HOW TO IMPROVE EHEALTH INTERVENTIONS
IN HEALTH PSYCHOLOGY AND BEHAVIORAL MEDICINE

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UNIVERSITY OF TWENTE.
Center for eHealth Research and Disease Management
Health, Psychology & Technology (dept)
Behavioural, Management & Social Sciences (fac.)
How are you involved in eHealth?
Your poll will show here

1. Install the app from pollev.com/app
2. Make sure you are in Slide Show mode

Still not working? Get help at pollev.com/app/help
or
Open poll in your web browser

PollEv.com/icbm
PURPOSE OF THE WORKSHOP
HOW TO IMPROVE EHEALTH INTERVENTIONS

- How to develop eHealth interventions that are user centred and implementable in practice
- How to evaluate the success of eHealth interventions
- Discussion about future directions in eHealth Research & Development

Procedure:
- Introduction; why & how eHealth interventions can be improved
- Demonstrations of methods to improve eHealth interventions
- Discussion about future of eHealth
- References (hand out), slides on website http://www.utwente.nl/igs/ehealth/
eHealth → different views on “technology”

- A tool (instrument for information exchange)
- An infrastructure (platform to manage data for self-care)
- A catalyst (disruptive innovations)

eHealth is not solely a technical development, but refers to a way of thinking on how to improve healthcare and how technology can support this
WHAT ABOUT PRACTICE?
Reach is undiversified (female, highly educated, white, living in high-income countries)

- Low adherence, not all participants complete an intervention
- There is a dose-response relationship

- We need to understand why & how eHealth interventions work
  - Why & how people use eHealth interventions
  - How technology can engage users, can increase adherence
Opening the black box, what do we see?
TSUNAMI OF HAPPINESS & WELL-BEING TECH

High drop out, low impact

- Text heavy programs
- Fixed program, no tailoring
- No room for reflection
- Limited interactivity
- Tech = tool
LIFESTYLE TECHNOLOGY
DESIGNERS’ MIND VERSUS USERS’ DEMANDS

- Look and feel of a self-help book
- Women-driven
- Content & System, asynchronous development

- Overestimation of self-tracking
LACK OF DIVERSITY

Highly educated, conscientious women
Hype in PERSONAL HEALTH RECORDS

- Expert-driven
  - Disease oriented
  - Data-driven
- Patronizing
- Lack of interactivity
- Problems with interoperability
- Low adherence

Demonstrations
UGLY TECH, FOR FRAIL PEOPLE

- IT does not Work
  - No data received (server)
  - Overload phone line
  - Sensor too sensitive

- IT does not help
  - Data hard to understand
  - Activity patterns (deviations) are not traceable to medical evidence, standards, treatment programs

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eHEALTH
IT ALL COMES DOWN TO ANSWERING THREE SIMPLE QUESTIONS:

- Does IT work?
  - Usage
  - Usability and persuasiveness
  - Adherence

- Does IT help?
  - Is anyone getting better

- Does IT pay?
  - Cost effectiveness
THE CEHRES ROADMAP

van Gemert-Pijnen, J. Med Internet Res 2011 | vol. 13 | iss. 4
DEVELOPING eHEALTH

- Developing eHealth requires preparing the social, ethical, laws & regulations conditions for uptake of technology.
- Involvement of stakeholders to define added values.
ADDED VALUE
IMPLEMENTATION RUNS PARALLEL TO DEVELOPMENT (BUSINESS MODEL)

An early-stage-development debate among stakeholders is needed to determine the added values for implementation.

