
Technologies for Well-Being: Opportunities and Challenges for HCI

Jochen Meyer

OFFIS Institute for Informatics
Escherweg 2
26121 Oldenburg, Germany
meyer@offis.de

Young S. Lee

Motorola Mobility Inc.
600 N. US Highway 45
Libertyville, IL 60067 USA
youngLee@motorola.com

Katie Siek

Univ. of Colorado Boulder
430 UCB
Boulder, CO 80309 USA
ksiek@colorado.edu

Susanne Boll

University of Oldenburg
Escherweg 2
26121 Oldenburg, Germany
susanne.boll@uni-oldenburg.de

Oscar Mayora

CREATE-NET
Via alla Cascata 56 D
Trento 38100, Italy
oscar.mayora@create-net.org

Carsten Röcker

RWTH Aachen University
Theaterplatz 14
52062 Aachen, Germany
roecker@humtec.rwth-aachen.de

Abstract

In recent years, we have seen an explosion of wellness interventions and technology applications focused on human's wellness with the intention of helping people avoid needing medical care. Given the increasing emergence of wellness applications, there is a need to integrate existing diverse research endeavors and discuss key challenges and opportunities for the next generation of wellness interventions and applications. We suggest four topics for wellness intervention research: theory, practice, technology, and, as a cross-topic issue, design. We identified challenges and opportunities related to motivation strategies, life-long use of technology, and aligning toward adoption.

Author Keywords

Wellness; interventions; applications; health promotion; preventive care; informatics

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

The emerging well-being applications market has noticeably increased in the last five years. Applications for wellness interventions, well-being and healthy living include systems for encouraging physical activity [1,2],

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healthy diet [3], and self-regulation of emotions [4]. Also, various wellness interventions have been created using a range of technology such as social computing and ubiquitous computing [5,6]. Given the increasing emergence of wellness interventions and applications, there is a need to integrate existing diverse research endeavors and discuss key HCI issues and opportunities for designing the next generation of wellness interventions and applications.

Although the difference between wellness and health is diffuse and a matter of discussion, it is generally accepted that wellness is focused on the promotion or maintenance of good health rather than the correction of poor health [5]. In this sense, wellness applications are different from health applications that typically focus on treatment or management of disease. Instead, wellness applications aim to keep individuals healthy by helping to avoid unhealthy behavior or unnecessary exposure to unhealthy environments, monitoring the personal health state while indicating changes. This distinctive aspect of wellness applications impose new questions and challenges to researchers in various fields of wellness, including HCI, preventive care, health promotion, and psychology. The most pressing questions we have encountered are:

1. How do we design a system that aim to promote individuals' and/or community's wellness for a long period of time or life-long?
2. What sensing technologies can be used, now and in the future?
3. How do we motivate individuals to use wellness systems?

In a joint workshop on “Wellness Interventions and HCI” and “User-Centered Design of Pervasive Healthcare Applications”, held at PervasiveHealth 2012 [9], we discussed these issues with participants from multi-disciplinary communities including the HCI community, pervasive health, and care. The fruitful discussions of this workshop helped us further understand the challenges and opportunities for wellness interventions, as we describe them here.

Topics of Wellness Research

We suggest four major topics for research on wellness interventions: theory, practice, technology, and, as a cross-topic issue, design.

Behavioral Theories. A recent trend in computing has been to develop persuasive technologies to motivate people to change their everyday behaviors using various behavioral theories such as the Goal-Setting Theory or the Trans-Theoretical Model of Behavior Change [8]. As shown in existing literature, behavioral theories can help guide the design of interactive applications for wellness interventions.

Wellness intervention practices. With rising concerns about health problems, such as obesity, sedentary lifestyles, and smoking, various wellness interventions have been implemented to promote good health behavior (e.g., physical exercise) or to prevent bad health behaviors (e.g., tobacco smoking cessation). It is generally accepted that effective interventions require a coordination of individual-, family-, school-, and community-based interventions.

Technology. With the increasing availability of sensor technologies, smart phones, and wireless broadband

access, new types of health related applications become possible. Similar to chronic illness mHealth interventions, wellness interventions can utilize such technology to provide people with the ability to manage their health and receive just-in-time feedback. These systems aim at supporting the individual in living a healthy life, avoiding unhealthy behavior or unnecessary exposure to unhealthy environments, monitoring the personal health state, indicating changes etc.

Design: Since wellness is broadly defined and personally defined, the target population for wellness applications is fairly diverse – everyone from lay populations to elderly to people with cognitive disabilities could utilize wellness applications. Therefore, there is a major need to understand how physical, emotional and cognitive abilities, caused by individual learning histories and health states, may impact the usage and acceptance of these systems.

Challenges and Opportunities

These four topics are already a frequent matter of research in e-health, however during the workshop discussions, we discussed at length the following challenges and opportunities that are not always considered when designing wellness interventions.

