Oiva – A Mobile Phone Intervention for Psychological Flexibility and Wellbeing

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Abstract
To provide a scalable solution to mental health problems caused by stress, we developed Oiva, a mobile phone intervention for improving mental and physical wellbeing. Oiva is based on Acceptance and Commitment Therapy (ACT) and its aim is to teach the users skills to increase their psychological flexibility. The application contains 45 text, audio, and video exercises. Two user studies demonstrated the usability and acceptability of the application and concept. The evaluations also revealed that the users expected guidance on the application for performing the intervention program. They also wanted to have possibilities to individualize the application by saving their own reflections about the exercises as notes. The preliminary evaluation results indicate that Oiva is a good starting point for the further design and research of mobile applications for reducing stress and improving wellness.

Author Keywords
Wellbeing; mobile applications; Acceptance and Commitment Therapy; user studies

ACM Classification Keywords
H.1.2. User/Machine Systems: Human factors. H.5.2. User Interfaces: Evaluation/methodology, User-centered design. J.4. Social and behavioural sciences: Psychology.

Introduction

Stress is a large-scale health problem in the modern society. In 2005, 22% of European workers reported having stress [3]. Stress is also strongly associated with other mental disorders, such as depression. Mental health problems are often under-diagnosed and under-treated. Even when care is available, it is not always effective. Challenges in face-to-face therapies include long waiting lists, travel required to see a therapist, stigma, and lack of support after the treatment has ended [6]. These challenges can be partly overcome by providing interventions via technology. Computerized therapies, usually delivered via personal computers or the Internet, have been shown to be as effective as face-to-face therapies in the treatment of many psychological problems. They enable easier, earlier and more flexible access to care at a lower cost. They also reduce the stigma related to mental health treatments. [6]

Acceptance and Commitment Therapy (ACT) aims at increasing individual's psychological flexibility – *"the ability to contact the present moment more fully as a conscious human being, and to change or persist in behaviour when doing so serves valued ends* [4]*."* Higher levels of psychological flexibility have been shown to be associated with better mental health and even behavioural changes. Psychological flexibility can be increased through the following six core processes of ACT. *Acceptance* means embracing feelings and events without trying to change them. *Cognitive defusion* techniques try to change the way one relates to thoughts, e.g. by distancing oneself from one's thoughts. The skill of *being present* helps to experience psychological and environmental events in a non-judgmental way. The *self-as-context* process aims at becoming aware of one's flow of experiences without emotional attachment to them. *Values* determine what is truly important and help choose life directions. *Committed actions* are concrete actions chosen based on values. Interventions based on ACT have been found effective for a wide range of problems, e.g. work stress and depression. [4, 8]

In the past few years, due to the wide availability of smartphones, mobile delivery of wellbeing interventions has become feasible. Mobile phones are especially promising because they enable integration of interventions into the daily lives of the users, unobtrusive monitoring of users' activities and contexts, and chances to provide interventions at opportune moments, i.e. when they are needed and wanted. A number of mobile applications for mental health have already been developed. Most of them are not guided full-length programs, but consist of basic mood assessments, feedback and small interventions or exercises. Morris et al. [7] developed a mobile application for increasing emotional self-awareness. The application consists of mood-related experience sampling and CBT-based exercises, such as cognitive reappraisals and relaxation. Burns et al. [1] developed Mobilyze!, a mobile phone and Internet based intervention for depression. There, the phone is used for gathering data on users' contexts and moods and for reminding them to use the Internet intervention. Depp et al. [2] evaluated a mobile intervention with patients who had bipolar disorder. The intervention, delivered via a PDA, prompted users to engage in personally selected self-management behaviours as a response to specific mood states. Conclusive evidence of effectiveness of these applications is not yet

available, as they have only been evaluated in short-term studies with a small number of subjects.

In this paper, we present Oiva, a prototype of a mobile application for improving psychological flexibility and mental and physical wellbeing. We describe the current state of the application, its principles and features. Then, the results of two preliminary user studies are presented in addition to how they have affected the design of the application. Finally, we describe the design changes that have been made due to the studies but are not yet present in the application.

Mobile Application for Improving Wellbeing

Oiva is a mobile application for delivering an ACT-based intervention program in bite-sized daily sessions. Oiva is targeted at working-age people who suffer from stress as well as declined mental and physical wellbeing. It contains intervention modules called "paths". Three of the paths are aimed at teaching the user the six core processes of ACT. One path focuses on physical wellbeing, such as physical activity, relaxation and mindful eating. The entire logic of the application is based on the ACT principles. Oiva is a stand-alone application running on the Android platform. It is targeted primarily for mobile phones, but can be used on Android tablets as well. The content of the application is currently in Finnish.

