated that they do not get motivated with challenges after a period of time, because they start repeating themselves, especially the challenges promoted regularly by the app (e.g., monthly 5K, monthly 10K).

> *I remember looking for a different challenge. Just distance and time can get boring after a while. If you don't do it for a competitive purpose, it doesn't make any sense after a while."* (P07)

For more experienced runners, easy challenges become less important. Some participants mentioned that they do not feel challenged because of target measures (e.g., distance, duration etc.) in the challenges are way below their level.

> *"But after a while it starts to become monotonous. The thing is, I mark the default 5-10-100-200 for the end of January, for February, and then for March. I'm not checking when marking, I do it automatically."* (P14)

In addition, sometimes runners are more interested in setting their own challenges rather than responding to others' or provided by the app.

> *"I don't like to do things that come to me from others, or things that are sent from somewhere. Whatever it is I want to do myself, I like that the idea comes from me."* (P04)

iv) Needs/Expectations_ the need for new and different types of challenges were mentioned by the participants since after a while the existing ones offered by the app

get too repetitive. They want to have different parameters rather than to be limited by performance specific.

> *"Challenges can be added to improve their social part. Because it is always based on km or something like this. Other than these, there may be challenges with different values."* (P03)

Parallel to this, the participants emphasized the need for entertaining elements in challenges. They would like challenges to be fun to participate in rather than being competitive goals only.

> *"Different challenges would be fun for me. It would be nice if different games were added."* (P12)

Being able to create challenges according to their own performances also was appealing for some of the participants, because those challenges can act as goals.

> *"But if you can create a challenge according to your goals at that time, it creates more driving force. In fact, if you can do this as a group, it can turn into something like a game within that group."* (P09)

Design Insights in Relation to 'Challenges' Feature

Challenges allow runners to see what they can achieve, their running level, and their comparative performance with others. They also provide an environment where runners can interact through a friendly competition without having need to communicate directly. Besides the sense of competition and success, challenges bring fun for runners. Participating in challenges individually or with fellow runners and friends help them to cheer up.

On the other hand, regular challenges become monotonous after a while and may cause users to lose their interest. Therefore, while designing challenge feature in apps, increasing the number and variety can be a good strategy. Especially, the challenges offering more fun ways of achieving the target together can increase social interactions between friends and fellow runners. For example, "Record a joint

run with 5 different users in 2 weeks" or "Run 10 different routes in a month and share your photos". This way, runners can participate in friendly challenges without the pressure of performing well in an activity.

Moreover, some users think of challenges as a goal to be achieved rather than a competition. Reaching to their goals and seeing their own progress motivate them, they feel satisfied and see the challenges as indicators of success. However, everybody performs differently based on their, for example, age, gender, physical built or based on whether they are beginners or more experienced runners. Accordingly, the same challenge can be very difficult for someone to achieve, whereas too easy for others. Therefore, challenges with a fixed difficulty level would make it difficult for every app user to enjoy similarly. To prevent this, in the design of challenges features, different metrics and levels should be taken into account, and difficulty levels should be built gradually. In this way, the motivation of the users can be increased both with the feeling of satisfaction from being able to complete the challenges and with the increased number of reference points that helps them to see their personal development.

4.3.8 Routes

Runners can see the routes from fellow runners' activity posts, or they can reach to publicly visible routes created by others, such as 'segments' in Strava. Findings about 'routes' based on the participants' responses can be seen in Figure 4.27.

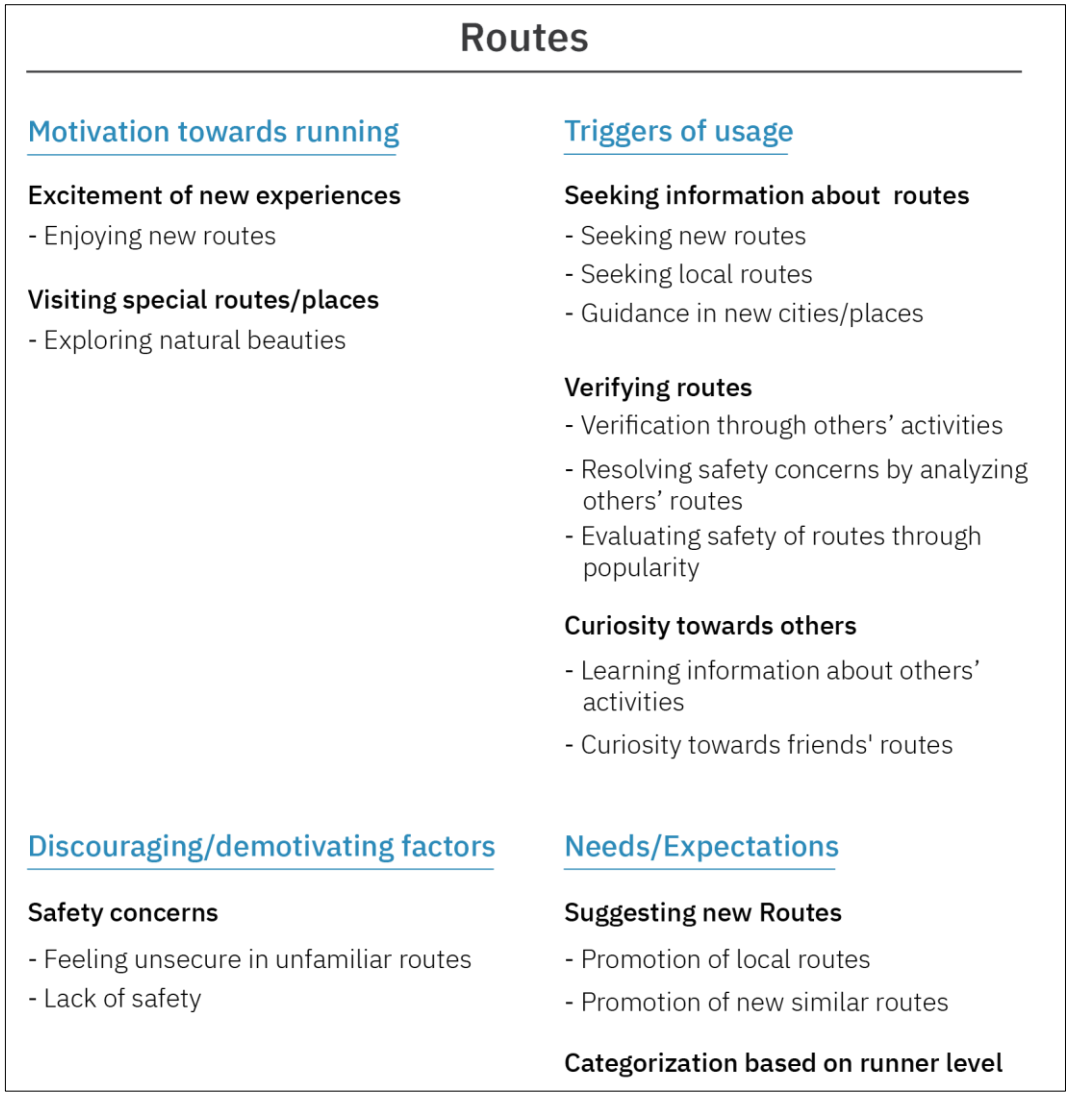

Figure 4.27 Categories and sub-categories related to 'routes' feature

i) Motivation towards running_ participants mentioned that they enjoy experiencing new routes when running. They feel excited to run in a new atmosphere and this excitement motivates them towards running. Parallel to that, if the route they are planning to run is somewhat a special location (e.g., natural beauty, historical place, popular location), they feel motivated to run and explore the location.

> *"But for example, now I have registered for the Marathon on the Lycian Road, I will prepare for it. It's a location that I love, I've been there before. I also registered in order to be able to go there again."* (P03)

> *"For example, there was a route in an Eymir [the lake] that I ran yesterday. Such places motivate people, they are enjoyable. It motivates me."* (P05)

ii) Triggers of Usage_ one of the prominent reasons for the participants to check others' routes was revealed to be seeking new routes. Participants mention that they look for information about specific routes that they are planning to run (e.g., elevation, surface type, popularity) or they just try to find a new route for themselves. Especially when they leave their city, they use other runners' data as a guide to get familiar with possible routes nearby to them.

> *"For example, if I see a route in the Metu land that I have never been to, I look at it, for example, to understand how it was connected there. I'm looking at the elevation. Doing that a route is formed in my mind that I can run later."* (P03)

> *I'm constantly looking at segments around me. Even later, I look at Google maps to see how the surroundings are, what the slopes are, etc. I analyze them and comment like "I can run here, how is it here."* (P12)

> *"For example, you don't know where you are going. but I'm trying to create a route, routes experienced by other runners offer you a source in an instant."* (P11)

Some participants mentioned that they also check others' activities and segments to verify the routes they are planning to run. It helps them to understand whether the route is safe or not. They look at the popularity of the route to judge its safety as well. Reading fellow runners' comments about the routes helps them to decide.

> *"I think it's a very good method to take courage and explore new places like 'Look, everyone is running here, why don't I go here'."* (P09)

> *"I changed cities like three times, and I was looking directly at the segments since I didn't know where to run. I also look at the places where people run."* (P08)

Some participants also stated that they check other runners' running routes out of curiosity or they check others' and their friends' activities to see where they run.

> *"Yes, it interests me, especially if there is a route that I think is different, I look at it like "where did they go, how did they run". For example, there is a woman running in the village in Çayyolu, I wonder how she does it."* (P08)

iii) Discouraging/demotivating Factors_ safety concern was the major discouraging factor in relation to 'routes' feature. Some participants, especially female runners, expressed their concerns about new routes as they feel insecure in the places they are unfamiliar with. Fear of animals was also mentioned by some participants when it comes to trail routes.

> *"As a female runner, I do not feel safe enough to run in an unfamiliar route in this country."* (P04)

> *"Especially beginners are afraid to go to the forest alone or run at night, they feel afraid of mad dogs."* (P09)

iv) Needs/Expectations_ participants highlighted the need for more detailed information about the routes. They mentioned that they want to learn about different characteristics of the route such as surface type, runner traffic and any potential hazards.

> *"In particular, I would like to know about the crowd of the route, crowds of people, etc. Of course, this is personal data use, but at least if there are runners out there, at least I can see it."* (P06)

Some participants expressed their wish to discover new routes. That is why, they wanted the apps to promote new local routes or routes similar to they usually run.

> *"It could also be something like 'Would you like to try that route' or 'There is activity on this route today, would you like to try it?'."* (P07)

Final expectation revealed from the participants' answers is the categorization of routes based on runner level. This suits to the public routes like the ones in segment section of Strava.

Design Insights in Relation to 'Routes' Feature

The routes seen by fellow runners' posts or the ones that are open to public (such as 'segments' in Strava) help runners to discover new routes and new experiences. Such experiences enable users to feel the excitement of discovery and to be motivated towards running.

The app users also check other users' activities to learn more about the routes and the routes' characteristics. However, in most apps the standard information that can be shared in activity posts or public routes is limited to distance, elevation and sometimes the number of users who ran that route before. In most cases, this information falls short to satisfy curious runners, and a does not provide reassurance for users who have security concerns about trying new routes.

One solution to avoid this can be to provide users with tags that contain information about routes, which they can share along with their activities. Ready-made tags can be provided by the apps grouped under different categories. For example, ground type, can offer options such as soil, asphalt or synthetic, whereas people density category can offer options such as crowded, average, uncrowded. In addition, users can also create custom tags for the routes that are accessible to everyone, and other runners experienced that route could vote for the tags to express their agreement/disagreement. This way, popular tags that receive certain number of votes by the community can be visible and create data validity information for users who will review them later. Custom tags may also contain detailed information about the routes (e.g., stony area, dark road, bare land without shadow, danger of stray animals, etc.) and through this collaborative information user-to-user interaction options between runners could be increased.

With the help of such tags, activity-tracking apps can suggest the most suitable routes for the users by allowing them to filter their preferences. Thus, even when they run in a location that they are not familiar with, they can easily reach the routes that suit to their preferences. Being able to easily access detailed information about routes

that they have not tried before may help users to try new experiences, and their motivation for running can be positively affected.

4.3.9 Running Events

Running events are organizations where many runners participate in and run together. These events may be created by the app (e.g., virtual races), or by external organizations like for charity, for remembrance of a person or for a shared value. Findings about ‘running events’ based on the participants’ responses can be seen in Figure 4.28.

Figure 4.28 Categories and sub-categories related to 'running events' feature

i) Motivation towards running_ the participants mentioned that since the running events usually host many runners, they create a sense of togetherness. Some participants reported that they enjoy running with groups of people as it is a collective experience and the shared value/purpose motivate runners more for running in such events.

> *"The thing that drives me there (in events) is, of course, the fact that there is a crowd, and that's why it's important that I am there too."* (P01)

Most of the events, except the virtual ones, take place in special routes/places (e.g., Anıtkabir, Eymir, Likya Yolu). Visiting these places and running for symbolic appreciation provide motivation for runners to run and to get prepared for these events.

> *"I had participated in previous 29th October Republic Day Run. It's more of a cultural thing, it usually comes from wanting to embrace it and be a part of it."* (P03)

Some participants mentioned that they set these types of events as their goals, and they start training to achieve their goals.

> *"For example, I entered the virtual Istanbul Run with a friend of mine, saying that we will run 10k there. We motivated ourselves that we need to achieve this by the end of the summer. This is how we started."* (P12)

> *"For me there is no small event, no big race. If there is a race, I prepare for it. Usually once a month. I create the training program according to them."* (P05)

Some of the participants highlighted their motivation source as the competition in these events, whereas some participants stated that the fun factor in the events is what keeps them motivated for running.

