

STOP : a gamified approach to support obese patients in changing their health habits.

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Abstract. Obesity is a challenge for the whole world and it is necessary to find new ways to reduce it and to help people in this situation by facilitating the acquisition of healthy habits to replace unhealthy ones. STOP is a project aimed at facing the challenge of obesity through a digital methodology and through a synergy between experts from the industry and academia. By tracing patients' habits, integrating these data with other data already present in databases and providing personalized paths and feedback the «STop Obesity Platform» can be a valuable help for both patients and Healthcare Professionals. All this is inserted in a gamification frame by the creation of an app that establishes an analogy to the well-known Dorian Gray mirror with the aim of encouraging the performance of the user or the acquisition of healthy behavior through a stimulating and engaging experience. This paper shows the main objectives of the project, defines the general structure of the app and provides some examples of prototype application.

Keywords: Obesity, Gamification, Serious Game, Artificial Intelligence, Healthy habits.

1 Introduction

1.1 «STop Obesity Platform» Project

Studies define overweight and obesity as abnormal or excessive fat accumulation that presents a risk to health. The most famous and used measure of obesity is the body mass index (BMI): a person's weight (in kilograms) divided by the square of his or her height (in meters). If the BMI is equal to or greater than 30, the person is generally obese; if instead the person has a BMI equal to or greater than 25, he/she is overweight.

According to Lancet, global obesity since 1975 has nearly tripled in man and more than doubled in women [1]. In 2016, 39% of adults were overweight, while 13% were

obese. Women are the most affected: 40% of the entire female population is overweight, while 15% is obese [2]. If projected to 2025, global obesity levels are set to reach 18% in men and surpass 21% in women. This problem does not spare neither children nor adolescents and it has a strong presence, contrary to popular belief, in very degraded and underdeveloped areas: globally, there are more obese than underweight people.

Obesity is now increasingly a challenge for the whole world and it is always necessary to find new ways to reduce it and to help people in this situation. This aim can only be achieved by facilitating the acquisition of healthy habits, replacing unhealthy ones, through careful prevention work, especially among the younger sections of the population.

STOP is a project aimed at facing the challenge of obesity through a digital methodology. STOP is, in fact, the acronym of «STop Obesity Platform» and this project aims to create an innovative platform to provide assistance and monitoring to obese people in the path of changing eating habits [Fig.1].

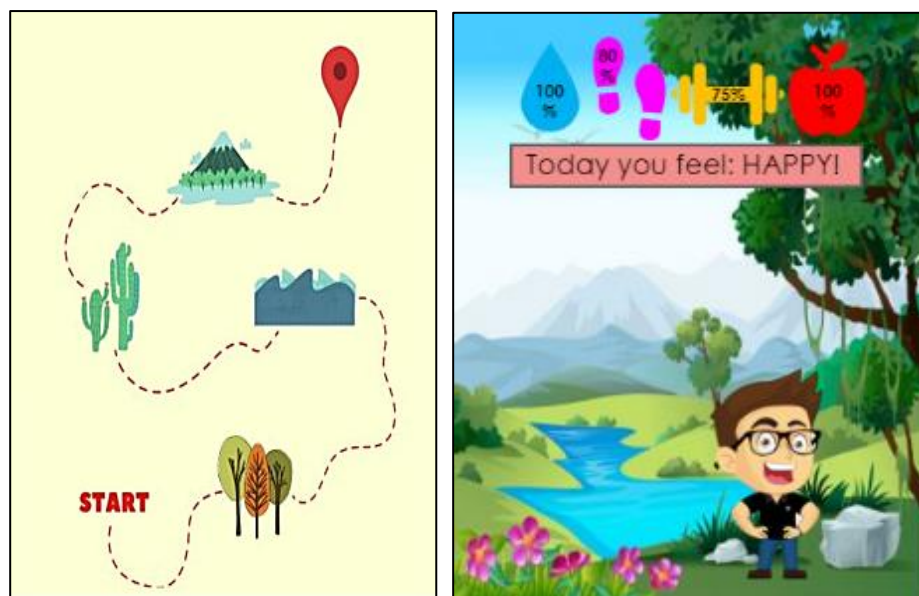


Fig. 1. The figure shows examples of screenshots of the game. On the left: the stages of the journey that the user has to overcome to change his lifestyle. On the right: the digital version of the portrait of Dorian Gray in which the user can observe the effects of his/her health habits on his/her alter ego and surrounding environment.

The interdisciplinary approach is the key to addressing such a complex issue, characterized by a wide variety of causes and consequences, as well as by a variety of different care pathways.

