

Exploring Possibilities of Designing Virtual Personal Health Coach in Relation to Gender Differences

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Abstract. Nowadays, technology affects our quality of life in various ways. One necessary aspect of using technology as a tool is to achieve optimal health, in other words, to make health focused decisions about everything in life. Different applications of technology now enable people to track their activity or food intake through applications, web-sites or mobile products. Now, the challenge is to interpret and use large sums of available data in order to improve people's wellbeing and promote health. In order to understand the possible approaches to promoting health, a study was designed with an aim of understanding what people would expect from a virtual personal health coach and whether there is a difference by gender on priorities. The paper makes conclusions of the possibilities of designing according to the different needs and expectations of women and men from a virtual health coach.

Keywords: Health promotion, virtual health coach, personal technologies.

1 Introduction

Today, technology has a vital role in people's lives, as it affects their lives in many areas by making them learn and share information [1, 2]. One necessary aspect of using technology as a tool is to help people to take health-focused decisions to achieve optimal health. Several applications and personal products have been designed with an aim of making people healthier or keeping their health status stable. Each system focuses on a specific kind of problem and increases the possibility of avoiding serious illnesses such as cancer or heart diseases, by collecting data from the user and analyzing it to help them make conscious decisions about their health. However, the current systems serve for several specific dimensions of health promotion; but the systems that cover the all the other dimensions of health promotion is required for a holistic approach. This paper, first explores the current state in using technology to improve wellbeing. Then a user study in which people were asked about their priorities from a possible virtual health coach for wellbeing is explained with analysis and synthesis. The paper further discusses the importance of HCI in maintaining a holistic approach in wellness research.

2 Using Technology to Improve Wellness

For this paper, it is important for HCI researchers to know that, in literature wellness has strong relation with people's optimum health to sustain their quality of life [3]. Wellness is a continuous, multidimensional and active state, which is geared towards balancing one's physical, emotional, social, intellectual and spiritual wellbeing in order to enhance one's life quality [4-8]. In several references, wellness has been defined with six dimensions [4, 6, 8-13], including *physical wellness* which is related to physical health and participation of physical activities; *emotional wellness* which is about being comfortable with one's emotions; *social wellness* which is about people's positive feelings about self and the environment; *intellectual wellness* which is about thinking critically about issues and making decisions and also finding solutions; and *spiritual wellness* which is about finding the meaning of life and creating tolerance to other beliefs.

"Being well" can be defined as being in a continuum of average of all the listed dimensions. Health is mostly considered wellness as not being ill or having no disease, but The World Health Organization defines health as a state of complete physical, mental and social wellbeing and not merely the absence of disease of infirmity [3]. On the other hand, wellness term is used interchangeably with health, [12] as both contain similar issues such as, physical, emotional, spiritual and social. It is possible to state that all the issues are related to the quality of life. In relation to these, the terms "wellbeing", "wellness" and "health" have been widely used by human computer interaction researchers, however they are used interchangeably in the holistic approaches [9, 14]. Preventive approaches are stated to decrease the rate of unhealthy life and decrease the treatment expenditures for governments with an aim of keeping people's quality of life at a certain level and this connects preventive approached to wellness research [15]. In that sense, wellness has gained great interest and has become the focus of several researches that try to combine technology and wellness.

The developments in technology, now, enable people to use mobile products for wellness purposes in any context. Several applications and personal products have been designed in order to make people healthier. Each system increases the possibility of avoiding serious illnesses such as cancer or heart diseases, by collecting data from the user and analyzing it to help people make decisions [16]. Informatics systems are now being used for capturing older adults wellness [17]. Innovative technologies are also being used for health coaching to increase people's health state and helping them to life healthy [18]. In another example, statistical inference algorithms are used to assess the level of stress by using mobile phones [19]. In addition, people can prefer online support about their nutrition behavior to gain knowledge and counselling such as DietAdvise [19]. There are also approaches that specifically focus on measuring physical activity and giving virtual feedback [20-24]. As an example, Bodymedia, is a system that includes biometric sensors and measure different physical parameters to measure physical activity [25]. Personal technologies [26], including smart phones and tablets [23], can also be used as a possible technology for improving wellbeing

that are now able to track physical activities [27], nutritional intakes gaining a great potential to be developed and keeping people out of hospitals [28].

