

# Is Gamification Effective in Motivating Exercise?

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**Abstract.** Despite the benefits of exercise, many individuals lack the motivation to integrate it into their daily lives. Recently, there has been a growing interest in the use of game principles in non-game contexts to make an activity that is perceived to be challenging, tedious or boring more enjoyable. With increased enjoyment through the infusion of game elements, it is expected that individuals will be more motivated to partake in the activity. Given this backdrop, the present study seeks to ascertain the utility of gamification for promoting exercise among individuals. We used Fitocracy as the gamification platform. Our results suggest that gamification improves not only attitudes towards and enjoyment of exercise but also shapes behavior in terms of increase in exercise activity. These findings augur well for gamification platforms and their usefulness in motivating exercise among individuals. Finally, our work suggests design implications for applications that aim to gamify exercise.

**Keywords:** Gamification · Enjoyment · Social support · Exercise

## 1 Introduction

Exercise is one of the best ways to sustain an individual's physical and mental well-being. Multiple studies have shown that regular exercise can reduce many health risks and diseases such as cardiovascular disease [26], diabetes mellitus [16], hypertension [25], osteoporosis [7], and obesity [12]. Despite these benefits many individuals lack the motivation to integrate regular exercise into their lives as some may perceive that such activities are less enjoyable and tiring compared to sedentary activities [30]. As well, lack of time and lack of social support have been cited as reasons [33]. Because of the risks involved in physical inactivity, there is a need to devise innovative solutions to motivate individuals to exercise.

Research has shown that enjoyment plays an important role in promoting exercise, and may be manifested as positive feelings such as fun and pleasure [3]. Enjoyment of the exercise has been found to have a strong relationship to exercise participation [9, 35] as it is a commonly cited reason for engaging in exercise. Additionally, there is also a body of literature that suggests the relationship between social support and level of

exercise. For example, the positive emotions derived from social interaction reinforce the positive experience of exercise, leading to further activity [10].

More recently, there has been a growing interest in the use of game principles in non-game contexts with the aim to increase user engagement and enjoyment [8]. Known as “gamification”, this idea seeks to make an activity that is perceived to be challenging, tedious or boring more enjoyable through the infusing of game elements. With increased enjoyment, it is expected that individuals will be more motivated to partake in the activity.

The current research landscape has focused on the application of the integration of game principles to motivate individuals to start exercising. These studies have focused on design of applications through the inclusion of game principles and social support [e.g. 17, 22]. Another thread of research has focused on immersive exergames that involves the use of human kinetics to interact with the game elements as a way to increase the player’s energy expenditure. Despite this promising approach, there is mixed evidence surrounding the resulting energy expenditure and intensity of the activities compared to traditional exercise [36]. Further, little is known about the effectiveness of the gamification applications in motivating individuals to exercise. Given this backdrop, the present study seeks to ascertain the utility of gamification for promoting exercise among individuals.

This paper will be organized as follows. The next section will focus on related work. The following section will highlight the method employed in this work. This will be followed by presentation of the results. This paper will close with a discussion of the results as well as concluding thoughts on this work.

## 2 Related Work

Exercise-related applications with gamification features adopting game principles as part of the players’ exercise activities. In these applications, users have the flexibility of selecting any type of traditional exercise that they would like to do and log the exercise that they have done. Users are rewarded with incentives such as points and badges. In this process, activities with game principles are entwined [4]. The social network of users in these applications also plays an important role in motivating the users to engage in exercise. Other users provide encouragement and advice to the user [17]. By fusing game principles with the availability of social support from other players, users would supposedly be motivated to exercise.

Rewards as well as social support are common features that have been integrated in gamified applications. The main aim of including rewards is to incentivize users’ effort that is embodied in points and badges [37]. Points provide a form of feedback to users of their performance in terms of effort and intensity put into the exercise [21]. For instance, more points are awarded to them for engaging in exercise longer, increasing the number of repetitions or putting more effort into the exercise. Badges are another form of reward that function as a status affirming, source of reputation, and achieving a goal [2]. In terms of social support, users are encouraged to post and share their activities as a form of accountability and motivation [23]. Others in the social network

are able to “like” the posts and contribute to comments as way of encouraging the users and sharing information [34].

