Supporting Health by Technology

IX

16 & 17 MAY 2019 MartiniPlaza Groningen
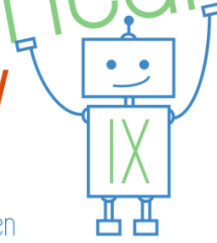
Abstract Book

Thursday, May 16th

Friday, May 17th

Monitoring, Feedback & Depression

REAL-TIME DETECTION OF EARLY SIGNS OF DEPRESSIVE RELAPSE BY MOOD MONITORING AND STATISTICAL PROCESS CONTROL

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Introduction: Formerly depressed patients often fail to recognize that their depressive symptoms are coming back and seek help when it is too late. This study demonstrates the potential of monitoring of feelings using the experience sampling methodology and real-time detection of change using statistical process control (SPC) to detect early signs of returning depressive symptoms.

Methods: Participants were seven patients from the community with a history of depression who discontinued their antidepressants. Participants answered questions on momentary feelings (e.g., I feel restless) online using their smartphone three times a day for four months. Using an SPC method, we evaluated for each participant after each data point if the running mean level of 'feeling restless' had significantly increased compared to a reference period.

Results: For the five patients who tapered without an increase in depressive symptoms, the running mean level of 'feeling restless' did not increase significantly during the research period ($P>0.05$). The running mean level of 'feeling restless' did increase significantly in the two patients who experienced an increase of their depressive symptom levels two months later ($P<0.05$).

Conclusion/Discussion: Using experience sampling of feelings and SPC , the increase in restlessness could have been detected in real-time, more than two months before depressive symptoms increased. SPC thus provides methods that allow early detection of a deteriorating mental state in real-time. In the future, SPC could potentially be applied in clinical practice to detect prodromes before the onset of a disorder, and may assist with clinical decision making aimed at prevention.

Monitoring, Feedback & Depression

DEVELOPING A FLEXIBLE INTERFACE TO GENERATE PERSONALIZED DIARIES IN MENTAL HEALTH CARE

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Introduction: Research shows that the frequent recording of mood and experiences throughout the day (termed the experience sampling method, ESM) may be highly relevant for mental health care. Clinicians and patients expect ESM may increase awareness, insight and self-management, and it may personalize interventions or alert patients to rising symptoms. The present project aims to develop a flexible interface to enable use of ESM in clinical practice.

Methods: Forty patients and 31 clinicians participated in interviews and focus groups to identify needs and barriers for implementation. Together with patients, clinicians, researchers, IT-experts, a first prototype for a flexible interface to generate personalized diaries was developed. The interface is termed PETRA: ***PE***rsonalized Treatment Real-time Assessment.

Results: Results indicated PETRA should offer extensive opportunities for personalization (e.g., the diary must be flexible regarding item content, measurement schedule, and the phase of care). However, considering time is limited in mental health care, diaries and feedback must be constructed quickly and easily. At the same time, diaries and feedback must be scientifically valid and supported by the latest innovations in research. Finally, data handling should be embedded in patients' personal health record ("elektronisch patientendossier") to meet all privacy and safety regulations. The first prototype meets all these standards and will be further developed to optimize implementation.

Discussion: With further developing, PETRA can be a tool to improve the patient-clinician relationship, increase patient self-management, lead to objective, personalized, reliable and visual data to guide treatment decisions, and increase efficiency of care.

Monitoring, Feedback & Depression

A PERSONALIZED MONITORING AND FEEDBACK TOOL AS AN ADD-ON TO SUPPORT STANDARD TREATMENT FOR DEPRESSION

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Background. Major depressive disorder (MDD) is a disabling condition. Optimizing treatments will reduce societal burden, risk for relapse, and improve an individual's quality of life. In this project, we use a truly personalized electronic diary and feedback module, named *Therap-i*, to intensively self-monitoring daily fluctuations in affect and person specific factors. We hypothesize that this module will contribute to decreased depressive symptoms via a more precise descriptive diagnosis, tailored treatment and increased self-insight, resulting in enduring increased self-management and better functional outcomes.

Methods: The study is a pragmatic randomized controlled trail (RCT). We aim to recruit 100 MDD patients in tertiary care. Patients will be randomly allocated to the treatment-as-usual (TAU) or *Therap-i* group. TAU consists of policlinic psychological treatment. The *Therap-i* module is an add-on to TAU, including electronic diary based self-monitor five times a day for two months. Diary items are based on participants' case-conceptualization. After 2, 4 and 8 weeks of monitoring, participants will receive a personalized feedback report, which will be discussed during a regular consult.

Results & Discussion. As the RCT study is currently ongoing, results of the pilot studies will be presented. These prior findings indicated that personalized electronic diary assessment in severely affected patients is feasible. Moreover, visualizations of complex data in personalized feedback reports (e.g. line and network graphs) proved to be helpful to obtain insight in complex symptom dynamics. The RCT study is the first to examine the effects of a truly personalized add-on module on symptoms in complex MDD patients.

Monitoring, Feedback & Depression

HOW CAN A SMARTPHONE PREDICT A MANIA OR DEPRESSION?

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Annually about 740,000 people in the Netherlands have a mood disorder. When someone has a mood disorder, general mood stays distorted or inconsistent with circumstances and interferes with the ability to function for a long time. Patients indicate that they would like to have better insight in own behavior and changes which might indicate a relapse. Previous research showed that a smartphone can collect a lot of data about behavior and associated mood. Based on this knowledge, using design research strategies, a first prototype of an application named Smart Alert was developed. The aim to develop Smart Alert is to help people who experienced a depressive or manic period with providing insight in their behavior and recognize behavioral changes in an early stage which might indicate a manic or depressive relapse.

Through Smart Alert it is possible to warn a patient when their behavioral patterns change, which might indicate a manic or depressive relapse a selfmanagement tool is born. The application measures the distance walked every day, the number of steps, social media usage, how often the patient makes a call, the nightly activity and monitors the mood of the patient by a lifechart. When there are significant changes in behavior, the application alerts the user. This way the app helps by giving insight into behaviorchanges and mood.

We have a testgroup of 62 participants who are diagnosed with a mood disorder. The data that is being generated is currently being analyzed with the aim to improve the algorithm.

(In)formal Care & Technology

GOALS AND CONFLICTS OF INFORMAL CAREGIVERS OF PATIENTS IN THE PALLIATIVE PHASE

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Background: This study aimed to explore goals informal caregivers have when their loved-one receives palliative care, conflicts they experience in achieving goals and the kind of support caregivers benefit from in this period. The outcomes form the basis for developing a digital tool to support Dutch caregivers of a loved-one in the palliative phase to reduce caregiver burden and promote positive care experiences.

Methods: Semi-structured qualitative interviews were conducted with (former) informal caregivers (N=20) and care professionals serving patients receiving palliative care and their informal caregivers (N=15). Interviews were recorded, transcribed verbatim and analyzed using thematic analyses.

Findings: Informal caregivers aimed to "live life as normal as possible", "comfort their loved-one", "spend quality time with loved-one/family", and "continue own activities (work, social life)". Care professionals experienced the imbalance between caregivers' wish to intensify professional support/help from the social environment, and loved-ones' wish to protect their privacy. Caregivers encountered difficulties in balancing caregiving with own activities, i.e. work, social life. Caregivers expressed that the feeling of being supported or acknowledged as individual in this situation supported them in this phase. Caregivers indicated that an overview of the regulations and various options for support would reduce their frustration and help to better balance caregiving tasks and other activities.

Discussion: Most caregivers care with unconditional love for their loved-ones, although they experience growing struggles in providing care and their other activities. To support caregivers of patients in the palliative phase pro-actively, guidance in balancing caregivers' own goals with caregiving demands could be helpful.

(In)formal Care & Technology

TELECARE FOR HEART PATIENTS: ARTICULATING KNOWLEDGE FROM EXPERIENCED PATIENTS AND PROFESSIONALS

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A successful project on telemonitoring heart patients has turned into a regular service; a daily practice in which patients are cared for at a distance. Even though the service is regular, it is still a fairly new practice to care for patients with severe heart problems living at home. In this research we focus on what patients and care givers need to know in order to let the new practice work.

We want to use this opportunity to share our ideas on how to understand and bring forward all implicit knowledge that patients and care givers in the telecare service have gathered. Part of the project results are patient journeys and care professionals' profiles which we will draw to map both the service and the new knowledge. A patient journey describes the 'steps' the care process contains from a patient's point of view. In order to understand the 'heart care at home-service' we are planning to observe and interview patient and professionals. We also will use a cultural probe, a kind of extended and creative form of a diary. Our results will be used to optimize the telecare service and develop education material to train the 'new home care professional'.

In this presentation we will share our preliminary results and discuss the challenges of our qualitative, somewhat unconventional and innovative methodology.

(In)formal Care & Technology

BENEFITS OF SMART COMMUNICATION BETWEEN SOCIAL ROBOTS AND EPD'S, FOR CLIENTS WITH EARLY STAGE MEMORYLOSS

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Background: eHealth solutions (ecosystems) become more applicable when developed in co-creation with end-users and if so, they decrease the efforts of caregivers while used.

Goal: The goal was two-sided: develop scripts that fit the client's personal goals, and establisha connection between a social robot and an EPD, in order to allow them to communicate without intervention.

Methods: In the first part of a one-year project, a framework for scripts was built and functional connections were established. During the second part these products were tested in a pilot.

Participants were interviewed, structured through empathy maps. Personas were created based on these interviews, reflecting their needs and wants. 20 clients and their caregivers participated in the ten week pilot. Goal Attainment Scaling (GAS) was used to identify their personal goals, according to this, personalized scripts were developed and scheduled in 'Mijn Lable Care' in order to be 'excecuted' by the robot 'Tessa'. The realisation of the goals was monitored by caregivers.

Results: Care-dependent clients favoured goals depending on the caregiver's workflow. Clients with more awareness of their memory loss, identified goals to assure their own independence. Approximately 60% of the clients showed progress on their personal goals, 30% showed no change, and 10% showed a decline. The caregivers rated the use of the joint technologies 7.7 on a ten-point scale.

Conclusion: Jointed technological solutions are proven most effective for clients who experience difficulties due to their memory loss. The level of caregiver-involvement affects the usefulness and the effect of the solution.

(In)formal Care & Technology

IAMYU: IDEOGRAPHIC ADAPTIVE MONITORING IN REAL-WORLD RESIDENTIAL YOUTH CARE

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Introduction: Personalized care is hot. Yet, the idiosyncratic nature of treatment processes is currently not well understood. Existing approaches to personalization are group-level based or use static matchmakers, whereas treatment processes are highly dynamic and personal. Consequently, 1) clinicians lack tools to time and adapt their treatment to individual and changing client needs, 2) clients feel less involved and empowered in their own care, and 3) scientists lack insight in intra-individual change processes. iamYu aims to provide a needs-based monitoring system to enable personalized youth care.

Methods :
A public-private-academic partnership was formed between client representatives, youth care organizations, technology providers and universities. All stakeholders are actively involved throughout the development process. iamYu is based on Idiographic System Modelling (ISM) and Complex Dynamic Systems theory. Instead of standardized, symptom-based questionnaires, clients and clinicians co-create the assessments. ISM relies on a semi-structured interview to construct a network of important factors and their interrelations, which reflects the clients current situation. ISM factors are translated into personalized assessments suitable for high-frequent process monitoring. Individualized time series analyses are used to identify early warnings that signify 'sensitive periods'.

Results
iamYu allows for idiographic and adaptive monitoring in real-world care settings. What distinguishes iamYu from other measurement-based care approaches is our emphasize on collaboration between clients, clinicians, and scientists for data collection, visualization, and interpretation. This allows for transtheoretic and transdiagnostic application of personalized care.

Discussion
iamYu provides an innovative approach to personalized care and collaboration. History, background, current development phase and future applications will be presented.

Symposium Serious Games

DESIGNING AND TESTING A MOBILE GAME TO HELP YOUNG PEOPLE QUIT SMOKING

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Smoking is one of the leading public health problems in the world. Currently, there is no evidence-based intervention program available to help young people quit smoking. In addition, recruitment and retention of young people are the most challenging aspects of the implementation and evaluation of smoking cessation interventions. In this project we designed *HitnRun,* a multi-component mobile game based on on the one hand theory and the other hand user research*,* to overcome the problems with current smoking cessation interventions among young people. By recruiting smoking youth from the outset of the design process, we have a better chance of designing something that will ultimately be viewed as relevant to their needs.

We examined the effects of *HitnRun*, compared to a psychoeducational brochure, in young smokers who are motivated to quit smoking (n = 144, M_{age} = 19.39). We tested the effect of *HitnRun* on weekly smoking behavior and for dose-response effects before, after, and three months after an intervention period of four weeks. Both intervention groups showed steep decreases in weekly smoking behavior over measurement moments, yet there were no differences found between both groups. However, participants that spent more time playing *HitnRun* showed steeper decreases in weekly smoking behavior over time compared to participants that spent less time playing *HitnRun*. Thus, a sub group of young people that connected with *HitnRun* also benefitted the most from that intervention. The need for personalizing smoking cessation programs for young people will be discussed, along with future iteration ideas for *HitnRun*.

