

A DESIGN SCIENCE APPROACH TO IMPROVE ADHERENCE ON EXERCISE PLAN VIA MOBILE APPLICATION BUILT BY RESEARCHKIT FRAMEWORK

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ABSTRACT

Introduction

With the advance of science and technology, the growing number of applications are developed for self-managed health project. A wide variety of innovative functions are built to help people control diet or sport plan. However, in medical industry, chronically ill patients often need rigorous and long-term health control. Motivated effects of application for patients in compliance with exercise plan according to doctors' instruction are more crucial than general public. The research objective is to examine completion rate based on different notified messages pushed to people with different personalities. The research results is helpful not only for chronically ill patients adhering to plans but for developers to creative more effective and useful applications in the future.

Related Work

In order to investigate effects of different messages on users with different personalities, the research refers to psychological theory describes by C.G. Jung (Jung et al., 1957). The research takes MBTI test to classified users into two types. The Myers–Briggs Type Indicator (MBTI) is an introspective self-report questionnaire. It is a useful tool to indicate psychological preferences in how people make decisions. The test results can be used as the basis of further analysis. The whole results of MBTI test includes eight characteristics and sixteen kinds of personality types. For the sake of narrowing our analysis down, we only collect data and distinguish users from selected two types of all result categories–Thinking and Feeling. Based on these two types, we give specific message to each participants. Our aim is to verify that users will motivated by messages which meet users' personalities.

Research Approach

The design science research methodology is presented by Peffer (Peppers et al. 2007). There are six stages during the design process including problem identification and motivation, objective of a solution, design and development, demonstration, evaluation and communication. At the design stage, we focus on how message effect differed between participants with different personalities. Building on the design science theory, we developed an iOS application using ResearchKit. ResearchKit is an open source framework introduced by Apple in 2015. For medical research, ResearchKit framework enables our iOS app to become a powerful tool. Developers can use a variety of customizable modules such as informed consent, surveys and active tasks to build useful medical application. The purpose of the application is to help participants schedule personal exercise plan and make sure that they are indeed abide by the plans. We develop the application as a design artifact according to design science guideline described by Hevner (Henver et al., 2004). Within the search process during design, the instantiation we created to improve adherence is the solution to our research objective.

Artifact

The artifact is the iOS application which provides basic exercise plan list. In the beginning, participants may asked for signature after viewing the research consent and finish a MBTI survey built by ResearchKit framework. The powerful ResearchKit tool provides consent module for us to implement complicated consent flow. Participants can easily finish online consent rather traditional paper work. The survey module includes lots of questionnaire type so that we can utilize it to classify personality type more convenient. After setting exercise plan, the system pushes notifications with specific message type to remind users according to the MBTI result at scheduling time. In order to make further comparison, we are going to collect results from participants who receive and do not receive messages. The application records all scheduling times and remind users to check whether they complete the sport item at the end of the scheduling day. The system automatically calculate average completion rate of each person and all data is stored for advanced analysis in the future work.

Experiment Design

The subjects will be randomly distributed to three groups when first registered personal information on the application. One group with matched messages. Namely, logical messages are sent to subjects who are identified as thinking type and emotional messages are given to users with feeling type personalities. Another group with mismatched messages. That is, logical messages are delivered to subjects who are feeling type and emotional messages are transmitted to users with thinking type personalities. The third group is set as the control group which is composed of both thinking and feeling type subjects. However, people in the control group receive no messages. The research is plan to collect results after subjects continuously use the application for a month. We can further compare completion rates among three groups and even find out factors which may influence final results such as gender, race and so forth.

Expected Contribution

The clear contribution of this research is the design artifact—the application. The main purpose for the research is to assist chronically ill patients in compliance with exercise plan with a view to managing their health condition. This focuses on validation, evaluation and the challenges of improvement inherent in the evaluation process. Not only can the application help patients with chronic disease improve exercise adherence but it also brings useful information for future research and application development. Developers are able to build more effective and efficient healthcare application based on the findings of the research.

Keywords: Design science, Myers–Briggs Type Indicator, ResearchKit

Reference

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