

Final report for smartphone application  
"Recovery Coach"  
Hankennumero: 114385

## Table of contents

1	Theoretical background	5
	1.1 Theoretical framework and DRAMMA model	6
	1.2 Potential benefits for employees and employers	7
2	Project partners and their role in the development process	8
3	Development process	9
	3.1 Problem statement	9
	3.2 Needs assessment	9
	3.2.1 Design criteria based on earlier online and app projects	9
	3.2.2 Questionnaire study on attitudes towards the app in a student sample	11
	3.3 Market research	11
	3.4 Business model	13
	3.5 Target group	14
4	Prototyping	15
	4.1 Demola mockups and the first basic prototype	15
	4.2 Workshop on e-mental health for Finnish HR professionals	15
	4.3 Name for the prototype	16
	4.4 Prototyping and usability analysis by an IT company (MindWork Media)	16
	4.5 Prototyping of Finnish mockups	19
5	Final prototype	20
6	Additional steps and deliverables of the project	30
	6.1 Prototype for smartphone app	30
	6.2 Workshop for Finnish HR professionals	30
	6.3 Project plan for research project financed by German health insurance	30
	6.4 Quotation for app coding from MindWork Media	30
	6.5 Legal issues	30
7	Use of TSR budget	31
8	Dissemination of findings	31
9	Future outlook and the next steps	31
10	Literature	33
11	Appendices	37
	Appendix 1: Invitation and program of workshop	38
	Appendix 2: Materials related to needs assessment	40
	Appendix 3: Summary of needs assessment in a student sample	45
	Appendix 4: Summary of prototyping in Finnish workers	47
	Appendix 5: Use of TSR budget	58
	Appendix 6: Overview of completed work tasks	59

## Project summary in English:

Knowledge workers exposed to high levels of job stress suffer from poor health and well-being which can impair their job performance, increase sickness absence rates and decrease retirement age. Accordingly, successful recovery that can counteract the deterioration of workers' well-being and health is vital. This replenishment of psychological and physical resources can occur during breaks, evening hours, weekends as well as during vacations. This resource replenishment is essential to stay energetic, engaged, and healthy, even when facing high demands and stress at work.

Vacations as the longest, unbroken chunk of leisure time form prime opportunities to fully recover from work. However, research has demonstrated that the expected positive effects of vacations often fail to appear at all or fade out soon after returning to work.

In this project, we developed the prototype for a smartphone application to improve recovery from job stress before, during and after a vacation. The aim of this app is to prevent deadline and preparation stress before vacation and to help people to look more forward to their vacation. During vacation, the app aims to prevent stress and helps the users to enjoy the vacation more. After vacation, the app supports the users in managing the reentrance stage and picking up work again. It also helps to cherish vacation memories and prolong beneficial vacation effects.

The prototype has been developed in an iterative process which involved generating ideas, presenting ideas and concepts to the target group and further improving the concept. The development process involved close collaborations with experts in recovery from work, occupational health and e-mental health interventions, different potential user groups and IT experts which assessed the feasibility of the ideas.

The final prototype is available online in Finnish (<http://www.holidaily.fi/>) and English (<http://www.holidaily.fi/english/>). The prototype includes 1) possibilities to monitor personal health and well-being levels, 2) options to store vacation photos and personal notes, 3) quizzes to increase knowledge about stress and recovery and 4) timed daily "Quests". The quests are considered the most important aspect of the prototype. Each quest is matched to a person's individual vacation dates. Users are invited to perform behavioral tasks which combine a variety of behavior modification and stress management techniques such as operant conditioning, meditation, imagery, cognitive restructuring, goal setting, and relaxation exercises. Most of the tasks are grounded in positive activity-based interventions. Theoretically, the app is based on the DRAMMA-model which stipulates the facets of leisure time activities which promote health and well-being: Detachment, Relaxation, Autonomy, Mastery, Meaning and Affiliation. In general, the period before, during and after the holiday serve as a starting point to create new, healthy habits and learn skills that are transferable to everyday life making "everyday a holiday". In line with this idea, the name of the prototype is "Holidaily".

A German health insurance company will fund the further development of the content and the programming of the app. The app can be translated into Finnish if additional funding for translation of the content is secured. Future challenges are the marketing of the app and making sure that the app is actually used after downloading it (which has been shown problematic in earlier studies using apps and online tools).

Summing up, we created a prototype for a smartphone application that was rated favorably by the target group and that can potentially improve and preserve Finnish workers' health and well-being by fostering successful recovery from work. Future research needs to determine the efficacy of this app specifically as well as e-mental health interventions more general.

## Projektin yhteenveto suomeksi:

Voimakkaalle työstressille altistuvat tietotyöntekijät kärsivät heikosta terveydestä ja hyvinvoinnista, mikä voi häiritä heidän työsuoritumistaan, lisätä sairauspoissaoloja ja nopeuttaa eläköitymistä. Työntekijöiden hyvinvoinnin ja terveyden heikkenemistä ehkäisevä onnistunut palautuminen on siten ratkaisevaa. Psyykkisten ja fyysisten resurssien täydentämisestä voi tapahtua taukojen, iltojen, viikonloppujen ja lomien aikana. Palautuminen on välttämätöntä, jotta työntekijät voivat pysyä energisinä, keskittyneinä ja terveisinä myös kohdatessaan suuria vaatimuksia ja stressiä työssään. Lomat tarjoavat ensisijaisen mahdollisuuden palautua työkuormituksesta täysin, sillä ne ovat pisin yhtäjaksoinen vapaa-ajan muoto. Tutkimuksissa on kuitenkin osoitettu, että lomilla ei välttämättä joko juuri ole positiivisia vaikutuksia, tai ne hiipuvat pian työhön palaamisen jälkeen.

Kehitimme tässä projektissa prototyypin älypuhelinsovellukselle parantaaksemme työstressistä palautumista ennen lomaa, sen aikana ja sen jälkeen. Sovelluksen tarkoituksena on estää lomaa edeltävä takarajoja ja valmisteluja koskeva stressi sekä innostaa ihmisiä odottamaan lomaansa. Loman aikana sovellus pyrkii estämään stressiä ja tekemään lomakokemuksesta miellyttävämmän. Loman jälkeen sovellus tukee käyttäjiä paluuvaiheen hallinnassa ja töihin paluussa. Se auttaa myös pitämään arvossa lomamuistoja ja pitkittämään lomien myönteisiä vaikutuksia.

Prototyypin kehittämisprosessiin kuului toistuvaa ideoiden luomista, ideoiden ja konseptien esittelyä kohderyhmälle sekä konseptin kehittämistä edelleen. Kehitysprosessiin kuului läheistä yhteistyötä työkuormituksesta palautumisen, työterveyden ja sähköisten mielenterveysinterventioiden ja IT-alan asiantuntijoiden sekä erilaisten potentiaalisten käyttäjäryhmien kanssa, jotka arvioivat ideoiden käyttökelpoisuutta.

Lopullinen prototyyppi on saatavilla internetissä suomeksi (<http://www.holiday.fi/>) ja englanniksi (<http://www.holiday.fi/english/>). Prototyyppi sisältää 1) mahdollisuuksia tarkkailla omaa terveyden ja hyvinvoinnin tasoa, 2) mahdollisuuksia tallentaa lomakuvia ja omia muistiinpanoja, 3) stressistä ja palautumisesta tarjoavia tietovisoja ja 4) ajastettuja, päivittäisiä "Haasteita". Haasteet ovat prototyypin tärkein osa-alue. Jokainen haaste on sovitettu vastaamaan käyttäjän yksilöllisiä lomapäiviä. Käyttäjää pyydetään tekemään tehtäviä, jotka yhdistävät useita käyttäytymisen muokkaamisen ja stressinhallinnan tekniikoita kuten väline-ehdollistumista, meditointia, mielikuvia, kognitiivista uudelleenarviointia, päämäärän asettamista ja rentoutusharjoituksia. Useimmat tehtävistä pohjaavat positiivisiin, toimintaan perustuviin interventioihin. Teoreettisesti sovellus perustuu DRAMMA-malliin, jonka mukaan terveyttä ja hyvinvointia tukevat osa-alueet vapaa-ajan aktiviteeteissa ovat irrottautuminen, rentoutus, autonomia, taidon hallinta, merkitykset ja liittyminen. Yleisesti, ajanjakso ennen lomaa, sen aikana ja sen jälkeen toimii lähtökohtana luoda uusia, terveyttä edistäviä tapoja sekä oppia jokapäiväiseen elämään siirrettävissä olevia taitoja. Tällöin "joka päivä voi olla kuin lomapäivä". Yhdenmukaisesti tämän ajatuksen kanssa prototyypin nimi on "Holiday".

Saksalainen sairausvakuutusyrittäjä rahoittaa sovelluksen ohjelmoinnin. Sovellus voidaan kääntää suomeksi, mikäli sen sisällön kääntämiseen järjestyy lisärahoitus. Tulevaisuuden haasteita ovat sovelluksen markkinointi ja sovelluksen käytön varmistaminen sen jälkeen, kun se ladataan (mikä on näyttäytynyt ongelmallisena aiemmissa sovelluksissa ja internet-työkaluja käyttäneissä tutkimuksissa). Yhteenvetona, loimme prototyypin kohderyhmän myönteisesti arvioimalle älypuhelinsovellukselle, joka voi parantaa ja ylläpitää suomalaisten työntekijöiden terveyttä ja hyvinvointia edistämällä onnistunutta työkuormituksesta palautumista. Tämän sovelluksen (ja yleisemminkin sähköisten mielenterveysinterventioiden) tehokkuuden selvittämiseksi tarvitaan tulevaisuudessa tutkimusta.

## 1 Theoretical background

High levels of job insecurity, increasingly complex work tasks, time pressure and 24/7 accessibility with the help of information technology are features of modern working life. Today's workforce is confronted with high levels of job stress due to increased demands, job insecurity and blurring boundaries between work and private life. It is estimated that 30–40% of workers have mental health problems and stress related disorders (Parent-Thirion et al., 2007). In Finland, the majority of working people can be described as knowledge workers who “think for a living” (Davenport, 2005). This means that they work in jobs which are cognitively demanding, forcing them to deal with information overload. Moreover, most workers also interact with other people such as customers, pupils, clients, patients or colleagues. Therefore, their work is also emotionally demanding and can require them to display appropriate emotions that do not necessarily meet their actual emotions, referred to as “emotional labor” (for a review, see Hülshager & Schewe, 2011). The increasing level of work demands of today's workforce has been described as “acceleration of work” (Ulferts et al., 2013), resulting in high stress levels. Ample studies have demonstrated that knowledge workers exposed to high levels of job stress suffer from poor health and well-being, impairing their job performance, increasing sickness absence rates and decreasing retirement age (e.g., Crawford et al., 2010; Fisher et al., 2015; Nixon et al., 2011, Virtanen et al., 2012). This has serious societal consequences.

Under these stressful working conditions sufficient and successful recovery that can counteract the deterioration of workers' well-being and health, and that can keep workers longer in the work force is important. Recovery from work, defined as “[...] replenishing of psychological and physical resources that have been depleted by effortful demands” (Ragsdale et al., 2011), is a key factor in buffering the relation between job stress and ill-health (Fritz et al., 2010; Geurts & Sonnentag, 2006). It is known that short-term stress in itself is hardly problematic. It is rather the prolonged activation of a person's psycho-physiological systems after the stressors are no longer present, which harms health and well-being in the long term (Brosschot et al., 2006; McEwen, 1998; Ursin & Eriksen, 2004). This activation can arise every time an employee worries about the future or ruminates about the past. Therefore, successful recovery from job stress and mental disengagement from work-related thoughts are essential to stay energetic, engaged, and healthy, even when facing high demands and stress at work (Sonnentag & Fritz, 2015).

Vacations constitute the longest, unbroken chunk of leisure time and therefore form prime opportunities to fully recover from work. Despite a vacation's enormous potential to enable recovery and to preserve and increase working people's health, well-being and job performance, research has demonstrated that the effects of vacations often fail to appear at all or fade out soon after returning to work (De Bloom et al., 2009). Reasons are, for example, negative incidents and lack of mental detachment from work during the recovery period, and high workload after work resumption.

In this project, we developed the prototype of a smartphone application to improve recovery from job stress before, during and after a vacation. The aim of this app is to prevent deadline and preparation stress before vacation and to help people to look more forward to their vacation. During vacation, the app aims to prevent stress and help employees to enjoy the vacation more. After vacation, the app supports the users in managing the reentrance stage and picking up work again. It also helps to cherish vacation memories and prolong positive vacation effects. The period before, during and after the holiday (minimally 3 weeks) serves as a starting point to create new, healthy habits and learn skills that are transferable to everyday life. We chose a smartphone app, because apps offer excellent opportunities to impact people's behavior. E-mental health is a rapidly growing field (Riper et al., 2010) and offers cost-efficient interventions for large, and also otherwise difficult to reach populations

(Lehr et al., in press). Existing and scientifically evaluated e-mental health programs show that web-based programs can significantly improve health and well-being (happiness, quality of life, satisfaction) and reduce stress (Feicht et al., 2013; Hasson et al., 2005; Hilty et al., 2013).

### 1.1 Theoretical framework and DRAMMA model

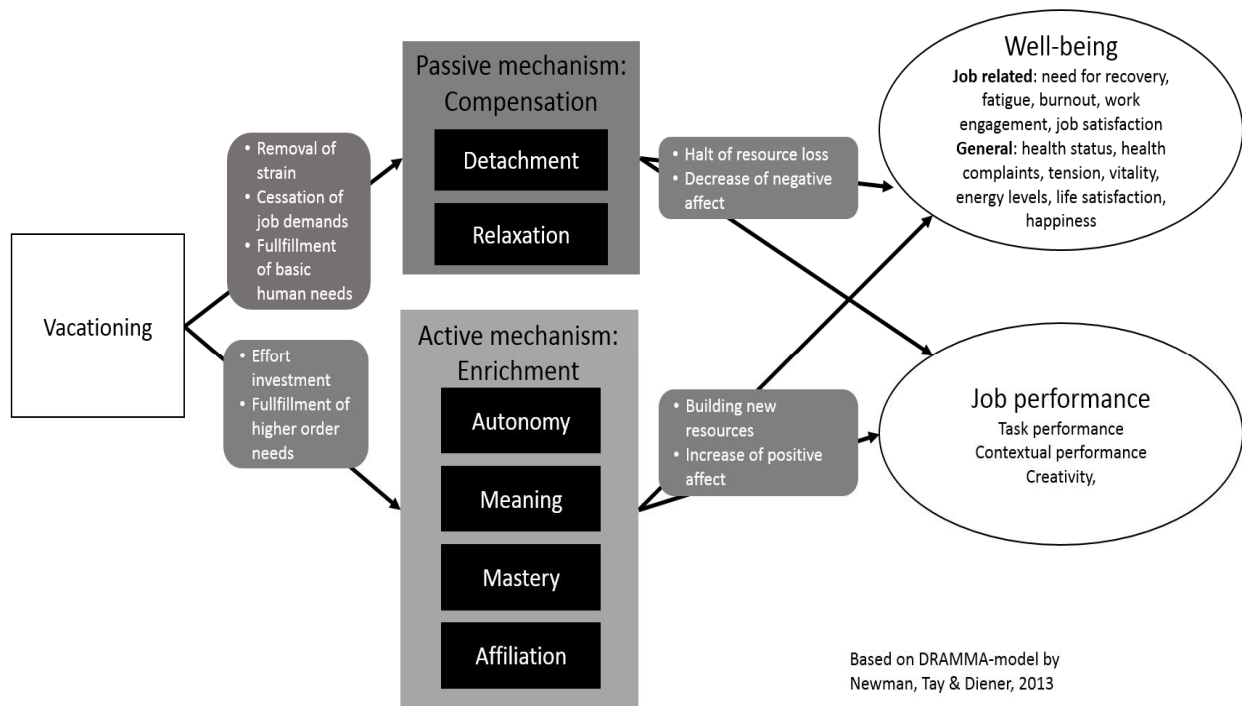
Research on recovery from work presumes two complementary processes underlying the restoration of depleted resources: a passive and an active mechanism (e.g., De Bloom et al., 2010). The passive mechanism relates to the view that recovery can only occur if employees are relieved of work-related demands (Meijman & Mulder, 1998). According to the Effort-Recovery Model (Meijman & Mulder, 1998), it is assumed that recovery can only occur when people cease to work and rest. Accordingly, an important condition for recovery is that those demands causing strain reactions (e.g., subjective, behavioral, and physiological responses) are no longer present. Therefore, low demands, as well as physical and psychological disengagement from work are assumed to enable workers' psychobiological systems to return to baseline levels (Sonnentag & Fritz, 2015).

The active perspective on recovery addresses processes other than the mere absence of demands. It acknowledges the potential and importance of the active engagement in challenging and pleasant free time activities (Geurts & Sonnentag, 2006). From the active perspective, such theories as the Conservation of Resources (Hobfoll & Shirom, 2001), the Broaden-and-Build (Fredrickson, 2001) and the Self-Determination Theory (Ryan & Deci, 2000) are relevant. According to these theories, to recover from job stress, employees have to gain new resources or restore threatened or lost resources, and engage in activities which produce positive affect or which satisfy their basic needs of autonomy, relatedness and competence. This means that breaks from work which enable workers to engage in activities that are pleasant, rewarding, and that create new resources such as improved social relationships and new skills are assumed to support recovery.

Sonnentag and Fritz (2007) suggested a framework of four major recovery experiences which assist employees to recover from job stress during off-job time: detachment, relaxation, mastery, and control. Detachment stands for mental disengagement from work-related thoughts and relaxation denotes a sense of calmness and serenity. It implies low levels of mental or physical activation and little physical or intellectual effort (Marzuq & Drach-Zahavy, 2012; Sonnentag & Fritz, 2007, 2015). Mastery encompasses learning opportunities and/or challenges resulting in feelings of achievement, competence and proficiency (Marzuq & Drach-Zahavy, 2012). Control or autonomy forms a basic human need and describes feelings of decision latitude (Ryan & Deci, 2000). Of these experiences, mental detachment from work seems to be most consistently associated with positive changes in health and well-being (for a review, see Sonnentag & Fritz, 2015). A few studies have also demonstrated positive links between mastery, relaxation, control, and well-being (e.g., Coffeng et al., 2014; Hahn et al., 2011; Kinnunen et al., 2011; Sonnentag et al., 2008).

