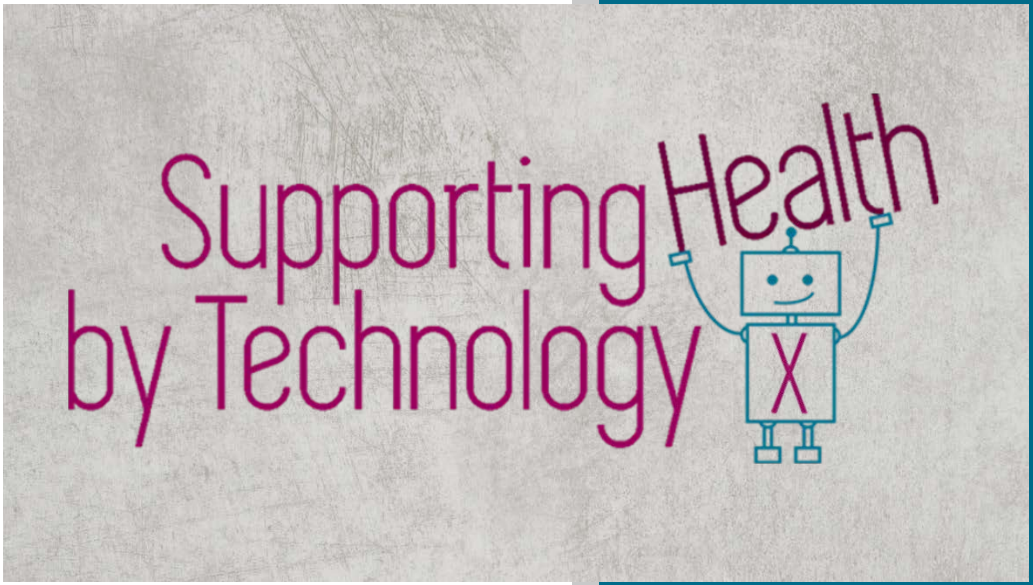
2020

Abstract book



Supporting Health by Technology

International Conference

11-6-2020

Centre for eHealth & Wellbeing Research

UNIVERSITY OF TWENTE.

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Abstract book of the postponed version of Supporting Health By Technology

Enschede, The Netherlands

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Preface

The Centre for eHealth & Wellbeing Research of the University of Twente, in collaboration with the University Medical Center Groningen, is very proud to present the abstract book of the **10th edition – 2020** of the succesful 'Supporting Health by Technology' series.

For our 2020 Supporting Health by Technology conference, we highly welcomed abstracts on subjects related to eHealth, ePublic Health, eMental Health, Big Data for Health, self-tracking, smart coaching and related fields, in a variety of inspirational and interactive formats, such as symposia, workshops, demonstrations, posters or oral presentations. We favored innovative contributions that highlight some of the newest applications of eHealth technologies and extended a warm welcome to pinoneers who explore new fields or new ways to apply eHealth technologies.

We were pleased to receive scientific work related to these subjects from a broad variety of contributors, such as scientists, healthcare professionals, patient organizations, policy makers, eHealth companies, students and many others. By bundling the work of these contributors, we hope to keep the eHealth community alive, and to promote the visibility of this community.

Given the current situation of the COVID-19 pandemic and regulations regarding travelling throughout the world, the conference can unfortunately not take place as originally planned and will be **postponed to next year, the 10th and 11th of June 2021, at University of Twente.** As we understand that scientific work that got accepted might not wait until next year to be presented, we will open a **new call for abstracts in 2021.**

However, at the same time, we are delighted to have received a great number of valuable abstracts from various fields of expertise, which is record-braking in the light of the history of our conference series. Although this year's conference cannot take place as originally planned we would like to contribute to the visibility of the authors' work within the international community by releasing this digital abstract book.

In total, we received 107 contributions to our conference from all over the world. This abstract book contains all accepted contributions to HealthByTech 2020. The included abstracts were reviewed by a board of experts in the field from University of Twente and University Medical Center Groningen in a double-blind review process. The program committee carefully assessed all reviews and comments made by the reviewers and based on this the final list of abstracts for the conference was comprised.

We would like to express our gratitude to all authors that submitted their valuable and inspiring work to our conference in 2020 and to the reviewers for their time and insights, and are looking forward to (physically) welcome you next year for an interactive and exciting conference.

In the meantime, to keep in touch with the community, contributors are highly welcome to join our new Linkedin group, a place to post own content, such as updates about current research, news, questions, or discussion points about digital and electronic health.

Supporting Health by Technology

Conference Postponed

We will be happy to see you next

10 and 11 of June, 2021

Stay in touch via **HealthByTech.com**, and also via...

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Oral presentations

Co-creation phases in integrating top-down and bottom-up requirements: developing a self-compassion app with cancer patients

Judith Austin, Stans Drossaert, Jelle van Dijk, Jelena Mirkovic, Elin Børøsund, Robbert Sanderman, Maya Schroevers and Ernst Bohlmeijer

A cancer diagnosis often involves profound psychological distress, while very few patients seek psychosocial care. Self-compassion is a resource that enables relating to experienced difficulties with kindness and wise, caring action. From previous research we know that compassion-based interventions can be effective in helping patients to cope with long-term physical conditions. However, these interventions are minimally offered in self-help and/or mobile format. Since the uptake of existing psychosocial interventions is low, this project set out to develop a low-threshold self-compassion self-help intervention using mobile technology. The intervention needed to be based on theoretical evidence on compassion-based interventions to be able to offer their benefits. At the same time, the intervention needed to be aligned with the needs, wishes and experiences of patients to be of use to them, particularly during the chaotic time that follows after a cancer diagnosis. Therefore, design requirements include both theoretical evidence (top-down requirements) and user experiences, wishes and needs (bottom-up requirements).

To enable integration of these requirements, five co-creation phases based on workshops with patients and oncology nurses were conducted, each with concrete co-design exercises. The first phase, “exploration of challenges” focused on exploring bottom-up requirements. This phase searched input on the most important targets for the intervention according to participants and on specific topics to be addressed within intervention content. The second phase, “defining content and values” focused on user recognition, appreciation, and suggestions for alterations of top-down content, and how top-down content could be adapted to the needs and vocabulary of end-users. This phase yielded information on which topics and exercises were appealing to the participants. The third phase, “concept design and features” focused on which bottom-up features are put forward by participants, and how they experience features derived from top-down requirements. This phase showed which design characteristics and features were most important for users (e.g. simple motivational elements but not too much gamification) and how top-down features would fit their needs (e.g. using push notifications, but letting the user choose the frequency). The fourth phase, “implementation” of the intervention, explored how participants would receive, offer and tell others about the app. This input enabled us to determine the times and ways in which to introduce the app to patients and the role of oncology nurses. The fifth and last phase, “structure and integration” explicitly focused on the integration of bottom-up and top-down requirements by evaluating iterative cycles of prototypes (participants’ mock-ups, researchers’ mock-ups and designer prototypes). Valuable lessons from both the top-down input and bottom-up input were presented, after which similarities and differences between them were discussed. During the fourth and fifth phase, possibilities and constraints from the software developer were also included as practical requirements.

During the presentation, concrete co-design exercises and methods of each phase will be illustrated, along with lessons learned. The five phases, methods and lessons from this co-creation process can be valuable for future intervention researchers/designers who aim to include end-users and stakeholders in the development, while also basing the intervention on existing theory and evidence.

What to discuss? Automatic topic selection for embodied conversational health coaches

Tessa Beinema, Harm Op den Akker, Lex van Velsen and Hermie Hermens

Background

Health coaching using embodied conversational agents is an active topic of research. In the Council of Coaches project, users can have a conversation with a group of embodied conversational coaches, who each have their own expertise and personality. However, coaching interactions with agents either tend to rely heavily on the user indicating what they want to discuss, or letting the user follow a predefined route. Development of an artificially intelligent algorithm that is able to select the most relevant topic to discuss would be a way to make the interactions agent-initiated, but still tailored to the user. This will allow the coach to start a conversation on a relevant topic, and prevents that the user has to select a topic themselves or has to go through a number of obligatory topics before reaching the topic that is relevant for them.

Aim

To a) specify topics that are part of coaching conversation (e.g. goal-setting, social conversation or giving feedback on performance) and to create a practical model for designing and implementing coaching conversations; and b) to develop an algorithm that automatically selects which coaching topic to discuss next, based on available knowledge about the user, their context and the coaching domain.

Methods

The topic structure was developed by deriving topics from the literature on behaviour change (such as the Behavior Change Technique Taxonomy v1, Michie et al. 2013), persuasive technology and relational agents. The topic structure does not only involve coaching topics, but also social topics that are relevant for our coaches but not included in literature on human-human coaching (e.g. explaining the interaction paradigm, or introduction between the coach and user).

The topic selection algorithm uses an implemented version of the model and an algorithm, which selects the topics. It is evaluated through a Micro-Randomized Trial that compares the topic selection version with a fully scripted version. This is incorporated in the final two evaluation rounds of the Council of Coaches application with 100 participants (two rounds of 50 participants in the UK/Netherlands).

Results & conclusion

In the presentation, we will elaborate on the development process and share the preliminary results of the first of two evaluation rounds. The first round took place in February-April, and the second round will take place in June-August.

Consumer activity trackers as opportunity for lifestyle change: What discriminates users from non-users?

Brenda Berendsen, Denise Peels, Catherine Bolman and Lilian Lechner

Background

Physical activity (PA) trackers are increasingly available, and offer a platform for behavior change techniques aimed at a healthy lifestyle. PA can be promoted using PA trackers and apps. For development and implementation of these interventions, it is essential to know who adopts consumer PA trackers and who does not. This study compared characteristics of users and non-users of PA trackers in terms of psychosocial determinants and technology acceptance.

Methods

In an online survey 533 adults (70% women, age 43 ± 14 years, BMI 24 ± 4 kg/m2) reported age, gender, weight, height and whether they had used a PA tracker or app in the past three months. All participants completed the online questionnaire measuring PA, psychosocial factors related to PA and technology acceptance. Psychosocial determinants of PA included attitude, self-efficacy, social influence, relatedness, competence and autonomy. Technology acceptance was based on the Technology Acceptance Model, extended with constructs related to use of health wearables in previous research, such as effort expectancy, relative advantage and costs. Users and non-users were compared using one stepwise logistic regression-analysis.

Findings

Of the participants 40% (n = 215) used a PA tracker in the past three months. Demographics and psychosocial determinants explained 12% of the variance in dichotomous activity tracker use. Users reported higher feelings of autonomy than non-users (OR = 1.76; $p = 0.014$). Other psychosocial determinants for PA did not differ between users and non-users. Adding technology acceptance to the model increased the explained variance to 66%. Users of PA trackers showed more a positive attitude regarding physical activity (OR = 2.20), higher perceived ease of use (OR = 2.29), affective quality (OR = 2.33), perceived privacy risk (OR = 1.56) and functional congruence (OR = 1.58), and lower perceived usefulness (OR = 0.41) and subcultural appeal (OR = 0.66; all $p < 0.05$). The intention to use a PA tracker in the future was strongly related to use (OR = 4.03; $p < 0.001$). Past use of a PA tracker and MVPA did not improve the model (explained variance of 67%, $p = 0.158$) and had no relationship with PA tracker use.

Discussion

Psychosocial constructs and technology acceptance together explained a large part of the voluntary use and non-use of PA trackers. Especially the constructs of technology acceptance proved very relevant for using PA trackers, although not all were relevant. Users had greater feelings of autonomy. That indicates that either the group that might benefit most from PA interventions is less likely to adopt a PA tracker voluntarily, or autonomy had been improved by PA tracker use. Other psychosocial determinants regarding PA did not differ between users and non-users, implying that consumer activity trackers are a promising platform to support PA interventions in target populations with different levels of motivation. As the cross-sectional design of the study prevents us from showing causality, future research should include measurements over time. When adoption has to be promoted, this would most likely succeed by improving technology acceptance in the target population.

Internet-based treatment for informal caregivers in Lithuania: feasibility and effectiveness

Ieva Biliūnaitė, Evaldas Kazlauskas, Robbert Sanderman and Gerhard Andersson

Background

Individuals who provide care for chronically ill or elderly family members are often referred to as informal caregivers. Even though caregiving can be experienced as fulfilling, often it can also cause emotional as well as physical strain. Since current evidence suggests internet interventions to be effective for individuals with wide range of symptoms, psychological help provided online could be a way to support this vulnerable population. This solution could be especially attractive for time-bounded individuals as well as the ones living in remote areas.

Aim of this presentation

Firstly, to present with feasibility and insights of how this intervention works for informal caregivers in Lithuania. Secondly, to evaluate the effects on measures of anxiety, stress and depression symptoms, as well as quality of life.

Methods

The intervention will be evaluated in a two-arm pilot randomized controlled trial with participants randomized to either eight-week internet treatment or a wait-list control condition. Intervention is a self-help, therapist supported program, based on cognitive behavioural therapy principles. It consists of eight modules, each discussing a different theme. The program was created for Lithuanian users in Lithuania, where the trial took place.

Findings

In total, 63 participants have taken part in the study, majority of whom were woman (n=57). Collection of post-assessment data currently is being finalized and will be examined during the Spring of 2020. Results will be presented for the first time in Health by Tech conference in Enschede.

Discussion

Informal caregivers represent a growing population that is often experiencing chronic stress among other psychological symptoms. Interventions delivered online could be one of possible solutions in improving their well-being. This certainly applies in Lithuanian context, where there is an existing gap between demand and availability of psychological services not only for informal caregivers, but in the general population as well.

Disclaimer: This project is part of the European Training Network on Informal Care (ENWTINE) consortium.

Development of the LeaveApp: assisting forensic patients during leave is balancing between treatment and control

Yvonne Bouman, Hanneke Kip and Dirk Dijkslag

Background

One of the most critical phases during secured clinical treatment of forensic psychiatric patients is the start of leave in general and more specific: unescorted leave. For both patients and staff, unescorted leave is strainful: Patient: Will I be able to withstand tempting possibilities? Will I be able to manage on my own? Staff: Will the patient abscond? And of course, will the patient refrain from delinquent behaviour whilst unsupervised? We developed a web-based app to assist patients and staff to support them during this phase: the LeaveApp [VerlofHulp] (Dijkslag et al., 2016).

Methods

During this presentation, we will guide you through the development process in which both the Risk Need Responsivity principles of effective forensic psychiatric treatment and self-management have been central. The first experiences with the use of the app (versions 1.0 and 2.0) in treatment will also be presented.

Findings

Implementation of this app proved to be a long road. Besides technical barriers, political, ethical and privacy issues had to be addressed during the process. Hence, we will present our lessons learned and the future path which we are currently taking in the implementation of de LeaveApp 2.1.

Discussion

Persuasion not only refers to the look and feel of technology, but also to contextual factors related to the target group and its environment. In forensic psychiatry, the complexity of the dual goal of protection of society coupled with treatment of severely ill patients warrants a thorough contextual analysis prior to the development and implementation of a specific technology.

An online education program for students sports studies on e-health to optimise lifestyle coaching

Katja Braam, Margot Koeneman, Ybranda Koster, Bart Visser, Laurence Alpay and Joan Dallinga

Introduction

Lifestyle professionals use tailored counselling techniques to support people to reach a healthy lifestyle. This is often done during weekly face-to-face sessions. Between these sessionsmany people find it difficult to manage their own health, or to comply to recommended health advises. In that context, the use of eHealth may optimize the efficacy of health advices and increase compliance. Yet, until now, lifestyle professionals often lack knowledge and skills about how to use eHealth in client-settings. In order to prepare future lifestyle professionals in the use of eHealth in their work, we have developed an online educational module for students from Sport Studies, who learn how to design lifestyle interventions with eHealth.

Methods

Focus-group meetings were held to determine the needs and wishes about eHealth in practice of current and future lifestyle professionals. A total of six meetings were carried out with twenty-five students, six teachers and ten lifestyle professionals and other experts of the field. Collected stakeholder information was coded, mapped and translated into requirements for the module in the school-used digital learning environment: Moodle. The general aim of the online module is to learn students the theory of intervention development, and to assist them in developing an eHealth intervention for a specific population with health problems.

Results

Using the theoretical background and the collected requirements, the researchers and Moodle experts were able to develop a complete online module in which students learn how to use eHealth in practice and are supported by their assignments to develop an eHealth intervention. The conducted requirements describe the need for evidence-based information on usability and availability of eHealth apps, as well as eHealth infographics, videos and practical examples to learn from. The theory of intervention mapping was visualized in infographics for each step of the process. Different videos were recorded. Among others, one video introduced a lifestyle professional and his client, in which both parties reflect on the use of eHealth in a coach-client setting. Finally, as a practical example the Wheelchair Exercise and Lifestyle Study was used showing the process and lessons learned during the development of an eHealth intervention for wheelchair users.

Conclusion and future perspectives

In this project an online educational module was developed which matches the requirements based on experiences and wishes of students, teachers and lifestyle professionals. To support future and current lifestyle professionals in applying eHealth in their daily work activities, more supporting tools need to be developed. In a new research project, a method and multi-disciplinary education module will be developed and tested to help lifestyle professionals to integrate eHealth in the counselling of their clients.

Blood glucose regulation beyond HbA1c in Type 2 Diabetes Mellitus

Niala den Braber, Miriam Vollenbroek-Hutten and Goos Laverman

Background

Glycated hemoglobin (HbA1c) is strongly correlated with the 3-month average blood glucose values and is used in clinical practice as standard for glycaemic control in patients with diabetes mellitus type 2 (T2DM). However, HbA1c provides only partial insight of the glucose regulation, missing information about the glycaemic variability and the glucose ‘time in range’ (TIR, glucose 3.9-10.0 mmol/L), ‘time below range’ (TBR, glucose <3.9 mmol/L) and ‘time above range’ (TAR, glucose >10.0 mmol/L). Information which may be of great importance to reduce the risk of developing diabetes related complications. Continuous glucose monitoring (CGM) technologies make it possible to determine these glycaemic parameters. As such, this study investigates the TIR, TBR, TAR and glucose variability in relation to three HbA1c groups to show to what extent the glycaemic parameters reflect a good HbA1c. Secondly, it is investigated what the frequency, duration and start time of day are of the TBR and TAR episodes to show information about the glucose during day- and nighttime, which is normally not measured. Finally, it is researched if there are explanatory factors for having TIR, TAR or TBR in T2DM patients.

Methods

With the Freestyle Libre glucose sensor, we measured the glucose values continuously during two weeks in 79 insulin-using T2DM patients . Patient characteristics, e.g. age, HbA1c, blood pressure, BMI, smoking habits, were recorded. The patients were grouped based on their HbA1c value: target Group≤53 (HbA1c ≤53 mmol/mol), Group54-62 (HbA1c 54-62 mmol/mol) and Group≥63 (HbA1c ≥63 mmol/mol). The average TBR, TIR and TAR of these three groups are calculated and coefficient of variation (CV, %), standard deviation (SD), low blood glucose index (LBGI) and high blood glucose index (HBGI) were used as parameters for glycaemic variability. Multiple linear regression analysis was used for the association between TIR, TAR and TBR and the patient characteristics to investigate if the CGM measurements are necessary.

Findings

Patients with a target HbA1c (Group≤53) do not spend significantly more time in range compared with patients of Group54-62. However, patients in Group≤53 have significantly more TBR compared with the other two groups. The LBGI of Group≤53 is significantly higher than the other groups and the HBGI and SD of Group≥63 are significantly higher than the other groups. The TBR episodes in the night (12:00–06:00 a.m.) last 2.2 times longer and happen 1.9 times more often compared with TBR in the daytime (06:00–

12:00 a.m.). TAR episodes occur 2.6 times more often during daytime. The duration of TAR episodes during day or night does not differ. Multiple linear regression showed that he only contributing factor to TIR, TBR and TAR was HbA1c, with R values of 0.75, 0.33 and 0.77 respectively.

Discussion

An HbA1c ≤53 mmol/mol, as strived in clinical practice, does not seem to have benefit for better TIR, but is accompanied with higher TBR. Measuring with CGM technology can additionally determine which patients have nocturnal TBR episodes, patients who may need treatment changes. The results in this research show the possibilities of CGM that cannot be determined using only HbA1c. The availability of this sensor technology enables an individualized approach for optimal glycaemic control.

Introducing Edna: the trainee genomic chatbot designed with patients in mind

Dana Bradford, David Ireland and Clara Gaff

Background

Clinical genomic testing is increasingly being used to help find the cause of a patient's medical condition. Unlike earlier genetic tests, genomic tests can also be analyzed to identify information about future health risks, or 'additional findings (AF)'. AF are genetic changes known to cause a condition. This raises challenges around how to support patient decision making and provide equitable access, with the current burden on genetic counsellors. In a pilot service, patients were offered genomic testing for 58 conditions for which early detection or risk reducing interventions are publicly funded by Victorian State Government (Australia). Genetic counselling is provided to ensure they understand the possible results of the test and to explore psychosocial issues (e.g. impact of results, family communication). Given the expected demand for this service for AF it was hypothesized that a chatbot could be developed to support genomic health decisions. The use of chatbots in health care is a rapidly emerging field to which CSIRO has contributed by developing chatbot technology for people with Parkinson's Disease and other neurological conditions. A chatbot can be accessed at any time by a patient from their own devices, and so has the potential to overcome barriers to accessing traditional genetic counselling.

Methods

Adults who had whole exome sequencing conducted for a genetic condition and had received the results were offered a genetic counselling session to discuss interest in provision of AF information. For those attending (N=83), a subset of de-identified transcripts (n=19) were analyzed to develop the chatbot 'brain'.

Findings

Themes common to the AF genetic counselling sessions included introductory conversations, definitions, probing for information and summarizing factors to consider in decision making. These themes were relatively straightforward to code, we simply entered the information we wanted the chatbot to provide. More challenging, the transcripts showed that sentiment analysis would be required – could Edna detect someone crying? We also made Edna's brain clever enough to understand synonyms, which meant we could collect information on family history. As a 'trainee', we decided it was not appropriate for Edna to give medical advice or information on support groups.

Discussion

On the basis of the transcribed counselling sessions, an engaging chatbot was successfully developed that is able to both provide and collect information. Edna is now being trialed to determine barriers to uptake, enablers for decision making and language processing issues for patients; and to explore genetic counsellor perspectives.

Facilitating wearable sensor measurements to augment general movements assessment at home: What do parents need?

Dana Bradford, Christian Redd, Mohanraj Karunanithi and Roslyn N Boyd

Background

General Movements (GMs) assessment in early infancy is highly predictive of a later diagnosis of cerebral palsy. Current investigations are underway to broaden the availability of the GMs assessment by facilitating video collection in the home using a smartphone app for later remote assessment. Despite this promising new modality, challenges remain, including dependency on infant behavioral state, and overall assessment load on the parents. Augmentation of in-home GMs assessment could be achieved using non-invasive wearable movement sensors attached to the trunk and limbs of the infant for a period of time. The degree to which parents are comfortable using this sensor technology at home has not been investigated. This study looked at potential enablers for parent facilitated GMs sensor assessment.

Methods

Qualitative analysis of parent interviews of a typically developing infant cohort. Recruitment is ongoing with four parents (all female) contacted to date. Parents were recruited through a preliminary cohort study testing the sensors in a clinic environment. Parents were invited to participate in a short semi-structured interview to discuss the barriers and enablers they foresaw for parents of 'high-risk' babies undertaking sensor assessment in the home. Content analysis of interview notes was undertaken to determine themes of barriers and enablers.

Findings

Participants suggested or supported several resources to facilitate home implementation of sensor technology including demonstrations prior to leaving hospital; provision on discharge of a package including written instructions, link to an app demonstrating placement with a 'gingerbread man' showing correct sensor placement that utilized the phone camera to determine if sensors were correctly positioned, supplemented by online videos, a frequently asked questions page and helplines for both technical and psychological support; and a follow-up call offered post-discharge. Parents felt it was important to manage expectations around when findings from the sensors would be provided. It was suggested that immediate feedback should be given on completion of data capture that the sensor had captured data (feedback that the technology worked) but that the interpretation of those data should be provided by a specialist. To manage anxiety, all parents could have a specialist appointment scheduled for approximately 4 months corrected age (CA) with the understanding that interpretation of sensor findings and video analysis taken at 12-14 weeks CA by a trained GMs assessor would be disseminated at that time.

Discussion

On the basis of interview data, multi-modal instructional resources, including a mobile phone app and online videos, are being developed as part of a broader implementation plan for using sensors to augment GMs assessment in the home environment.

Using a digital interactive narrative as guided self-reflection for beginning nurses to encourage self-care

Ivo Bril, Nick Degens, Joke Fleer and Lisette Van Gemert-Pijnen

Background

Burn-out and turnover rates among beginning Dutch nurses are high. One of the main reasons for this is the difficulty in adjusting to the tumultuous working environment or making it work in their favor. This is particularly hard for beginning nurses, as they do not have enough experience to reflect on their ordeals and take appropriate actions.

One way to prompt their self-reflection is to provide focused questions within controlled situations that are believable and relatable. The contextualized guidance provides clarity and helps student nurses analyze tough situations in a safe and structured environment. Through this process, they are invited to reflect on what they could do differently, or whom they could reach out to for help.

Methods

Using a User-Centered design research approach, we have developed a digital interactive narrative that helps beginning nurses identify aspects of their job that they find challenging (i.e. it provides contextualized guided self-reflection). In this prototype, the reader plays through an interactive story based on common work floor experiences that require assertive behavior (e.g. a shift throughout which a patient is too demanding). At certain points in the story, the user has to consciously decide how the protagonist acts by selecting from a set of possible (re)actions. Each action leads to story-appropriate consequences, after which the story continues. After finishing the story, users are provided with more in-depth feedback on their (non-) assertive behaviors, using the related moments in the story as context.

In line with our User-Centered approach, testing was aimed at informing future iterations of the prototype with input of the target audience. In its current form, the focus was put on the clarity and realism of the story, the level of control experienced by the user, and the acceptance and perceived usefulness of the feedback. Small-scale tests were conducted with a group of student nurses with internship experience (n=18). A version of the prototype was played and feedback was gathered through the use of interviews and surveys.

Results

Both groups deemed the story very realistic and recognizable; some nurses described that they had had similar experiences during their internships. The group had no issues with the interactive nature of the story and they liked the tough choices they had to make, stating that it made them think of similar situations they had experienced themselves. Although the feedback-aspect was only tested with a part of the participants, this aspect was unanimously seen as clear and useful. However, the prototype lacked a clear follow-up on what to do with the feedback and what to do next.

Discussion

As there is no true surrogate for experience, beginning nurses need more support as they acclimate to the complex demands of the working field. Although the scale of testing was limited, the prototype shows promise as a vehicle for guided self-reflection. Further iterations should refine the feedback element at the end of the story to focus more on supporting the user in taking action to achieve meaningful change.

Social Support Agents for People with Diabetes

Merijn Bruijnes and Willem-Paul Brinkman

Background

Diabetes mellitus is a chronic disease that is characterized by high blood sugar levels over a prolonged period, which if left unmanaged can lead to serious complications such as cardiovascular disease, stroke, damage to the eyes or death. While the condition cannot be cured, a healthy lifestyle and proper disease management have been shown to prevent or slow the onset of complications and reduce their impact on the quality of life. However, adopting a healthy lifestyle and managing the condition means changing deep-seated behavior patterns, something that is very difficult without the right support. In fact, the social support from family members and peers has been shown to be crucial in maintaining lifestyle changes and optimizing diabetes management. However, eHealth tools that support the social context of a patient have received little attention.

Methods

We aim to use Artificial Social Agents (ASA), such as chatbots, virtual agents or social robots, to support people who struggle in maintaining a healthy lifestyle and who may suffer from welfare diseases, such as diabetes. We support these people and their social group with ASAs to reduce prejudice and increase pride. Imagine for example a diabetic who is upset with a friend who did not accommodate their specific diet at a party, while the friend is embarrassed because they forgot the diet. An ASA can obtain information from a patient and redistribute it strategically in a social group, taking into account what information can and should (not) be shared. In the example, the friend would, without shame, ask the ASA all about the diet and could proudly accommodate the patient’s dietary needs. The patient would be pleased that their diet is accommodated at the party without having to publicly ask for it.

Findings and discussion

We explore the norms and values underlying social interactions between people with diabetes and their social circle through focus groups and longitudinal online surveys. Any social eHealth technology should be aware how to adhere to those norms and values. The longitudinal aspect of our data gathering is novel and promises to give participants a better understanding of the impact of our technology on their lives, and thus improves the quality of their feedback. A prototype of the chatbot will be presented and discussed, combined with preliminary findings from the focus groups and longitudinal online surveys.

Simultaneous practices in developing eHealth: the patient journey as outcome and innovative instrument

Loes Bulle-Smid, Marloes Bults, Annemarie van Hout and Marike Hettinga

Background

Telemonitoring is gaining attention as a way to improve care for patients with chronic heart diseases. A successful project on monitoring heart patients at home has turned into a regular service. In our research project, the objective was to gain insight in patients’ and professionals’ experiences and knowledge when using telemonitoring. Heart Care at a Distance, including technology, ways of working, protocols, support and logistics, was developed by Hartcentrum Isala and the company HC@home. During development the involved professionals (care, IT, logistics) developed along, but the acquired knowledge and experience has remained implicit. For successful professionalization and upscaling of the service these must be made explicit. Our research aimed at both adding to the quality of the service as to education of professionals.