Symposium Serious Games

TAKE A DEEP BREATH: BIOFEEDBACK VIDEO GAMES FOR ANXIETY REGULATION

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Sensing, monitoring and interpreting physiological signals is an important aspect of emotion regulation. Furthermore, physiological symptoms are strongly related to the impairment of youth suffering from anxiety. Biofeedback is a process in which an individual's physiological states are measured and information about these states is subsequently fed back to the individual in order to facilitate physiological regulation. Biofeedback seems promising for anxiety treatment however there is a lack of insight into why or through what mechanisms biofeedback training works. Especially the role of cognitive appraisals has received little empirical attention even though these are important determinants of adaptive trajectories in responding to anxiety. Furthermore, an important practical limitation of biofeedback training is that it requires continued practice but lacks engagement. DEEP is a video game that uses breath-based biofeedback and virtual reality to help individuals regulate their anxiety in an interactive manner. Players control the game by using deep diaphragmatic breathing a technique that has been found to effectively alleviate anxiety. In current study youth (17-25 years old) with elevated anxiety symptoms were randomly assigned to four practice sessions with DEEP or a phone-based guided breathing exercise over the course of two weeks. Changes in anxiety symptoms, physiology (e.g. heart rate and breathing) and appraisal patterns (e.g. self-efficacy) are measured at the screening, throughout all sessions and after three months. Initial results show that engagement and appraisals of self-efficacy and control were related to better anxiety regulation.

Symposium Serious Games

IN-GAME PLAY BEHAVIORS DURING AN APPLIED VIDEO GAME FOR ANXIETY PREVENTION PREDICT SUCCESFUL INTERVENTION OUTCOMES

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Anxiety disorder is the most prevalent and frequently diagnosed disorder in youth, and associated with serious negative health outcomes. To prevent the escalation of anxiety in children at-risk, the video game *MindLight* has been developed. The game incorporates three therapeutic techniques based on cognitive-behavioral principles: relaxation, exposure, and attention bias modification. Results from two randomized controlled trials show improvements in anxiety that are maintained up to six months. These results are promising, but it remains unclear if children's engagement with the therapeutic techniques actually predict improvements in anxiety symptoms. An important advantage of game-based interventions is that they provide excellent opportunities to isolate therapeutic action mechanisms and test their impact on intervention outcomes.

In the current observational study, on-screen videotaped output while playing *MindLight* was coded and analyzed for forty-three 8 to 12-year old children with elevated levels of anxiety. Results showed that changes in in-game play behaviors representing therapeutic exposure techniques predicted improvements in anxiety symptoms three months later (when children had not played the game for three months). This study is a first step towards identifying and validating game mechanics that can be used in new applied games to target anxiety symptoms or other psychopathologies with the same underlying deficits. Practical implications for clinical research on anxiety, game design, and future research will be discussed.

Symposium Serious Games

EXPLICIT MENTAL HEALTH MESSAGING INFLUENCES VIDEO GAME SELECTION IN YOUTH WITH ELEVATED MENTAL HEALTH SYMPTOMS

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The first impression of a therapeutic video game may determine both whether and how a game is played. As the majority of internalizing mental health disorders (i.e., disorders that are aimed inwards like depression and anxiety) are untreated in youth, youth outside the clinical setting with elevated mental health symptoms are a promising target audience for therapeutic games. However, being explicit about the mental health aim of a game may theoretically both promote and impede game uptake. Thus, the current study examined the effect that an explicit mental health introduction message has on game selection. Undergraduate students (n = 129, Mage = 21.33, SDage = 3.20) with elevated mental health symptoms (i.e., depressive, anxiety and stress symptoms) were asked to select and play a video game following two game trailers: one including a mental health and one including an entertainment focused message. Although players believed they had two game options, both trailers portrayed the same game with random assignment determining which design held which message. Results showed that participants were 3.71 times more likely to choose what they believed was the mental health game (p < .001). Additionally, participants preferred one trailer design over the other and were 5.65 times more likely to select the mental health game promoted in one trailer design over the other (p < .001). Thus, using explicit mental health messaging to promote therapeutic games to youth with elevated mental health symptoms is promising particularly when the trailer design is attractive.

Health Advice & Technology

360 DEGREES DIAGNOSIS OF TYPE 2 DIABETES TO PERSONALISE LIFESTYLE ADVICE

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Lifestyle modification can be effectively used to halt disease progression and even normalize symptoms for type 2 diabetes (T2D) – what is known as remission. Especially interventions aimed at modifying physical activity (PA) and diet are very promising. However, most of these interventions are one-size-fits-all. A more personalised and tailored approach, based on the physical, mental, behavioural and socio-economic health status of a person, helps in optimizing such interventions to better fit the needs of individual patients.

In 2018, the so-called 360° diagnosis tool has been developed by TNO for use in the primary care setting and specifically for the treatment of T2D. With this tool an extensive assessment can be done of the physical and mental health status, the lifestyle behaviour and the socio-economic environment of an individual, using data from online questionnaires and clinical data. Combined, these data give a holistic view of a patient's health status, which is visualized in the "profile wheel" (see figure 1). Usability tests showed positive evaluations of this tool.

At the moment, the tool is applied in a Lifestyle as Medicine program in which also a personalised diet and/or PA is advised based on biomarker indices derived from an oral glucose tolerance test. The profile wheel is discussed in the consult between the practice nurse and the patient, wherein the traffic light colors reflect the status of the patient. The goal of this pilot is a feasibility test of the 360° diagnosis tool and personalised advices in a primary care setting.

Health Advice & Technology

DENTAL COACH (' MONDMAATJE'), DENTAL CARE E-HEALTH PREVENTION PROGRAMME WITH AN APP

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Abstract Introduction: During the last 20 years little improvements have been made in the field of behavioural changes in dental prevention. Still, many patients have difficulty following the advice that they receive from their dental hygienist, dentist or periodontist. The aim was to develop an e-health dental prevent programme with an app which will support patients in behavioural changes to make their teeth healthier and keep them healthy.

Abstract Methods: Four years ago, a starting design was made. In cooperation with Freed interactive the Dental Coach prevention programme was developed. The programme is scientifically substantiated, and all tailored prevention information is provided for patients and dental care providers in a clear overview. In a dental office the programme was tested by periodontists, oral hygienists and patients.

Abstract Results: By using a dashboard, dental care providers can use the various features of the Dental Coach prevention programme. Information, which is entered in the dashboard, becomes visible for the patient in the app. This results in a personalised oral health care advice and guidance. Various features are available to obtain the requested patient dental behaviour like customised advice, personal action plan, individual motivational messages, diary function, brushing timer and appointment reminders.

Abstract Conclusions/Discussion: Dental Coach is a useful dental e-health prevention programme.

Conflict of interest: LJMM Gründemann and MG Vroom are owners of Dental Coach/MondMaatje.

Health Advice & Technology

PROMOTING QUALITY-ASSURED ONLINE SELF-TESTING FOR SEXUALLY TRANSMITTED INFECTIONS WITHIN A MARKET-DRIVEN CONTEXT

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Introduction: The number online providers of self-testing for sexually transmitted infections (STIs) is increasing in the Netherlands. Self-testing may contribute to timely diagnosis, lower healthcare costs and shorter waiting lists at STI clinics. But ill-informed self-testing may lead to underdiagnosis and insufficient partner management. To improve linkage to high quality self-testing the online advice application Advies.chat was launched in 2017. We assessed process indicators of its implementation in 2018.

Methods: The application generates tailored advices based on clinical guidelines. It takes into account personal characteristics, sexual behaviour, sexual risks and symptoms. A built-in chatbot answers free text questions users can write themselves. The advice explains which specific STIs need to be tested for and refers to selected providers. Anonymous process data from the Advies.chat database were analysed.

Results: Advies.chat was visited 337,736 times in 2018; 113,257 visitors started the questionnaire and 17,449 the chatbot. The most common reason for using Advies.chat was the 'possibility of being STIs or HIV infected' (75%). Around 60% finished the questionnaire, leading to 65,736 advices and 8,739 clicks to selected online self-test providers.

Conclusions: Online self-management tools can promote quality self-testing within the upcoming market of private STI testing. Advies.chat shows that online triage and tailored advice is feasible and increases traffic to quality testing providers. The contribution of Advies.chat to the estimated 430,000 consultations at GP's and STI clinics in the Netherlands is sizable. Methods need to be developed to assess the impact of online self-management and self-testing on STI control.

Health Advice & Technology

TECHNOLOGY AS A SOURCE OF HEALTH INFORMATION FOR YOUTH IN EGYPT

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Background: Health information access is an important domain in which technology plays an increasing role. Egypt is a lower middle income country with 61% of its population under the age of 30 and there is an increased access and use of Internet in the country.

Objectives: The aim of the study was to measure the overall use of Internet based health information among youth in Egypt; and the association between gender, age, health status, family income and parental education level and the use of Internet to obtain health related information.

Methods: This study design was based on an Internet questionnaire-based cross-sectional survey with questions regarding age, gender, perceived health status, family income and parents' education. Respondents were recruited from two schools and universities in Cairo. The total sample size was 301 participants aged 16-26 years.

Results: The prevalence of using the Internet among participants of this study was 72.8%. The results of the multivariate analysis showed that the strongest statistical significant predictor was having a high family income (OR=1.95; CI95%: 1.14 – 3.33). Gender was also a statistically significant predictor for using Internet for searching for health information. For females, the odds ratio was 1.90 as compared to males (OR=1.90; CI95%: 1.11 – 3.27).

Conclusions: The prevalence of using the Internet among youth in Egypt to search for health information is relatively high. The results were used as a rationale for recommendations of relevance for future interventions programs and online health information related research.

Games & Virtual Reality

EXPLORING THE POTENTIAL OF VIRTUAL REALITY IN PATIENT EDUCATION: THE CASE OF CHRONIC KIDNEY PATIENTS

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Background: The rapid evaluation of virtual reality (VR) has allowed novel and creative solutions across clinical medicine. Yet, VR has not been used for the purpose of patient education. Studies have shown that 40-80% of the information provided by healthcare practitioners is forgotten by patients immediately. VR may have various benefits such as better information processing and recall due to more absorption and less distraction.

Aim: To evaluate a VR-intervention to educate kidney patients about peritoneal dialysis, a type of dialysis that can be conducted at home.

Method: Pre-dialysis kidney patients (n=23, average age 67) were exposed to a VR-intervention and subsequently interviewed about their experiences and the (self-perceived) impact it had on their knowledge and reassurance/anxiety about the treatment. All interviews were transcribed verbatim and analysed with two independent coders, using inductive analysis.

Results: The majority of patients positively appreciated the VR-intervention. Patients mentioned being less distracted and more focused on the information in the VR-intervention. One-third of the patients mentioned that VR had no added value to inform them about peritoneal dialysis. Most patients stated that the VR-education had a positive impact on their knowledge. While the VR-education was reassuring for most patients, some indicated that the intervention had actually increased their worries and insecurities.

Conclusion: Patient education by VR seems to be acceptable to most patients and may help to improve information processing and recall of medical information. It can be reassuring for some patients, but may also be frightening. More quantitative and experimental research is needed.

Games & Virtual Reality

ASCES: A BALANCED GAME BASED SOLUTION FOR CHRONIC DISEASES

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Worldwide the prevalence of obesity has increased dramatically, making it one of the biggest drivers of preventable chronic diseases and healthcare costs. The treatment of obesity is difficult, as it is a multifactorial problem. Obesity hampers treatment of many other chronic diseases like COPD and diabetes. It is known that at an early age a reset in the programming of body cells can occur, inducing a lifelong sensitivity for the development of obesity. Recent research has shown that changes in body composition can already start in children as young as 4 years old. Obesity is not just a matter of too much food and too little exercise. It should be handled from many different perspectives, not at least from a psychological and family-based perspective. In this project, we focus on the prevention of obesity in children using an e-health obesity prevention program: ASCeS (Anima Sana, Corporus Sana). This presentation shows the first prototype of this game based application. It will also show the development process with the Game of Games (a game to build games). The game is based upon the balanced scorecard principle, on four critical obesity factors objectives are formulated and (automatically) measured. A Tamagotchi will show if you perform well on these critical areas. The game will combine Augmented Reality, Virtual Reality but ultimately Reality. It can be tweaked to the real circumstances (demographics and professional healthcare).

Games & Virtual Reality

DESIGN OF A SMARTPHONE APPLICATION TO PROVIDE VIRTUAL HEALTH COACHING FOR ASTHMATIC CHILDREN

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Introduction:

Asthma is a chronic respiratory condition characterized by the inflammation of airways. Symptoms include wheezing, cough, shortness of breath and chest tightness. Asthma is highly prevalent in children. The symptoms affect the sleep patterns of the child, hinders participation in outdoor activities and could lead to anxiety. Recent statistics reveal that In the Netherlands, the incidences of childhood asthma are prominently increasing. Adhering to prescribed medicines and pursuit of physical activity (PA) can bring asthma to controlled phase. Because of the chronic nature of asthma, there is a need for continuous virtual health coaching which would induce healthy behavior changes in the child.

Methods:

A literature review using keywords asthmatic children, pursuit of PA, behavior change, persuasiveness and virtual health coaching and requirement engineering to gather features that would be incorporated in the application was implemented. Stakeholder analysis consisting of parents of asthmatic children, pulmonary pediatrician, nurse, technical physicians and software developers was conducted in the hospital to gather requirements.

Results:

Five theories of behavior change and behavior change techniques (BCTs) were decided to be included in the coaching strategies.

The coaching strategies adopted in the design include avatar coaches, diary trackers, online forums, teleconsultation, educational videos and games. The theories and BCTs are chosen that would support goal setting, feedback, monitoring, awareness and habit formation. Game mechanics such as challenges, rankings and levels are employed in the application.

Conclusions:

An application that incorporates features of persuasive system was designed to induce healthy behavior changes in asthmatic children.

Games & Virtual Reality

DEVELOPMENT AND EVALUATION OF A VIRTUAL REALITY PUZZLE GAME TO DECREASE FOOD INTAKE

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Food exposure is considered the leading cause of overeating. However, subsequent intake is believed to decrease when individuals engage with foods outside an eating context in an unrelated task/game—this is called the pre-exposure effect. This effect has only been found with physically present foods and not with images. As Virtual Reality (VR) provides a sense of physical presence, we examined whether the pre-exposure effect also occurs with virtual food.