> *"It usually makes more sense to go for the more serious ones. But if we are going with a group of friends and family, then it doesn't matter, I will go to all of them. It is necessary to distinguish whether it is a sporting event or a social event."* (P17)

ii) Triggers of Usage_ besides getting motivated from running with others, participants also mentioned that they treat the running events as an opportunity for socializing with fellow runners and with their friends. Since there is a symbolic value/purpose in the events, the participating runners share similar interests and as the participants of the study stated this leads to new friendship opportunities.

> *"But in the event at METU [Middle East Technical University], for example, I have people I know there, I meet with them. When I think this would be good for socializing, I participate (to events)."* (P03)

> *"Pace is not important for me in those kinds of runs. Running with my group or friends, having fun makes me happier. That's why it's nice to participate."* (P11)

Again, some participants highlighted that they run in such events to create strong memories through the special places they visit, through the experience they share with their friends and the finishers' awards.

> *"Because when we look back tomorrow, I'm doing it to say, "oh look how fun it was to participate in this run, look, this t-shirt from women's day is a memory of it."* (P01)

> *"I think it is very nice to keep it as a memory, especially if certain items belonging to the race etc., are distributed."* (P06)

Since these events bring people with similar interests together, some participants also emphasized they experience a sense of belonging, which is another reason for runners to participate in running events.

> *"Of course, this is a commemoration event, your performance is unimportant. But I feel like being there, participating in that run on the spot, is something special."* (P13)

> *"Events are also a great motivation because going to a city you don't know, meeting with people you don't know and acting together for the same purpose is a motivation."* (P04)

iii) Discouraging/demotivating Factors_ some participants stated their reason for not participating in running events as being unaware of them most of the time. The

runners only hear about the events from their friends by chance or occasionally they come across a post in social media.

> *Because we only heard about them (events) when we look at them on the search engine and be like "oh look, there is something here and this is close", or when one of our friends say, "there is something here, I will go there."* (P13)

> *"I don't usually come across them on Strava. There are times when I find it on social media or in the circle of friends and say, 'Where is this, let me sign up too'."* (P07)

iv) Needs/Expectations_ promoting the running events within the apps were mentioned by most of the participants during the interviews. They stated that they would like to hear more about upcoming events, especially the local ones. They would even like to see the announcements public events by amateur organizations (e.g., industrial design students' or engineering students' weekly run in Devrim Stadium).

> *"Promotion of events is very important. For example, most people are unaware of the Lycian marathon or miss their registration time. Maybe Strava can report registration times etc. I think such improvements are needed."* (P03)

> *"It would be nice if the app could examine all of the events and say, "Here are the suitable races for the next month for you" and show me the ones that are suitable for my location."* (P13)

Participants also said that they would like to know other runners planning to attend to upcoming events. Especially, if they set that event as a goal, they would like to review how others are training for the event.

> *"For example, if the organizers of the event open a page and match the people in Ankara who say, 'I will participate in the event in Ankara', this can be very motivating."* (P03)

Design Insights in Relation to 'Running Events' Feature

Running events are found to be motivating by most of the participants, albeit for different reasons. While some runners take part in the events to compete with others, the others see it as an opportunity for socializing or for fun. Also, when users become aware of such events, they set them as a goal. Sometimes whilst training they get motivated to perform well but sometimes, they just target to complete the event.

However, many participants reported that they feel upset to not to be aware of planned events. They can hear about the events either from their friends planning to attend or from the social media accounts by chance. Activity-tracking apps can be designed to offer strategies for informing users about upcoming events and for increasing their visibility. The apps can inform users about upcoming events by sending notifications, e-mails, or in-app alerts, depending on user preferences. The users can avoid being exposed to an unwanted amount of information by filtering what kind of activities they want to be aware of. For example, if users want to be informed about activities within a certain distance, they can set this limit themselves. It may also be useful to create an event calendar within the app. Major and local events run by well-known organizations and online communities can be automatically added to the calendar by the app. While looking at the calendar, users can adjust their location preferences and access information such as day/time/distance of upcoming events in the regions they want.

In addition, users can declare whether they will participate in the event and this information can be shared with other users if they wish to allow. In this way, users can learn about the people who plan to participate in the events. For example, they can be informed about the participation of their friends who do not have one-on-one interaction. Since these events are also a socialization tool for them, being aware of the participation status of other users can be extra motivating for them.

4.3.10 Notifications

Activity-tracking apps send notifications to users that consist of information about running or other users' activities. Findings about ‘running events’ based on the participants’ responses can be seen in Figure 4.29.

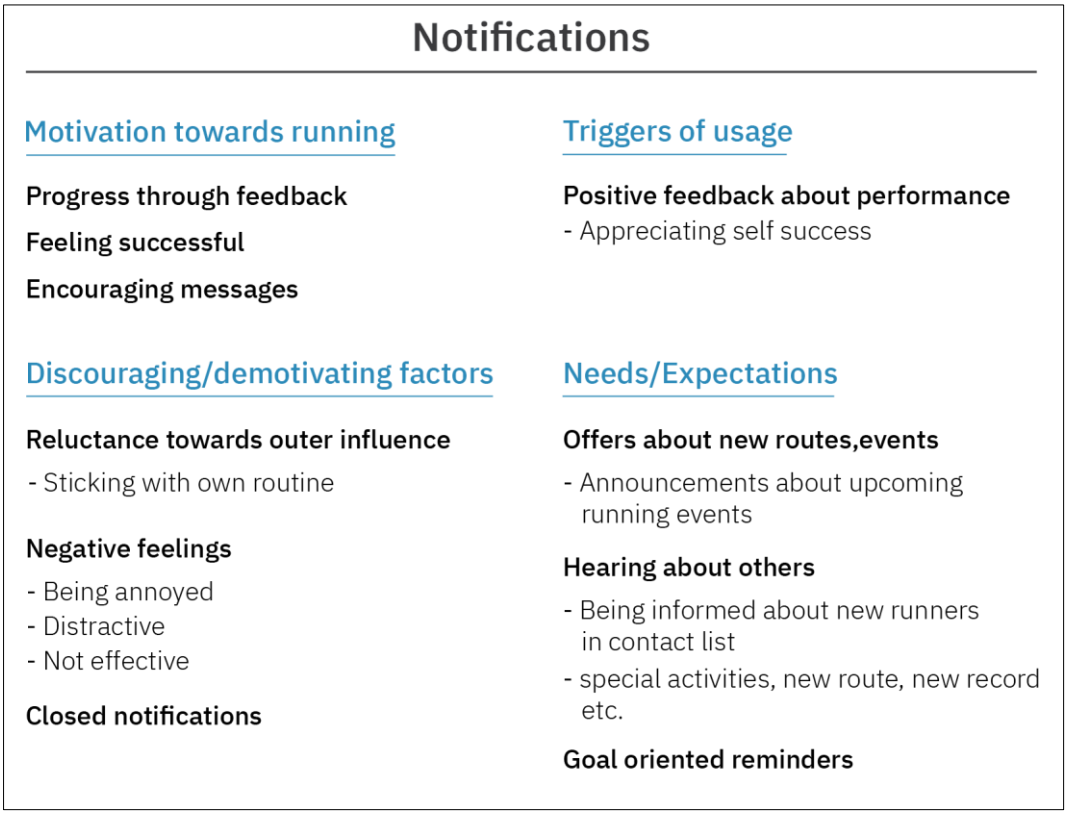

Figure 4.29 Categories and sub-categories related to 'notifications' feature

i) Motivation towards running_ some participants mentioned they achieve progress by getting constructive feedback from the app through notifications. They feel successful and this keeps them motivated for the following runs.

> *"It gives me positive messages through notifications, like 'You are in the 5-10% of those running with you'. Knowing that I am performing well affects me very positively and increases my motivation."* (P10)

Also, the participants find reading encouraging messages from the app very useful for building up their motivation.

> *"Such notifications are generally closed for me, but it was motivating when I used it. For example, 'You haven't done any sports for a week, you can do it to feel stronger' etc."* (P11)

ii) Triggers of Usage_ participants stated that they read the notifications to have positive feedback about their performances. This leads them to feel successful.

> *"... there is a 2 km segment in Anıttepe. For example, something I like when it says: 'You ran that segment for the first time so fast'. Because I look at my paces in those segments after such a notification." (P11)*

iii) Discouraging/demotivating Factors_ some participants mentioned that they prefer all the notifications from all of the installed apps stay closed. That's mainly because negative feelings raised by them. Most of the participants highlighted that they feel annoyed by notifications. They found them distractive and not effective at all.

> *"I turned them off [notifications] all. Because I regularly look at the app, other than that, it seems distracting for me. Except for e-mail, I've turned them off."* (P03)

Some participants talked about their reluctance towards outer influence. They would like to stick with their own routine. Any type of external influence, whether it is training tips or even positive feedback in relation their performance, makes them feel intervened.

> *"I don't want anything from outside to affect me. I want to be informed only as much as I want. I don't like when someone pokes me. I want it to be in my own time zone."* (P04)

> *"I don't need any reminders. I'm making a plan myself. It would not be better if someone reminds me, because I am already preparing one day in advance like 'what will I do tomorrow etc.'"* (P05)

iv) Needs/Expectations_ some participants mentioned that they would like to hear more about upcoming events through the notifications.

> *"For example, there may be notifications about the runs around me. If it's about upcoming runs, I can check it out, of course a few days before not the same day."* (P06)

> *"For example, we created a group run, like an event. App can make it out like a suggestion to the people around. Like 'A group activity has been created near you, are you interested in running'."* (P09)

Besides getting activity related information, a few participants also mentioned that they would like to hear about other runners' activity highlights. They would like to be keep informed about their followers' activities, new routes they run or new personal bests they achieved.

> *"I would like to receive notification of my friend, who has not been active for a long time, if he has been active that day. It would be a reminder to me when I wasn't active, or it would be an encouragement to run together."* (P07)

Some participants wish to receive reminders about the goals they set. For example, reminders about upcoming events they can participate in or their target distance to cover in a month.

> *"You can set a daily time frame for activity, and it gives a reminder for that time. If you don't, it can notify again. Such a system can be good without pushing too much."* (P07)

> *"Encouraging reminders like "Bravo here we are, this is our new target" could be nice."* (P13)

Design Insights in Relation to 'Notifications' Feature

Most participants seemed to share negative feelings towards notifications. They generally describe notifications as distracting and annoying. In addition, they are annoyed by the fact that incoming notifications are related to information that does

not interest them. Instead, they would like to get notified about the information they want to know.

In fact, there are options in the apps where users can customize the notifications they want to receive. For example, Strava gives the opportunity to choose from a very wide range. By default, users are notified by all different information types, but they can make any changes they want. However, many users are unaware of this, because they need to navigate through several menus. The visibility of the preferences needs to be increased in order to show users that they can choose the topics they want instead of turning off all notifications. One way would be to remind users that they have such a possibility in the notifications sent and have them access it with a click if they wish to do so. In addition, it may be useful to remind the users that the application offers customization options to provide information about where they can access these settings.

Apart from these, one of the reasons why users find notifications distracting may be the timing of them. Notifications that come on a day when for example, they are not planning to run or when they are busy can be frustrating. That is why it can be useful to provide users with the option to set timing of the notifications. Users with a regular schedule can mark their activity times, or the app can determine by analyzing the past activities (e.g., Saturday mornings, Tuesday after 7.00 pm, Thursday after 7.00 pm). Promoting activity related information when the users' mind is on running, would be more beneficial and it would attract more users to use notifications.

Moreover, users want to receive notifications not only about running, but also about the performance of other users. Being aware of the activities of the runners they are especially curious about may interest them. Users can choose from the runners they follow and receive notifications about their running times, routes, and results. In this way, they can have more opportunities to interact with other users and thus be more motivated.

4.4 Discussion

Researcher's design insights about each social interaction feature were presented under corresponding headings in the previous sections. In this section, prominent factors in the relation between activity-tracking apps' social interaction features, users' motivation, and overall user experience are discussed. Discussion is based on the second and third phases of the field research.

4.4.1 Relation between Social Interaction Features of the Activity-Tracking Apps and Runners' Motivation

The results show that all of the social interaction features of the activity-tracking apps investigated in this research (i.e., sharing; following; likes; comments; online communities; leaderboards; challenges; routes; running events; and notifications) had positive influence on the motivation of the runners. In this section, frequently recurring and prominent factors that motivate users through social interaction will be discussed under the following headings:

- Personal interaction with fellow runners
- Acknowledgment
- Connectedness
- Excitement of new experiences
- Comparison

4.4.1.1 Personal Interaction with Fellow Runners

The direct interaction between the app users and fellow runners through activity sharing, likes and comments is found to be one of the most important factors that positively affect their motivation.

The results of the survey show that sharing activities with photos or messages and receiving feedback through likes or comments are in high ranks in increasing the motivation of the runners. However, the feedback received during the interview sessions as well as survey findings indicate that the participants were more impressed and motivated by receiving ‘comments’ rather than ‘likes. That is because the app users think that likes are given without thinking much and due to their repetitiveness, their value decreases, whereas in the comments it is possible to add personal notes. The interaction offered through the comments also provides users an opportunity to learn from each other and share information about activity, such as new routes, training types, injury precautions. Accordingly, the importance of users’ ability to express themselves well and getting detailed feedback from other runner can be highlighted within social interaction features.

4.4.1.2 Acknowledgment

One of the most prominent reasons that social interaction features of the apps motivate users found to be the feeling that they are noticed by other users. When runners share their activity, the comments and likes they receive make them feel acknowledged and appreciated. Hence, they feel successful and motivated for the following run.

