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Persuasive tech in keeping chronic patients' willingness in health self-management

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ABSTRACT: Chronic disease is a long and very harmful illness to patient. With the improvement of e-health technology, many users can monitor and manage their health condition at home. At the same time, recording health data is a time-consuming and boring work. Without the supervision of health care professionals, many patients feel very difficult to persist on it by themselves. This platform with persuasive tech is designed to test the effectiveness of peer pressure in the health self-management in the e-health.

1 INTRODUCTION

Chronic illnesses are rising faster in Asia than globally. Asia will be home to half of the world's elderly population and half of the global burden of chronic conditions by 2030. Asians increasing life expectancy and growing economic affluence will add tremendous pressure on the region's already-stretched health-care systems and create ever higher demand for quality care. So health self-management can improve patients' medical experience and reduce the societal burden of chronic patients.

Self-management is providing services that are person-centered (Marie McGill). (Norm, 2010) there are many ways in which technology could assist with the management process. In almost all, the monitoring physical data by sensor and user's self-entering everyday data to the system are the mainly two methods. Physical data can be stored, reviewed, and analyzed to detect by the professionals and be set back to the patients for their feedback. Because this is a extensive area for e-health, this paper is priority focus on the user-inputting health data by themselves. According to the user interview, one of the most difficult parts is user's persistent in the health journal of self-management. Normally, user doesn't know what these data means for him and he can't have the perception of his body. People are born with inertia. In view of the technology still can not solve the problem of automatic recording daily health behaviors, we should turn to the persuasive tech to improve chronic patient's willingness in persistent health self-management. Although chronic disease

is a irreversible lifelong disease and it is an important cause of death, it is easy to be neglected for many people. Without records of patients health condition and relative behaviors for long term, the diagnosis of the chronic patients can't be detect timely and accurately. To pull on that thread a bit further, the number of chronic patients will became huge in the next several decades. If more patients can monitor and record their physical conditions at home, a lot of medical resources will be saved, that is helpful for the aging society.

2 GETTING STARTED

2.1 *Model of persuasive tech*

Model of persuasive tech is a tool to describe the user's behavior change, which is studied in the Persuasive Technology Lab of Stanford University. According to BJ Fogg's article, there are three important events in the model: motivation, ability and triggers. A trigger is something that tells people to perform a behavior now. In fact, for behaviors where people are already above the activation threshold—meaning they have sufficient motivation and ability—a trigger is all that's required (Fig. 1). Triggers are divided into three types: sparks, facilitators, and signals. A spark is a trigger that motivates behavior. A facilitator makes behavior easier. And a signal indicates or reminds.

In our research, we pay more attention to the behavior triggers. The reason is that for the patients who suffer the chronic diseases, they have the strong motivation to keep their health and maintain their lifelong. Because the young patients

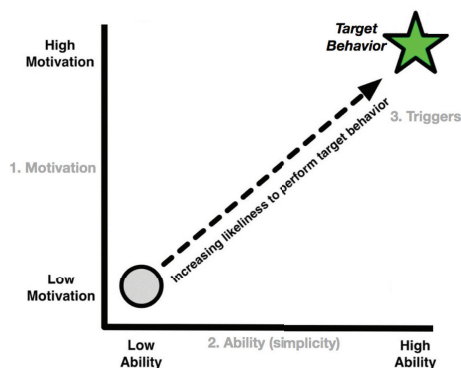


Figure 1. The Fogg Behavior Model.

are growing fast in the recently ten years, they have the ability to operate the mobile phone application and other medical instruments at home. According to our interview, the most difficult thing for them to interrupt recording health conditions is the lack of behavior triggers. They may forget, lazy or feel too boring to do this task. Some patients think they can't see any feedback on the recording data and their health data are almost the same everyday, which makes the task more difficult to maintain. For this reason we introduce the social psychology to the FBM model as a behavior trigger and design an experiment to test the effectiveness.

2.2 Peer pressure theory

Peer effects can arise for a variety of reasons. In their theoretical contribution, Kandel and Lazear (1992) underline how the positive effects of peer pressure on effort can overcome free riding in environments with profit sharing. They distinguish between internal pressure (or guilt) and external pressure (or shame), with observability being the discriminant between the two. (Sotiris, 2013) Peer pressure is influence on a peer group, observers or individual exerts that encourages others to change their attitudes, values, or behaviors to conform to groups. Social groups affected include membership groups, in which individuals are “formally” members, or social cliques in which membership is not clearly defined. Peer pressure theory has been verified in psychology labs, but it is about the users in real physical environment. The effect of online peer pressure between the strangers has not been tested yet. Some mobile phone APPs are designed according to the peer pressure theory, but they are more about the competition social interactions among acquaintance. Very few is about the co-work social interaction between the strangers.

In this paper, the aim of the experiment is to improve the chronic patients' behavior of recording their healthy data everyday. Peer pressure will

be a good choice to be the triggers in the FBM. The hypothesis are: 1. online co-work can be a group dynamics that improves users' motivation & behavior. 2. obscure identity social relationship can form the trigger to motivation & behavior.