We performed a 2 (Mode: Real-Life vs. VR) x 2 (Stimulus Type: Food vs. Nonfood) between-subjects study (n = 162). An immersive VR (HTC Vive) puzzle game was developed with a gameplay based on the pre-exposure effect. Two versions of the VR game were developed, one with virtual chocolate (Virtual-Food condition) and one with virtual wooden (Virtual-Nonfood condition) puzzle pieces. In the Real-Life-Chocolate condition players puzzled with real chocolate and in the Real-Life-Nonfood condition with real wooden pieces. Subsequent food intake was measured with a taste task.

In the whole sample, no main effect of Stimulus Type and no interaction between Mode and Stimulus Type was found. Food intake was higher after puzzling in VR than in Real-Life ($F(1,158)=5.556, p=0.020$). Females' food intake was higher after puzzling with virtual and real chocolate than wooden puzzle pieces ($F(1,114)=3.986, p=0.048$).

The pre-exposure effect was small and only found for females, which limits the game's potential as intervention for decreasing intake. The higher food intake after a VR experience is in line with theories on computer-related mental stress effects on intake but needs further investigation.

Demo Session 1

ASCAPED: DESIGN OF A VIRTUAL ESCAPE ROOM TO TRAIN SOCIAL SKILLS FOR CHILDREN WITH ASD

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Background: Children with autism spectrum disorder (ASD) often face challenges in social situations. Clinical practice provides a broad spectrum of interventions for children with ASD to improve social skills, but many interventions lack proof of effectiveness, or the effectiveness is shown in terms of the continuity and intensity of the intervention. In autism research, researchers increasingly explore the potential of digital (game-like) interventions to improve traditional social skill training. Digital (game-like) interventions have the potential to embrace different strategies to motivate, trigger, and facilitate learners.

The escape room trend has grown in huge numbers in recent years. Escape rooms cannot be played successfully without effective social interaction and communication between the players. The goal of this research project is to develop a virtual escape room for children with ASD and their peers, focusing on communication and social skills improvement.

Methods: Following the design research framework, four steps have been taken in the design process. Each design step consisted of the design of a prototype, a prototype playtesting session and a creative workshop with children (n=32).

Results: A three player virtual escape room prototype is developed (figure 1) and playtested with children. Children each play on a tablet device and need social interaction to successfully fulfill the game. During play sessions observations (n=15) show that children are immersed, motivated, and working together effectively.

Conclusions: This study presents the design process of a virtual escape room. The developed game looks promising in the enrichment of social skills training for children with ASD.

Demo Session 1

EHEALTH TECHNOLOGY TO PREVENT AND CONTROL ZOONOTIC OUTBREAKS: THE ONE HEALTH HUB.

MF ter Horst, N. Beerlage-de Jong, LMA Braakman-Jansen, J.E.W.C van Gemert-Pijnen
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Background: According to the Centres for Disease Control and Prevention, zoonotic diseases encompass a large part (75%) of all new or (re-)emerging infectious diseases in people [1]. To deal with these infections, cross-sectoral cooperation between human, animal and public health sectors is essential [2]. For this reason, the OneHealth approach must be applied, wherein these sectors strongly collaborate in order to achieve better public health outcomes [3]. However, as of yet this cross-sectional cooperation is suboptimal and should be improved [2].

One Health Hub: In this study, funded by ZonMW and Interreg (DE-NL), a web-based eHealth technology is developed, the *OneHealth Hub* (OHH). The OHH aims to support cross-sectoral cooperation by providing (1) information, (2) education and (3) communication, and by including not only professionals (working in human, animal or public health) but also general public as target group. It consists of an **interactive tailored Q&A system** for professionals and general public, and a **serious game** for professionals to support cross-sectoral cooperation through skills training for multidisciplinary decision-making during zoonotic outbreaks.

The OOH demo will be introduced, participants can experience how a health technology can offer support in the prevention and control of zoonotic diseases. For example, the visitor can look up specific information by using the chatbot (part of the Q&A system) or the visitor can play the serious game in order to understand the complexity of decision making during zoonotic outbreaks. Demo presenters provide background information about the development process of the OHH.

Demo Session 1

BLENDED EHEALTH EDUCATION

N. Köhle, J. Keizer, H. Kip, F. Sieverink, N. Beerlage-De Jong, S.M. Kelders,   J.E.W.C. Van Gemert-Pijnen, ENSCHEDE, Netherlands

Successful eHealth implementation and adoption requires knowledgeable and skilled health professionals (1). However, eHealth is not or only minimally included in future health professionals' education. With this presentation, we share the innovative blended eHealth education approach of the Centre for eHealth and Wellbeing Research (CEWR) to show how knowledge on eHealth can be disseminated in different ways and for different target groups.

Our education focuses on the relation between humans, technology, and the context from a socio-technical perspective. We teach knowledge, practice insights and skills for the development, implementation and evaluation of eHealth (1, 2). We educate bachelor and master students from various studies, such as Psychology, Technical Medicine and Health Sciences, and we provide masterclasses for health professionals via the Dutch eHealth Association (NeHS). In all these educational activities, we use innovative, technology-supported approaches.

The foundation of our education is the "eHealth Research, Theory & Development: a Multidisciplinary Approach" book and supporting micro lectures that students can study in their own time. Thereby, we "flipped the classroom" (3) by transforming traditional lectures to interactive workshops, in which students discuss ongoing research, practice with real-life cases and experience state-of-the-art technologies (e.g. VR presentation-skills training and analysing self-monitored Fitbit data). Also, we've developed a free massive open online course (MOOC) to disseminate our knowledge with (hitherto over 22.000) other interested people.

With this blended education approach, we equip students and healthcare professionals with skills to improve eHealth development, implementation and evaluation, which is needed to optimize eHealth's potential in practice.

Demo Session 1

SPEECH THERAPY APP (STAPP): CHALLENGES AND OPPORTUNITIES IN TERMS OF A SUSTAINABLE BUSINESS MODEL

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Introduction: The Speech Therapy App (STAPP) is a digital speech therapy tool for iOS (iPad) for patients with acquired speech and language pathology, like aphasia and apraxia of speech. We intend to license STAPP to a commercial party that is responsible for exploitation. Main research question is how to develop a sustainable business model that supports both expansion with new features and integration of innovative speech technologies.

Methods: STAPP was developed in a process of co-creation in collaboration with patients and speech therapists in various clinical settings, and a software developer. STAPP is based on the most recent scientific insights and uses innovative technology to empower self-management of patients. Motivational elements and various support buttons, like animations, video, audio and written words, enables patients to practice at any time and at any location, aiming at higher exercise intensity.

Results: STAPP is now available for healthcare providers and is successfully implemented in several healthcare institutions in the Netherlands and Belgium. Currently we are investigating user experiences and effectiveness of this tool. STAPP is built on an architecture that allows for easy extension in software modules for new targets groups and translations into other languages. Furthermore, STAPP has the opportunity to add new digital functionalities, like speech recognition and automatic speech feedback tools.

Conclusion: During the conference we would like to discuss how a sustainable business model should be developed for this successfully implemented tool in a niche market, allowing for both extension with new modules and integration of innovative speech technologies.

ACTITHINGS TOOLKIT: SUPPORTING ADHERENCE TO PHYSICAL EXERCISE PROGRAMS BY PROVIDING NOTIFICATIONS IN OPPORTUNE MOMENTS

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Home-based physical exercise programs can delay or even prevent age-related frailty among older adults, but insufficient adherence to these programs is a reoccurring problem. Health intervention studies provide evidence that health-related messages shown to people in suitable points in time and place are effective in changing people's behavior. Some physical exercise programs remind their participants via an alarm clock or display invitations to start due exercises, but these technology-delivered prompts hardly consider the suitability of this particular moment for an exercise. Within our research about how technology can support the integration and long-term maintenance of a physical exercise program in the daily lives of elderly, we explore the usefulness of innovative interactive tools which provide older adults with environmental prompts for exercises in opportune moments.

We understand opportune moments as points in time when a person has the capability and willingness to get reminded about a physical exercise and to conduct it. These moments are profoundly dependent on individual preferences and may happen any time throughout the day. Therefore, we developed a modular toolkit, called ActiThings, with high- and low-fidelity, easy to use, ambient and wearable technologies for a) sensing situations such as location-identifying beacons, power-sensing plugs and sedentary-behavior identifying pillows, and b) providing notifications, e.g. smartwatches, tablet PCs, speakers, and smart bulbs. In an iterative, human-centred interaction design approach, we investigated the usefulness of the ActiThings toolkit and further learned about timing and locations for opportune moments, as well as how reminders should be provided.

Tools to Monitor Physical Activity

FIT FOR PLAY: EXERGAMING TO STIMULATE INACTIVE CHILDREN ON BEHALF OF THEIR LONG-TERM HEALTH

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Sedentary behavior in children (> 4 years of age) has increased over the last decades, resulting in a decline of physical skills. This leaves children prone to health risks such as obesity, mental depression, a lower self-esteem, and social exclusion. The risks increase particularly in children who develop a sedentary lifestyle. Exergames seem promising in engaging children in physical activities. Professionals from a variety of disciplines are thus interested in using exergaming in their work.

Although there are promising results showing the potential effectiveness of exergames to increase the amount and quality of physical exercise, many questions remain to be answered. Chief among them is the question of which specific aspects of the exergames are responsible for the behaviour change process. The aim of our research project is thus to gain a greater understanding of the design space for exergames to support children in their physical behaviour.

In our preliminary research we used a participative design method. Domain experts were invited to partake in interviews and co-creation sessions. These activities led to an in-depth list of requirements on a platform and exergame level and a first overview of necessary design directions. Future directions for this project include a participative design research study in which a platform containing multiple exergames will be developed and evaluated on a national scale, resulting in a knowledge base for dissemination in relevant fields of work.

Tools to Monitor Physical Activity

EXTENDING FACE-TO-FACE EXERCISE PROGRAMS FOR OLDER ADULTS WITH A TABLET AND E-COACHING

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Physical activity is vital to a healthy life. It decreases the chance of various diseases. Furthermore, it can prolong the ability of older adults to live independently. Community-based programs typically offer weekly group exercises for older adults. Exercising once a week is, however, not enough to achieve health benefits. Additional home-based exercises can increase the exercise frequency. A tailored intervention supported by a tablet and e-coaching was developed to deliver instructions and motivate older adults to achieve higher levels of physical activity.

A clustered randomized controlled trial included 224 older adults (>55 years) who either participated for six months only in weekly community-based group exercises (control) or an additional program with home-based exercises that was supported by a tablet and e-coaching. Before and after the six months intervention period the physical activity levels of the participants were measured with a combination of a wearable accelerometer sensor and a diary that described their activities over the past three days. Furthermore, the daily use of the tablet was tracked during the six months intervention.

The results show that older adults that participated in the additional home-based exercise program achieved significant higher physical activity levels than control participants who only followed the weekly group exercises. A technology-enhanced intervention can successfully extend face-to-face exercise programs and facilitate health-related behavior change in older adults.

Tools to Monitor Physical Activity

FOXFIT: A SMART TOOL TO STIMULATE PHYSICAL ACTIVITY IN CHILDREN WITH ASTHMA

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Physical activity (PA) can positively affect disease control in children with asthma. To effectively increase PA participation in these children, healthcare providers are seeking for interventions that stimulate PA in a playful way.

To develop an intervention that suits the future users' needs, concept mapping was performed to gather information on PA stimulating factors in asthmatic children (age 8-11 years). Patients (n=25), their parents (n=17), and healthcare professionals (n=21), reported that important stimulating factors relating to PA were setting goals, sufficient knowledge about asthma, tailored PA, and an application of supportive and rewarding digital technology.

These stimulating factors were translated into requirements, which resulted in a prototype. A small group of users tested the prototype. Subsequently, an improved version, named Foxfit, was built consisting of a smartphone application for children and a web application for healthcare providers. In the current version (Figure 1), children wear a PA monitor and use their app to register their health. These data are visualised in the healthcare provider's application to provide insight in the child's PA behaviour. The child and healthcare provider together set personalised goals, schedule activities, and select suitable education. The app visualises the child's PA behaviour. Parallel, children learn about asthma and PA, and receive activity suggestions.

This year, a pilot study started to assess the feasibility and usability of Foxfit for both children and healthcare providers. Additionally, we study changes over time in PA, enjoyment of PA, and self-esteem related to PA. Results will be available in June 2019.

Adherence & Engagement

HOW DO WE MEASURE ADHERENCE TO A BLENDED SMOKING CESSATION TREATMENT?

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Blended care (combined face-to-face/web-based) is a promising way to stop smoking. Because adherence is an indicator for both acceptance and effectiveness of a treatment, we explore the measurement of adherence to a new, second-line, blended smoking cessation treatment (BSCT). Two methods for the measurement of adherence are compared and validated.

User data of 75 patients of the outpatient smoking cessation clinic of Medisch Spectrum Twente hospital (Enschede/The Netherlands) are analysed. BSCT, based on the current Care Standard, consists of five sessions face-to-face alternated with five online sessions for six months. Two adherence measurement methods are compared: time-based (exposure to number of minutes of protocol-based components) and content-based (active use of eight face-to-face and ten web-based components). The first method is relatively simple and heuristic, the second more detailed and labour-intensive.

Both adherence measures correlate reasonably well with each other (rho=.53) and have useful content, construct and divergent validity. Predictive validity is only found for the content-based method: adherence is higher in quitters (P=.03).

This study compared and validated two methods for the measurement of adherence to a blended treatment. Both methods seem adequate for clinical research, with the time-based method appearing to be more efficient while the content-based method appears to have better predictive validity.