Analysis of the online survey also revealed that the social interaction options related to sharing activities are rated highly to increase the motivation of the participants. In other words, sharing the activity results is as important as carrying it out, reaching their goals, or even completing a challenge. As the source of motivation is the acknowledgment by others, the shares do not have to be limited with the well-performed activities either. For example, runners also share activities like an easy jog they recorded after returning from an injury or a social run with a friend they had not seen for a long time. Through the relevant comments (e.g., 'welcome back') on

such posts, they feel that their activity is acknowledged by others; thus, they feel motivated.

4.4.1.3 Connectedness

The feeling of connectedness that emerges through social interaction is another important factor affecting users' motivation. Runners come together with other runners in communities. They run together, plan activities or exchange knowledge with each other, and this collective interaction makes them feel like they are part of a community.

This feeling is found to be emerging through different social interaction features such as online communities, virtual or real running events, and even the leaderboards. In addition to the motivation and fun that come from running with others, the sense of belonging also helps runners be in solidarity with other runners. They try to motivate each other through positive feedback. In some cases, they even feel responsible to other members of the group. When they schedule a run with fellow runners, they feel motivated to participate, not to break their promises and disappoint others.

Sometimes even being aware of other runners can foster a sense of belonging. For example, being aware of other runners, who also completed a challenge, participated in a running event, or ran the same route, is also motivating for the app users, even if they are not a member of the same online community.

4.4.1.4 Excitement of new experiences

Another factor that motivates users through social interaction is that it creates new opportunities. One of the opportunities is a chance to meet new runners. For example, participating in a running event can be an opportunity for users to get to know other participants and even run together in the future. Having a new running partner may

bring a new running experience, and such excitement can motivate them for their activity together. In addition, when participants have meaningful conversations with other runners through the app, they learn new information about running including new routes they can try, upcoming running events or training types they did not know before. Their excitement about trying out what they learn also motivates them to run.

In summary, users' desire to learn about running and fellow runners, and the excitement of discovering something with this newly learned information keeps them motivated, thus increases the importance of such interactions.

4.4.1.5 Comparison

As can be seen from the fieldwork analysis, comparing the activity data with others' is found to be one of the important factors that positively affects runners' motivation. The survey results show that challenges from other users ranked as second among the social interaction features that increase motivation. Moreover, in the interviews, some participants emphasized that by competing with other runners, they feel motivated to run and improve their performance. Besides, the participants compare their activity data with fellow runners not only to compete with them but also to make a self-assessment of their own performance.

In fact, all sports by their very nature ground and encourage comparison. Especially in an area like running, where there are multiple measurables (e.g., distance, pace, duration, etc.), users inevitably tend to compete with others. Competitiveness affects different runners in different ways. While some get motivated through comparison, some feel inadequate or defeated hence demotivated when they see better performances than theirs'. This depends on whether the runner has a competitive character or not, and the purpose of running. However, the ability to compare activity data with other runners through different social interaction features has an important influence on the motivation of app users.

4.4.2 Factors Affecting Runners' Experience in Social Interaction Features

In this section, the prominent factors that affect runners' experience within the social interaction features of the activity-tracking apps are discussed. These factors are necessary to fulfil to direct runners' intention to use activity-tracking apps and social interaction features. The fieldwork analysis revealed that these factors notably affect runners' experience. In this section, frequently recurring and prominent factors that affect runners' experience through social interaction features will be discussed under the following headings:

- Accessibility
- Customization
- Feedback
- User-to-user interaction
- Validity and Safeguarding of Personal Data

4.4.2.1 Accessibility

When the participants' needs and complaints about the social interaction features were examined, the importance of visibility (of the app features) has emerged as a prominent factor affecting the user experience. Participants mentioned about their needs and expectations from the apps. However, although apps offer different features to satisfy mentioned expectations, users are not aware that these options exist or how to reach them.

For the notification feature, many participants mentioned that they deactivated this feature because they did not want to receive countless irrelevant messages from the app since they were distractive. But the participants still wanted to get notifications about information they prefer. In fact, Strava offers to its users an opportunity to

choose from a long list of options regarding what they want to receive notifications about. However, it is not straightforward to access to this feature, since the users need to navigate between a few different menus from the settings tab.

There is a possibility of encountering such problems in activity tracking apps that offer many different features and different social interaction options to their users. However, users should be able to easily access to relevant menu without any difficulty. This would help for improved user experience.

4.4.2.2 Customization

Another important factor in terms of user experience is customization of the options offered by social interaction features. Users of activity-tracking apps include different types of runners (e.g., young/old, beginner/experienced, competitive/ uncompetitive, etc.). Therefore, social interaction features may not have the same effect on the user experience of different types of runners. Some users may find leaderboards exciting and motivating, while others may think they are demotivating. Similarly, while some users may get encouraged by performance-oriented challenges from other users, some may get motivated more from fun-oriented social challenges. The fieldwork results show that users want to have more variety in which they can customize for activity sharing, such as performance-related information options or social phrases that can be added to the posts.

In addition, categorization of social interaction options for users with different running levels is also among the frequently mentioned expectations. Information of suitable runner level in routes/segments, the marking and diversification of challenges according to different runner levels, and even the formation of tags or subgroups that indicate the group level in online communities can be given as examples.

All these findings highlight the importance of giving users autonomy through social interaction features. Thus, improving the customization options and categorization would be necessary for uplifting overall user experience.

4.4.2.3 Feedback

Interview results revealed that overall user experience of the participants is affected by the feedback they receive from the app or from other runners. Participants get a sense of achievement and feel successful mostly through receiving feedback from the app or other runners. The activity posts they share, challenges they finish, leaderboards they take part in, or running events they participate in help to strengthen this feeling. For example, when they share an activity, they receive likes and comments from others, or when they complete a challenge, the app informs them with notifications and emails.

In fact, all apps investigated offer users an opportunity to give feedback to each other. Besides that, they also give feedback to users with notifications, emails or in app messages. Moreover, it is possible to say that the way the feedback are given can improve the overall user experience. As a note, word choices in notifications, timing of the notifications or the way users are informed when they complete a challenge (e.g., celebratory animations in-app, congratulation e-mails, in-app messages), would have an impact on the level of achievement they feel. These, in fact, highlight the importance of further research and development of feedback options in social interaction features.

4.4.2.4 Validity and Safeguarding of Personal Data

The interview analysis showed that the participants had some concerns about the validity of the information from other runners and the privacy of their own information. Users' doubts about the validity of other runners' data, especially in leaderboards and virtual running events, negatively affect their experience. They also

had concerns about the validity of information they read from other users. For example, they are hesitant to try the routes/segments they see in the app, as they do not know how reliable the comments about the routes are.

Besides the validity of information from other runners, some participants were concerned that their personal information (e.g., location data, profile details) might not be safe even if they do not allow the app to share it. Therefore, even if they start running from their doorstep, some users start recording their activity after they are away from their house in order not to worry about the safety of their location data.

For such reasons, validity has an important place for social interaction features in apps. Accordingly, the overall experience can be enhanced by making users feel safe with their personal data and providing solutions to relieve their concerns about the information they get from other users.

4.4.2.5 User-to-user Interaction

Another important factor affecting the overall experience was revealed to be the availability of user-to-user interaction for the participants. The survey results show that the participants found interactions initiated by other users (e.g., challenge by other users) more motivating than interactions initiated by the app (e.g., notifications from the app, routes suggested by the app). This finding is also confirmed by the interview analysis, and the importance of user-to-user interaction was highlighted for various aspects such as being inspired by the performances of other runners, achieving progress by competition, or providing motivation and support to teach others by giving feedback.

These findings support the need for better developing and diversifying user-to-user interaction features. In addition to promoting events generated by app or external organizations, providing them with the opportunity to create their own events and to invite other users would be a good strategy to improve user-to-user interaction.

4.4.3 Social Interaction Features and Psychological Needs

Under this heading, findings of the fieldwork and prominent factors affecting the social interaction features and motivation relationship are examined from the perspective of Self Determination Theory (Deci & Ryan, 2000) and three psychological needs: autonomy, competence, and relatedness. As mentioned by Calvo and Peters (2014), recently, these psychological needs have come to the fore, especially in the field of positive computing and its applications, and they are considered as a criterion for meeting user expectations. To summarize briefly, feeling autonomous is to have a sense of control or choice over the intentions and related outcomes of an activity. Competence is about feeling confident and effective in meeting challenges supported by a sense of mastery over a task. And finally, relatedness can be considered as the sense of belonging in a social environment where one feels cared for and connected to others.

In fact, when this fieldwork was planned, it was not intended to analyze the relationship between social interaction features and runners' experiences in terms of psychological needs. However, since expectations and contents that address these needs were seen frequently in the answers of the participants, these needs are discussed separately under the following headings.

4.4.3.1 Autonomy

First, users' desire to have control over social interaction features and what they can do with them can be directly related to the need for autonomy. For example, customization options are important for users in social interaction features, and this indicates that sense of choice and sense of control has a positive effect on overall experience with social interaction features and running motivation. In the same way, notifications that remind users to do something and how to do it are disturbing for them. This shows that external pressures affect the users negatively during the decision-making process. In addition, another important factor affecting the

motivation of users through social interaction features is that they can learn new information and get excited by the new experiences according to their own preferences (e.g., new routes, training tips, running activities) through these interactions. This shows the importance of offering different options to users in social interaction features.

Overall, in order to provide users with a more positive experience, it is important not to ignore the need for autonomy and to provide users with a sense of control over social interaction features.

4.4.3.2 Competence

The perceived competence was also important for providing and maintaining running motivation, according to fieldwork results. Participants mentioned that comparing themselves with others is important both in terms of competing with fellow runners and making self-assessments to understand their running level. However, in some cases, this comparison affects users negatively. For example, they may feel overwhelmed by performances they see in the leaderboards that are way ahead of their level. In addition, when they think that the challenges created by the application or their friends are far above their own level, or when they cannot complete the challenges they have participated in, they may feel inadequate and become demotivated. These actually highlight the importance of fulfilling the need for competence in social interaction features.

For this reason, while designing social interaction options in running applications, it is important to prepare challenges according to the levels of different users, to offer leaderboards where they can compare their performance with other runners at their own level, and to provide feedback where they can monitor their progress, to offer them a sense of ability and to positively affect their motivation.

4.4.3.3 Relatedness

Several factors highlighted the importance of fulfilling the need for relatedness for providing a better experience in social interaction features. In the results of the research, the participants mentioned that it is very important for them to be able to interact with other users through their activity posts. Accordingly, one of the most important factors that encourage them to share their activities and run more is the feeling of being acknowledged by others. In other words, they feel connected with other users when they are noticed by them or when they receive feedback through likes or comments. In addition to sharing activity-related posts, online communities and running events are also important features that provide users with a feeling of connectedness. When users become a member of these online communities or participate in running events, they feel the support of other runners and become more motivated. Thus, their overall experience is positively affected by this sense of belonging.

For this reason, it is important for social interaction features to encourage users to give feedback to other users, to design mediums where they can interact personally, to provide features that enable them to feel in solidarity with each other, in order to satisfy the need of relatedness of users and to offer them a more positive experience.

CHAPTER 5

CONCLUSIONS

5.1 Overview of the Study

The aim of the research was to understand the relationship between the runners' motivation and the social interaction features of the activity-tracking apps. The research also investigated runners' needs and expectations with an aim to improve their experience with social interaction features. To fulfill these aims, a literature review and a three-phase fieldwork study were conducted.

First, in order to be knowledgeable about physical activities, motivation, social interaction, and activity-tracking apps, related literature focusing on these subjects and their relationship with each other was investigated (Chapter 2). The findings were discussed in relation to the effects of social interaction on runners' motivation and experience. Following that, fieldwork including the review of existing activity-tracking apps, an online survey among runners, and one-to-one online interviews with runners was conducted. In Phase 1, selected mobile activity-tracking apps, Strava, Nike Run Club, and Adidas Running were reviewed by the researcher to identify the features where users can experience direct or indirect interaction with other users. The social interaction features identified in this phase were used to inform the content of the following phase.

In Phase 2, an online survey was conducted with 120 runners to examine the effects of social interaction features of the activity-tracking apps on the runners' overall motivation. Accordingly, participants were asked to indicate on a 5-point Likert-scale regarding how social interaction features affect their overall motivation level. Questions in the survey were also designed to find out whether there is any relation between social interaction features and motivation of different types of runners (e.g., based on their age, activity level, etc.).

In the final phase of the study, one-to-one semi-structured interviews with open-ended questions were conducted with 17 amateur runners to gain detailed insights about the relationship between social interaction features and their motivation. This phase was also aimed at examining runners' needs and expectations from social interaction features to understand how those features affect the overall experience.

The fieldwork results and analysis are presented together with design insights about social interaction features and discussions regarding social interaction and motivation relationship and factors affecting the use of social interaction features in Chapter 4. In this final chapter, research questions introduced in Chapter 1 are revisited, and the limitations of the study are presented with suggestions for future studies.

5.2 Revisiting Research Questions

Previous chapters provided detailed answers to the research questions. In this section, direct answers to research questions are presented. The research aimed to find answers to the following main and sub-questions.

- What are the features in activity-tracking apps that promote social interaction between runners?
- How do the social interaction features affect runners' motivation?
    - Are there any patterns amongst the motivation of different types of runners (e.g., age, activity level, etc.)?
- What motivates runners to run and to interact with others through social interaction features?
    - What are the factors affecting runners' experience regarding social interaction features in activity-tracking apps?
- What design insights can be gathered for social interaction features of activity-tracking apps?