Still, it is argued that technology may not be a sole media to improve wellbeing, but it requires any systems that keep doctors, nutritionists and physicians in contact to develop integrated methods and technologies for increasing the health and wellness state of people [27, 29]. For instance, when a technology pushes the user to do more physical activity, can create serious heart problems if the user already has one. That's why, the issue should not be considered on the bases of single dimension only, but instead it should try to cover all possible problems. A large amount of data can be collected with different technologies, but currently the challenge is to interpret and use all these large sums of available data in order to improve people's wellbeing properly. Therefore, this study aims to find users' expectations from a virtual health coach which aims to fulfill all areas of health for an individual by understanding their needs in their daily life.

3 Methodology

A study was designed with an aim of understanding what people would expect from a virtual health coach, specifically how they would like to be supported, and whether there is a difference between priorities of women and men. In this paper, gender difference was specifically explored, as in several wellness related studies, significant difference was observed between men and women in relation to their wellness perceptions [30-32].

3.1 Instrument and Participants

For the study, six health promotion behaviors [13] were used as the possible support dimensions. For each dimension, one visual card was designed and printed on 10cmx10cm cardboards (Fig. 1). It should be noted that these cards were designed to support the interviews with visual materials. In total, 40 participants (20 women and 20 men) were interviewed, ages ranging from 25-35.

3.2 Data Collection Procedure

Each participant was interviewed either in the participants' or researchers' offices. The participant was first introduced the health promotion support dimensions through the visual cards and was asked to rank the importance of the support that would come from a virtual health coach. Following that, the participant was asked to talk about the reasons why the support is important. Specifically, participant was asked the reasons behind that ranking, why the support dimension is important or not important, whether there is any dimension-related problem that they would like to solve through virtual health coach and if any, how they would like to interact with the virtual health coach.

A typical session lasted between 35-45 minutes and all the interviews were voice recorded with permission.

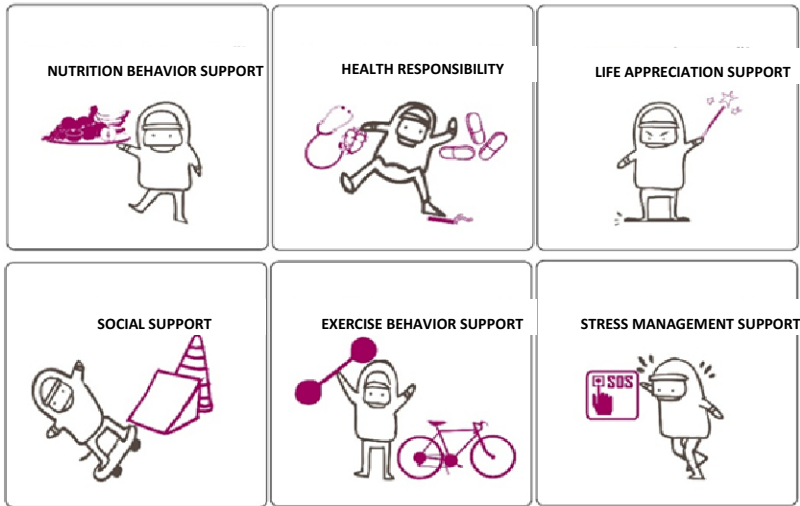


Fig. 1. Visual Cards

3.3 Data Analysis

To analyze data, the voice records were transcribed first. For qualitative data, initial open coding was done with a small set of data [33]. With these initial codes, a glossary of terms was built to reach at consistent analysis at the end. The final glossary of terms was used for data analysis of all the interviews. Participants' rank ordering of dimensions were analyzed, first in general and then in relation to gender. This was done by adding up all the rankings of participants. Finally, details of rank ordering results were interpreted in relation to findings gathered from the interviews.

4 Findings

The general rank ordering results show that, participants need *nutrition behavior* support more than other supports (Fig. 2). Following that, *health responsibility* support and *exercise behavior* support are ranked at the same importance level. *Stress management* support is at 4th place; and *social* support and *life appreciation* support are at 5th and the 6th place in the overall ranking (Fig. 2). On the other hand, gender-related rank ordering results shows that *exercise behavior* support is in the 1st place for women participants, but is in 3rd place for the men; while *nutrition behavior* support is in the 2nd place for both genders (Fig. 3). A striking result is achieved in *health responsibility* support, as the men ranked it on the 1st place, as women believed it was the 4th most important among the support behaviors.