Adherence & Engagement

MEASURING ENGAGEMENT TO EHEALTH INTERVENTIONS: TESTING THE TWENTE ENGAGEMENT TO EHEALTH TECHNOLOGIES SCALE (TWEETS)

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Engagement is seen as an important concept within eHealth technology and often regarded as a mediator for the effectiveness of these interventions. Recent studies have shown that engagement is more than just the usage of a technology, but there is discussion on what engagement entails precisely within this context and how to measure it. It has been suggested that a self-report scale is an accessible way to get a more nuanced picture of engagement. However, no such validated, theory-based scale for engagement to eHealth technologies exists yet.

Based on a systematic review into the concept of engagement in different fields, and interviews among engaged health app users, a first version of the TWente Engagement to Ehealth Technologies Scale (TWEETS) was developed. This scale consists of nine items measuring behavioral engagement (e.g. routinely using the intervention), cognitive engagement (e.g. feeling motivated to reach your health goals by the intervention) and affective engagement (e.g. enjoying seeing progress in the intervention).

This scale has been pilot tested in a study where participants are asked to use a (any) step counter app on their smartphone for two weeks and fill out different measures on engagement and related concepts after one day, one week and two weeks. Around 250 participants (mainly students at the University of Twente) have completed all surveys. First results of the performance of the TWEETS regarding factor structure, correlation with related measures (e.g. involvement, usage, enjoyment) and with outcomes (i.e. number of steps) will be presented at the conference.

Adherence & Engagement

FACTORS RELATED TO SUCCESS AND FAILURE OF APP-BASED TREATMENT IN WOMEN WITH URINARY INCONTINENCE.

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Introduction: The effectiveness of conservative treatment for urinary incontinence (UI) in women highly depends on adherence, which varies from 18% to 95%. Accompanying costs of UI-care are high. We recently showed in the UrinControl trial that app-based treatment is non-inferior to conservative treatment. Knowledge about factors that are related to success or failure of app-based treatment can help in improvement of app-based treatment.

Methods: The UrinControl trial included 262 women with UI of which 131 were allocated to app-based treatment. A qualitative study with semi-structured interviews was performed with 10 women from the app-based treatment group that showed the least improvement and 10 women that showed the most improvement. The interview focused on factors related to success and failure of the treatment and log-data from the app was used to guide the interviews. Interviews were analyzed and common factors related to success and failure were identified.

Results: Data will be available at the time of the conference. Interviews are currently being conducted.

Conclusions/Discussion: Based on the outcomes we will formulate improvements for app-based treatment of urinary incontinence in women.

Adherence & Engagement

BEATING CANCER FATIGUE WITH THE INTERNATIONAL UNTIRE APP - RECRUITMENT, PARTICIPANTS & UPTAKE

S.S. Spahrkäs

UMCG / RUG, GRONINGEN, Netherlands

Cancer-related fatigue (CRF) affects millions of (former) cancer patients worldwide. Successful treatment options exist (i.e. psychotherapy), but are resource intensive, and access is often limited to a restricted number of people in need. Interventions delivered via the mobile phone (mHealth) might have potential in delivering effective treatment to many patients. The Untire app has been developed with the aim to improve CRF and quality of life (QoL) in (former) cancer patients. This oral presentation aims to shed light on the reach and costs of online recruitment, participant characteristics, and uptake of the international Untire App mHealth study.

The Untire app study is an RCT targeted to (former) cancer patients with CRF via social media (Facebook & Instagram) across four English-speaking countries. Reach of recruitment was assessed by the number of people who clicked on the Facebook advertisement. Sociodemographic and health characteristics were assessed using online questionnaires. Data about the uptake (adherence to study assessment and number of app downloads) were automatically stored.

Online recruitment resulted in 3.060 people who clicked on the Facebook advertisement and showed interest in our study. The majority of participants that showed interest in our study were female, middle-aged, and from the United Kingdom.

Online recruitment for reaching participants for international mHealth studies might have potential, but it is resource intensive in terms of time and costs. We managed to include (just) a sufficient number of participants. As long as participants did not receive their incentive yet, they were more adherent to complete assessments.

Symposium Technology and Mental Health

INTRODUCTION ACADEMIC COLLABORATIVE CENTRE 'TECHNOLOGICAL AND SOCIAL INNOVATION FOR MENTAL HEALTH'

I.M.B. Bongers[1], J.J.P.A. Bierbooms[1], M.A. Feijt[2], W.A. IJsselsteijn[2]
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In 2018 Tilburg University (TiU), Technical University Eindhoven (TU/e) and Mental Healthcare Eindhoven (GGzE) formalized their collaboration in the Academic Collaborative Centre (ACC) 'Technological and social innovation for mental health'. Within this ACC both science and practice, and technological and social innovation on the other, collide. We aim for sustainable innovations for mental healthcare that are incorporated in daily practice (systemic change).

To achieve this systemic change we use a human-centered research approach, using:

- participatory research designs
- living labs
- research through design
- fourth generation methodology
- realistic evaluations

We will do this not from the ivory tower of science, nor from the perspective of one party within this playing field. We involve all stakeholders in the process of innovation: knowledge institutes, health care organizations, companies and the people themselves.

Our approach of joining forces has led to a number of highly relevant projects in three stakeholder domains. The results of different multi-disciplinary collaborations is that we are able to create more sustainable innovations that provoke systemic organizational change in mental healthcare. This goes along with an opportunist matching of funding to different innovation projects.

The ACC aims to be a fourth generation university (Steinbuch, 2016): working in a geographically defined area and an equal cooperation between different parties and disciplines. It enables local networks in creating their own value. At the conference we are looking forward to showcase this by means of an illustration of the different projects in the three domains.

Symposium Technology and Mental Health

WARM TECHNOLOGY: A HUMANE, AFFECT-CENTERED DESIGN APPROACH FOR AND WITH INDIVIDUALS LIVING WITH DEMENTIA

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With an increasing average lifespan in the world's population, an increasing number of people are diagnosed with dementia. We are still some ways away from a viable medical treatment of dementia, and prevention strategies are in their infancy. In order to keep professional care manageable and affordable, an increasing demand is placed on family and other informal caretakers to contribute to chronic care. In this context, technological solutions are explored to help individuals suffering from dementia maintain relative independence, ensuring their physical safety as well as adequate and timely medical care. Examples include medication reminders, fall detection and prevention, and assistive robotics. Important though such innovations are, the focus on functional support, safety and security appears to lead to solutions that are frequently perceived as anonymous, impersonal, complicated, and mechanistic or "cold". In addition, there is a fear that technology will replace interpersonal contact in care. We wish to understand and sensitize ourselves to these perceptions of technology, and reposition technological interventions as "warm": technology that is affect-centered, non-intimidating, personally empowering, and respectful of social connectedness. In this presentation, we will define warm technology in the context of support and well-being in dementia care, and discuss the person-centered process of designing for and with people living with dementia – a process based on mutual trust, dignity, and personal history, context and preferences. We will illustrate our approach using various design examples.

Symposium Technology and Mental Health

ENHANCING EMPATHY IN MENTAL HEALTHCARE: OPPORTUNITIES OFFERED BY SOCIAL INTERACTION TECHNOLOGIES

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Introduction: Therapeutic rapport is considered a fundamental part of the therapeutic interaction process, and highly related to successful therapeutic outcomes. An integral part of therapeutic rapport is empathy. With the introduction of communication technologies in psychotherapeutic practice, many practitioners have doubts whether mediated interactions sufficiently allow for a good therapeutic relationship, despite a lack of empirical studies confirming this. Their apprehension mostly seems to originate in having access to fewer nonverbal social cues in mediated interactions. In addition, technological issues and risk of distraction may negatively impact the feeling of closeness and rapport. The current project explores how novel communication technologies can be used to improve empathy in therapeutic interactions, and ameliorate some of the perceived drawbacks of mediated settings.

Methods: Multiple methods are being employed to explore promising opportunities. A literature search is conducted to review previous efforts on using technology to support therapeutic interactions. In addition, interviews and workshops with practitioners are used to gain insight into their perspective on this topic.

Results: In short, this study can be approached in two complementary ways: by ameliorating shortcomings in the communication technology, and/or by extending or enriching the current possibilities of mediated social interaction.

Conclusions/Discussion*:* By identifying these opportunities, we hope to encourage a new way of thinking about technology, emphasizing its potential added value to the quality of psychological treatment. Eventually, the goal is to broaden the array of available treatment possibilities for mental healthcare professionals, and so to improve the quality of mental health care.

Symposium Technology and Mental Health

PERSONAS FOR THE DESIGN OF A PLAYFUL TRAINING ENVIRONMENT FOR SKILL ENHANCEMENT IN EMENTAL HEALTH

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Introduction:

An important reason for the rather slow uptake of eMental Health (EMH) is the lack of skills professionals experience in finding and using online technologies. A potential strategy to tackle this problem is to offer an environment with playful training possibilities. The purpose of our study is to specify the user-requirements for such an environment.

Methods:

Data was gathered on the context and characteristics of the potential users of the environment, their needs and values and the triggers to use such an environment. We a questionnaire, a focus group and 17 interviews (mixed methods). Subsequently, the data was used to draw 'personas' as a first step to identify the user-requirements.

Results:

The majority of the respondents (n = 290) see themselves as minimal (25.5%) or passive users (43.1%). In several cases there is a discrepancy between the perceived value and the experienced skill level of EMH (e.g. VR, biofeedback). Finally, we found that the ease of use, alignment with learning needs, multi-player options, competition, and management support are important triggers to use a playful training environment.

Conclusion:

The results deliver important information on the personas for a playful training environment. We will base these personas on the levels of adoption of EMH. To complete the user requirements these personas will be input for different use case scenarios, which enables designers to create a product that enhances an effective onboarding and application of the environment.

Special Round Table

DUURZAME SAMENWERKING VOOR OPSCHALING VAN ZORGTECHNOLOGIE EN INNOVATIES: DIABETES EN HARTFALEN

JEWC van Gemert-Pijnen
University of Twente, ENSCHEDE, Netherlands

Ronde Tafel Discussie DUURZAME SAMENWERKING VOOR OPSCHALING VAN ZORGTECHNOLOGIE EN INNOVATIES: Diabetes en Hartfalen Opzet 5 kwartier met pauze Nederlands 25 mensen en op uitnodiging Doel en doelgroep Veel technologie bereikt de markt niet, komt niet verder dan prototyping. Er is een gebrek aan (internationale) investeerders, aan innovatieve business modellen en vele producten leveren niet op waar de klant om vraagt. De kwestie is wat nodig is om een ecosysteem op te zetten voor innovatieve en duurzame integrale en holistische zorg voor diabetes en hartfalen. Wat bepaalt een succesvolle PPS, wat betekent dat voor het vormen van duurzame consortia? Welke partijen zijn van belang voor een opschaling van duurzame samenwerking en voor het vormen van publiek-private consortia in het domein van zorg voor diabetes en hartfalen? De tafeldiscussie leidt tot een propositie met uitgangspunten voor regie in opschaling en voor het vormen van publiek-private consortia in het domein van zorg voor diabetes en hartfalen. Doelgroep: onderzoek, bedrijf , zorgverzekeraar, en zorgpraktijk , op invitatie max 25 mensen De propositie wordt uitgesproken tijdens het congres na afloop van de ronde tafel bijeenkomst

Self-Monitoring and Management

EVALUATING THE FEASIBILITY OF A MOBILE SELF-MANAGEMENT APPLICATION FOR PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Background: Chronic Obstructive Pulmonary Disease (COPD) is characterized by persistent respiratory symptoms and airflow limitation. Exacerbations can lead to additional care and often to hospital admission. Self-management interventions have the potential to reduce exacerbations. The use of mobile devices is promising and can increase patients' self-management.

Objective: To evaluate the feasibility of a mobile self-management application for patients with COPD who are at risk for readmissions.

Methods: Six patients participated in usability testing with a functional prototype. The application provides patients with a 8-week self-management program consisting of: lung exacerbation action plan, questionnaires to monitor health, video consultation and education. Patients performed tasks and answered questions. The outcomes were used to optimize the application. Subsequently, a one group feasibility study with assessments at baseline and after the intervention weeks is conducted. In total, 45 patients will be included. Feasibility will be evaluated by the components use and satisfaction. Use will be measured using log data and questionnaires covering constructs of the Unified Theory of Acceptance and Use of Technology model. Changes in self-management, using Partner in Health scale, will also be assessed. Preliminary evidence of the effects on hospital readmissions will be generated.

Results: Usability testing showed that patients were positive about the functionalities in the application. However, we found that the application needed to be simplified. Therefore, the 8-week program is structured per week instead of per day. Patients also preferred that information be presented ordered by category (e.g. nutrition). Preliminary results of the feasibility study will be presented.

Self-Monitoring and Management

PERSONAL HEALTH RECORD; MEANINGFUL USE FOR FACILITATING SUSTAINABLE LIFESTYLE CHANGE IN REHABILITATION

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Introduction: The Dutch government aims for nationwide implementation of Personal Health Record (PHR) in 2020, to empower citizens in periods of health and impairment. The Center for Rehabilitation of the University Medical Center Groningen focusses on stimulating sustainable active lifestyle and intents to facilitate a smooth transfer from clinic to home setting. In that perspective, the current project aims to study opportunities for meaningful use of PHR.

Methods: In the first stage requirements, intentions and barriers were investigated among end users, using semi-structured interviews with patients and a focus group discussion with health care professionals. A prototype PHR was developed based on these requirements by a private company (WijDus), and will be pilot-implemented summer 2019 using an iterative development approach.

Results: Both patients and professionals corroborated the added value of using PHR, in order to gain insight in rehabilitation processes and progress, by also including self-reported data. A PHR provides opportunities for interaction between patients and professionals, facilitating a sustainable lifestyle change. Barriers included lack of digital skills for both patients and care professionals, keeping track of data gathered by multiple patients and sources, dealing with several available PHR solutions, and use of language. A clickable prototype PHR (IkDus) became available January 2019.

Conclusions: Intentions of patients and professionals regarding use of a PHR were positive in general, despite barriers that should be taken into account for pilot-implementation. The clickable prototype PHR will be presented and barriers for implementation of this early prototype will be discussed during the conference.