Q1. **What are the features in activity-tracking apps that promote social interaction between runners?**

To answer this question, first, in literature, persuasive features and strategies for motivating users utilized by activity-tracking apps were reviewed. Accordingly, socially-oriented strategies, such as comparison, cooperation, and competition, were found to have an influence on the physical activity levels of users (see Section 2.4.3). However, the researcher has not come across any studies that specifically focused on social interaction features in activity tracking apps. Therefore, then existing activity tracking apps were reviewed to find out whether any of the app features have the potential to create social interaction opportunities between the users, if so, what features can be identified. The review included three apps, Strava, Nike Run Club, and Adidas Running. Some of the features are excluded as they were only available for the apps requiring paid membership (e.g., training trends). The app features selected for this research and their brief descriptions are listed below (see Section 4.1 for more information).

- ***Sharing_*** users can share their activity data, follow other runners, and give feedback to each other by sending likes or making comments.
- ***Online Communities_*** runners can participate in online communities or groups. They can plan mutual activities, observe other members' performance, and share messages with each other.
- ***Leaderboards_*** users can compare their stats with other runners through rankings in this feature. Leaderboards may include all global subscribers of the app or can be specific to certain criteria (e.g., regional, community, route-specific, age group, or gender-based)
- ***Challenges_*** users can create challenges or join challenges created by other runners to compete with them. There are also challenges created and promoted by the apps to motivate their users.

- ***Routes_*** routes that are suggested by the apps or created by other users can encourage runners to interact. They can meet new runners and run together with others on popular routes. They also can compare their stats with fellow athletes who ran on the same track.
- ***Running Events_*** apps can promote running events organized by external organizations that users can run together for different purposes. Apps also promote virtual running events.
- ***Notifications_*** apps send notifications to users consisting of information about running or other users' activities. Although they do not provide direct communication, they can encourage users to check other runners' activities and interact with each other.

Q2. How do the social interaction features affect runners' motivation?

In order to understand the effects of social interaction features of the apps on runners' overall motivation, an online survey was conducted with 120 amateur runners (see Section 4.2). Social interaction features included sharing the activity with photographs or messages, receiving feedback via comments or likes, leaderboards including all users or only friends, challenges created by the app or other users, special running events, and notifications from the app or other users. The participants were asked to indicate on a 5-point Likert-scale [Strongly demotivating (-2), Slightly demotivating (-1), Neither motivating nor demotivating (0), Slightly motivating (1), Strongly motivating (2)] regarding how social interaction features of mobile activity-tracking apps affect their overall motivation level.

Results were analyzed considering average Likert scale scores, and it is revealed that all social interaction features included in the survey have a positive influence on runners' motivation. Among these, the top five receiving the highest scores respectively were: 'receiving feedback via comments', 'challenges created by other

users', 'receiving feedback via likes', 'sharing activity with photographs', and 'events from other users'.

The social interaction features were also evaluated according to their usage rate. Accordingly, the features that are used most were ‘receiving feedback by comments’ or ‘likes’ with 96% (96/100) usage ratio for both. On the other hand, ‘challenges’ generated by the app or by other users had the two lowest usage rates, respectively 68.3% (69/101) and 69.7% (69/99).

Results also show that when a particular feature has two possible sources to be initiated (i.e., by the app or by other users), in all cases, the percentage of having a positive influence on runners' motivation was higher in the options initiated by other users.

These findings highlight the importance of social interaction features in activity-tracking apps on runners' motivation. Moreover, participants were motivated by comments more than likes, and they favor social interaction features initiated by other users more than the ones initiated by the app. These indicate that user-to-user personal interaction has an important role in increasing runners' motivation.

Q2.1. Are there any patterns amongst the motivation of different types of runners (e.g., age, activity level, etc.)?

To answer this question, the participants' responses to interview questions regarding ‘how social interaction features of mobile activity-tracking apps affect their overall motivation level’ were compared across personal information (age, gender, sharing frequency, and running frequency) previously gathered in the survey. When age, gender, and sharing frequency of runners were examined, there were not any observable changes in the results since percentages of being positively affected by social interaction features did not reveal any consistent patterns.

However, the running frequency of the participants was observed to have a direct influence on the relation between social interaction features and runners' motivation

(see Section 4.2.5). For example, the increased running frequency was associated with the ‘leaderboard’ feature. Leaderboards resulted in higher percentages of positive influence on motivation for participants who run more. Also, participants with higher running frequency were positively affected by receiving feedback with likes and comments more than participants with lower running frequencies. Moreover, survey results showed that the percentage of having a positive influence is higher in features created by users than the features created by the app. However, as the frequency of running increases, differences in percentages of positive influence are observed to alter in favor of features created by the app.

Q3. What motivates runners to run and to interact with others through social interaction features?

It is revealed that all social interaction features included in the survey have had a positive influence on runners' motivation. In Phase 3 of the fieldwork, interviews with runners were conducted to gain insights into the relationship between social interaction features and their motivation. When the survey and the interview results are analyzed together, frequently recurring factors which have a key role in runners’ motivation were identified (see section 4.4.1). These factors are presented with brief details below.

- ***Personal Interaction with Others***

  Direct interaction of users with other runners through activity sharing, likes, and comments is one of the most important factors that positively affect their motivation about running. It is seen that the participants were more impressed and motivated by the comments instead of the likes because they can get insights from others and have an in-depth interaction with them. This depth of interaction also provides users the opportunity to learn and share information about the activity, such as new routes, training types, injury precautions. Accordingly, the importance of users' ability to express

themselves well and get detailed feedback from other users can be highlighted for social interaction features.

- ***Acknowledgment***

  Being acknowledged by other runners is also an important factor that motivates users through social interaction features. When they share their activities, runners feel noticed and appreciated through the comments made by other users and the likes they receive. With this acknowledgment, they feel successful, and this sense of achievement motivates them towards their next run. Accordingly, it can be said that for runners, sharing is as important as doing the activities, reaching the goals, or completing the challenges themselves.

- ***Connectedness***

  The feeling of being a part of a group that emerges through social interaction is another important factor affecting runners' motivation. They run together, plan activities, exchange knowledge and support each other, and this collective interaction motivates them to run. This feeling seems to be emerging through different social interaction features, including online communities, running events, and even the leaderboards. In addition to these, even being aware of the existence of other runners can foster a sense of belonging.

- ***The excitement of New Opportunities***

  Another factor that motivates users through social interaction is that they create many new opportunities for them, including opportunities to meet new runners and learn new information about running, such as new routes, upcoming events, or training types. Their desire to learn about running and other runners and the excitement of discovering something with this newly

learned information keeps them motivated, thus increasing the importance of such interactions for them.

- ***Comparison***

  As can be seen from the fieldwork analysis, comparison of activity data with others is one of the important factors that significantly affect the motivation of runners in social interaction features. Competitiveness affects different runners in different ways. While some users get motivated through comparison, some users feel inadequate or defeated hence demotivated when they see better performances than theirs'. Besides this, runners compare their activity data with other runners not only to compete with them but also to make a self-assessment of their own performance.

Although not directly investigated in this research, the headings introduced above were compared with the persuasive design strategies related to social support structured by Oinas-Kukkonen and Harjumaa (2008) in the literature (see Section 2.4.3). As a result, some features are associated with the findings of this study. For example, personal interaction can be linked with social learning provided by observing others' performance and learning running related information. Social comparison and competition can also relate with comparison heading since comparing performance with others to compete or to make self-assessment of own performance motivates runners. Moreover, a sense of belonging can be associated with social facilitation and cooperation, whereas being acknowledged directly relates to recognition.

Q3.1 What are the factors affecting runners' experience regarding social interaction features in activity-tracking apps?

In the fieldwork, runners' use of social interaction options, their needs, and expectations about them were also examined (see Section 4.4.2). As a result, the most prominent factors affecting runners' overall experience were revealed. These factors are accessibility; customization; feedback; user-to-user interaction; validity and safeguarding of personal data, which are discussed in the following headings.

Accessibility_ when participants' needs and complaints about the social interaction features were examined, the importance of visibility of the features have emerged as a prominent factor affecting the overall experience. Apps should make users be able to find features easily to easily access to the relevant menu without any difficulty to improve their experience.

Customization_ Social interaction features do not have the same effect on different types of runners. Thus, understanding user profile and their expectations in social interaction features and improving customization options, and providing categorization in some features are important for apps to achieve effective interaction with users.

Feedback_ Runners' experience is also affected by the feedback they receive from the app or other runners. Apps give feedback to users with notifications, emails, or in-app messages regarding their activities, achievements, or encouraging messages. Apps also provide users with the opportunity to give feedback to each other. The way these feedbacks are presented is also important to enhance runners' experience. Thus, apps should do further research on improving the feedback options in social interaction features.

Validity and Safeguarding of Personal Data_ users' concerns about both the validity of the information from other runners and the privacy of their own were revealed in the analysis of fieldwork. Accordingly, to enhance runners' experience regarding social interaction features, the app should make them

feel safe with their personal data and provide solutions to relieve their concerns about the external information they receive.

User-to-user Interaction_ accessibility to user-to-user interaction is another important factor affecting runners' experience regarding social interaction features. Users feel more motivated when a feature is initiated by other users rather than by the app. Interviews also highlighted the significance of user-to-user interaction with different aspects, including being motivated by others' comments or learning new information from others. Thus, apps should focus on developing and diversifying user-to-user interaction in social interaction features.

Q4. What design insights can be gathered for social interaction features of activity-tracking apps?

Based on the fieldwork analysis, design insights about investigated social interaction features are presented under related headings with examples (see section 4.3.1). As the research findings are relevant to different disciplines, including design, development, health & well-being, sports, and design research, researchers and practitioners are believed to benefit from the design insights. Accordingly, the following insights, including general and feature-specific ones, can be offered while designing activity-tracking apps.

General Insights

- accessibility of social interaction features should be increased to make them easy to reach,
- runners with different levels (e.g., daily runners, occasional runners) and experience should be taken into consideration while designing the social interaction features,
- customization options in social interaction features should be improved and diversified to appeal to different types (e.g., competitive, social) of runners,

- social interaction features should promote user-to-user interaction and provide opportunities for runners to directly interact with each other,
- runners should be encouraged to give feedback to each other's activities to promote interaction,
- social interaction features should be designed in a way to make users feel safe with their personal data and the validity of external information they learn about in the app.

'Sharing' feature should:

- enable additional types of information (e.g., weather forecast, speed of wind) to be included in the activity posts to highlight runners' achievements and goals,
- allow users to express their feelings in their activity posts with more detail in a simple way using ready-made expressions and/or phrases,
- provide opportunities for sharing posts that are not related to performance (nutrition tips, drinking coffee with others after-run),
- provide alternative ready-made phrases or icons for giving feedback in addition to 'likes'.

Online Communities feature should:

- increase and diversify interaction options provided in online communities,
- enable users to filter the information they want/do not want to read in their feeds,
- allow users to label their shares within the group with tags (e.g., #route suggestions, #training tips).

Leaderboards feature should:

- include different ranking categories in leaderboards according to levels of runners to be inclusive for all users.

Challenges feature should:

- take different metrics and running levels into account and build difficulty levels gradually while designing challenges,
- enable users to create challenges according to their preferences and to invite their followers or fellow community members to challenges,
- increase the number and variety of challenges (e.g., social challenges, fun challenges) for runners to participate without pressure of performing well.

Running Events feature should:

- inform users about upcoming running events with notifications, e-mails, or in-app alerts, depending on their preferences.

Routes and Notifications feature should:

- create tags to give information about routes and provide filtering for users to find suitable routes for routes and relieve users' concerns about the validity of information,
- avoid sending too many notifications because users find it annoying.

5.3 Additional Findings

Besides the direct answers to research questions, some additional observations in relation to activity-tracking apps' social interaction features and running motivation can be made.

To begin with, social interaction features in running apps provide extrinsic motivation to the users. As can be seen from the responses of the participants, some users, who already have intrinsic motivations for running, continue their activities without a need for extrinsic motivation. Social interaction features provide users who lack intrinsic motivation with the external support they need, and over time this

extrinsic motivation may lead into intrinsic motivation for some users. This is important in terms of getting inactive users (without intrinsic motivation) to adopt and maintain running habits through the support of social interaction features. Thus, it would be beneficial to examine these features within this perspective.

In addition to the sources of motivation, runner types/personas also affect the relationship between social interaction features and running motivation. It was observed that social interaction features had different effects on different participants (e.g., who were motivated by competition or who were demotivated by competition). The points that the participants mentioned as important were also related to their running perspective. Therefore, different runner personas should be considered when designing social interaction features. For example, as a starter, it would be beneficial to study and consider the differences between four runner personas (casual individual, social competitive, individual competitive, and devoted) mentioned by Janssen et al. (2020).

Finally, although this study focuses on runners and the social interaction features facilitated in running apps, findings can also be beneficial for different sports. This is because social interaction features have an important role in all sports branches, especially in individual sports, which allow competition or solidarity among athletes. For example, in fitness sports and cycling, users can be motivated through social interaction features, and the findings of this study can be useful for designing and improving social interaction features to provide motivation for the athletes of that sport branches as well.

5.4 Social Interaction Feature Updates in Activity-Tracking Apps

In the results of the fieldwork, alongside the factors affecting social interaction features and the relation between running motivation and activity tracking apps, design insights for enhancing these features were also presented. Three activity-tracking apps (Strava, Nike Run Club, and Adidas Running) were examined in the

first phase of the fieldwork to identify features that promote social interaction among the users. In a study by Mumcu (2021), it was observed that the usage of mobile sports applications also increased during the COVID-19 pandemic, which also coincided with the present research. With the increasing interest in activity tracking apps, running, and social interaction in general, as well as the effects of the pandemic period, the abovementioned apps continued to update themselves towards providing better social interaction whilst the present research has been conducted.