Design. The initial idea of the application was created based on a needs assessment with experts in psychology, user needs and technology. The first priority in the design was to ensure the integrity of the intervention when delivered via the mobile channel. A model of the therapy process was created and used for defining the structure of the application. The data model used in the implementation reflects this structure; it consists of exercises, paths and a personalised program. ACT-based content and exercises were adapted for the mobile phone by creating audio and video versions of exercises and abbreviating textual content in order to support short daily usage sessions. We also took care that the progress made in the application would be saved continuously to enable efficient continuation after interruptions often encountered in mobile usage. The next task was to ensure that the application would be easy to take into use and engaging in use that is expected to take several weeks. Thus, evaluations with users were involved in several phases of design.

Content. The application contains 45 exercises under four paths, which are called Aware mind, Wise mind, Values, and Healthy body. The exercises build on each other, i.e., the earlier exercises teach skills that are utilised in later ones. The exercises are mostly short, experiential exercises, which take about 1–3 minutes to complete. Each exercise begins with an introduction screen presenting the purpose, duration and instructions of the exercise. The user can then choose among the provided formats of the exercise, which include audio, text and video, depending on the exercise. After each exercise, there is a reflection screen, which summarizes the skills learned in the exercise and enables the user to write notes and reflections in the diary (Figure 2). The notes are saved in the diary and can be accessed later in the main screen and the exercise screens. On the main screen, the user can view all diary entries. On the exercise screens, only the notes pertaining to that specific exercise are displayed.

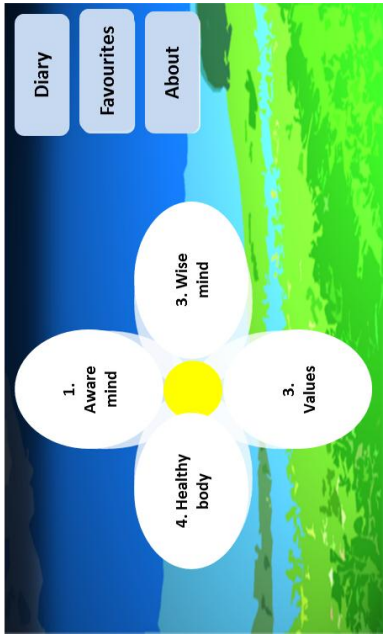

Figure 1. The main menu of Oiva.

Functionality. The four paths can be accessed from the flower-shaped menu on the main screen (Figure 1). Each petal represents one of the paths and they are numbered according to their recommended order. The paths consist of 1–4 subsections ("steps"), which consist of 5–8 exercises. Each path and step includes an introduction with text and video to explain the skills the user will learn and their significance for wellbeing. The application gently steers the user through the intervention program by suggesting a certain path, step, and exercise. This is done by numbering and dynamically highlighting the recommended item on the main screen as well as on the step and exercise screens. However, the other options are not locked so that the user can decide whether to follow the recommended route or navigate freely. The progress and encouragement are presented in several ways. Firstly, the number of completed exercises is displayed for each step. Secondly, the background colour of the completed steps and exercises is changed. Every time the user completes an exercise or a step, she gets a virtual rose as a reward on the application.

User Studies

This section presents the results of two preliminary user studies that were conducted to receive feedback on the concept. The first study was conducted with an early prototype of the application, and the second with a version that was improved based on the findings of the first study. The design changes described in this section were implemented in the second prototype and validated in the second study. As the results are initial impressions of small-scale studies, quantitative studies will be conducted in a later phase. A total of 12 participants were recruited among colleagues who were not involved in the development of the application. Seven of the participants were female, and all had a sedentary occupation. Their average age was 36. Half of the users participated in the first study and the other half in the second one. The test sessions were conducted in a usability laboratory with one participant present at a time. The participants carried out pre-defined tasks with the prototype and a semi-structured interview was conducted.

General findings. The participants responded positively to the application and perceived it as easy-to-use. According to the participants, most exercises were understandable and clearly presented. The exercises raised a lot of interest among the participants and they were willing to test them. Both audio and text exercises were used and both were considered important. The usual duration of the exercises, about 2–3 minutes, was considered appropriate. Videos were perceived more problematic as they required a lot of concentration. This highlighted the need to keep the videos very short.