Methods

The project had an iterative approach in which different qualitative methods were used. First we observed regular care by joining the professionals and patients during the meetings in the hospital. We interviewed patients at home and asked them to use the cultural probe. By inviting them to take pictures, keep a diary, make drawings or 'send' postcards, we gathered rich data on how heartcare at home influenced their lives. Then we discussed the contents of the cultural probe in a second interview. We also interviewed the professionals we further deepened the analysis of the observations and cultural probes. The care professionals were involved in dialogues that were used as a part of our analysis.

Findings

First, we drew a patient journey of the 'Heartcare at Home'- service. Meanwhile we noticed how their journey was influenced by the new knowledge care professionals gain while monitoring patients at a distance. The dialogues we had with the professionals on the data we gathered, showed us how professionals' knowledge and experience helped them to deal with all the individual differences in patient care. This knowledge became clear while discussing the hindrances and choices they encounter. We called this 'issues' and embedded them in the patient journey. The second result of the project consisted of three profiles for the professionals working with Heart Care at a Distance: nurse specialist, physician and IT support. These profiles represent the tasks and skills required for these (care) professionals which can serve the purpose of validation of portfolios of potential co-workers to assess their required education.

Conclusion

The patient journey map is an instrument for the professionals to discuss the facilitating and impeding factors of the monitoring service on their daily work processes and other factors that have consequences for the patient. The map is provided with issues that can be used in the discussion and in the development of the service. These arguments are linked to items on the patient journey. Competence profiles were conducted for professionals working with heartcare at a distance. These profiles include specific competences such as motivational interviewing to promote the patients' lifestyle at a distance. With the use of these profiles 'Heart Care at a Distance' can deploy targeted employees who are ready to scale up this care.

Virtual coaches: How do labels, human cues and working alliance affect intervention adherence and effectiveness?

Talia Cohen Rodrigues, Thomas Reijnders, David de Buisonjé, Tobias Kowatsch, Veronica Janssen, Roderik Kraaijenhagen, Douwe Atsma and Andrea Evers

Background

To prevent lifestyle-related diseases we need solutions that can easily be implemented on a wider scale. One possible solutions lays in the use of virtual eHealth lifestyle support. However, healthcare professionals indicate they lack the time and skills to provide such lifestyle support. Furthermore, studies on the effectiveness of guided (human-supported) versus unguided (self-help, with virtual support) eHealth interventions report inconsistent results.

People generally prefer human contact over automated feedback. Previous studies show that the perception of interacting with a human being or computer (the label) can affect social responses, even when the content of the interaction is equal. But despite their expectations, people do act socially towards technology. Building a relationship with technology (e.g. a virtual coach) happens more easily when the virtual coach shows human behaviour (human cues).

An underlying mechanism for the effectiveness of digital interventions could be the experienced working alliance by the user. Working alliance with healthcare professionals has shown to predict effectiveness and adherence in both face-to-face and digital settings. However, whether the experienced working alliance with a virtual coach is associated with eHealth effectiveness remains unknown.

This study will therefore test how (1) the label of the type of coach (human vs. virtual), and (2) the use of human cues influence intervention adherence and effectiveness. Furthermore, we will investigate whether (3) the working alliance between user and coach mediates this effect.

Methods

For this online experiment, we will employ a 2 (label: automatic, human) x 4 (cues: none, visual, relational, both) between participant-design. 200 participants will follow our 3-week intervention with an app that monitors their steps and sends daily feedback messages. This involves daily exercises aimed to increase physical activity levels, based on behavior change techniques. Before the start, participants will get a description of a human coach or a virtual coach (manipulation of label). During the intervention, messages of the coach will either contain visual human cues, relational human cues, both, or no human cues. Working alliance will be measured before the start, and after each week of the intervention with the Working Alliance Inventory Short Revised form.

Expected findings

We expect that people in the Human Label-group and Human cues-groups will be more adherent to the intervention, and will show a higher increase in step count (Effectiveness). Furthermore, we expect that Working alliance mediates the effect of Label and Human cues on Adherence and Effectiveness. In addition to the main effects of Label and Human cues (as tested in previous studies), we expect an interaction effect of Label and Human cues on Working alliance. These results will give insight into the factors that predict the success of a virtual coach, and whether a working alliance with a virtual coach also predicts adherence to and effectiveness eHealth interventions.

Exploring drivers and barriers to the implementation of lifestyle monitoring: a qualitative multiple stakeholder approach

Karlijn Cranen, Anna M Braspenning, Liselore Snaphaan Jae and Eveline JM Wouters

Background

Lifestyle monitoring (LM), which allows for unobtrusive monitoring of activities of older adults in the home environment, is one approach in healthcare delivery to address problems associated with an aging population. It can detect health deterioration, facilitate early intervention and possibly avoid hospital admission. However, for LM to redeem its intended effects it is important that these innovative healthcare services are implemented effectively. Therefore, the aim of this study is to explore the perceptions of informal caregivers, healthcare professionals and healthcare managers of lifestyle monitoring and to gain an understanding of the factors that impede or facilitate successful implementation as seen important from their perspectives.

Methods

This study was based on a qualitative case design and included three regional care provider organizations in the Netherlands, which were involved in the implementation of lifestyle monitoring in the care for older (single household) adults living independently at home. The lifestyle monitoring system consisted of passive infrared - and contact sensors that were installed in the homes of older persons. Household activities were monitored with these sensors. With a mobile phone application, available for android and IOS devices, healthcare professionals and informal caregivers were able to monitor activities and receive alerts when unusual behavior was detected.

Semi-structured interviews were used to explore stakeholders' perspectives. A convenience sample was purposively selected and included 5 informal caregivers, 4 healthcare professionals and 5 healthcare managers. Interviews lasted between 32 and 77 minutes and took place at the homes of informal caregivers and the workplaces of healthcare professionals and managers. Written and verbal consent to participate was obtained from all participants. An open coding process was used to identify key themes of the implementation process. Data were then arranged according to a thematic framework based on the Normalization Process Theory.

Findings

The different stakeholders in this study agreed on the perceived benefits that lifestyle monitoring brings, e.g. fall detection, being able to monitor without intrusion of privacy and the provision of health data that support disease management decisions. However, both healthcare professionals and informal caregivers made suggestion for improvements in design. Management and healthcare professional engagement varied across providers, with low engagement impeding implementation. Engaging healthcare professionals was considered a challenge by all of the managers in this study sample. Furthermore, informal caregivers raised the issue of being unaware of the existence of LM. In addition, stakeholders reported that an older adults' decision to use LM was often preceded by an adverse event such as fall injuries. Financial aid provided by the municipality was considered an important facilitator for the implementation of LM by all stakeholders. However, according to healthcare professionals, additional costs for Wi-Fi subscription remained an important barrier for low income households.

Discussion

This study highlights the importance of the development of strategies that can help to facilitate the use of lifestyle monitoring at the very onset of the aging process. In addition, results suggest that other stakeholders should be involved to reach intended users and underscore the need for a targeted communication strategy.

Matching persuasive design with self-management needs of patients with cardiovascular diseases: A survey vignette experiment

Roberto Rafael Cruz-Martínez, Jobke Wentzel, Robbert Sanderman and Lisette van Gemert-Pijnen

Background

Cardiovascular diseases constitute an alarming crisis for health care worldwide. Remote, technology-based self-management support is proposed as a potential solution. However, little research has been done to understand how these technologies should be designed so that they can effectively support specific self-management goals of patients. This study aims to explore expert preferences and insights for matching persuasive design strategies with key self-management goals and tasks.

Methods

A survey vignette experiment was conducted. The choice of factors and levels was informed by the Persuasive Design Model from Oinas-Kukkonen et al. and the Middle Range Theory of Self-Care of Chronic Illness from Riegel et al. The factorial design of the experiment consisted of 2 factors (persuasive design categories and self-management needs) with 3 levels each (primary task support, dialogue support, social support; self-care maintenance, self-care monitoring, self-care management). The experiment thus generated 9 vignettes with different combination of factors and levels. Experts with experience on the topics self-management, cardiovascular diseases, and eHealth were recruited and randomized in an online survey to obtain data from all factorial combinations.

Findings

The study is currently in its data collection stage, so far more than 50 experts have participated. Quantitative data is being collected in the form of ratings about the potential success of persuasive designs (represented by mock-ups) when matched to specific self-management needs (represented by case videos). Qualitative data is being collected in the form of expert insights about barriers that could hinder the success of persuasive design approaches. Preliminary analyses show that the vignettes are so far generally perceived to realistically depict scenarios of relevant self-management needs. Preliminary findings also show that some persuasive design strategies might be perceived by experts to work better for some specific needs than others.

Discussion

The final results of this study will be presented during this oral presentation. The value of our findings are that they tackle directly the challenging topic about how to create a fit between technology and human needs. Self-management is a complex, dynamic process that varies across patients living with cardiovascular diseases. Therefore, it is important to understand, based on theoretical models, which strategies can be potentially more effective. The results of this study will show which potential paths should be primed in terms of designing and tailoring remote, technology-based eHealth interventions to support self-management in cardiovascular diseases.

Needs and barriers of urologists for e-Health decision support to limit antimicrobial resistance (AMR)

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Background

Antimicrobial resistance (AMR) threatens modern healthcare and leads to deteriorated patient outcomes and increased hospital costs. Limiting AMR requires adequate diagnostics and treatment, also known as Antimicrobial Stewardship (AMS). In many hospitals Antimicrobial teams (A-teams) are struggling, suffering from lack of time, budget and IT support. In this setting urology departments are extra vulnerable because of the high number of (high risk) gram-negative bacteria species encountered. In most electronic patient files it is currently not possible to simultaneously gain an overview of required clinical, microbiological and pharmaceutical information per patient. Reviewing this information still requires a lot of time. To increase efficiency and effectivity hospitals are looking for computer-assisted surveillance systems to support AMS activities. The aim of this study is to explore the needs and barriers of urologists for e-Health decision support in daily clinical practice.

Methods

A qualitative participatory approach was applied and the CeHRes roadmap was used. Two consecutive focus groups were conducted among urologists and urology fellows from a general hospital.

For the first focus group the SWAB guideline for AMS was used to identify the most important decision support indicators using a 5-point rating scale. Subsequently the motivation, current situation and information needs for these most relevant indicators were explored. The results were translated in examples for possible e-Health solutions, which were discussed in the second focus group to determine important values. These values and prospective users' needs will be translated into user requirements together with key-stakeholders. Both focus groups were audiotaped and transcribed verbatim. The output of the focus groups was deductively coded using the interview questions.

Findings

During the first focus group (n=5) the following decision support indicators were considered most relevant for improving diagnostics and antimicrobial treatment: taking cultures before starting antimicrobial therapy, switching intravenous therapy to oral, changing to pathogen-directed therapy as soon as culture results are available, protocolled A-team consultations and adapting antimicrobial dose to renal function. The motivation for choosing these indicators were: a) treating pathogen-directed, b) saving time and c) avoiding AMR. In the current situation there is a) a lack of data and b) data are only available after a time consuming effort. For better decision support there was a need for a) automated prescribing support; b) clearly presented infection related data, c) swifter insight in culture results and d) extension of the A-team support.

During the second focus group (n=5) three e-Health examples were explored using screenshots: an infection dashboard, a pop-up notification and a multidisciplinary consultation interface. At the time of writing the abstract the second focus group has taken place. The output is however yet to be transcribed and coded.

Discussion

The focus groups show a clear need for decision support with diagnosis and treatment of infections among urologists. The user centered approach of the CeHRes roadmap gives insight in end-user requirements to design an usable e-Health solution that fits the environment in which it will be used. This solution could improve efficiency and effectivity and subsequently AMS within the hospital.

Exploring the attitude towards health, healthcare and eHealth of people living in disadvantaged neighborhoods

Jasper Faber, Isra Al-Dhahir, Jos Kraal, Andrea Evers, Niels Chavannes, Rita van den Berg-Emons and Valentijn Visch

Background

Health disparities between high and low socioeconomic classes of people are growing. eHealth is on the one hand considered a solution, as it can be personalized to fit the needs of a specific target group. On the other hand it is considered a cause, as it requires digital skills and a specific pro-active attitude towards health and healthcare that is not shared among all socioeconomic classes. To turn eHealth into a solution for people in low socioeconomic environments, it is necessary to design it in such a way that it fits their needs, preferences and capabilities. Therefore, we aimed to explore the attitude of people in low socioeconomic environments towards their health, healthcare and eHealth. This information will be used to form eHealth design principles that enhance alignment of eHealth to people in these areas.

Methods

Between October 2019 and June 2020, we applied an ethnographic community-based participatory research approach with people of a community center situated in a disadvantaged neighborhood in Rotterdam, the Netherlands. In the first phase we visited the center biweekly to conduct observations and semi-structured interviews (N=12). Preliminary themes were created and maintained continuously throughout this process by analyzing the notes and transcribed interviews through thematic analyses. In the second phase we translated the preliminary themes into visual storyboards. These storyboards were discussed in two focus groups consisting of five participants. One of these focus groups was recruited at a different neighborhood center to increase generalization.

Findings

The preliminary results suggest specific pragmatic themes regarding the target group's health goals, perceived investments, responsibility, loyalty, information interpretation, health system distrust and eagerness to engage with innovation. Regarding the attitude towards health, the results suggest that our target group has lower future reward expectations and a higher perceived investment regarding healthy behavior. This results in a short-term health focus that values visible effects, joy, participation and family care. In addition, we found that the responsibility of their health is often not perceived to be in their own, but in the hands of their care providers, coincidence, fate or religion. The inclination of the responsibility towards their care providers seems to express itself in a strong feeling of loyalty towards them. We perceived that a lack of nuance in the interpretation of their health messages, for example cutting carbs being interpreted as carbs are bad, often causes confusion. The participants mentioned that they often feel patronized and misunderstood by healthcare, which leads to distrust and defiance. For eHealth, we found eagerness and interest to engage with innovation. While our target group mentioned several barriers such as not being reached, technology anxiety and need for personal contact.

Discussion

The preliminary themes suggest novel starting points, such as short-term health focus, interpretation of health messages and eagerness for innovation, for the future development of design principles that aim to enhance the alignment of eHealth towards people with a low socioeconomic status.

Value-based Healthcare in Action: clinician experiences of a digital rehabilitation platform supporting Orthopaedic patients

Geremy Farr-Wharton, Jane Li, Jill Freyne, M.Sazzad Hussain and Danakai Bradford

Background

Clinician engagement brevity means patient self-motivation largely determines preparation and recovery program compliance for total knee replacement (TKR) patients, leading to postoperative dissatisfaction with pain experienced in 34% of patients after recovery. Addressing this, mobile apps supporting bidirectional data communication between clinicians and patients are rapidly increasing. We have co-designed, built and clinically trialled a digital rehabilitation platform, Activate TKR, aimed to support patients through TKR rehabilitation and empower clinicians with remote patient monitoring and physiotherapy prescription to improve value-based care.

Methods

A multi-site multi-state randomized control trial was implemented at four hospitals in Australia, including public and private hospitals, with 133 patients recruited between November 2016 to September 2019. Intervention patients were provided a mobile app and a wearable activity tracker worn daily from up to four weeks before surgery to 12 weeks after surgery. Surgeons known to use a specific brand prosthetist across the trial sites were invited to participate. Recruited surgeons (n=6) were asked to nominate a physiotherapist at their site to coordinate the trial and prescribe physiotherapy programs to patients. 8 clinicians (5 surgeons, 3 physiotherapists) who had the platform access for at least 12 months were approached for interview in August 2018 to investigate the value of the technology to clinicians in delivering care.

Findings

Physiotherapists reported that Activate TKR enabled digital delivery of customizable physiotherapy programs to patients via the app, and monitoring program compliance through the clinician web portal. In addition, as a result of the patient recovery data (steps, stairs, sleep, self-reported knee range of motion etc.) available to them in real time, during face-to-face consultations physiotherapists could efficiently recap a patient’s weekly progress and spend more time on exercise technique and care provisioning. Physiotherapists also reported feedback from intervention patients about their improved engagement with their recovery supported through the app. For surgeons, as patients remain in their care throughout TKR, the positive impact of Activate TKR in encouraging patients to engage with their rehabilitation was a key driver for them. The surgeons felt the platform created positive value to their service as their patients reported receiving a better empowerment experience overall throughout the TKR journey because of the educational component of the app.

Discussion

Our findings demonstrated value creation for the clinicians who implemented Activate TKR with their patients. For physiotherapists, the enhanced program delivery and monitoring is transforming the service they deliver in traditional rehabilitation, and providing better patient support as they move from time-based to outcome-based physiotherapy. For surgeons, they are deriving value from the platform via their patients having an engaging tool that helps them prepare for surgery, improving their overall experience during TKR. These positive value changes are benefiting patients, though with change comes higher patient expectations on the care they are provided with, which has implications for integrating the digital service into the practices, such as how the duty of care will change, who will provide that care and how will the additional time and effort commitments will be managed.

Feasibility of respiratory frequency estimation by inertial sensors embedded in a virtual reality headset

Claudia Floris, Federica Landreani, Sarah Solbiati, Gianfranco Damato, Bruno Lenzi, Valentino Megale and Enrico Caiani

Background

Virtual and augmented reality headsets, with embedded micro-electromechanical systems (MEMs), offers the potential to monitor physiological information, i.e heart rate or respiration, in a non-intrusive way and without additional sensors while using this technology, by utilizing the ballistocardiographic principle. Accordingly, our aim was to test the feasibility and accuracy of MEMs technology in VR headworn device for obtaining the VR respiratory frequency (RESPVR) from the subtle head motions relevant to the mechanical vibrations generated by the head circulation and its modulation by breathing actrivity, comparing results with imposed respiratory frequency.

Methods

Thirty healthy participants (age 24±2, 18 females) were tested at rest in three different postures: while standing (ST), sitting (SIT) and in supine position (SUP). Accelerometric (ACC) and gyroscopic (GYR) data (Oculus Go, Oculus, Microsoft, USA) were recorded for 50 seconds using a specifically designed app, while listening to a sound stimulus in order to impose a specific breathing frequency (RESPIMP). For each posture, three different acquisitions were performed in random order using 7, 10.5 and 14 breaths/min as imposed respiratory stimulus. After re-sampling (170 Hz), checking for artifacts (at least consecutive 15 sec with no artifacts) and pre-filtering (Butterworth bandpass 0.1-0.9 Hz), each orthogonal components (i.e., three for ACC and three for GYR) were analyzed in the frequency domain analysis using Fast Fourier Transform, where the spectral frequency with the highest peak component was used to derive the RESPVR, and compared with the corresponding RESPIMP by computing absolute error E=|RESPVR-RESPIMP|.

Findings

Between the two motion-sensitive sensors, the gyroscope outperformed the accelerometer, thus demonstrating that respiratory variation in venous return is reflected in cardiac output towards the head and measurable by head rotational movements. However, the feasibility of the GYR analysis was highly affected by postural-related body movements, resulting in 30% in ST, 60% while SIT, and 98% while SUP. In all postures, for all RESPIMP, the X component was the one resulting in lower E. In particular for SUP, the median error (25th;75th) in X was 0.5(0.5;0.8) breaths/min, 0.6(0.5;0.7) and 0.3(0.3;0.9) for 7, 10.5 and 14 breaths/min respectively.

Discussion

From a head-worn VR device while supine, it is possible to obtain reliable measurement of respiratory frequency by analysis of the X gyroscopic signal component, without the need of wearing additional sensors. These results open novel possibilities to indirectly measure biomarkers relevant to emotional responses, thus offering a biofeedback of the experienced situation, both physical and mental, that could be used both to validate the VR intervention, and to personalize the VR experience.

Improving Mental Health Care in Developing Countries Through Digital Technologies: a Scoping Review of Interventions in Latin America

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Background

Most Latin American (LA) societies are low- and middle-income countries. Despite being in a socio-economic development process, these countries still have limited resources in mental health and significant inequalities in access to treatment. Given the sharp increase in Internet access and the rapid penetration of smartphones in the region, the use of Internet-based technologies might help to overcome access barriers, providing more widely distributed and low-cost mental healthcare.

This study aimed to map the existing evidence on Internet-based interventions research for the prevention, treatment, and management of mental disorders across LA countries. We put particular emphasis on the Chilean case since it is an interesting case study given its high prevalence of mental disorders and marked socio-economic and geographical inequities in access to healthcare.

Method

PubMed, Embase, CINAHL, WoS, SciELO, and CENTRAL databases were searched for interventions supported by Internet and digital technologies, conducted with individuals living in LA, aimed at the prevention, treatment, and management of mental disorders. Supporting or training Internet-based interventions for mental healthcare providers were also included. Efficacy/effectiveness studies, as well as feasibility studies (dealing with issues such as the acceptability and practicality of interventions), were included. To study in greater depth the state of art of this field in Chile, we also searched for grey literature and on-going studies in the country.

Findings

Twenty-two published studies carried out in LA were found. Additionally, four unpublished/on-going studies in Chile were identified. Most studies were conducted during the last five years. Interventions are heterogeneous in terms of participants (e.g., secondary students, patients, healthcare professionals), context (e.g., rural, urban, schools, primary healthcare), aims (e.g., collaborative care, monitoring relapse) and modalities (e.g., website, online games).

Despite their heterogeneity, most interventions are meant to reduce the burden of depression and have prioritized to assist vulnerable groups in low-resource settings, especially in primary care. In Chile, this is especially relevant for low-resource health services located in rural hard-to-reach areas where there is no specialized mental healthcare nearby.

Most studies assess the feasibility and acceptability of the interventions, but few studies assess their effectiveness and cost-effectiveness. Most interventions have proven to be feasible and with adequate acceptability from their users.

Discussion

What can we learn from the Latin American experience in e-mental health? This study shows that Internet-based interventions for the prevention and treatment of mental disorders are at an early stage of development in LA countries compared to developing countries. Internet-based interventions have proven to be feasible, but the relative lack of effectiveness studies conspires against efforts to disseminate and scale-up digital mental health interventions in the region.

In Chile, the experience of including qualitative methods for user satisfaction assessment has brought insight into the importance of implementing culturally sensitive interventions. This is particularly relevant because some interventions have been replicated from other (developed) countries. These studies have also highlighted the need to include effective user retention strategies, given the high attrition rate affecting Internet-based interventions, and moving from an expert-driven design to participatory design. The results lead us to advocate for increasing the number of studies and, more importantly, improving the quality of e-mental health development and research in LA to produce better evidence to guide mental health policies. We hope the growing amount of knowledge accumulated in the region could guide practices in other developing countries for supporting the mental health of underserved populations.

Using a film to show your euthymic being in case of an admission for mania

Peter Goossens, Ruben Eijsink, Tanja Dijk and Thea Daggenvoorde

Background

The progress and recovery of a patient with bipolar disorder during hospitalization is differently seen by professionals working at an High Intensive Care ward and relatives of the patient. Professionals often indicate that the situation of the patient is improving while relatives notice little improvement. This can be caused by a difference in perspective. The relatives' perspective is the patient in a euthymic mood state were the professionals' perspective is the person during an acute episode of mania or depression. For this reason, a project is started regarding the development of a film intervention. Patients, supported by their ambulant psychiatric nurse, record a ten-minute film to show their 'being' in a euthymic mood state. Professionals at the admission ward can watch this film when the patient is hospitalized and get an impression of the patient in a euthymic mood state.

Methods

The six steps from the intervention mapping protocol were used. Several studies were undertaken.

Findings

In a first study patients, relatives and professionals were interviewed to gather information about their views and opinions with regard to this idea, the content that needs to be included in the film and the way to use this film. On basis of the results supporting materials were developed and 20 films were recorded. A qualitative study was carried out to examine the experiences of patients with recording the film. The results of this study supported further development of this intervention. An addition to the institutions' Electronic Patient File was needed in order to store and use the film safely. E-learnings to support professionals are developed. The implementation is ongoing as are studies to investigate experiences of users and effects on patient outcomes.

Discussion

With this self-management intervention, patients can contribute actively to their treatment and wellbeing. Although the intervention itself is promising from patients', relatives', and professionals' perspective, some questions remain. We assume that professionals at an High Intensive Care ward will value the information presented in the film and will use it for planning and conducting person centered care. But what will the availability of this information mean for them professionally? Implementing innovations in clinical practice is often challenging. New practices will not be implemented if potential users do not embrace them. It is still unclear which specific conditions are needed that enhances implementation and use in clinical practice.

POWER2DM – Predictive model-based, personalized self-management support system for Type-1 and Type-2 diabetes patient empowerment

Albert de Graaf

Background

There is an urgent need to develop cost-effective intervention strategies for diabetes. Given the enormous scale of the problem, and the fact that such a large percentage of cases arise due to an unhealthy lifestyle, personalized care systems that include innovative self-management support strategies, well-linked to the medical care of patients, are of prime importance. This applies to both type 1 and type 2 diabetes patients. However, good self-management with diabetes places a considerable burden on the patient and requires a great deal of discipline. Many patients therefore have difficulty in achieving their treatment goals. POWER2DM is a European Horizon 2020 project in which an eHealth system is being developed to support self-management in diabetes and relieve the patient. In this project 8 different partners from 6 different countries work together.

Methods

POWER2DM (started Feb 2016) [1], [2] will deliver a personalized self-management support system (SMSS) for T1 and T2 diabetes patients. It will offer a guided action plan for self-management by combining decision support based on personalised results of interlinked predictive computer models, e-coaching and e-advice feedback functionalities based on Behavioural Change Theories, and real-time collection, processing and interpretation of personal data (sensors) and self-management activities.

Findings

The user requirements, requirement analysis of the system architecture, and conceptual design of the architecture have been completed. The main software components Personal Data store, Authorization Service, sensor data integration module, Prediction Service, Action Plan Engine, and Communication Engine have been completed. A first operational prototype of the POWER2DM SMSS interlinking these components providing user interfaces was constructed and deployed in the Microsoft Azure cloud. POWER2DM was registered as a Class I Investigational Medical Device in The Netherlands. The system is currently being deployed in the POWER2DM Evaluation Campaign, a pragmatic randomised trial with 9 months follow-up in which a total of 230 patients (115 type-1 diabetes, 115 type-2 diabetes) will be randomised to either Power2DM support (Power2DM group) or usual care (usual care group).

Discussion

The POWER2DM Predictive model-based, personalized self-management support system for Type-1 and Type-2 diabetes patient empowerment is operational and currently being deployed in a clinical evaluation study. It is expected that POWER2DM will increase self-management capabilities and participation of the patient in the care process, resulting in better self-control and management of the disease. This should lead to better glucose management, thereby preventing severe episodes and long-term complications.

Acknowledgement:

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AYAs’ Online Information Needs: A Comparison with Healthcare Professionals’ Perceptions

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Background

Adolescents and young adults (AYAs) diagnosed with cancer greatly rely on the Internet to fulfil their cancer-related information needs. The Internet is often coined the most important source of healthrelated information and plays a considerable role in fulfilling needs and coping with cancer. However, an often-overlooked area in the field of eHealth is the role of healthcare professionals. Adequate perceptions of AYAs’ online information needs are of vital importance, as healthcare professionals may adapt their offline information provision accordingly. In other words, having different perceptions of AYAs’ met and unmet information needs may lead to inadequate information provision during consultations. The aim of this study is therefore to examine AYAs’ online information needs and healthcare professionals’ perceptions of these needs. More specifically, it examines similarities and differences between AYAs’ needs and healthcare professionals’ perceptions.

Methods

Two surveys were disseminated: one among AYAs (N = 94) and one among healthcare professionals (N = 55). AYAs were recruited via Kanker.nl and healthcare professionals through AYA-specialized hospitals. Online information needs were assessed with 18 items, such as “Receiving personal advice adjusted to your symptoms”. AYAs were asked to indicate whether they wished for such information (1 = yes or 2 = no), and whether such information was available to them (1 = yes or 2 = no). Healthcare professionals were shown the same items, but were asked for their perceptions of AYAs’ wishes and perceived availability of online information. Scores were recoded to reflect met and unmet online information needs.

Findings

Healthcare professionals (HCPs) underestimated AYAs’ general online information needs to have email contact with treating doctor, p = .004; AYA = 86.8%, HCP = 59.1%, request diagnostic tests, p <.001; AYA = 67.3%, HCP = 16.0%, request referral to another specialist, p <.001; AYA = 82.4%, HCP = 30.4%, and participate in an online self-help course, p <.001; AYA = 88.2%, HCP = 76.9%. On the other hand, healthcare professionals overestimated AYAs’ needs to receive test results, p = .001; AYA = 90.2%, HCP = 95.8%, have email contact with nurses, p = .004; AYA = 96.5%, HCP = 100%, meet peers online, p = .006; AYA = 72.7%, HCP = 94.3%, and receive reminders, p <.001; AYA = 92.2%, HCP = 100%.

Discussion

We found that healthcare professionals both overestimate and underestimate AYAs’ online information needs. This could indicate that healthcare professionals sometimes provide AYAs insufficient advice about online information, but sometimes also provide irrelevant information. As adequate information provision is vital for coping with cancer, it is important to understand how healthcare professionals can support AYAs in meeting their online information needs. To address the most common online information needs AYAs have, checklists including topics can be used in consultations. Such checklists can also be used as a starting point to focus on each AYA independently, and to tailor consultations to individual needs. This way, healthcare professionals will be better able to give advice about online health information, which contributes to better access to, understanding of, and satisfaction with eHealth.