More recently, Newman et al. (2014) extended the list of important recovery experiences in their DRAMMA-model, derived from reviewing theories and empirical findings from different fields. The DRAMMA model aims to explain the relation between leisure activities and well-being and stands for Detachment, Relaxation, Autonomy, Meaning, Mastery and Affiliation. In addition to the mechanisms proposed by Sonnentag and Fritz (2007), this model includes meaning and affiliation. Meaning refers to activities which instill a sense of purpose in life (Stebbins, 2001) and affiliation describes activities which create feelings of belongingness and therefore fulfill people's innate need for relatedness (Ryan & Deci, 2000). This framework will be applied in the current project.

Figure 1: Theoretical framework



Scientific research indicates several pathways, based on the DRAMMA-model, to prevent stress, to boost and to prolong beneficial recovery effects. The goal of the app we developed is to translate these findings into practical strategies and behavioral tasks to decrease stress and to amplify the positive effects of vacationing. These strategies are based on two approaches. The first approach relates to positive psychology, more specifically to “positive activity-based interventions” which have generally been shown to promote well-being and lower depression (for meta-analyses, see Bolier et al., 2013; Sin & Lyubomirsky, 2009). In these interventions employees are requested to engage in different activities such as counting one’s blessings (Emmons & Crumpler, 2000), reliving positive events (Lyubomirsky et al., 2006), savoring positive experiences (Bryant et al., 2005) and designating three good things (Seligman et al., 2005). The other approach utilizes behavior modification. Employees are asked to perform behavioral tasks which combine a variety of behavior modification and stress management techniques such as operant conditioning, meditation, imagery, cognitive restructuring, goal setting, and relaxation exercises (for an overview of strategies, see Richardson & Rothstein, 2008). These tasks are aimed at building up and improving social support networks, at enhancing time management skills, and at integrating healthy habits into everyday life (e.g., Ludwig & Kabat-Zinn, 2008; Sheldon & Lyubomirsky, 2006; Sin & Lyubomirsky, 2009).

## 1.2 Potential benefits for employees and employers

Stress-related disorders are the biggest cause of early death in Europe (WHO, 2001) and are linked to poor health and well-being, productivity and job performance (e.g., Demerouti, Taris, & Bakker, 2007; Gilboa et al., 2008). Job performance can be divided into three aspects: task performance, contextual performance and creativity. Task performance refers to a person’s work activities that directly contribute to the organization’s core business, whereas contextual performance refers to workers’ behaviors that go above and beyond the tasks strictly required by the job description, such as volunteering for additional work or helping co-workers (Motowidlo & Van Scotter, 1994).

Binnewies, Sonnentag and Mojza (2009b) found that feeling recovered during leisure time predicted an increase in self-reported task performance after 6 months. As stress presumably damages

particularly the motivational aspects of performance such as going beyond routine job responsibilities (Van Dyne et al., 2002), contextual performance may even be affected more strongly by poor recovery than task performance. Until now, there is some evidence suggesting that people who feel well-rested in the morning exhibit higher contextual performance later during the working day. Well-recovered workers are also more willing to help colleagues, share information and “walk the extra mile” for their employer (e.g., Binnewies et al., 2009a; Sonnentag, 2003). The third aspect of performance, creativity, refers to “[...] the production of novel, useful ideas or problem solutions” (Amabile et al., 2005, p. 368). There are only few characteristics of human performance that have as much impact on our lives as creativity (Scott et al., 2004). It can be conceived as a key factor that drives civilizations forward, helps individuals adapt to change and to solve every day problems (Ritter, 2012). According to the Neural Network Model of Creativity (Martindale, 1999) and the Broaden-and-Build Theory (Fredrickson, 2001), stressed people primarily display routinized, habitual, well-rehearsed behavior patterns, because their attention is focused on the stressors. In this situation, creative ideas are less likely to come to awareness. Their thinking is fast, accurate, logical, and standard whereas rested workers tend to think in a more flexible, diverse, and creative fashion (e.g., De Bloom et al., 2014; Van Dyne et al., 2002). So far, an experimental study using an idea generation task before and after vacation demonstrated that cognitive flexibility, a crucial component of creativity, significantly increased after a vacation from work (De Bloom et al., 2014). Consequently, improving recovery during vacations is not only beneficial for the individual employee in terms of health and well-being. Investing in employee recovery may actually also pay off for employers as it may improve employees’ job performance.

The literature review of Newman et al. (2014), demonstrated that leisure is connected to well-being through detachment, relaxation, autonomy, mastery, meaning and affiliation. If these experiences are facilitated, working people’s well-being is expected to increase. Subjective well-being is in turn related to physical health and job performance (e.g., Fritz & Sonnentag, 2006; Taris & Schreurs, 2009; van der Linden et al., 2005).

## 2 Project partners and their role in the development process

- Development team
  - o Occupational health psychology?: Dr. Jessica de Bloom (University of Tampere, Finland)
  - o Occupational health psychology; Finnish context: Prof. Ulla Kinnunen (University of Tampere, Finland)
  - o E-mental health; online interventions: Prof. Dirk Lehr (Leuphana University Lüneburg, Germany)
  - o Occupational health psychology; recovery from work: Dr. Christine Syrek (Trier University, Germany)
- Demola team
  - o Computer science; software engineering; psychology; human technology interaction; economics: Elina Sipilä, Biju Thankachan, Markus Koskela (University of Tampere), Teo Mäntymaa (TAMK), Oleg Kolesnikov (TUT)
  - o Demola facilitator: Joonas Kempainen
- Advisors
  - o E-mental health; online interventions; app development: Dr. Kirsikka Kaipainen (Headsted, Finland)
  - o Legal issues: Jorma Helin (University of Tampere, Finland)



- Programmers
  - o Coding of smartphone apps; technical advice: Stephan Plat (MindWork Media, Netherlands)
- Target group/Prototyping
  - o City of Tampere; contact person Sami Uusitalo
  - o Visy; contact person Petri Granroth
  - o Institute for Advanced Social Research; contact person Prof. Risto Heiskala

## 3 Development process

### 3.1 Problem statement

Despite a vacation's enormous potential to enable recovery and to preserve and increase working people's health, well-being and job performance, beneficial vacations effects often fail to appear at all or fade out soon after returning to work. Is it possible to develop a digital tool to help employees to make the most of their vacation and recover well? How can 1) stress before, during and after vacation be decreased, 2) enjoyment of a holiday be increased and, 3) beneficial vacation effects be prolonged after returning to work?

### 3.2 Needs assessment

#### 3.2.1 Design criteria based on earlier online and app projects

In this section, we will briefly discuss problems of mobile interventions as suggested by scientific literature (e.g., a review of 101 scientific papers in e-mental health published by Kelders et al., 2012) and by the experts consulted in this project. This will result in a list of criteria, problems and solutions to overcome these problems in the current project.

*Smartphone app versus other online tools:* Several tools were considered in this project in transferring the knowledge and the behavioral tasks in order to set behavioral changes in motion. The daily tasks included in our prototype could for instance also be delivered by email. However, this would require internet connection. The same applies to using online platforms. An additional problem is the lack of a reminder in these situations. In the case of an internet platform, users must take the initiative to visit a website. Especially during holidays, people may forget this. They may also deliberately not read their email during vacation. An overload of emails and mounting up of emails during one's absence from work is perceived as a common stressor around vacationing. Adding emails to the existing pile may increase people's stress. Earlier studies which compared mobile and internet-based applications found that mobile applications were better integrated into daily activities (Gasser et al., 2006). Therefore, we decided to develop a standalone application independent of time, location and network coverage. Smartphones are highly suited as a research tool, because user penetration is 68% in Finland (TNS Gallup, 2014). In addition, smartphones are items which many people carry with them 24 hours per day, during work, free time and also during holidays.

*Android operating system:* The app will be designed for Android, because this operating system is most widely used in Finland (38% market share; TNS Gallup Finland) and the world (78% market share, International Data Corporation).

*Offline use:* As many of the participants travel abroad during their holiday, the app must work without internet connection. The data will be stored locally on the phone. Every time the phone is connected to the internet, the data are synchronized and saved at an online server.

*Adherence:* Online interventions generally have low adherence rates of around 50% (ranging widely from 10% to 90%). Adherence is higher in online interventions which include interactions with a

counselor. It seems crucial to motivate users to adhere to the intervention and contact with other persons may help to increase adherence (Kelders et al., 2012; Ludden et al., 2015). Rewards for desired behavior are essential to stimulate adherence to health programs. Individualized, specific feedback works better than general feedback. Our app includes possibilities to collect points and the avatar also displays a person's progress.

*Reminders:* A common problem in smartphone app is that people download the app but forget to use it then. Or they may start using the app and lose interest later on when they have not yet developed a habit to use the app every day. Studies have shown that reminders greatly increase adherence and effectiveness of online interventions (Webb et al., 2010; Fry & Neff, 2009). Therefore, it is crucial to include some form of reminders in designing an app. To stimulate adherence and usage of the app, the app needs to actively address the user and remind him/her to use the app. However, when actively addressing users, there is also the risk of annoying them with the result of the user ultimately deleting the app from his/her phone. Accordingly, there should be reminders, but not more often than once per day. Apps provide the option to automatically push information to the users instead of requiring the user to actively start the app or visit a website.

*Primary task support:* Effective strategies in e-mental health are related to primary task support such as tailoring to individual needs, self-monitoring, rehearsal, suggestion, praise, rewards, social support, social learning, social comparison, cooperation, normative influence, competition and recognition. We tried to include all of these elements in our prototype, too.

*Gamification:* Use of game playing elements such as points and scores increase motivation and develop skills (Deterding et al., 2011). Games are useful learning tools, because they give users intense involvement, structure (they have rules), motivation (they have goals), interactivity (they give us an opportunity to "do"), outcomes and feedback, ego gratification (they have win states), creativity (they involve problem solving) and social interactions (Prensky, 2005).

*Social support:* Increasing social support is an important strategy in behavior change (Van Dam et al., 2005; White & Dorman, 2001), but has not often been used in online interventions (Capurro et al., 2014). Including some form of social support to online interventions will most likely increase the effectiveness of these interventions and enhance adherence. An app should provide the possibility to share one's progress with others and interact with other users.

*Privacy and confidentiality:* Privacy and confidentiality issues may arise and security of personal data is important. Accordingly, it is important that users can freely decide whether they share information in the app with their social network or whether they want to keep all information for themselves. For apps in the mental health sector, dealing with mental illnesses that may be stigmatized, it is also useful to password-protect an app. However, password protection seriously limits the ease of use and may lower adherence rates. As our app contains information which most users would share on social media and which is not related to any stigmatized illness, personal problems or the like, we decided not to protect the app by a password.

*Personalized, relevant information:* Personalization of app functionalities and content can improve people's satisfaction with services, increase users' efficiency and ease of use (Ludden et al., 2015). Personalization happens on different levels in the app: firstly, a calendar function ensures that the quests received match the vacation phase of the user (before, during, after). Moreover, the user collects points and the mood of the avatar resembles these points. Each day, the user is presented with a choice of three different quests. All the quests are formulated in a way that provides high levels of autonomy and options for the users to determine their own course of action. For instance "Pamper

your body” could mean eating ice cream for one person while it means exercising or getting a massage for another.

*Ease of use:* Digital tools need to be intuitive to use. People will not use apps which are impractical or illogical to use. The navigation in the app should be simple, straightforward and visually appealing.

*Autonomy:* Decision latitude is a basic human need (Ryan & Deci, 2001) and our needs assessment in a sample of students showed that people are concerned about decreasing levels of autonomy if they use an app before, during and after their holiday. Therefore, it is important that the app presents behavioral changes as suggestions and that each change includes enough freedom for an individual. Tasks need to be presented in an instructive way, but without being pushy, taking away a person’s control.

### 3.2.2 Questionnaire study on attitudes towards the app in a student sample

We assessed the general attitude towards using a smartphone app during holidays in a sample of 85 students with the help of a digital questionnaire. A summary of the answers to this questionnaire can be found in Appendix 3. Below, we present a short summary of the results:

The most important reasons for using a vacation app were:

- To cherish positive holiday memories
- Curiosity
- To prevent a bad holiday
- To be more relaxed in everyday life

The most important reasons for not using an app were:

- Aversion of using one’s smartphone during holiday; „digital detox“
- Doubts that an app can help to boost and prolong positive vacation effects
- No need for an app; no problems to recover

The most important functions and characteristics of a useful app mentioned were:

- Diary function which helps to organize photos, videos, notes (connected to location)
- Practical information regarding vacation activities
- Reducing incoming calls/messages

Overall:

- The students were rather critical regarding the usefulness of a vacation app
- Especially app use during vacation was viewed rather negative

### 3.3 Market research

This TSR project started with a project within Demola. Demola is an open innovation environment which connects university students and businesses. Guided by a Demola facilitator and the involved stakeholders, the Demola student team tried to develop a concept/prototype for a program (i.e., a website, an online service or a smartphone application). The initial plan was to develop the whole prototype within the framework of Demola. The Demola student group started their project by conducting a small market research to find out whether there are similar wellness or holiday online programs/apps on the market as we have on our mind. Later in the project, we also asked participants in the pre-testing sessions to list all apps related to holidays or well-being that they have downloaded and used. Below, we present a synthesis of the programs and apps mentioned.

#### Overview of existing travel apps and programs

- Airbnb
- Agoda
- Trivago
- Tui
- Booking
- Momoda
- Zoover
- Nysse
- Tripadvisor
- VacationPlanner
- Couchsurfing
- Roadtrippers
- TripCase
- Travel iBlog
- Viator
- Tripit

The vacation apps and programs found and mentioned by the participants and identified by the students are mainly focused on recommendations (from other travelers) for things to do at certain holiday destinations (e.g., Tripadvisor), as well as finding and booking holiday accommodations (e.g., Booking, Agoda). Some apps also provide a countdown/calendar until the holiday, packing lists or weather information about certain locations. Participants of the pretesting sessions also used online platforms focused on public transportation. Some apps aim to manage and organize travel itineraries (e.g., Tripit). Several apps offer the possibility to organize holiday photos and write a diary (which can later on be printed). Overall, it seems that most holiday apps are mainly commercial, selling accommodations and other holiday products (sightseeing tours etc.). However, some functionalities of vacation apps were also relevant for our app: A vacation countdown/calendar and keeping a diary (by storing photos and texts). In the next step, the market research was broadened to include also

#### Overview of existing well-being apps and programs:

- Positive Activity Jackpot
- Daily Challenge
- Oiva
- Happify
- Mobilyze
- myCompass
- Firstbeat Mobile Coach
- Mobile Mood Diary
- Mood Map
- Headspace
- Withings
- Endomondo

Many well-being apps are focused on monitoring a person's mood, health and/or physical activities (e.g., Endomondo, Mobile Mood Diary). Many of these programs target (mild) psychological illnesses such as anxiety, exhaustion/burnout or depression (e.g., Oiva; myCompass, Mobilyze). These programs often include a monitoring function (to keep track of one's mood or symptoms) which is also an important component of cognitive-behavioral therapy. In addition, some programs include simple exercises related to SMART goal setting, increasing pleasurable activities, deep breathing, progressive muscle relaxation, and mindfulness or decreasing worry. Only one of the programs is available in Finnish language (Oiva). Also accessing the English programs turned out to be difficult due to practical problems (e.g., registration requires an Australian mobile phone number). Below, we will describe the three apps in more detail that come closest to our concept and which include relevant functionalities for our idea.

*Happify*: uses simple games and exercises to improve well-being and decrease negative thoughts. The user is presented with small tasks every day. These tasks focus on gratefulness, reducing rumination and stress, goal setting, improving self-esteem and improving social relationships. They usually include little playful games such as writing down negative thoughts and then shooting/eliminating those thoughts in an angry-birds like game. Another task is to write down 3 positive experiences for a certain day. By completing these activities, the user earns points. A downside of this program are the rather high costs (minimally 15\$ per month).

*Positive Activity Jackpot*: aims at stimulating “pleasant event scheduling”. The user can get tips for enjoyable activities nearby (based on GPS data) and the app also offers the option to invite friends for these activities. The user can also have the app randomly decide which activity to engage in. While the general idea is interesting, it is questionable how realistic it is to engage in a random activity on a certain day. For instance, “white water rafting” may be quite difficult in certain places and points in time. This app seems particularly relevant during vacation, but maybe not so much during working periods. The app also provides little guidance and concrete help how to engage in these activities. The activities stay rather abstract.

*Daily Challenge*: is an online platform which provides users with a “challenge” every day. The challenges are sent by email. The challenge is usually formulated as one instructional sentence. Below this sentence, a short paragraph explains “Why it matters”. Users can then indicate by clicking on a link in the email if and how they solved the challenge. They also get points for each successfully completed challenge and the points are displayed as a growing plant. Via an online platform, users can also see how others completed their challenges and reply to these accounts. Even photos can be shared with the community. If the user does not complete a challenge, he/she gets a reminder on the same day by email. There are also possibilities to encourage other users or to make a pact. If both users complete all challenges, they get more points. This app comes closest to the concept of our app and the “Challenges” are very similar to the “Quests” we have in mind. The only difference is that “Daily Challenge” also includes many physical exercises (e.g., stretching etc.) as daily challenge. We will not include any physical movements or exercises. Moreover, the program is mainly email based. This means, users need internet connectivity to use it. During holidays, many people may not have internet or choose to purposely refrain from checking emails. Still the elements that we consider very useful are: 1) daily reminders to engage in a challenge, 2) an online community to share own solved challenges, read other people’s challenge solutions, encourage others and make pacts, 3) points for completing challenges and displaying them in a playful way, 4) option to share solved challenges via Facebook.