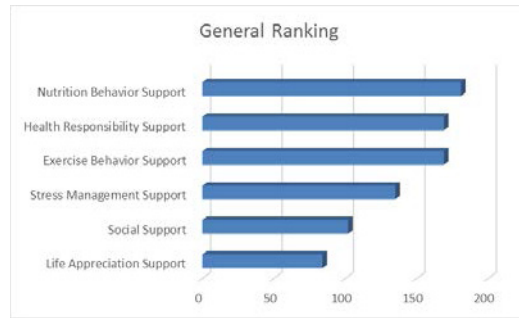


Fig. 2. General Ranking of Support Dimensions

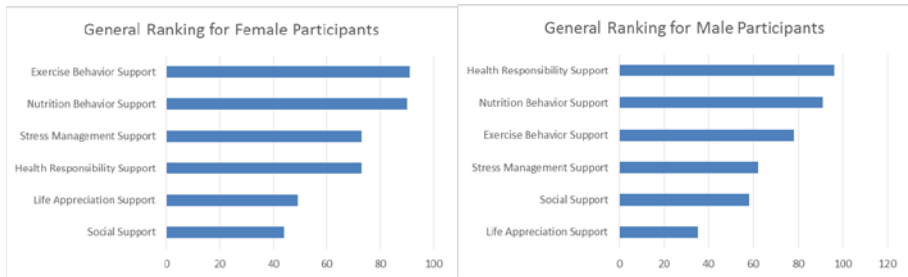


Fig. 3. Gender-Related Ranking of Support Dimensions

Not surprisingly, the results show that the main reason why people need a virtual **nutrition behavior support** is their desire to *promote health status*. Participants stated that, they cannot change their nutrition behavior as they are either unable to motivate themselves to change it or unable to be conscious about nutrition behavior. Participants stated that nutrition behavior should be supported with exercise and health responsibility feedbacks to maintain their holistic wellness. While the reasons do not differ, the design solutions differ for women and men; women prefer only *visual tips* on healthy nutrition behavior and healthy receipts, while men prefer *visual prescriptive personal nutrition information* that might come from a smart mobile technology. In addition, men prefer *audio motivational stimulus* on healthy nutrition behavior and have *reminder-type intrusive stimulus* while women do not.

In relation, participants want health responsibility support to prevent health status by them, to change their health responsibility behavior, and to be conscious about health responsibilities. The number of comments was similar for each need, but the possible design solutions differ for women and men. For instance, women prefer a personal check-up system by a mobile device; report of vital signals, log of menstrual cycle, medical tips on a visual platform especially from computer at work. On the other hand, men prefer to monitor their vital signals by a mobile device which they can carry everywhere. Men also prefer solutions about gathering information about health responsibility behaviors such as health responsibility tips and reminder from a mobile platform in an intrusive way. It was interesting that women prefer visual

stimulus about unhealthy behaviors such as nutritional information on credit card bill or barcode, while men prefer audio personal healthy tips that alerts them when they are alone, like driving car.

Results show that, people need exercise behavior support to promote physical wellbeing and they expect to be motivated for physical activity and exercise, and to manage body weight. It was interesting that men stated that they cannot motivate themselves to keep regular exercise, while women participants cannot motivate themselves to exercise actually. It was also interesting that women stated that their lack of motivation for physical activity is mainly because their constantly changing psychological state, while men related their lack of motivation to their lack of knowledge on exercise. Still, custom databases and to-the-point tips on exercise with reminding features are preferred by both men and women. They also prefer to have custom visual database and intrusive stimulus from virtual health coach on managing body weight. On the other hand, while men stated that monitoring their physical activity and exercise can increase their level of motivation, women did not mention about that possibility.

The agreed reason upon why people need a virtual stress management support was unsurprisingly to overcome stress with the reasons of people's inability to manage stress level and to solve problems. There was no apparent difference between women and men apart from women' inability to solve daily problems. In the design solutions, both women and men prefer visual plans about time and work and also for daily activities. In addition, men preferred audio and visual relaxing stimulus when stress level is critical. Some of the women suggested building a smartphone application to help them about selecting dress in the mornings. For stress support, women just prefer to manage their emotional status such as overcoming stress, while men prefer to be physically active and also to overcome stress.