Transferable Therapy: Mirror Therapy in a Virtual Reality Environment

Gido Hakvoort, Loes Bulle, Hilco Prins, Martijn Klarenbeek, Edwin Nibbering, Coen Kniknie and Marike Hettinga

Background

Rehabilitation after an accident in which an arm or hand is paralyzed, is a long process. Stimulate the brain during this process is important to improve recovery. A common therapy to help patients, is mirror therapy. Originally designed for people with phantom limb pain it activates mirror neurons to fool the brain into perceiving a paralyzed arm or hand is still moving. The development of virtual reality technologies promises new opportunities for mirror therapy. It allows the addition of gamification elements and gives patients the opportunity to practice independent from time and location. In the project 'Virtual Reality for Rehabilitation' we try to achieve just that. However, to what extent the effects of mirror therapy are transferable to a virtual reality environment is yet to be studied.

Methods

We designed a study to determine to what extent mirror therapy for patients with peripheral nerve injuries is transferable into a virtual reality environment. We developed two setups in virtual reality, one with a virtual mirror (VRM), one without a virtual mirror (VRNM) and compared these to a setup with a real mirror (RM). For the study we invited healthy participants to focus on the transferability of mirror therapy into a virtual reality environment. Participant used all three setups (RM, VRM, VRNM) during three trials and were asked to indicate when they experienced a sensation of their mirrored hand. After each trial participants answered questionnaires on virtual presence (i.e. the Igroup Presence Questionnaire), usability (i.e. the System Usability Scale) and their overall experience of the setup. The order of the trials was counterbalanced to cancel out carryover effects. Afterwards we compared the results of the different setups.

Findings

At the time of writing we are in the middle of our study but will be able to present preliminary findings in the coming months. Although we expect some differences between the three setups, we expect these to be in terms of usability and virtual presence. We do expect that mirror therapy can be transferred into a virtual reality environment but also that a virtual mirror influences the experience of the mirrored hand. These expectations are based on tryouts during development where VRM and VRNM prototypes led to sensations in mirrored hands of therapists and patients.

Discussion

During our study we invited healthy participant, however whether mirror therapy in a virtual reality environment has the same effect on actual patients will be a topic in our follow-up studies. Since the aim of the project is also to make mirror therapy more appealing, gamification elements should be added to the virtual reality environment. This could however influence the patients' focus and attention during therapy - undermining the basic principles of mirror therapy. For this we are looking into using electroencephalogram for quantitative data analyses to measure the activation of motor areas in the brain. Finally, in order to integrate virtual reality mirror therapy, long term effects of the therapy on compliance, recovery, patient reported outcome measures (PROMs) and costs will have to be studied.

Close Encounters of the Infectious Kind: Fighting Epidemics with Smartphones

Henri ter Hofte, Judith Kaptein, Wouter Keuning and Marike Hettinga

Background

Infectious diseases are a severe threat to human health. If not kept in check, they can develop into pandemics like the Spanish Flue, which killed up 100 million persons between 1918 and 1920. The ongoing outbreak of the novel coronavirus COVID-19 has developed into a pandemic with more than 66.000 cases and 1500 deaths at the time of writing.

As illustrated by the LowlandZ zombie app that spread a virtual epidemic at the Lowlands festival in 2017 and the BBC Pandemic app in 2018, smartphones can be a valuable tool for studying outbreaks, by automatically tracking encounters: periods in which two humans are in proximity close enough for long enough for an infection to occur.

We believe that smartphones may also be used as a valuable non-pharmaceutical tool to fight epidemics. After a person indicates via an app that he or she developed symptoms or is a confirmed case, other potentially infected persons can be identified by the system, by tracing back the network of recent encounters to earlier infections and by following the network of encounters in the forward direction to identify newly infected persons. Crucially, newly infected persons may be identified even before they start to develop symptoms.

Methods

We design and evaluate the capability to fight epidemics with smartphones in three stages, with three components:

Component / stage	**Infector** ***infectious disease***	**Behavior** ***human behavior***	**Detector *detects encounters to identify possible newly infected persons early***
1.	Simulated	Simulated	Simulated
2.	Virtual disease (app)	Real subjects	Smartphone app + network + service
3.	Real disease	Real subjects	Smartphone app + network + service

Findings

In this oral presentation, we provide an overview of these stages and report the findings of our simulations in stage 1 and the results of our technical feasibility studies for stage 2:

- Epidemio Engine, an individual based engine that can simulate:
  - infectious diseases, based on various disease parameters;
  - human behavior, based on patterns of encounters, how individuals respond to the disease, and how individuals provide input to and respond to notifications of the detector;

  - detector: an IT-system that detects and processes encounters and human input, and that identifies suspected newly infected individuals via backward and forward tracing of possible infections via the encounter network, and that provides early notifications to these individuals or the individuals they are likely to encounter.
- Technological feasibility of encounter detection:
  - indirect detection of encounters by correlating smartphone location traces. Our findings indicate this approach can scale to millions of persons by using geospatial indices like Uber's H3.
  - direct detection of encounters by passively listening to or actively scanning for identifiable devices of others via networking techniques such as Wi-Fi, Bluetooth, and UWB.

Discussion

Using smartphones to fight epidemics is epidemiologically relevant and technically feasible. In future research we intend to develop a virtual disease app and detector and test the reaction of hundreds of users using the app for several weeks to months, while carefully taking privacy and ethical considerations into account.

Barriers and facilitators in the procurement of digital health: a case study in Dutch district nursing

Sander Holterman, Marike Hettinga, Erik Buskens and Maarten Lahr

Background

Western countries are facing challenges in keeping health care accessible and affordable. Integrated care and digital health are widely accepted and promising solutions to tackle these challenges. However, many studies have shown that implementing these solutions is a complex and slow process. Funding is considered one of the most significant barriers, including the lack of adequate payment models. Lately, the Dutch health system has progressed by including integrated care and digital health as priorities in national health policies, improve the health IT-infrastructure and reimbursement possibilities. Still, scaling up innovative forms of health care such as in district nursing progresses much slower than intended as in Dutch sectoral agreements. The aim of this study is to identify the barriers and facilitators in the procurement of innovative and digital health in district nursing.

Methods

For this study we used a case study approach, in which multiple stakeholder perspectives are compared using thematic framework analyses. We analysed fourteen interviews (secondary data) and fifteen governmental and third-party reports and attended two focus groups organised by the taskforce Procurement (i.e. an initiative within the sectoral agreement on district nursing).

Findings

Five themes emerged from the analysis.

Aim and purpose: having a vision on the future of health care, feeling the sense of urgency and being willing and able to change the governance within organisations, helps providers to get their innovative and digital care procured since payers value these elements.

Provider-payer relationship: the procurement of innovative and digital care benefits from a trust-based relationship between the provider and the payer organisation. In the regulated competition of the Dutch health system this is a challenge. Due to capacity constraints, providers with a larger market share or with a track-record on innovation seem to access the negotiations easier than the smaller ones or those that have just started.

Capacity and means: the high number of contracts that have to be negotiated each year and the limited time and staff that providers and purchasers have, hampers in depth assessments. Sharing knowledge on innovative ways of procurement is not common practise.

The business case: societal business cases are challenging due to lack in alignment in outcomes, indicators and instrument and views on the importance of scientific evidence vary between stakeholders.

The payment model: The procurement of digital health hampers due to negative incentives, the shortterm focus and fragmentation of the traditional fee-for-service model. Bundled payment models seem to be promising however such custom-made contracts still require too much of the scarce capacity, due to complexity and lack of standard contract elements and good practises.

Discussion

Barriers and facilitators in the procurement of innovative and digital health care in district nursing relate to both the implementation and procurement process, as well as to the payment model. The ambitions within the Dutch sectoral agreements are high given the complexity of implementing certain interventions and supporting alternative payment models. Sharing good practises of less complicated interventions might already contribute to the scaling ambition.

Kracht TeRUG – Development of Positive Psychology eHealth for spinal surgery patients

Annemieke van der Horst, Karlein Schreurs, Ernst Bohlmeijer, Rianne Huis In 'T Veld and Saskia Kelders

Background

Spinal lumbar fusion surgery is an option to treat a specific type of (chronic) low back pain. About 65% to 75% of spinal surgeries are effective in achieving reduction of pain and improvement of physical functioning. Nonetheless, recovering from surgery is often accompanied by moderate to severe postoperative pain. Furthermore, around 20% of lumbar surgery patients experience persistent postoperative pain, also known as failed back surgery syndrome (FBSS).

To prepare spinal surgery patients for the procedure and help them cope with possible surgery-resistant pain and disabilities, an eHealth application (“Kracht TeRUG”, Strength Back) is developed. The content of the application was created with the help of future users, i.e. patients and health care professionals.

Methods

For the development of the eHealth application, the CeHRes Roadmap was used. As a contextual inquiry, semi-structured interviews were held with 12 lumbar fusion surgery patients and nine health care professionals. For the value specification and design phase, three focus group sessions were held with health care professionals and new patients. During these sessions input was gathered, a prototype was demonstrated and feedback was collected.

Findings

Preoperatively, patients wanted to receive information about the surgery to prepare themselves and to manage expectations. Postoperatively, patients wanted to receive guidance during their recovery at home. They requested step-by-step physical guidelines and wished to remain in close contact with the health care professionals of the orthopedic center. Patients were open to the idea of positive psychology and thought this to be helpful in coping with the ups and downs of recovery. The health care professionals pointed out the app enables them to provide clear and uniform information.

We have developed an application with 8 modules and several exercises. The content is based on the input of the patients and professionals, combined with elements of positive psychology and mindfulness which have been proven effective for chronic pain patients in previous research.

The app, “Kracht TeRUG”, contains several information modules: illness and surgery; preparation; pain education; pain medication; physical therapy; recovery; experiences of other patients; when to contact a doctor. Additionally, the app contains positive psychology modules with value based exercises and mindfulness exercises.

Discussion

During the interviews and focus group sessions, patients as well as professionals were very capable of voicing their needs and ideas for the eHealth application. Because future users were involved in the development of the application from the start, high adherence to the eHealth application is expected. Whereas care professionals may see surgery as a singular event, our research shows it takes place in a history full of health-related experiences, beliefs and expectations that require coping and emotion regulation to maintain emotional well-being. “Kracht TeRUG” aims to empower spinal surgery patients in the perioperative phase to cope with pain and their fluctuating recovery through the use of positive psychology, mindfulness and by providing information.

Innovating care through technology and education. An ethnographic view on care education in transition

Annemarie van Hout, Guus Ten Asbroek and Marike Hettinga

Background

In the project “Fieldlabs, 21st Century community care”, directed by ROC of Amsterdam, 17 partners in care, education, local authorities, technology providers and research institutes collaborate in the Amsterdam region. Fieldlabs aims to innovate education in care, in order to make it ‘21st century proof’. A major ingredient in this innovation process is care technology. In different subprojects, experiments are undertaken in which for example nursing students are testing different technologies to improve quality of life for residents of in a nursing home. One way to see if the project has the desired effect, is user research. We are therefore aiming to answer these questions: What experiences do the various users of the field labs have and how do these experiences relate to the objectives of the main project?

Methods

Ethnographic research helped us to map the subprojects and both observe and discuss what participants experience. We carried out participatory observations, interviews with various users and deliberated our findings in focus groups. During the project we discussed some of our data with the project leaders, deriving from responsive methods, in order to let them learn from our insights, and us learning from their expert reaction, but also to be able to follow the projects closely. Grounded theory helped us to analyze our material, which we present to the project group in regular interim reports.

Findings

Themes we have identified are: learning, encounters and organizational issues. The themes show different perspectives on starting problems of innovative processes, but also what works very well in the project. Some of the outcomes show how an innovation can be a success and an issue at the same time. Students for example were very enthusiastic about the opportunity to experiment with technology in order to solve a resident's problem, especially since they were on an internship and therefore exercising this learning in another care organization. For residents concerned and their regular care professionals it was mostly a nice intervention, but there are worries about scaling up: what if this experiment will repeat itself every semester? And who will take care of the follow-up: will the technology be here to stay, who is taking care of fall-outs, etcetera?

Discussion

In this presentation we will map different users for whom different norms and values are important and potentially can conflict. For caretakers an important value is being able to give care that fits the resident's needs. Often understaffed, projects out of the daily scope can be a challenge. Teachers, one of the other user groups, value innovating education, increasing supervision and using new technologies. We will discuss our observations of their interaction. We will furthermore explore the various values and norms in user research, focusing on innovating care through technology and education and try to answer questions on how to deal with them.

The maturity of the technology as the starting point of your eHealth evaluation

Stephanie Jansen – Kosterink

Background

The clinical evaluation of eHealth interventions is challenging. The time allocated to the evaluation in research projects is often insufficient to assess changes in clinical outcomes. Resulting in disappointing outcomes, hampering the future implementation of the eHealth intervention. In literature is suggested to tailor the type of evaluation to the development cycle of the technology. Therefore, the starting point of every eHealth evaluation should be the maturity of the technology. Given the time constrain of a research project, even well prepared evaluations with immature technology can be very helpful for developers and could speed up further clinical evaluations and implementation. Therefore the aim of this study is to address the appropriateness to use the level of maturity of an eHealth technology as starting point for every evaluation to obtain valuable knowledge.

Methods

The maturity of an eHealth technology can be assessed by Technology Readiness Levels (TRLs). These levels offer the possibility to clearly communicate whether a technology is ready for use in daily practice. The TRL scale is an ordinal and qualitative scale and TRLs are time and context specific. In total three phases of maturity are described: the research phase (TRL1 toTRL3), the development phase (TRL4 – TRL6) and the deployment phase (TRL7 – TRL9). For this study we present the planned clinical evaluation of the Back-UP project (Project Number: H2020-SC1-2017-CNECT-2-777090) as a case. The aim of this European project is to develop a technological platform (Back-UP tool) with prognostic models to improve management of neck and low back pain. Within the duration of this project, 36 months, both the prognostic models and the technology needs to be developed and evaluated.

Findings

The original plan was to evaluate the clinical effectiveness of the Back-UP tool within a stepped wedge cluster randomized trial (SWT). An SWT is a pragmatic study design and the outcomes of a SWT are very close the daily clinical practice. At first, it was the idea that the maturity of the technology would be TRL7 or TRL8. However, during the project it seems that the overall maturity of the technology was more close to TRL3 or TRL4. The opinion of the consortium was that it will not be productive to introduce immature technology to clinical practice too quickly. This could lead to non-use and disappointment, and hamper further implementation of the Back-UP tool or other eHealth innovations. Therefore, it was decided to abandon this original plan and search for alternatives to support the development and further implementation of the Back-UP tool. Given the current maturity of the Back-UP tool the evaluation we will assess the level of acceptance of the future tool among clinicians based on a low-fidelity prototype, visualized by a computer animation.

Discussion

Within the Back-UP project, the adjusted evaluation will result in knowledge which speed up further evaluation and implementation of the Back-UP tool in a clinical setting. In conclusion, researchers should be resilience and adapt in all cases the clinical evaluation to the maturity of the technology to obtain valuable knowledge and speed up future implementation of the eHealth innovation.

CareCircle: Monitoring Older Adults' Health via Family, Friends and Neighbors

Christina Jaschinski, Stephanie Jansen-Kosterink, Marjolein den Ouden and Lex van Velsen

Background

With more people reaching old age, there is a growing number of people with chronic diseases and in need of care. At the same time, older adults are encouraged to age in their own home environment and monitor their own health and wellbeing. This can be problematic, especially for older adults without a strong social engagement, whose health issues might go unnoticed. In addition, older adults' self-reported health status can be biased. A solution for these problems could be provided by CareCircle, a conceptual cooperative care system that enables family members, friends, and neighbors to actively engage in the care process and monitor an older adult's health and well-being. The aim of this study was to investigate the early user acceptance of the CareCircle system among older adults, informal caregivers, and healthcare professionals.

Methods

To investigate early user acceptance, end-user walkthroughs with 6 older adults, 3 family members, and 4 healthcare professionals were conducted between November and December 2019. A low-fidelity prototype was used to illustrate the conceptual design of the CareCircle system. This prototype contained the following features: an overview of one's CareCircle members, an overview of the data flow (who-can-see-what), a general report function, an incident report function, and a validated screening instrument for frailty. Participants' responses were transcribed, and thematic analysis was applied to identify common concepts and themes.

Findings

The majority of older adults, family members, and healthcare professionals could imagine using the CareCircle system in the future. Perceived advantages included more insight into older adults' health status and easy communication among stakeholders. However, older adults emphasized that acceptance would strongly depend on their level of control in the data sharing process. In addition, healthcare professionals were worried about the reliability of the reported data, potential information overload and a consequential increase in administrative burden.

Discussion

Overall, older adults are open to sharing basic health data with their social network (i.e., family members, friends, and neighbors) as long as they remain in control over the data-sharing process. Future research efforts will aim to further specify the user requirements, develop a high-fidelity prototype and test the CareCircle system in daily (clinical) practice. Privacy and control will be the focal points for the further development of CareCircle.

Postoperative recovery of accelerometer-based physical activity in older cancer patients

Leonie Jonker, Sharon Hendriks, Maarten Lahr, Geertruida de Bock and Barbara van Leeuwen

Background

Functional outcome, including recovery of physical activity, is an important outcome measure after cancer surgery. Traditionally, patients self-report their physical activity using questionnaires, but accelerometer-based wearables could provide a more accurate, objective, continuous and comprehensive understanding of physical activity. However, objective physical activity data for older cancer patients is scarce. The aims of this study were to i) quantify physical activity levels of older surgical cancer patients, ii) assess recovery of physical activity 3 months after surgery, iii) characterise patients who achieved recovery, and iv) compare objectively measured physical activity with self-reported physical activity.

Methods

This study analysed physical activity data collected in a single-centre observational cohort study with remote home monitoring. We approached patients aged > 65 who were planned for cancer surgery from May 2018-July 2019 in a tertiary referral academic hospital. Participants received a Fitbit Charge 2 to measure daily step count and intensity of activity (Moderate-vigorous physical activity: MVPA) before surgery until 3 months after surgery. Physical activity data was transferred from Fitbit via Fitbit application, Self-Management System (study application), to a Smart Adaptive Case Management System (professional website). This enabled real-time, remote monitoring of physical activity before and after surgery. Patients completed questionnaires to assess subjective physical activity and functional performance. The primary outcome was the percentage of patients who returned to (≥ 90% of) their preoperative (baseline) physical activity levels 3 months after surgery. Secondary outcomes were recovery of self-reported physical activity and functional performance. The correlation between objective MVPA (Fitbit) and self-reported physical activity (MVPA) was tested using Spearman's correlation.

Finding:

Fifty patients (mean age of 73 years, 68% male) were recruited and available Fitbit data was analysed. Median step counts a day at baseline, before hospital discharge, and 3 months postoperative were 5974 (IQR 4250-7922), 1619 (IQR 920-2839), and 4674 (IQR 3047-7592), respectively. The fifteen out of 37 (41%) patients who reached baseline levels 3 months after surgery seemed to have a better self-reported physical activity and classified physical status before surgery and less in-hospital complications compared to patients who did not reach baseline levels, although statistically non-significant. Three months after surgery, 63%) of the patients who completed physical activity questionnaires before and after surgery recovered to baseline level. Self-reported functional performance returned or exceeded baseline values in 76%-95% of the patients. Self-reported MVPA had a weak non-significant positive correlation with objectively measured MVPA before surgery (Spearman's rho: 0.33 (p = 0.076)) and a weak non-significant positive correlation of the measures after surgery (Spearman's rho: 0.287).

Discussion

Physical activity before and after cancer surgery was quantified for elderly patients and 41% returned to baseline levels. There was a discrepancy between accelerometer-based and self-reported physical activity. The results of this study emphasise the need for subjective and objective measuring of physical activity to contribute to a better understanding of recovery of postoperative physical activity in elderly cancer patients. Further research is necessary to characterise patients with different postoperative physical activity levels, to better inform patients on postoperative recovery and support shared-decision making prior to surgery.

Development methods for eHealth technologies: an initial overview

Hanneke Kip, Julia Keizer and Saskia Kelders

Background

Thorough development of persuasive eHealth technologies results in a good fit between the technology, its users and the context. Development processes of eHealth can be guided via models such as the CeHRes Roadmap, a framework for persuasive, holistic eHealth development. However, despite the importance of development, not much is known about specific methods for different development phases and settings. This highlights the importance creating an overview of methods that can be used to make informed, well-substantiated decisions about which methods to use in the development process, resulting in more efficient development. In order to create a first, initial overview of methods, we combined a focused scoping review and qualitative survey on studies conducted by the research group that developed the CeHRes Roadmap. The goal of this study was twofold: first, to create an overview of development methods used, and second, to provide insight into the lessons learned about these methods. The results of this study can serve as the foundation for a toolkit

Methods

In order to create an up-to-date and complete overview of development methods used in the targeted studies, the current study combined two methods: a scoping review on studies published by researchers of the group that created the CeHRes Roadmap, and complementary data collection via a qualitative survey with current members of the research group. This was done to collect information about methods on which researchers did not (yet) publish. Data from 46 papers and 14 surveys were systematically analyzed. Via elaborate data extraction forms, we extracted information about the type of method, the rationale for using the method, accompanying research questions, and reported information about lessons learned about using the method in eHealth development.

Findings

A distinction was made between development methods and products. Methods are used to gather new data, while products can be used to synthesize previously collected data and to support the collection of new data. The following methods were identified and described: interviews; questionnaires; focus groups; literature reviews; prototype testing; card sorting; desk research; log data analysis; Delphi study;

and experience sampling. The following products were identified: prototypes; stakeholder maps; values; requirements; and business models. For each of these methods products, information about lessons learned was synthesized to provide more insight into what to account for when choosing and using these methods and products.

Discussion

This study shows that there is a plethora of methods that can be used at different points in the development process and in different settings. To support researchers in choosing the most appropriate method for their study and context, it is recommended to develop a more comprehensive toolkit with development methods. The current study serves as a first step for its foundation. There is a need for a larger systematic review in order to gain insight into experiences with eHealth development methods of other research groups. This will result in a comprehensive overview and more in-depth reflections on lessons learned about these development methods and products.

Research on the road using the ExperiVan

Jan-Willem van 't Klooster, Ellen Giebels, Peter Slijkhuis, Simon Langener, Lisanne Nijen Es and Nienke Beerlage-de Jong and Lisette van Gemert-Pijnen

Background

The BMS Lab is the faculty lab of the faculty of behaviour, management and social sciences (BMS) of the University of Twente. It consists of over 450 m2 lab facilities. The majority of its 240 annual research projects physically takes place at fixed lab spaces at the university. Although having clear advantages (e.g. high control, fixed set-up), university locations also come with substantial restrictions. The most important drawback is that the research tends to focus on high-educated, and Western student samples from relatively high socio-economic status. These samples are arguably limited representative. Moreover, inclusion of elderly, patients and healthcare professionals is challenging.

Methods

To tackle the abovementioned restrictions, BMS commissioned a mobile laboratory in 2018. The goal was to allow research on the road, with participants and professionals from the street or at specific locations. Based on an extensive design process and input from different stakeholders and experts, it was constructed and first used for field measurements in June 2019.

Findings

Three studies have been carried out with the mobile laboratory called ExperiVan since then. This included an eye tracking experiment using participants from the street, in which participants were asked about their opinion on an informative website about infection diseases. Secondly, on-site evaluations with healthcare professionals were carried out, to gather expert input on a serious game about dilemmas regarding zoonosis. Lastly, the ExperiVan was successfully used in a virtual reality calibration study.

Discussion

The mobile laboratory is used in different studies with participant from. Usage so far shows that it is a fitting facility to conduct field research in naturalistic settings, using technology such as eye tracking or VR.

Let’s Talk About It! Social Robots for Eliciting Disclosures for Emotional and Psychological Health

Guy Laban, Jean-Noël George, Val Morrison and Emily S. Cross

Background

People tend to disclose thoughts and feelings with others, especially when experiencing unique life events. This is an evolutionary function of strengthening our interpersonal relationships, but also for producing a wide variety of health benefits. These include coping with stress and traumatic events, eliciting help and support (Frattaroli, 2006; Frisina, Borod, & Lepore, 2004; Kennedy-Moore & Watson, 2001), and playing a critical role in successful treatment outcome (Sloan, 2010). Given the importance of self-disclosure for psychological health, here we are interested in assessing the viability of using social robots for eliciting rich disclosures to identify needs and emotional states. We expect that people will ascribe mental capacities to these following social robots’ human-like design and gestures (Epely & Waytz, 2010), and thus disclosures to social robots will be genuine in nature.

Methods

Two (N = 26 & N = 27) within-subjects experiments with three treatments were conducted. In a random order, participants were asked one (in the first experiment) or two (in the second experiment) pre-defined questions about their life by each of the three different agents: (1) a social robot, (2) a human, or (3) a voice assistant, demonstrating different visual and verbal cues that corresponded appropriately to their embodiment. After the three interactions, participants answered a questionnaire reporting on their perceptions of self-disclosure (adapted from Jourard, 1971) for each of the agents. The interactions were recorded for content and voice analysis, extracting the length (in number of words) and duration (in seconds) of the disclosures, the compound sentiment and sentimentality (see Hutto & Gilbert, 2014) of the disclosures’ content, and the pitch, harmonicity, energy, and intensity of the participants’ voice.

Findings

The first experiment entails that people perceived to disclose more to a human than to a robot and a voice assistant. No differences between the agents were found in terms of observed measurements of disclosure. The second experiment entails that people perceived to disclose less to a voice assistant than to a human and a robot. Moreover, people were sharing more information and were speaking longer with a human than with a robot and a voice assistant. Finally, participants’ voice was more intense, and their pitch was higher when speaking to a robot, compared to when speaking to a human or a voice assistant.

Discussion

As social robots are gradually being introduced in health interventions (see Robinson, Cottier, & Kavanagh, 2019), this study provides preliminary evidence for people’s perceptions of disclosers to robots, compared to objective evidence of the disclosed information. While people perceive they disclose more to a human than to a robot or a voice assistant, no actual observed differences in the content of the disclosure or in the participants’ voice acoustics emerges between the three agents in the first experiment. Nevertheless, the results of the first experiment did not replicate in the second experiment. This calls for further investigations of the psychological underpinnings of self-disclosures to robots, and the potential role of robots in eliciting disclosures as part of health interventions.

Go up in smoke: proof of concept study on tobacco craving in a VR environment

Simon Langener, Joanneke van der Nagel, Randy Klaassen, Laura Brouwer and Dirk Heylen

Background

Recent technological developments in virtual reality (VR) provide a potential to reduce the burden of tobacco addiction. Despite efforts to reduce smoking initiation and to increase smoking cessation, still approximately 19.2% of female and 25.7% of male adults in the Netherlands smoke. Recent research indicates even higher prevalence rates in vulnerable groups, such as individuals with intellectual disability, mental illness, or low socio-economic status. One of the factors in the persistence of tobacco related disorders, is that smoking cessation programs are only successful in about 10-16% of patients. Moreover, existing treatments may not be suitable for vulnerable groups, which might hinder uptake and effectiveness.

Several studies in the area of VR have assessed the potential to evoke craving as part of cue-reactivity. However, research on cue-exposure therapy, which is based on the extinction of a conditioned response, reports only limited effects. Thus, teaching coping strategies in VR that are related to real-life situations, might be a potential approach for behavior change, especially in groups that barely benefit of existing cessation programs.

Methods

This research comprises two evaluations with each three iterations as part of a user-centered development approach. Recruited participants were heavy smokers (Fagerström >= 5) from three Dutch healthcare institutions, involving individuals with intellectual disability, mental illness, and pulmonal issues. The first part of participants derived from every subgroup participated (1) to improve the cue-reactivity environment, procedure and related measurements. The other part applied (2) virtual coping strategies after being exposed to the previously improved cue-reactivity environment to explore and refine possibilities for craving reduction. Self-reported data (VAS, QSU-Brief), psychophysiological measures (GSR, HR), and eye-tracking were used as a potential continuous measurement of craving. Moreover, the think-aloud protocol was employed to improve the user's experience based on the cognitive insights.

Findings

Twenty-three participants participated in the first study group to improve the cue-reactivity and related measurements within the virtual environment. Preliminary results indicate a significantly increased level of craving after exposure compared to baseline. Participants in all subgroups successfully managed to use the VR-application while an increasing age revealed more problems in handling controls. Smoking-related cues and contexts were rated highly individually due to personal habits. The incorporated multimodal interactions involving smell, sound, and haptics have been identified to be important factors that influence cravings. Moreover, social influences and emotional distress have been reported to influence the urge to smoke. To continuously monitor craving levels in vulnerable groups, eye-tracking has been reported unfeasible due to complicate calibration procedures. Furthermore, motion artifacts and uncontrollable contextual variables might bias the measurement of galvanic skin responses.

Discussion

The preliminary results are in line with the previous research in the field of VR cue-reactivity by showing significant increases in craving within the subgroup of vulnerable individuals. The iterative development approach indicates a need for highly personalizable environments with complex multimodal cues, that involve social interactions and affective influences. Future research should investigate the potential of coping skills training by providing scientifically validated relaxation and distraction exercises.