### 3.4 Business model

During the development process of the prototype, we mapped potential business models with different stakeholders. The most direct way to finance the app is to have users directly pay for it via the app store. However, participants in the pretesting session indicated that they would, on average, not pay more than 1,00 € for an app. Considering the small market in Finland, it is rather unrealistic to assume that the user fees would be enough to keep the system running, that is, to keep it bug free, support users when they face problems and to update the content regularly. Moreover, payment could pose a hurdle for use and prevent the app from becoming widely used.

Accordingly, a better strategy may be to have (occupational) health care providers and health insurances include the app as a tool to improve their customer’s health and well-being. To our knowledge, Finnish health care providers do hardly make use of the potential which online programs and apps offer in dealing with huge numbers of people. An exception to this is the Firstbeat Wellness Analysis (Firstbeat Hyvinvointianalyysi, see [www.firstbeat.fi](http://www.firstbeat.fi)) which has been taken in use occupational health services. In other European countries, there is a trend for health insurances to provide free online programs for their customers. In the German context, the “Techniker Krankenkasse” has played a pioneering role in this regard and offers its customers a wide range of freely accessible e-(mental) health programs. We assume that this trend will also take-off on a larger scale in Finland within the upcoming years, too. Therefore, we think that the concept for the app will be well-received in the health market. Moreover, the app can be used to collect new empirical data to test the efficiency of

the app, further improve the content of the app and to investigate whether vacation effects of health and well-being can be improved and prolonged with the help of a digital tool.

In Europe, more and more focus is placed on preventive activities to lower the pressure on primary care. In many countries, there is a shortage of physicians, especially in the countryside. Living in the countryside can also mean that one has to travel far distances to see a doctor. Digital tools which merely need internet accessibility can make health services available for a broad audience (Lehr et al., in press). Also, in Finland so called distant physicians (in Finnish *etälääkäri*) services are available.

Based on our experiences from negotiations with the Barmer GEK, a large health insurance company, we know that occupational health care providers are particularly interested in products outside the traditional disease model (i.e., curing what is not functioning well). Positive psychology and the benefits of nourishing what is good and healthy have seen a steady increase in popularity among scientists and the general population. According to the Finnish Occupational Health Care Act (1383/2001), occupational health care providers aim to maintain and improve the health, work ability and functional capacity of employees at different stages of their work careers and to promote the functioning of the work community. Our app would be an interesting tool which can help to achieve these aims. Mobile health or e-mental health tools constitute important means to help workers rapidly and easily access health care service in order to improve their quality of life (Lehr et al., in press). Ultimately, these measures also prevent acute load reactions to develop into chronic load reactions and illness, consequently saving costs for companies and society at large.

### 3.5 Target group

Concerning the users, research has shown that female, middle-aged, higher-educated women are overrepresented in occupational health interventions (Ludden et al., 2015). Women seem to be more aware of their health and well-being problems and also more often suffer from poor mental health. For instance, sleeping problems, anxiety and depression (e.g., Gater et al., 1998; Kessler et al., 1994) are more prevalent among women than among men. Women also face higher levels of work-home conflicts and report that they find it difficult to achieve a healthy work-life balance and to recover during free time after work (e.g., Connell, 2005; Rosenfield & Mouzon, 2013). Women, for example, take up significantly more household and caretaking tasks than men, irrespective of the fact that they are often working full-time, too (e.g., Saxbe et al., 2011; Sayer, 2005). This means that they face a greater burden to perform well in different areas of life. Accordingly, we expect that women are more often affected by problems to juggle working and private life, finding a healthy balance of the two spheres of life and facing challenges in managing boundaries between the home and the work domain. Their need for recovery may consequently also be higher than the need of men (see also Kinnunen & Mauno, 2009). Therefore, women may also be more interested in a tool which promises to improve recovery from stressful life.

Even though the app is relevant for other user groups too, we aim to aspire especially to this group of female, higher-educated employees. It seems easier to reach this group and this group also seems to be more affected by problems that our app addresses (e.g., recovery after work, work-life balance). Concerning the age range, we think that the app will mostly appeal to workers between 25 (starting to work) and 45. Older age groups may, on average, not be so confident in using smartphones and apps. If the app is successfully used within this group, future versions of the app could address other groups. Apps may constitute an effective means to include also groups that are more difficult to reach in interventions such as men or blue collar workers.

## 4 Prototyping

Developing the prototype for a smartphone app is an iterative process, meaning that we went through the development cycle repeatedly, constantly improving the prototype. We will describe the most important steps in prototyping below.

### 4.1 Demola mockups and the first basic prototype

As a first step in the development process, we started up a project within the context of Demola (see also chapter 3.3.). The project started in February 2014 and the team consisted of 5 students from the University of Tampere (UTA), the Technical University of Tampere (TUT) and the University of Applied Sciences (TAMK). The multidisciplinary team had a background in theoretical computer science, software engineering, psychology, human technology interaction and economics. After presenting the problem and the basic idea, the students started to work on the concept. We met on a weekly basis to discuss the progress.

The students developed a concept for an app using the online program "Marble". One of the students programmed a very basic version of an app. Overall, the deliverables of the project were not good enough to justify licensing them. This means that the ideas provided by the project leader were not developed much further. The market research as well as the pre-testing sessions were rather shallow and did not lead to many new insights. The functionalities and the visuals of the prototypes (mockups and basic version of the app) were not properly developed to appeal to a wide audience of professionals and potential users. Nevertheless, the Demola project rendered some interesting insights and ideas to improve the basic concept for the app. We summarize these points below.

Conclusions and insights from the Demola project:

- A smartphone app (opposed to email-based programs or online platforms) is the most suitable medium for engaging people in healthy behaviors before, during and after a vacation, because most people always carry their phone with them and an app also works offline.
- "Marble" is a useful program to develop a visually appealing concept for an app
- The daily challenges could be called "Quests" to underscore the playful element of the app
- Users should be provided with a choice of three daily quests to stimulate autonomy and flexibility to choose a quest that fits into a person's day schedule
- A playful avatar which mirrors a person's engagement with the app should be used
- Quests should be color-coded based on the DRAMMA aspect they target

### 4.2 Workshop on e-mental health for Finnish HR professionals

In the next step of the development process, we organized a workshop for Finnish human resource professionals who are interested in e-mental health. We invited three experts in e-mental health and occupational well-being as speakers. For the detailed program and output of the workshop, see Appendix 1 and 2. The workshop had three goals:

- 1) ... to learn about advantages and challenges in using e-mental health programs in practice.
- 2) ... to deepen and enrich the needs assessment for the app concept we developed.
- 3) ... to get first reactions regarding the prototype developed by the Demola team.

The most important conclusions from the workshop were:

- It is very difficult to keep people engaged in using an app. Special attention should be devoted to this issue.

- Apps could be interesting HR tools, because they are cost-effective and have low threshold for using (e.g., for stigmatized illnesses).
- A good wellness app should
  - o give feedback on an individual's progress
  - o gently guide the users without restricting choice
  - o be tailored to personal needs, customized, sense when it is (not) needed
  - o visually appealing, fun, surprising
  - o support relatedness, collaboration and play with travel companions
  - o encourage full mental detachment from work (by reminding/preventing people from checking their emails or engaging in other work-related activities)

We (i.e., Lehr, Syrek, Kaipainen and De Bloom) also used the time before and after the workshop to think about funding options for coding the app and started preparing a joint application for funding for a German health insurance.

### 4.3 Name for the prototype

Several months after getting the functionalities of the prototype straight, it was also time to invent a name for the app. The research team got together and brainstormed about different possibilities. The initial pool of ideas was critically reviewed in light of the needs assessment and the results from the testing sessions. Critical questions were for instance: 1) Does the name convey how amazing the product is?, 2) Is the name easy to pronounce?, 3) Is the name accurate to what the app does?, 4) Does the name provide a first glimpse of the functionalities of the app?, 5) Does the name convey the feelings we want people to associate with the app? A name should also be short and easy to remember (fewer than 11 characters). In the name searching process, we also googled several possible names and checked trademarks. We also made sure that the name was not yet reserved in app stores. The basic idea was that the name would include some elements related to holidays and a hint on the functionality/goal of the app. An important aspect in this regard was the social element and the idea to use an avatar who could be something like a "holiday friend". Names we considered were for example "Holiday buddy" or "Holimate". Also Finnish names (e.g., Lomafrendi, Lomamigo, Lomakamu, Matkaveri, Lomapp) were also taken into account. However, we decided that an international name fits the concept better and reflects the background of the team. Moreover, many apps that have English names are considered "hipper" and more fashionable and modern. After discussing all options (in total 21 ideas), the team arrived at the name "Holidaily". This word is easy, short and hints at a key concept (holidays) as well as the key functionality of making everyday a holiday. This name was evaluated in the prototyping sessions in the following months.

### 4.4 Prototyping and usability analysis by an IT company (MindWork Media)

After the workshop, Kirsikka Kaipainen informed us about personnel changes at Headsted which prevented them from further developing the mockups for our project. However Kirsikka Kaipainen remained involved in the project and had an advisory role for the duration of this project. She was for instance involved in the prototyping and she gave feedback on all versions of the prototype. As Headsted could not develop the prototype and the students' product was not good enough for our purposes, we decided to hire an IT company to further develop the mockups, give advice on functionalities and also provide a cost estimate for the programming costs of the app. MindWork Media is a young Dutch startup company which is specialized in designing websites, webhosting, content management and web applications. Several fruitful discussions with the company, and several versions of the mockups followed and constituted the input for the discussions and improvements in the next round of prototyping in different target groups. The company also has a designer which



developed the visuals for our prototype. He drew several versions of the avatars and the design until our team was satisfied.

MindWork Media also supported us in registering the domain name "Holidaily.fi" where the mockups are hosted now. In the next step, the mockups including the avatars and the visual elements were tested in two different testing sessions.

The first testing session was organized by Jessica de Bloom on 25.11.2016. She arranged a 1.5 hour meeting of 11 social scientists (8 males, 3 females) working at the Institute for Advanced Social Research at UTA. The researchers navigated through the mockups before the meeting. During the meeting, they shared their views and experiences.

The second testing session was organized by MindWork Media with 7 persons from the target group (young and middle-aged knowledge workers; 6 females, one male, aged 19 to 55 years; 70% highly educated) on 07.01.16. This testing session took about 3 hours and included also a usability analysis of the mockups (i.e., ease of navigation, logic of structure, layout, wording etc.). The results of the two testing sessions will be described below.

General comments from participants:

- "The app is inspiring and also seems like a useful tool in research"
- "The names of the app are rather inconsistent: Holidaily, Holidave...This could be streamlined"
- "It would be nice if GPS tracking or geo caching could be included in the app. Or something around tracking one's health performance."
- "Most apps focus on changing negative behavior/illness; It's nice that this app focuses on something positive (i.e., boosting/improving a positive experience)."
- "This app could help to keep track of travels and places visited (via Treasure chest)."
- "This app is rather patronizing, telling people what to do and what not to do; the tips also challenge the way people like to have holidays (e.g., long holidays, starting work on Mondays, working during vacation etc.); They may not like an app telling them they should change their habits."

Holidaily as title of the app:

- The title for the app seems well-chosen. Asking the participants what they would associate with this app, they answered "a vacation app", an app that "gives you moments of peace and quiet", "helps you to plan vacation activities", "makes people enjoy life more", "helps people to celebrate a holiday". Some people associated the term with commercial things such as "daily vacation deals" or "an app to sell vacations".

"Holidave" avatar:

- People were excited about the avatar. They described Holidave as "cute", "relaxed", "funny", "happy" and "sunny". Somebody said upon seeing the avatar that he makes her to "want to go on holidays immediately". Several people indicated that they would like to see a female version of the avatar as well.
- An avatar adds a personal touch for many people. They found the idea creative and inspiring. They believed that the avatar would motivate them to use the app.

On boarding/Explain button:

- The information about the DRAMMA model seemed quite detailed and abstract before people have used the app. One participant asked whether the information could be deleted there

and instead describe a bit more about these factors in the quests (i.e., why is it useful to do X?).

- It was not entirely clear why the app should be used before and after the holiday. There should be better/more information what the general goal of the app is and how you use it; There should be motivating information, why you should use the app.
- One participant asked whether there could be a classification/division in three phases "Getting ready", "holidays", "afterglow"? It should be made clear that the app can/should be used in all phases of the vacation.

Gaming elements (collecting points, competing with others and sharing information):

- The group was divided about the gaming and social elements in the prototype.
- Some suggested to enhance the gaming elements and liked the idea of sharing content with others and competing against each other.
- Others were worried that the competition element may induce stress: "I myself like games and measuring my own performance a lot, but I'm not sure if it works in the context of a vacation. Even though one would like gaming, it still might cause negative feelings if you feel that using the app is something you must do. Or if you are very bad at it. "

Tailoring to target group:

- Several persons indicated that they would like several different avatars that you can choose from (e.g., minimally avatars from both genders or a gender-neutral avatar)
- Two persons wondered whether holidays at home also count as holidays and whether you could use the app then, too. It would be good to add "Staycation" as an option for holiday type, too.
- In Finland, the app could include "Mökki" as a type of holiday, too, that is, domestic vacations.
- Someone raised the idea to tailor the content to different target groups, such as families.

*Conclusions and changes in app based on two testing sessions:*

- Some ideas were nice but rather unrealistic. Tailoring the app to specific target groups or including GPS are interesting functionalities, but rather distant from the core idea of the app. They could be included in later versions of the app. In this stage, these ideas cannot be taken into account.
- The points which were taken into account boil down to the following changes in the app:
  - o Sharing scores and competing with others should be optional. One page about sharing in the mockups was deleted. Instead, a "share" sign was added on another page; and options such as email, whatsapp and Facebook were included.
  - o Include several avatars to choose from, at least also a female avatar (Holidaisy). For people who do not like the gaming element, there should be an option to choose "no avatar"
  - o Concerning vacation types, include "Staycation", so holiday at home & "Nature holiday" and "domestic vacation". As the space on the screen is limited, only the option "Other" was added.
  - o The information/explanation about the DRAMMA model was shortened.
  - o Include more/better information about the general idea behind the app (during onboarding process) answering the question "Why should I use this app?". This was done so that a start page is included, with a catchy slogan about the app. This page also includes the information that the app is applicable to all vacation phases.

#### 4.5 Prototyping of Finnish mockups

After the first sessions of prototyping in the target groups in Finland and the Netherlands the changes described above were applied. In the next step, the prototype was translated into Finnish by a student assistant. The Finnish version can be found at: [www.holidaily.fi](http://www.holidaily.fi). The updated English version can be found on: [www.holidaily.fi/english](http://www.holidaily.fi/english). After the translations, the prototype was tested in a group of 15 Finnish employees. The complete set of results can be found in Appendix 4. The most important conclusions from this test session were:

- Most potential app users (= PAU´s) got a positive impression of the app and are interested in using it
- Most PAU´s have downloaded wellness or holiday apps before, but do rarely use them
- The apps which PAU´s used earlier are fundamentally different from our app concept
- PAU´s believed that an app could particularly help to prolong positive vacation effects after vacation
- 50% of PAU´s would use app before and after vacation; 35% would use app during vacation
- App use during vacation may be limited, because many people want to minimize use of electronic devices during holidays (= "digital detox")
- Avatars were very well-received by the majority of the PAU´s
- Main functionalities of app were rated favorably and in the following order: 1) Experience hunt/Treasure chest, 2) Quests, 3) Tracking one´s own health and well-being, 4) Quiz
- PAU´s were divided about the usefulness of collecting points
- Most PAU´s would like to share quests and experiences via social media (mainly via Facebook & Whatsapp)
- App was intuitive to use
- 50% of the PAU´s would like to use app
- Most PAU´s would not like to pay anything or under 5€ for the app
- Decrease of points by wrong quiz answers was considered demotivating; This should be changed in the final version of the app
- Most PAU´s rated the prototype positively; adjectives which described the app best according to the PAU´s were: innovative, lively, interesting, fresh, creative and fun-to-interact with (at least 3.8 points on a 5-point scale)

## 5 Final prototype

We will now present screenshots of the prototype and an explanation of its functionalities.



This is the start page after the user has downloaded the app. It includes a very short description of the app and the aim of the app. It also states that the app can be used during all phases of the holiday (before, during and after vacation). The screen also shows "Holidave", one of the avatars.



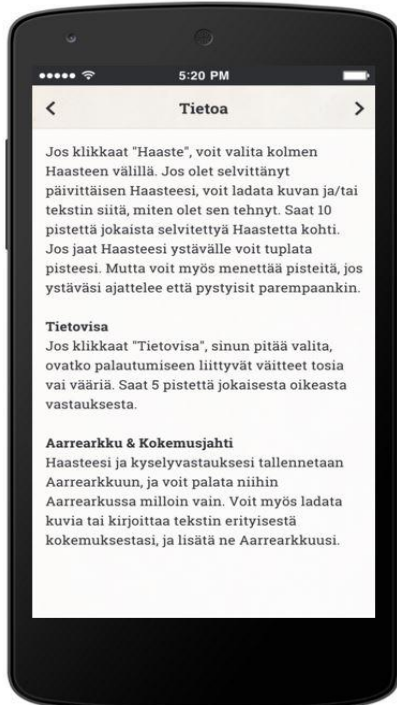
When users click on the arrows next to the avatar, another female avatar, Holidaisy, is shown. The user also has the option to choose "no avatar". After selecting the avatar, the user is taken to the next page by clicking "Aloitetaan".