3 CASE STUDY: HEALTH SELF-MANAGEMENT WITH PEER PRESSURE

3.1 Experiment design

This experiment conception is divided into two parts. First, test the the effectiveness of peer presser theory to improve the user's motivation in e-health self-management. Second, test the matrix dot graphics as a trigger for long term effectiveness of this prototype. As motivation includes award and fear emotions, this prototype will designed to full-fill this psychology needs. System's Producing graphic is the trigger in this prototype (Figs. 2, 3).

3.2 Research methods

Test 1:

The prototype is a tangible social board with a dot matrix display. Two group of participant are invited to take part in the test in the lab. Group A is the control group who only do test separately. Group B is the experimental group without knowing who are the other peers. He is showed the social board and explained that every dot represents a person. At first, the participant is asked to do a trouble and time-consuming task (for example, a set of mathematical problems). One dot will be lighted when someone in the group is finished. The more peers are finished, the more dots will be lighted (Fig. 4). The time-consuming will be recorded and the two group data will be compared. If the Group B's time is shorter than the Group A, that means the peer pressure theory is valid in the experiment.

Test 2:

Group A and Group B are doing test 2 as the test 1. When all the test finished, the dots will become a dot matrix graphics. (This dot matrix graphic is used to be the feedback of stranger's

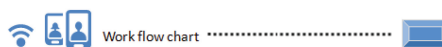
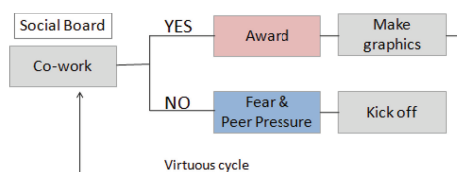


Figure 2. Flow chart 1.

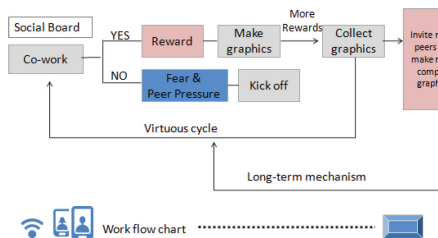


Figure 3. Flow chart 2.

interaction online and it can be changed to different forms, such as a picture, a jigsaw puzzle, etc.) This experiment is asked to do several rounds. The number of rounds will be recorded and compared. If the Group B do more rounds than Group A, that means the co-work is valid to the endurable behavior of group members.

As the members in group are always separated in the tests, the peer pressure is come from the dot matrix on the social board. This experiment is designed perfectly to test the hypothesis goal.

3.3 Implementation

This experiment design is a platform for testing the effectiveness of social computing in changing user's behavior. As social forces is difficult to test in the lab, this platform is brought up to resolve this problem. The advantage are low cost, convenient and quick. With the use of group dynamic theory, the peers are abstracted to dots (or other icons), the feed back of group goal (it can be any difficult or troublesome work) is represented by the completed graphic (or other jigsaws) that is also a trigger to all users. If somebody of the group is failed to complete his daily goal, the group graphic will not completed display, then the other peers will urge him to do the project as soon as possible. When all the group numbers are insist on completing the group goal, the system will produce more complex graphics for them as awards. Users can collect these graphics and print them on different products or their skins as badges. This will be supposed to improve user's motivation of persistent health record (Figs. 5, 6).

4 DISCUSSION

Chronic disease is a long and very harmful illness to patient. With the improvement of e-health technology, many users can monitor and manage their health condition at home. At the same time, recording health data is a time-consuming and boring work. Without the supervision of health care professionals, many patients feel very difficult

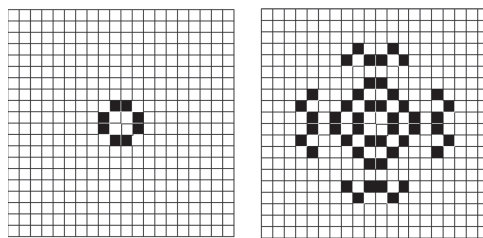


Figure 4. Dot matrix board.



Figure 5. Complex dots matrix feedback.

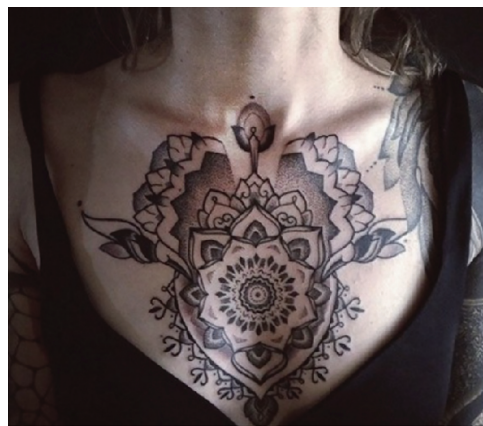


Figure 6. Implication of matrix graphic.

to persist on it by themselves. This platform is designed to test the effectiveness of peer pressure in the e-health. In the next step, we will collect the data and testify the hypotheses.

5 CONCLUSION

Given the popularity of chronic disease, applications designed to promote healthy living are promising for helping users set and achieve their

health-related goals, but have not yet proven themselves for long-term adoption and behavior change (Sajane, 2010). Thus, other measures should be used. This platform can be used to compare the implication in the cross-culture and the effectiveness of different trigger patterns to users' behaviors. This prototype can be used as a trigger in the smart interactions for health self management.

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