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Hemodynamic Monitoring with CardioMEMS in Heart Failure Patients: Rationale and Design of MONITOR HF trial

Gerard Linssen, Jesse Veenis, Sumant Radhoe, Rudolf de Boer and Jasper Brugts

Background

Assessing hemodynamic congestion based on filling pressures instead of clinical congestion can further improve quality of life (QoL) and clinical outcome by intervening before signs and symptoms occur in heart failure (HF) patients. CardioMEMS® (Abbott Inc., Atlanta, GA, USA) is a small implantable sensor capable of measuring pressures in the pulmonary artery (PA) on a daily basis. The CardioMEMS HF System® includes an implantable wireless sensor with delivery catheter, a patient and hospital electronics system and a patient database (Integrated Merlin.net website for Patient Data Management). The sensor measures PA pressure using MEMS (micro-electromechanical systems) technology and requires neither battery nor leads. The sensor is implanted in a branch of the left PA via a transvenous catheter inserted through the femoral vein. PA pressures can be used as an invasive hemodynamic surrogate marker of filling pressures, which has been shown to precede a period of decompensation for several weeks. This time window would enable the physician to intervene before clinical symptoms arise and act in a pro-active way to avert an exacerbation of HF and a HF hospitalization by adjusting the dose of diuretics or vasodilators. The clinical efficacy of remote monitoring of PA pressures by this system has been demonstrated in the USA. Currently, the PA sensor is not reimbursed in the European Union as its benefit in addition to standard HF care is unknown in Western-European countries.

Aims

To demonstrate efficacy and cost-effectiveness of hemodynamic PA monitoring in addition to contemporary standard HF care in a high quality Western European health care system, as part of a conditional coverage programme in the Netherlands for the health care related costs.

Methods: The MONITOR HF study is a Dutch prospective multi-center, randomised clinical trial in 340 patients with chronic HF (New York Heart Association (NYHA) functional class III) randomised to remote monitoring with the CardioMEMS® PA sensor on top of standard HF care or standard HF care alone. Eligible patients have at least 1 hospitalization for HF in 12 months before enrolment or an ER visit for unplanned intravenous diuretics; and will be randomized in a 1:1 ratio. Minimum follow-up will be 1 year and maximum 36 months. The primary endpoint is the change in QoL as measured by the Kansas City Cardiomyopathy Questionnaire HF questionnaire. Secondary endpoints are the number of HF hospital admissions and changes in health status assessed by EQ-5D5L questionnaire including health care utilization and formal cost-effectiveness analysis.

Findings

The study started enrolment on April 1st 2019. The MONITOR HF trial will evaluate the efficacy and cost-effectiveness of hemodynamic monitoring by CardioMEMS® in addition to standard care delivered in dedicated HF outpatient clinics for patients with chronic HF.

Discussion

If proven effective, this has important implications for countries with similar health care structures and levels of HF care in Western Europe. The field of remote monitoring is most likely to develop using additional tools for patient control and pressure feedback with more sophisticated monitoring websites or tools and patient self-management.

Healthcare Professionals' Attitudes as a Facilitator of Using Digital Technology by Older Adults

Ittay Mannheim, Eveline J.M. Wouters, Leonieke C. van Boekel and Yvonne van Zaalen

Background

Digital technology (DT) has the potential to improve quality of life and healthcare for older adults. Albeit, adoption of DTs is low and early abandonment is prevalent. Age-based stereotypes and attitudes of healthcare professionals, towards the abilities of older adults to use DT have not been considered as possible barriers in how DTs are used and designed.

Methods

Two studies assessed healthcare professionals' attitudes towards older adults' abilities to use DT. In study I, 70 physiotherapists rated the abilities of young and old people to use different types of DT described in three vignettes. Participants also filled an ageism scale and a newly developed scale measuring Attitudes Towards Older Adults Using Technology (ATOAUT). In order to assess attitudes towards older adults indirectly and not in comparison with younger adults, study II manipulated the age participants rated following the DT vignettes. Participants were randomly assigned to one of three conditions and rated the ability of a young (25-year), old (75-year) person or comparison group (25-year and 75-year), followed by the ageism and ATOAUT scales.

Findings

In study I, participants rated younger adults as significantly more probable to use DT than older adults. A significant correlation was established between higher levels of ageism and negative attitudes towards technology use. Preliminary results of study II indicate that participants in the comparison condition rated younger adults as more able to use DT than participants in the young condition, and older adults as less able than participants in the old condition. More so, participants in the young condition and the comparison group rated ageism and ATOAUT more negatively than participants in the old condition.

Discussion

While using DT in healthcare holds a promise to improve care that older adults receive, it seems that healthcare professionals generally hold negative attitudes towards older adults' abilities to use DT. More so, it seems that comparison of older adults to younger adults might amplify age-based stereotypes, as demonstrated by the polarization between ratings of young comparing to old adults' abilities, higher levels of ageism and more negative attitudes. This in turn might influence how professionals actually use or introduce DT with older adults. Therefore, in order to realize the potential of using digital technology in the care of older adults, the role of stereotypes and ageism must be considered. Further research and development of interventions to reduce ageism, and increase of older adults' participation in development of DT is also called upon.

Evaluation of a pharmacy based personal health record for respiratory patients: a focus group study

Esther Metting, Anna Jetske Baron, Niels Chavannes, Anthony Tran, Sanne van Luenen, Corina de Jong and Maarten Lahr

Background

Asthma and COPD are prevalent diseases and require ongoing self-management. eHealth can help but it is a challenge to match the needs of patients. Especially can be difficult to reach- halve zin. In this study, we evaluated the opinion of asthma and COPD patients about a pharmacy-based personal health record(PHR).

Methods

Patients (age 66 [55-78], 18% male, 55% asthma, 27 % COPD, 18% other respiratory disease) tested the PHR on the pc and thereafter we discussed their experiences in two focus groups (n=6 and n=5). The focus groups were audio recorded and transcribed verbatim. Data was coded according to content analysis according to the topics: login, general impression of the PHR, medication information, disease information, disease monitoring, social support.

Findings

Navigating through the website was difficult and it was unclear where to login. It was sometimes complicated to find information (“I cannot see the wood for the trees”). They recommend to keep the website very basic with a limited set of links at each page. Information about triggers was lacking, other information was considered to be relevant. Opinions about disease monitoring varied. Some were not interested (“If I have complaints I will let my GP refer me to the pulmonologist”), whereas others would like to monitor their complaints (“because I hardly visit my GP”). Patients did not consider social support could be enhanced by this PHR.

Discussion

Especially information about treatment and disease was perceived to be relevant, though difficult to find and not complete. Developers need to take the specific needs of elderly regarding navigation and visual problems, into account. The target population needs to be included when optimizing the PHR.

Barriers and motivators to use eHealth in primary care respiratory patients according to professionals

Esther Metting and Claudine Dobbelaar

Background

60-80% of pulmonary patients cared for in general practice. The prevalence of chronic diseases is expected to raise in the coming years, which will increase workload in primary care. eHealth might be improve self-management in patients and reduce workload for the GP. Aim of the study is to investigate experiences and needs of primary care professionals regarding eHealth applications for asthma and COPD patients.

Methods

2 focus groups with primary care professionals and an online survey to quantify the results of the focus groups. The main topics were: experiences with eHealth, useful applications, different aspects of the

implementation of eHealth, coaching patients with eHealth. Data was thematically coded using NVIVO and data were analyzed with SPSS.

Findings

The results from the 2 focus groups (n=15, 13% male, mean age 43 [28–59] showed that applications must be reliable and useful before implementation in primary care: “I think that is often the problem for us in the general practice, we do not know which applications are reliable, so then I decide not to use it.” According to the respondents of the survey (N=60, 73% GP, 14% nurse, 3% other) 77% time is an important barrier for eHealth implementation. 13% (N=7) considered anxiety by patients as barrier. Improved support of the patient (75%), increased knowledge of the disease (77%) and increasing the motivation of the patient (64%) are motivators for the implementation of eHealth.

Discussion

Future studies should investigate how eHealth can save time and how eHealth can be made suitable for all patients to prevent anxiety. A list of tested and reliable eHealth applications for primary care will be helpful.

Development of an online integrated care platform with and for health care providers and patients: lessons learned from the H2020 Connecare study in respiratory patients

Esther Metting and Maarten Lahr

Background

The Connecare H2020-EU project aims to develop a smart adaptive integrated care platform for chronic disease management. The consortium consists of a health care providers, IT specialists and scientist from all over Europe. The developed prototype with a dashboard for health care providers and app for patients can support healthcare providers (HCP) to organize care around chronically ill patients. In this way, communication between HCP will be facilitated and patients self-management will be stimulated. In this study we describe the development of the app for respiratory patients.

Methods

Patients with asthma and COPD cyclically evaluated the prototype that was connected with a Fitbit and their opinions were shared with IT technicians during regular consortium meetings. Moreover we evaluated the log data of the prototype tested in 6 months follow-up. We also evaluated the usability of using motivating messages regarding physical activity using the System Usability Scale (SUS).

Findings

Patients provided feedback on the prototype of the application and the app was adapted accordingly. Especially the layout was improved. Patients who used the app for 6 months (n=46, mean age 60±13, range 31-82, 52% male, 30% asthma, 65% COPD, 4% ACO) needed support when installing the app but were able to use the app after installation. The app was considered to be user friendly (SUS: 82%±16). Sending motivational messages did not improve the average step count.

Discussion

The Connecare prototype improved substantially based on patients’ feedback. However, patients need support when installing and linking the prototype with the Fitbit. The prototype is ready for further development and implementation.

Development and pilot testing of the self-help app ‘MyDiamate’ for adults with diabetes

Linda Muijs, Maartje de Wit, Hans Knoop and Frank Snoek

Background

Several psychological interventions are available for persons with diabetes (PwD) and psychological distress. We aimed to develop a self-help app to support a broad group of PwD interested in improving healthy coping with diabetes and their mental health. The objective of the pilot study was to test the acceptability, feasibility and usability of this app: ‘MyDiaMate’.

Methods

We developed ‘MyDiaMate’ in an iterative process, collaborating with healthcare professionals and a panel of adults with diabetes. The content was largely based on key elements of diabetes-specific, evidence-based guided (online) cognitive behavioural interventions, and consists of 4 modules (Diabetes in Balance; My Mood; My Energy and My Goals) and 2 diaries (mood and energy). Adults with diabetes were recruited via clinics in Amsterdam, social media and diabetes-platforms. The app was tested in a mixed-methods non-randomized pilot study with pre- and post- measurements of wellbeing and symptoms (emotional well-being (WHO-5), diabetes-distress (PAID-5), fatigue (CIS) and resilience (RES)). Participants received three months of access to the app and completed questions on usability afterwards on a 5-point Likert scale (higher scores representing higher usability). User patterns were explored using log-data. Low and high-user groups were created by median split in minutes of usage. Relationships between participant characteristics, usability and usage were examined by correlation and chi-square analyses. In addition, we conducted in-depth interviews in a small sample of participants (n=4).

Findings

55 participants filled out the baseline questionnaire, 51 participants opened the app at least once, and 32 participants completed the follow-up questionnaire. Participants’ mean age was 42.7 (15.6), most were women (n=39, 70.9%), higher educated (n=36, 65.5%), and diagnosed with type 1 diabetes (n=37, 67.3%). About half reported psychological vulnerability based on their wellbeing and symptoms scores (25 (45.5%) participants scored above the cut-off on one or more questionnaires) or current/history of psychological complaints (n=27, 49.1%). Main reasons for participating were a) to improve mental fitness (40.6%), b) curious to see the app (25.0%) and c) wanting to contribute to research (34.4%). Participants used the app from 2 to 116 minutes (median=39) in a period of 1 to 91 days (median=9). Figure 1 displays the percentages of participants using each module and diary within the structure of MyDiaMate. There were no differences in well-being scores between the low and high-user groups, although participants without a history or current psychological complaints were more likely to be a high-user (p=.04). Mean usability score ranged from 1.0 to 4.8 (medium = 3.2; max 5), with large variation. People who spent more time on the app, gave the app a higher overall score (r=.46, p=.008). Most participants (n = 13, 40.6%) would recommend the app to others with diabetes. Interviews largely corroborated the finding that individual expectations and preferences can vary largely and deserve further attention.

Discussion

Overall, MyDiaMate was well received and deserves further dissemination. Given the large individual differences in user patterns, further research should aim to explore ways to optimize personalization based on individual preferences and needs.

Development and evaluation of new technologies in insurance medicine using principles of Invention Mapping

Elza Muller, M. A. Huysmans, H. J. van Rijssen, J. R. Anema

Background

Our daily life is changing fast due to the introduction of new technologies. The use of information and communication technology in order to enhance health and support health care (e.g. e-Health) is already essential nowadays in medical practice. Surprisingly enough, there is no record of new technologies being extensively used in the field of insurance medicine.

This creates an interesting opportunity to investigate the benefits of introducing new technologies in the field of insurance medicine.

The aim of the study is to develop one or more interventions, based on new technologies, such as e-Health, for insurance physicians and people with work disabilities and to evaluate their effectiveness and feasibility in daily practice.

Research question(s)

How can the use of new technologies enhance the reliability and practical implications of work disability claim assessments by insurance physicians and the effectiveness? of return to work interventions and RTW-counselling for people with work disabilities?

Methods

In order to design an effective and practical intervention for the field of insurance medicine, principles of the Intervention Mapping protocol will be used.

- Experts in the field of new technologies, such as e-Health, will be determined and subjected to semi- structured interviews in order to investigate the landscape of applications and tools that can be relevant and applicable in the field of insurance medicine.
- Needs assessment of specified target groups (i.e. insurance physicians and people with disability benefits) will be conducted using interviews and focus groups to clarify the target group's practical problems, proposed solutions, and expectations with respect to the use of new technologies.
- A complementary literature study will be conducted in order to complete the insights on the selected topics presented by the stakeholders.
- Results and data gained in steps 1, 2 and 3 will be presented to relevant stakeholders in focus groups in order to discuss possible and applicable e-Health intervention(s) with added value in social insurance practice. Performance and change objectives of the interventions will be determined and specified.
- Developing interventions based on new technologies applicable for the field of insurance medicine.
- Small scale implementation and evaluation of effectiveness and feasibility of several intervention pilots in the daily practice of insurance medicine.

Findings

The research project has started in September 2019. (Preliminary) results are expected in the summer of 2020.

Discussion

We would like to discuss with different stakeholders, with knowledge and experience of both technology and/or an interest in insurance medicine, their ideas about the application of new technologies in the field of insurance medicine.

- What new technologies are in the nearby future suitable to apply in the field op insurance medicine?
- What are benefits and/or pitfalls of the use of these technologies?

Older person's motivations to participate in the use of mobile smartphone App monitoring of hypertension in Uganda

Grace Nakimuli, Isaac Ddumba and Daniel Ssentamu

Background

Cardiovascular Disease (CVD) risk factors such as hypertension and diabetes are more prev-alent among the older persons. The CVD risk factors contribute to over 60% of NCD related deaths in later years. Therefore, urgent need for strategies to optimally monitor and control CVD risk factors is paramount in averting morbidity and mortality among older persons. A mobile smart phone App focusing on monitoring of hypertension could be an innovative tool to encour-age. The study aimed at exploring older persons motivates for participating in eHealth monitor-ing of blood pressure.

Methods

A cross-sectional research using a qualitative approach (HTN SmartApp Study) Set-ting and Participants: It's a nested study from the prospective study of "Testing the use of Smartphone App in control of CVD risk factors among older persons in Uganda". A total of 45 interview guides and 4 focus group discussions were conducted. The study included older per-sons with Smart phone, diagnosed with hypertension and he/she is on treatment. We employed semi-structured questionnaires for data collection.

Results

Eager to know about their Blood pressure numbers, benefits from other CVD risk reduction strategies, reminder to take medications, being functionally independent, daily check up their BP numbers, presence of individual at home and being the first cohort to participate in this trial, were some of the prominent motivators to participate in this trial. Although the design of the study could have influence the reasons to participate in the trial, physical navigating of Mobile SmartApp independently could have been a great motivator.

Discussion

Individual benefits and social networks motivated seniors to participate in this trial; such features should be put into consideration while conducting recruitment for older persons for future trials. Additionally, maintenance of level of independence and optimal control of hy-pertension emerged as a great concern among older person living alone.

How do Frisian residents perceive the promises and pitfalls of e-health technologies?

Dirk Postma and Job Van 'T Veer

Background

In the upcoming decades the Dutch healthcare system will face an increase in healthcare consumption because of an ageing population. Further, in the peripheral regions of The Netherlands the population is shrinking, which threatens the availability and quality of the healthcare system. Much is expected of ehealth technology to help us face these challenges in health and social care. However, there is no detailed insight in the willingness and perceived ability of citizens residing in these regions to use ehealth technologies in their personal contexts. If we want to stimulate their use of e-health technologies, we need to be responsive to these conceptions. In a large survey we studied the current use and attitudes towards e-health technologies among people living in the northern part of The Netherlands (Friesland).

Methods

A digital questionnairre was send to the 5.942 members of Panel Fryslân (recruited from probability samples of all Frisian municipalities), resulting in 2.845 participants (48% response). We broke down the generic term of 'e-health technology' into six specific scenario's of people using a type of e-health technology (an older lady using assisted living technology to maintain independence, a middle-aged man using online therapy for anxiety, etc). About each scenario we asked respondents to estimate for themselves e.g. the expected benefits, efforts and risks, intent of use (based on UTAUT-model). We concluded with general questions about respondent's current e-health use.

Findings

In general, respondents show moderately positive attitudes towards health technology. A majority expects e-health technology helps people to maintain a healthy lifestyle (58%), supports selfmanagement (60%), and improves communication with health professionals (61%). People are less convinced about 'policy-maker' arguments: Technology as a solution to the decreasing availability of healthcare or the increase of healthcare-costs, is recognized by 32% and 41% respectively. A majority sees a responsibility for care-organizations and (local)governments to support health-consumers in adequately using e-health technology. 28% does not use any form of e-health.

Attitudes (expected benefits, expected easy of use) towards all six technologies are also moderately positive. Scenario's describing technology that provide practical and physical support (assisted living technology, chip in shoulder to monitor vital signs) generate more positive attitudes. Scenario's in which human contact is facilitated or substituted with technology (online self-help for mental health issues or consulting an artificial intelligent care-professional) generate more critical attitudes. Despite their moderate personal attitudes, most people do expect increased future needs for all six technologies.

Discussion

Attitudes of people in the Northern part of The Netherlands towards e-health technology are moderately positive, but our result paint an ambivalent picture: the use of e-health technology seems motivated by maintaining personal health and independence, yet people expect support from care and government institutions to (learn to) use it.

Clearly, not all types of technologies generate the same attitudes or levels of use. Thus, more detailed insight is needed to come up with effective strategies to motivate the uptake of e-health technologies in these peripherical regions.

Training of Ambulance Nurses with Virtual Reality: Finding the Business Case

Hilco Prins, Chris Dijksterhuis, Bram Oosting, Nick Degens and Marike Hettinga

Background

Virtual Reality (VR) can bridge the gap between theoretical educative materials and complex real-life situations that ambulance nurses face in practice. The ability to simulate scenarios from a compelling caregiver perspective offers a powerful learning method. We aim to contribute to the training of ambulance nurses by utilizing new opportunities that VR offers. In this study we investigate which factors contribute to the implementation and long-term use of VR training by ambulance services for their employees.

Methods

We held interviews with five heads of learning & development departments of ambulance care services. We developed a questionnaire with 20 open questions based on the STOF model in combination with phases of technology development. The interviews were recorded and then analyzed by placing relevant comments and statements in the CANVAS business model.

Findings

With regard to the value proposition, respondents think that use of VR can contribute to the organizations' vision on ambulance care training. They strive for practice-oriented, personified, teacher-independent, blended learning and learning together. Respondents would like to see that VR-training focuses on components that now receive less attention and situations that cannot easily be trained with other means, such as soft skills, rare situations and upscaling. They also find dealing with distracting and dangerous circumstances extremely suitable for VR. Respondents find it important that the VR training can be embedded in working processes and linked to IT systems. Both in terms of terminology and in terms of content, the VR training must fit with professional requirements and tasks, the CanMEDS roles and learning objectives. It must be provided with teaching materials and lesson plan. For accreditation, it should be possible to automatically register the credits and training hours of employees. Insights and procedures are changing rapidly in the world of ambulance care, which means that maintenance and organization of updates will have to be a major part of the service.

With regard to the business case, a distinction should be made between individual and team use. In the case of individual use, scarce ambulance personnel need to be scheduled less for training days, making them more employable. During the service, they can train independently at times when no effort is required, even during evening, night or weekend shifts. In the case of team use, savings can be made if it leads to substitution of more expensive training courses. With VR it should be possible to get more out of or save on expensive large-scale simulation exercises on location. It provides the opportunity for preparation, practice and repetition of all roles, thereby increasing learning outcomes.

Discussion

Simultaneously with the development of the VR application, we have started investigating the requirements from the implementation perspective so that this can serve as input for the development. This interactive method means that the implementation issue is still evolving. Important issue in the short term is ownership and in the long term multiplayer opportunities with other first responders such as police and firefighters.

Companion Robots - Science Fact or Science Fiction?

Katie Riddoch and Emily Cross

Background

In an attempt to reduce loneliness and the myriad associated health problems, companies are in the process of developing ‘companion robots’ - machines designed to be engaging, comforting, and respond to the user in an intuitive manner. As well as having capabilities of functionally assistive robots (e.g. carrying food and fetching medication), a further aim of companion robots is to design these machines in such a way that they can connect with a user in a social way. To quantify the extent to which we perceive robots as social agents, opposed to objects, researchers have employed tasks in which they ask participants to inflict “harm” to a robot. The length of time between being given the instruction and complying (termed “hesitation”) is measured. Researchers propose that relatively long periods of hesitation reflect empathy for the robot, and the perception that it has agency, and is “sentient”.

Methods

In our laboratory-based experiment, 84 adults aged 18-83 interacted with the Pepper Robotic System (Softbank Robotics) for approximately 10 minutes. We then used an adapted version of the “hesitance to hit” paradigm in which participants were instructed to hit the humanoid robot on the head with a mallet. After agreeing to do so participants were halted, and a semi-structured interview was conducted to probe the thoughts and feelings they experienced during the period of hesitation. We were curious why people hesitated, and whether hesitation reflects bonding or attachment to the robot, as suggested in previous research.

Findings

Preliminary analysis of participant responses indicates that that hesitation not only reflects perceived socialness - but other factors including (but not limited to) concerns about cost, cognitive overload, and the influence of authority. Interestingly, the responses also offer insight into individual differences with regards to anthropomorphism, and feelings of connection towards the robot. Specifically, we find that some people heavily anthropomorphise the robot – expressing that they perceive the robot as aware, feeling, and with gender. In contrast, some people state that they feel little after being asked to hit the robot, and that it is simply an object or machine. In future we intend to compare the qualitative and demographic data – potentially shedding light on the source of such individual differences.

Discussion

The findings of this study allow us to better understand the “hesitance to hit” measurement technique – leading us to advocate for the use of semi-structured interviews in other lines of research. In addition to aiding method-validation, the words of participants are thought-provoking and insightful. In addition to generating new research questions, the responses speak to how some people form strong connections with the robot after a mere ten minutes. Currently, the end user of “companion robots” is regarded to be individuals with autism or dementia, however these findings suggest a potential place for social robots in the lives of the broader population.

Adherence to Smoking Cessation Treatment and predictors of adherence: Comparing Blended Treatment with Face-To-Face Treatment

Lutz Siemer, M. G. Brusse-Keizer, M. G. Postel, Somaya Ben Allouch, Robbert Sanderman and M. E. Pieterse

Background

Blended face-to-face and web-based treatment is a promising eHealth service. Since adherence has been shown to be an indicator for treatment acceptability and a determinant for effectiveness, we explored and compared adherence and predictors of adherence to a blended and a face-to-face smoking cessation treatment, both similar in content and intensity.

The objectives of this study were (1) to compare adherence to a blended smoking cessation treatment (BSCT) with adherence to a face-to-face treatment (F2F); (2) within the blended treatment, to compare adherence to its F2F-mode with its Web-mode; and (3) to determine baseline predictors of adherence to both treatments as well as (4) the predictors to both modes of the blended treatment.

Methods

We calculated the total duration of treatment exposure for patients (N=292) of a Dutch outpatient smoking cessation clinic, who were randomly assigned either to the blended smoking cessation treatment (BSCT, N=162) or to a face-to-face treatment with identical ingredients (F2F, N=130). For both treatments (BSCT vs. F2F) and for the two modes of delivery within the blended treatment (BSCTs F2F mode vs. BSCTs Web mode), adherence levels (i.e. treatment time) were compared and the predictors of adherence were identified within 33 demographic, smoking-related, and health-related patient characteristics.

Findings

We found no significant difference in adherence between the blended and the face-to-face treatment. BSCT patients spent an average of 246 minutes in treatment (IQR 150-355; 106.7% of intended treatment time); F2F patients spent 238 minutes (IQR 150-330; 103.3%). Within BSCT, adherence to the face-to-face mode was twice as high as to the web-mode. BSCT-patients spent an average of 198 minutes in F2F-mode (SD 120; 152% of the intended treatment time) and 75 minutes in Web-mode (SD 53, 75%).

Higher age was the only characteristic consistently found to uniquely predict higher adherence in both BSCT and F2F. For F2F, more social support for smoking cessation was also predictive of higher adherence. The variability in adherence explained by these predictors was rather low (BSCT: R2=.049; F2F: R2=.076). Within BSCT, to be living without children predicted higher adherence to BSCTs F2F-mode (R2=.034), independent of age. Higher adherence to BSCTs Web-mode was predicted by a combination of an extrinsic motivation to quit, a less negative attitude toward quitting and less health complaints (R2=.164).

Discussion

This study has been one of the first attempts to thoroughly compare adherence and predictors of adherence of a blended smoking cessation treatment to an equivalent face-to-face treatment. Interestingly, although the overall adherence to both treatments appeared to be high, adherence within the blended treatment was much higher to the face-to-face mode than the web mode. This supports the idea that in blended treatment one mode of delivery can compensate for the weaknesses of the other. The low variance in adherence predicted by the characteristics examined in this study, suggests that other variables, such as provider-related health system factors (e.g. communication style, clarity of diagnostic and treatment advice; or continuity of care) and time-varying patient characteristics should be explored in future research.

Outpatient smoking cessation: Preliminary findings of a non-inferiority RCT comparing blended with face-to-face delivery mode

Lutz Siemer, M. E. Pieterse, Somaya Ben Allouch, M. G. Postel, Robbert Sanderman and M. G. Brusse-Keizer

Background

Blended face-to-face and web-based treatment is a promising mode to deliver smoking cessation treatment. In an outpatient clinic in a Dutch Hospital, effectiveness of a blended treatment (BSCT) was compared to usual face-to-face treatment (F2F). The results from 6 months post-treatment follow-up are presented here.

Methods

In this open-label two-arm non-inferiority RCT, patients (N=344) of a Dutch outpatient smoking cessation clinic were assigned either to the blended smoking cessation treatment (BSCT, N=167) or a face-to-face treatment with identical ingredients and duration (F2F, N=177). Cotinine-validated point prevalence abstinence at 3 months follow-up, taken shortly after quit date was analyzed. Intention-to-treat analyses were performed, retaining missing participants as continuing smokers. Non-inferiority was assessed based on a one-sided margin of five percentage points difference between arms. Additionally, a Bayes Factor was estimated (with a BF>3 supporting non-inferiority, and a <.3 rejecting non-inferiority).

Findings

At 6 months follow up, 8/167 BSCT patients (4.8%) and 31/177 F2F patients (17.5%) were abstinent, with a difference of 12.7% (95%CI: 6.2-19.4) in favor of F2F. Furthermore, a BF=0.02 was found.

Discussion

Contrary to our own expectations, the abstinence rates of BSCT were lower than those of F2F. For the cotinine validated point prevalence abstinence, the application of the five-percentage points non-inferiority margin and the resulting calculation of the Bayes Factor indicated the inferiority of BSCT. These results should be considered with great caution, as there was only a very low response rate for cotinine validated point prevalence abstinence.

Adherence in a pilot eHealth self-management intervention for patients with both COPD and heart failure

Joanne Sloots, Mirthe Bakker, Tanja Effing, Monique Tabak, Gerard Linssen, Clara Van Ommeren, Michiel Eijsvogel, Martijn Grinovero, Job Van der Palen and Anke Lenferink

Background

eHealth might support self-management interventions by facilitating home-based care through monitoring and coaching. We hypothesize that our eHealth self-management intervention, tailored for patients with Chronic Obstructive Pulmonary Disease (COPD) and Chronic Heart failure (CHF), could improve patients’ adherence to self-management action plans and inhaled medications.

Methods

The eHealth self-management intervention that was developed for this pilot study, included proven effective daily symptoms diaries that were linked to an automated decision support system and launched self-management advices if necessary (e.g. self-treatment), real-time monitoring of inhalation medication by an add-on sensorized inhaler, and feedback from an embodied conversational agent. Patients participated in three self-management training sessions and subsequently used the eHealth self-management intervention via a portal on a tablet for four months. We assessed patients' adherence to: 1) symptom diary completion; 2) following up advices from the decision-support system; and 3) using inhalation medication. Also, inhalation technique was analyzed.

Findings

Eleven patients with COPD and CHF with a mean age of 66.8 ± 2.9 participated, 4 women and 7 men. In total, 1176 diary days (93.2%) were completed. Seven patients received 24 advised actions via the portal, of which 11 (46%) were performed. Thirteen (54%) actions were not performed, of which 6 were 'call the case-manager' and another 5 were not performed in agreement with a healthcare provider. Seven patients used a sensorized inhaler with a total inhalation adherence rate of 98.3%, while 51.6% of the inhalations were performed correctly. The most frequent error made was inhaling too short (79.9%).