Self-Monitoring and Management

WHICH ASPECTS OF SELF-MANAGEMENT IN CHRONIC SOMATIC CONDITIONS ARE SUPPORTED BY EHEALTH AND MHEALTH APPLICATIONS?

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Background: Self-management is essential in dealing with chronic somatic condition(s) since these conditions ask for continuous (self-)care and patients are the main agents in their daily living with a chronic condition. Four types of self-management can be distinguished: disease management (e.g. adherence, symptom monitoring, life style changes), role management (e.g. in professional and private context), management of emotions and building a meaningful perspective on living well with a chronic condition. Aim of this study is to describe the evidence of ehealth and mhealth applications for different aspects of self-management in chronic somatic conditions.

Methods: A narrative review of 30 systematic reviews (2015-2019) on ehealth and mhealth applications used in chronic somatic diseases. The following topics were extracted: aim application, type of self-management, target group, feasibility, acceptability and effectiveness of the applications and recommendations for improvement.

Results: A broad range from clinician-focused to patient-centered applications was found. Most ehealth/mhealth interventions were focused on self-management of the disease and the treatment. Most are typically developed and used for one specific condition. With regard to effectiveness, mixed results were found. Effects seem to improve with tailored components, combined communication channels and when developed theory-based. Recommendations emphasized ehealth for multimorbidity, co-creation and training for patients and health professionals.

Conclusions: Technology seems to change the way individuals manage their health in chronic conditions and the interaction with their health care providers. Supporting disease management by technology showed mixed effects. There seems paucity of interventions aimed at other types of self-management than disease management.

Self-Monitoring and Management

THE QUANTIFIED SELF (QS): HOW CAN MONITORING ONE'S OWN BEHAVIOR LEAD TO HEALTH BEHAVIOR CHANGE?

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People always have monitored health relevant information; from their environment, from their body and from their mental processes. This implies that they are equipped with the cognitive abilities to translate this information from various relevant parameters into behavior. In the QS paradigm the information from monitoring the own body is often brand new, or depicted in new ways. Therefore, people have to newly learn what the information means and they have to choose what their behavioral responses will be. To guide people towards healthy behavior it is essential that we understand what the effects of monitoring are. At least four classes of effects can be distinguished and applied in the development of technology:

Monitoring effects. These effects refer to a broad class of secondary or spin-off effects of monitoring the own behavior. The bare fact that someone has decided to allocate attention to the own behavior can have psychological effects.

Meaning effects. These effects are caused by knowledge on the parameter that is assessed. People give meaning to a parameter quantity by comparing it to a standard against the background of a rational.

Contextual effects. These are effects of people's interpretations of relations between measurements or events. People may construe meaningful relations in cognitive frameworks.

Experimental effects. These effects are based on experiments that people set up to learn about the parameters or related states. On the basis of the above interpretations people may try to deliberately influence the parameter; they may try to test their hypotheses.

Monitoring and Coaching

FEASIBILITY OF SMARTPHONE'S ACCELEROMETERS TO DETECT INDUCED CARDIAC DECONDITIONING IN BEDRIDDEN VOLUNTEERS

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Introduction. Inactivity and prolonged bed rest are unnatural states of the body, often related to chronic diseases and ageing, inducing reduced functional capacity in multiple body systems. Tools for self-measuring this decline represent first step towards higher engagement in rehabilitation programs. We aimed to use smartphone's accelerometers to measure vibration-induced cardiac activity signal (m-SCG) and test its feasibility in detecting changes induced by 60 days bed rest (BR), known to induce cardiovascular deconditioning.

Methods. Twenty male volunteers (age:34 ± 8; BMI:24 ± 2 kg/m^2) were studied at MEDES (Tolouse, France) along 17-18. One minute m-SCG was acquired while supine, before (PRE) and after 58 days (HDT58) of BR. After removing inter-beat morphological variability in 32 consecutive beats by non-linear averaging, specific fiducial points associated to isovolumetric contraction (IVC), aortic valve opening (AO) and closure (AC) were detected and used to compute temporal and amplitude indices, compared by Wilcoxon test (* $p<0.05$) between PRE and HDT58.

Results. Cardiac deconditioning after BR was confirmed by median reduction in orthostatic tolerance time (from 25 to 10 min), and maximal oxygen consumption (from 37 to 30 ml/kg/min). At HDT58 the IVC peak was mainly affected, resulting in 31% amplitude reduction, 26% decrease in peak-to-peak IVC-AO and 30% in its slope.

Conclusions. m-SCG by smartphone's accelerometers is sensitive to measure cardiac deconditioning induced by prolonged BR. This approach could be extended to chronic patients to daily monitor their condition, thus providing a new potential tool for self-tracking using common smartphone. We acknowledge Italian Space Agency for funding this research.

Monitoring and Coaching

INVESTIGATING RESILIENCE PATTERNS BASED ON WITHIN-SUBJECT CHANGES IN SLEEP AND RESTING HEART RATE VARIABILITY

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Occupational stress can cause all kinds of health problems. Resilience interventions that help employees deal with and adapt to adverse events can prevent these negative consequences. Due to advances in sensor technology and smartphone applications, relatively unobtrusive self-monitoring of resilience-related outcomes is possible. With models that can recognize intra-individual changes in these outcomes and relate them to causal factors within the employee's own context, an automated resilience intervention that gives personalized, just-in-time feedback can be developed. The Wearables and app-based resilience Modelling in employees (WearMe) project aims to develop such models. A cyclical conceptual framework based on existing theories of stress and resilience is presented, as the basis for the WearMe project. The included concepts are operationalized and measured using sleep tracking (Fitbit Charge 2), heart rate variability measurements (Elite HRV + Polar H7) and Ecological Momentary Assessment (mobile app), administered in the morning (7 questions) and evening (12 questions). The first (ongoing) study within the WearMe project investigates the feasibility of the developed measurement cycle and explores the development of such models in social studies students that are on their first major internship. Analyses will target the development of both within-subject (n=1) models, as well as between-subjects models. The first results will be shared at the Health By Tech 2019 conference in Groningen. If successful, future work will focus on further developing these models and eventually exploring the effectiveness of the envisioned personalized resilience system.

Monitoring and Coaching

ADVANCING EHEALTH DEVELOPMENT TO SUPPORT SELF-MANAGEMENT OF CARDIOVASCULAR DISEASES INTEGRATING THE CEHRES-ROADMAP WITH MULTIDISCIPLINARY THEORIES

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This study reviews through the lens of a holistic framework (CeHRes-Roadmap) the use of theories in eHealth research and development aimed at supporting self-management of cardiovascular diseases (CVD). Based on that knowledge we present and recommend principles for a multidisciplinary and holistic approach of eHealth.

Scopus, Web of Science, Embase, CINAHL, PsycINFO, ACM DL, and the Cochrane Library were searched for research reports that describe the application of theory to support self-management in CVD. Studies were selected and key data was extracted, coded, and iteratively analyzed via the meta-ethnography systematic approach. The five holistic principles of eHealth development proposed by the CeHRes-Roadmap are used to guide data synthesis. These principles are that 'eHealth development…' 1) '…is a participatory development process'; 2) '…creates new ecosystems for improving health and healthcare'; 3) '…is intertwined with implementation'; 4) '…is coupled with Persuasive Design'; 5) '…requires continuous evaluation cycles'.

Based on the preliminary analysis of 17 papers included, ingredients of multidisciplinary theories have been identified. Currently, characterization of these ingredients regarding match with CeHRes principles is carried out.

Our preliminary analysis has shown that the holistic principles are identifiable in the general literature. However, a high level of interpretation is needed because there is an overall lack of reporting on operationalization of theory. Furthermore, theory-based implementation approaches and continuous/formative evaluation are scarcely applied/reported on (principles 2, 3 and 5). In our presentation we will show how the CeHRes-Roadmap integrates with the knowledge of multidisciplinary theories which contributes to more effective research and development practices.

Monitoring and Coaching

DEVELOPMENT OF A NOVEL DECISION-MAKING SUPPORT FRAMEWORK FOR PLANNING OF AUTOMATED EXTERNAL DEFIBRILLATORS DEPLOYMENT

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INTRODUCTION AND AIMS: Public Access Defibrillation (PAD) is the leading strategy in reducing time to first defibrillation in cases of Out-of-Hospital Cardiac Arrest (OHCA), but PAD programs are underperforming considering their potentiality. Our aim was to develop a decision-making support framework for planning of defibrillators deployment, exploiting georeferenced information processed with Geographic Information Systems (GIS).

METHODS: The framework, based on an historical database of OHCAs, known Automated External Defibrillators (AED) locations, topographic and demographic information, proposes new strategies for AEDs deployment focused on residential OHCA, exploiting a machine learning-based risk mapping. Performance of AEDs is evaluated through their 'catchment area' (i.e., area that could be reached from the location of the device within 3 minutes along streets network). As case scenario, it was applied and validated onto the city of Milan, Lombardy (Italy).

RESULTS: The new proposed deployment strategy resulted more effective compared to the existing distribution, with a potential duplication (34.99%) of the spatial coverage of OHCAs compared to the actual one (18.56%). Further improvements in AEDs deployment were simulated with different cost scenarios: doubling the estimated initial investment would result in almost triplicating the spatial coverage of OHCAs (from 18.56% to 57.45%).

CONCLUSIONS: Results suggest that PAD programs, either in brand-new territories or in further improvements, would significantly benefit from a comprehensive planning, based on mathematical models for risk mapping and on geographical tools, as the one proposed. Model-based strategies resulted more effective and more efficient when compared with the current distribution in all the simulated scenarios.

Demo Session 2

DEVELOPMENT OF A PROTOTYPE PERSUASIVE VIRTUAL REALITY TRAINING SUPPORTING THE PREVENTION OF SURGICAL SITE INFECTIONS

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Background: A surgical site infection (SSI) is a serious postoperative wound infection. To maintain a patient's safety, guidelines for hygiene, administering antibiotics, hair removal and temperature of the patient are applied. However, compliance with these guidelines appears problematic due to both cognitive (situation awareness) and affective (mindset) determinants. Virtual reality (VR) as a training approach has the potential to address these determinants. Building upon earlier research, we developed a VR training prototype to support operating room (OR) staff in complying to the guidelines.

Method: A focus group (n=5) among OR staff was conducted to transform determinants for non-compliance into realistic VR scenarios. Filming took place in a simulated OR starring an experienced OR team and two students acting as assistants. Finally, training instructions were built around the videos based on requirements resulting from earlier research.

Results: Findings resulted in a VR training prototype where users are challenged to detect 18 risk situations. Results are visualized to serve as input for team debriefings. A second module was developed where a surgeon responds differently (sub-assertive, assertive, aggressive) to a critical remark from a colleague. Tailored follow-up questions focus on self-reflection, correcting irrational thoughts and stimulating discussion within the team to foster an open dialogue culture.

Conclusion: The focus group provided input for detailed scenarios for the initial VR training prototype. Future steps include iterative testing of the prototype, improving persuasiveness and fostering embedding into an eLearning platform to increase the compliance of OR staff with best practices for preventing SSIs.

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Demo Session 2

DESIGN OF AN EHEALTH APP TO IMPROVE IMPLICIT VITALITY IN BREASTCANCER PATIENTS: A CO-CREATION PROCESS

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Introduction: More than 50% of all breast cancer patients experience fatigue symptoms during and after their treatment course. They automatically and unconsciously focus their attention on the fatigue symptoms, which can lead them to develop a distorted fatigue self-image (= cognitive bias) that works unfavorably with respect to fatigue-related behavior.

A Cognitive Bias Modification (CBM) eHealth app could be a simple manner to modify the distorted self-image in the direction of vitality. The aim of the current study was to develop this vitality CBM app in a participatory design process.

Method: Semi-structured interviews were conducted with 5 breast cancer patients and 8 health professionals (e.g. nurse practitioner, oncology nurses, general practitioner). Aim of the interviews was to collect the functional and content requirements for the eHealth app. Furthermore, questions about the impact and course of fatigue and moment of offering the app in the treatment course were included.

Results: Interview outcomes showed that the app should be simple and have a positive appearance with warm colors. The app should contain an introduction video explaining how to perform the task as well as the relevance (i.e. idea behind the app). Furthermore, the app should contain a reminder, positive reinforcement and an option for a progress bar. Professionals showed that the moment of offering the app should be after the first chemotherapy session.

Conclusion: Based on these results, a prototype has been developed that can be demonstrated.

Demo Session 2

ENABLING AUTOMATED COACHING

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In order to motivate people to lead a less sedentary life, the Hanze University of Applied Sciences Groningen and KPN ICT Consulting developed an automated recommender system. We investigated the possibility of automated coaching in order to increase physical activity and help people to reach their daily step goal. By monitoring people's activity level and progress during the day, we predict personalized recommendations. The effect of these recommendations on the individual's activity level forms the basis for a personalized coaching approach.

Step count data is used to train a machine learning algorithm that estimates the hourly probability of the individual achieving the daily steps goal. The outcome of this prediction is combined with the effect of the type recommendation for the individual to deliver the best recommendation for the individual. To show the practical usefulness, we constructed a platform to manage the data, rules, machine learning algorithms and clustering of participants. Additionally, a mobile app has been developed that demonstrates the possibility to determine whether the participant will achieve his/her daily step goal and the personalized advice produced by the recommender to motivate the individual.

Special Round Table

EHEALTH IMPLEMENTATIE WERKPLAATS, DELEN VAN KENNIS EN ERVARINGEN

MF ter Horst[1], E Buskens[2], M Lahr[2], R van der Morst[3], L Zwiers[3], LR Ploeg[1], F van der Hoek[4], R. Sanderman[2], J.E.W.C van Gemert-Pijnen[1]

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In deze implementatie kenniswerkplaats komen wetenschappelijk -en praktijkkennis bij elkaar rondom eHealth; wat zijn de factoren voor succes en falen? Hoe leren we van elkaar en welke stappen zijn nodig voor betere opschaling van eHealth?