Enjoyment for motivating exercise in gamified applications is brought about and enhanced through the presence of the game principles. It has been identified in prior studies to have a strong correlation with exercise [9] and it is important leverage on it to motivate exercise [14]. This is because enjoyment is considered to be a more proximal and is seen to be a tangible outcome of exercising compared to other factors. It is an affective outcome of exercising during which endorphins are released to improve the individual’s mood and is easily experienced by individuals as an after effect of exercising. As a consequence, enjoyment could alter an individual’s perception of the actual effort put into exercise [e.g. 1]. Additionally, it could push the individual to exert more effort to the activity [28]. At the same time, it leads to the intention to undertake the activity in the future that may lead to sustain the engagement in exercise [35]. In the long run, exercise provides the psychological and sociological benefits in addition to the physiological benefits.

Social support is also a feature in gamified applications that could improve the effectiveness in motivating exercise. In general, social support refers to the way social relationships help to buffer stress on health and well-being [5]. Studies have highlighted that social support is related to the motivation to exercise. It has been suggested that social support provides the initial motivation in undertaking the exercise activity [11]. Further, it has been observed to have positive correlations with sustained exercise engagement [6]. Social support in motivating exercise could be examined in several aspects. Appraisal support is a type of social support gained from the social interactions in the network of users, and it provides a sense of encouragement for them. This is because the platform enables them to share their struggles with others who may be facing the same issues as them [27]. This support provides a sense of reinforcement to the individual in maintaining their health. Information provision is another type of social support where exercise-related information is provided by others in the social network. Users no longer rely solely on health-related professionals to seek health-related information as they can now also seek this from others who have similar issues online [23, 31]. Put differently, receiving information from others in the social network would improve users’ knowledge and increase their motivation to exercise.

### 3 Methodology

Given the objective of this paper, we employed a pre-test/post-test experimental design to determine the effects of gamification on physical exercise. This approach takes into account users’ perceptions before the intervention and after the intervention to enable us to examine the differences in their perception of physical exercise with respect to the influence of the gamification and social support features.

Prior to the study, participants were asked to complete a questionnaire survey eliciting their exercise habits in terms of the type of exercise and frequency they engaged in them, their attitudes and their level of enjoyment of the exercises they performed. They also completed questions related to their demographic information. Next, participants were introduced to Fitocracy where its gamification features were

presented. They were then asked to use the platform as part of their exercise routine for a month. Thereafter, a similar questionnaire survey was administered to elicit participants' exercise habits, attitudes and level of enjoyment.

The measures for attitude were adopted from the Exercise Motivations Inventory [20]. This 44-items measure a diverse set of reasons for engaging in exercise activities. The reasons that could be elicited from the scale include stress management, weight management, recreation, social recognition, enjoyment, appearance, ill-health avoidance, competition, fitness and health pressures. The measures for habit were based on the types of exercise that the participants did as well as the frequency of engaging in the exercises. The measures for level of enjoyment were adopted from Physical Activity Enjoyment Scales (PACES) [18]. This 18-items measure the extent an individual enjoys engaging in any physical exercise, regardless if it was done for exercise or for sports.

As mentioned previously, we used Fitocracy (<http://fitocracy.com>) as the gamification platform for this study. Fitocracy may be characterized as an online social network that combines gamification elements to motivate people to improve their fitness. In Fitocracy, users log their exercise activity (Fig. 1) and points are awarded based on the benefits of each activity that users engage in. Users may level up once they reach certain point threshold levels (Fig. 2). To add an element of competition, users are also ranked in a leaderboard based on points earned (Fig. 3). Fitocracy also offers social networking features that allow users to follow others, view and comment on their exercise activities and join special interest groups. Launched in 2011, the site reached 1 million users in 2013 and has garnered awards and recognition for promoting health and fitness online. Given its popularity, Fitocracy is thus an appropriate platform for studying the influence of gamification on exercise activity.

In total, 100 participants comprising 48 males and 52 females with an average age of 28 years were recruited. Participants with Computer Science and IT training made up the bulk of the participants (47 %) in addition to those educated in life and health sciences as well as healthcare (19 %). The remainder of the participants had engineering, arts, humanities and social sciences, hospitality and tourism, business, advertising, design and media and education backgrounds. Web sites were the main

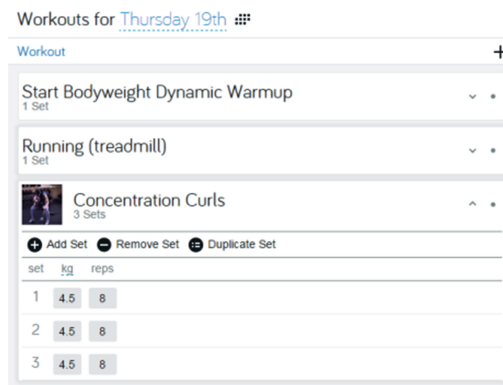


Fig. 1. Logging exercise activities in Fitocracy

source for the participants to find health and fitness information (79 %). Additionally, they used various social media platforms for information sharing on health and fitness. All of the participants were concerned with their health and fitness, but did not engage in the activity regularly. At the start of the study, most of the participants exercised at least once a week, performing activities such as walking, jogging and swimming.