Discussion

Patients' adherence to self-reporting symptoms via the eHealth self-management intervention and to inhalation medication was high. However, both following-up of the advice 'call the case-manager' and inhalation technique was poor. Qualitative analyses could help to identify reasons for non-adherence, so that the intervention could be further tailored and patient adherence could be improved. Also, it would be interesting to assess whether incorporating real-time personalized coaching could improve inhalation technique and adherence to following up actions.

Development of a Personalised m/eHealth Recovery Programme for Working-Age Knee Arthroplasty Patients: A Delphi Study

Carlien Straat, Pieter Coenen, Denise Smit, Gerben Hulsegge, Rutger van Geenen, Gino Kerkhoffs, Rob Janssen, Tim Boymans, Judith Huirne, Johannes Anema and Paul Kuijer

Background

Clinical Decision Support Systems (CDSSs) are computerized systems using case-based reasoning to assist clinicians in making clinical decisions. Despite the proven added value to healthcare, the implementation of CDSS in daily clinical practice is scarce. Particularly, little is known about the acceptance of CDSS among clinicians. Therefore the aim of this study is to inform the audience about the factors involved in the acceptance of CDSSs among primary and secondary clinicians in the treatment of Neck and/or Low Back Pain (NLBP).

Methods

To assess the acceptance of CDSSs among clinicians we conducted a mixed method analysis of questionnaires and focus groups. An online questionnaire was sent to Dutch General Practitioners and physical therapists aimed to identify the factors influencing the acceptance of CDSSs in primary care (intention to use, perceived threat to professional autonomy, trusting believes and perceived usefulness). Next to this, two focus groups were conducted with clinicians in secondary care addressing the general attituded towards CDSSs, the factors determining the level of acceptance, and the conditions to facilitate use of CDSSs.

Findings

A pilot-study of the online questionnaire is completed and the results of the large evaluation are expected spring 2020. Eight clinicians participated in two focus groups. After being introduced to various CDSSs, participants were positive about the value of CDSS in the care of NLBP. The clinicians agreed that the human touch in NLBP care must be preserved and that CDSSs must remain a supporting tool, and not a replacement of their role as professionals.

Discussion

By identifying the factors hindering the acceptance of CDSSs in the primary and secondary care settings, we can draw implications for implementation of CDSSs in the treatment of NLBP.

Alzheimer Care Trainer: a personalized simulation to practice daily care situations with people with Alzheimer's disease

Mariet Theune, Frédéric Ehrler, Nicolas Szilas, Henk Herman Nap, Pia Vandebergh, Razvan Craciunescu and Martijn Vastenburg

In this presentation we introduce the Alzheimer Care Trainer, a personalized simulation that allows informal caregivers of people with Alzheimer's disease to practice daily care situations in order to identify the most adapted interaction style towards the person they care for.

Background

Alzheimer's disease impacts not only the life of the people themselves but also that of their caregivers. Many people with Alzheimer's disease are supported at home by their relatives or home caregivers. The behavior changes induced by the evolution of the disease can alter the quality of the relationship between the person with Alzheimer's disease and his/her relatives, transforming simple daily activities into overwhelming challenges and therefore impacts the quality of life of these informal caregivers. One source of tension is the misunderstanding of the person with Alzheimer's behavior and the incapacity of the caregiver to adopt the proper behavior when interacting with this person, in the event of insufficient knowledge and training or lack of experience. Learning strategies to cope with the daily life activities is a recognized intervention to mitigate caregivers' burden and stress.

Methods

In the POSTHCARD project, we develop the Alzheimer Care Trainer, a narrative simulation that allows caregivers to practice daily living situations they might encounter with a person with Alzheimer's disease. The simulation lets caregivers enter a virtual 3D home environment, where they can explore and experience real-life interactions with the person they care for. They can customize the simulation according to the specific characteristics of the illness as well as their own coping style, allowing them to practice multiple scenarios and explore different strategies. This will make informal caregivers aware of the appropriate behaviors to care for people with Alzheimer's disease and to interact positively with them in a meaningful and constructive way. Examples of daily situations that can be practiced in the simulation include eating (learning how to react positively to the patient's loss of appetite and changing abilities to eat) and toileting (learning to deal with negative attitudes of the patient towards personal hygiene and care activities such as taking a shower or simply washing hands).

Findings

Informal and formal caregivers dealing with people suffering of Alzheimer have been involved in the testing of early mockups of the Alzheimer Care Trainer. Through questionnaires and interviews they have provided feedback on the design, as well as input for the desired functionalities. Based on this input, a first working prototype of the Alzheimer Care Trainer has been developed.

Discussion

Currently we are working on improving and extending this prototype based on heuristic evaluations by usability experts. The next step will be to carry out a pilot test among end-users in three countries: the Netherlands, Belgium and Switzerland.

POSTHCARD is co-funded by the AAL Joint Programme and the National Authorities and R&D programs in The Netherlands, Belgium, Switzerland and Romania. In the Netherlands the project is being made possible by ZonMw under project number 735170004.

Qualitative explorations of robotic animal companions in dementia care

Ans Tummers-Heemels, Marleen Hillen, Yvonne de Kort and Wijnand Ijsselsteijn

Background

We explore the potential psychosocial health benefits offered by affective presence technology, specifically robotic animal companions, for people living with dementia. In research to date, robotic companions have shown promise to enhance quality of life, including the desire to feel needed, to hug, to ameliorate loneliness and stimulate reminiscence, and to provide emotional support, social bonding and feelings of security. In our present research, we extend current work by including comparative and longitudinal perspectives. We report on insights obtained from two qualitative studies, deploying two different robotic animals in contrasting environments, timespans and circumstances.

Methods

Both qualitative studies use behavioral observations and interviews as the primary means of data collection. The first study (n=12), in a care home setting, compares psychological and behavioral engagement of people with dementia when interacting with a real dog, a robot animal companion (Pleo), or a human only. The second study (n=1), a longitudinal case study over 9 months, focuses on an elderly lady, Elsie, age 82 with middle stage Alzheimer's disease. It investigates the psychosocial effects of long-term bonding with a soft fur covered robotic cat. We use thematic analysis to explore the results.

Findings

The results from the first study suggest that the conversations and interactions with the life dog and the Pleo robot were more fluent than the interaction with the life person only. Participants were stimulated to enthusiastically tell about animals they used to own. In the second study, Elsie immediately started talking to the robotic cat, caressing it, and accepting it as a socially responsive and feeling creature. The robotic cat acted as a social lubricant and created opportunities for interaction between Elsie and other seniors. Even after 9 months of intense interaction with the robot cat, there's no lull in engagement and psychosocial rewards are still strongly experienced.

Discussion

Robotic companions appear to generate a form of affective presence which may result in rich and varied responses, ranging from surprise and engagement (Study 1 and 2) to intense feelings of love and attachment (Study 2). The 'illusion of non-mediation' appears to be rather high – robotic companions are immediately accepted as feeling, sentient creatures, and treated as such. Robotic companions provide excellent opportunities for interaction with others – they are shared objects of interest that can trigger conversations and social interaction between familiar strangers (i.e., triangulation) and may stimulate reminiscence.

The lifelikeness of the robotic companion seems to play a secondary role. The simple robot cat's repertoire of relatively basic responses combined with its tactile qualities appears sufficient to create a strong emotional attachment. The more complicated behavioral repertoire of the Pleo (Study 1) did not result in more rewarding interactions, and may be harder to use and more vulnerable to malfunctions. Overall, our results suggest that robotic animals, in quite different settings and over longer periods of time, can provide affective presence, create strong emotional attachment, and can play a significant role in the immediate and long term psychosocial health of individuals suffering from middle to late stage dementia.

Big data in health: Big challenges and big opportunities

Bernard Veldkamp

In many sectors (marketing, transport, chain stores, etc.), large amounts of data are being collected, stored, and analyzed with great benefits. The question arises whether the same holds for health. Within the field of health, data can be obtained in various ways. Data can be obtained from doctors or patients for specific purposes, they can be recorded by third parties in administrative systems, and data can be obtained from the interaction of patients or doctors with online systems. The increase in the amount of data, together with an increased availability and accessibility of data in electronic form, and the linking of previously separated data files, is labeled 'big data'. Big data can be used to gain more insight in specific processes, to predict for example behavior, and to develop measures to improve health.

Big data have the following characteristics (Laney, 2001):

- Volume: It involves large quantities of data
- Variety: Data sources and the data itself differ
- Velocity: Data are added and updated continuously

These three Vs denote that big data expand along various dimensions. Besides volume, the variety and velocity of the data also increase. In this paper the challenges and opportunities of big data will be discussed based on two examples: 'Screening trauma survivors for PTSD' and 'Risk prediction of post-operative wound infections for surgery patients'.

Based on these examples and the discussion with various experts, a number of big data paradoxes arose that will be discussed with the audience:

1. Prediction paradox: maximum predictive validity vs causality inferences
2. Privacy paradox: privacy protection vs combining different data sets
3. Clustering paradox: combining data vs data leaks
4. Individual context paradox: Disconnect context from the data to ensure the privacy of individuals versus context needed to interpret data
5. Give and take paradox: Decisively asking for data versus hesitantly providing data
6. Technology capacity paradox: Fast growing opportunities for collecting and analyzing data versus slow growing human capacity.

The key question for scientific research to answer is: How can big data analytics contribute to health? It can be observed that big data can be used for a large number of purposes by different actors in the field of health. The list of possible purposes seems almost endless. The availability of tools and software provides many opportunities to realize them. Because of this, the future of big data analytics in health seems very bright. It should be mentioned though that many challenges still exist. The various paradoxes mentioned exemplify that the field of health analytics is still at its infancy, and that development in human capacity is urgently needed.

LEAVES: A virtual agent for processing grief in later life

Lex van Velsen, Miriam Cabrita and Harm Op den Akker

Background

Loss of a spouse is a frequent occurrence in later life. While most older adults successfully process this, and progress to prolonged grief. Prolonged grief, on its turn, can result in many mental and physical problems, like poor sleep, cardiovascular problems, depression, and suicidal tendencies.

Methods

LEAVES (optimizing the mentaL health and resiliencE of older Adults that haVe lost thEir spouSe via blended, online therapy) is an online grief program, offered by a virtual agent, that will support in the prevention and treatment of prolonged grief, so that older mourners can lead an active, meaningful and dignified life. The LEAVES service will consist of the online grief program Livia, the Before You Leave program, that allows for storing personal memories, Roessingh Research and Development's virtual agent platform, and accessible front-end design. LEAVES helps older adults to process the loss of a spouse in an empathic and caring online environment. It can detect persons at risk for complications, can uncover negative trends in their emotional life, and will act to counter this trend. LEAVES will cater to secondary end-users (family, informal caregivers) by reducing stress. The service relies on online treatment if possible, but is blended with telephone or face-to-face counselling when necessary.

Findings

LEAVES is a project that is funded within the Active and Assisted Living (AAL) Programme. The LEAVES consortium covers three countries (the Netherlands, Portugal and Switzerland), and includes lead users and exploitation partners from each country. The project will take place between February 2020 and January 2023. Through iterative, user- and stakeholder centered design, a service model, functional and visual design will be developed, tested, and redesigned to ensure high usability and a pleasant user experience. The project will include a real-life evaluation in which 315 end-users will use the service in three countries (the Netherlands, Portugal and Switzerland). The evaluation of LEAVES will focus on clinical effect, its business case, and technology acceptance. These results will pave the way for smooth integration in existing care paths and reimbursement schemes. Simultaneously, a value proposition and Pan-European business model will be developed. During the presentation, we will set out the project and present our initial findings on functional and user experience design.

Discussion

LEAVES service aims to soften the mourning process, prevents depression or social isolation, strengthens widow(er)s resilience and wellbeing, and quickens a return to societal participation.

UltraViolet imaging to enhance awareness of UV damage to the skin and protection using sunscreen

Rudolf Verdaasdonk and Catherine van Montfrans

Background

The significant increase of skin cancer occurring in the western world is attributed to longer sun expose during leisure time. For prevention, people should become aware of the risks of UV light exposure by showing skin damage and the protective effect of sunscreen with an newly developed UV camera.

Methods

An UV imaging system was developed given people the experience as if looking in the mirror seeing their face in UV light. The system was assembled from consumer components: A Sony NEX5t camera was adapted to full spectral range. In addition, UV transparent lenses and filters were selected based on spectral characteristics measured to obtain the highest contrast for e.g. melanin spots and wrinkles on the skin. Either UV 365 nm black light fluorescent tubes or UV LED strips were used for uniform illumination. Safety of the UV illumination was determined relative to the sun and with absolute irradiance measurements at the working distance according the international safety standards. The 'UV mirror' was demonstrated at public events (Dutch National Cancer Day and Marathon of Amsterdam) and images were taken before and after application of sunscreen giving a ' black paint' experience. The amount of coverage of sections of the face by sunscreen were scored and feedback from participants was obtained using questionnaires.

Findings

The UV imaging system shows superficial skin features like melanin spot and wrinkles with high contrast. The 'UV mirror' was successfully demonstrated during public events was well received by dermatologists and participating public. Especially, the 'black paint' effect putting sun screen on the face was dramatic and contributed to the awareness of regions on the face what are likely to be missed especially around the eyes and ears. Seventy eight percent of the participants responded that they intended to improve their sun protection behavior after being confronted with their UV face image.

Discussion

The UV imaging system induces a significant improvement of the awareness of sun damage and on skin protection behavior. UV imaging has high potential for diagnostics in dermatology and other areas.

Using log-data for improving engagement in serious gaming for coping with chronic pain burdens

Miel Vugts, Ruud Scheijen, Aglaia Zedlitz and Inge Bongers

Background

Blended serious gaming may assist some patients with chronic pain (CP) during multidisciplinary rehabilitation in acquiring skills to limit psychosocial burdens. Involvement in the serious game ‘LAKA’, selecting pre-scripted ‘decisions’ for an Avatar in social ‘encounters’ at four virtual travel ‘destinations’, elicits awareness about self-discrepancies. This can be leveraged, in therapist guided debriefings, for improving emotional functioning. However, demands of patients and therapists for timely personal feedback on game-play need to be met. Our objective is to contribute to the sparse examples of log-data analysis as a source of meaningful feedback provision.

Methods

Various R. packages were used to explore automatically logged ‘decision’ scores of LAKA, collected but not reported during previous evaluations. Scores (1-5) varied in the degree in which decisions display ‘mindfulness’ to a social context (eg. withholding prejudice or helping someone). These ‘score’ data were combined with previously reported demographics, health outcome, and subjective experiences after gaming. Similar information were available from an earlier pilot study. In total, 6139 observed decisions by 165 CP patients were included. First, decision score dependency on the previous score was indicated with first-order Spearman auto-correlations. First order Markov-chain model results were used for weighting decision scores by their likelihood in the context of the previous decision. Line graphs were created of individual patients' weighted and unweighted decision scores were visualized using 'ggplot2'. Secondly, we explored relationships between various decision scores with patient characteristics (using 'rsubgroup'), patient experiences, and self-rated mindfulness (Pearson correlations). Finally, hidden Markov modeling with Latent Gold is planned for looking at transitions between latent states indicative of learning processes.

Findings

Generally, decision scores were weakly auto-correlated ($\rho = .28$, $P<.000$) and improved with progress in the game. Better decision scores had higher probabilities ($\rho = .39$, $P<.000$). Markov modeling results were used to calculate weighted decision scores (d) as the averages, within encounters (s), of scores (i), depending on the corresponding transition probabilities (p). The calculated weighted average for all decisions was negatively associated with the autocorrelations ($\rho = -.24$, $P=.002$). Data mining with the subgroup algorithm, finding combinations of categorical attributes retrieved from patient records that describe substantially sized groups with positive deviations of continuous decision scores. We consistently observed slightly better scores for patients without family related or financial problems, without unemployment benefits and with paid work, and not scoring higher than 80% or lower than 20% of the other patients with respect to coping styles (e.g. passive or palliative responses). Self-rated coping through active engagement or reassuring thought were associated positively with better gaming scores ($.19<\rho<-.22$, all $P<.01$). No significant association of scores with mindfulness before or after gaming were found. Patients that made similar decisions to others rated their perceptions of acceptance of gaming as more positive ($\rho = -.24$, $P=.01$, $n=109$).

Discussion

Our explorations led us to using several techniques for showing interesting patterns regarding how different patients respond to game-scenarios. These methods' results can give insight to therapists for providing timely and personal feedback on serious game-play to different patients. Score differences between patients reflected coping traits and influences of the environment that patients live in, which suggests that serious gaming can help in addressing how patients respond to difficult circumstances. These findings warrant future validation. Scores generally improved with progress in game-play, but this can have many explanations. A better understanding of learning trajectories requires completion of the planned analyses and resuming evaluations with practicing therapists.

User needs, requirements and usability issues of a platform for healthy Living: "BENEFIT for all"

Jobke Wentzel, Floor Sieverink, Britt Bente, Thomas Reijnders, Linda Breeman, Roderik Kraaijenhagen, Veronica Janssen, Andrea Evers and Lisette van Gemert-Pijnen

Background

Make healthy living fun – this is the goal of the BENEFIT project (Keesman et al. 2019). Users, patients (cardiovascular disease is a main target group) need to make many lifestyle changes in order to become healthy or stay healthy. Grounding a healthy lifestyle in one's daily life, creating long-lasting behavior change and healthy habits is not easy. Cardiac patients are offered a revalidation trajectory after leaving the hospital after a cardiac event. A period during which they have to adapt to new treatment regimes, recover, and cope with all the changes they go through. The BENEFIT project aims to support patients such as these CVD patients in doing this, by guiding them, facilitating healthy behavior by rewarding it. An online platform is created to support the medical, psychological, and general coaching interventions.

Methods

An existing program (My Health ePlatform - HEP) is redesigned to fit the goals of the BENEFIT project. To this end, we carried out an expert evaluation, usability tests, and conducted user interviews. Another round of usability tests and interviews are planned for April 2020. During these sessions, the HEP was evaluated by testing scenarios of use (either by users or experts), and subsequently interviewing patients.

Findings

In various iterations concrete suggestions for redesign were identified. E.g., the need to tunnel users towards features they need to use was a recurrent issue in early designs. Also, platform/BENEFIT goals were not communicated clearly to patients in the platform's setup. On a more fundamental level, key issues for implementation and core values of patients emerged; what place does HEP hold within patient care? Are health care workers available to answer patient messages? What services can be provided via the platform? What patient values can be catered to? For example, patient values of being 'seen' as a patient, feeling reassured and reduce fear emerged as important. Expert evaluations show that earlier platform designs did not necessarily acknowledge these values. With regard to some of the identified design issues, tunneling and feedback are incorporated into the platform more prominently, to provide clarity. Data collection is ongoing, we aim to provide an overview of the platform's key features (and users' evaluations thereof) at the conference. This version/design will be tested as part of the project's larger effect study in a larger 5-hospital stepped wedge approach.

Discussion

The development process in this project has been largely iterative; many evaluations contributed to (proposed) changes in the design of the platform. Also, this information shed light on the context and requirements for implementation of this project into various possible contexts. Besides more 'basic' issues that were tackled in our user studies, we also uncovered patient needs and values that reach beyond usability. These insights can form the basis for a value-based business model and need further evaluation.

Symposia

1. Newest scientific developments and implementation efforts on self-monitoring and wearables in psychiatric care

Fionneke Bos, Yoram Kunkels and Barbara Montagne

People with mental health disorders are often looking for ways to successfully live and cope with the impact of the disorder. One way to do so is to frequently monitor mood, symptoms, experiences, and physiological markers in daily life. Indeed, research has shown that self-monitoring as well as wearable devices (e.g., heartrate monitoring or actigraphy) might help people regain a sense of control and obtain insight into ways to influence their well-being. Similarly, the obtained data can help patients and clinicians to discuss treatment goals. Therefore, self-monitoring and wearables are generally seen as highly promising for psychiatric care.

In this symposium, we will present the latest scientific developments concerning self-monitoring and wearables in psychiatric care, and elaborate on current implementation efforts. We will start by shortly outlining the rationale behind self-monitoring for psychiatry and introducing an innovative flexible interface that can be used for the implementation of personalized self-monitoring. Next, we will examine the potentials and the pitfalls using activity monitors to measure activity in patients suffering from mood disorders. Finally, we will discuss a clinical case where self-monitoring and innovative personalized feedback was used in psychiatric care.

Walking away from this symposium, you will know more about what currently is possible regarding self-monitoring and wearables in psychiatry.

1.1 PErsonalized Treatment Real-time Assessment (PETRA): a flexible interface for personalized diaries in psychiatry

Fionneke Bos, Marieke Wichers, Ando Emerencia, Wim Veling, Benno Haarman, Date van der Veen, Robert Schoevers, Erwin Veerman, Evelien Snippe, Judith Rosmalen, and Harriëtte Riese

Background

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:

Interviews and focus groups (with 42 patients and 34 clinicians) were held to identify needs and barriers for implementation. The roadmap of the Center for E-health Research (CeHRes; Van Gemert-Pijnen et al. 2011) was used to develop a flexible interface that supports the use of ESM for patients and clinicians. The interface is termed PETRA: PErsonalized Treatment Real-time Assessment.

Findings

PETRA consists of two modules: a decision aid to guide patients and clinicians from their clinical question to a scientifically valid and personalized ESM diary, and a feedback module that attractively visualizes the data. First prototypes of both the decision aid and the feedback module have been developed and tested with end users. During the presentation, we will demonstrate the decision aid and feedback modules, and elaborate on the development process.

Discussion

PETRA is the first tool that facilitates the use of ESM in clinical practice. Ultimately, we aim to create a tool that helps to improve the patient-clinician relationship and increases efficiency of care.

1.2 Using wearable technology to facilitate long-term ambulatory assessment of activity in patients with mood disorders

Yoram Kunkels, Harriëtte Riese, Stefan Knapen, Rixt Riemersma - van der Lek, Sandip George, Arie van Roon, Robert Schoevers, and Marieke Wichers

Background

Rapid technological advancements in the field of wearable monitors of physiological functioning have dramatically changed the way we measure participants. These developments offer novel opportunities, such as collecting long-term continuous datasets, while at the same time introducing new hurdles, such as how to process and analyze such Big Data sets. In this presentation we will share our experiences with these new wearable technologies during data collection and analysis.

Methods

Long-term, continuous activity data was collected using actigraphy in multiple samples. In the first study, patients with a history of Unipolar depression tapered their antidepressant dosage while wearing light-weight, wrist-worn accelerometers continuously for 120 days. In the second study a sample of patients suffering from Bipolar disorder continuously measured their activity using actigraphy for 180 days.

Findings

In general, actigraphy performs well as a wearable technology for ambulatory assessment in psychopathological samples. We found that patients did not experience substantial burden due to wearing the device. Moreover, actigraphy offers high-resolution data which can be used for both common circadian rhythm and sleep analyses, as well as more advanced analysis methods. However, generalizability of the results is hampered by variation in measurement units between devices.

Discussion

Wearable activity monitors can be a useful addition to the toolkit of various health-related professionals, such as clinicians, researchers, and coaches. Its strength lies with its ability to obtain large, long-term datasets with only a small burden to participants. Actigraphy is well supported with dedicated software to perform multiple processing tasks and analyses. Nonetheless, in order to reach its full potential, various issues due to lack of standardization still have to be resolved.

1.3 JCP DNA: Prevention is better than cure in the event of crisis!

Barbara Montagne, Massi Aoudjan, Elisa van Delft, Corine ter Burg, Date C. van der Veen, Laura F. Bringmann, and Gert Stulp

Background

Individuals with a personality disorder experience rigid and long lasting social, emotional and cognitive problems. Problems with the regulation of their arousal frequently results in crisis. In a Joint Crisis Plan (JCP) the client identifies, together with the clinician, predictive signs for crises and possible solutions to stop a crisis from happening or to resolve a crisis. Even though the results of JCPs are generally promising, there are pitfalls: 70% of the participants do not complete the JCP and 87-96% do not implement a JCP once completed. This can be due to a number of problems when creating a JCP. Firstly, drafting the JCP requires reflection on one's own emotions and secondly, it requires recognition of the relation between the various variables of the JCP. Both are difficult. One can argue that the information on which the JCP is based, is not as reliable as we want it to be. In this usability and feasibility study, we investigated whether we can bring the information on which the JCP is based closer to daily life by using a personalized questionnaire that is filled in several times a day (Experience Sampling Method).

Methods

Four patients, treated at GGZ Centraal at the personality disorders outpatient clinic, participated. Each individual patient transformed, together with a clinician, their old JCP into a personalized questionnaire including the most relevant variables (context, thoughts, feelings, behavior). The patient completed this personalized questionnaire three times a day for four weeks, using an online app, until there were at least 60 measurements. After all the data was collected, it was visualized in a poster (ESM-viz). During face-to-face contact this visualization was presented and discussed between patient and clinician with the aim to really understand what is shown.

Findings

Patients were very positive about the information it provided, even when patients had been in treatment for a long time (years), it brought new insights into the relationship between the different variables included and the threat of a crisis. It also appeared on several occasions that specific context variables were much more important than previously thought.

Discussion

This study shows that not only patients are willing and able to fill out an online questionnaire during an unstable period in their lives but also that the data collected is valuable for the patient as well as the clinician. This methodology provides information about the relationship between specific variables and the imminent crisis that was not previously recognized as such. This is an important step in narrowing the gap between daily reality and the information on which the JCP is based. A follow-up study is planned to further investigate this ESM-viz methodology.

When we are able to retrieve previously unavailable information on the relationship between variables as well as make this visible in an informative and meaningful way for patients, this also gives specific direction to interventions aimed at crisis prevention. In short, we can prevent rather than cure in the event of a crisis!

2. mHealth and eHealth interventions in the treatment of patients suffering from cancer-related fatigue

Simon Spahrkäs, Mariët Hagedoorn, Rosalie van Woezik, Melanie Schellekens and Marije van der Lee

One of the most prevalent side effects of cancer and its treatment is fatigue, characterized by feelings of weakness, exhaustion, and lack of energy. After completion of treatment, one-third of cancer patients suffer from severe fatigue that can persist for months and even years. This cancer-related fatigue (CRF) is a complex, multifactorial condition that is often accompanied by significant distress and reduced quality of life. As the number of cancer survivors is expected to increase considerably in the coming years, a better understanding and development of effective treatments for CCRF are critical.

We present three studies that contribute to a better understanding and improvement of CRF and its treatment:

1. The results of a randomized controlled trial, showing the effectiveness of a self-management app to improve fatigue and quality of life in cancer patients.
2. The preliminary results of a proof-of-principle study, discussing how an experience sampling app and the resulting symptom networks can help personalize psychological care for chronic CRF.
1. The design of a preference trial, discussing the development and pilot testing of an online couple Mindfulness-Based Cognitive Therapy and online couple Activity Coaching intervention to improve patients' fatigue and both couple members' emotional wellbeing.

Recommendations and challenges for both research and clinical practice will be discussed.

2.1 Beating Cancer-Related Fatigue with the Mobile App 'Untire': Results from a Waiting-List Randomized Controlled Trial

Simon Spahrkäs, Anne Looijmans, Robbert Sanderman and Mariët Hagedoorn

Background

The purpose of this waiting list randomized controlled trial (RCT) was to examine the effectiveness of the 'Untire' mHealth self-management app in improving fatigue and quality of life (QoL) in (former) patients with cancer.

Methods

Patients with CRF were recruited via social-media, and randomized into intervention and waiting list control group. Outcomes were assessed at baseline, 4, 8, 12, and 24 weeks. GLMM were calculated to assess the effects of having access to the Untire app versus no access over time. Additionally, we tested potential moderators (i.e., patient characteristics) and the clinical relevance (i.e., reliable change) of the hypothesized intervention effects.

Findings

Results revealed steady improvement for the intervention vs. waiting list control group in fatigue severity, fatigue interference, and overall QoL on average after 12 weeks (all P's < .01), whereas no differences were found in levels of overall QoL in the past week (P = .71). Overall effect sizes were largest for fatigue severity (d = 0.40), followed by fatigue interference (d = 0.35), and overall QoL on average (d = .32). Moderation analyses indicated that the intervention effects did not depend on age, gender, country of residence, and cancer status (patients vs. former patients). Exploratory sensitivity analysis indicated that patients with high or medium use benefited most, compared to low, non-active intervention and control participants.

Discussion

Access to the Untire app significantly improved levels of fatigue severity, interference, and overall QoL on average, among patients with CRF after 12 weeks of app access, with generally small to moderate overall effect sizes.

2.2 COMPANION – Co-creating a Couple Online Mindfulness intervention and Physical Activity interveNtION targeting cancer-related fatigue

Melanie Schellekens, Fabiola Müller, Marrit Tuinman, Marije van der Lee and Mariët Hagedoorn

Background

There is a growing group of patients in need for treatment of chronic cancer-related fatigue (CCRF). While online mindfulness-based cognitive therapy (eMBCT) and online physical activity coaching (AC) are effective in reducing CCRF, their effectiveness is not optimal: Some patients do not or do not sufficiently improve. Importantly, these interventions are directed at the patient alone despite growing evidence for the importance of a dyadic approach.