Auteurs: Lisette van Gemert-Pijnen[1], Robbert Sanderman[1,2], Erik Buskens[2], Maarten Lahr[2], Ren van der Most[3], Mariska ter Horst[1], Lisa Zwiers[3], Lisa Ploeg[1] en Frank van der Hoek[4]

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De presentatie is gericht op de lancering van de eHealth implementatie werkplaats en de website met etalages van implementatie eHealth voorbeelden. Ten tweede op optimaliseren van implementatie van eHealth technologien, we gaan in op factoren voor succesvolle implementatie in de gezondheidszorg. Voorts gaan we in op hoe we de werkplaats willen laten functioneren; welke stakeholders van belang zijn voor het verkrijgen van een community gericht op opschaling van eHealth technologie.

De presentatie zal in het Nederlands zijn en staat open voor maximaal 25 deelnemers die actief willen meewerken aan de werkplaats Implementatie. De werkvorm bestaat uit introductie en achtergronden van de kenniswerkplaats. Aan het eind van de presentatie is er gelegenheid voor een discussie over hoe uitwisseling van informatie en kennis via de werkplaats kan plaatsvinden.

De bijeenkomst vindt plaats op vrijdag.

Machine Learning & Big Data

IMPLEMENTATION OF A DIGITAL TOOLBOX IN SOCIAL SKILLS-INTERVENTIONS FOR CHILDREN WITH AUTISM: A SERVICE-DESIGN APPROACH

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Background: Successful implementation of eHealth-solutions is difficult. Early participation of key-stakeholders (clients, care-professionals) is advocated, to avoid neglecting needs and conditions in the specific work-context. This is why insights from the discipline of service-design can be useful for implementation processes: Service designers avoid a focus on only the new (digital) elements, but take the entire (healthcare)-service in account, as it is experiences by clients and professionals. As part of a 2-year project to develop a digital toolbox (games, interactive tools) for children with autism, our implementation-process aimed to redesign the professional context by using a broad selection of service-design methods.

Methods: First, thorough understanding of the target-group (children with autism) was needed, using contextual interviews, empathy-maps and personas (focus-group children with ASS; n=8). Then, a panel of care-professionals (child-psychologist, psychiatrists; coaches; n=7) investigated the current therapy as experienced by this target-group (customer-journey maps), and what changes were needed to adequately deploy the digital toolbox (design-scenarios, desktop-walkthrough, service-blueprints, prototype-testing). In a final session, care-professionals reflected on the usefulness and feasibility of service-design methods in implementation processes.

Results: Care-professionals found the service-design methods useful and appreciated their involvement in these early stages of the implementation-process. The methods helped reasoning from the perspective of their clients and pinpoint friction points. The hands-on and visual way design-methods facilitated them to generate ideas about changes needed in the current treatment to coherently incorporate the digital toolbox.

Conclusion: Service-design is a promising approach to actively involve care-professionals in the implementation of innovative digital interventions in child-therapy.

Machine Learning & Big Data

THE ADAPTATION OF THE 'FIT FOR BLENDED CARE' INSTRUMENT TO SUPPORT THERAPISTS IN USING EHEALTH

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While blended care - the combination of in-person treatment and eHealth - has multiple benefits for mental healthcare, there are also difficulties with implementation and long-term use. The 'Fit for blended care' instrument was developed to address such issues; it aids in deciding with whom, when and how to start blended treatment. We adapted the instrument to fit forensic mental healthcare to facilitate blended treatment in this specific context.

Interviews with 18 therapists were conducted to identify factors related to the use of Minddistrict – a web-based application. Hereafter, the opinions of three therapists and a manager regarding the existing 'Fit for blended care' instrument were discussed. Main outcomes were that factors should be combined, that the instrument should be more concise, and that it should be fine-tuned to fit the forensic context. The adapted instrument consists of two parts. In Part 1, the patient individually indicates if (s)he possesses the required equipment and reading and writing skills. The second part contains five patient-related factors derived from the interviews and existing instrument: motivation for online treatment; writing about feelings, thoughts and behavior; conscientiousness; psychosocial problems; and social support. These factors should be discussed by therapist and patient. Based on the outcomes, the therapist picks an option and receives tailored advice. The advice is based on input of five therapists, researchers and the original instrument. In our presentation, we will talk about the research process, show the adapted version of the instrument and explain how it can be used in treatment.

Machine Learning & Big Data

CAN COMPUTERS GET DIABETES? USING MACHINE LEARNING TO IMPROVE INSULIN DOSAGE ADVICE

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Purpose/Background: Each time they inject insulin, people with diabetes type 1 have to consider a.o. current blood glucose (BG) concentration, carbohydrate in food (CHO), and previous insulin injections (IN). They also must take into account slowly varying personal factors: Insulin to Carbohydrate Ratio (ICR) and Correction Factor (CF).

We investigated whether we could learn ICR and CF automatically using a particle filtering machine learning algorithm.

Methods: We first built a 'virtual patient' (ViP), a simulation of a diabetes patient, with realistic errors for BG and CHO. We evaluated how well our machine learning algorithm predict a ViP's BG.

We also evaluated how well the algorithm performed on data from 11 real subjects with diabetes type 1, aged 12-18, who recorded BG, CHO and IN, using an app, for three weeks.

Results: Within 2 weeks worth of ViP measurements with realistic BG errors, the average prediction error of the particle filtering algorithm goes down to 0,6 mmol/L (with maxima <1,1 mmol/L). Using realistic CHO estimation errors, however, maximum prediction errors are much higher: 2,2–2,8 mmol/L. These decreased to satisfactory levels when CHO estimation errors were halved.

Using data from real patients, however, the particle filtering algorithm was unable to predict BG with meaningful accuracy.

Conclusions: Particle filtering algorithms can learn the personal ICR and CF of a Virtual Patient, despite realistic BG measurement errors. CHO errors do matter and should preferable be halved compared to current practice. Using data from real patients, our particle filtering machine learning algorithm failed, however.

Machine Learning & Big Data

RISK FACTOR IDENTIFICATION AND CONTRIBUTION TO SURGERY-SPECIFIC SURGICAL SITE INFECTION

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Background: To identify common risk factors for the future occurrence of SSI across digestive system surgical procedures, thoracic surgery and orthopaedic procedures and show what the marginal contribution of explaining the future occurrence of SSI is of risk factors specific to each group of surgeries.

Methods: Retrospective data from serial point-prevalence studies, performed at the Erasmus MC University Medical Center, Rotterdam, The Netherlands were used, together with medical data, from 3.250 surgical procedures, during the period 10 January 2013 to 29 May 2014. Common risk factors across three groups of surgical procedures were evaluated using a multivariate forward-step logistic regression model to identify the marginal contribution of the risk factor specific to each group of surgical procedure using the increase in the Gini coefficient.

Results: For digestive system surgical procedures, antibiotic use, temperature, smoking status, age, CRP, thrombocyte, during of surgery and surgical urgency are risk factors for SSI, where the last four were specific to the digestive system group of surgical procedures and increased the Gini coefficient by 9.5% (0.63 to 0.69). Preoperative length of stay, antibiotic use and leukocyte are risk factors for orthopaedic surgical procedures. Temperature, age and the use of antibiotics were significant for thoracic surgical procedures.

Conclusion: Risk factors for SSI, specific to a surgical procedure group can increase the ability to explain the future occurrence of SSI by 9.5%. The models developed in this study can aid healthcare workers to improve preoperative counselling and help identify potentially modifiable risk factors.

Elderly & Healthy Ageing

PROACT: EVALUATING THE USER EXPERIENCE AND ECONOMICAL BENEFITS OF A SELF-MANAGEMENT CARE PLATFORM FOR MULTIMORBIDITY

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Health systems across Europe face difficulties when providing care to persons living with multimorbidity; care for these persons is often fragmented, inefficient and potentially unsafe due to poorly integrated and coordinated care. ProACT (Integrated Technology Systems for ProACTive Patient Centred Care) is a project funded under the European Commission's Horizon 2020 scheme that aims to develop and evaluate a digital integrated care ecosystem to support older adults living with multimorbidity via the application of a self-measurement sensor-suite and self-learning AI that provides individual behavioural recommendations at home. The study features trials in Belgium, Ireland and Italy. The trials involve a total of hundred twenty participants with multimorbidity and sixty carers for the duration of one year. The study combines qualitative and quantitative data-evaluation techniques, to gain a holistic perspective on the development of self-management solutions enabled by digital health technologies such as ProACT. Concurrently in the trial we conducted a social cost-benefit analysis to estimate the net-effect of ProACT on a societal level, with methodological challenges such as estimation of quality adjusted life years gained within the bounds of proof of concept trials. Since this trial is a long term evaluation (1 year) of the experience of multiple actors with the system - older adults with multi-morbidity and different care providers, we want to reflect on the challenges and the lessons learned of setting up this proof of concept trial in Belgium, and share our experiences which can be applicable to studies of digital health innovations for the aging population.

Elderly & Healthy Ageing

IMPLEMENTING EHEALTH FOR POSTOPERATIVE HOME MONITORING OF ELDERLY CANCER PATIENTS: A FEASIBILITY STUDY

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Home monitoring using mobile devices could be useful in filling the gap in surveillance after hospital admission. However, it is unclear whether elderly patients will be able to use ICT-based supportive systems. The aim of this study is to assess the feasibility of postoperative home monitoring in elderly oncological patients.

In this single-site feasibility study, we included patients aged 65 and over, who underwent a resection of a solid malignant tumor. Included patients use a mobile application connected to different smart-devices in order to monitor various parameters. The primary outcomes are usability (system usability score), acceptability (Likert satisfaction scale, Net Promotor Score), compliance (% days that subjects used the devices), recruitment and retention (% of completed post-discharge assessments). Secondary outcomes include vital parameter trends during home monitoring, complications, unplanned hospital readmissions, physical functioning and quality of life.

Fifty-eight patients were approached for participation between March-December 2018 of which 24 (41.4%) gave consent (median age 73 years, range 65-88). Reasons for decline in participation were a high mental burden of the study (n=20; 71.4%) or absence of internet access at home (n=4; 14.3%). Five (20.8%) of the 24 included patients did not have previous experience with a smartphone or tablet. Ten patients completed their follow-up, six patients dropped out during the study. The subsequent results (n=6) are expected to be complete in April 2019.

In this study, eHealth was implemented in postoperative home monitoring of 24 elderly oncological patients. The results of this feasibility study are expected in April 2019.

Elderly & Healthy Ageing

GROWING ROOTS: CONNECTING ELDERLY THROUGH AMBIENT NATURE PROJECTIONS

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Introduction: Loneliness amongst elderly is becoming increasingly recognised as a serious public health concern. Exposure to nature improves mental health (Kaplan & Kaplan, 1989) and reduces feelings of loneliness (Maas et al., 2009). However, nature is often not accessible for elderly, e.g. because of mobility issues. Interestingly, modern technologies, like augmented reality and ambient technology, offer promising opportunities to improve well-being of elderly (Baños et al., 2012). Therefore this research aims to study to what extent ambient nature projections within domestic or social settings can reduce loneliness amongst elderly.

Methods: Five focus group sessions were conducted within Dutch elderly care facilities to investigate the inhabitants' attitude towards augmented nature and gather feedback on the developed ambient nature projections (see Figures 1-4). Groups consisted of four to nine elderly, between 69 and 92 years old, with different care needs.

Results: Elderly participants in the focus groups reacted positively towards the idea of having augmented nature projections within their care centre where they could sit down, drink coffee and have a chat with others.

Discussion: Focus groups provided the insight that the need for and perception of ambient nature projections might be highly dependent on the mobility and autonomy of participants. Especially elderly with reduced mobility expressed strong needs for nature interaction. Future research should point out what scenes are most appropriate for individual experience compared to scenes that are most suitable for the initiation of social contact when others are in the same room.

NATALIE (NEED ARTICULATION THROUGH AUTONOMY LOSS IN ELDERLY)

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Project Natalie focuses on independent living for people with dementia by generating fundamental yet applicable knowledge to design eHealth-technology to overcome difficulties in the dialogue between patients and (in)formal caregivers. Open communication about the challenges of living with dementia and accurate articulation of wishes and needs is crucial in providing support to this target group. However, not accepting having dementia and fearing humiliation impedes patients to talk about their illness, which threatens a patient-centred-care approach and patients' autonomy.

The aim is to generate knowledge that helps to design adaptive, user-friendly applications for people with dementia, that (1) persuade them to overcome impediments to talk about their illness, (2) supports them to enter the dialogue with their (in)formal caregivers and (3) assist in creating better insight what support they need to uphold independent living.

Research-activities are a coherent combination of regular research-methods (literature-study, effect-evaluation) with a research-through-design setup (emphasizing target-group involvement). The eventual product is a theoretical framework that describes design-principles and methodological procedures that guides the design of these applications.

Initial Research through design activities concerns the juxtaposition between the experience of the patient's autonomy and the (in)formal caregivers perception of that autonomy. Preliminary findings from context mapping sessions, as well as exploratory methods, concerning the experience and perception of autonomy in dementia care and the needs articulation that accompanies them, are presented. These findings led to the first draft of a design for autonomy framework for elderly with early-onset dementia, that can be shared during the presentation.

Symposium Virtual Reality

WHICH PROFESSIONAL CONTEXTS CAN ENRICH THE TRAINING OF MEDICATION SKILLS OF NURSES THROUGH VIRTUAL REALITY?

