

Developing an App for Cardiovascular Prevention and Scientific Data Collection

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Abstract. Background: Mobile apps may encourage a lifestyle that avoids unhealthy behaviors, such as smoking or poor nutrition, which promotes cardiovascular diseases (CVD). Yet, little data is available on the utilization, perception, and long-term effects of such apps to prevent CVD. Objectives: To develop a mobile app concept to reduce the individual CVD risk and collect information addressing research questions on CVD prevention while preserving data privacy and security. Methods: To validate the concept, a prototype will be built, and usability studies will be performed. Results: We expect to determine whether it is possible to reach a broad user base and to collect scientific information while protecting user data sufficiently. Conclusion: To address CVD prevention, we propose a mobile coaching app. We expect high acceptance rates in validation studies.

Keywords. mHealth, Mobile Applications, Cardiovascular Diseases

1. Introduction

Cardiovascular diseases (CVD) remain the leading cause of death in the Western world [1]. Apart from conventional risk factors, such as smoking or hypertension, unhealthy lifestyle, including poor nutrition and psychological stress, are known to increase CVD risk. Modern technologies inform about risk factors and coach their users to adhere to a healthier lifestyle. Studies have shown that mobile medical apps can positively impact daily behavior in the short term [2,3]. Lifestyle apps target a broader user base while focusing on a subset of risk factors [4]. To evaluate the impact of both application types on CVD risk, long-term research data is necessary. Yet, such data collections are limited by the high costs of continuous data acquisition. Moreover, there is a need to evaluate the effects of mobile apps in primary prevention. Previous trials mainly included subjects with diagnosed CVD or other high-risk related diseases [2,3].

2. Methods

This paper presents a mobile app concept, which aims to provide a lifestyle application that targets relevant risk factors for CVD. Moreover, the concept allows collecting

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scientific data through the app on how lifestyle changes impact CVD risk. We will build a prototype to validate the concept in usability studies.

3. Results

The system architecture consists of multiple subsystems. Health information and study questionnaires are distributed via a content delivery network to a web platform and a mobile app. The web platform serves as an entry point into the app. The app provides personalized content for the user and gathers individual health information. All data is processed locally on the device, ensuring maximum data security and protection. Health data, collected via smartphone sensors and connected wearables, is automatically imported into the app. Additional information can be entered manually. Both data types include parameters used for the calculation of the individual risk for CVD.

The mobile app decides based on prerequisites whether a user is eligible for a study. Studies can specify additional data to be collected. Only upon user consent, the app transmits anonymized health data to the study database. The data transmission is secured using end-to-end encryption between the study database and the user's device. Each study is examined for suitability of conduction in the app and requires an ethical vote.

4. Discussion and Future Work

To address CVD prevention, we propose a mobile app that allows the app user to lower their individual risk. For gaining insights into prevention, the app offers an anonymous collection of clinical data from users. The development of the prototype will be finished in 2021. Usability studies will be performed, emphasizing whether we can establish a user base broad enough for trials and whether the app protects user data sufficiently. Due to the focus on data protection, we expect high acceptance rates of the app.

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