Current eMBCT interventions solely intervene upon individual factors (e.g. patient cognitions), while evidence strongly suggests that also dyadic factors (partner responses, couple communication) perpetuate patient fatigue. Moreover, current physical activity interventions solely intervene upon patient activity and do not take advantage of the dyadic mechanisms (being active together, partner support) that can facilitate a more balanced physical activity. A more profound approach to relieve the fatigue burden is not directed at the patient alone, but also the patient's partner as this allows intervening upon the dyadic context that evidently shapes patient fatigue.

Methods

In the COMPANION project, we will extend two evidence-based patient interventions, eMBCT and AC, to the couple. Both couple interventions will make use of the processes targeted in the patient interventions and, additionally, intervene upon the dyadic context. That is, targeting the dyadic perpetuating factors of fatigue (couple eMBCT) and dyadic mechanisms to facilitate activity change (couple AC) has the potential to provide an additional treatment effect.

We will start with a needs assessment to explore how and to what extent patients want their partners to be involved in their CCRF care, and partners want to be involved in the patient's care for CCRF. To assure the couple interventions' feasibility in terms of usability and engagement for both couple members, we will co-create these interventions with couples, MBCT- and systemic therapists, physiotherapists, and service providers.

In a preference trial we will assess the feasibility, potential effectiveness and potential working mechanisms of the couple eMBCT and couple AC. Couples with a preference are assigned accordingly, otherwise they are randomized to eMBCT or AC.

Findings

We expect to develop a needs-based, usable and engaging couple eMBCT and couple AC targeting CCRF. Furthermore, the pilot preference trial will provide insight into the couple interventions' (1) feasibility in terms of recruitment rate, intervention preferences, adherence to the protocol and acceptability to patients, partners and (physio-)therapists, (2) potential effectiveness (including patients fatigue, patient and partner wellbeing and relationship satisfaction) and (3) potential working mechanisms (e.g. sleep quality, catastrophizing) for reducing patient fatigue.

Discussion

Given that a healthy relationship is an important coping resource for cancer patients and their partners, by developing a couple eMBCT and couple AC we can help the couple cope with fatigue in a manner that is adaptive for patients' fatigue and both couple members' emotional wellbeing, in addition to optimizing effectiveness.

2.3 First Results of an ESM-App to Personalize Treatment for Chronic Cancer-Related Fatigue using Network Analysis.

Rosalie van Woezik, Tom Bootsma, Melanie Schellekens and Marije van der Lee

Background

Chronic Cancer-Related Fatigue (CCRF) can have a negative effect on quality of life and can lead to impairments in patients' daily functioning. Previous research has shown that patients differ in their experience of CCRF (Bootsma, Schellekens, van Woezik, van der Lee, & Slatman, 2019). For example, one patient was disturbed by unexpected waves of fatigue during the day, whilst another person experienced severe fatigue constantly throughout the whole day. Moreover, CCRF influences different aspects of patients' lives, from the way they see themselves to their social life.

Both physical activity interventions and psychosocial interventions have shown to be effective in reducing fatigue. However, it is unclear which therapy works best for which patient. Since patients experience CCRF differently, it is important to take a personalized approach. One method to personalize treatment for CCRF is by applying the network analysis (Borsboom & Cramer, 2013). The network approach views a disorder as a network of symptoms that can influence, strengthen, and sustain one another instead of being loose components. For example, one patient can experience waves of fatigue, withholding him/her from planning social activities, resulting in a depressed mood, increasing the fatigue even further. By mapping the individual's specific symptoms and relationships between these symptoms, we can study what factors contribute to CCRF and what factors are helpful in coping with CCRF. By using an experience sampling app, which measures thoughts, feelings and behaviors throughout the day, we can model these individual networks. This information can help patients and therapists to discuss what treatment is most suitable for the patient. We will test whether the app is considered helpful by patients and therapists and whether it contributes to a more personalized treatment of CCRF.

Methods

Based on extensive network analysis and qualitative research we developed an Experienced Sampling Method (ESM) app in which patients' experiences with CCRF were comprehensively measured. Patients register their fatigue, thoughts, feelings, and behaviors 5 times a day for 21 days (n=5) using Ethica software (www.ethicadata.com). This allows us to model individual contemporaneous and dynamic networks of CCRF. Patients will receive descriptive feedback of the app's results. Moreover, a therapist will present the personal network to the patient during the intake meeting. Patients will be interviewed about their experiences with the app and the feedback reports. Therapists will also be interviewed on whether the app helps them to personalize the patient's treatment.

Findings

The first individual networks will be presented in this presentation along with the clinical implications of these networks.

Discussion

The aim of this study is to gain more insight into whether feedback regarding individual networks of CCRF can contribute to more personalized and effective psychological care for CCRF. We will discuss potential benefit and disadvantages of the ESM-app.

Workshops

Serious games for professional skills: an escape room for exploring the possibilities of eMental Health

Joyce Bierbooms, Milou Feijt, Wijnand Ijsselsteijn, Meddy Weijmans, Wouter Sluis-Thiescheffer and Inge Bongers

Background

Despite a growing body of evidence in support of the benefits of eMental Health (EMH), its actual use among mental healthcare professionals remains relatively low. Reviews on this topic found that the adoption by professionals is negatively influenced by limitations in their skills, abilities, and experiences with EMH. To overcome these limitations, a possible approach is to apply gaming techniques in training skills and abilities. Gaming techniques are a powerful means to provide hands-on experiences in a safe and social environment, and increase engagement in skill enhancement. This supports professionals in exploring EMH in a meaningful setting which would be difficult and potentially problematic in genuine therapeutic settings.

In our project we aim to design a game-based environment for mental health care professionals, anticipating required EMH skills in modern therapeutic settings. Extensive research into the context and needs of mental healthcare professionals informed the design of an escape room scenario. An escape room is a game in which participants find themselves in a story line and have to solve puzzles within a limited amount of time. An escape room scenario offers the possibility to design story lines that reflect the real therapeutic settings of mental healthcare professionals.

Goals

In the workshop we aim to present the developed escape room scenario by providing the attendants a hands-on opportunity to experience and evaluate elements of the escape room scenario. Having this possibility to really ‘play’ parts of the escape room makes this workshop very interactive and increases participants’ awareness of the possibilities of EMH. In addition, it introduces them to using an escape room as a new concept for skill enhancement.

Content and (interactive) activities

In the workshop we will first introduce our escape room scenario and underlying rationale for the design choices. Following this, we will have an interactive part where the attendants have the opportunity to work in small groups to work on a number of escape room puzzles. We will end the workshop with a short reflection on the experiences and a discussion on the applicability of an escape room for the purpose of exploring and experiencing EMH.

Due to the content of the escape room puzzles, this will be a Dutch only session.

Expertise of workshop leader(s)

The workshop will be led by Joyce Bierbooms and Milou Feijt. Joyce Bierbooms is a senior researcher at Tilburg University, currently leading a postdoc research into the possibilities of serious games to enhance mental healthcare professionals’ skills in using EMH. Milou Feijt is a PhD student at TU/e and has done extensive research into the adoption of EMH among mental healthcare professionals. She is currently focusing on the development of a measurement instrument to assess professionals' adoption of EMH, and the exploration of novel technologies to support empathic interactions in EMH.

Co-designing technology with health care professionals: yet another task on their plate?

Anita Cremers and Rosa de Vries

Background

Health care professionals have extremely busy work schedules. Unfortunately, they need to spend a lot of their time on administrative tasks, whereas they would like to devote it to helping patients, which is what they were trained for in the first place. Properly designed technology could help to lessen the burden of administration and provide more quality time with patients. In the project COUNT (Communication and Operation on the Unit Between Nurses and Technology), we are working on developing this type of technology for hospital nurses. To make sure we are developing technology that is really helpful to and usable by nurses, we involve them in co-design activities. This is a challenge in itself, similar to the reason why the project was started: nurses have very little time, and it is hard to plan activities since chances of something unexpected coming up are high. Because nurses are so engrossed in their daily activities, it is difficult for them to take some distance to think about innovations, and moreover, technology is generally not of particular interest to them.

In COUNT, we have developed and applied a number of techniques to involve nurses in co-design and to stimulate them to think of possible technological innovations in their daily work. Although the techniques were primarily targeted at hospital nurses, lessons learned apply to a much wider target group of health care professionals.

Goals

In the workshop, we intend to share our experiences and insights on involving health care professionals in co-design processes. We invite the audience to discuss these findings and to share their own experiences with co-designing in a health care context, and apply these in a small exercise in which we develop a new technique targeted at a specific type of health care professional.

Content and (interactive) activities

We first present some of the techniques we have developed for co-designing with nurses in a hospital context. We then share our experiences, insights, do's and don'ts with respect to applying these methods. We invite the audience to discuss our findings and to share their own experiences with co-designing in health care. On the basis of the combined experiences we carry out an exercise in small groups to develop a new technique for involving specific types of health care professionals (described in personas) in a specific case of developing technology. We end the workshop by sharing the techniques and considerations made with the other groups.

Expertise of workshop leader(s)

Anita Cremers is professor (lector) Multimodal Use Interface Design at the Research group Co-Design of Utrecht University of Applied Sciences and senior researcher at TNO, The Netherlands. Rosa de Vries is researcher and designer at the Research group Co-Design of Utrecht University of Applied Sciences. They are both working in the (Dutch SIA RAAK Publiek project COUNT (Communication and Operation on the Unit Between Nurses and Technology)), in which they are co-designing technology that supports nurses in their daily work to reduce time spent on administration and enhance time spent with patients.

Exploring the Possibility of AI Paternalism in Health Apps

Michael Kühler and Katja Stoppenbrink

Background

Health apps are supposed to promote their users' health by tracking health related data and assist in possible diagnosis and/or by influencing their users to act in a healthier way, for instance by way of nudging or gamification. Concerning this latter potential, such health apps may thus be considered persuasive technologies, which raises concerns about how they may affect their users' autonomy. On the one hand, it is argued that such health apps in fact promote their users' autonomy because they enable them to pursue their (authentic and autonomously chosen) goals in a better way. On the other hand, it is argued that such apps rather diminish autonomy in that the users are infantilized and unduly manipulated. However, both positions at least agree on the fact that such apps do have an influence on their users' decision-making and behavior and thus affect users' autonomy. Moreover, it can safely be assumed that the apps are not actors themselves, since they do not act autonomously—however weakly defined. In contrast, consider health apps which include AI technology and are capable of

1. analyzing their users' behavior in light of the individual user's health related data as well as data gathered from other users and more general health related data,
2. drawing conclusions as to which behavior would benefit the individual user in terms of health, and
3. influence the individual user's behavior accordingly, for example again by way of making "nudging" suggestions on what to do or by means of gamification.

Arguably, such AI based health apps may now be considered a sufficiently autonomous actor when it comes to influencing the users' behavior for their own good. If so, it seems that AI based health apps gain a paternalistic potential, which needs to be analyzed and critically addressed in more detail.

Goals

The workshop is intended to do just that and aims at an interdisciplinary discussion about the possibility and potential of AI paternalism in health apps. Leading questions are:

1. How plausible is the idea and concept of AI paternalism in health apps to begin with?
2. How feasible would such an AI paternalism be from an engineering point of view?
3. Assuming it being sufficiently plausible and technically feasible, how would the actual influence
4. of such AI based health apps on users' autonomy look like in more detail in order to be considered
5. paternalistic?
6. Finally, following the above, what kind of ethical conclusions should be drawn concerning the
7. legitimacy of AI based health apps' paternalistic potential?

Content and (interactive) activities

In order to facilitate a maximum amount of interdisciplinary interaction, the workshop will feature only very brief pitches on the above listed questions (no more than 15 minutes total), before engaging in a plenary discussion with the audience. Depending on the number of people present, this may be conducted as a plenary discussion right after the pitches or feature a number of discussions in smaller groups (about 15 minutes), each joined by one of the principal participants, before finally engaging in a plenary discussion on each group's results.

Expertise of workshop leader(s)

Katja Stoppenbrink and Michael Kühler have collaborated on topics in ethics for years, in particular on the topic of paternalism. Most recently, they organized a panel on paternalism at the Tagung für Praktische Philosophie in Salzburg 2019, Katja Stoppenbrink presented a paper at the workshop "For One's Own Good? The Concept and Ethics of Paternalism" in Belgrade 2019, co-organized by Michael Kühler. Currently, they are working on an international and interdisciplinary project proposal on the topic of "AI paternalism." The proposed workshop is part of this ongoing work.

The Shared Decision Support Table

Harry van de Wiel, Roelof Kammenga and Jan Wouda

Rationale

Shared Decision Making (SDM) takes place in various contexts of healthcare, such as:

- patient-physician consultations;
- (multidisciplinary) team discussions;
- board meetings.

In SDM it is important to keep track of all arguments from different perspectives. Especially when the problem is complex, the interests are divers and multiple stakeholders are involved, underlying interests are often not fully clarified with suboptimal decision making as a result.

Shared Decision Support Table

The Shared Decision Support Table (SDST) helps to clarify and elaborate decision arguments from different perspectives by:

- visualizing arguments and their underlying interests;
- manipulating and categorising arguments as physical objects;
- organizing the pro's and con's of a stand or choice.

The SDST consists of a touch screen with specialized software. The SDST is available in different sizes to accommodate the context and purpose of the SDM.

A facilitator:

- prepares the SDM session with the available software;
- instructs participants about the SDST;
- guides the session by eliciting input, encouraging participants, structuring discussions and summarizing results.

A manual and a training program for facilitators is available for the implementation of the SDST.

Learning objectives

- experience the added value of the SDST in shared decision making;
- know the potential of the SDST in various healthcare domains;
- make a considered decision about the SDST application.

Teaching methods

After a plenary introduction six participants practice with the SDST in a simulated healthcare setting. The other participants can follow the SDM process on a large screen. They are subsequently invited to work with the SDST in a second session. Finally, the potential, limitations and application of the SDST in participants' working environment, are discussed.

Evaluation

A digital evaluation inventorising participants' ideas, considerations and intentions to use the SDST.

Teaching methods

10 min.: Plenary introduction about the SDST application and use

25 min.: Six participants are invited to work with the SDST themselves in a simulated healthcare setting. We developed several SDM settings from which we can choose the setting that appeals most. The entire SDM process is shown on a large vertical screen to the other participants.

25 min.: The other participants are subsequently invited to work with the SDST in a second session .

20 min.: Discussion: participants are invited to put forward their ideas and considerations about the application of the SDST in their own working environment In this discussion the potential and limitations of the SDST, based on our own experiences with the tool in healthcare settings and in medical education, are also addressed.

10 min.: Evaluation: by using a digital evaluation form comparable to Kahout, we will inventorise participants' knowledge, ideas, considerations and intentions to use the SDST.

Posters

The use of outcome data for shared decision making in breast cancer follow-up - the SHOUT-BC study protocol

Jet Ankersmid, Constance Drossaert, Luc Strobbe, Cornelia van Uden - Kraan and Sabine Siesling

Background

In the Netherlands, about 15.000 new cases of breast cancer are diagnosed yearly. Treatment for breast cancer is highly personalized. In contrast, follow-up is equal for each curatively treated breast cancer patient based on a standard guideline: an annual mammogram and physical examination for five years following treatment. This one-size fits all approach is under debate as about half of the patients detect recurrence themselves and the risks for locoregional recurrence (LRR) and second primary (SP) breast cancers are not equal for everybody. Moreover, patient preferences are not taken into account. Personal risks for LRR and SP can be used to guide informed decision making regarding personalized follow-up (e.g. by using them in a patient decision aid (PtDA)). In our SHOUT-BC study, we aim to assess the effects of Shared Decision Making (SDM) supported by outcome date on perceived and observed SDM, satisfaction about care and utilisation and outcomes of care; alongside its implementation in daily clinical practice.

Methods

A PtDA was developed in several co-creative sessions with key stakeholders (patients and healthcare providers (HCPs) and SDM experts) with input of qualitative needs assessment studies among patients (n=21) and HCPs (n=21). Moreover, the PtDA incorporates the outcomes (LRR and SP risk) based on the INFLUENCE-nomogram: a tool to calculate personal risks for LRR and SP, developed based on a large set of outcome data from the Netherlands Cancer Registry (https://www.evidencio.com/models/show/721). The PtDA consists of three parts: a handout sheet, an online PtDA (to go through at home), and a summary sheet (an overview of the patient's preferences and considerations as a base for final decision-making). To support implementation, HCPs in the participating hospitals will receive a training concerning outcome-based SDM regarding breast cancer follow-up, specifically using the developed PtDA.
The effects of outcome-based SDM are assessed using a Multiple Interrupted Time Series (mITS) design, in which 630 breast cancer patients will be included into two conditions (before or after implementation of the PtDA) in seven top clinical hospitals over a period of 20 months. Data is collected at three timepoints using questionnaires: after the consultation in which the decision for the organisation of follow-up care is made and after 6 and 12 months. In addition, 230 consultations between HCPs and patients facing the decision about the organization of follow-up care are audio-recorded and analysed. Additional data (e.g., data on health care utilization), is collected from patients' medical records. Primary outcomes of the study are reported and observed SDM. Secondary outcomes include decisional conflict and regret, fear of recurrence, risk perception, disease perception, and quality of life. Separate Interrupted Time Series (ITS) analysis using segmented regression will be performed to analyse the mITS data per hospital.

Results

In this presentation, the developed outcome-based PtDA will be demonstrated and the study protocol will be presented.

Conclusion

This project will increase insights into the feasibility and value of transparency of outcomes relevant to patients and identify best practices on disclosing and using these outcomes for SDM, specifically concerning breast cancer follow-up.

Patient and stakeholder co-creation: design of an eHealth intervention to support long-term behavior change and weight loss maintenance

Rikke Aune Asbjornsen, Jobke Wentzel, Mirjam Smedsrød, Marianne Olliver, Jøran Hjelmesæth, Lisette van Gemert-Pijnen and Lise Solberg Nes

Background

Long term behavior change and maintaining weight after weight loss is hard. Research examining motivational and persuasive design elements to meet end-user needs, has the potential to identify which ingredients to incorporate in the design of innovative eHealth solutions supporting sustainable behavior change. The aim of this study was to identify design elements that motivate and support patients in maintaining weight after weight loss.

Methods

Service design tools and - methods were applied to elicit user needs and engage end-users and stakeholders in the early design process. Two focus groups with patients (n=10) and one focus-group with health care providers specialized in obesity (n=6) (i.e., medical doctor, health psychologist, physical therapist, clinical nutritionist) were conducted. Focus groups participants were asked to identify elements that can meet end-user needs to maintain weight, through an open card sorting task, by means of specially developed cards with motivational and persuasive design features (e.g. rewards, goal-setting, feedback) based on earlier research findings (1).

Findings

The study revealed 11 design elements identified by both prospective end-users and other stakeholders as essential in supporting weight maintenance after weight loss, in order to stimulate motivation and engagement. Tailoring and personalization of the eHealth technology were key design features highlighted by the participants. Stakeholders' perspectives indicated how these design principles should be combined with other identified design elements and be concretized to meet user needs (e.g. tailored feedback and suggestions based on personalized goals, action and coping planning, and rewards).

Discussion

This study shows how creative service design methods and co-creation with users and other stakeholders, can provide valuable input in the design of products and services, including digital technologies, to meet end-user needs. The findings can contribute to the development of novel solutions that may support long-term behavior change and weight loss maintenance, and provide knowledge on how digital design choices were made and translated into low and high fidelity prototypes.

Perceived acceptability of persuasive features in mHealth interventions: Does stage of change matter?

Kimberly Bakker, Christian Wrede and Pelin Gül

Background

Through the past years research has increasingly focused on promoting health behaviour through persuasive eHealth interventions delivered through mobile applications. A large part of applications apply a one-size-fits-all approach, which does not include tailoring the application to users' individual differences. As tailoring can have a positive impact on sustaining user interest and adherence to the intervention, tailoring is of great importance for long-term behaviour change. The aim of this research was to explore the relationship between stages of change, according to the transtheoretical model, and the perceived acceptability of commonly employed persuasive mHealth intervention features aimed at promoting healthy eating. In this study five stages were taken into account (precontemplation [PC], contemplation [C], preparation [P], action [A], maintenance [M]), which according to the model individuals need to go through in order to reach a sustainable behaviour change.

Methods

Data were collected through a cross-sectional online survey among 178 participants using storyboards depicting eight different persuasive features, the URICA-E2 measuring stage of change, and questions with respect to how acceptable participants perceived the depicted persuasive features.

Findings

The results of Pearson Correlation analyses showed that the stages PC and P were significantly positively correlated with at least one persuasive feature. C was significantly positively correlated with all eight persuasive features. The last stage M showed several significant negative correlations with the persuasive features.

Discussion

The results suggest that people who are actively thinking about eating healthy and intend to eat healthy in the next six months (C) perceive the different persuasive features as acceptable. People who have already been eating healthy for at least six months (M) do not perceive most of the persuasive strategies as acceptable. The findings from this study indicate that persuasive mHealth interventions promoting healthy eating may better accommodate the needs of diverse users by considering their individual stage of change, thereby highlighting the importance of creating individualized intervention sequences.

An Ambulatory Health Behavior Model from Self-Reported and Physiological Data in Type 2 Diabetes Mellitus Patients

Carlijn Braem, Utku Yavuz and Peter Veltink

Background

Comorbidities in Type 2 Diabetes Mellitus (T2DM) patient decrease the quality of life. With proper self-management and a healthy lifestyle, both comorbidities and quality of life can be improved. To achieve a proper self-management and a healthy lifestyle personal coaching is essential but is a heavy burden on the healthcare system. To limit the burden, an intelligent artificial personal coach (e-coach) is needed. Ambulatory mapping of health behavior and lifestyle will lead to personalized behavior e-coaching. The aim is to extract physical activity, sleep health, glycemic control and eating behaviors features from self-reported and physiological data to model human health behavior.

Methods

Data is used from the DIAbetes and LifEstyle Cohort Twente-2 (DIALECT-2), an observational cohort performed at the local hospital (ZGT Hospital, Almelo and Hengelo, The Netherlands)[2,3]. Patients were monitored ambulatory for two weeks. This included reporting diet in a food-dairy, wearing a step-count and heart rate device (Fitbit Charge, Fitbit Inc., San Francisco, CA, USA) and measuring interstitial glucose levels with flash glucose monitoring (Freestyle Libre, Abbott Diabetes Care, Alameda, CA, USA). The physiological data, step count, heart rate and glucose concentration, were analyzed in Python programming language (Python Software Foundation, https://www.python.org/). First data was pre-processed by cleaning physiological data. This involved detecting discontinuities in the data and replacing empty values. Hereafter small all data loss gaps (1 to 5 consecutive data samples) were interpolated with spline interpolation. Finally, data imputation was used to fill medium sized gaps (5 to 20 consecutive data samples). Offline change point estimation from the ruptures package was used to detect the sleep-wake cycle from the FitBit steps and heart rate data.

Findings

In total, data from 74 T2DM patients from the DIALECT-2 were used in the analysis. The health behavior parameters including: 1) physical activity and fitness parameters from daily sedentary hours, hours of moderate to vigorous activity and resting heart rate data, 2) sleep health from daily hours of sleep and number of wake-ups during the night data, 3) glycemic control from time in and of out of glycemic range variables, 4) macronutrients from the self-reported food-dairy will be computed.

Discussion

Features related to physical activity, sleep health, glycemic control and eating behaviors are combined to make an ambulatory health behavior model. Future work includes adding chronic stress and emotional behavior to health behavior model.

Affect fluctuations when tapering antidepressants in pregnancy: an experience sampling methodology study

Huibert Burger, Marlies Brouwer, Nina Molenaar, Alishia Williams, Casper Albers, Mijke Lambregtse van den Berg and Claudi Bockting

Background

Fluctuations of affect have been linked to an increased risk of recurrence of depression. During pregnancy affect fluctuations, and depression have been linked to various adverse effects in the offspring, including low birth weight. We sought to exploratively compare positive and negative affect fluctuations in pregnant women receiving Preventive Cognitive Therapy (PCT) while tapering antidepressant medication (ADM) to pregnant women continuing ADM, and to investigate if affect fluctuations in early pregnancy were related to prenatal depressive symptoms (36 weeks of gestation) and to birth weight.

Methods

We used data from a Dutch randomized controlled trial (RCT) and a prospective observational cohort of women using ADM at the start of pregnancy. Experience sampling methodology (ESM) was used during the first eight weeks of participation to assess fluctuations of positive and negative affect. Depressive symptoms were assessed at 36 weeks pregnancy, and birth records were used to assess birth weight.

Findings

In total, 146 (44 RCT, 102 cohort) pregnant women using ADM at start of their pregnancy participated. Nineteen women participated in the ESM study, 8 tapered ADM and 11 went on to use ADM. There were no significant differences in positive and negative affect fluctuations or prenatal depressive symptoms between women receiving PCT while tapering ADM versus women continuing ADM. We found no association between affect fluctuations and prenatal depressive symptoms and birth weight.

Discussion

The findings of this explorative study provide no evidence that affect fluctuations in early pregnancy are associated with prenatal depression or birth weight. Moreover, there is no evidence that tapering antidepressants with the guidance of preventive cognitive therapy had effects on prenatal depression or affect fluctuations, nor on birth weight. Although the study had an explorative nature with a small group of women, nevertheless with a large amount of individual responses, the results of the ESM study give some indication that women receiving PCT while tapering ADM remained stable in positive and negative affect throughout pregnancy. Nevertheless, subsequent large controlled studies on tapering ADM with psychological interventions in pregnant women are highly needed.

Explaining occupational and leisure physical activity among office- and factory workers: towards persuasive eHealth solutions

Miriam Cabrita and Roos Bulthuis

Background

Current eHealth solutions promoting physical activity in daily life fail to properly address the challenges from occupational and leisure time. Recent research in the field of physical activity highlights that the relative amount of time spent in each activity intensity category (i.e. sedentary, light, moderate and vigorous) has specific implications to our health. Furthermore, the context in which physical activity takes place – for example occupational vs. leisure time – seems to influence the effects of physical activity. Although still under research, the nature of occupational activities compared to leisure activities (i.e. fixed intensity, volume, and duration) seems to explain the different effects for human health. In this sense the need to recognize the motivators and barriers to engage in physical activity during work and non-working hours becomes clear. This will help to design tailored persuasive eHealth strategies to promote physical activity during occupational and leisure time.

The objective of this study is to investigate the motivational profile of factory and office workers in relation to their physical activity profile. Based on literature four profiles of physical activity can be expected: (1) moderate occupational and leisure activity; (2) high occupational and leisure activity; (3) high occupational and low leisure activity; (4) low occupational and leisure activity. Furthermore, we will investigate which are the most relevant facilitators and barriers for physical activity at work and during leisure time in each one of the physical activity profiles.

Methods

Twenty office workers and twenty labor manual workers will be included in the study. At intake, each participant will answer an adapted version of the Sports Motivation Scale (SMS-II) to identify the motivational profile. Next to it, physical activity will be monitored 24/7 during a period of 2 weeks using the MOX2 sensor from Maastricht Instruments. No feedback on physical activity will be provided during the measurement period. At the end of the two weeks study, participants will be asked to fill in a questionnaire on facilitators and barriers for physical activity divided into 4 categories: physical, psychological, work- and home-environment. The study will be performed in collaboration with Pro-Corpus, an occupational healthcare center in the region focused on well-being at work.

Findings

We hypothesize that office workers who are physically active after work are more intrinsically motivated, while those who are active during working hours are more extrinsically motivated. In terms of factory workers, we hypothesize that those active outside working hours are at least intrinsically or extrinsically motivated. Finally, we hypothesize that workers who are not active outside working hours fit an amotivation profile. The study will be conducted in the Spring 2020.

Discussion

To be confirmed, the results of this study will be used in personalization of eHealth interventions to promote physical activity during occupational and leisure time. This study will be performed in the context of the H2020 SmartWork and Bionic projects, which look at how technology can support workability of older workers, in the case of office and factory workers, respectively.

Implementation of e-mental health interventions for informal caregivers: a systematic review

Chelsea Coumoundouros, Erika Mårtensson, Giulia Ferraris, Louise Von Essen, Robbert Sanderman and Joanne Woodford

Background

Informal caregivers of people with chronic health conditions can experience anxiety, distress, depression, and other mental health difficulties as a result of their caregiving role. E-mental health interventions present a way to provide effective and accessible mental health support to informal caregivers, however implementation of e-mental health interventions can be challenging. A systematic review was conducted to (1) examine implementation barriers and facilitators, and (2) identify implementation and intervention features associated with intervention effectiveness, to inform the design and implementation of e-mental health interventions for informal caregivers of adults with chronic diseases.

Methods

Studies published since 2007 were searched for in six electronic databases, clinical trial registries and OpenGrey. Eligible studies reported on the implementation and/or effectiveness of e-mental health interventions for informal caregivers of adults with chronic diseases. Studies reporting on implementation, defined as including any aspect of the Consolidated Framework for Implementation Research or the implementation outcome framework (Proctor et al, 2011), will be included in a thematic synthesis. Qualitative and quantitative data related to implementation will be integrated into the thematic synthesis to identify barriers and facilitators to implementation. Pragmatic randomized controlled trials reporting on intervention effectiveness will be included in a qualitative comparative analysis to determine conditions related to: (1) an intervention’s implementation (e.g. provision of training to therapists) or (2) intervention characteristics (e.g. mobile app), sufficient for an intervention to be effective.