Some of the features are observed to be in parallel with the recommendations presented in response to research questions in this thesis. For example, Strava recently started to offer to its premium users an option to create challenges according to their preferences and invite any of their followers or fellow community members. Another new feature available to premium users in Strava is the filtering of routes according to different types of information such as distance, surface type, or elevation (see Figure 5.1).

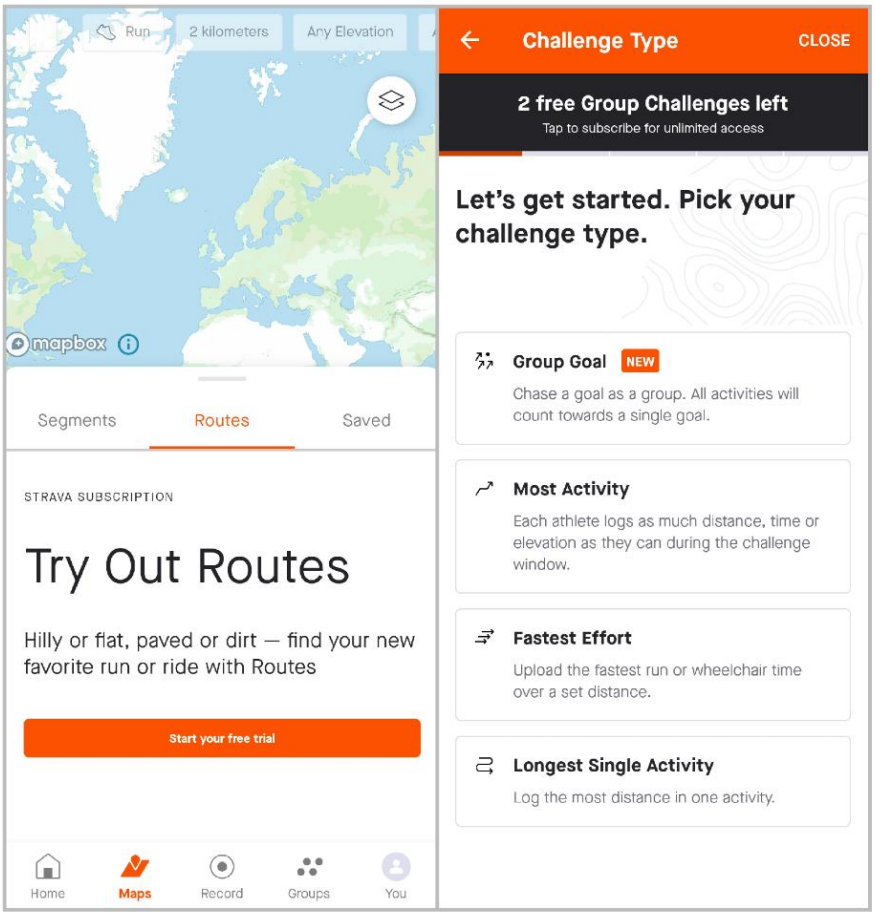

Figure 5.1 Examples of social interaction feature (routes and challenges) updates in 'Strava'

Besides these features, Strava has also adopted different strategies to motivate users. For example, they started to share stories of inspiring runners who finished certain races or participated in several challenges (see Figure 5.2). They share the stories on their website and inform users via e-mails and notifications to check these stories. Strava also started to encourage users to support other runners by giving them feedback. They remind users to do so via in-app messages that can be seen in users' feeds (see Figure 5.3).

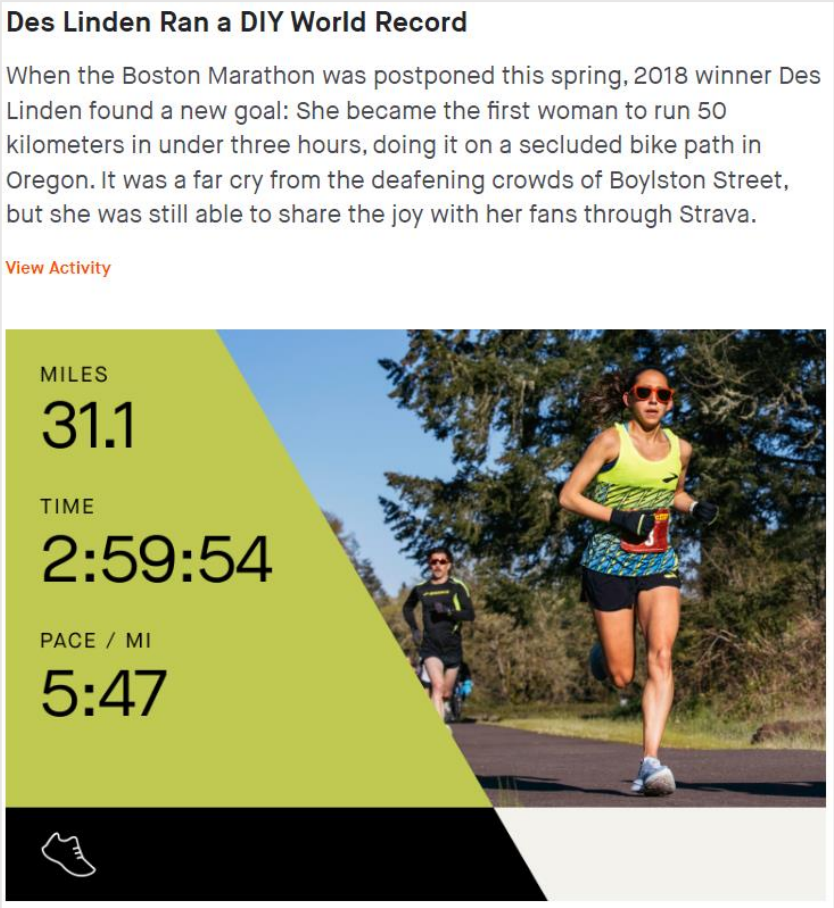

Figure 5.2 An example of stories shared in Strava's website (taken from https://www.strava.com/yis-community-2021)

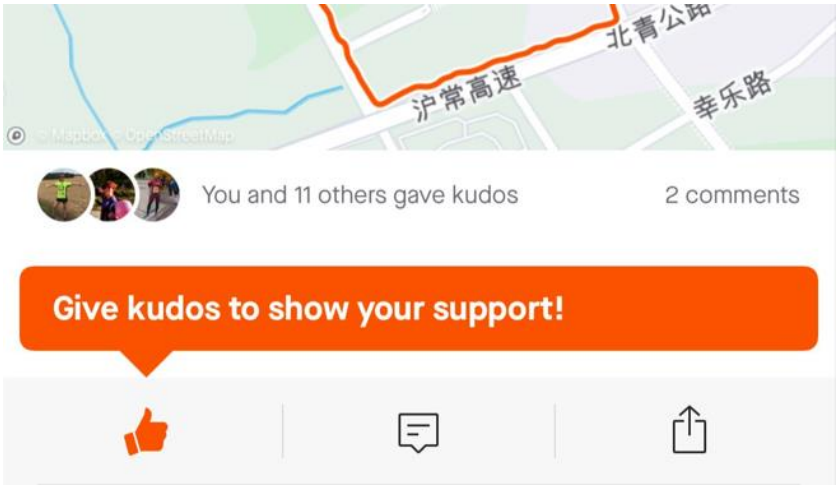

Figure 5.3 An example of in-app messages encouraging users to give feedback to other runners in 'Strava'

Similar updates can also be seen in other activity tracking applications. The pandemic period undoubtedly increased people's attention to the usage of activity tracking apps, and it is only natural to expect that social interaction features will be at the forefront for enhancing the motivation and experience of users. Therefore, it is believed that this research responds to a contemporary issue that will grow in importance in the future.

5.5 Limitations of the Study

The fieldwork was carried out during the COVID-19 pandemic breakout when many sports activities had to be partially or entirely stopped due to the restrictions taken globally. Since it was not possible to foresee the level of restrictions, it took a long time to reach the desired number of participants who continued running on a regular basis for the survey.

Moreover, although one-to-one interviews in the final phase of the fieldwork were initially planned to be conducted in a physical setting, due to restrictions and obscurity of the days ahead, they are decided to be held through Zoom online platform. However, there were no difficulties during the online interviews. In fact, it was easy to hold a conversation during interviews, as users felt relatively more relaxed because they often connected from a familiar and comfortable environment (home or office). It was also easier to schedule the interviews since there were no time and location barriers.

Another limitation caused by the COVID-19 was that participants' running habits and frequencies have changed during the pandemic period. This also has influenced their time spent on the apps and their engagement with social interaction features. However, it was easy for them to recall and talk about social interaction features and their effects on running motivation.

5.6 Suggestions for Future Studies

In the fieldwork, 120 amateur runners filled out the online survey. Following that, one-to-one online interviews were conducted with 17 participants. All participants were citizens of Turkey. Future studies can be conducted with international participants to investigate the relation between runners' motivation and social interaction features in the activity-tracking apps.

All participants were amateur runners with varied running frequencies. The results of the fieldwork indicated that different running frequencies have an effect on the motivation of the participants. Future studies can take these different types of runners into consideration while deciding on participant profiles to reach more specific results.

Three activity-tracking apps (i.e., Strava, Nike Run Club, Adidas Running) were included in this research based on their popularity and accessibility. All social interaction features included in this study were provided by these apps for free. However, activity-tracking apps may also provide additional features or more detailed options within the features for their premium users. Further research can comprise these features to contribute to the findings of the research.

Design insights for enhancing social interaction features in activity-tracking apps were presented as a result of this research. Lastly, future studies may concentrate on the implementations of these insights and then investigate their effectiveness on runners' motivation and on their overall experience.

REFERENCES

Aicher, T., Simmons, J., & Cintron, A. (2018). An Analysis of Running Event Consumer Behaviors. *Journal of Applied Sport Management*, *June*, 26–35. https://doi.org/10.18666/jasm-2018-v10-i2-8836

Antoci, A., & Sabatini, F. (2018). Online networks, social interaction and segregation: an evolutionary approach. In *Journal of Evolutionary Economics* (Vol. 28, Issue 4). https://doi.org/10.1007/s00191-018-0556-6

Barkley, J. E., Lepp, A., Santo, A., Glickman, E., & Dowdell, B. (2020). The relationship between fitness app use and physical activity behavior is mediated by exercise identity. *Computers in Human Behavior*, *108*(September 2019), 106313. https://doi.org/10.1016/j.chb.2020.106313

Beldad, A. D., & Hegner, S. M. (2018). Expanding the Technology Acceptance Model with the Inclusion of Trust, Social Influence, and Health Valuation to Determine the Predictors of German Users' Willingness to Continue using a Fitness App: A Structural Equation Modeling Approach. *International Journal of Human-Computer Interaction*, *34*(9), 882–893. https://doi.org/10.1080/10447318.2017.1403220

Bell, N., & Stephenson, A. L. (2014). Variation in motivations by running ability: using the theory of reasoned action to predict attitudes about running 5K races. *Journal of Policy Research in Tourism, Leisure and Events*, *6*(3), 231–247. https://doi.org/10.1080/19407963.2014.933227

Berger J. Invisible Influence: The Hidden Forces that Shape Behavior. Simon and Schuster, 2016.

Bitrián, P., Buil, I., & Catalán, S. (2021). Enhancing user engagement: The role of gamification in mobile apps. *Journal of Business Research*, *132*(July 2020), 170–185. https://doi.org/10.1016/j.jbusres.2021.04.028

Brunet, J., & Sabiston, C. M. (2011). Exploring motivation for physical activity across the adult lifespan. *Psychology of Sport and Exercise*, *12*(2), 99–105. https://doi.org/10.1016/j.psychsport.2010.09.006

Buis, L. R., Poulton, T. A., Holleman, R. G., Sen, A., Resnick, P. J., Goodrich, D. E., Palma-Davis, L., & Richardson, C. R. (2009). Evaluating Active U: An internet-mediated physical activity program. *BMC Public Health*, *9*, 1–13. https://doi.org/10.1186/1471-2458-9-331

Cai, J., Zhao, Y., & Sun, J. (2022). Factors Influencing Fitness App Users' Behavior in China. *International Journal of Human-Computer Interaction*, *38*(1), 53–63. https://doi.org/10.1080/10447318.2021.1921483

Calvo, R. A., & Peters, D. (2014). Positive computing: technology for wellbeing and human potential. MIT Press.

Caspersen, C. J., Powell, K. E., and Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. Public Health Rep. 100, 126–131

Chen, Y., & Pu, P. (2014). HealthyTogether: Exploring social incentives for mobile fitness applications. *ACM International Conference Proceeding Series*, 25–34. https://doi.org/10.1145/2592235.2592240

Cheng, L. K., Huang, H. L., & Lai, C. C. (2021). Continuance intention in running apps: the moderating effect of relationship norms. *International Journal of Sports Marketing and Sponsorship*. https://doi.org/10.1108/IJSMS-08-2020-0143

Cho, J. (2016). The impact of post-adoption beliefs on the continued use of health apps. *International Journal of Medical Informatics*, *87*, 75–83. https://doi.org/10.1016/j.ijmedinf.2015.12.016

Cho, J., Lee, H. E., & Quinlan, M. (2015). *Complementary Relationships Between Traditional Media and Health Apps Among American College Students*. *63*(4).