Desiring to manage emotional status is the reason of why people need a virtual **social support** through which they can promote their emotional status with social activities. Mostly, people need social support for managing emotional status by getting social suggestions to *realize positive side of life* and to be *motivated for social plans*. Both women and men prefer prescriptive personal suggestions for possible social activities on a visual platform. The other reason of need for a virtual social support is surprisingly to be physically active. Mostly men expected social support about the shared physical activity plans of friends so that they can socialize with friends during exercise or they can make physical activity plan with friends.

Life appreciation support was listed as the least important support in comparison to other needs. Still, the major need for this support was *to realize positive side of life* and *to appreciate life* so as to realize their daily achievements. Both men and women stated to have a report of daily achievements. In addition, men expect to have tips on how to appreciate their life. Alternatively, women stated that a stimulus to boost their emotional status can work well for life appreciation such as a song or prompts.

5 Discussion

We believe that with our findings, a virtual health coach can be designed that covers all dimensions of health promotion behaviors, focusing mainly on the top three important dimensions; nutrition behavior, health responsibility behavior and exercise behavior and supporting stress management, social and life appreciation behaviors. The results of the study showed that people can need a virtual health coach with several reasons; they can use it to *prevent or change* an undesired behavior or situation; *manage* a situation that is encountered or *promote* a desirable behavior or situation (Fig. 4).

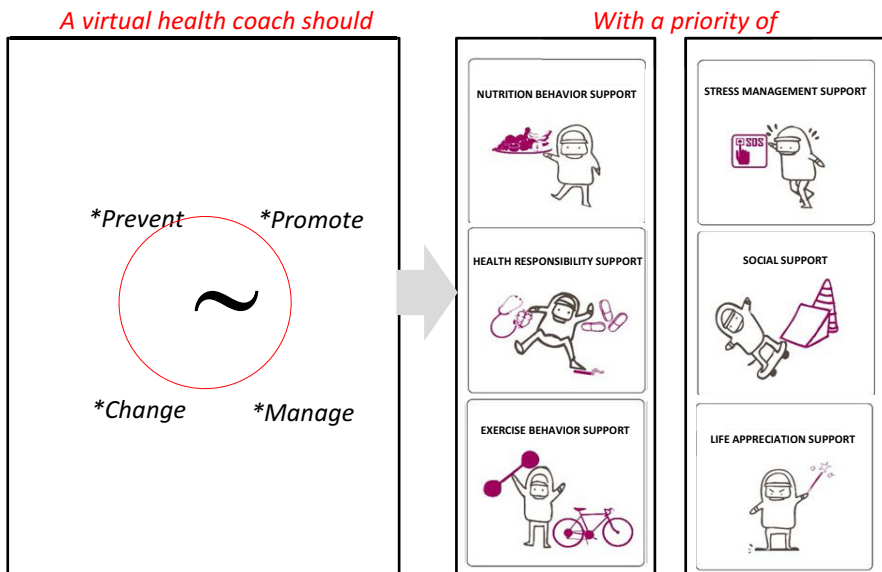


Fig. 4. Summary of the Findings

While the problems faced do not differ much between men and women, design solutions differ substantially. While women users require instant and specific solutions for a current situation, men participants require solutions that can affect their habits in the long run. The virtual system should work as an intelligent personalized system that create awareness and lead people to health choices or practical solutions, such as advising a healthy meal serving place instead of a fast-food restaurant. Design solutions, mostly clustered to be intrusive to be a motivation source for both women and men. We suggest that, the systems would work better when they are designed by considering the gender differences. Prescriptive solutions, like instant exercise suggestions for women or like personal workout plan for men users, with an additional feedback on their movement technique can work for all users that also use visual and audio feedback.

6 Concluding Remarks

Our study showed that women and men have similar needs from virtual health supports and facing similar problems in related to health promotion behaviors. On the other hand, expected design solutions vary for women and men users. We believe that, in building-up new health promotion systems, applications, or implementations designers can consider our findings and relate their design solution to user expectations in relation to gender differences.

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