## 4 Results

Participants' exercise attitudes, enjoyment and habits were measured before and after the study. The differences of their perceptions towards exercise were examined using paired sample t-tests. At the same time, the participants' comments corroborated with the statistical findings. Here, they shared their opinions on the game principles in motivating them to exercise after using Fitocracy for a month.

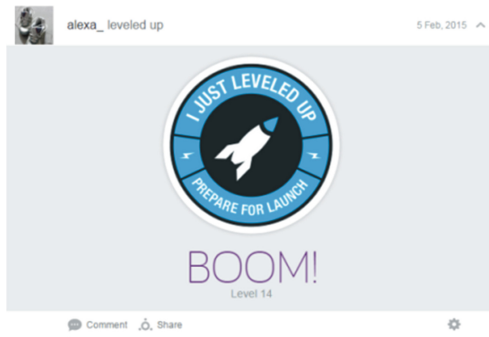


Fig. 2. Levelling up to a new level after reaching a milestone

### Leaders

Filter by Everyone within the Last 30 Days and show Male & Female




Standing	Name	Gender	Level	Points
221	 pmfsv Joined: October 2014	♂	32	54,178
222	 gwufit Joined: August 2013	♂	38	54,070
223	 teddy17 Joined: June 2012	♀	47	54,041

Fig. 3. Ranking users in leaderboard

Overall, participants' attitudes towards exercise changed during the study. A paired sample t-test was conducted to determine the differences in their attitude towards exercising. It yielded a significant difference for prior to the study ( $M = 107.56$ ,  $SD = 16.21$ ) and after the study ( $M = 114.99$ ,  $SD = 15.72$ );  $t(99) = -4.89$ ,  $p < 0.001$ . This highlighted that the participants significantly improved their attitude towards exercise after using Fitocracy.

As for enjoyment, the participants shared that they enjoyed exercising. After using Fitocracy for a month, their perception towards enjoying exercise improved as determined through another paired sample t-test. The test showed significant differences in exercise enjoyment prior to the study ( $M = 60.93$ ,  $SD = 9.37$ ) and after the study ( $M = 64.37$ ,  $SD = 10.20$ );  $t(99) = -3.12$ ,  $p < 0.001$ . This result thus shows that participants enjoyed exercising significantly after using Fitocracy than before.

Finally participants improved their exercise habits by increasing the length of time engaged in exercise. A paired sample t-test was conducted to determine the difference in the time engaged in exercise prior to the study ( $M = 49.28$  min,  $SD = 10.95$ ) and after the study ( $M = 53.26$  min,  $SD = 14.15$ ) and it showed significant difference with  $t(99) = -3.81$ ,  $p < 0.001$ . Put differently, as a result of using Fitocracy, there was a significant increase in the time spent engaging in exercising as compared to before using the application.

Qualitative comments obtained from participants after the experimental study also corroborated with our statistical findings. In particular, participants reported liking the ability to follow other Fitocracy users to track their progress for either inspiration or competition. One sentiment shared by a participant was that *"the leveling system and social aspect motivates me and push me to do more exercise"*. In other words, the gamification features enhanced participants' enjoyment and the social support from other users motivated them to engage in exercise frequently.