Choi, J., Lee, M., Lee, J. K., Kang, D., & Choi, J. Y. (2017). Correlates associated with participation in physical activity among adults: A systematic review of reviews and update. *BMC Public Health*, *17*(1), 1–13. https://doi.org/10.1186/s12889-017-4255-2

Cohen, L., Manion, L., Morrison, K., & Publishers, R. (2009). Book Reviews Research Methods in Education (6th ed). *The A Ustr Alian Educational Researcher*, *January 2000*.

Consolvo, S., Everitt, K., Smith, I., & Landay, J. A. (2006). Design requirements for technologies that encourage physical activity. *Conference on Human Factors in Computing Systems - Proceedings*, *1*(May 2014), 457–466. https://doi.org/10.1145/1124772.1124840

Criddle, C. (2020). *Coronavirus creates boom in digital fitness*. https://www.bbc.com/news/technology-55318822

Curry, D. (2021). *Fitness App Revenue and Usage Statistics*. https://www.businessofapps.com/data/fitness-app-market/

Dahn, J. R., & And, F. J. P. (2005). Exercise and well-being: a review of mental and physical health benefits associated with physical activity. *Current Opinion in Psychiatry*, *18*(2), 189–193. http://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=00001504-200503000-00013

Darin, T., Almeida, R., Carneiro, N., Silva, D., & Sánchez, J. (2015). Motivational Resources for Physical Exercises : Evaluation of User Experience in Mobile Fitness Applications. *Nuevas Ideas En Informática Educativa TISE 2015*, 323–332. http://www.tise.cl/volumen11/TISE2015/323-332.pdf

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems*, *13*(3), 319–339. https://doi.org/10.2307/249008

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. New York, NY: Plenum Press.

Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Diel, K., Broeker, L., Raab, M., & Hofmann, W. (2021). Motivational and emotional effects of social comparison in sports. *Psychology of Sport and Exercise*, *57*(August), 102048. https://doi.org/10.1016/j.psychsport.2021.102048

Dunn, A. L., Trivedi, M. H., & O’Neal, H. A. (2001). Physical activity dose-response effects on outcomes of depression and anxiety. *Medicine and Science in Sports and Exercise*, *33*(6 SUPPL.), 587–597. https://doi.org/10.1097/00005768-200106001-00027

Edwards, E. A., Lumsden, J., Rivas, C., Steed, L., Edwards, L. A., Thiyagarajan, A., Sohanpal, R., Caton, H., Griffiths, C. J., Munafò, M. R., Taylor, S., & Walton, R. T. (2016). Gamification for health promotion: systematic review of behaviour change techniques in smartphone apps. *BMJ Open*, *6*(10), e012447. https://doi.org/10.1136/bmjopen-2016-012447

Ejiri, M., Kawai, H., Kera, T., Ihara, K., Fujiwara, Y., Watanabe, Y., Hirano, H., Kim, H., & Obuchi, S. (2021). Exercise as a coping strategy and its impact on the psychological well-being of Japanese community-dwelling older adults during the COVID-19 pandemic: A longitudinal study. *Psychology of Sport and Exercise*, *57*, 102054. https://doi.org/10.1016/j.psychsport.2021.102054

Feng, W., Tu, R., & Hsieh, P. (2020). Can gamification increases consumers’ engagement in fitness apps? The moderating role of commensurability of the game elements. *Journal of Retailing and Consumer Services*, *57*(August), 102229. https://doi.org/10.1016/j.jretconser.2020.102229

Finkelstein, E. A., Haaland, B. A., Bilger, M., Sahasranaman, A., Sloan, R. A.,

Nang, E. E. K., & Evenson, K. R. (2016). Effectiveness of activity trackers with and without incentives to increase physical activity (TRIPPA): a randomised controlled trial. *The Lancet Diabetes and Endocrinology*, *4*(12), 983–995. https://doi.org/10.1016/S2213-8587(16)30284-4

Frederick, C. M., & Ryan, R. M. (1993). Differences in motivation for sport and exercise and their relations with participation and mental health. Journal of Sport Behavior, 16(3), 124–146.

Global Running Apps Market Report. (2021). https://www.cognitivemarketresearch.com/running-apps-market-report

Glynn, L. G., Hayes, P. S., Casey, M., Glynn, F., Alvarez-Iglesias, A., Newell, J., Ólaighin, G., Heaney, D., O'Donnell, M., & Murphy, A. W. (2014). Effectiveness of a smartphone application to promote physical activity in primary care: The SMART MOVE randomised controlled trial. *British Journal of General Practice*, *64*(624). https://doi.org/10.3399/bjgp14X680461

Goose, M., & Winter, S. (2012). The coach's impact on long distance runners' training and competition motivation. *International Journal of Sports Science and Coaching*, *7*(2), 383–398. https://doi.org/10.1260/1747-9541.7.2.383

Gould, D., Dieffenbach, K., & Moffett, A. (2002). Psychological characteristics and their development in Olympic champions. *Journal of Applied Sport Psychology*, *14*(3), 172–204. https://doi.org/10.1080/10413200290103482

Gowin, M., Cheney, M., Gwin, S., & Franklin Wann, T. (2015). Health and Fitness App Use in College Students: A Qualitative Study. *American Journal of Health Education*, *46*(4), 223–230. https://doi.org/10.1080/19325037.2015.1044140

Gui, X., Chen, Y., Caldeira, C., Xiao, D., & Chen, Y. (2017). When fitness meets social networks: Investigating fitness tracking and social practices on WeRun. *Conference on Human Factors in Computing Systems - Proceedings*, *2017-May*, 1647–1659. https://doi.org/10.1145/3025453.3025654

Guthold, R., Stevens, G. A., Riley, L. M., & Bull, F. C. (2018). Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants. *The Lancet Global Health*, *6*(10), e1077–e1086. https://doi.org/10.1016/S2214-109X(18)30357-7

Hayashi, T., Noguchi, T., Kubo, Y., Tomiyama, N., Ochi, A., & Hayashi, H. (2022). Social frailty and depressive symptoms during the COVID-19 pandemic among older adults in Japan: Role of home exercise habits. *Archives of Gerontology and Geriatrics*, *98*(October 2021), 104555. https://doi.org/10.1016/j.archger.2021.104555

Heatherton, A. T., & Walcott, V. A. (2009). Handbook of social interactions in the 21st century. In *Handbook of Social Interactions in the 21st Century*.

Heazlewood, I., Walsh, J., Climstein, M., Adams, K., Sevene, T., DeBeliso, M., & Kettunen, J. (2015). Participant motivation: A comparison of male and female athletes competing at the 2009 World Masters Games. In J. Montague, & L. M. Tan (Eds.), Proceedings of the 2015 Asian Congress of Applied Psychology (pp. 291-297). World Scientific Publishing.

Hebden, L., Cook, A., van der Ploeg, H. P., King, L., Bauman, A., & Allman-Farinelli, M. (2014). A mobile health intervention for weight management among young adults: A pilot randomised controlled trial. *Journal of Human Nutrition and Dietetics*, *27*(4), 322–332. https://doi.org/10.1111/jhn.12155

Higgins, J. P. (2016). Smartphone Applications for Patients' Health and Fitness. *American Journal of Medicine*, *129*(1), 11–19. https://doi.org/10.1016/j.amjmed.2015.05.038

Hodge, K., Allen, J. B., & Smellie, L. (2008). Motivation in Masters sport: Achievement and social goals. *Psychology of Sport and Exercise*, *9*(2), 157–176. https://doi.org/10.1016/j.psychsport.2007.03.002

Huang, G., Sun, M., & Jiang, L. C. (2021). Core Social Network Size is associated with physical activity participation for fitness app users: The role of social

comparison and social support. *Computers in Human Behavior*, *129*(June 2021), 107169. https://doi.org/10.1016/j.chb.2021.107169

Ingledew, D. K., Markland, D., & Medley, A. R. (1998). Exercise motives and stages of change. *Journal of Health Psychology*, *3*(4), 477–489. https://doi.org/10.1177/135910539800300403

Jackson, A. S., Blair, S. N., Mahar, M. T., Wier, L. T., Ross, R. M., & Stuteville, J. E. (1990). Prediction of functional aerobic capacity without exercise testing. In *Medicine and Science in Sports and Exercise* (Vol. 22, Issue 6, pp. 863–870). https://doi.org/10.1249/00005768-199012000-00021

Janssen, M., Walravens, R., Thibaut, E., Scheerder, J., Brombacher, A., & Vos, S. (2020). Understanding different types of recreational runners and how they use running-related technology. *International Journal of Environmental Research and Public Health*, *17*(7). https://doi.org/10.3390/ijerph17072276

Jia, Y., Liu, Y., Yu, X., & Voida, S. (2017). Designing leaderboards for gamification: Perceived differences based on user ranking, application domain, and personality traits. *Conference on Human Factors in Computing Systems - Proceedings*, *2017-May*, 1949–1960. https://doi.org/10.1145/3025453.3025826

Johnson, D., Deterding, S., Kuhn, K. A., Staneva, A., Stoyanov, S., & Hides, L. (2016). Gamification for health and wellbeing: A systematic review of the literature. *Internet Interventions*, *6*, 89–106. https://doi.org/10.1016/j.invent.2016.10.002

Jorgensen, D. L. (1989). Participant observation: A methodology for human studies. Sage Publications, Inc. https://doi.org/10.4135/9781412985376

Kilpatrick, M., Hebert, E., & Bartholomew, J. (2005). College students' motivation for physical activity: Differentiating men's and women's motives for sport participation and exercise. *Journal of American College Health*, *54*(2), 87–94. https://doi.org/10.3200/JACH.54.2.87-94

Knaving, K., Woźniak, P., Fjeld, M., & Björk, S. (2015). *Flow is Not Enough*. 2013–2022. https://doi.org/10.1145/2702123.2702542

Knight, J. A. (2012). Knight - 2012 - Review Physical Inactivity Associated Diseases and Disorders. *Annals of Clinical and Laboratory Science*, *42*(3), 320–337.

Koenig-Lewis, N., Marquet, M., Palmer, A., & Zhao, A. L. (2015). Enjoyment and social influence: predicting mobile payment adoption. *Service Industries Journal*, *35*(10), 537–554. https://doi.org/10.1080/02642069.2015.1043278

Koivisto, J., & Hamari, J. (2019). The rise of motivational information systems: A review of gamification research. *International Journal of Information Management*, *45*(October 2018), 191–210. https://doi.org/10.1016/j.ijinfomgt.2018.10.013

Lee, H. E., & Cho, J. (2017). What Motivates Users to Continue Using Diet and Fitness Apps? Application of the Uses and Gratifications Approach. *Health Communication*, *32*(12), 1445–1453. https://doi.org/10.1080/10410236.2016.1167998

Lee, I. M., Shiroma, E. J., Lobelo, F., Puska, P., Blair, S. N., Katzmarzyk, P. T., Alkandari, J. R., Andersen, L. B., Bauman, A. E., Brownson, R. C., Bull, F. C., Craig, C. L., Ekelund, U., Goenka, S., Guthold, R., Hallal, P. C., Haskell, W. L., Heath, G. W., Inoue, S., … Wells, J. C. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: An analysis of burden of disease and life expectancy. *The Lancet*, *380*(9838), 219–229. https://doi.org/10.1016/S0140-6736(12)61031-9

Lee, W., Chae, Y. M., Kim, S., Ho, S. H., & Choi, I. (2010). Evaluation of a mobile phone-based diet game for weight control. *Journal of Telemedicine and Telecare*, *16*(5), 270–275. https://doi.org/10.1258/jtt.2010.090913

León-Guereño, P., Galindo-Domínguez, H., Balerdi-Eizmendi, E., Rozmiarek, M., & Malchrowicz-Mośko, E. (2021). Motivation behind running among older

adult runners. *BMC Sports Science, Medicine and Rehabilitation*, *13*(1). https://doi.org/10.1186/s13102-021-00366-1

Li, J., Liu, X., Ma, L., & Zhang, W. (2019). Users' intention to continue using social fitness-tracking apps: expectation confirmation theory and social comparison theory perspective. *Informatics for Health and Social Care*, *44*(3), 298–312. https://doi.org/10.1080/17538157.2018.1434179

Lin, C. W., Mao, T. Y., Huang, Y. C., Sia, W. Y., & Yang, C. C. (2020). Exploring the Adoption of Nike+ Run Club App: An Application of the Theory of Reasoned Action. *Mathematical Problems in Engineering*, *2020*. https://doi.org/10.1155/2020/8568629

Lin, J. J., Mamykina, L., Lindtner, S., Delajoux, G., & Strub, H. B. (2006). Fish'n'steps: Encouraging physical activity with an interactive computer game. Lecture Notes in Computer Science, 261–278. https://doi.org/10.1007/11853565_16

Lister, C., West, J. H., Cannon, B., Sax, T., & Brodegard, D. (2014). Just a fad? gamification in health and fitness apps. *JMIR Serious Games*, *2*(2). https://doi.org/10.2196/games.3413

Litman, L., Rosen, Z., Spierer, D., Weinberger-Litman, S., Goldschein, A., & Robinson, J. (2015). Mobile exercise apps and increased leisure time exercise activity: A moderated mediation analysis of the role of self-efficacy and barriers. *Journal of Medical Internet Research*, *17*(8). https://doi.org/10.2196/jmir.4142

Mahan, J. E., Seo, W. J., Jordan, J. S., & Funk, D. (2015). Exploring the impact of social networking sites on running involvement, running behavior, and social life satisfaction. *Sport Management Review*, *18*(2), 182–192. https://doi.org/10.1016/j.smr.2014.02.006