MOTIVATION STRATEGIES

The main target group of wellness interventions is the self-defined “well” person who aims to stay healthy as long as possible. This is one of the key aspects of wellness interventions and one major difference to existing mobile and persuasive health systems. We need to understand the user’s motivation in this

context to successfully adopt technology for long-term wellness use.

Today’s persuasive systems are frequently informed by health behavior change models. However, the user’s main goal in wellness is *sustaining* an existing health state which often, though not always, means that sustaining an existing lifestyle and avoiding a change for the worse is much more important than changing towards a healthier lifestyle. It is not clear yet how to implement existing theories correctly in this context.

A user’s motivation is not a binary “on-off” state, but it is an analog continuum. Users will face periods of unhealthy lifestyle. Rather than considering them a failure and risk reducing the user’s motivation, it might be more appropriate to build up cycles of tension and release, like those found in games, continuously re-challenging the user and helping find the way back. It is thus vital to find the right balance between support on the one hand, and competition or collaboration on the other. Strategies may include goal setting, but also more obtrusive approaches such as social pressure or financial incentives.

LIFE-LONG USE OF TECHNOLOGY

Staying healthy is a life-long, never ending effort. This is a second key aspect and difference between wellness interventions and existing health management systems. While the trans-theoretical model, which is frequently used in e-health applications, has a maintenance phase that usually is assumed to last no more than 6-24 months, and most existing systems don’t even last that long.

Technology for supporting well-being is likely to be used over a long period of time, covering years or possibly decades. From a system's point of view, it would be ideal if technology were used 24/7 for complete data logging and continuous interaction. However, until today the only health technologies that really are used 24/7 are implanted devices such as cardiac pacemakers or artificial organs, which obviously are not appropriate platforms for wellness interventions. It is questionable whether a suitable true-24/7 technology will ever exist in the future. What we might rather need is a "hop on, hop off" approach, where users chose to use some technology only for a certain period of time, abandon the use for some time, before returning to use some other technology later.

But even if life-long doesn't mean 24/7, what we need is technology that is easy to use, unobtrusive, and reliable. We need to deal with failing technology, and with the user's changing use of technology. We need technology that is as reliable and safe as a medical product, but that is as fun and easy to use as a lifestyle product.

And we need to deal with the data that the users are collecting throughout their lives: We need to make sense of different types of data, we need to visualize them in appropriate ways, and we need to fulfill the users' expectations for use and reflection. We need long-term storage of data, where the elderly can still access the data they collected decades ago in their childhood. The ownership of the data may change: A child's data may be in the custody of its parents; then data ownership may transition to the teen as they are old enough; with growing old, various caregivers may

need some access rights to the data. Ultimately, data may even outlive the user.

From a research project's point of view, we don't know yet how to evaluate wellness interventions. Traditional approaches for e-health applications are comparative studies where one user group is using an experimental tool, and after a few months the outcomes are compared to a second group without that tool. This approach is not possible for a life-long technology when the outcome may be visible only after years or decades. We therefore need different indicators that measure success or failure of a wellness intervention without directly knowing the outcome.

ALIGNING TOWARD ADOPTION

Further thinking the hop-on, hop-off model of lifelong use of technology, it seems reasonable that wellness interventions are used mainly in certain periods of life, when health becomes more important. Such periods may be breaks where one's life changes, e.g., when moving out of the parent's home, starting a new job, being pregnant, going through a mid-life crisis, or retiring. Here, wellness interventions might be used intensively for some period of time to understand one's own health and adopt an appropriate behavior.

We need to better understand the factors that contribute to an adoption. This includes the user's needs, which may be in conflict with current technological advances, current trends, fashion and aesthetics, but also the user's individual experience. Designing for adoption requires a high level of customizability, and it needs to take into account personal needs and preferences.

There is a potential conflict between health and wellbeing as a part of a modern lifestyle with “cool and sexy” products on the one hand, and the need for functional, medically oriented tools. Users have varying habits, different socioeconomic backgrounds, technology proficiencies, and different needs for privacy and security. Therefore, we may need specific technology acceptance models for wellness applications and new design methods that also take into account cultural differences.

Summary

The differences between health and well-being are a frequent matter of controversy and discussion in the field of health informatics and health-related HCI. While we agree that no clear border exists, we believe that well-being is indeed a concentrated domain of health that is much more concerned on preventive action. Where e-health in general often focuses on sick persons and has the goal to help them deal with their diseases, wellness interventions start from people being healthy and aims to maintain their health.

There are many questions arising only in the wellness and well-being context: What is or should be the life cycle of the interventions we design? Where does the wellness and health spectrum fit in our applications? How can we adapt applications for real world usage on ever changing technology? To exploit the potential of technology for wellness and well-being, these challenges will need further research.

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