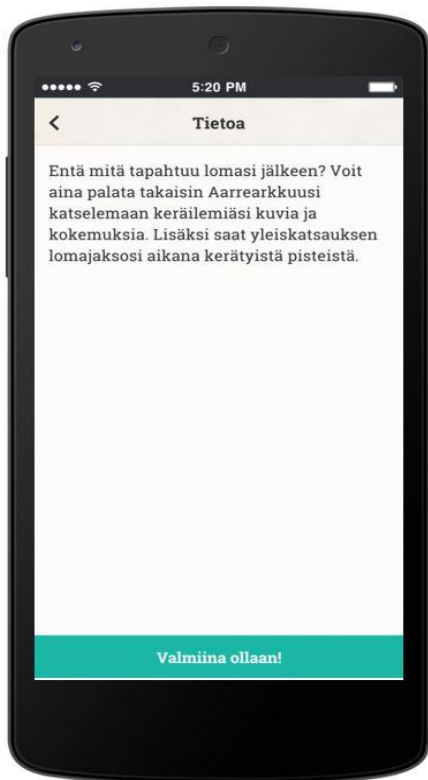


This is the start page which will open when the user starts the app again. The user can choose to either go to the app directly or get an explanation of the functionalities first by clicking "Tietoa".



If the user chooses to get an explanation, several screens explain all functionalities of the app. In the final app, this information will be on one screen which will be scrollable.





After reading the explanations of the functionalities, the user is guided to the app itself by pressing the button "Valmiina ollaan!".



This screen shows the user an overview of his/her vacations. This overview shows both vacations in the past and upcoming vacations ("aktiivisena"). Each holiday in the overview includes the location, the year and a photograph which the user can upload. Moreover, the overview shows the points earned by the user across a certain holiday. By clicking on "+", the user can enter a new holiday.



This is the screen which is shown when the user has clicked on "+", indicating that (s)he wants to enter a new holiday.

This screen shows the basic information which the user needs to enter in order to start using the program.

The user must enter the starting and ending date and the type of holiday. The user can also upload a picture from his collection of photographs or from the internet. This picture can be changed later on as well.



This is the basic/home screen which shows the most important functionalities of the app (= Experience hunt/Treasure chest, Quest, Quiz, Questionnaire).

Moreover, a countdown towards the holiday is shown ("12 päivää lomaan"), points collected and the avatar.

The avatar's mood changes according to the number of points collected ("182 pistettä"). The more points, the better the mood of the avatar. The avatar can also gain new items for its holiday such as sun glasses or a suitcase.

This screen also includes a link to the "Treasure chest".

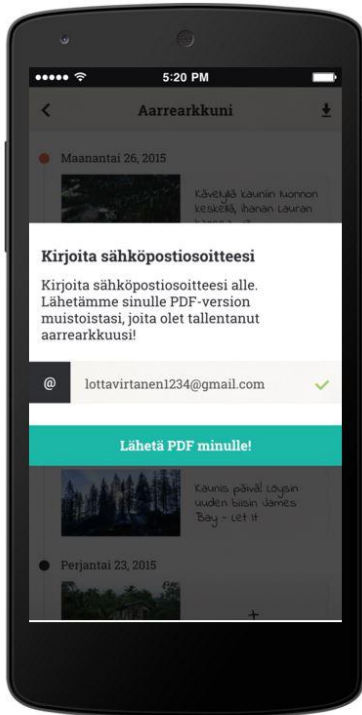




This screen shows how the user can enter an entry to the "Treasure chest". At any point in time, the user can add a photograph or a short written note which can be added to the treasure chest.



This is the "Treasure chest". Each entry is automatically ordered by the current date. The photographs and notes related to the Quests also go to the Treasure chest. These photos and notes get a little mark in the left corner ("Haaste") to indicate that they are related to a quest. Users can scroll through the Treasure chest.



In the right upper corner of the Treasure chest, the user can click on the icon to download the content of the treasure chest as a pdf-document. This document can be emailed and printed as a photobook/book of experiences after the holiday.



When clicking on "Quest", the user gets to see a selection of 3 different quests every day. The quests are color-coded according to the recovery element they relate to (i.e., detachment, relaxation, autonomy, mastery, meaning, affiliation). Each quest consists of one sentence of instruction and 2-3 sentences explanation why the user should engage in certain activities.



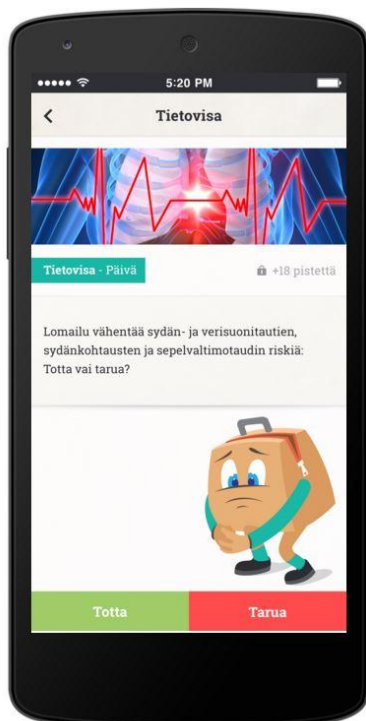
When the user has completed the quest that (s)he has selected before, (s)he can upload a photo showing how the quest was solved and/or write a short text about it.

This report of quest completion is automatically added to the "Treasure chest".

Unsolved quests go back to the pool of quests and may return another day. Users can also decide to send a quest to the pool in case they know that they want to work on this quest on a specific other day.

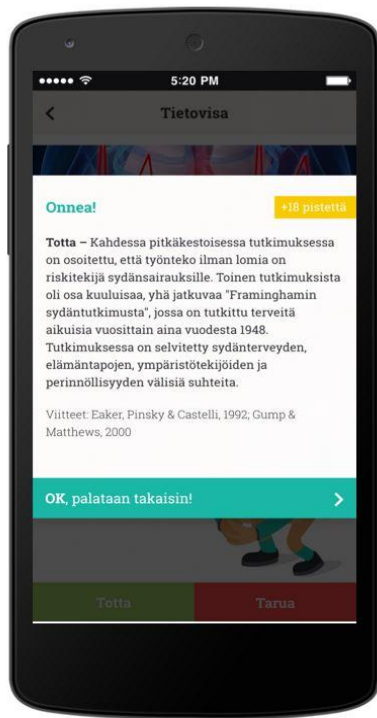
Furthermore, the user can choose to share the photo and the text with friends via social media.

At the end of each day (around 7 pm), the user gets a reminder (in the form of a push notification) asking whether (s)he has something to add to the "Treasure Chest".



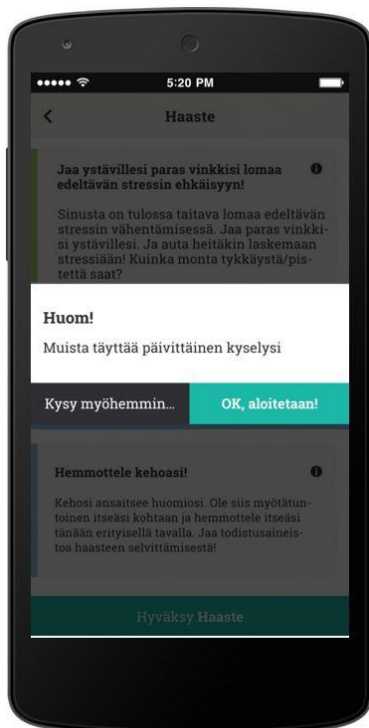
Another important element of the prototype is the "Quiz".

The user is presented with a statement related to recovery from work and stress. (S)he has to indicate if the statement is true or false.



If the user has chosen an answer, (s)he gets an explanation why the answers were correct or false.

For each correct answer, the user gets additional points (which will affect the mood and belongings of the avatar).



Every day, the user is also requested by means of a push-notification to reply to a questionnaire about his/her current level of health and well-being.

This serves as feedback for the user after the holiday (as well as scientific purposes if the app is used for data collection).



The questionnaire consists of 3 questions about health and well-being which vary every 3 days.

The user can answer with the help of a visual rating scale from 1 to 10.

This information is automatically logged and displayed.

This way, the user can track his/her own well-being before, during and after the vacation.

This information can also be used for research purposes (with informed consent of the users).

The information will become visible for the user two weeks after vacation.



Two weeks after the vacation, the self-reported ratings of health and well-being are made available for the user.

The user can scroll/swipe through the calendar in order to follow his/her well-being levels.

The overview also displays the number of collected points as well as items added to the Treasure Chest and solved Quests.

By clicking on the dots in the calendar, the user can also see the entries (photographs/texts) in the treasure chest on that particular day.

## 6 Additional steps and deliverables of the project

Below, we provide a short overview of the additional steps taken in the development process. Moreover, an overview of the completed work tasks can be found in Appendix 6. We also describe the deliverables of the project.

### 6.1 Prototype for smartphone app

We developed a prototype for a smartphone app which is available online in Finnish at <http://www.holidaily.fi/> and in English language at <http://www.holidaily.fi/english/>.

### 6.2 Workshop for Finnish HR professionals

On 7 May 2015 we organized a workshop on e-mental health for Finnish HR professionals. The workshop was attended by 23 persons working at 21 different Finnish companies. The workshop consisted of three keynote presentations about job stress and the potential of digital tools and online interventions to lower job stress. In addition, the participants of the workshop engaged in several practical exercises in which they learned and discussed how to apply the new knowledge in their daily working life. The Demola student team also presented the first prototype for the app and got feedback from the HR professionals. Therefore, the workshop also served as a needs assessment for the prototype. The workshop was well-received and we got positive feedback about the content and the quality of the presentations. The program and the materials produced during this workshops are shown in Appendix 1 and Appendix 2.

### 6.3 Project plan for research project financed by German health insurance

Our project partner Prof. Dirk Lehr has long established ties with the German health insurance "Barmer GEK". This insurance company has financed several applied research projects within the health sector. Prof. Lehr got us into touch with the representatives of the insurance and arranged a meeting on 13 November 2015. During this meeting in Germany, we got the chance to present the prototypes of the app we have developed and explain the ideas behind the prototype. The representatives of Barmer told us that they would like to fund a research project to develop and to assess the effectiveness of the app. This relates to the fact that German legislation changes next year and from 1 January 2017 on, health insurances are obliged to reinvest a share of their profits in prevention measures. A smartphone app could be seen as a preventive measure. This research project would include the programming costs of the app as well. The Barmer representatives invited us to submit a research proposal in December 2015. The negotiations about the exact terms and conditions, the budget and duration of the project have been continuing until April 2016. On 19 April, the contract for a 2-year research project was signed. If everything goes according to the plan, the first version of the app will be ready in summer 2016. We are currently working on a contract between the parties (i.e., Barmer GEK, Leuphana University and UTA) which enables us to translate the app to Finnish as well.

### 6.4 Quotation for app coding from MindWork Media

The prototype for the app was developed in close collaboration with the IT company "Mind Work Media" which can also program apps. Based on this prototype, the company has estimated the costs for programming to be 12.019 € for the final product.

### 6.5 Legal issues

I have consulted a legal advisor of the University of Tampere (Jorma Helin) concerning the rights of the app. He recommended to file an "invention disclosure form". This has been done.

## 7 Use of TSR budget

In general, we went through all the steps outlined in the TSR work plan. However, some steps took considerably more time than expected. A major change in the budget occurred with regard to the Demola project. As the result of the project was not satisfactory, we did not buy the license. This saved a great amount of the budgeted money. This money was in turn used to hire an IT company to design the mockups for the prototype. For the rest, the budget was in line with the planned budget. For an overview of the costs, see Appendix 5.

## 8 Dissemination of findings

Recently, we contacted journalists from Hyvä Terveys, Tiede Magazine, Helsingin Sanomat and Aamulehti to inform readers about this TSR project, the prototype and to promote the outcomes of this project.

## 9 Future outlook and the next steps

As the app will be programmed for the German market, the most important step to make the app available for Finnish workers is to secure funding to translate the content and adapt the app to the Finnish working context. We will submit a research proposal to TSR which includes the costs for these adaptations. Another task which is still going on is the content development. The research team has decided on the format of the quests and quizzes and also produced some content. However, for the complete version of the app, more content needs to be generated. We will also use student seminars to develop quests based on the DRAMMA-model (Newman et al., 2014).

The first version of the app will probably only include the most essential elements. This means, we may not yet include quiz questions. The second version of the app can be a more advanced version with additional elements. In our view, interesting additions for the future could be:

*Online community:* The app could provide users with the option to share their quests in an online community. Reading how other users have solved the quests may be a fun activity in itself. In addition, it may provide some inspiration to users who do not know how to solve their quests. It could also be interesting to provide users with the option to share their quests only with certain persons (e.g., their family or travel companions) and also rate how well they solved their quest.

*Increase of quest pool by users:* It is possible that users come up with ideas for quests. If the quests are suitable, they could be added to the pool of quests which is available for every user.

*Avatars and rewards:* The first version of the app probably includes two different types of avatars (male/female) or the option without avatars (simply displaying the amount of points). Future versions could include a variety of different avatars (e.g., resembling certain interests or hobbies). The rewards for the avatars could also be diversified. After earning a certain amount of points, users could be provided with the opportunity to choose an item for their avatar (e.g., surfboard, skis, deck chair, or a cocktail)

*Visuals:* The visuals could be matched to the type of holiday. If a person chooses a beach holiday, the colors of the app could change to sand colors, blue sky pictures, sea and sea shells. If a person chooses winter sports holiday, the colors could change to white (snow) and blue (sky). For a holiday in the cottage, green colors (for the forest) and blue (for lakes) could be used.

*Quests matched to location:* It is possible that certain quests match a holiday destination better than others. In the first version of the app, we will formulate quests that are applicable for all holiday types. The next versions of the app could include some quests which are more location specific.

*Lower Quest frequency:* It is also possible to program the option that users choose for a lower quest frequency. Instead of daily quests, the user could choose for the option to get fewer quests and prolong the period of app use.

*GPS connection:* Several persons noted that they would like to link photographs and diary entries to certain locations. It could be interesting to include the GPS coordinates in the diary entries. In this way, a map could be shown including pictures and the associated memories.

*Different target groups:* This app targets highly-educated female knowledge workers. Future versions of the app could be tailored to other target groups which are often difficult to reach in occupational health interventions such as blue collar workers or men.



## 10 Literature

- Amabile, T. M., Barsade, S. G., Müller, J. S., & Staw, B. M. (2005). Affect and creativity at work. *Administrative Science Quarterly*, *50*(3), 367-403.
- Binnewies, C., Sonnentag, S., & Mojza, E. J. (2009a). Daily performance at work: Feeling recovered in the morning as a predictor of day-level job performance. *Journal of Organizational Behavior*, *30*(1), 67-93.
- Binnewies, C., Sonnentag, S., & Mojza, E. J. (2009b). Feeling recovered and thinking about the good sides of one's work. *Journal of Occupational Health Psychology*, *14*(3), 243-256.
- Bolier, L., Haverman, M., Westerhof, G., Riper, H., Smit, F., & Bohlmeijer, E. (2013). Positive psychology interventions: a meta-analysis of randomized controlled studies. *BMC Public Health*, *13*(1), 119.
- Brosschot, J. F., Gerin, W., & Thayer, J. F. (2006). The perseverative cognition hypothesis: A review of worry, prolonged stress-related physiological activation, and health. *Journal of Psychosomatic Research*, *60*(2), 113-124.
- Bryant, F. B., Smart, C. M., & King, S. P. (2005). Using the past to enhance the present: boosting happiness through positive reminiscence. *Journal of Happiness Studies*, *6*, 227-260.
- Capurro, D., Cole, K., Echavarría, M. I., Joe, J., Neogi, T., & Turner, A. M. (2014). The use of social networking sites for public health practice and research: A systematic review. *Journal of Medical Internet Research*, *16*(3), e79.
- Coffeng, J. K., van Sluijs, E. M., Hendriksen, I. J. M., van Mechelen, W., & Boot, C. R. L. (2014). Physical activity and relaxation during and after work are independently associated with the need for recovery. *Journal of Physical Activity and Health*, *10*, 109-115.
- Connell, R. (2005). A really good husband: Work/life balance, gender equity and social change. *Australian Journal of Social Issues*, *40*(3), 369.
- Crawford, E. R., Lepine, J. A., & Rich, B. L. (2010). Linking job demands and resources to employee engagement and burnout: a theoretical extension and meta-analytic test. *Journal of Applied Psychology*, *95*(5), 834-848.
- Davenport, T. H. (2005). *Thinking for a living: How to get better performance and results from knowledge workers*. Boston: Harvard Business School Press.
- De Bloom, J., Geurts, S., & Kompier, M. (2010). Vacation from work as prototypical recovery opportunity. *Gedrag & Organisatie*, *23*, 333-349.
- De Bloom, J., Kompier, M., Geurts, S., De Weerth, C., Taris, T., & Sonnentag, S. (2009). Do we recover from vacation? Meta-analysis of vacation effects on health and well-being. *Journal of Occupational Health*, *51*, 13-25.
- De Bloom, J., Ritter, S., Kühnel, J., Reinders, J., & Geurts, S. (2014). Vacation from work: A 'ticket to creativity'? The effects of recreational travel on cognitive flexibility and originality. *Tourism Management*, *44*, 164-171.
- Demerouti, E., Bakker, A. B., Geurts, S. A. E., & Taris, T. W. (2009). Daily recovery from work-related effort during non-work time. In S. Sonnentag, P. L. Perrewé, & D. C. Ganster (Eds.), *Current perspectives on job-stress recovery: Research in occupational stress and well-being* (Vol. 7, pp. 85-123). Bingley, UK: JAI Press.
- Demerouti, E., Taris, T. W., & Bakker, A. B. (2007). Need for recovery, home-work interference and performance: Is lack of concentration the link? *Journal of Vocational Behavior*, *71*(2), 204-220.
- Deterding, S., Sicart, M., Nacke, L., O'Hara, K., & Dixon, D. (2011, May). Gamification. Using game-design elements in non-gaming contexts. In CHI'11 *Extended Abstracts on Human Factors in Computing Systems* (pp. 2425-2428). ACM.
- Emmons, R. A., & Crumpler, C. A. (2000). Gratitude as a human strength: Appraising the evidence. *Journal of Social and Clinical Psychology*, *19*(1), 56-69.
- Feicht, T., Wittmann, M., Jose, G., Mock, A., Hirschhausen, E. von, & Esch, T. (2013). Evaluation of a seven-week web-based happiness training to improve psychological well-being, reduce stress, and enhance mindfulness and flourishing: a randomized controlled occupational health study. *Evidence-based Complementary and Alternative Medicine*.
- Fisher, G. G., Ryan, L. H., & Sonnega, A. (2015). Prolonged working years: Consequences and directions for interventions. In J. Vuori, R. Blonk, and R. H. Price (Eds.), *Sustainable Working Lives* (pp. 269-288). Dordrecht, The Netherlands: Springer Science+Business Media.
- Fredrickson, B. L. (2001). The role of positive emotions in positive psychology. The Broaden-and-Build Theory of positive emotions. *American Psychologist*, *56*(3), 218-226.
- Fritz, C., & Sonnentag, S. (2006). Recovery, well-being, and performance-related outcomes: The role of workload and vacation experiences. *Journal of Applied Psychology*, *91*, 936-945.
- Fritz, C., Sonnentag, S., Spector, P., & McInroe, J. A. (2010). The weekend matters: Relationships between stress recovery and affective experiences. *Journal of Organizational Behavior*, *31*, 1137-1162.
- Fry, J. P., & Neff, R. A. (2009). Periodic prompts and reminders in health promotion and health behavior interventions: Systematic review. *Journal of Medical Internet Research*, e16