Findings

Electronic database searches yielded 9248 unique records to undergo title/abstract screening. The literature screening process is currently underway to identify full-texts eligible for inclusion in the analysis. Preliminary findings will be presented at the conference. Descriptive characteristics of included studies, such as county of origin, informal caregiver characteristics and intervention features (e.g. delivery method, content) will be reported to describe the scope of the review. Initial themes identified in the thematic synthesis, representing barriers and facilitators to implementation, will be presented alongside a discussion of how to translate these findings into practice. Identified themes will also be discussed in the context of initial results from the qualitative comparative analysis, as conditions important for intervention effectiveness may relate to implementation facilitators and barriers. If a qualitative comparative analysis cannot be completed prior to the conference, pragmatic trials reporting on intervention effectiveness will be descriptively summarized and further analysis plans discussed.

Discussion

Implementation planning is essential to successful integration of e-mental health interventions into existing healthcare systems. By connecting identified barriers and facilitators to implementation with implementation and intervention features important for effectiveness, this review aims to identify key factors to consider during implementation planning, and present potential solutions to overcome identified implementation barriers.

Considering different groups of informal caregivers in designing digital eHealth interventions

Srishti Dang, Anne Looijmans, Giovanni Lamura and Mariet Hagedoorn

Background

Although informal caregivers (ICGs) express that they provide care out of love, they also experience caregiving burden. Recognizing the damaging effects of caregiving burden on ICGs, supportive eHealth interventions are being developed. One of the issues in designing technology-based interventions for ICGs is that different ICGs may have different needs and expectations concerning the design features of the technology-based interventions, such as the content presented in the tool (relevance) or the ease of use of the technology (usability). For example, ICGs taking care of their spouse may have different needs with respect to the content from those taking care of their parents; or male and female ICGs, or for those taking care of patients in the early stage of illness and those taking care in the palliative stage have different needs with respect to the usability of an eHealth intervention.

Methods

In the current study, we conduct a systematic review to explore the content needs of different groups of ICGs (based on relationship, gender or stages of patient's illness) have. A structured search of PubMed, CINAHL, and PsycINFO databases was done to identify the relevant studies. A narrative synthesis method will be used to extract and analyze the data. The findings from this systematic review will be used in the subsequent usability study, where we aim to evaluate an eHealth prototype. We will perform this usability study among different ICG groups using an eHealth tool prototype through a think-aloud method to explore whether different groups report different needs with respect to the content and usability of the eHealth tool.

Findings

A preliminary search resulted in 5504 articles. After the removal of duplicates and inclusion of articles from the year 2010 – 2019, we were left with 2166 articles. Screening 2166 abstracts and titles against the eligibility criteria were done independently by two reviewers. Currently, screening the full text of the included articles.

Discussion

The findings will help in tailoring the eHealth interventions according to the needs of different groups of ICGs.

Monitoring menopause: Use of and need for self-tracking health technologies in menopause

Teddy Eliëns, Marieke Hendriks, Marjolein De Boer, Nadine Bol, Jenny Slatman and Emiel Krahmer

Background

Over the last decade, self-tracking health technologies have become increasingly popular. A number of self-tracking apps offer options geared towards women and their health, and especially towards monitoring their bodily changes. As menopause involves a plethora of possible bodily changes – e.g., the cessation of menstruation, hot flashes, a dry(er) vagina, high blood pressure, or insomnia – , there is a broad spectrum of potential apps that menopausal women may use to track these changes. Despite the potential for technology in supporting menopausal women, we currently lack knowledge about these women's use of and needs for self-tracking apps.

Methods

To identify what kind of self-tracking apps women use, whether they use them for menopause, and what their self-tracking needs are, an online survey was developed. Through online posts and snowball sampling, we recruited menopausal women to fill out the online survey. Respondents (N = 203) were on average 53 years old (M = 52.82, SD = 4.15, range 42-66). The survey consisted of questions regarding women's current health app use, their need for apps regarding menopause, and perceived availability of apps for menopause. Current health app use was measured by asking the number of health apps women had installed on their smart device(s), the names of these apps (max. 10), and for which menopausal symptoms they used these apps. Furthermore, we assessed their need for and perceived availability of apps for menopause with two questions on a 7-point Likert scale.

Findings

Our preliminary findings indicate that out of the 203 respondents in the study, 125 women indicated to have mobile health apps (61.6%). On average, women reported to have about 3 health apps – such as pedometers, calorie counters, and period trackers – installed on their mobile device(s) (M = 2.81, SD = 2.62, range 1-20), of which 84.6% were actually used. Furthermore, 56.4% of the wide variety of health apps that women reported were used for menopausal symptoms, such as weight gain (11.6%), mood swings (6.1%), and fatigue (5.9%). Women who use health apps reported a higher need for apps specifically for menopause (M = 2.93, SD = 2.10) than those who do not use such apps (M = 2.01, SD = 1.65), t(188.49) = 3.44, p = .001); however, this need is still relatively low. Moreover, women who used health apps felt there was a lack of availability of health apps for menopause (M = 3.86, SD = 1.75) compared to those who do not use health apps (M = 4.58, SD = 1.59), t(194) = -2.87, p = .005.

Discussion

Our study shows initial support that many menopausal women are using mobile apps for their health, and also to some extent for monitoring menopausal symptoms. Interestingly, while women reported a relatively low need for menopause apps, they also generally felt that there was a lack of availability of such apps. Our poster will further outline women's formulated needs for menopause apps and the role technology could play in supporting those needs. Such insights are valuable in developing health interventions for menopause.

eHealth implementation from the perspective of a healthcare organization

Ina Flierman

Background

In Roessingh technology plays an important role. Since many years Roessingh joins Roessingh Research and Development in several research en development projects concerning eHealth. The last years the focus in Roessingh lies not so much on developing a technology or content for eHealth, but more on how to integrate the use of eHealth and technology in daily processes and structures of the organization. Doing so Roessingh has extensive knowledge and experiences in implementing eHealth in daily care.

Methods

Roessingh makes use of the Telerevalidatie.nl portal, through which patients can perform parts of their treatment program at home. Also Roessingh established the Novalab, a central place were new technologies find their way to being used in daily care. Parts of research and development take place in the Novalab and Novalab is a window to show our application options. Two working groups, containing mostly therapists, are working on creating awareness and knowledge of several implementation options in daily care processes involving their teams en colleagues. Also Roessingh is involved in creating a network in Twente for exchanging experiences and helping colleagues outside our organization.

Findings

Implementing eHealth it is very important to connect several aspects to one another and also around the patient, eg financial aspects, IT, carepaths, science, rules and laws, etc. We need to connect and find common ways to what lies ahead. In a way it is all about making connections between people who unfortunately speak different languages (technical, scientific, medical, ethical, etc). These connections need to be made inside an organization but also to the outside world. Therefore Roessingh focusses on creating a network in the region and talk to other parties in the same business, but also anyone who deals with the same issues. We have to learn from other parties and mistakes of others. Making mistakes is part of innovation, so let us not be scared of that. We find it helpful to use publicity. But also to let students investigate and show the use of the portal or technologies in the Novalab and to let patients tell their findings from their perspective. We know that implementation takes time and that careprofessionals need time to change their way of work. We say: just do it! Learn by doing.

Discussion

So, what is needed? What can help implementing eHealth / technology? Why are expectations skyhigh, but true implementation is still scarce? What have we learned and how can we keep learning?

Healthy Loads & Happy LEDs - An interactive dining table to capture social eating behavior

Juliet Albertina Maria Haarman and Roelof Anne Jelle de Vries

Eating is more than the consumption of food. Eating is often a social activity. We sit together with friends, family, colleagues and fellow students, to connect, share and celebrate aspects of life. Sticking to a personal diet plan can be challenging in these situations. The social uncomfortableness that is associated with having a different diet than the rest of the group greatly contributes to this. Additionally, it is well known that we unconsciously influence each other while we eat. Not just in the type of food that we choose, but also the quantity of the food that we consume, and even the speed with which we consume the food is affected by our eating partners.

The interactive dining table is created to open up the concept of healthy eating in a social context: where individual table members feel supported in their individual diet plans, yet still experience a positive group setting. The table is embedded with 199 load cells and 8358 LEDs, located below the tabletop surface. The table can use artificial intelligence to detect weight shifts over the course of a meal, identify individual bite sizes and classify interactions between table members and food items. Simultaneously, the LEDs can be used to provide real-time feedback about eating behavior, give perspective regarding food choices, or alter the ambience of the dining experience as a whole. Light interactions can change over time and between settings, depending on the composition of the table members or the type of meal that is consumed.

How to conduct a summative evaluation of eHealth applications: the Council of Coaches case study

Marian Hurmuz, Stephanie Jansen-Kosterink and Harm Op den Akker

Background

eHealth can play a major role in bridging the gap between care supply and demand. For successful implementation of an eHealth application, it is important to evaluate the application iteratively at each development stage (formative evaluations), and when there is a mature technology, the eHealth application has to be evaluated in a real-world setting (summative evaluation). The objective of this presentation is to present a method to conduct a summative eHealth evaluation.

Methods

As a case study, we present Council of Coaches. Council of Coaches is a web application in which users can have virtual conversations with a group (council) of virtual coaches. These coaches give information and feedback on healthy lifestyle primarily in the areas of physical activity and nutrition. Given the maturity of the technology, the aim of the Council of Coaches evaluation is to assess the use, user experience, and potential health effects. In this method, use will be assessed by the log data of the eHealth application, and user experience and potential health effects will be assessed by questionnaires. Volunteers from the target population will participate in an observational cohort study with a pre- and post-test design. The evaluation consists of two phases: implementation phase (use of the eHealth application that will be evaluated) and follow-up phase (facultative use of the eHealth application). Participants will complete multiple questionnaires: before the implementation phase, after the implementation phase and, after the follow-up phase. According to the Dutch Medical Research Involving Human Subjects Act, this study does not require formal medical ethical approval. This has been verified by the CMO Arnhem-Nijmegen. Each participant will sign an informed consent form before the start of the study.

Findings

The Council of Coaches evaluation will be carried out in two countries, The Netherlands and Scotland, and it will consist of two rounds. The first round will start in February 2020, the second round will start in May 2020, with 25 participants in each round in each country. For the first round, 25 participants are already recruited and included. For the second round, 10 participants are already recruited. In May 2020, the preliminary results of the first 25 participants will be available. During this presentation, these preliminary results will be presented. This will consist of the effect of the chosen recruitment method, user demographics, user experience, use/drop-out, and of the preliminary results on potential health effect.

Discussion

This summative evaluation will give us a broad overview of the use, user experience and effectiveness of an eHealth application in a real-world setting. This method also could guide other researchers engaged in eHealth evaluations and help them in preparing a summative eHealth evaluation, with a prerequisite that the eHealth application under study is mature.

The acceptance of clinical decision support systems among clinicians in the treatment of neck and/or back pain in primary and secondary care

Stephanie Jansen - Kosterink, Miriam Cabrita and Ina Flierman

Background

Clinical Decision Support Systems (CDSSs) are computerized systems using case-based reasoning to assist clinicians in making clinical decisions. Despite the proven added value to healthcare, the implementation of CDSS in daily clinical practice is scarce. Particularly, little is known about the acceptance of CDSS among clinicians. Therefore the aim of this study is to inform the audience about the factors involved in the acceptance of CDSSs among primary and secondary clinicians in the treatment of Neck and/or Low Back Pain (NLBP).

Methods

To assess the acceptance of CDSSs among clinicians we conducted a mixed method analysis of questionnaires and focus groups. An online questionnaire was sent to Dutch General Practitioners and physical therapists aimed to identify the factors influencing the acceptance of CDSSs in primary care (intention to use, perceived threat to professional autonomy, trusting believes and perceived usefulness). Next to this, two focus groups were conducted with clinicians in secondary care addressing the general attituded towards CDSSs, the factors determining the level of acceptance, and the conditions to facilitate use of CDSSs.

Findings

A pilot-study of the online questionnaire is completed and the results of the large evaluation are expected spring 2020. Eight clinicians participated in two focus groups. After being introduced to various CDSSs, participants were positive about the value of CDSS in the care of NLBP. The clinicians agreed that the human touch in NLBP care must be preserved and that CDSSs must remain a supporting tool, and not a replacement of their role as professionals.

Discussion

By identifying the factors hindering the acceptance of CDSSs in the primary and secondary care settings, we can draw implications for implementation of CDSSs in the treatment of NLBP.

The impact of a virtual agent in the natural context of elderly people with dementia

Michiel de Jong and Marike Hettinga

Background

Cognitive assistive technologies have been put forward as a solution to support older adults with dementia in living independently at home for longer period of time. Although findings from past work are often focussed on design guidelines or functional requirements related to trust in and expectations of the technology, it may be less suited to evaluating the impact of technology on people's lives. We therefore assess whether and how a virtual agent influences people's home lives using acceptance and quality of life. We also explore how conventional measures focused on the perception and adoption of a virtual agent relate to its use and its user's quality of life.

With our project "Living well with Anne" we aim to develop a virtual agent, called Anne, which can help elderly with dementia in daily life maintaining Quality of Life (QOL). Anne is set to enable elderly with dementia longer independently by giving them an easy-to-use, natural way to interact with.

Anne is equipped with the following features:

- Agenda
- Medication reminders
- News
- Video calling

The project started in June 2017 and will end in May 2020 using a user-centered approach of which the field trial is the final study.

Methods

Anne is the result of the project researchers' past work in assisted living as well as a comprehensive participatory design approach, in which potential users (or by proxy) are involved in all stages of development. In our field trial we conducted an exploratory study using baseline and evaluation. The baseline study consisted of the MMSE (MiniMentalStateExamination), SF-12 (Short Form Health Survey), QOL-AD (Quality of Life, Alzheimer), Almere Model. In our evaluation we used QOL-AD, Almere Model, SUS (System Usability Scale), Closeness scale.

Elderly people with mild dementia were approached after approval of their formal and informal caregivers. Finally 20 participants in each country (Netherlands, Italy and Luxembourg) with either cognitive impairment or dementia were involved in a field trial for about 5 weeks. Furthermore, the tablet with the virtual agent Anne was put in the home of the participant by supervision of the informal caregivers.

Findings

Data is available at the end of February and will be analyzed in March and April. At the conference we want to present our general findings.

Effect of motivational interviewing combined with digital shoe-fitting on adherence to orthopaedic shoes: study protocol

Manon Jongebloed-Westra, Christina Bode, Erik Koffijberg, Jaap van Netten, Peter ten Klooster, Stein Exterkate and Lisette van Gemert-Pijnen

Background

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 adherence to this footwear is crucial. However, adherence to orthopaedic footwear is often low and there is a lack of insight in methods to improve this adherence. We propose a novel care approach, motivational interviewing (MI) and a digital shoe-fitting procedure to improve adherence to custom-made footwear and to be (cost-) effective. The aim of this trial is to assess the (cost-)effectiveness of a novel care procedure (MI combined with digital fitting) compared to the usual care (no MI and traditional fitting) in ulcer prevention and footwear adherence.

Methods

In a randomized controlled trial, 220 participants with diabetes mellitus, with or without previous ulcers, whom are prescribed custom-made orthopaedic shoes will be included. Participants will be randomized over the intervention or control condition. The intervention group will receive the novel care procedure, the control group will receive usual care. A temperature sensor will be built in participants' custom-made shoes to measure wearing time continuously throughout 12 months. Daily activity will be measured using logdata with a stepwatch, combined with the wearing time to calculate adherence. Clinical outcomes and complications will be registered. Patient satisfaction, medical consumption and quality of life will be measured through questionnaires and using the logdata. Differences in costs and quality of life will be determined in a formal cost-effectiveness analysis. The primary outcome is the proportion of participants who adhere to the use of their orthopaedic shoes, that is, take at least 80% of their total steps with custom footwear.

Discussion

Results will consist of sensor-based, objective and subjective assessment of adherence to the orthopaedic shoes, clinical outcomes and complications, measures of patient satisfaction and podiatrist satisfaction, incremental costs, incremental quality-adjusted life years, and (cost-)effectiveness, over a 1 year time horizon in both the intervention and control groups. As such this trial will generate insights into the socio-economic and wellbeing impact of the novel care procedure on adherence to orthopaedic shoes.

Social media use, loneliness, and well-being among older adults: the moderating role of social cohesion

Rosa Krause, Inge Knippenberg, Montserrat Prats Lopez, Denise Peels, Catherine Bolman and Lilian Lechner

Background

Loneliness and social isolation are well-known issues among older adults, often caused by age-related issues, and likely to result in reduced well-being (Cotterell, Buffel, & Phillipson, 2018; Finlay & Kobayashi, 2018; von Soest, Luhmann, Hansen, & Gerstorf, 2018). In the digital age, one solution to this problem could be social media. Social media is opted as a potential contribution in strengthening well-being and social connectedness, and decreasing loneliness among older adults (Chopik, 2016; Hashi, 2016; Khosravi, Rezvani, & Wiewiora, 2016; Leist, 2013; Lüders and Brandtzæg, 2016; Nef, Ganea, Muri, & Mosimann, 2013). However, studies into the associations between social media use, and loneliness and well-being among elderly revealed inconsistent results (Aarts, Peek, & Wouters, 2015; Bell et al., 2013;

van Ingen, Rains, & Wright, 2017; Chopik, 2016). This is why more insight is needed to gain better understanding and to possibly find options for prevention and treatment strategies. In fact, social cohesion is known to be an important determinant of well-being (Chopik, 2016) and is therefore assumed to influence the relationship between social media and loneliness and well-being.

Methods

313 randomly selected adults aged 65 years and older living in four communities from one city in the Netherlands participated in this study. No exclusion criteria were defined. Participants could either fill out the survey on paper or online. The survey contained demographic measurements, as well as social media use, loneliness, psychological well-being, and social cohesion. Hierarchical multiple regression analysis were performed using IBM SPSS version 24.0 (IBM Corp, 2016) to test the effect of the predictors on loneliness and psychological well-being. Social media use was entered at stage one, demographic factors and social cohesion were entered at stage two, and the interaction term (social media use * social cohesion) was entered at stage three.

Findings

63.1% of the participants used social media; primarily those a) with a lower age, b) married or cohabitant, and c) with an average or high level of education. Results revealed that at stage one, social media use predicts significantly overall and emotional loneliness, and psychological well-being. A marginal effect of social media use was found for social loneliness. At stage two, where demographic factors and social cohesion were added, only social media use as predictor for emotional loneliness remained significant, marginal effects of social media use were found for overall loneliness and well-being. Finally, the interaction term (stage 3) predicts significantly overall and social loneliness, and psychological well-being.

Discussion

The results indicate that the associations between social media use on the one hand and overall and social loneliness, and psychological well-being on the other hand, are moderated by social cohesion. However, causality cannot be established with the current design. Further, only social cohesion was measured in the neighborhood and not social connectedness with friends, relatives, and acquaintances. Also, the current study is limited to only one city in the Netherlands. Therefore, it is important to be cautious to generalize these results. Possible future implications would be to execute this study in other Dutch cities for validation purposes.

SEMIoTICS: SEmantic Model-driven development for IoT Interoperability of emergenCy Services – Developing IoT Early Warning Systems

Joao Moreira, Luis Ferreira Pires and Marten van Sinderen

Background

This poster describes a recent PhD research [1]. The main component of Disaster Risk Reduction (DRR) is an Early Warning System (EWS), which is a distributed information system that is able to monitor the physical world and issue warnings if abnormal situations occur. EWSs that use Internet-of-Things (IoT) technologies, so called IoT EWS, are suitable to realize (near) real-time data acquisition, risk detection and message brokering between data sources and information receivers.

Over the last years, numerous IoT EWSs were developed to monitor different types of hazards. Multi-hazard EWSs require integration of existing EWSs and seamless integration with new EWSs.

Interoperability of EWS components is necessary for effective integration, e.g., so that sensors, devices and platforms work with each other and with other EWSs.

Although IoT technologies offer possibilities to improve the EWS efficiency and effectiveness, this potential can only be exploited if interoperability challenges are addressed at all levels. Semantic interoperability refers to the ability of two or more EWSs (or EWS components) to share data elements in a prescribed format (syntax) and precise unambiguous meaning (semantics). The main problem of approaches for semantic IoT EWSs is to address together these challenges: (RQ1) Semantic integration (different standards, ontologies and data models); (RQ2) real-time processing in time- and safety-critical applications; (RQ3) data analysis for effective situation awareness and decision support.

Methods

We followed the Design Science Methodology [2]. For problem investigation, we conducted a systematic literature review (SLR) to investigate the problems of semantic interoperability of EWSs, following the SLR for software engineering methodology [3]. The problem statement is: Improve the semantic interoperability of IoT EWSs by designing the SEMIoTICS framework, which addresses the challenges (RQ1, RQ2, RQ3) in order to efficiently and effectively reduce the risks of disasters.

The SEMIoTICS framework is a “meta-system” to develop semantic interoperable IoT EWS. SEMIoTICS is grounded in the Situation Awareness theory and applies the Findable, Accessible, Interoperable and Reusable (FAIR) data principles. It consists of an architecture, technologies and guidelines based on model-driven software engineering [4], validated through single-case mechanism and statistical difference-making experiments [5]. The functional validation was performed within the H2020 INTER-IoT project for risk reduction of fatal accidents at the port of Valencia by improving health prevention and quick emergency response [6], with semantic integration of e-Health and logistics, which motivated the extension of the SAREF standard for ECG use cases [7].

Findings

The SEMIoTICS framework addresses the challenges, considering existing data representations and possible processing restrictions. SEMIoTICS adopts ontology-driven conceptual modeling while considering RDF best practices for implementation, reinforced by the FAIR principles.

We experienced that deciding whether to design a concept in the foundational or core or domain-specific layers is a challenging task. For example, in the SAREF extension for e-Health, the Time Series concept may suit better to the core ontology (SAREF) rather than the domain-specific (SAREF4health). The use of a reference ontology improved the modelling quality of SAREF4health because of its explicit semantic foundations. The reuse of standardized ontologies showed to be important because they provide the viewpoint of community perspectives (IoT, healthcare and emergency domains).

Discussion

The trade-off between ontology quality and lightweight data serialization was crucial in the design of the SAREF4health ontology due to the performance requirement regarding the impact of measurement time series in the message payload, i.e., the verbosity problem. Currently, SAREF4health is being used by the ETSI task force (STF566) that is developing the standardized extension of SAREF for e-Health and aging well (SAREF4ehaw). Independent of whether SAREF4health is fully incorporated in SAREF4ehaw, we believe that this work provides an important contribution towards a higher-quality HL7 FHIR ontology, rather than a simple RDF representation of the FHIR lexicon data model, as it is now.

The Role of national culture in the adoption of public e-health systems in Sweden

Shweta Premanandan and Pär Ågerfalk

Background

Studies show that public digital systems (for example, formal care services) fail due to underutilization by citizens, despite heavy investment, good design, usability and support. Investigating this underutilization from the perspective of national culture is essential. Hence, the aim of this study is to explore the effect of national culture on the way e-health systems are perceived and used by individuals. It is helpful for policy makers to explain the currently relatively low penetration rate of such public digital systems and formulate strategies to encourage adoption. The outcome will form the basis for further study to understand adoption of digital systems in the context of informal care. The results from this study of public e-health systems (formal care services) will be used as theoretical propositions to design a study protocol in order to understand adoption of digital systems in the context of informal care.

Methods

In-depth semi-structured interviews were conducted with eight users of public ehealth systems in Sweden. Snowball sampling was used to identify respondents. The study protocol was developed using the extended Unified Theory of Acceptance and Use of Technology (UTAUT) and Global Leadership and Organizational Behaviour Effectiveness (GLOBE) cultural dimensions. Interviews were recorded, transcribed verbatim and analyzed using thematic analysis using NVivo 12.

Findings

The themes that were analyzed were Perceived Risk, Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Performance Orientation, Power Distance, Collectivism, Uncertainty Avoidance and Assertiveness. Most of the respondents found the interface inconsistent but still used it because it was easy. Though the system was considered easy to use, the users perceived the process to accomplish a simple task as complicated.

Discussion

The study vindicates that cultural dimensions largely determine use behavior. Swedish society is characterized as being high on uncertainty avoidance and low on power distance, collectivism, performance orientation and assertiveness. Despite being high on Uncertainty Avoidance, the perception of risk associated with use was low due to an inherent trust in their government and the systems they provide like the e-health. Users, however, expected an unambiguous system equipped with help files to navigate without having to seek external help. Unlike other cultures, word of mouth was not found to be a determinant to adoption owing to the individualistic nature of the Swedish culture. These cultural dimensions provide a schema for system designers and developers to comprehend the needs of users and design accordingly. On a theoretical note, the extended UTAUT seemed to not be the best theoretical framework for this context and further work will investigate the use Social Cognitive Theory.

Vitality Navigator

Kiki Buijs-Spanjers, Ameen Abu –Hanna, Sophia de Rooij

Background

The Vitality Navigator is a well designed Health Check based on solid evidence from earlier studies, incorporating problems and unmet needs in community dwelling elderly persons. A desktop and a mobile phone version have been tested in > 1200 persons and based on these experiences currently a third, improved version is designed by Curavista bv, a Dutch eHealth company with 20 years experience in consumer health technology and supplying over 100.000 users with over 50 modules of self-assessment & self-management tools. Curavista is one of the 4 organisations who received the Med Mij quality mark. In this study we investigated the feasibility and usability of the VN as a health check and its impact regarding health seeking behaviour on the internet and on contacts with health services.
This study answers which needs community dwelling elderly persons have for using a digital health check and how it impacts their health seeking behaviour. Implementation of the results already took place.

Methods

This cohort study evaluates the first responders who completed the VitalityNavigator, an online self-assessment and self-management tool for seniors to screen for common geriatric problems themselves. In order to do so, we analysed the output of the VitalityNavigator.

Findings

In this study we aimed to evaluate the results of the first responders of the VitalityNavigator as an online self-assessment and self-management tool for seniors in a real life setting without a supervisory role for health care professionals. The results showed 36% of the respondents belonged to the target population. The target group was comparable with the earlier studied population. The five most common reported geriatric problems were loneliness, obesity or overweight, (increased) risk of alcohol or drug abuse, and hypertension. These five geriatric problems differed between male and female respondents. Male respondents reported fewer geriatric problems compared to female respondents. Items at the beginning of the VitalityNavigator had high response rates, whereas items at the end of the VitalityNavigator had lower response rates. Interesting to mention is that apparently the VitalityNavigator was also used in persons at a younger age than the target population in 64% of the cases.

Where Citizen Science and Technology meet Positive Health

Egbert Siebrand

The Topfit Citizen Science project aims to contribute to the health of Citizens in the Twente region. Within a period of three years, stakeholders amongst others citizens and scientists will engage in four pilots, define goals and execute activities to promote health. Besides promoting health there are several other goals and ideals like promoting employability and innovation. There are three key concepts in the project, namely Citizen Science, Positive Health and Technology. These concepts come together with sometimes very different ideals, values and norms. The concept of citizen science is characterized with values like democratization, openness and inclusion. (Bezuidenhout & Warne, 2018) (Davis, Taylor, & Martin, 2019) (Schrögel & Kolleck, 2019) (Strasser, Baudry, Mahr, & Tancoigne, 2019) These ideals might not only collide with science values like reliability and verifiability but also with the concept of positive health. (Koskinen, 2017)

Positive health is a relatively new concept with many dimensions where bodily functions is only one aspect. Health here is not considered as merely the absence of disease but rather defined as how one deals with the obstacles in life. This conception of health is very subjective and is hard to merge with the objective field of science. (Jung, Liebrand, & van Asten, 2019) Reasons for participation in Citizen Science projects in general can be curiosity and generating knowledge but when it comes to projects promoting health it is more likely that health itself, but also responsibility, a possibility to change and involvement are the key factors. (Dosemagen & Parker, 2019)

Also technology has different meanings for different stakeholders. For some stakeholders it enables Citizen Science projects, some stakeholders have a utopian view that it ensures a healthy future and for others it is a necessary means to an end. (Chari, Petrun Sayers, Amiri, & al., 2019) Although technology can help to promote different aspects of Positive Health, there are several issues to be considered. One is that Positive Health is a reaction on medicalizing of healthcare which is essentially a focus on bodily functions and not taking other aspects of healthcare into account. Another issue related to this one is that technology mediates our perception (Ihde, 1990) (Verbeek, 2005) and likely also the different aspects of Positive Health. So by the use of technology we might look different to aspects of Positive Health like mental wellbeing, quality of life and purpose, and define and value it therefore differently.

The aim of this research is to deeply explore the relation between the three key concepts mentioned before: what are the differences and similarities in terms of ideals, values and norms, and what does this mean for the different stakeholders involved in this- and future projects? In order to answer this latter question, part of the research will be a focus on care of the self (Foucault, 1990) and change of perceptions like medicalization and a utopian view that are mediated by social constructs and technology. This research project will result in a tool, framework or vocabulary for Citizen Science projects in relation to positive health.

Patients' Attitudes Toward an Online Patient Portal for Communicating Laboratory Test Results: Real-World Study Using the eHealth Impact Questionnaire

Esther Talboom, Rosian Tossaint, Annelijn Goedhart, Anke Versluis and Marise Kasteleyn

Background

Communicating laboratory test results online has several advantages for patients, such as improving clinical efficiency and accessibility, thereby helping patients to take an active role in managing their health.

Objective

This study aimed to investigate the experiences and self-efficacy of patients using an online patient portal that communicates laboratory test results.