Maher, C., Ryan, J., Kernot, J., Podsiadly, J., & Keenihan, S. (2016). Social media and applications to health behavior. *Current Opinion in Psychology*, *9*, 50–55.

https://doi.org/10.1016/j.copsyc.2015.10.021

Malchrowicz-mośko, E., Gravelle, F., Dąbrowska, A., & León-guereño, P. (2020). Do years of running experience influence the motivations of amateur marathon athletes? *International Journal of Environmental Research and Public Health*, *17*(2). https://doi.org/10.3390/ijerph17020585

Markland, D., & Ingledew, D. K. (1997). The measurement of exercise motives: Factorial validity and invariance across gender of a revised Exercise Motivations Inventory. *British Journal of Health Psychology*, *2*(4), 361–376. https://doi.org/10.1111/j.2044-8287.1997.tb00549.x

Martela, F., & Riekki, T. J. J. (2018). Autonomy, competence, relatedness, and beneficence: A multicultural comparison of the four pathways to meaningful work. *Frontiers in Psychology*, *9*(JUN), 1–14. https://doi.org/10.3389/fpsyg.2018.01157

Masters, K. S., Ogles, B. M., & Jolton, J. A. (1993). The development of an instrument to measure motivation for marathon running: The motivations of marathoners scales (moms). *Research Quarterly for Exercise and Sport*, *64*(2), 134–143. https://doi.org/10.1080/02701367.1993.10608790

Mastroianni, B. (2015, November 3). Many Americans download health apps, then ignore them. CBS News. https://www.cbsnews.com/news/many-americans-download-health-apps-thenignore-them/

Mateo, G. F., Granado-Font, E., Ferré-Grau, C., & Montaña-Carreras, X. (2015). Mobile phone apps to promote weight loss and increase physical activity: A systematic review and meta-analysis. *Journal of Medical Internet Research*, *17*(11). https://doi.org/10.2196/jmir.4836

Matthews, J., Win, K. T., Oinas-Kukkonen, H., & Freeman, M. (2016). Persuasive Technology in Mobile Applications Promoting Physical Activity: a Systematic Review. *Journal of Medical Systems*, *40*(3), 1–13. https://doi.org/10.1007/s10916-015-0425-x

Middelweerd, A., Mollee, J. S., van der Wal, C. N., Brug, J., & te Velde, S. J. (2014). Apps to promote physical activity among adults: A review and content analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *11*(1), 1–9. https://doi.org/10.1186/s12966-014-0097-9

Miriam., R., Christina., N., Darko., J., & Alexander., W. (2013). Long-term health benefits of physical activity--a systematic review of longitudinal studies. *BMC Public Health*, *13*, 813. http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed12&NEWS=N&AN=24010994

Molina, M. D., & Myrick, J. G. (2021). The 'how' and 'why' of fitness app use: investigating user motivations to gain insights into the nexus of technology and fitness. *Sport in Society*, *24*(7), 1233–1248. https://doi.org/10.1080/17430437.2020.1744570

Mumcu, H. E. (2021). Fitness-related on health mobile applications during COVID-19: Case of Turkey. *Progress in Nutrition*, *23*(1), 1–9. https://doi.org/10.23751/pn.v23iS1.11629

Munson, S. A., & Consolvo, S. (2012). Exploring goal-setting, rewards, self-monitoring, and sharing to motivate physical activity. *2012 6th International Conference on Pervasive Computing Technologies for Healthcare and Workshops, PervasiveHealth 2012*, 25–32. https://doi.org/10.4108/icst.pervasivehealth.2012.248691

Neupane, A., Hansen, D., Sharma, A., Fails, J. A., Neupane, B., & Beutler, J. (2020). A Review of Gamified Fitness Tracker Apps and Future Directions. *CHI PLAY 2020 - Proceedings of the Annual Symposium on Computer-Human Interaction in Play*, 522–533. https://doi.org/10.1145/3410404.3414258

Nyenhuis, S. M., Greiwe, J., Zeiger, J. S., Nanda, A., & Cooke, A. (2020). Exercise and Fitness in the Age of Social Distancing During the COVID-19 Pandemic.

Journal of Allergy and Clinical Immunology: In Practice, *8*(7), 2152–2155. https://doi.org/10.1016/j.jaip.2020.04.039

Oinas-Kukkonen, H., & Harjumaa, M. (2008). A systematic framework for designing and evaluating persuasive systems. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *5033 LNCS*(December 2014), 164–176. https://doi.org/10.1007/978-3-540-68504-3_15

Orji, R., Oyibo, K., Lomotey, R. K., & Orji, F. A. (2019). Socially-driven persuasive health intervention design: Competition, social comparison, and cooperation. *Health Informatics Journal*, *25*(4), 1451–1484. https://doi.org/10.1177/1460458218766570

Oyibo, K., & Vassileva, J. (2020). Persuasive features that drive the adoption of a fitness application and the moderating effect of age and gender. *Multimodal Technologies and Interaction*, *4*(2), 1–19. https://doi.org/10.3390/mti4020017

Oyibo, K., & Vassileva, J. (2021). Relationship between perceived UX design attributes and persuasive features: A case study of fitness app. *Information (Switzerland)*, *12*(9). https://doi.org/10.3390/info12090365

Park, K., Weber, I., Cha, M., & Lee, C. (2016). Persistent sharing of fitness app status on twitter. *Proceedings of the ACM Conference on Computer Supported Cooperative Work, CSCW*, *27*, 184–194. https://doi.org/10.1145/2818048.2819921

Parker, K., Uddin, R., Ridgers, N. D., Brown, H., Veitch, J., Salmon, J., Timperio, A., Sahlqvist, S., Cassar, S., Toffoletti, K., Maddison, R., & Arundell, L. (2021). The use of digital platforms for adults' and adolescents' physical activity during the COVID-19 pandemic (our life at home): Survey study. *Journal of Medical Internet Research*, *23*(2), 1–10. https://doi.org/10.2196/23389

Peters, K., Chen, Y., Kaplan, A. M., Ognibeni, B., & Pauwels, K. (2013). Social

media metrics - A framework and guidelines for managing social media. *Journal of Interactive Marketing*, *27*(4), 281–298. https://doi.org/10.1016/j.intmar.2013.09.007

Piggin, J. (2020). What Is Physical Activity? A Holistic Definition for Teachers, Researchers and Policy Makers. *Frontiers in Sports and Active Living*, *2*(June), 1–7. https://doi.org/10.3389/fspor.2020.00072

Popov, S., Sokič, J., & Stupar, D. (2019). Relations between motivation for long-distance running and emotional well-being. *Psihologija*, *52*(2), 139–154. https://doi.org/10.2298/PSI180605032P

Qiu, Y., Tian, H., Zhou, W., Lin, Y., & Gao, J. (2020). 'Why do people commit to long distance running': serious leisure qualities and leisure motivation of marathon runners. *Sport in Society*, *23*(7), 1256–1272. https://doi.org/10.1080/17430437.2020.1720655

Qu, S. Q., & Dumay, J. (2011). The qualitative research interview. In *Qualitative Research in Accounting and Management* (Vol. 8, Issue 3). https://doi.org/10.1108/11766091111162070

Recascino, C., & Smith, H. (2003). Competition and intrinsic motivation in physical activity : A comparison of two groups. *Journal of Sport Behavior*, *26*(3), 240–254.

Reiss, S. (2012). Intrinsic and Extrinsic Motivation. *Teaching of Psychology*, *39*(2), 152–156. https://doi.org/10.1177/0098628312437704

Ridinger, L. L., Funk, D. C., Jordan, J. S., & Kaplanidou, K. (2012). Marathons for the masses: Exploring the role of negotiation-efficacy and involvement on running commitment. *Journal of Leisure Research*, *44*(2), 155–178. https://doi.org/10.1080/00222216.2012.11950260

Rocha, C. M., & Gratao, O. A. (2018). The process toward commitment to running—The role of different motives, involvement, and coaching. *Sport*

Management Review, *21*(4), 459–472. https://doi.org/10.1016/j.smr.2017.10.003

Rosselli, M., Ermini, E., Tosi, B., Boddi, M., Stefani, L., Toncelli, L., & Modesti, P. A. (2020). Gender differences in barriers to physical activity among adolescents. *Nutrition, Metabolism and Cardiovascular Diseases*, *30*(9), 1582–1589. https://doi.org/10.1016/j.numecd.2020.05.005

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, *25*(1), 54–67. https://doi.org/10.1006/ceps.1999.1020

Saxena, S., Van Ommeren, M., Tang, K. C., & Armstrong, T. P. (2005). Mental health benefits of physical activity. *Journal of Mental Health*, *14*(5), 445–451. https://doi.org/10.1080/09638230500270776

Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of Human Computer Studies*, *74*, 14–31. https://doi.org/10.1016/j.ijhcs.2014.09.006

Segar, M. L. (2017). Activity Tracking + Motivation Science. *ACSM'S Health & Fitness Journal*, *21*(4), 8–17. https://doi.org/10.1249/fit.0000000000000309

Shih, L. H., & Jheng, Y. C. (2017). Selecting persuasive strategies and game design elements for encouraging energy saving behavior. *Sustainability (Switzerland)*, *9*(7). https://doi.org/10.3390/su9071281

Statista. (2021). *Number of mobile app downloads worldwide from 2016 to 2020*. https://www.statista.com/statistics/271644/worldwide-free-and-paid-mobile-app-store-downloads/

Stibe, A., Oinas-Kukkonen, H., & Lehto, T. (2013). Exploring social influence on customer engagement: A pilot study on the effects of social learning, social comparison, and normative influence. *Proceedings of the Annual Hawaii International Conference on System Sciences*, *January*, 2735–2744.

https://doi.org/10.1109/HICSS.2013.222

Stuntz, C. P., & Weiss, M. R. (2009). Achievement goal orientations and motivational outcomes in youth sport: The role of social orientations. *Psychology of Sport and Exercise*, *10*(2), 255–262. https://doi.org/10.1016/j.psychsport.2008.09.001

Tai-Seale, T. (2003). Stage of change specific triggers and barriers to moderate physical activity. *American Journal of Health Behavior*, *27*(3), 219–227. https://doi.org/10.5993/AJHB.27.3.3

Thomas, D. R. (2006). A General Inductive Approach for Analyzing Qualitative Evaluation Data. *American Journal of Evaluation*, *27*(2), 237–246. https://doi.org/10.1177/1098214005283748

Tsai, T. H., Chang, Y. S., Chang, H. T., & Lin, Y. W. (2021). Running on a social exercise platform: Applying self-determination theory to increase motivation to participate in a sporting event. *Computers in Human Behavior*, *114*(July 2020), 106523. https://doi.org/10.1016/j.chb.2020.106523

Tu, R., Hsieh, P., & Feng, W. (2019). Walking for fun or for "likes"? The impacts of different gamification orientations of fitness apps on consumers' physical activities. *Sport Management Review*, *22*(5), 682–693. https://doi.org/10.1016/j.smr.2018.10.005

Turner-McGrievy, G. M., Beets, M. W., Moore, J. B., Kaczynski, A. T., Barr-Anderson, D. J., & Tate, D. F. (2013). Comparison of traditional versus mobile app self-monitoring of physical activity and dietary intake among overweight adults participating in an mHealth weight loss program. *Journal of the American Medical Informatics Association*, *20*(3), 513–518. https://doi.org/10.1136/amiajnl-2012-001510

USATF. (2020). *Events*. https://www.usatf.org/events

Vallerand, R. J. (2004). Intrinsic and Extrinsic Motivation in Sport. *Encyclopedia*

of Applied Psychology, Three-Volume Set, 427–435. https://doi.org/10.1016/B0-12-657410-3/00835-7

Wang, B. R., Park, J. Y., Chung, K., & Choi, I. Y. (2014). Influential Factors of Smart Health Users according to Usage Experience and Intention to Use. *Wireless Personal Communications*, *79*(4), 2671–2683. https://doi.org/10.1007/s11277-014-1769-0

Wang, C. K. J., Liu, W. C., Kee, Y. H., & Chian, L. K. (2019). Competence, autonomy, and relatedness in the classroom: understanding students' motivational processes using the self-determination theory. *Heliyon*, *5*(7), e01983. https://doi.org/10.1016/j.heliyon.2019.e01983

Warburton, D. E. R., & Bredin, S. S. D. (2017). Health benefits of physical activity: A systematic review of current systematic reviews. *Current Opinion in Cardiology*, *32*(5), 541–556. https://doi.org/10.1097/HCO.0000000000000437

Whelan, E., & Clohessy, T. (2021). How the social dimension of fitness apps can enhance and undermine wellbeing: A dual model of passion perspective. *Information Technology and People*, *34*(1), 68–92. https://doi.org/10.1108/ITP-04-2019-0156

WHO. (2020). *Healthy At Home - Physical activity*. https://www.who.int/campaigns/connecting-the-world-to-combat-coronavirus/healthyathome

World Health Organization (2018). More Active People for a Healthier World, Global Action Plan on Physical Activity 2018-2030. Geneva, UK: World Health Organization.