- Gasser, R., Brodbeck, D., Degen, M., Luthiger, J., Wyss, R., & Reichlin, S. (2006). Persuasiveness of a mobile lifestyle coaching application using social facilitation. *Persuasive Technology* (pp. 27-38): Springer.
- Gater, R., Tnasella, M., Korten, A., Tiemens, B. G., Mavreas, V. G., & Olatawura, M. O. (1998). Sex differences in the prevalence and detection of depressive and anxiety disorders in general health care settings. *Archives of General Psychiatry*, 55: 405-413.
- Geurts, S. A. E., & Sonnentag, S. (2006). Recovery as an explanatory mechanism in the relation between acute stress reactions and chronic health impairment. *Scandinavian Journal of Work, Environment & Health*, 32, 482-492.
- Gilboa, S., Shirom, A., Fried, Y., & Cooper, C. L. (2008). A meta-analysis of work demand stressors and job performance: Examining main and moderating effects. *Personnel Psychology*, 61(2), 227-271.
- Hahn, V. C., Binnewies, C., Sonnentag, S., & Mojza, E. J. (2011). Learning how to recover from job stress: effects of a recovery training program on recovery, recovery-related self-efficacy, and well-being. *Journal of Occupational Health Psychology*, 16, 202-216.
- Hasson, D., Anderberg, U., Theorell, T., & Arnetz, B. B. (2005). Psychophysiological effects of a web-based stress management system: A prospective, randomized controlled intervention study of IT and media workers. *BMC Public Health*, 5(1), 78.
- Hilty, D. M., Ferrer, D. C., Parish, M. B., Johnston, B., Callahan, E. J., & Yellowlees, P. M. (2013). The effectiveness of telemental health: A 2013 review. *Telemedicine and E-Health*, 19(6), 444-454.
- Hobfoll, S. E., & Shirom, A. (2001). Conservation of Resources Theory: Applications to stress and management in the workplace. In R. T. Golembiewski (Ed.), *Handbook of organizational behavior* (Vol. 2nd ed, rev. ed and exp. ed., pp. 57-80). New York: Marcel Dekker.
- Hülshager, U. R., & Schewe, A. F. (2011). On the costs and benefits of emotional labor: a meta-analysis of three decades of research. *Journal of Occupational Health Psychology*, 16(3), 361-389.
- Kelders, S. M., Kok, R. N., Ossebaard, H. C., & Van Gemert-Pijnen, J. E. (2012). Persuasive system design does matter: a systematic review of adherence to web-based interventions. *Journal of Medical Internet Research*, 14(6), e152.
- Kessler, R. C., McGonagle, K. A. and S. Zhao S. et al. (1994). Lifetime and 12 month prevalence of DSM-111-R psychiatric disorders in the United States. *Archives of General Psychiatry*. 51: 8-19.
- Kinnunen, U., Feldt, T., Siltaloppi, M., & Sonnentag, S. (2011). Job Demands-Resources Model in the context of recovery: Testing recovery experiences as mediators. *European Work and Organizational Psychology*, 20(6), 805-832.
- Kinnunen, U. & Mauno, S. (Eds.) (2009). *Irtiottoja työstä: Työkuormituksesta palautumisen psykologia*. [Recovery from work stress.] Tampere: Tampereen Yliopistopaino.
- Lehr, D., Geraedts, A., Asplund, R. P., Khadjesari, Z., Heber, E., de Bloom, Ebert, D. D. Angerer, P. & Funk, B. (in press). Occupational e-Mental Health – current approaches and promising perspectives for promoting mental health in workers. In M. Wiencke, S. Fischer, M. Cacace (Eds.), *Healthy at Work – Interdisciplinary perspectives*. Springer.
- Linden, D. V. D., Keijsers, G. P. J., Eling, P., & Schaijk, R. V. (2005). Work stress and attentional difficulties: An initial study on burnout and cognitive failures. *Work & Stress*, 19(1), 23-36.
- Ludden, G. D. S., van Rompay, T. J. L., Kelders, S. M., & van Gemert-Pijnen, J. E. W. C. (2015). How to increase reach and adherence of web-based interventions: A design research viewpoint. *Journal of Medical Internet Research*, 17(7), e172.
- Ludwig, D. S., & Kabat-Zinn, J. (2008). Mindfulness in medicine. *JAMA: the journal of the American Medical Association*, 300(11), 1350-1352.
- Lyubomirsky, S., Sousa, L., & Dickerhoof, R. (2006). The costs and benefits of writing, talking, and thinking about life's triumphs and defeats. *Journal of Personality and Social Psychology*, 90(4), 692-708.
- Martindale, C. (1999). The biological basis of creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 137-152). Cambridge, UK: Cambridge University Press.
- Marzuq, N., & Drach-Zahavy, A. (2012). Recovery during a short period of respite: The interactive roles of mindfulness and respite experiences. *Work & Stress*, 26(2), 175-194.
- McEwen, B. S. (1998). Stress, adaptation, and disease: Allostasis and allostatic load. *Annals of the New York Academy of Sciences*, 840, 33-44.
- Meijman, T. F., & Mulder, G. (1998). Psychological aspects of workload. In P. J. D. Drenth, H. Thierry & C. J. de Wolff (Eds.), *Handbook of work and organizational psychology (2nd edition)*. *Work psychology* (Vol. 2, pp. 5-33). Hove: Psychology Press.
- Motowidlo, S. J., & Van Scotter, J. R. (1994). Evidence that task performance should be distinguished from contextual performance. *Journal of Applied Psychology*, 79(4), 475.
- Newman, D. B., Tay, L., & Diener, E. (2014). Leisure and subjective well-being: A model of psychological mechanisms as mediating factors. *Journal of Happiness Studies*, 15, 555-578.

- Nixon, A. E., Mazzola, J. J., Bauer, J., Krueger, J. R., & Spector, P. E. (2011). Can work make you sick? A meta-analysis of the relationships between job stressors and physical symptoms. *Work & Stress, 25*(1), 1-22.
- Parent-Thirion, A., Macias, E. F., Hurley, J., & Vermeulen, G. (2007). *Fourth European Working Conditions Survey*. Dublin: European Foundation for the Improvement of Living and Working Conditions.
- Prensky, M. (2005). Computer games and learning: Digital-based games. *Handbook of Computer Game Studies*, pp. 97-124.
- Ragsdale, J. M., Beehr, T. A., Grebner, S., & Han, K. (2011). An integrated model of weekday stress and weekend recovery of students. *International Journal of Stress Management, 18*(2), 153-180.
- Richardson, K. M., & Rothstein, H. R. (2008). Effects of occupational stress management intervention programs: A meta-analysis. *Journal of Occupational Health Psychology, 13*(1), 69-93.
- Riper, H., Andersson, G., Christensen, H., Cuijpers, P., Lange, A., & Eysenbach, G. (2010). Theme issue on e-mental health: a growing field in internet research. *Journal of Medical Internet Research, 12*(5), e74.
- Ritter, S. M. (2012). *Creativity: understanding and enhancing creative thinking*. (PhD), Radboud University Nijmegen, Nijmegen (Netherlands).
- Rosenfield, S., & Mouzon, D. (2013). Gender and mental health. In *Handbook of the sociology of mental health* (pp. 277-296). Springer Netherlands.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68-78.
- Saxbe, D. E., Repetti, R. L., & Graesch, A. P. (2011). Time spent in housework and leisure: Links with parents' physiological recovery from work. *Journal of Family Psychology, 25*(2), 271-281.
- Sayer, L. C. (2005). Gender, time and inequality: Trends in women's and men's paid work, unpaid work and free time. *Social Forces, 84*(1), 285-303.
- Scott, G. M., Leritz, L. E., & Mumford, M. D. (2004). The effectiveness of creativity training: A quantitative review. *Creativity Research Journal, 16*, 361-388.
- Seligman, M. E. P., Steen, T. A., Park, N., & Peterson, C. (2005). Positive psychology progress: Empirical validation of interventions. *American Psychologist, 60*(5), 410-421.
- Sheldon, K. M., & Lyubomirsky, S. (2006). How to increase and sustain positive emotion: The effects of expressing gratitude and visualizing best possible selves. *The Journal of Positive Psychology, 1*(2), 73-82.
- Sin, N. L., & Lyubomirsky, S. (2009). Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: a practice-friendly meta-analysis. *Journal of Clinical Psychology, 65*(5), 467-487.
- Sonnentag, S. (2003). Recovery, work engagement, and proactive behavior: A new look at the interface between nonwork and work. *Journal of Applied Psychology, 88*(3), 518-528.
- Sonnentag, S., Binnewies, C., & Mojza, E. J. (2008). "Did you have a nice evening?" A day-level study on recovery experiences, sleep, and affect. *Journal of Applied Psychology, 93*(3), 674-684.
- Sonnentag, S., & Fritz, C. (2007). The recovery experience questionnaire: Development and validation of a measure for assessing recuperation and unwinding from work. *Journal of Occupational Health Psychology, 12*, 204-221.
- Sonnentag, S., & Fritz, C. (2015). Recovery from job stress: The stressor-detachment model as an integrative framework. *Journal of Organizational Behavior, 36*, 72-103.
- Stebbins, Robert A. (2001). Serious leisure. *Society, 38*(4), 53-57.
- Taris, T. W., & Schreurs, P. J. G. (2009). Well-being and organizational performance: An organizational-level test of the happy-productive worker hypothesis. *Work & Stress, 23*(2), 120-136.
- Ulferts, H., Korunka, C., & Kubicek, B. (2013). Acceleration in working life: An empirical test of a sociological framework. *Time & Society, 22*(2), 161-185.
- Ursin, H., & Eriksen, H. R. (2004). The cognitive activation theory of stress. *Psychoneuroendocrinology, 29*(5), 567-592.
- Van Dam, H. A., van der Horst, F. G., Knoop, L., Ryckman, R. M., Crebolder, H. F., van den Borne, B. H. (2005). Social support in diabetes: A systematic review of controlled intervention studies. *Patient Education and Counseling, 59*(1), 1-12.
- Van Dyne, L., Jehn, K. A., & Cummings, A. (2002). Differential effects of strain on two forms of work performance: Individual employee sales and creativity. *Journal of Organizational Behavior, 23*(1), 57-74.
- Virtanen, M., Heikkilä, K., Jokela, M., Ferrie, J. E., Batty, G. D., Vahtera, J., & Kivimäki, M. (2012). Long working hours and coronary heart disease: a systematic review and meta-analysis. *American Journal of Epidemiology, 176*(7), 586-596.
- Webb, T. L., Joseph, J., Yardley, L., & Michie, S. (2010). Using the internet to promote health behavior change: a systematic persuasive system design does matter: A systematic review and meta-analysis of the impact of theoretical basis, use of behavior change techniques, and mode of delivery on efficacy. *Journal of Medical Internet Research, 12*, e4

White, M. & Dorman, S. M. (2001). Receiving social support online: Implications for health education. *Health Education Research, 16*(6), 693-707.

WHO. (2001). *The World Health Report 2001 – mental health: New understanding, new hope*. Geneva: World Health Organization

## 11 Appendices

### Overview

APPENDIX 1: INVITATION AND PROGRAM OF WORKSHOP	38
APPENDIX 2: MATERIALS RELATED TO NEEDS ASSESSMENT	40
APPENDIX 3: SUMMARY OF NEEDS ASSESSMENT IN STUDENT SAMPLE	45
APPENDIX 4: SUMMARY OF PROTOTYPING IN FINNISH WORKERS	47
APPENDIX 5: USE OF TSR BUDGET	58
APPENDIX 6: OVERVIEW OF COMPLETED WORK TASKS	59

### Workshop: “Occupational Health meets ICT”

Possibilities and challenges in using ICT to preserve and to improve employee’ health, well-being and job performance

#### What and Who?

Today’s work force is confronted with unprecedented **high levels of work stress** due to information overload, high work pace, job insecurity and blurring boundaries between work and private life. Many workers have difficulties to mentally disengage from work during free time and recover their mental and physical resources. **Human resource managers** face the need to deal with issues that lie at the crossroads between work and private life. **Effective solutions to stress-related problems** can involve measures and tools that easily cross the boundaries between different spheres of life. Information and Communications Technology can easily be integrated into people’s every lives and positively impact their health, well-being and job performance.

**Modern information technology** seems to offer virtually endless possibilities to promote working people’s health and well-being, possibly lowering sickness absence rates and increasing work performance. ICT interventions are promising and cost-effective tools in human resource management. Still, ICT is not a magic bullet:

- What can make workers motivated to use the available programs?
- Which tools and programs have actually proven successful?
- What are the benefits and challenges in using ICT-support in occupational health?

In this workshop, **international experts** within the field of occupational health psychology and ICT supported well-being interventions share their knowledge and experience with the participants. The “Discussion Carousel” provides the HR experts with the opportunity to **discuss current issues** within the field of recovery and ICT, exchange ideas and experiences with other experts and **build a network of professionals** within the field of “ICT in occupational health”. This workshop is supported by the Finnish Work Environment Fund (Työsuojelurahasto).

#### When and Where?

The workshop takes place on Thursday, **07.05.2015 from 13.00 to 19.00** at the premises of the **University of Tampere**. It is organized by Dr. Jessica de Bloom and Dr. Christine Syrek, occupational health psychologists and researchers.

#### For Whom?

The workshop is aimed at **Occupational Health professionals** such as Human Resource Managers, work psychologists and related professions. The workshop is relevant for people who are confronted with problems concerning work-life balance and stress, as well as ICT solutions to improve worker well-being.

#### Signing up

The group size for this workshop is limited. First come, first served. So, sign up as soon as possible for this workshop and at the latest on **30 April 2015** via this link:

<https://www.surveymonkey.com/s/P8XTXV2>.

