Chapter 16
Gamification:
Improving Patient Adherence in mHealth for Diabetes Management

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ABSTRACT

Diabetes is a chronic disease requiring a strict management. MyDiabetes is a mobile application for type I diabetes management that, as other mHealth applications, faces the challenge of user adherence and motivation. Here the authors describe the application's redesign and the implementation of different gamification techniques to tackle these challenges. The transition to the current version of the application was made in two stages. The first addressed the redesign of the application and started implementing gamification techniques. The second stage improved some of the features and added others. After the second stage, a new survey was conducted to evaluate the implemented features and improvements. While objectives and incentives to increase the number of records were endorsed by 56.5% of users, health directed badges and objectives increased the acceptance rate to 91.3%. Long-term effectiveness of the gamification approach will be done in the future.

INTRODUCTION

Diabetes in 2019 affected 463 million people around the world (International Diabetes Federation, 2019.). It is a chronic disease characterised by high glucose levels in the blood, caused by the person's pancreas inability to produce enough or any insulin. Uncontrolled glycaemic values can have a serious negative impact on quality of life. In severe cases, it can lead to heart problems, blindness and/or amputation.

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However, when managed correctly patients can lead a normal life without complications (World Health Organization, 2016).

Proper diabetes management requires a frequent supervision of glycaemic values, as several variables can influence glycaemic values. Examples are ingestion of carbohydrates, previous insulin administrations, the practice of exercise and other diseases. This number of different parameters burdens the patient in decision moments, for example, while calculating the next insulin bolus.

The rapid evolution and spread of smartphones opened a plethora of opportunities for healthcare. This has led to Mobile health (mHealth), a concept defined as the practice of medicine and public health using mobile devices.

MyDiabetes is an Android mobile application targeted for the management of type I diabetes. This application can be used to record significant diabetes related data and contains features such as: an insulin bolus calculator, a food database and an advice system based on medical guidelines. In order to function correctly, the MyDiabetes application requires the user's input. However, in a time where most devices can interact, users see data input as an unnecessary burden. The tougher the task, the more reluctant the user will be to complete it. Adding to this obstacle, the MyDiabetes application must also motivate their users to manage their diabetes correctly.

This is where gamification techniques come into play. Gamification aims to improve the interaction between users and the application in question, for a purpose other than pure entertainment while using the motivational principles that games provide. Healthcare can be demanding on people, especially in the context of chronic diseases that require frequent management and monitoring. A common challenge for mHealth applications is to maintain user-adherence while continuously motivating users to manage their well-being. The use of gamification can serve as a tool to address both mentioned matters.

In this work, the authors propose to use gamification to motivate the user to not only input more data, but also to improve their diabetes management.

The authors in this chapter will start by discussing gamification notions and principles. This will serve to better value the literature review section. The following sections will describe the work the authors did on the gamification and usability of the MyDiabetes mobile application. The authors will continue, providing some recommendations based on the results previously described. The chapter will end with the reached conclusions and further research ahead.

BACKGROUND ON GAMIFICATION

Gamification is defined as the use of game elements and techniques in serious contexts (Johnson et al., 2016). Before elaborating on the implementation made to reach the proposed application objective using gamification, it is important to introduce the concepts that serve as basis to the work presented. This section will describe existing game elements and techniques used in gamification, player types and will serve to understand motivation and behavioural persuasion.

Game Elements as Gamification Techniques

As stated by Souza-Júnior M. et al., gaming mechanics can be used to engage and stimulate the user's desire to solve health problems, when correctly implemented (Souza Júnior et al., 2016). Werbach and Hunter (Werbach & Hunter, 2012) proposed a framework, in which they present the game elements in