Obesity is also a serious problem for its both direct and indirect costs, i.e. related to diseases caused by excess weight. The World Obesity Foundation (WOF) estimates that global annual expenditure will amount to 1.2 trillion dollars by 2025.

For this reason, the main commitment of the STOP project is to create a synergy between experts from the industry and academia to achieve the goal of reducing public costs related to the management of obese patients.

During the project, the two actors - academia and industry - will be able to collaborate to obtain the right information to bring consumer needs and market challenges closer together with the advancement of research.

As already mentioned, so far the collaboration has produced the idea of an innovative platform for People with Obesity (PwO) that will help them to improve their health habits under the supervision of Healthcare Professionals.

The objectives of the project and the platform are, therefore, multiple:

- Collect data on obese patients and their habits;
- enabling health professionals to access a wide range of information by integrating pre-existing data with those collected by patients;
- increasing self-awareness and self-knowledge by PwO, leading to the acquisition of healthy habits.

2 Prototype description

2.1 The value of gamification in obesity

The STOP platform is a typical example of gamification, from the moment it was been designed and will be implemented to meet only the needs of obese patients. There is no state-of-the-art tool designed exclusively for people with obesity, which is why STOP can be an innovative and specialized service.

While in Game-based learning, existing platforms or games are utilized to teach something else, gamification applies typical game mechanisms to non-gaming situations [3]. The aim is encouraging the performance of an activity or the acquisition of behavior through a stimulating and engaging experience [4, 5].

In fact, several studies have highlighted the importance of gamification to increase the motivation of subjects to perform a given task or modify a habit through some enjoyable challenges, calibrated to the status of the user. Nowadays, gamification has been utilized in various domains, starting with education [6, 7] and business environments [8], right up to health management [9, 10].

The innovative STOP project is highly connected with the artificial intelligence models, because the game must support the user, considering the general health status, his/her personalized goals, and previous interactions.

The idea behind STOP operation is very simple: the STOP platform will allow collecting data on PwO habits through various types of smart devices. This information will be integrated and enriched with a large amount of pre-existing data and, through so-

phisticated analysis procedures, will provide interesting insights to Healthcare Professionals. Based on the data and gamification approach, they will be able to create an app-based tool to teach healthy practices.

The acquisition of data and the tracking of patients' health habits will allow the app to provide an experience adapted to the real needs of the subject. As regards physical exercise, in fact, more and more studies have highlighted the growing importance of innovative and personalized methodologies to improve development and athletic performance [11,12,13].

In particular, the information acquired by the app will cover four areas: nutritional habits, hydration, amount of steps and, indeed, physical exercise.

In STOP the approach to gamification takes the form of a digital version of the portrait of Dorian Gray: the user will be able to observe the consequences of his/her behavior and habits on his/her virtual alter ego. Creating an own personalized character to face different challenges and levels allows the user to feel more involved and engaged and this is crucial for obese patients. Gamification serves the purpose of minimizing negative emotions that they usually encounter in traditional forms of education. In fact, they often have trouble pursuing their goals and experience a great sense of frustration after a setback: all this leads them to abandon the paths of changing unhealthy habits.

For the same purpose, it may be provided the presence of an intelligent tutor with the task of supporting the PwO in their path, providing useful information, intelligent feedback, advice or emotional support in difficult times. Each app notification can be customized and therefore different for each user and for each situation, in order to create a comfortable and stimulating atmosphere and to achieve better outcomes [14].

In addition, the presence of points and/or awards attributed to users in the game provides immediate feedback on their performance [15], allowing PwO to focus on even small daily successes and to pay more attention to subsequent goals. Providing the ability to move forward in small steps is also critical as changing health habits is a gradual process that needs time to settle. Furthermore, the use of levels might increase player's ego-oriented attitude [16].

3 Conclusions and future directions

As obesity is becoming an increasingly serious disease of our civilization, STOP platform is an innovative way to increase the knowledge of obese patients about themselves and to accompany them gradually towards a process of improving their health habits.

Its gamification approach allows the user to experience fun and interest, increasing adherence to treatment and involvement in the use of the platform. In addition, the possibility of tracing information in multiple areas also makes this tool an important data archive to refer to in the future for the development of intervention programs.

To test the usability of the instrument and, subsequently, its validity and effectiveness there will be a feasibility study followed by a pilot randomized controlled trial.

In future, the platform may be used in experimental studies to assess its impact on the improvement of health habits, taking into account variables such as age, gender or social background of participants. The results obtained through this innovative platform can then be compared with those obtained through traditional or digital methodologies already in existence.

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