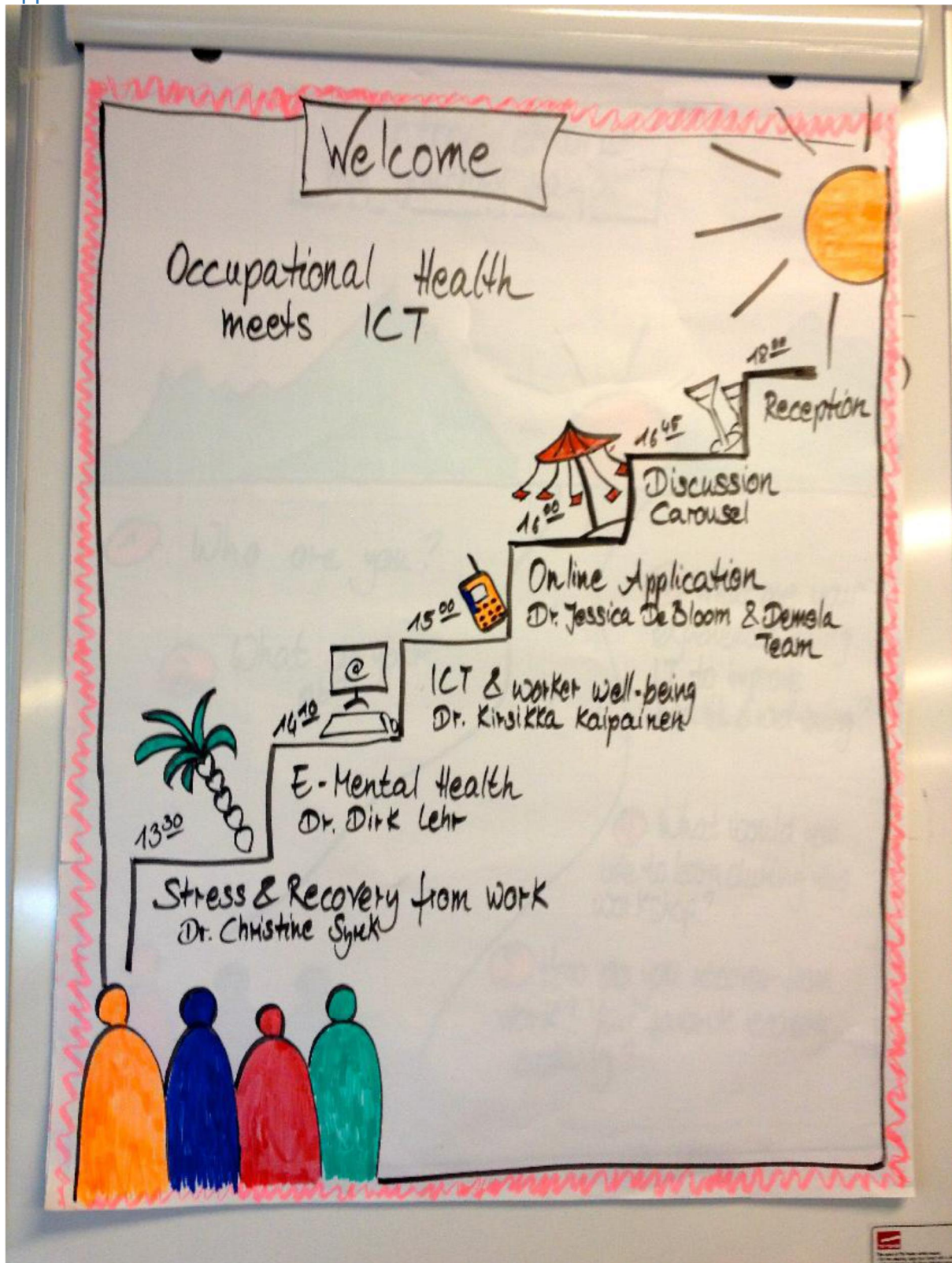
---

---

## Program

13.00 – 13.30:	Welcome Icebreaker & Goals (Dr. Jessica de Bloom & Dr. Christine Syrek)
13.30 – 14.00:	Stress and Recovery from Work (Dr. Christine Syrek, Trier University) Recovery researcher and psychotherapist Dr. Christine Syrek presents the latest evidence on the relation between stressful work, health and well-being. She focuses on mental processes related to unsuccessful recovery from work such as rumination and worrying about unfinished work tasks. Christine also provides the audience with several practical tips how to manage boundary crossing between work and private life and to mentally disengage from work.
14.00 – 14.10:	Questions and Discussion
14.10 – 14.40:	E-Mental Health (Dr. Dirk Lehr, Leuphana Innovation Incubator) Dr. Dirk Lehr, researcher and spokesperson for eHealth of the German Psychological Association, presents the benefits and challenges of ICT use in occupational health and discusses several evidence-based programs to lower employee' stress and to improve well-being.
14.40 – 14.50:	Questions and Discussion
14.50 – 15.00:	Break: ICT supported Mindfulness Exercise (Headspace)
15.00 – 15.30:	ICT and Worker Well-Being (Dr. Kirsikka Kaipainen, Headsted) Dr. Kirsikka Kaipainen is a founding member of Headsted, a Finnish IT company which develops web based interventions for issues related to mental well-being such as anxiety and stress. She shares her expertise about key factors of successfully implementing online interventions in practice.
15.30 – 15.40:	Questions and Discussion
15.40 – 16.00:	Break: Mind Travel
16.00 – 16.30:	Online Application to Improve Recovery from Work Although billions of workers around the world spend their precious time and money on vacationing, positive vacation effects are generally short-lived or fail to appear at all. Scientific research indicates several pathways to prevent stress, to boost and to prolong beneficial recovery effects. The "Recovery Coach" translates findings from 150 scientific studies into easy-to-digest tips and tasks to improve working peoples' well-being and to preserve their long-term workability.
16.30 – 16.45:	Questions and Discussion
16.45 – 17.30:	Discussion Carousel In this interactive exercise, the participants of the workshop visit several work stations and discuss timely issues within the field of recovery and ICT. This time can also be used to create a network of professionals interested in ICT supported Occupational Health.
17.30 – 18.00:	Wrap up & Reflections (Dr. Jessica de Bloom & Dr. Christine Syrek)
18.00 – 19.00:	Reception with Drinks & Snacks

---







## 2. Where do you see the **pros** & **cons** of using apps in occupational health mgmt?

### **pros**

- increase motivation towards work
- maintaining good habits after healthcare visit (availability, access)
- cost-effectiveness
- low threshold / lowers stigma
- smart phone penetration → integrated to 24/7 life
- more tools for OHC
- data gathering + sharing the data
- safe by point of view → minimizing risks
- supporting learning

### **cons**

- lack of motivation
- privacy concerns
- reduced human interaction
- "throwing ICT at employees"
- burden on OHC providers
  - requires change in practices
- no incentive in OHC
  - money for treating illness, not prevention
- app overload
- stress factor might increase



3. Where do you see barriers in introducing ICT solutions in occup. health / your company? How can you tackle them?

- cost, maintenance
- only government funding for fixing, not for prevention.
- lack of (ICT) knowledge by occup. health experts.
- attitude to ICT solutions is problematic and low motivation. (trust)
- not one platform available.
- some people are ICT allergic }  
- RDI - problem } virgins }
- unrealistic expectations
- good communication / patience /
- clear link to existing processes
- Focus group, FINDING PIONEERS } pre-planning }  
motivation }
- individuals too stressed to try out new solutions
- not a project only but continuous actions



4. What do you do to lower your / your workers' stress before, during & after their vacation?

- MAKE LIST OF TASKS BEFORE / AFTER
- COMPANY POLICY & attitude
  - E-MAIL
  - PHONE USING
  - No work during holiday
- SHARE THE MOMENTS / EXPERIENCES
- Keep the calendar clear of major activities before / after
- Discussion with superior
- "Forget your work - we'll manage"
- promote the benefits of recovery (as a boss)
- don't start new projects <sup>(just)</sup> before vacation /  
don't give new tasks - " - "
- out of office notification (email + phone) - transition routines
- lower expectations
- balance between low-effort activities & challenge
- having coffee / cake with co-workers before / after
- share work information with colleagues



## 5. The perfect "Recovery Coach" app would be able to...

- User in control
- Sense when it is needed, e.g. detect stress
- tailored, customized - WORK LIFE HOLIDAYS, ETC
- Foster pleasant anticipation
- Sense when it is not needed / wanted
- Social link, with in application  
VERSITAL - WEEKENDS, LONG HOLIDAYS, ETC
- Suggestions (no orders)
- nice to look at. - not work-life
- GPS: map out your vacation → print out
- make the group/family stronger
- change the company culture
- giving surprises about your holiday/location/events
- encourage to stay away from phone/computer!
- intrinsic motivation!
- also cater to physical health - EXERCISE  
- READ A BOOK  
- EAT ICE CREAM
- FUN!  
- advice when you should have a vacation / longer break

### Appendix 3: Summary of needs assessment in a student sample

In a sample of 85 students (87% female, mean age 21 years), we assessed the general attitude towards using a smartphone app during holidays. Below, we present a summary of the answers:

- 1) Studies show that positive vacation effects on health and well-being do not last long. Why would you (not) use an app which helps you to recover better during the vacation and prolong the positive effects?

Reasons for using an app (in order of number of times mentioned):

- To cherish positive holiday memories
- Curiosity
- To prevent a bad holiday
- To be more relaxed in everyday life
- To get useful tips
- To get some motivation, because one tends to be lazy during holidays
- To experience positive emotions related to the holiday
- Love for apps
- Alternative to photobook; smartphone is always present with me

Reasons for not using an app (in order of number of times mentioned):

- Aversion of using smartphone during holiday; „digital detox“
- Doubts that an app can help to boost and prolong positive vacation effects
- No need for an app; no problems to recover
- Feeling that the app limits autonomy
- Costs for buying an app

- 2) How would an app need to look like and what would it need to include to help you to recover better during your vacation and to prolong positive effects?

- Suggest activities & provide practical information about culture and surroundings
- Help me collect memories (photos, videos, texts) and work like a diary
- Disable all incoming and outgoing communication except emergencies calls/messages
- Possibility to make photos and make notes; integrate map where a photo was taken
- Relaxing music/Playlist of holiday songs
- Meditation exercises
- Help to organize vacation activities (like agenda)
- Remind me of my recovery priorities and goals
- Send collective message home to everybody (to prevent single messages)
- Help me enjoy the moment more
- Project holiday photos on screen after vacation to cherish memories
- Disable other persons' mobile phones so that they cannot disturb me during holidays
- Translator
- Enable chat with people I like
- Show nice pictures of nature
- Make photobook
- Record vacation sounds
- Packing list before holiday
- Intuitive to use
- Personalized

*Conclusions:*

- The most important reasons for using an app were:
  - o To cherish positive holiday memories
  - o Curiosity
  - o To prevent a bad holiday
  - o To be more relaxed in everyday life
- The most important reasons for not using an app were:
  - o Aversion of using smartphone during holiday; „digital detox“
  - o Doubts that an app can help to boost and prolong positive vacation effects
  - o No need for an app; no problems to recover
- The most important functions and characteristics of a useful app mentioned were:
  - o Diary function which helps to organize photos, videos, notes (connected to location)
  - o Practical information regarding vacation activities
  - o Managing and reducing incoming calls/messages
- Overall, the students were rather critical regarding the usefulness of a vacation app.
- Especially app use during the vacation itself was viewed rather negative

## Appendix 4: Summary of prototyping in Finnish workers

### Conclusions:

- Most potential app users (= PAU´s) get a positive impression of app and are interested in using it
- Most PAU´s have downloaded wellness or holiday apps before, but do rarely use them
- The apps PAU´s used earlier are fundamentally different from our app concept
- PAU´s believe that an app could particularly help to prolong positive vacation effects after vacation
- 50% of PAU´s would use app before and after vacation; 35% would use app during vacation
- App use during vacation may be limited, because many people want to minimize the use of devices
- Avatars are very well-received by PAU´s
- Main functionalities of the app are rated favorably: 1) Experience hunt/Treasure chest, 2) Quests, 3) Tracking one´s own health and well-being, 4) Quiz
- PAU´s are divided about usefulness of collecting points
- Most PAU´s would like to share their experiences and app entries with others via social media (mainly via Facebook & Whatsapp)
- App prototype is intuitive to use
- 50% of the PAU´s would like to use app
- Most PAU´s would not like to pay anything or under 5€ for app
- Decrease of points by wrong quiz answers is considered demotivating; This should be changed in the final version of the app
- Most PAU´s rated the prototype positively; adjectives which described the app best were: innovative, lively, interesting, fresh, creative and fun-to-interact with (at least 3.8 points on a 5-point scale)

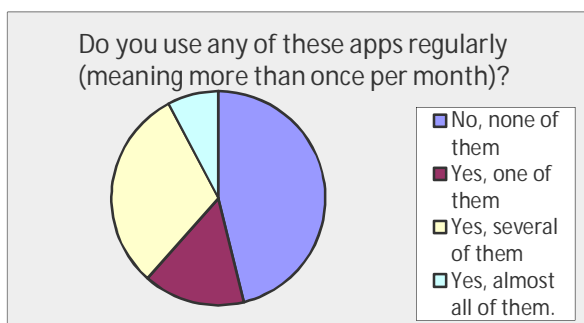
### Background characteristics of the sample

- N = 15
- Mean age 36 years (range: 27-60 years)
- 67% female
- 27% Bachelor degree, 53% Master degree, 20% Doctorate
- Job titles: commercial attaché, chief executive officer, coordinator, secretary/executive assistant, researcher, planning officer, physiotherapist, project worker, supervisor,
- Companies: City of Tampere (3), Visy (2), University of Tampere (4), Other/anonymous (6)
- 13% Lower level white collar workers; 87% Upper level white collar workers
- 93% have smartphone, 79% have downloaded vacation or wellness apps before

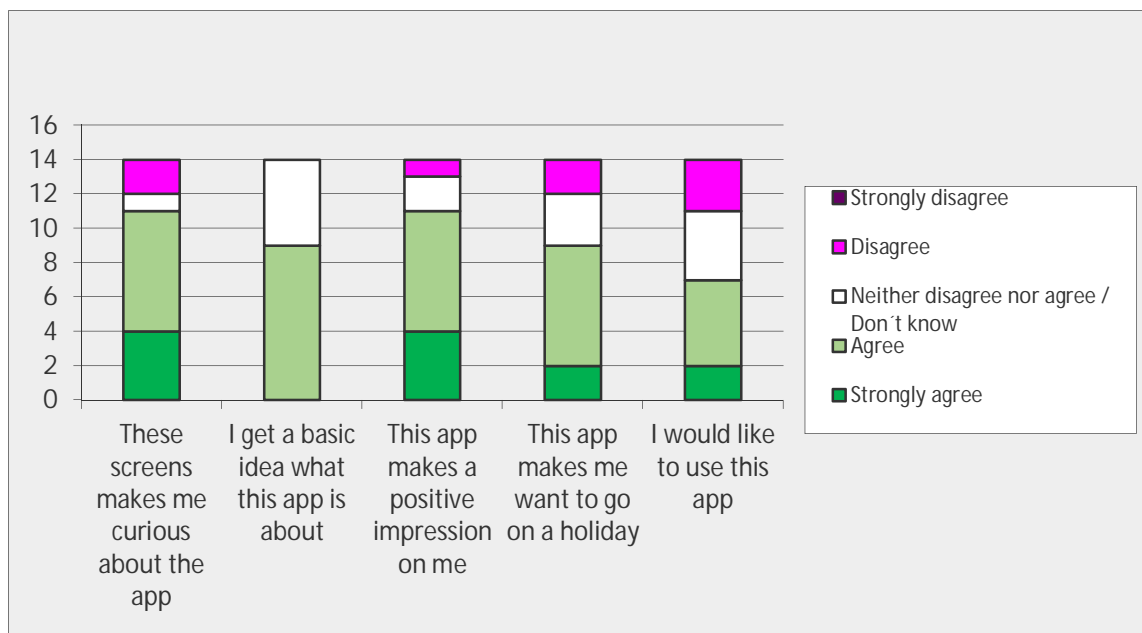
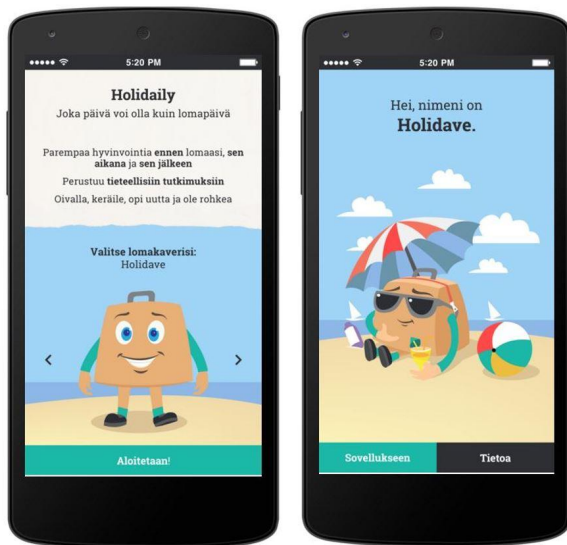
### Answers to questionnaire

Names of the travel/wellness apps downloaded:

- Movescount, Sportstracker, Lonely Planet, Oiva (2), MindShift, Moves, Noom, Headspace (3), SleepBot, Yoga applications, workout applications, Endomondo, Sports Tracker, Womens'



calendar, Satokalenteri, Nysse, Agoda, Booking, Momondo, Tripadvisor (3), 24 Rent, Auroral, Forecast, C:geo, Depart, OruxMaps, Rainman, Weather, Withings, Airbnb, Daily challenge



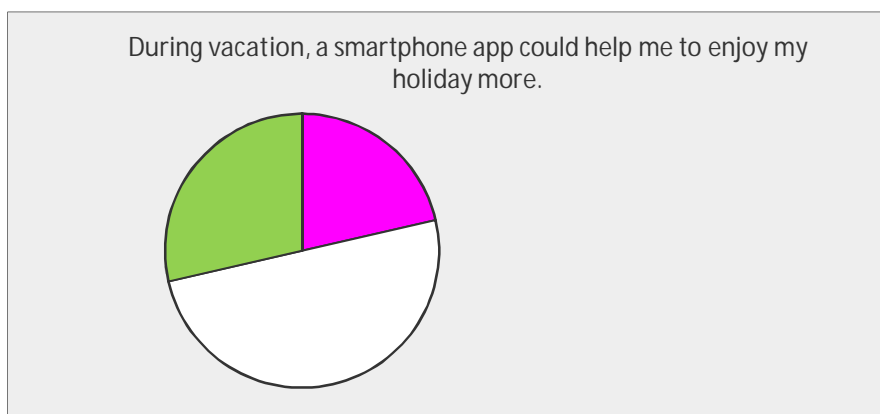
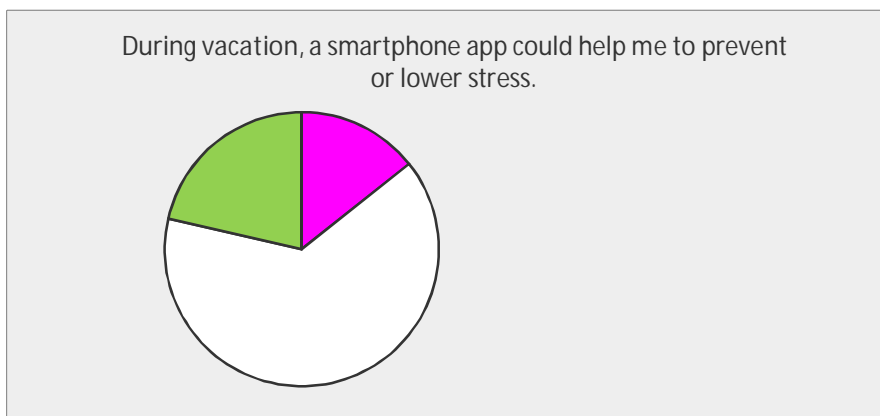
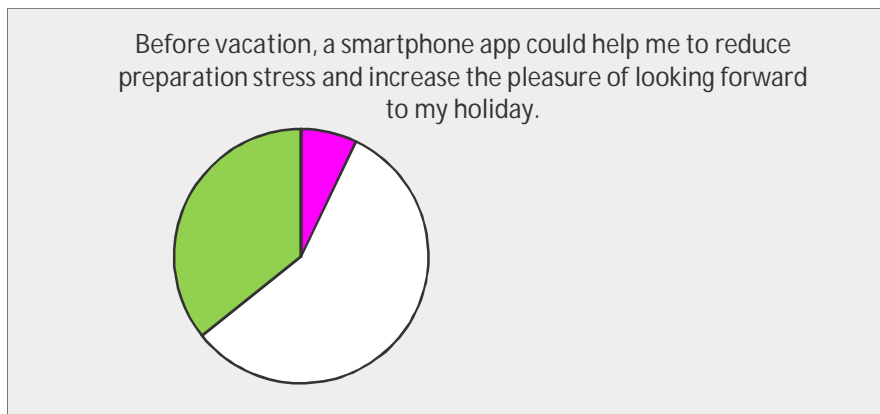
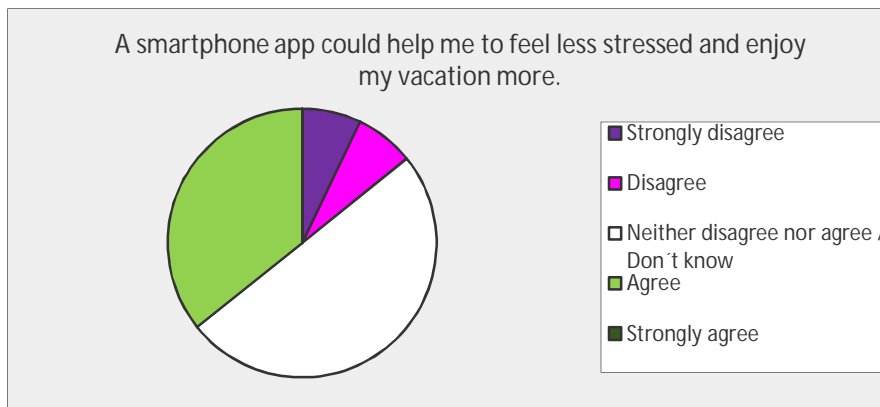
If you disagree with one or several of these statements, can you explain why?