Methods

We used the online-administered eHealth Impact Questionnaire to explore patients' attitudes toward the portal. Patients visiting the portal were asked to complete the questionnaire. The subscale Information and Presentation assessed the usability of the patient portal and the subscale Motivation and Confidence to Act assessed self-efficacy to determine whether patients were motivated to act on the presented information. We used a cutoff score of 65 or greater to determine whether the portal was rated positively.

Results

The questionnaire was completed by 354 of 13,907 patients who viewed their laboratory results in the patient portal, with a response rate of 2.55%. The mean Information and Presentation score was 67.70 (SD 13.12) and the mean Motivation and Confidence to Act score was 63.59 (SD 16.22). We found a positive, significant correlation between the 2 subscales (r345=.77, P<.001).

Conclusions

Patients participating in the study rated the usability of the portal positively. However, the portal only slightly helped patients to take an active role in managing their own health. The low response rate precludes generalization of the results. Future research should examine avenues to further increase patients' self-efficacy and study whether portal acceptability differs in subgroups. Patient portals conveying laboratory test results in understandable language seem usable and potentially provide a viable way to help patients take a more active role in managing their own health.

Remembrance; Balancing autonomy resonating design through co-mapping life events

Lars Veldmeijer, Bard Wartena and Job van der Veer

Introduction

Natalie(Need articulation through autonomy loss in elderly) is a project that focusses on communication between people with dementia(PWD) and their (in)formal caregivers. The main goal of the project is to balance the polarities of autonomy between the experience of autonomy by the PWD versus the perception of his/her autonomy by the (in)formal caregivers. Through a research-through-design approach, design for autonomy is pursued through a balancing autonomy resonating design framework and set of design principles. Where autonomy is rooted in one's identity, communicating about needs with a PWD requires insights into the past.

Methods

Based on the design principle identity, a participatory design method to delve into the past together through reminiscence was conceived; Remembrance. The concept of Remembrance is; a. Mapping the life of the person with dementia (Life events; through objects and memories) b. Comparing the perspectives of the events(Co-mapping) c. Determining together what is experienced as the most urgent in the now and d. Exploring how this translates into short/long term wishes and needs. Reminiscence Therapy is central to this process, through exchanging perspectives about the memories, gaps between experience and perception of life events become clear.

Results

Through this process, the PWD and formal caregiver become concordant about the level of desired autonomy in need articulation and how this can remain resonant through the shared decision-making processes. Through objects and memories, important life-events and the contrasts in perception between the partakers, give insight into meaningful goals and activities. The map negates triggers and guidelines on how to balance autonomy for the individual.

Conclusions

Interactions between the PWD and different partakers in the shared-decision-making process, often focus on the facets of the problem at hand instead of honouring the authentic autonomy of the individual's identity. Perspective-taking in life events, through objects and memories, creates a mutual understanding of the gaps between experience and perception of autonomy.

Self-management of happiness and well-being through a Behavior-based Language Interactive Speaking System (BLISS)

Jelte van Waterschoot, Iris Hendrickx, Arif Khan, Esther Klabbers, Marcel de Korte, Louis ten Bosch, Rob Tieben, Joost Hermans, Helmer Strik, Catia Cucchiarini and Mariët Theune

Background

Recent developments in healthcare indicate important shifts towards a more independent, self-determining position of patients based on self-management of care. E-health is well-positioned to provide innovative solutions, but generally these require that potential applications take account of the specific needs and preferences of their individual users. We are developing one such solution: an interactive, personalized spoken dialogue system named BLISS (Behavior-based Language Interactive Speaking System) that can communicate with people to facilitate their self/joint-management of health and well-being.

The project is couched in a broad conceptualization of health and wellbeing as happiness and "the ability to adapt and to self manage" (Huber et al., 2011), in line with a Positive Psychology view of health in which positive experiences play a central role. In Dutch healthcare systems, this view on positive health and happiness has been widely embraced.

The goal of BLISS is to collect information about its users and to discover what aspects of their lives can impact their well-being and happiness. To achieve this, users interact with BLISS through spoken dialogues.

Methods

BLISS uses a classical spoken dialogue system architecture with five main components: Automatic Speech Recognition (ASR), Text-to-Speech Synthesis (TTS), Dialogue Management (DM), Natural Language Generation (NLG) and Natural Language Understanding (NLU). In the current implementation of BLISS, the NLU, NLG and DM components run locally on the device, whereas the ASR and TTS components run as cloud services.

A first (prototype) version of the BLISS system was tested at several venues with users to find out a) how people interact with a computer when talking about their daily activities and b) to collect data that could be used for further improvements of the system. A list of activities was selected to generate questions during the dialogues. The users' responses were recorded (both audio and text data) in a database, which enables us to maintain user-specific knowledge bases and to personalize the questions to the activities of a specific user.

Findings

So far, we collected 55 conversations (average duration 2.5 minutes per conversation) from native speakers of Dutch from different regions of The Netherlands and Belgium, with no experience with spoken dialogue systems. Analysis of these data indicates that most subjects had relatively high expectations about the system, as they talked naturally and expected prompt responses, which was not always possible due to current system limitations. In the poster we will present our preliminary findings.

Discussion

BLISS is work in progress; a new version of the BLISS system is expected soon. During data collection, some issues emerged: a) sometimes the follow-up questions generated by the NLG component were suboptimal, b) some speakers preferred to use English words embedded in Dutch utterances, which caused ASR errors, c) the prototype system could not yet react appropriately when users didn't answer the question. Possible solutions such as ASR code-switching approaches and user modeling for improved answer detection will be investigated.

This work is part of the research programme Data2Person (628.011.029) which is (partly) financed by the Dutch Research Council (NWO).

Access to Music for People with Dementia

Rik Wesselink, Geke Ludden, Berry Eggen and Marike Hettinga

Background

Difficulties and inabilities in using everyday products decrease quality of life and hamper independent living for people with dementia (PwD). Impairment in executive functioning, apraxia and apathy are common amongst PwD and they progress as the dementia progresses. Next to problems in understanding how to interact with a product, this results in the fading of initiative.

Music can have a great positive impact on quality of life of PwD. A growing number of studies show the positive effect of listening to music on quality of life. Listening to music can have positive effects on mood and quality of sleep, decrease symptoms of depression and decrease fear.

With a focus on the interaction with music, we study how smart technology can enable human-product-interaction while adapting to loss of initiative. The resulting knowledge will support (interaction) designers to create better products for PwD.

Methods

We use contextmapping and focus groups to study the needs and barriers of people with mild-moderate dementia in relation to music in daily life. Results from this study will inform a ‘research through design’-phase, where we will combine literature studies with design explorations on solutions for problems in product interaction and loss of initiative.

Findings

We are currently in an early stage of the research. First results are coming in and show both the challenges in working with PwD as participants and the possibilities it brings for rich insights into their personal perspectives. Our contextmapping resulted in rich data and a deep insight into the needs and barriers in relation to music. One participant explained that at a certain point she has had enough of all the thoughts in her head and puts on music that makes her feel happy again. Another participant recently bought an all-in-one music system to play his cd’s and records and listen to the radio. Unfortunately the product was almost impossible to use for the participant. This shows that the needs of PwD in relation to music might be richer then what people generally expect. Moreover, it shows a gap between these needs and the availability of solutions.

Discussion

Including PwD in research is still relatively scarce but becoming increasingly popular. When doing so, it is important to understand their fragility and what this means for their potential involvement. In our study we aimed for rich qualitative information using contextmapping, and we realized this could result in a burden for participants. We found a balance in the richness of the qualitative data and the burden for the participants by combining our contextmapping with (less intensive) focus groups to verify and add to the insights gained from the contextmapping.

Motivations and willingness to provide informal care: a systematic review of qualitative literature

Mikołaj Zarzycki and Val Morrison

Background

Informal caregiving constitutes the backbone of a society's care supply. But why do caregivers start caring and continue doing so? With ageing populations, the need for informal care is growing, thus it is important to understand their expectations and motivations. This systematic review examines the possible determinants of motivations and willingness to provide informal care.

Methods

Following the EPPI Centre guidance, six electronic databases and a wide range of additional sources (grey and unpublished literature) were systematically searched. 7450 records were screened with a final inclusion of 99 papers. A quality score was attributed to each study. The data was synthesized using the thematic synthesis.

Findings

Diverse determinants of motivations and willingness to provide care emerged from the literature, including personal, relational, familial, social and ethnocultural factors and their implications for the continuation of the caregiver's role were described. Caregiving was generally based on familial obligations, reciprocity, affection, illness beliefs, individual and supraindividual values (e.g., family values), social and cultural expectations (e.g., gendered roles). Demographic factors also played a vital role.

Discussion

Multi-level factors influencing motivations and willingness to provide care were organised as different orientations of motives. In addition, from studies providing a longitudinal perspective, it is noticeable that determinants influenced motivation and willingness differently at different stages of caregiving plus different factors were identified at different stages. The implication of these findings for subsequent outcomes of caregiving is being explored in a multinational empirical study, also in relation to caregiver outcomes (ENTWINE-iCohort Prospective Study in Informal Care).

Demos

Self-compassion by Tech: A Demonstration of a Supportive Self-compassion App for People with Newly Diagnosed Cancer

Judith Austin, Stans Drossaert, Jelle van Dijk, Robbert Sanderman, Maya Schroevers and Ernst Bohlmeijer

Background

A diagnosis of cancer often has an immense impact on the life of cancer patients, and they are at an increased risk for distress, depression and anxiety. Given the low number of distressed patients who ask for or receive psychosocial care, the already high load of medical appointments for patients and their needs for autonomy, an intervention that can be executed in their own time may be particularly helpful. Mobile technology offers possibilities to partake in an intervention in a familiar context, to reach a large amount of people at low-threshold, and to help with integration of intervention content into daily life. Self-compassion, a way of responding to difficulties with kindness and wise, caring action, can help patients to increase their well-being and reduce distress. Since people with cancer are in the midst of an extremely challenging situation that entails difficult emotions and often self-blame, self-compassion is particularly relevant as a tool to help cope with the diagnosis. In compassion-based interventions such as Compassionate Mind Training, participants learn about the origins and nature of their emotions and safety strategies, and to cultivate mindful and compassionate acceptance towards them. Participants learn to recognize three evolutionary based emotion systems (threat-protection, drive and soothing system) in themselves, as a way to reduce self-blaming and shame and increase the sense that it is human and universal to experience functional but difficult emotions that are not our fault. In addition to such psychoeducation, Compassionate Mind Training consists of reflective, meditative and visualization exercises, in which participants learn to soothe and support themselves during difficult times. A recent review found that compassion-based interventions show promise in reducing anxiety and depression in people with cancer and are well-received by intervention participants.

Combining the relevancy of self-compassion with the benefits of mobile technology, we have developed a supportive self-compassion app for people with newly diagnosed cancer in a co-creative design process. The development process consisted of a series of co-creative workshops with patients and nurses, and focused on integrating requirements of cancer patients and stakeholders (bottom-up input) and theoretical evidence about compassion-based interventions (top-down input) into an intervention.

Description of the application/technology/concept

The self-compassion smartphone app consists of six sequential modules that include psycho-education and exercises aimed at cultivating self-compassion in the time after a cancer diagnosis. Next to the sequential modules, features that are directly accessible from the app homepage include a mood tracker and an exercise in which the user recalls a pleasant moment of the day. Push messages are used to stimulate integration of the content into daily life.

Practical description of demo

The application will be set-up on two laptops, so that multiple conference visitors can navigate the application themselves or in discussion with the researcher. The visitors can learn how we have translated the theoretical and user requirements into technical solutions.

The Diameter: mobile coach for patients with Type 2 Diabetes Mellitus

Niala den Braber, Annemieke Konijnendijk, Miriam Vollenbroek-Hutten and Goos Laverman

Background

Diabetes Mellitus type 2 (T2DM) is a growing problem and is associated with an increased risk of morbidity and mortality. To reduce this risk, it is of importance to prevent hyperglycaemia and hypoglycaemia as much as possible. A healthy lifestyle has positive effects on glucose levels and therefore on the diabetes management. To achieve this, the patient needs support to develop and maintain a healthier lifestyle.

ZGT, UT and RRD have joined forces to develop ‘the Diameter’. This mobile application helps patients with T2DM to maintain steady blood glucose levels by living healthy. The app offers the diabetic patient self-management and helps to maintain motivation. For example, patients are actively coached in regulating their blood sugar levels, possibly with less medication. Measurement results can be shared with the diabetes treatment team, making optimal use of the outpatient clinic visits.

Description of the application/technology/concept

The Diameter measures exercise, sugar values and records dietary data. These values are continuously analyzed by a computer model and translated into insight and advice. The model takes personal preferences into account and uses so-called "motivation theories". Advice is therefore tailored to the patient. Also, the patient receives feedback of the impact of their diet or activity choices on their glucose management. The increased insight and experience with the Diameter should contribute to a more responsible, healthier lifestyle.

Practical description of demo

For the demo a few mobile phones will be available for people to see how the prototype Diameter app works and what it looks like. Also, flyers are provided and with a poster or banner an overview of the Diameter will be shown.

(Self)Care: using interactive narrative as guided self-reflection for beginning nurses to encourage self-care

Ivo Bril, Nick Degens, Joke Fleer and Lisette Van Gemert-Pijnen

Background

Burn-out and turnover rates among beginning Dutch nurses are high. One of the main reasons for this is the difficulty in adjusting to the tumultuous working environment or making it work in their favor. This is particularly hard for beginning nurses, as they do not have enough experience to reflect on their ordeals and take appropriate actions.

One way to prompt their self-reflection is to provide focused questions within controlled situations that are believable and relatable. The contextualized guidance provides clarity and helps student nurses analyze tough situations in a safe and structured environment. Through this process, they are invited to reflect on what they could do differently, or whom they could reach out to for help.

Description of the application/technology/concept

Using a User-Centered design research approach, we have developed a digital interactive narrative that helps beginning nurses identify aspects of their job that they find challenging (i.e. it provides contextualized guided self-reflection). In this prototype, the reader plays through an interactive story based on common work floor experiences that require assertive behavior (e.g. a shift throughout which a patient is too demanding). At certain points in the story, the user has to consciously decide how the protagonist acts by selecting from a set of possible (re)actions (Fig. 1). Each action leads to storyappropriate consequences (Fig. 2, 3), after which the story continues. After finishing the story, users are provided with more in-depth feedback on their (non-) assertive behaviors, using the related moments in the story as context.

Practical description of demo:

The '(Self)Care' demo will be introduced briefly, after which visitors can play through the interactive narrative on the present laptop(s) and experience the dilemmas that nurses face on a daily basis. The demo presenter provides information about the design and development process and is available for further discussion and questions.

Virtual Reality for Rehabilitation

Gido Hakvoort, Loes Bulle, Hilco Prins, Martijn Klarenbeek, Edwin Nibbering, Coen Kniknie and Marike Hettinga

Background

Rehabilitation after an accident in which an arm or hand is paralyzed, is a long process. Stimulate the brain during this process is important to improve recovery. A common therapy to help patients, is mirror therapy. Originally designed to help people with phantom limb pain it activates mirror neurons to fool the brain into perceiving a paralyzed arm or hand is still moving. Mirror therapy itself consists of multiple stages during which patients gradually regain control over hand and arm functions. During therapy sessions patients take place in a low stimulus environment and try to stimulate the motor areas in their brain by moving their non-impaired hand or arm and focus on its reflection in a mirror. By transferring all of this into a virtual reality environment, gamifications elements can be added to make the therapy more appealing. In addition, it gives patients the opportunity to practice when and wherever they want and, it allows for usage data to be collected, analyzed, and presented to provide meaningful insights. In the project 'Virtual Reality for Rehabilitation' we focus on the question how new technologies can facilitate natural interaction in a virtual reality environment and support, optimize and maybe even replace existing rehabilitation processes. For this we are developing a system that support both patients and therapist.

Description of the application/technology/concept

Our system consists of two different applications. First, a virtual reality application (build in Unity) with a training environment. Within this training environment patients with peripheral nerve injuries can do exercises related to different stages of mirror therapy. We use a Leap Motion Controller (attached to an HTC-VIVE Pro) to detect finger, palm and hand movement and translate these movements into movements in the virtual reality environment. This allows patients to interact with objects in the virtual reality environment but also to mirror their non-impaired hand or arm and use it to perform small tasks in mini games. This allows all exercises to be practiced in an interactive way. In the meantime, data on correct/incorrect movements, number of repetitions, movement speed, and joint angles are collected and send to the second application. This application analyzes the data, translates it into a patient progress overview and makes it available for a therapist to gain insights into the status of the therapy. During appointments these insights could help the therapist to adjust the therapy and set new goals for the patient. Future work includes adding other therapies to our system, testing with newer hardware to support at home usage, and having a system analyze patients' progress to come up with suggestions for new goals or moving into next stages.

Practical description of demo

Our demo shows the current state of our virtual reality training environment for patients with peripheral nerve injuries. The demo contains several mini games to practice hand or arm movement in an interactive way and shows how new technologies can transfer mirror therapy into a virtual environment.

"Kracht TeRUG" – Positive Psychology eHealth for spinal surgery patients, developed through co-creation

Annemieke van der Horst, Karlein Schreurs, Ernst Bohlmeijer, Rianne Huis In 'T Veld and Saskia Kelders

Background

Spinal lumbar fusion surgery is an option to treat a specific type of (chronic) low back pain. About 65% to 75% of spinal surgeries are effective in achieving reduction of pain and improvement of physical functioning. Nonetheless, recovering from surgery is often accompanied by moderate to severe postoperative pain. Furthermore, around 20% of lumbar surgery patients experience persistent postoperative pain, also known as failed back surgery syndrome (FBSS).

To prepare spinal surgery patients for the procedure and help them cope with possible surgery-resistant pain and disabilities, an eHealth application ("Kracht TeRUG", Strength Back) is developed. The content of the application was created with the help of future users, i.e. patients and health care professionals.

Description of the application/technology/concept

"Kracht TeRUG" is developed by following the steps of the CeHRes Roadmap. Through contextual inquiry (interviews), value specification (focus group sessions) and design, a prototype of the app is developed. The application consists of 8 modules and several exercises. The content is based on the input of patients and professionals, combined with elements of positive psychology and mindfulness which have been proven effective for chronic pain patients in previous research.

"Kracht TeRUG" contains several information modules: illness and surgery; preparation; pain education; pain medication; physical therapy; recovery; experiences of other patients; when to contact a doctor. Additionally, the app contains positive psychology modules with value based exercises and mindfulness exercises.

Practical description of demo

During the demo visitors of the conference can "walk through" the steps of the different perioperative phases, read the patient information, fill in the positive psychology exercises and listen to the mindfulness audio exercises.

To get a feel for the app: see screen shots below.

Close Encounters of the Infectious Kind: The Epidemio Simulation Engine

Wouter Keuning, Judith Kaptein, Henri ter Hofte and Marike Hettinga

Background

If infectious diseases are not adequately controlled, they can be a serious risk to human health. Influenza pandemics in recent history, such as the Spanish Flu (1918-1920), the Asian Flu (1957-1958), H1N1 (2009-2010) and the currently ongoing COVID-19 strain of the coronavirus are an example of this.

Smartphones can be a useful instrument when investigating pandemics as shown by the LowlandZ virtual zombie app (2017) and the BBC pandemic app (2018). Smartphones can assist with automatically detecting 'close encounters of the infectious kind'; a moment in time for which two persons are close enough to each other for a sufficient duration for disease transmission to take place. We think that smartphones can play an important role, not only in investigating, but also in helping to counteract the spread of infectious diseases.

In our research, we are working towards an app in which a person can tell if he/she shows signs of an infectious disease or knows for sure he/she is contaminated. With this information, other persons likely to have been infected can be determined by the system via back tracing the encounter network to the possible start of the spread. By subsequently following the encounter network in a forward direction, newly contaminated persons can be determined and warned possibly even before they begin to show signs of an infection, which might contribute to counteract the spread of the disease.

Description of the application/technology/concept

We demonstrate a simulator, the Epidemio Engine, in which infections and encounter networks can be simulated faster than real-time based on the simulation of individuals. The simulation consists of three components; an 'Infector', 'Behavior' and a 'Detector'. The Infector simulates the infection and spread of a disease in the population. The Behavior component simulates human behavior in a population such as taking preventive measures when warned by a detector. The Detector tries to detect which people in the population are infected and which people are at risk. By warning the people at risk, their behavior can be changed and by that the chance that they become infected and may spread the disease even further.

Practical description of demo

The Epidemio Simulation Engine gives the user control over various parameters to investigate how the various parameters of Infectors, Behaviors and Detectors might influence the spread of an infectious disease and hence, helps to study the effectiveness of fighting such an infectious disease with a smartphone-based detector. The Epidemio Simulation Engine demo runs on a laptop, for which we need a table, 240V AC power and an internet connection.

Using digital nature to promote social connectedness in older adults through storytelling

Kars Otten, G.J. Westerhof, T.J.L. van Rompay, D.L. Gerritsen and J.W.J.R. van 't Klooster

Background

Social connectedness, or relatedness, is a basic psychological need (1). Yet, half of all older adults experience feelings of loneliness, which is associated with social isolation (2). Considering our aging population, interventions to promote social connectedness in older adults are called for. People tend to connect to and socially interact with each other by means of communicating stories: i.e. storytelling (3,4). Hence, a promising strategy to enhance social connectedness could be to stimulate storytelling.

Over the years, researchers have accumulated a range of beneficial effects of nature (5,6): positive communication (7), enhanced feelings of social support and, particularly relevant to the present context,

reduced feelings of loneliness (8), and increased feelings of being connected to others and the world at large (9). However, for older adults access to nature can be limited, e.g. due to by mobility constraints. Interestingly, when nature is presented digitally, positive effects have been found as well (7,9,10,11), underscoring the benefits of digital nature for those with restrained access to nature.
Consequently, digital nature can be used to promote social connectedness in older adults through storytelling. This study aims to investigate which specific features of digital nature can act as a conversation starter to encourage storytelling in older adults.

Description of the application/technology/concept

With the digital nature system one can easily create immersive, animated projections of nature scenes, which can be tailored to specific needs. Moreover, with this technology the effects of specific features of nature (e.g. tree density) can be tested experimentally. Several features are animated to enhance immersion in the virtual environment. The nature scenes can be exported as videos.

Practical description of demo

We will demonstrate the software for designing nature scenes on a laptop and show the resulting video on a mobile setup (screen of 4 x 3 meters if possible, and laser-projector).

Little Red Riding Hood

Sophia de Rooij

Background

Problem: Cognitive and physical impairment are often responsible for changes in the lives of both people with impairment and their family carers. These changes and care needs are sometimes hard to discuss together, but important to discuss to prepare for the future.
Gap: To discuss processes, events or outcomes are often sensitive and difficult conversations as a person with dementia experiences difficulties with communication. We currently do not know how we can support people with care needs and their family carers in having these conversations, and improve conversation quality and satisfaction.

Description of the application/technology/concept

“Grootmoeders huisje” is a digital conversation tool, tablet based application that might prompt a discussion about difficult topics with good quality and satisfaction that enables them to reveal their own preferences and needs. Little Red Riding Hood and her grandmother have daily life conversations that take place in the house of her grandmother.

Practical description of demo

Gameification tool available in the app store, designed by UMCG, IJsfontein and Foundation Effective Elderly CareText

Werkplaats e-health implementatie

Lisette van Gemert-Pijnen, Robbert Sanderman, René van der Most and Syl Slatman

Background

The implementation of e-Health technologies often is a cause of many problems. To help cope with these problems, the “Implementatie Werkplaats” (Implementation Workplace) was set up. The goal of this workplace is to create a network of people working on the implementation of e-Health technologies and share knowledge about implementation. The “Werkplaats” is an initiative of the University of Twente, University of Groningen/UMCG and the healthcare innovation Forum (ZIF) and also offers a website where they can ask questions, help each other and find theoretical information on implementation.

Description of the application/technology/concept

Website (www.werkplaatsimplementatie.nl)

Practical description of demo

We would like to advertise our website among interested people working on implementation of e-Health. This could be done using a stand where people could use the website and join our network.

IJ-lab: less assumptions, more research

Matthijs Spruijt

Background

IJ-lab is the research hub of Therapieland and Gezondeboel, e-mental health platforms which offer a broad range of preventive and curative e-mental health modules, which are used in blended treatments or as self-help.

At IJ-lab a diverse group of internal and external researchers, team members and students share knowledge and jointly conduct research into the effectiveness and applicability of e-health.

Use, effectiveness and satisfaction are our most important pillars. We start projects in different research areas, including effectiveness, tracking & monitoring, virtual reality, persuasive design / UX design, implementation, screening, and analytics.

Description of the application/technology/concept

IJ-lab actively searches for collaborations with universities, colleges and knowledge institutions, to conduct research and put the generated knowledge directly into practice. These collaborations can take different forms:

- Facilitate research

By providing insight into our data, by providing access to our platform and by providing tools such as a VR application. This is possible in the context of short-term or long-term research.

- Research consortium

IJ-lab can be a partner of a research consortium when submitting a research application. We can make an in-kind contribution to the research.

- Development of e-health applications

IJ-lab has a lot of knowledge and expertise in the field of e-health development through Therapieland and Gezondeboel. This means that we can be a good partner for the development of an e-health application in the context of research. Think of adapting one of our existing e-health programs or developing a new program, if this is not yet part of our products. When the development of an e-health application is part of a research consortium, this may be part of the in-kind contribution on behalf of IJ-lab.

- Possibility for student graduation projects

IJ-lab gives students the opportunity to conduct graduation research. Preferably it concerns a subject from our research directions, which includes effectiveness, tracking & monitoring, virtual reality, persuasive design / UXdesign, implementation, screening, and analytics.

Practical description of demo

We would like to demo the platforms Therapieland and Gezondeboel and concept of IJ-lab hoping to inspire others to conduct research together. By displaying the different possibilities for collaboration, we aim to create opportunities for future research projects on eHealth.

Health Text Processing with Orange

Erik Tjong Kim Sang, Peter Kok, Wouter Smink, Bernard Veldkamp, Gerben Westerhof and Anneke Sools

Background

Currently digital data is available abundantly for health research. The amount of data calls for automatic analysis but this requires experience in data mining and computer programming usually not present in health research groups. Analysis software with a user-friendly interface is required to enable research using large digital data sets. Such software is now available in the form of Orange, a free data mining toolkit developed by the Bioinformatics Laboratory of the University of Ljubljana in Slovenia. The software offers a large collection of modules that can be combined in a user-friendly graphical interface to form customized data analysis pipelines. Orange consists of open source Python code and can be extended with custom-built modules.

Description of the application/technology/concept

We use Orange for text analysis of online correspondence between counselors and patients with substance dependence related health problems. We have extended the Orange software with projectspecific modules that take care of data loading, data organization, data selection, data filtering, data analysis and data visualization.

Practical description of demo

We will demonstrate how Orange can be used for building data processing pipelines by selecting and linking modules with mouse clicks. Next we will show how text data can be loaded in Orange, be processed and be visualized.

Human Transformation Apps: How Neuroscience, AI and No-Code Platforms are Revolutionizing Digital Health

Leon Young and Fiona So

Background

Demand for app solutions that help solve pressing health challenges is growing fast. The COVID-19 pandemic in particular has highlighted the critical importance of being able to develop effective solutions rapidly, while still being able to iterate them as needs change or are better understood. The convergence of two recent innovative developments is disrupting how mobile technology is adapting to meet this demand.

The first is the emergence of a new category of technology known as Human Transformation Technology (HTT), ie. technology, including apps, that combine neuropsychologically effective design with sophisticated tech to drive better outcomes in health and behavior change. The second is the rise of low-and no-code platforms. These platforms combine simple visual app-building interfaces with powerful AI, wearables interfacing and big data capabilities, allowing anyone without coding knowledge to create impactful apps for health.

As a result, more people on the frontlines of healthcare - administrators, government agencies, doctors, nonprofits, and researchers - can now create their own healthtech solutions at a fraction of the cost typically required when hiring a custom developer. This ubiquitous democratization of technology has exciting implications for education, training and research in the health sector, expanding possibilities for better health compliance and optimized behavior change.

Description of the technology

Cogniss is a low- and no- code software platform that greatly reduces the design and development costs required to create high quality, personalised Human Transformation Apps.

Typically, the app development process is complex, relies heavily on developers who are untrained in the application of neuropsychology and behavior change theory, and costs between $100,000 to $500,000 to complete. By contrast, Cogniss empowers non-technical health subject matter experts and teams to develop, test and iterate impactful apps for any target user group within minutes, and at very low cost.

In addition to simplifying and significantly lowering the costs of app development, Cogniss embeds neuropsychologically-informed design into its software and AI engines, ensuring apps are grounded in evidence-based practice. Whether the issue is practising healthy mental health habits or managing addictions, Cogniss recognizes that the common factor underlying all effective interventions is the smart application of neuroscientific research to what are essentially behavior-based challenges. True learning occurs when solutions are designed around how the brain processes, stores and recalls information, as well as take into account neuroplasticity, and what drives individual motivation, knowledge retention and sustained behavior change.

Using Cogniss' point-and-click app creator, health practitioners and other support staff can easily create solutions for personal fitness, mental health, health behavior change, diagnosis and treatment, patient engagement, clinician management, medical trials, or public health education.

Cogniss is already being used by governments, health institutions, and universities to power app-based solutions that address challenges from supporting the mental health and wellbeing of frontline health workers during COVID-19, managing the adverse effects of problem gambling, slowing brain ageing in the elderly, and more.