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Every day, nurses find themselves in complex professional situations wherein they have to check, prepare, distribute, administer and evaluate medication for their patients. One simple mistake could create great complications. Skills in high-risk professional practices can be strengthened and preserved through lifelike virtual simulation training. It offers nurses the possibilities to engage with difficult, unclear situations that also come across unexpectedly during professional practice.

Medication administration requires not only theoretical knowledge about medicines, medication safety and medication calculations, but also skills to apply this knowledge precisely and efficiently under various circumstances. Medication calculations ask for regular computational skills, such as addition, subtraction, multiplication and division of whole numbers, decimals and fractions, and conversions between the latter. Automation of computational and medication skills in various (virtual) situations reduces the burden on nurses' working memories and ensures a shorter decision-making process, which improves analytical and problem solving abilities.

To explore which medication situations nurses experience, we interviewed 15 hospital and home care nurses. We will use the results as starting point for the design of a virtual reality training program.

Preliminary results from the interviews already gave an idea of professional contexts that may be built into a virtual reality environment. Examples are occasional prescription, calculation or preparation errors, system delay or failure, sudden changes in the condition of a patient, time pressure and overdose. Also all kinds of distractors such as alarms of various kinds, smartphone sounds, questions from colleagues, patients or relatives, and hectic and noise in the nursing ward.

Symposium Virtual Reality

PREPARE FOR THE UNEXPECTED. USING VIRTUAL REALITY TO INNOVATE EDUCATION FOR AMBULANCE PARAMEDICS.

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Virtual Reality has the potential to bridge the gap between theoretical educative materials and the often complex real-life situations that paramedics face in practice. Virtual Reality provides a safe way to experience these situations, to repeat if necessary, and to reflect on the decisions made during training with a teacher or coach during a debriefing. In the next two years partners from the educational system and from practice, both within the healthcare sector and the creative industry, will work together towards strengthening and innovating the current educational climate for ambulance paramedics. An important design goal is to establish general sensory and interactive requirements to support immersive learning experiences; in other words, what is (minimally) required of virtual reality environments to ensure maximal impact on the target audience. To ensure effective implantation and use in the long run, barriers and facilitating factors within the relevant organisations is another key research topic. The used design framework entails at first a focus on the user context by researching and specifying user needs and appropriate training situations. Second, concepts and prototypes will be constructed in rapid iterative fashion, based on existing work. Finally, high fidelity prototypes will be implemented and piloted within the context of the relevant organisations. In short, we aim to increase the quality of healthcare education even further through designing and sustained embedment of new and interactive technologies, particularly through the use of Virtual Reality.

Symposium Virtual Reality

EXPLORING THE ANTICIPATED USE OF HEAD MOUNTED DISPLAYS FOR FUTURE HEALTH CARE PROFESSIONALS.

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Wearables such as Head Mounted Displays (HMDs) have been available for several years now, but uptake has been slow so far. Few studies have been conducted in the area of health and wellbeing with regard to HMDs and the public media reported mixed emotional reactions of people regarding the wearables. The objective of this study was to gain insight into preferences on anticipated use in the early phase of HMDs.

A survey was conducted among Dutch students
following a nursing or social work education (N=100) which included the following variables: current use and experience with current ICT applications, areas of interest of anticipated HMD use, potential use functionalities of HMDs, attitudes towards receiving non-visible cues in social interaction, the behavioral intention to use HMDs in the near future, compatibility of HMDs with other applications, and costs.

Results showed that regarding the areas of high interest of anticipated use of HMDs lies especially in receiving information regarding: emergencies via the HMD if something is happening close to their physical location; news; general information of their physical location, and entertainment. The attitudes towards receiving non-visible cues in social interaction such as detecting stress levels or mood were all reported with a negative attitude. More than half of the respondents reported to have an intention to use a HMD in the future. In the presentation, the results will be discussed in the light of the implementation and use of HMDs in real life health care contexts.

Poster Presentations

FACTORS INFLUENCING ADOPTION OF TECHNOLOGY BY NURSES

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Background: The world's population is aging, and with aging population comes an increase of chronic diseases and multimorbidity. At the same time a shortfall of trained health care professionals is anticipated. This raises questions on how to provide the best possible care. The use of Information and communication technology (ICT) and e-health has the potential to address the challenges that healthcare is facing. ICT applications and e-health, such as videophones, telemedicine and mobile devices, can benefit the healthcare system. Nonetheless, ICT is not used to its full potential. One of the key factors is the low adoption rate by nursing professionals. The nursing profession is characterized by teamwork and interdisciplinary collaboration. Nurses often work in nursing teams and collaboration between different disciplines is necessary for providing health care. Thus, collaboration is necessary when implementing ICT innovations.

Methods: A systematic literature review was conducted in online databases PubMEd, CINAHL and IEEE, using key words related to innovation, nursing teams and adoption.

Results: The result of the systematic review is that little is known about the relation between ICT adoption by nurses and the nature of collaboration by nurses in teams and in interdisciplinary networks. This leads to further research questions and a need for further research in this subject.

Poster Presentations

PRIDE AND PREJUDICE: TACKLING CHRONIC DISEASE PREVENTION THROUGH REAL-LIFE MONITORING AND CONTEXT-AWARE INTERVENTION DESIGN

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Physical activity and diet are two, strongly linked, key lifestyle factors for sustainable health. Inactivity and poor dietary behavior are both affected by an interaction of personal, social, cultural and societal conditions. Sticking to a healthy diet combined with regular physical activity is extremely challenging, and many people are unable to change their habits. The most successful endeavors combined interventions in multiple environments and focused on groups rather than on individuals.

Physical activity and diet share another feature: they are difficult to modify on the long-term, and also difficult to measure. Most studies rely on self-report, which often turn out to be unreliable and invalid. Memory bias, social approval, and social desirability bias occur frequently while reporting various aspects of dietary intake and in physical activity. Objective measurements are needed to gain more insight into actual behavior. Moreover, we need longitudinal measurement, because health effects typically occur on the long-term.

The novel approach we present combines monitoring in real-life through sensors (food intake, physical activity, and health parameters) with the development of design interventions at different levels of the system (person, group, society), and evaluation of the (long-term) effectiveness of these combined interventions. The interventions will address both the socio-cultural context and the physical context in which products are acquired and consumed and where physical activity can take place.

As a first step, we present a measurement system that monitors food-related activities in the kitchen real-time combined with experience sampling, which will serve as input for the design of interventions.

Poster Presentations

HEALTH AND WELLNESS IN A CONNECTED SOCIETY

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The application of new technological innovations are finding their way into the health and wellness sector where they are increasingly used for various purposes. The research project 'Health and Wellness in a Connected Society' will be looking at new technologies to measure, monitor and stimulate physical activity for health care patients (e.g. diabetic, chronic pain, heart failure). How combinations of these new technologies can contribute to improving care, health and well-being will be the central research question this project addresses. In particular how they can facilitate 24/7 monitoring to support care, treatment and interventions plans. One of the first steps will be to investigate how new technologies can be used to measure physical activity and movements in-the-wild (i.e. at home) and be integrated into everyday life. The research project will then continue to build upon these findings, collect data from these technologies and utilize this for intervention methods. The project also allows to further investigate technological issues, the effects these technologies have on their users, and both privacy and ethical aspects of applying these technologies. Insights into these topics will help to develop guidelines for using (combinations of) new technologies to support care, treatment and intervention plans.

Poster Presentations

EFFECT OF MOTIVATIONAL INTERVIEWING COMBINED WITH DIGITAL SHOE-FITTING ON ADHERENCE TO ORTHOPAEDIC SHOES: STUDY PROTOCOL

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Diabetic foot ulcers are a leading cause of hospitalization, amputation and high treatment costs. Personalized orthopaedic shoes are considered essential to prevent (re)ulcerations, and therefore adherence to this footwear is crucial. However, adherence to orthopaedic footwear is often low and there is a lack of insight into the (long-term) benefits of methods that might improve this adherence. The aim of this study is to assess the (cost-)effectiveness of a novel care procedure (motivational interviewing (MI) combined with digital shoe-fitting) compared to usual care (no MI and traditional fitting).

In a randomized controlled trial, 220 participants with diabetes mellitus, with or without previous ulcer, who are prescribed custom-made orthopaedic shoes will be included and randomized over the intervention (novel care) or control condition (usual care). A temperature sensor will be built in participants' custom-made shoes to continuously measure wearing time throughout 12 months. Daily activity will be measured using logdata with a stepwatch, and combined with the wearing time to calculate adherence. The primary outcome is the proportion of participants who adhere, that is, take at least 80% of their total steps with custom footwear.

Results will consist of sensor-based and objective assessment of differences in adherence to orthopaedic shoes, quality of life, productivity, costs and quality-adjusted life years, over one year. In addition, the patient perspective; the experience on orthopaedic footwear, use and usability, will be described. This trial will generate insights into the socio-economic and wellbeing impact of the novel care procedure resulting from improved adherence to orthopaedic shoes.

AUTOMATED REFLECTIVE ECOACHING FOR STRESS MANAGEMENT

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Background: Most eHealth tools that include self-tracking to improve a healthy lifestyle summarize the collected data for the users. However, users need to obtain a deeper understanding of the data and decide upon the next step by themselves, i.e. perform reflection on the data. Reflective coaching via an automated eCoach can bridge the gap between awareness via self-tracking towards real behavior change. In this study, we focus on improving stress management and resilience among employees via the BringBalance app. The research questions concern:

From the perspective of the employee, were they able to perform reflection on the self-tracking data? How and for what purpose were the elements in the app used? What was the adherence to the app?

Methods and results: 30 employees were recruited via the HR department of a software company. Participants used the BringBalance app for six weeks and performed reflection via four phases (Gilbert and Trudel, 2001): 1) identification, 2) strategy generation, 3) experimentation, and 4) evaluation. Data collection consisted of log data, build-in questionnaires for reflection in the app, in-depth interviews, and a pre- and posttest survey (including questions on the perceived value of reflection, the Brief Resilience Scale and the Perceived Stress Scale). The posttest survey asked about the utility of the elements in the app for the purpose of reflection. Preliminary results are that most employees, that completed the program (47%), experienced more insights into stress and resilience and strategies for improvement. Difficulties in integration into daily life were experienced.

Poster Presentations

WEARABLES IN THE CARE FOR PEOPLE WITH DEMENTIA SHOWING CHALLENGING BEHAVIOUR

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In nursing homes, dementia is up to 80% accompanied by challenging behaviour (CB; e.g., anxiety, agitation and disinhibition). The cause of CB can be treated psychosocially, by means of a thorough analysis of behaviour. However, due to the client's limited communicative capabilities this analysis is very complex. Persons with dementia cannot themselves indicate what is experienced as being stressful. This hampers the identification of the stressors causing CB. By measuring biomedical variables, such as movement, temperature, heart rate variability, blood pressure and skin conductance by means of a wearable (wristband), stress-related parameters can be measured easily and continuously. Currently, it is unknown if and how wearables can be used in facilitating a psychosocial approach to reduce or prevent CB.

In this multiple-case study, a wearable (Empatica E4) was used 3 days in two subjects with dementia showing CB. Simultaneously, CB was observed and scored. Stakeholders (i.e.,involved healthcare professionals and legal representatives) were interviewed.

Putting on the wearable by the healthcare professional was feasible in both subjects, and stress-related parameters were measured continuously. Skin conductance often increased before visible CB. Stakeholders were open to the use of a wearable, provided that clear instructions and support are available and clients do not experience the wearable as a burden. Finally the wearable should be beneficial for the person with dementia in order to be accepted by the stakeholders. Future research will investigate the in-depth relationship between biomedical measurements and CB, and the practical considerations when implementing the wearable in people with dementia.

Poster Presentations

TO IDENTIFY EFFICACIOUS SELF-REGULATION TECHNIQUES IN AN E- AND MHEALTH INTERVENTION TARGETING AN ACTIVE LIFESTYLE.

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Objective: Many e-and mHealth interventions use a range of behaviour change techniques, but it's unknown which (combination of) techniques are most effective. Therefore, our aim is to investigate the efficacy of three behaviour change techniques (i.e. action planning=AP, coping planning=CP and self-monitoring=SM) on adults' physical activity (PA) and sedentary behaviour (SB).

Methods: 480 healthy adults used the e-and m-health intervention for five weeks. Participants were randomly allocated to eight groups and received a different version, in which three behaviour change techniques were combined. Levels of PA and SB were assessed at baseline and post-intervention using self-reported validated questionnaires. RM ANOVA's were conducted using SPSS24.0.

Results: Receiving SM increased participants' total PA ($F=6.61;p=0.01$), moderate to vigorous PA ($F=6.61;p=0.01$) and reduced their levels of SB ($F;5.87;p=0.02$) in comparison with participants receiving no SM. Groups receiving CP improved vigorous PA compared to groups receiving no CP ($F=4.56;p=0.04$). Participants who had a combination of AP and CP improved their total PA compared to participants only having AP or CP ($F=4.29;p= 0.04$). No improvements in PA or SB were found in groups receiving a combination of CP with SM and CP with SM compared to receiving these techniques alone.

Conclusions: Favourable intervention effects were found on adults' PA and SB receiving "SM". No further improvements were found using SM in combination with AP and/or CP which states that using SM within interventions is important. Furthermore, when participants need to plan certain activities such as vigorous PA, it seems that CP is a fruitful technique.

Poster Presentations

THE CHALLENGES OF A DIGITAL SOCIETY - A SHARED RESPONSE BY THE DUTCH UNIVERSITIES

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In the current digital society, every aspect of our lives is being affected by the digitalization of data. To address complex questions arising from further development and use of digital technologies, the Association of United Universities in the Netherlands (VSNU) has initiated the Digital Society program, bringing together over 30 leading professors in their respective fields. Key objectives are 1) putting societal needs central to further research about digitalization processes, 2) promote responsible human-centered digitalization, and 3) collaborate closely with stakeholders.