- The texts are a bit clumsy and they don't convey a clear idea of the app's purpose. First it says "every day can be like holiday", but then the next line refers to specific holiday times. Also, "parempaa hyvinvointia" is sort of vague - I'd rather have something more concrete in terms of what the app gives me.
- I already want to go on a holiday, the app doesn't increase that desire, especially since beach holidays are not my cup of tea. But the graphic of Holidave on the beach is nice.
- For me the picture or the graphics is not appealing. I don't really identify myself with the character. It is not badly designed but just doesn't appeal to me.
- Holiday to me means not having to use any computer system, programme or application
- I don't feel like I need instructions how to spend my holiday. And these screens don't make me feel otherwise.

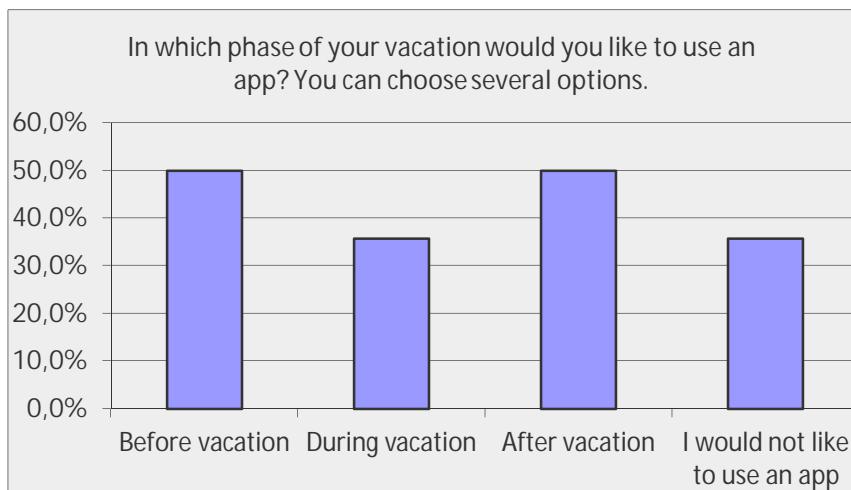
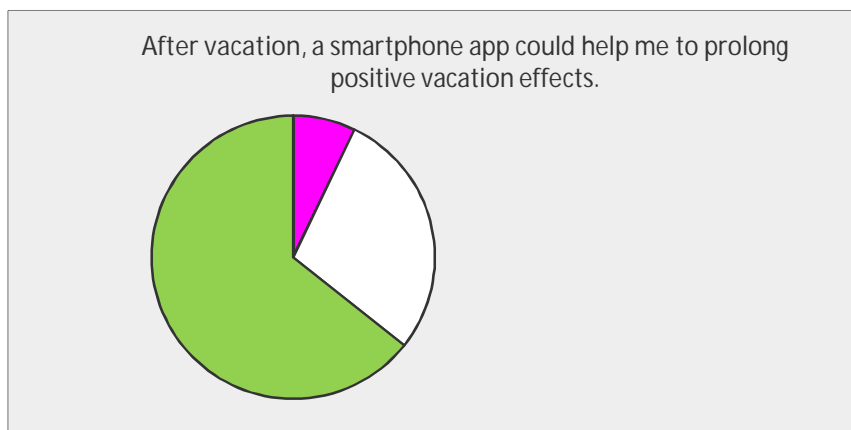
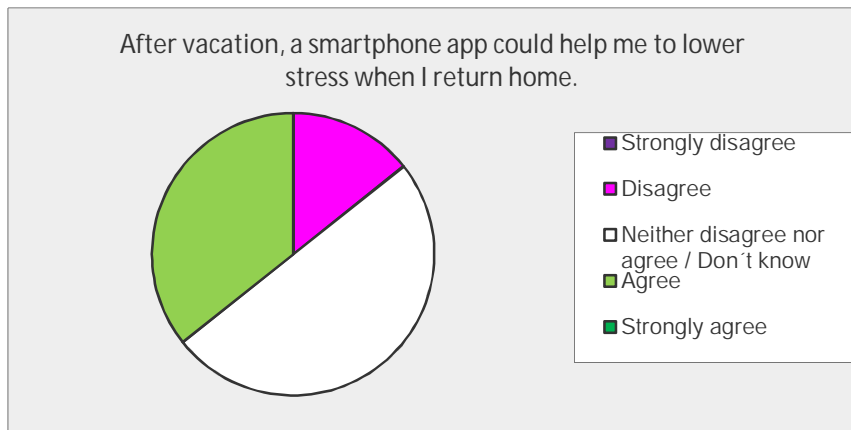


- These screenshots aren't telling a lot about what's coming up when you use the app. But it makes you curious.

### Need for app



## Need for app

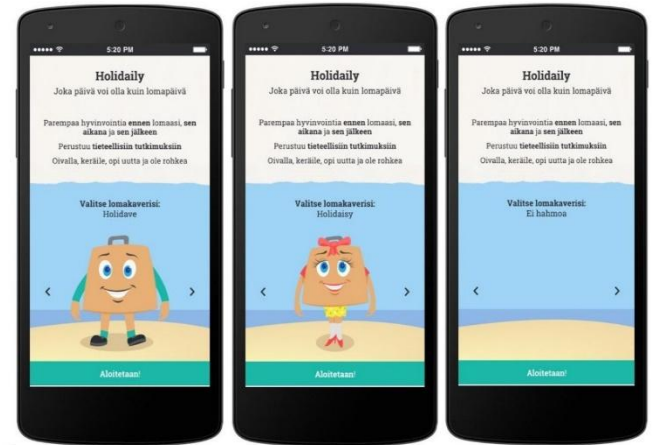
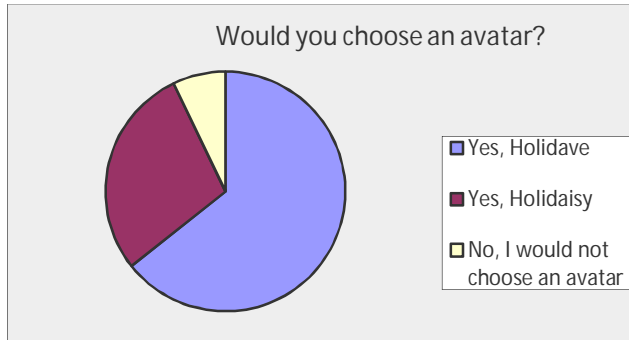


If you would not like to use an app during one or several phases, why is that?

- I'd rather stay away from electronic devices as much as possible during vacation.
- The reason is that, for me, holiday and relaxation and no stress mean not being hooked to any computers, devices or programmes.
- I might use my phone to find nice places and restaurants during my holiday but I don't need any dedicated app for that.
- On a holiday I usually prefer to minimize all screen time.
- I am not interested! I do not need any app - I am not motivated!

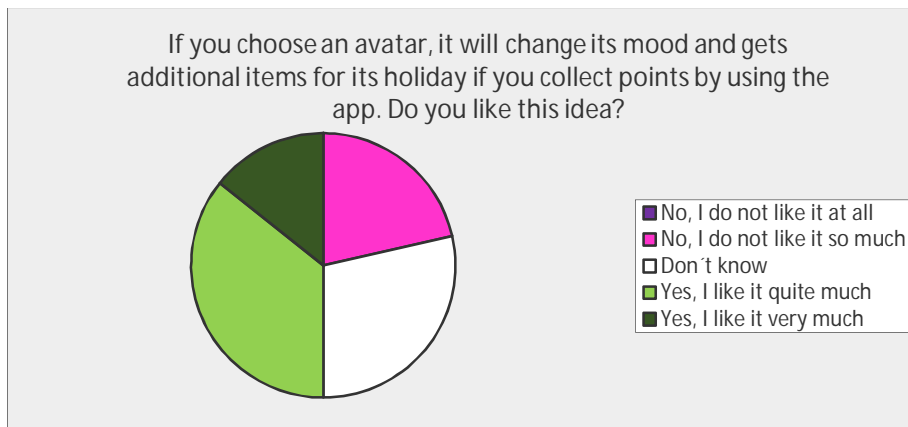
- I'm not sure if I would use the app during holiday, because I like to minimize the smartphone use then (and I don't have problems to detach/recover during a holiday). I think I would most likely use it after a vacation, because it's sometimes hard to get back to the normal routine and this app could make it more fun.

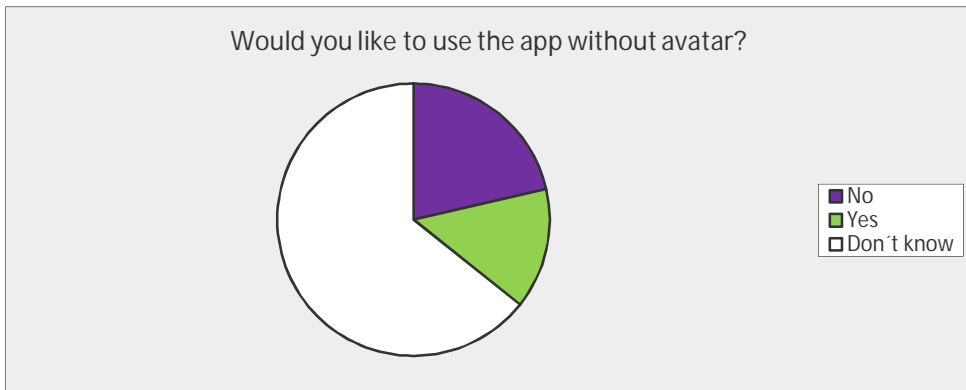
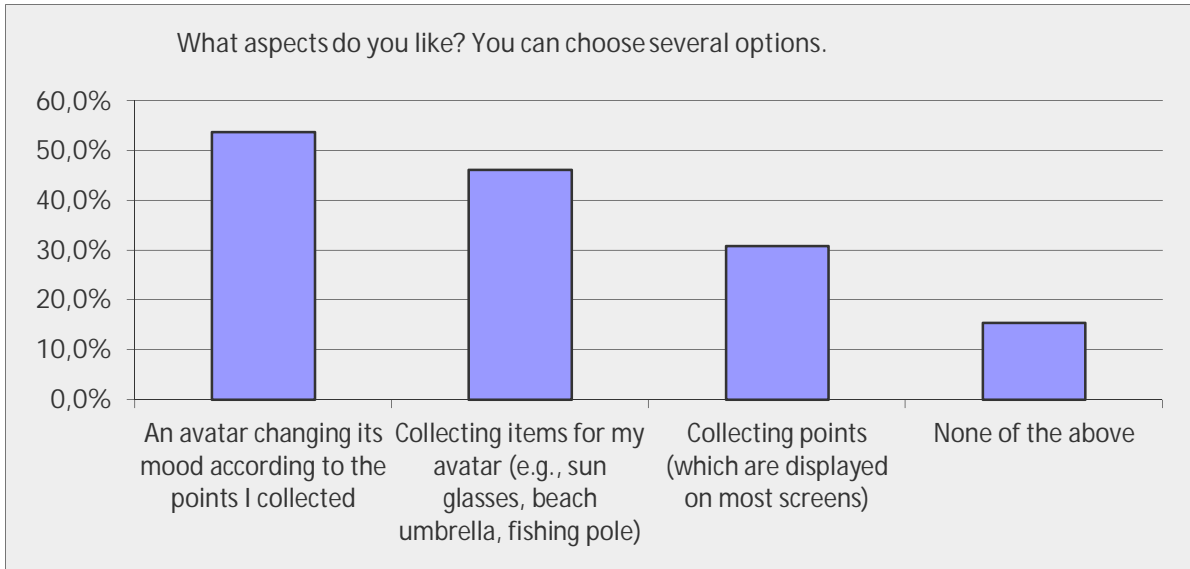
## Avatars



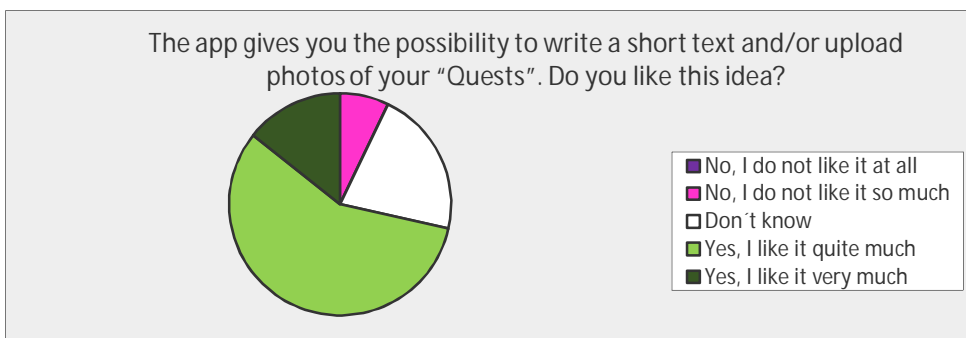
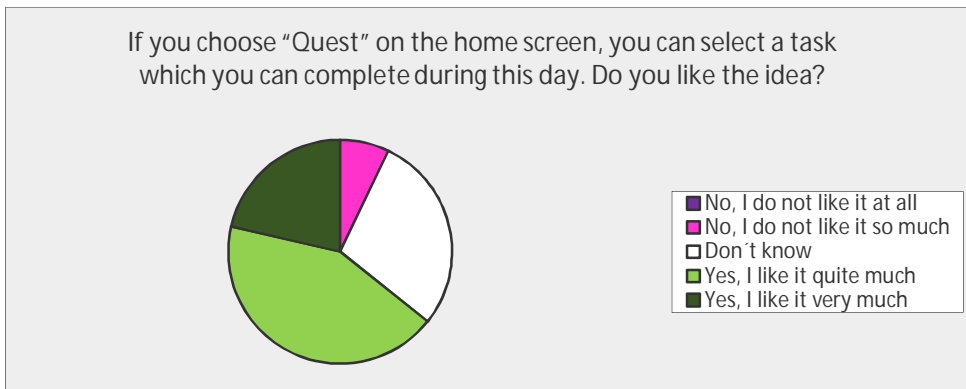
### Comments on avatars:

- It might be nice to know whether the choice of an avatar has any influence on the functionality of the app. For example, does Holidaisy (who is way too feminine for me) give different tips than Holidave?
- I like the idea of an avatar but still don't find these two characters appealing.
- A bit on the stereotypical side as far as gender representations go.
- They bring a smile on my face :)
- They could be gender-free.
- I wonder how many options for an avatar people have while using the app.
- I like Holidave a lot!
- The design is not as stylish as it could be. This is perhaps a bit childish and I would prefer a more human like avatar.

