

Promoting a healthy life style: how to improve long term adherence

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ABSTRACT

Technology supported services for increasing a healthy lifestyle are upcoming and shown effective in the short run. However the adherence to these services rapidly decreases after a couple of weeks. Including aspects of behavioral science into the coaching given in these services can be a possible solution for this problem. In this paper we will address the relationships between physical activity and aspects from theories on behavioural change. Based on the results it can be concluded that self-efficacy and stage of change are constructs that should be taken into consideration when developing interventions aimed at increasing level of physical activity and adherence to well-being enhancing technologies.

Author Keywords

Behavioural change, telemedicine, physical activity, technology supported well-being.

ACM Classification Keywords

H5.m. Miscellaneous.

INTRODUCTION

Regular physical activity has a significant positive effect on prevention of chronic diseases such as cardiovascular disease, diabetes, cancer and obesity [1], but also on mental health condition through reduced perceived stress and lower levels of burnout, depression and anxiety [2]. This means that influencing people to change their sedentary lifestyle to a more physically active lifestyle will lead to higher levels of well-being, less chronically ill and higher life expectancy. In other words: improving level of physical activity is profitable and a key aspect for healthy, as well as for chronically ill individuals, during one's entire life. To support people in deploying an active lifestyle various applications are currently available. One such example is the activity based ambulant feedback system [3]. The

concept behind this system is that the activity of the person is measured during everyday life using accelerometers, which is presented to the user on the display of a Personal Digital Assistant (PDA). The user's cumulative activity was plotted on a graph showing an additional line representing activity of a norm group. The system provided advice on whether the user needed to become more active (e.g. take a short walk) or take a break, based on the percentage of deviation from the norm. Previous research indicated the potential of this system [3]; however, it also showed that after a couple of weeks the compliance to using this system drops substantially.

It is expected that including aspects from theories on cognitive behavioral change in the coaching component of these systems might have a positive effect on the effectiveness of these systems.

Behavioural Change

Social Cognition Models (SCMs) attempt to define the cognitive factors that underlie social patterns of behaviour. The Social Cognitive Theory (SCT), Theory of Planned Behaviour (TPB) and TransTheoretical Model (TTM) [4] are three well-known theories on what constructs constitute behavioural change. We will not discuss these theories, but rather focus on two aspects which are thought to be of central importance in these different models. The first is self-efficacy: the subject's belief that the particular behaviour is, or is not, within an individual's control [5]. The second is a construct from the TTM. It is assumed that subjects move through five stages when adapting behaviour (precontemplation, contemplation, preparation, action, maintenance). It is best described as a circular model, since subjects can enter and exit at any point and relapse to an earlier stage. One specific technique to apply these theories is known as tailoring, or personalizing information. Tailoring on the constructs mentioned above can enhance the effect or impact of a message and thereby increase the effect of an intervention and long term usage of the service [6].

For identifying which factors specifically need to be taken into consideration when providing users personalized feedback, we will explore the relationship between self efficacy, stage of change and baseline physical activity

This paper has been accepted to the DIS 2012 Workshop Designing Wellbeing, June 11-12, 2012, Newcastle, UK.

levels as well as changes in physical activity levels by using a life style application.

Participants

Data from participants that were using one out of two different systems were used. The two different systems concern the activity based ambulant feedback module (ABF) described above and a commercial activity monitoring system. The latter system comprises an activity monitor and a web portal that shows the user's past performance, progress and allows for goal-setting. Measurements are obtained using an accelerometer that shows the users their daily progress towards their personally set goals.

Data are available of 81 patients coming for physical rehabilitation and 300 healthy controls (of which n=32 from Roessingh Research and Development). Patients concern Chronic Obstructive Pulmonary Disease (COPD) (n=38), Chronic Low Back Pain (CLBP) (n=20) and cancer (n=23). In all studies, level of physical activity was assessed using a tri-axial accelerometer. In the study using the commercial activity monitoring system, feedback was personalized on stage of change and level of self-efficacy.

ABF

The number of days participants wore the system [3] differed across studies and the studies did or did not include a final measure. Therefore, only baseline activity level is used here. Stage of change was assessed at baseline using a questionnaire. With respect to achieving a balanced level of physical activity, data was registered in such a way that activity decay over the day could be computed.

Commercial activity monitoring device

After subjects received the system, their stage of change and level of self-efficacy was assessed using questionnaires. Physical activity was monitored for 12 weeks (unless participants dropped out of the program earlier).

RESULTS AND CONCLUSIONS

Results showed that

- Regarding the ABF, although patients in the maintenance stage were more active than patients in other stages of change, they show a comparable level of activity decay as patients in other stages of change (Figure 1).

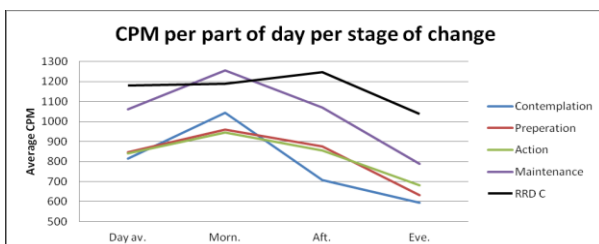


Figure 1. Activity (Counts Per Minute) per part of the day. Patients are classified per stage of change and compared to activity of healthy controls.

- The commercial system showed that subjects with an average to high level of self-efficacy are more active than subjects with a low level of self-efficacy.

Conclusions

Results show that self-efficacy is related to level of physical activity. Furthermore, patients have difficulty distributing their activity throughout the day, regardless of their stage of change. This indicates that for the development of the services mentioned here (i.e. well-being enhancing technologies) it is essential to take some individual characteristics into consideration and personalize coaching. For example, for users with low levels of self-efficacy, feedback should be aimed at increasing self-efficacy (for example by letting the user experience successes) as to obtain a larger increase in level of physical activity. A user with high self-efficacy requires other feedback. All in all, feedback should ideally be tailored on level of self-efficacy and possibly also on how active users are when they start using the system.

ACKNOWLEDGMENTS

This publication was supported by the Dutch national program COMMIT (project P7 SWELL).

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