Xie, H., Chen, Y., & Yin, R. (2020). Running together is better than running alone: a qualitative study of a self-organised distance running group in China. *Leisure Studies*, *39*(2), 195–208. https://doi.org/10.1080/02614367.2019.1698647

Yang, Q. (2017). Are Social Networking Sites Making Health Behavior Change Interventions More Effective? A Meta-Analytic Review. *Journal of Health Communication*, *22*(3), 223–233. https://doi.org/10.1080/10810730.2016.1271065

Yang, Y., & Koenigstorfer, J. (2020). Determinants of physical activity maintenance during the Covid-19 pandemic: A focus on fitness apps. *Translational Behavioral Medicine*, *10*(4), 835–842. https://doi.org/10.1093/tbm/ibaa086

Zach, S., Xia, Y., Zeev, A., Arnon, M., Choresh, N., & Tenenbaum, G. (2017). Motivation dimensions for running a marathon: A new model emerging from the Motivation of Marathon Scale (MOMS). *Journal of Sport and Health Science*, *6*(3), 302–310. https://doi.org/10.1016/j.jshs.2015.10.003

Zelenović, M., Manić, M., Stamenković, A., Čaprić, I., & Božić, D. (2021). Barriers to physical activity in adolescents: A systematic review. *Turkish Journal of Kinesiology*, *7*, 22–30. https://doi.org/10.31459/turkjkin.840536

Zhang, X., & Xu, X. (2020). Continuous use of fitness apps and shaping factors among college students: A mixed-method investigation. *International Journal of Nursing Sciences*, *7*, S80–S87. https://doi.org/10.1016/j.ijnss.2020.07.009

Zinner, C., & Sperlich, B. (2016). Marathon running: Physiology, psychology, nutrition and training aspects. In *Marathon Running: Physiology, Psychology, Nutrition and Training Aspects*. https://doi.org/10.1007/978-3-319-29728-6

Zuckerman, O., & Gal-Oz, A. (2014). Deconstructing gamification: evaluating the effectiveness of continuous measurement, virtual rewards, and social comparison for promoting physical activity. *Personal and Ubiquitous Computing*, *18*(7), 1705–1719. https://doi.org/10.1007/s00779-014-0783-2

APPENDICES

A. ONLINE SURVEY CONSENT FORM

ARAŞTIRMAYA GÖNÜLLÜ KATILIM FORMU

Bu çalışma ODTÜ Endüstri Ürünleri Tasarımı Bölümü yüksek lisans öğrencilerinden Batuhan Şahin tarafından Prof. Dr. Bahar Şener-Pedgley danışmanlığında yürütülmektedir. Bu form sizi araştırma koşulları hakkında bilgilendirmek için hazırlanmıştır.

Çalışmanın amacı nedir?

Çalışmanın amacı farklı tip koşucular için sosyal etkileşim seçeneklerini anlamak, geliştirmek ve gelecekte alakalı uygulama veya platformlarda daha iyi bir kullanıcı deneyimi sunmaktır.

Bize nasıl yardımcı olmanızı isteyeceğiz?

Araştırma çevrimiçi ortamda anket şeklinde yapılacaktır. Anket 41 sorudan oluşmaktadır ve tamamlama süresi yaklaşık 8 dakika uzunluğunda olacaktır. Anket çoktan seçmeli sorular, açık uçlu sorular ve değerlendirme sorularından oluşmaktadır.

Katılımınızla ilgili bilmeniz gerekenler:

Bu çalışmaya katılmak tamamen gönüllülük esasına dayalıdır. Herhangi bir yaptırıma veya cezaya maruz kalmadan çalışmaya katılmayı reddedebilir veya çalışmayı bırakabilirsiniz. Araştırma esnasında cevap vermek istemediğiniz sorular olursa cevaplamayabilirsiniz.

Araştırmaya katılanların kimlik bilgileri gizli tutulacak ve kimlik bilgileri herhangi bir şekilde eşleştirilmeyecektir. Toplanan verilere sadece araştırmacı ulaşabilecektir. Bu araştırmanın sonuçları bilimsel ve profesyonel yayınlarda veya eğitim amaçlı kullanılabilir, fakat katılımcıların kimliği gizli tutulacaktır.

Araştırmayla ilgili daha fazla bilgi almak isterseniz:

Çalışmayla ilgili soru ve yorumlarınızı araştırmacıya batuhansahin.id@gmail.com adresinden iletebilirsiniz.

☐ ***Yukarıdaki bilgileri okudum ve bu çalışmaya tamamen gönüllü olarak katılıyorum.***

B. ONLINE SURVEY QUESTIONS

1. Age

- <25
- 25-29
- 30-34
- 35-39
- 40-44
- 45-49
- 50-54
- 55-59
- >60

2. Gender

- Male
- Female
- Do not prefer sharing

3. How often do you run?

- 1 in two weeks
- 1 per week
- 2-3 times a week
- 3-5 times a week
- almost every day
- Every day

4. On average, how much time do you spend on running per week?

- 15-30 minutes
- 30-60 minutes
- 1-3 hours
- 3-7 hours
- 7-11 hours
- 11-15 hours
- 15+ hours

5. Which of the following ground types do you prefer to run on?

- Road (Asphalt)
- Synthetic Track
- Trail (Soil)
- Sand
- Grass
- Other:

6. Are you a member of any online/offline running community?

- Yes
- No

7. Do you use a device to record your running activity?

- Yes
- No

8. What type of devices do you use to record your activity?

- Smart phone
- Smart watch
- Other:

9. Do you post any activity-related social posts before/after the run? (Sharing activity logs with phone applications, social media sharing, etc.)

- Yes, always.
- Mostly.
- Sometimes
- Rarely
- No, I am not sharing anything.

10. Which platforms/apps do you use for your sharing?

- Social media platforms (Instagram, Facebook, Twitter etc.)
- Smartphone apps (Strava, Nike Run Club etc.)
- Other:

11. Select the options that motivate you about your activity sharing. I'm sharing because...

- Sharing my activity with other people motivates me.
- The comments and likes on my activity post motivate me.
- Sharing my activity regularly motivates me for the next days.
- Competing with others over my activity performance motivates me.
- Being able to cooperate with my running team motivates me.
- Other:

Social Interaction Features

Evaluate the effect of the following social interaction features in activity tracking applications/platforms on your motivation.

12. Challenges (Created by app)

- -2 -- Decrease my motivation significantly
- -1 -- Decrease my motivation slightly
- 0 -- Neither decrease nor increase my motivation
- 1 -- Increase my motivation slightly
- 2 -- Increase my motivation significantly
- I do not use this option.

13. Challenge (Created by other users)

- -2 -- Decrease my motivation significantly
- -1 -- Decrease my motivation slightly
- 0 -- Neither decrease nor increase my motivation
- 1 -- Increase my motivation slightly
- 2 -- Increase my motivation significantly
- I do not use this option.

14. Sharing photos Before/After Activity

- -2 -- Decrease my motivation significantly
- -1 -- Decrease my motivation slightly
- 0 -- Neither decrease nor increase my motivation
- 1 -- Increase my motivation slightly
- 2 -- Increase my motivation significantly
- I do not use this option.

15. Sharing messages Before/After Activity

- -2 -- Decrease my motivation significantly
- -1 -- Decrease my motivation slightly
- 0 -- Neither decrease nor increase my motivation
- 1 -- Increase my motivation slightly
- 2 -- Increase my motivation significantly
- I do not use this option.

16. Comments on your posts

- -2 -- Decrease my motivation significantly
- -1 -- Decrease my motivation slightly
- 0 -- Neither decrease nor increase my motivation
- 1 -- Increase my motivation slightly
- 2 -- Increase my motivation significantly
- I do not use this option.

17. Likes on your posts

- -2 -- Decrease my motivation significantly
- -1 -- Decrease my motivation slightly
- 0 -- Neither decrease nor increase my motivation
- 1 -- Increase my motivation slightly
- 2 -- Increase my motivation significantly
- I do not use this option.

18. Routes (Suggested by app)

- -2 -- Decrease my motivation significantly
- -1 -- Decrease my motivation slightly
- 0 -- Neither decrease nor increase my motivation
- 1 -- Increase my motivation slightly
- 2 -- Increase my motivation significantly
- I do not use this option.

19. Routes (Created by other users)

- -2 -- Decrease my motivation significantly
- -1 -- Decrease my motivation slightly
- 0 -- Neither decrease nor increase my motivation
- 1 -- Increase my motivation slightly
- 2 -- Increase my motivation significantly
- I do not use this option.

20. Leaderboards (Including global users)

- -2 -- Decrease my motivation significantly
- -1 -- Decrease my motivation slightly
- 0 -- Neither decrease nor increase my motivation
- 1 -- Increase my motivation slightly
- 2 -- Increase my motivation significantly
- I do not use this option.

21. Leaderboards (Including followers)

- -2 -- Decrease my motivation significantly
- -1 -- Decrease my motivation slightly
- 0 -- Neither decrease nor increase my motivation
- 1 -- Increase my motivation slightly
- 2 -- Increase my motivation significantly
- I do not use this option.

22. Running Events

- -2 -- Decrease my motivation significantly
- -1 -- Decrease my motivation slightly
- 0 -- Neither decrease nor increase my motivation
- 1 -- Increase my motivation slightly
- 2 -- Increase my motivation significantly
- I do not use this option.

23. Notification, Email and Messages (From app/platform)

- -2 -- Decrease my motivation significantly
- -1 -- Decrease my motivation slightly
- 0 -- Neither decrease nor increase my motivation
- 1 -- Increase my motivation slightly
- 2 -- Increase my motivation significantly
- I do not use this option.

24. Notification, Email and Messages (From other users)

- -2 -- Decrease my motivation significantly
- -1 -- Decrease my motivation slightly
- 0 -- Neither decrease nor increase my motivation
- 1 -- Increase my motivation slightly
- 2 -- Increase my motivation significantly
- I do not use this option.

25. In the next stage of this research, one-on-one interviews will be conducted with some participants in order to exchange detailed information. I would be very happy if you would like to contribute to this process and share your opinions and suggestions. Please write your e-mail address to be included in the next stage.

C. INTERVIEW CONSENT FORM

ARAŞTIRMAYA GÖNÜLLÜ KATILIM FORMU

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Çalışmanın amacı farklı tip koşucular için sosyal etkileşim seçeneklerini anlamak, geliştirmek ve gelecekte alakalı uygulama veya platformlarda daha iyi bir kullanıcı deneyimi sunmaktır.

Bize nasıl yardımcı olmanızı isteyeceğiz?

Mülakatlar yaklaşık 45 dakika uzunluğunda olacaktır. Mülakat 10 soru içermektedir ve sorular açık uçlu sorulardır.

Katılımınızla ilgili bilmeniz gerekenler:

Bu çalışmaya katılmak tamamen gönüllülük esasına dayalıdır. Herhangi bir yaptırıma veya cezaya maruz kalmadan çalışmaya katılmayı reddedebilir veya çalışmayı bırakabilirsiniz. Araştırma esnasında cevap vermek istemediğiniz sorular olursa cevaplamayabilirsiniz.

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Yukarıdaki bilgileri okudum ve bu çalışmaya tamamen gönüllü olarak katılıyorum.
(Formu doldurup imzaladıktan sonra uygulayıcıya geri veriniz).

Ad Soyad **Tarih** **İmza**

D. THE INTERVIEW QUESTION GUIDE

At the beginning, to understand their approach towards running, activity frequency, and data tracking habits, three warm-up questions to be asked to the participants:

Q1: Why are the reasons for you to run?

Q1P1: How do you feel before/during/after you run?

Q2: How frequently do you run in a week?

Q2P1: Do you follow a routine?

Q2P2: Are there any negative causes for you to break out of your routine? If yes, can you mention them?

Q2P3: Are there any reasons which motivate you to run out of your routine? If yes, can you mention them?

Q3: Do you use any tracking devices or smartphone applications to keep track of your activity data? If yes, can you tell which ones?

Then, to get familiar with the participants' tendency to share/follow others regarding activity-related information a general question to be asked:

Q4: Do you share any kind of information (comments, pictures, etc.) online regarding your activity before/after your run?

Q4P1: Which platforms do you use?

Q4P2: Can you talk about your motivation towards sharing activity-related information?

Q4P3: Do you follow other people's sharing/posts? If yes, can you talk about the reasons behind it?

Then, briefly remind the participants 'aim of the research and its relationship with social interaction features in running apps. Following question to be asked and repeated for each of the social interaction features.*

Q5: How do you feel about *this** feature? How it affects your motivation?

Q5P1: What kind of improvements can be made for this feature to be more beneficial?

During the final part of the interviews, the participants to be asked to reflect on their experiences.

Q6: What are the most motivating aspects of social interaction features? Can you explain why?

Q7: Do you remember any negative experiences or demotivating situations regarding social interaction features? Can you explain why?

Q8: What improvements can be made on social interaction features to increase motivation and user experience in general?

E. ETHICAL APPROVAL

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02 KASIM 2020

Konu: Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Bahar Şener PEDGLEY

Danışmanlığını yaptığınız **Batuhan ŞAHİN'in** ***"Birlikte Koş: Mobil Koşu Uygulamalarında Sosyal Etkileşim Seçeneklerinin İncelenmesi ve Kullanıcı Deneyiminin Geliştirilmesi"*** başlıklı araştırması İnsan Araştırmaları Etik Kurulu tarafından uygun görülmüş ve 280-ODTU-2020 protokol numarası ile onaylanmıştır.

Saygılarımızla bilgilerinize sunarız.

Prof.Dr. Mine MISIRLISOY
İAEK Başkanı

F. ACTIVITY CLASS CHART

Activity Class Chart

	Training Description	Training Frequency	Training Time Per Week
0	No exercise	-	-
1	Occasional, light exercise	Once every two weeks	Less than 15 minutes
2			15 to 30 minutes
3		Once a week	Approximately 30 minutes
4	Regular exercise and training	2 to 3 times per week	Approximately 45 minutes
5			45 minutes to 1 hour
6			1 to 3 hours
7		3 to 5 times per week	3 to 7 hours
8	Daily training	Almost daily	7 to 11 hours
9		Daily	11 to 15 hours
10			More than 15 hours