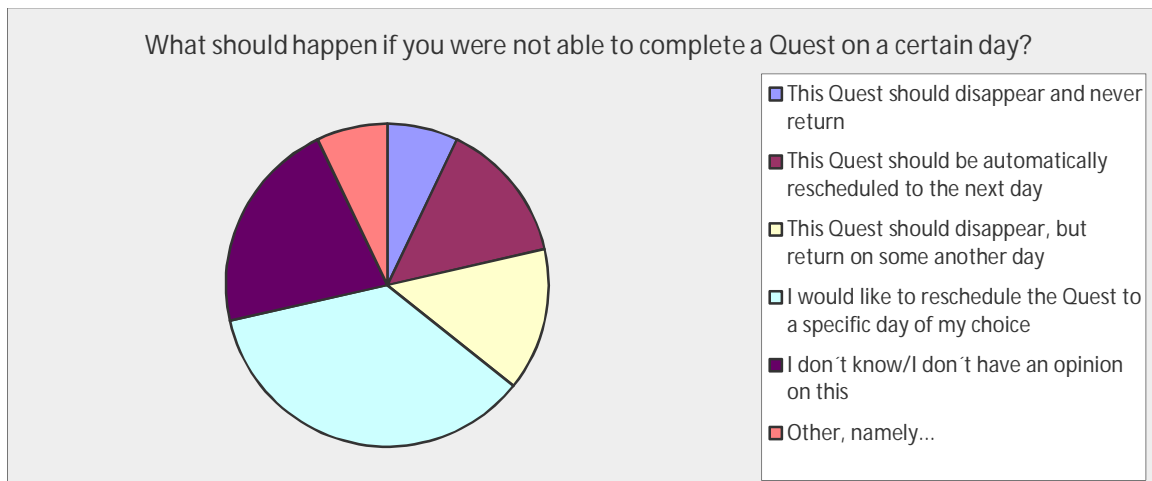




### Quests



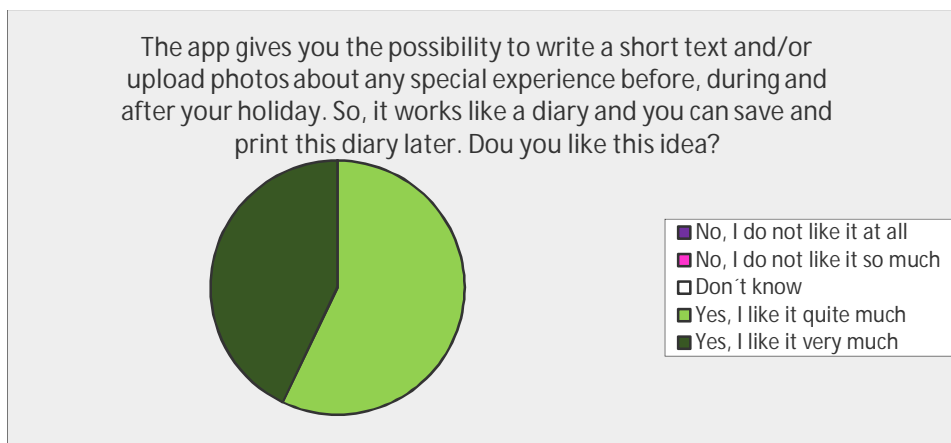
## Quests



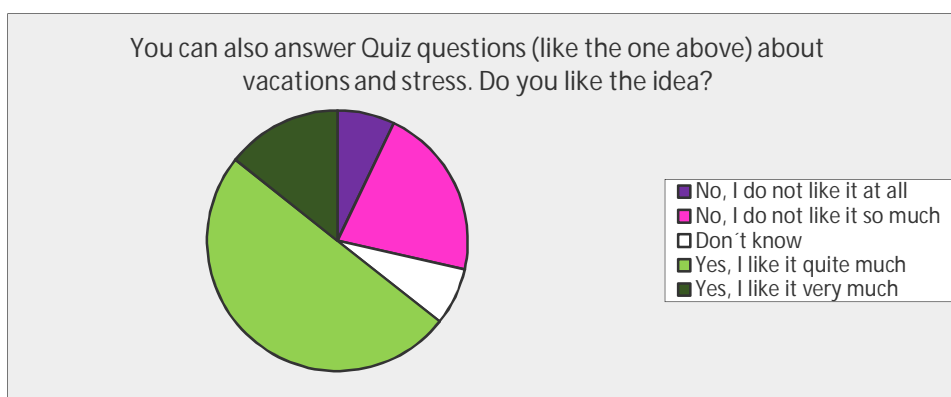
### Comment:

- If I don't have time to complete a quest, it should stay in the app, as a reminder or so. But it shouldn't send me notifications of uncompleted quests. That would be annoying.

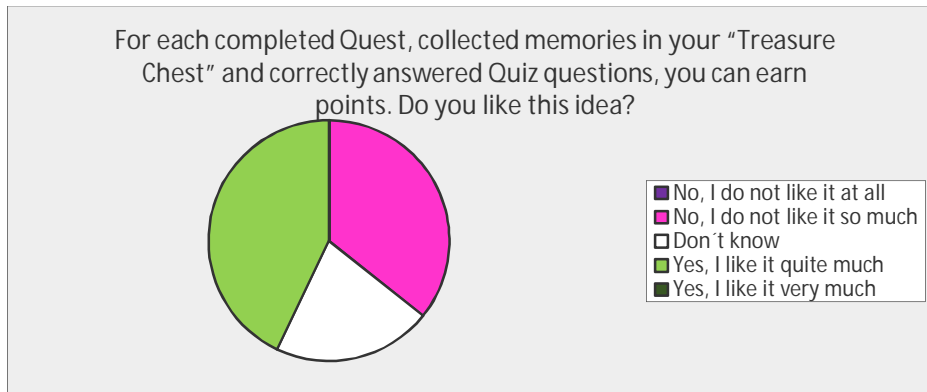
## Experience hunt/Treasure chest



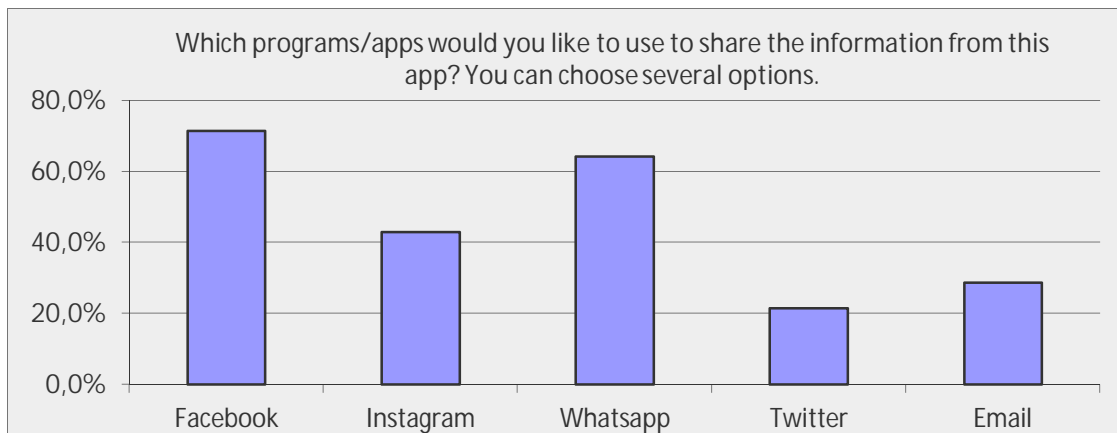
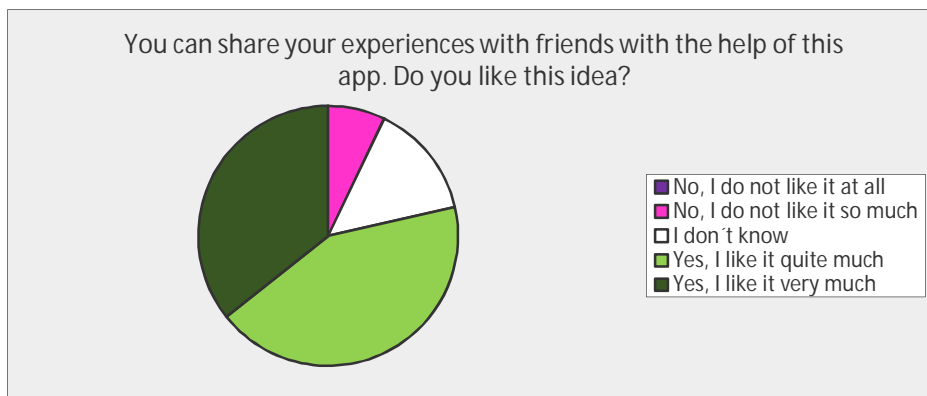
## Quiz



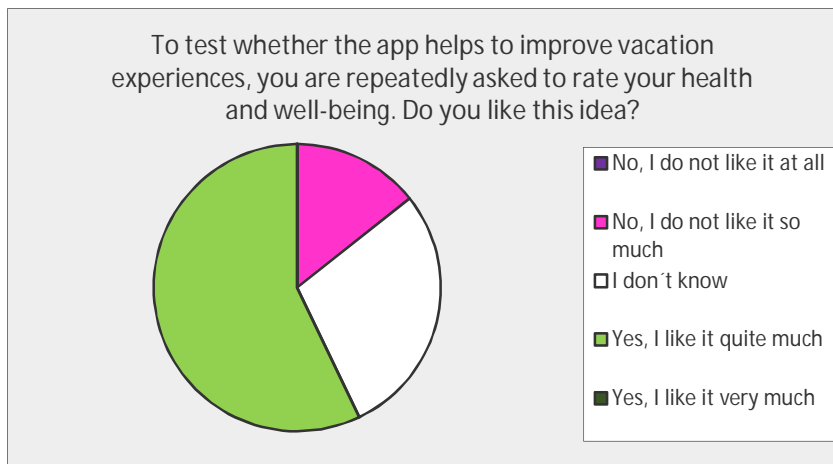
## Collecting points



## Sharing experiences



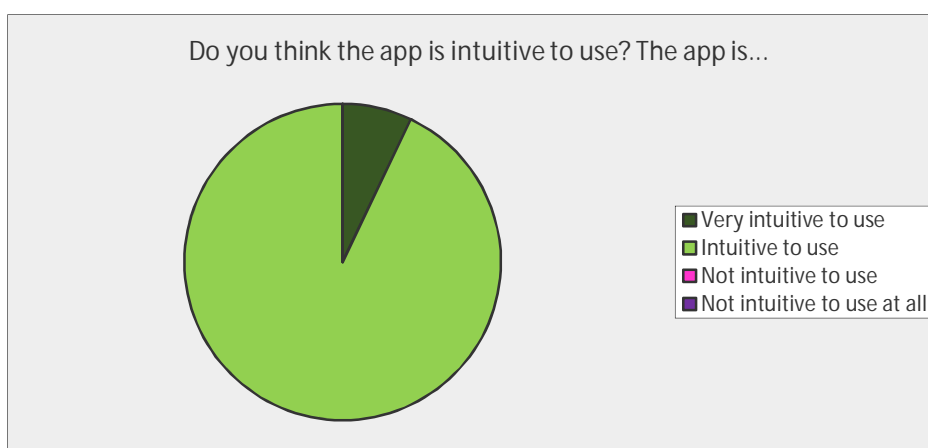
## Tracking health and well-being

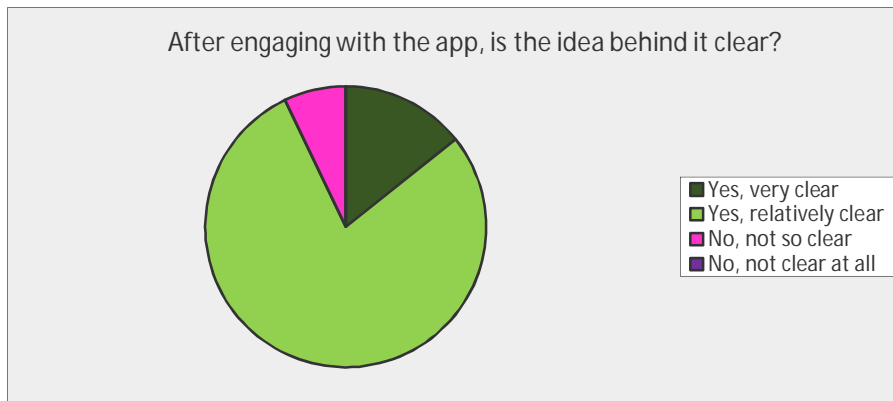


### Why is that?

- Two reasons: 1) it's very important for research, and 2) I think especially the self-rated mood is an important measure for the user's self-reflection. In my opinion, the change in mood level would be much more telling (and motivational) about the effect of doing the quests than arbitrary points.
- It makes you pay your attention to the app, not the holiday itself.
- I feel like holiday is a pretty private thing.
- If the questionnaire is this short, no problem! Filling in a longer questionnaire every day would be too much.
- Idea sounds really good - and needed! But in real life, I don't know how this would work. Maybe I won't have time to fill these questionnaires and do the quests etc. I want to keep it simple: if it's too much work to use the app, I will forget it.
- If it keeps track of health and well-being and the user can see a graph of this daily info later that would be nice. I think personally I wouldn't like to fill in quizzes but other people are more keen on those

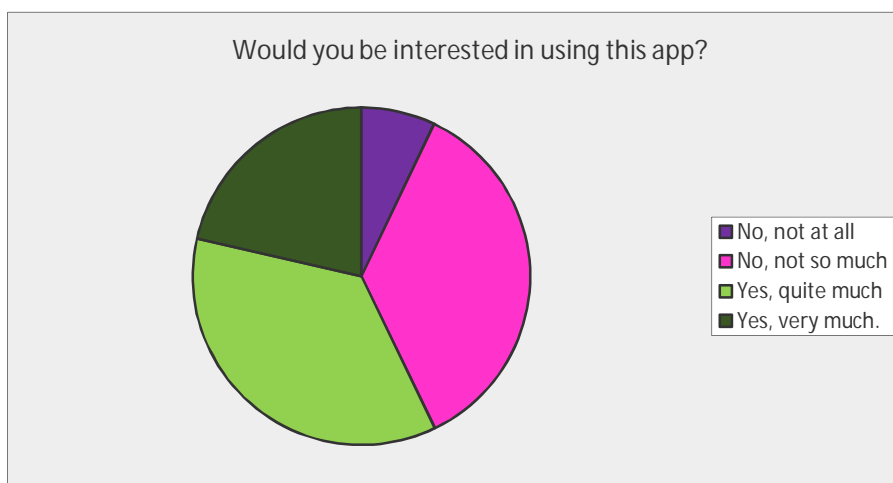
### Usability analysis





### Overall evaluation

This app is...						Average	Rank order of scores
serious	0	0	3	10	1	3,9	2
boring	1	0	4	5	4	3,8	3
stupid	0	0	7	6	1	3,6	5
dull	0	2	3	7	1	3,3	4
lifeless	0	0	5	7	2	3,8	3
customary	0	0	3	7	4	4,1	1
unimaginative	0	0	5	7	2	3,8	3
passive	0	0	6	4	4	3,9	2
rigid	0	1	10	2	1	3,2	5
one-size fits all	2	6	5	0	1	2,4	6
annoying	0	1	6	2	5	3,8	3
	3	10	57	57	26	<b>3,6</b>	



### Comments:

- I would be interested in trying it out to see how it could benefit my recovery process.
- I could use it as entertainment or to kill time while waiting for something, but would not like to take it too seriously.
- Not motivated, do not like things like these (I'm too old!)

### How much would you pay for this app?

- Don't know (2), 0 (5), 1€ (2), 3€ (2), 5€ (1), 20€ (1), 50€ (2)



What is the best aspect of this app?

- Scientifically based actions to improve well-being, put into form of *quests*.
- Maybe to see how you can relax better, lower your stress levels in daily life and using your holidays as a tools to increase that.
- Funny and entertaining pictures, clear arrangement.
- *Collecting and storing memories* of a trip.
- It's always good if stress can be reduced.
- *Experience hunt/Treasure chest*.
- It's versatile yet simple to use.
- It could help to keep time.
- I'm interested on my well-being, so by using this app it makes it easy to get the most out of recovery from work. And enjoy more of my holidays.
- It might help in taking the most advantage of your holiday.
- I like all the ideas and how it looks like.
- That is about holidays.

What is the worst aspect of the app?

- I dislike the points idea, and would rather use more relevant measures, such as mood/exhaustion. But this probably divides opinions. In any case, I think wrong answers to quizzes should never decrease points, it'll surely drive users away from the quizzes!
- The health app market is very challenging. More engaging content, less science and technology.
- Like I have said the visual aspects or the layout of the app doesn't really appeal to me.
- Too much work before, during and after holiday.
- The quiz seems rather dry and boring.
- Doesn't attract people to use it if they are not specifically looking for something like it.
- It needs some practice to use it.
- Somehow I don't like the idea of collecting points on my holiday - I prefer to escape all measurements and unnecessary "suorittaminen".
- It could create stress.
- Maybe "too" scientific? People are not that interested in the background of apps, so I doubt that they would read the info's etc. An app should have a clear benefit for the people using it.
- If you want to rest on your holiday and take it easy, it might get you stressed and thinking, am I doing everything I should or am I wasting my holiday?
- It is an app!

Concluding comments:

- I'd like to see the concept of mini-holidays being more central to the app - after all, the app says "make every day a holiday", but it still seems to be focused on longer vacations.
- The idea of an app that helps people to use their holidays and also daily life between holidays in more effective ways without high stress levels or worries sounds good. The idea of an app that could help you to feel more relaxed about your holiday and gain more benefits from it is interesting in general. The ideas presented here were okay but based on this survey I would not probably download this app. Maybe more appealing visual looks and clearer message on the main idea of the app would help to market it to the big crowd.
- I think it's great but also some room for improvement.

## Appendix 5: Use of TSR budget

Salary (from UTA; oma rahoitus)

- Scientific advice by U. Kinnunen:
  - Salary, personnel costs & overhead: 36%

Funding from TSR

- Student assistant for 15 hours: 2%
- IT advice from Kirsikka Kaipainen, Headsted: 4%
- International workshop 11%  
(room rental, catering, travel tickets and dinner for keynote speakers)
- Travel costs to meet project partners in Germany 3%
- Designing mockups and quote for programming (MindWork Media, 24% tax) 26%
- Usability analysis, translation & improvements of mockups (MindWork Media) 18%

Total: 14 223 €

## Appendix 6: Overview of completed work tasks

Tasks & Main actors	2015												2016			
	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Write proposal for Demola project ( <i>De Bloom</i> )																
Demola project ( <i>student team &amp; De Bloom</i> )																
Generate ideas for concept and functionalities ( <i>all stakeholders</i> )																
Develop content ( <i>De Bloom, Syrek &amp; Lehr</i> )																
Needs assessment ( <i>student sample &amp; HR practitioners</i> )																
Market research on existing mobile/online interventions ( <i>student team</i> )																
International workshop on e-health at work ( <i>all stakeholders</i> )																
Legal advice ( <i>Helin UTA, De Bloom, Kinnunen</i> )																
Present and discuss ideas in focus groups ( <i>De Bloom, Kinnunen, Kaipainen, Syrek, Lehr</i> )																
Invent name for app																
Testing mockups in target group ( <i>De Bloom, potential users IASR</i> )																
Testing mockups in target group ( <i>De Bloom MindWork Media, potential users</i> )																
Refine concept, create flow map & blue prints ( <i>De Bloom, MindWork Media</i> )																
Translate mockups to Finnish ( <i>student assistant</i> )																
Prototyping in Finnish workers ( <i>City of Tmp, Visy, De Bloom, Kinnunen</i> )																
Write final report for TSR ( <i>De Bloom, Kinnunen</i> )																
Recruit partners to fund coding the program ( <i>De Bloom, Lehr, Syrek</i> )																
Write project proposal for German insurance ( <i>De Bloom, Lehr, Syrek</i> )																
Negotiate with German insurance ( <i>De Bloom, Lehr, Syrek</i> )																
Write final report for TSR ( <i>De Bloom, Kinnunen</i> )																