Guidance. The version tested in the evaluations did not yet contain guidance features to steer users to perform the exercises in a certain order. The numbering of items was the only clue of the recommended order. The participants tended to select the exercises according to how interesting the name of the exercise sounded or according to their personal interests. Only few participants proceeded in the numbered order. Thus, sometimes they selected an exercise that was too difficult to understand without doing the former exercises. For example, a breathing technique was taught in one of the first exercises and utilized in some of the later ones. Many participants commented that they did not know how to proceed in

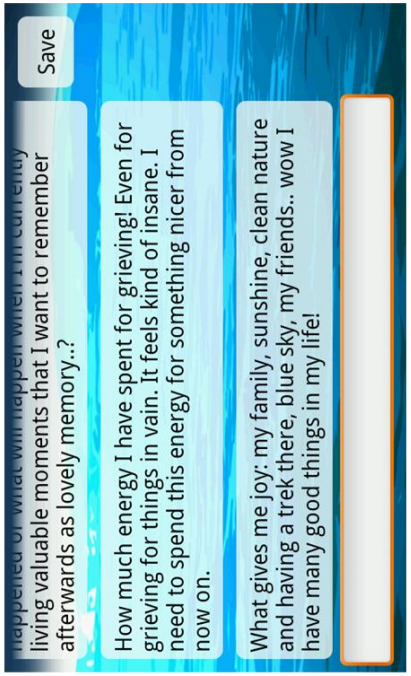

Figure 2. Diary.

the application as all the items seemed available and equal. So they just browsed through it. The participants were asked if they would like the application to guide them. Some participants commented that it might be boring and restricting to be forced to do the exercises in a certain order, especially if the initial exercises did not happen to be interesting for them. Some participants, on the other hand, stated that they would like the application to provide guidance and that the application could unlock new sections only after the former parts have been conducted. Based on these findings, the subtle guidance mechanism utilizing highlighting was designed, described in the Functionality section. At this point it is not yet clear how critical it is for the users to strictly follow a set path through the exercises, so we want to gently guide the users while allowing them to proceed to interesting parts.

A personal touch. A common feedback from the participants was that they would like to "be able to do something concrete instead of just thinking." Some exercises even advised users to make notes or list things but did not provide a tool to do it. The users desired a way to "leave an imprint" in the application, for example, they wanted to save reflections about the exercises and write down their thoughts and ideas. This was seen as a potential way to add a personal touch to the application. Based on this finding, the diary feature was designed. The diary was designed to support both general reflections and notes made while performing the exercises. The exercise-specific notes improve the interactivity of the exercises, for example, the user can list personal values directly to the application when asked to do so.

Playful features and progress. Many users also wished for playful features to keep up their motivation and interest in using the application. The features suggested included displaying progress more clearly and rewarding for it. Some users suggested that new exercises could be unlocked when earlier exercises have been performed, and thus the new exercises would act as rewards.

Design changes in progress. To improve the guidance and playfulness, we have designed *a progress view*, accessible from the main screen, which visualizes the progress in the form of a puzzle. Completing a step awards the user a new piece in the puzzle. The puzzle becomes complete after the user has completed the necessary exercises from each path. In order to remind the user of the learned skills, we have designed *a skill reminder*. It reminds the user to apply the skills learned in the application to the everyday life. The skill reminders appear on the following days after specific exercises have been completed. For example, after completing mindfulness exercises, the application may send a reminder stating: "Be present in this moment, whatever you are doing." These reminders will be context-sensitive to better support taking the learned skills into daily life.

The current version of the application does not yet utilize all the possibilities of the smartphone platforms, because at the moment, we want to study the pure effectiveness of a mobile intervention utilizing ACT. Our ultimate vision is to create a personalized and context-sensitive mobile intervention based on the ACT principles. After we have ensured the effectiveness of the intervention, we aim to add more intelligence, such as context-sensitivity and dynamically tailored

programs. Further studies will be organized on whether these kinds of features improve the effectiveness or bring additional value to the intervention.

Discussion and Conclusion

We have developed a mobile phone intervention for increasing psychological flexibility and improving mental and physical wellbeing. To the authors' knowledge, this is the first mobile application utilizing ACT as the theoretical basis and the first stand-alone mobile application to provide a complete guided intervention program. As ACT is very strongly based on experiential exercises and mental processes, Oiva is different from existing mobile applications, which are often heavily reliant on experience sampling and advice giving. The findings of our preliminary user studies were positive and give grounds to proceeding to longer term studies of user experiences and effectiveness of mobile application in reducing stress and improving wellness. We will study the user experiences and the effectiveness of the application in two upcoming trials. The first one will be a one-month feasibility study with 15 participants. This trial will verify that the application is ready for a long-term use both technically and from the user experience point of view. Later, a randomized controlled trial will be organized to study the effectiveness of three different interventions on stress and features of metabolic syndrome. A total of 360 subjects will be randomized into four groups - a control group and three intervention groups: face-to-face ACT intervention, Oiva ACT-based mobile intervention, and a web intervention.

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