With respect to enjoyment, participants found the gamification features in Fitocracy made exercising fun and enjoyable for them. These features motivated them continue engaging in exercise on a regular basis. A participant highlighted that *"the leveling up system seems to be a good way to motivate and encourage regular exercise (like playing a game)." The points system that works in tandem with the levels feature provided a sense of meaning for participants in terms of the effort put in during the exercise activity. As points in Fitocracy are awarded based on the effort and the intensity that they had put in during the exercise session, it serves as a form feedback of their performance. Similarly, users are awarded badges when they reach a new level and these are displayed on their feeds as a form of recognition for the effort that they had put into their exercise. In sum, providing feedback and recognition of the participants' effort motivated them to improve themselves further.*

In addition, participants were able to appreciate the support from other users in the Fitocracy network of users. Particularly, they shared that were able to find information about various topics that could improve their understanding on health and fitness. This form of informational support could further improve their motivation to exercise. This was shared by a participant: *"Fitocracy is a motivating website and is a bridge between the health and fitness community and health and fitness information seekers. It is a useful website for health and fitness information seekers."* Another type of social support, appraisal support, was also found to be motivating for participants. One of

them commented that “*I can take a look around my buddies’ activities and follow their progress.*” In other words, being able to follow their friends’ progress is an appraisal of participants’ own progress, and this could be motivating for them.

Despite the integration of gamification features as a way to increase the motivation to exercise, there was a group of participants who felt that the competition embodied in the gamification features were demotivating to them. One participant shared that low scores were demotivating, “*Sometimes, if you have a constantly low score, motivation will fade away.*” For these participants, they points that they had scored compared with the rest of the users could not propel them to engage in exercising more frequently. This may provide a hint that competition between users may not be universally appealing and alternative ways of providing them with the motivation for engaging in exercise may be needed.

In summary, using Fitocracy for a month yielded significant differences in participants’ attitudes, enjoyment and habits towards exercising. These findings are further substantiated through the qualitative comments provided by the participants. We found that the participants felt that the gamification features enhanced their enjoyment and provided a supportive environment that motivated them to engage in exercise. However, there were also those who felt that they were gamification features overemphasized the competitive aspect. This caused them to feel demotivated by the scores they had achieved.

## 5 Discussion and Conclusion

This paper examined the its influence of gamification on users’ perceptions of exercise and actual exercise behavior. We asked participants to use Fitocracy, an application with gamification features that aims to encourage exercise, for a month. Their attitudes and habits towards exercise as well as perception of enjoyment were elicited at the start and at the end of the study. Our results suggest that gamification improves not only attitudes towards, and enjoyment of exercise but also shapes behavior in terms of increase in exercise activity. These findings augur well for gamification platforms and their usefulness in motivating exercise among individuals.

Based on our findings, we propose three design implications for applications that aim to gamify exercise. First, the results indicate that gamification features are effective in motivating individuals to exercise. This corroborates with other studies that had been done on gamifying exercise [e.g. 3, 22]. In order to do so, the activities associated with exercise are entwined with the game principles [4], and these principles have to be relevant to the context of use [29]. As noted above, points provide a form of feedback of the users’ performance of the exercise undertaken. The information provided has to be relevant to the context and understood by the users. Similarly, the badges that are awarded when a milestone is reached have to be relevant to the context as well. By doing so, users would be more likely to continue engaging in exercise at their own volition.

Second, the outcome of our study suggests that social support features are essential in motivating individuals to exercise. Hence, it is important to include such features in gamified applications. There are a number of features that could be considered. One type of social support feature would promote appraisals of users’ efforts by others in the

social network [23]. For example giving “props” and commenting on a user’s workout or status in Fitocracy would provide encouragement to the user. Similarly, informational support facilities could be made available for players to share or seek exercise related information. Here, status updates and comments are two such examples where players could post their workout, share relevant information and solicit advice from other players [27]. Another form of support would be a repository of exercise-related articles that could add to the players’ body of knowledge and further propel them to improve their exercise habits.

Finally, not all players may favor the competitive aspect that is often part of gamification features. This could be due to the different types of needs that such users would have. For instance, users with a high need for achievement might find the competitive aspect found in gamification features to be more appealing than those with a low need for achievement [13]. Furthermore, the competitive aspect may be taken too far by users and bring about negative feelings [31]. For such cases, collaborative gamification features could be included to reduce this tension. A collaborative feature would encourage players to work together and focus less on the competition between players. This would include group challenges where two to four players come together to complete a task [e.g. 19].

There are limitations to this work that warrant further investigation. One limitation is that there was no control group used in the experiment to establish the actual effects of gamification on the motivational behavior for exercising [15]. Future work may seek to compare between a gamified application and a non-gamified application between two groups of users [e.g. 37]. Another limitation is that not all of the participants found the competitive elements to be motivating. This perception of gamification as being competitive is attributed to users’ individual differences. Future work may propose a personalized approach to determine features that are appealing to both competitive and non-competitive users [e.g. 24].

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