To meet these objectives, all Dutch universities collaborate across disciplinary boundaries. The aim is to develop a shared research agenda and engage with a broad range of societal partners to create research that puts societal needs central. This should accelerate the processes of digitalization and the promotion of responsible, human-centered digitalization and datafication. Seven program lines are set up to bundle research activities and accomplish this common goal. In the 'Health & Well-being' program line, eight universities work together to develop, evaluate and implement integrated and personalized digital healthcare solutions, while understanding the societal challenges raised by this digitalization.

With this program, we hope to increase inter- and multi-disciplinary university positions, attention for digitalization and data science, methodological repertoires in all disciplines and the number of co-authored and co-referenced publications amongst participating researchers. Further, we hope to provoke higher quality public and political debate, increase social experimentation, and improve digital literacy in Dutch society. Finally, the program should lead to more inter- and multi-disciplinary collaborations and productive public-private partnerships.

STRUCTURED APPROACH TO CREATE EHEALTH PERSONAS THAT HELP TO DEFINE INTENDED USE

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Personas, describing and exemplifying the fictive users of a technology, are a commonly used tool to remind developers and researchers of their target group. Mainly health-related attributes are used to describe eHealth personas. However, reaching beyond health characteristics may lead to richer personas that reflect *users* instead of patients. We expand on previous approaches for persona development by combining qualitative data and log data in a user study. We aim to contribute to the understanding of how persuasive technological interventions can be designed to support user needs, ability, and preferences and to better predict use.

Personas are developed for technology to empower people with cardiovascular diseases (CVD) in maintaining a healthy lifestyle. First, relevant information was extracted from interviews with participants (n=25) from a previous study using a predefined coding scheme based on the conceptual model of LeRouge, supplemented with existing literature. All resulting themes and variations were categorized into binary variables to enable cluster analysis. Furthermore, quantitative data regarding the use of eHealth technology, demographics, eHealth skills and quality of life were added to this cluster analysis.

Currently, the analysis of interview data is finalized. Themes emerging from the secondary qualitative analysis will be used in a hierarchical cluster analysis (work in progress). The identified clusters will be compared by carrying out comparative, non-parametric statistical tests on the distinct variables of each cluster. The resulting personas will be used to select (persuasive) technology features to be included in the design, to profile participants and to tailor future interventions.

WEIGHT MAINTENANCE: FINDING EFFECTIVE COMBINATION OF PERSUASIVE AND BEHAVIOR CHANGE TECHNIQUES STIMULATING MOTIVATION AND ADHERENCE

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Introduction: Obesity and weight-loss maintenance (WM) is a major health challenge that requires novel solutions, as three out of four regain lost weight. Combining persuasive design principles (PSDs) with behavior change techniques(BCTs) in eHealth development could contribute to facilitate the behavior change needed. The aim of this review is to identify PSDs and BCTs intervention components that are used to stimulate motivation and adherence in eHealth interventions for sustained WM.

Methods: A systematic literature search was performed in: PsycInfo, Ovid Medline, Embase, Scopus, Web of Science, and Amed, from January 1, 2007 to June 30, 2018. Arksey and O'Malley's scoping review method was applied, next to the Persuasive System Design-model[1]and Michie´s Behavior Change Taxonomy[2].

Results: Thirty-four weight loss (WL) and eleven WM interventions met the inclusion criteria. Analysis revealed the most frequently applied PSDs and BCTs in the WL and WM interventions (e.g. self-monitoring, goal-setting and feedback). Successful eHealth interventions supporting weight loss maintenance contained a combination of five PSDs and BCTs. The research also revealed several PSDs and BCTs mentioned in the publications to stimulate motivation and adherence.

Discussion / Conclusions: The current findings provide guidance for eHealth design and testing of identified principles and techniques, and their effect on health outcomes. Findings do also contribute to development of novel solutions that may contribute to support lifelong behavior change and weight loss maintenance.

Poster Presentations

GRIDT: THE NETWORK FOR BEHAVIOR CHANGE AND SOCIAL MOVEMENTS

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The Gridt Network is a non-profit and open-source social platform in development, designed to stimulate discipline and leadership in its users. In modern-day health care, motivating people to implement new habits for a healthier lifestyle is perhaps the most important task. Although sharing knowledge and monitoring information help to support desirable behavior, inducing behavior change and habit formation remain challenging for both client and caregiver. For relatively simple tasks, such as regular excercising and flossing teeth, many people already know the why, how and what, but still struggle with turning motivation ("I want to do something) into volition ("I will act on it"). Gridt is a new way of connecting people that provides them with a permanent social nudge to act on their goals.

As opposed to existing social media platforms, Gridt consists of unilateral connections between users with common goals in implementing new behavior. By passing down the information of completed tasks to their peers, users are enabled to lead and follow each other in desired behavior. The unilateral connection means that the person who sends information does not 'see' the receiver: users only see their leaders, not their followers. This new type of digital social connection resembles the idea of a conga line or the Dutch way of doing a 'polonaise', in which every individual sets the group in motion and vice versa.

As a non-profit initiative, Gridt actively shares its technology to promote an open internet that contributes to a healthier and more sustainable society.

Poster Presentations

PERSONALIZED RECOMMENDATIONS FOR APPS THAT SUPPORT HEALTH BEHAVIOUR CHANGE

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Digital health behaviour change interventions, such as smartphone apps to help people quit smoking, eat healthier and exercise more, could provide a (cost-)effective way to improve and maintain physical health. However, uptake and use of these 'health apps' is currently low, and choosing an app based on anything other than popularity is difficult.

Our reasoning is that the chances of successful health behaviour change as a result of using health apps would increase, if people were able to find the (type of) apps that better fit their 'needs'. In other words: we hypothesize that recommending a certain (type of) app to a specific individual, based on characteristics of the app on the one hand, and an estimate of preferences of the individual for those characteristics on the other, will increase the chances of actually achieving the desired health behaviour change.

This PhD-project is aimed at finding ways to offer the 'right' app to the 'right' person in the early stage of the selection process (at the time of downloading the application) by creating a health app recommender system. In the first phase of the project we explore, amongst others, what mechanisms or features of apps for health behaviour change work best for whom in which context. In the second phase, we will exploit those and other insights to create a recommender system that not only tries to estimate the preferences of an individual, but also tries to predict effectiveness of a certain (type of) health app for a particular individual.

Poster Presentations

UNDERSTANDING HOW AND WHEN COMPUTER- AND GAME-BASED INTERVENTIONS HAVE IMPACT IN CHRONIC PAIN MANAGEMENT

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Background: Digital technologies such as the internet, mobile apps, serious games, and virtual reality have significant potential impact in chronic pain management through improvements in accessibility, engagement quality, personalization, or cost-effectiveness. Moving this from promise to practice requires transferable understandings of what technologies work best, how, for whom, under what circumstances, and why.

Objective: Developing theory on the extents, respects, durations, ways, reasons, circumstances, and costs of impact of various digital technologies targeted at various patients with chronic pain.

Methods: This poster presents the mixed-methods evaluation designs, findings, and conclusions of a PhD thesis about ways and conditions of feasibly and effectively integrating a mindfulness-based serious gaming intervention ('LAKA') into a regular multidisciplinary rehabilitation program for patients with complex chronic pain and fatigue. To offer perspective for serious gaming results, a comprehensive systematic review and meta-analysis was conducted on the effects of (other) computer-based interventions and on heterogeneity by differences between patient outcomes, control groups, intervention types, or the patients with chronic pain or functional somatic syndromes.

Results: Findings culminated in the proposition of a 'program theory' of how, for whom, and when serious gaming produces desirable patient outcomes (see figure).

Discussion: Follow-up research focuses on (1) extending the explanatory scope towards other aspects of impact (reach, adoption, implementation and sustenance) and costs, and on (2) refining insight into how serious gaming (adoption) could improve by providing more valuable data to its users. Hereto, subsequently, realist approaches to literature reviewing and data-science tools for analyzing log-data are used.

Poster Presentations

WAP AS AN EFFORT TO INCREASE THE HEALTH STATUS AND MENTAL HEALTH FOR TELKOM EMPLOYEE

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In the Biopsychosocial approach, an individual's health is not merely their physical health, free from disease and injury. An Individual's health is not just determined from its physical scope , but also from a mental and social aspects, too. These three aspects interact with each other and cannot be separated from a person's wellbeing. In this paper we explains the Wellness Assistance Program (WAP) for improving the quality and health care of Yakes Telkom Employees.

This study aims to review WAP to provide insight and change related to a better lifestyle, the importance of routine health and produce ideal stress conditions to remain productive and healthy.

This program uses a one group pre-test post-test design. Measurements are based on health status that was acquired from each participant's General Check-Up (GCU) results and stress levels obtained from a Psychological Health Questionnaire (74 items).

The pilot project for WAP started in 2016 there were 54 subjects; 135 subjects for 2017; and 703 subjects for 2018. The results of the posttest indicates that there is always an improvement to the participants' health status and stress levels compared to those who don't participate in WAP.

Using WAP the improvement of participants' health status, both physical and mental participants decreased 9% in 2018 and 7% in 2017. Increasing the number of WAP participants every year and the limited resources that manage WAP, a big data analysis is needed to be able to estimate and monitor the health status and stress level of participants.

Poster Presentations

MECHANISMS OF CHANGE OF APP-BASED INTERVENTIONS TO REDUCE PERSEVERATIVE COGNITION IN DEPRESSION: STUDY DESIGN

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Introduction: Major Depressive Disorder (MDD) is the most prevalent psychiatric disorder and is characterized by high relapse rates. Persistent negative thinking and rumination (i.e., perseverative cognition [PC]) are key characteristics of MDD that often persist in the remitted phase. Therapeutic techniques, including fantasizing and mindfulness, seem potent in reducing relapse, putatively by enhancing positive attitudes and acceptance of thoughts, respectively. The study aims to investigate 1) the psycho-physiological and cognitive mechanisms by which one-week App-based training of fantasizing vs. mindfulness affect PC and 2) whether pre-therapeutic individual characteristics of individuals predict superior effectiveness of one intervention over the other in reducing PC.

Methods: Remitted MDD patients (N=50) and healthy controls (N=50) will perform a diary study using ecological momentary assessment and cognitive tasks in a cross-over design. Furthermore, heart rate variability and electroencephalogram will be measured during a mind-wandering inducing task and emotion regulation. Baseline measures will be compared to measures during one-week App-based training of fantasizing and mindfulness.

Expected results: Fantasizing and mindfulness both seem potent in reducing PC, but may rely on different mechanisms. In contrast to positive fantasizing, which aims at enhancing positive cognitions, MBCT enhances a patient's ability to accept any thought that may arise. If these proposed mechanisms are correct, we should see distinguishable changes in thought content reported after mindfulness (predominantly a reduction in the perseverativeness of thought) and positive fantasizing (predominantly an increase in the number of positive thoughts). Furthermore, we aim to identify individual markers predictive of individual effectiveness of the interventions.

Poster Presentations

VIRTUAL REALITY RELAXATION FOR SELF-MANAGEMENT OF STRESS IN PATIENTS WITH PSYCHIATRIC SYMPTOMS

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Background: Stress and negative mood states can trigger and worsen psychiatric disorders. Relaxation exercises using imaginary visualization of pleasant environments can have a positive effect on the level of stress and negative mood states. The immersive properties of virtual reality increases the users' ability to focus their attention on the environment that elicits relaxation. Therefore, we aimed to investigate whether virtual reality relaxation (VRelax) is more effective than standard relaxation exercises.

Methods: A randomized crossover trial was performed in patients with an anxiety, psychotic, depressive or bipolar disorder. Participants were randomly assigned to start with either VRelax or standard relaxation which they used at home for 10 consecutive days for =10 minutes per day. After 10 days, participants used the other relaxation instrument (i.e. VRelax or standard relaxation) for another 10 days. Ecological momentary assessments were used to measure different mood states before and after each session. The difference in change in mood states was analyzed using multilevel random effects regression analysis.

Results: In total, 47 participants completed the study. VRelax resulted in a significantly greater improvement in anxiety (B=-4.30, 95%CI=-5.86;-2.73), sadness (B=-3.65, 95%CI =-5.39;-1.91), cheerfulness (B=3.67, 95%CI=2.15;5.18), overall positive mood (B=7.59, 95%CI=2.28;12.89), and overall negative mood (B=10.88, 95%CI=5.89;15.87) compared to standard relaxation.

Discussion: VRelax was more effective than standard relaxation exercises in improving negative and positive mood states. Virtual reality is a powerful mode of administration and a promising tool in reducing negative mood states in patients with psychiatric symptoms.

COUNCIL OF COACHES - A NOVEL HOLISTIC BEHAVIOR CHANGE COACHING APPROACH

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Despite the proliferation of ICT solutions for personalized healthcare, there is still no easy way to provide older adults with integrated coaching services. Therefore Council of Coaches, a Horizon 2020 project, is working on a radically new virtual coaching concept where multiple autonomous, embodied virtual coaches together form a council to fulfill the needs of older adults in an integrated way. Each coach has his own expertise, personality and style of coaching, and despite their different viewpoints they all share a single goal: to support their client across every aspect of well-being, including physical, social, cognitive and mental support. As a client you can share your thoughts with the council, or listen and observe how the coaches exchange their views on numerous issues. The coaches listen to you, inform you, monitor you and support you in taking control of your health.

Council of Coaches will be empowered by a novel Open Agent Platform, providing core functionalities for the development and deployment of coaches, including technologies for non-obtrusive interactions between the client and the coaches. To this end, leading edge spoken dialogue interaction technologies will be provided as embodied conversational agents that will join in conversations with the client. The platform will not be confined to a certain number of coaches - rather it will enable developers and innovators to introduce new coaches that provide additional knowhow and services. Hence, Council of Coaches will enable a new virtual coaching ecosystem, bringing together healthcare services providers with innovators to implement novel ideas.