Location: Amsterdam, The Netherlands
Core activities: Health check for employees with accompanying personalized advice on exercise and diet.
Expertise: Preventive health and movement science
Market: Lifestyle and health

The goal of this research project is to reduce costs due to absenteeism form work. To achieve this we offer a holistic health check (3-4 times a year) for employees together with personalized advice on exercise and diet. The research group is located at the Vrije Universiteit Amsterdam and comprises of a PhD candidate and two Master's students in Human Movement Sciences (Biomechanics/Kinesiology).

**Description**

This project investigates the development of the m-health app, a mobile application (iOS and Android). The goal of this project is to improve health and wellbeing of employees, and thereby reduce costs due to absenteeism from work. To achieve this, we will first offer a holistic health check (3-4 times a year) for employees of companies that provide this check to their employees. During the health check, several parameters are checked: blood pressure, cholesterol levels (including total lipid profile), hand grip strength, blood glucose, daily activity, endurance capacity on a bike ergometer, lung function test through spirometry, blood oxygen saturation and anthropometry (measuring height, weight and circumference of the abdomen and hip). The check is provided together with personalized advice on exercise and diet. In this way, we aim for a preventative system instead of the current curative health care system. In addition to the health checks, we also organize master classes, feedback moments and running groups to give employees a social platform and keep them motivated.

We provide a holistic, evidence-based health assessment that is directed at preventing a diseased state rather than curing already established illnesses. The initiative combines already existing, state-of-the-art health parameter tests with physical activity tracking, enabling us to make customized consult regarding exercise and diet available to our clients. The complexity of the health check-up is a new sophisticated way of measuring the population's health status. Results give an in depth view of someone's health and supply them with the proper information needed to create personalized health-enhancing programmes, i.e. exercise, diet, and lifestyle adaptations. Moreover, the check-ups and the measured parameters resemble the amount of effort someone puts in with regard to following or obtaining a healthy lifestyle. In contrast to competitors, who solely focus on assessing physical activity levels via a mobile application, we emphasize that this initiative is completely evidence-based as a variety of different valid and reliable health parameters are also incorporated.

**Key Task**

In this project the focus is on the technical innovation for a new m-health app that gives personalized feedback and uses push notifications and nudges at the right time with the right layout through smart learning algorithms. The new m-health app will make it possible to analyze the data in the app automatically and create a feedback loop of the user, its behaviour and the feedback messages. The aim is to create an app with personalized feedback to improve health. The data created through automated feedback together with the health data and the in-person diet and exercise consultations from the provided health checks will eventually make it possible to also predict health status using smart learning algorithms and therefore have a great preventative power.

The technical research question is whether it is possible to stimulate healthy behaviour through personalized feedback in an app and what are the necessary software, framework and technical expertise needed to make this possible. The app will work on data from several sources - data from all the tested health parameters, data from the suggested in-person consultations, data on movement and exercise of the app user, input data of the user regarding their mental health, data on the user's food intake and data regarding absenteeism and sick- leave.

The app will give the user feedback, which will have an effect on the user, and this will create new data. This feedback loop created in the app works through an algorithm (see Figure 1). This algorithm must learn from the data input and send the user updates, reminders, nudges and motivational messages (push-notifications). This project will investigate the possibilities of such an algorithm and the necessary minimum data-set to enable the desired functionalities in the app and then build the app in iOS and Android.

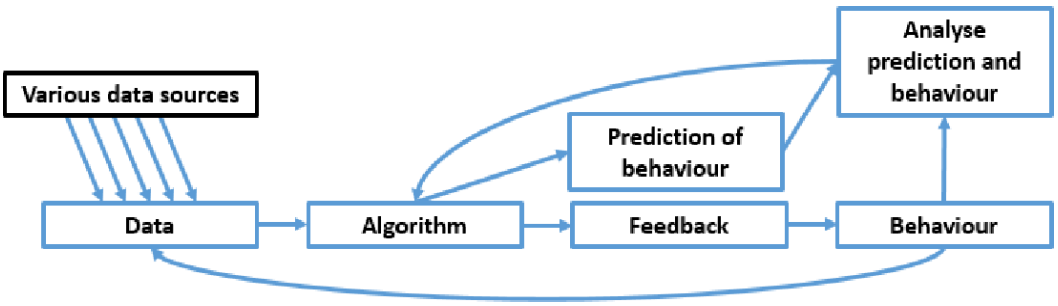


Figure 1 Based on consult and behavioral data, the algorithm provides feedback through messages in the m-health app. This is designed to calibrate the behavior of the participant according to current behavior and past metrics. These behavioral effects also provide data fed forward into the algorithm. The algorithm will assess predicted behavior compared with real behavior to create a closed feedback loop for the algorithm to learn how to best match real-time interventions.