Why Business Modeling is Crucial in the Development of eHealth Technologies
Maarten van Limburg et al, 2011
eHealth: Scope

Krijgsman & Klein Wolterink, 2012
USER REQUIREMENTS - DESIGN

- What are their capacities, motivations?
  - Age, gender, personality, SES; self-efficacy, locus of control...
  - Resources, skills/experiences, trust in tech..
- What works best for whom?
  - Care-consumers
  - Pragmatic
  - Less self-reliant
  - Critical of Society
TECHNOLOGY DESIGN

- Formats design (web-based, mobile, pervasive, robots, sensors…)

- Technology can motivate;
  - Usability, accessibility
  - Interactivity (dialogue, feedback)
  - Persuasive (charismatic, motivating elements)

Demonstrations
Technologies as persuaders:

- Anonymity, persistence
- Different cues for communication (text, speech, smell, video, and graphics) simultaneously
- Access to situations human persuaders would not be allowed (bathroom) or able to physically be (pervasive systems etc.).
Persuasive Systems Design model

Primary Task Support
- Reduction, Tunneling, Tailoring, Personalization, Self-monitoring, Simulation, Rehearsal

Dialogue Support
- Praise, Rewards, Reminders, Suggestion, Similarity, Liking, Social role

Credibility Support
- Trustworthiness, Expertise, Surface credibility, Real-world feel, Authority, Third-party, Verifiability

Social Support
- Social learning, Social comparison, Normative influence, Social facilitation, Cooperation, Competition, Recognition

Kukkonen, 2009
TAILORING

QUITTING tools

Fagerstrom Addiction Questionnaire

The Fagerstrom test is a rough estimate of your physiological addiction to nicotine. It can give you an idea of where you stand in relationship to other smokers in terms of how physically dependent you are on the active drug in tobacco.

Your score was 60% (6/10 points) on the questionnaire.

What does this mean?

Your score on this questionnaire was in the average range. This means that you are likely to have some difficulty with physical withdrawal symptoms when you quit, but no more than most other people.

Please Note: This appraisal is an awareness tool only. It is not diagnostic in nature, and is in NO WAY intended to contradict or replace advice of your personal physician. When in doubt it is always best to seek professional one-on-one consultation. If you want to get help right now, you may do so by contacting a QuitNet Counselor.

Content author: Alan S. Peters, CTTS-M

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USING PSD TO CREATE USER-CENTERED APPS

- Information tailored to tasks HCWs
- easy to use formats
- Reduces errors, saves time

Demonstrations
USING METAPHORS AS DESIGN TO INSPIRE
Persuasion through social media..

- Role models
- Social support

“Healthy Mouth Means Healthy Life, and Better Sex”

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EFFECTS OF PERSUASIVE TECHNOLOGY

- Significant predictor for adherence (=use of tech)
- Significant effects on outcomes health behavior
- Practical way to assess adherence objectively and comparably
- Practical way to assess technology from a theoretical basis

Demonstrations
EVALUATION
WHAT WORKS, HELPS IN PRACTICE?

- Formative evaluation & summative evaluations
  - Usability tests and interviews (does IT work)
  - Usage, user patterns via log files (how IT works)
  - Persuasiveness and user preferences (what works for whom)
  - Fractional factorial designs (what elements matter most)
  - Usage over time (what are the long term effects)
  - Health technology assessments (what are the cost/benefits)
## DIABETES eCOACH

LOGFILES TO IDENTIFY DROP OUTS AND USAGE PATTERNS

### Appendix X. Overview of activity patterns in months

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Start & Restart prompts for persuasion

Nijland, 2011
LOGDATA RESEARCH SO FAR…
INSIGHT IN BLACK BOX

- **Differences:**
  - Adherers use more and use more sessions per lesson (Kelders, 2013)
  - More use -> more effect (Donkin 2012; dose-response)
  - High active users -> more use of all content features (Van Gemert, 2014)

- **Prediction:**
  - Number of log-ins in week 1 predicts adherence (pub in progress)
  - Number of active days in week 1 predicts adherence (Freyne 2012)
  - Usage of different features predicts adherence (Freyne 2012)

- **Patterns:**
  - Market basket and Markov chain for association and patterns (Tian 2009)
IMPLEMENTATION PLAN

- Critical criteria for operationalization

The Ten Critical Dynamics of Innovation Diffusion
- Relative Advantage
- Trialability
- Observability
- Communications Channels
- Homophilous Groups
- Pace of Innovation/Reinvention
- Norms, Roles, and Social Networks
- Opinion Leaders
- Compatibility
- Infrastructure

Diffusion of innovations in health care,
Cain & Mittman
Poster P73 Floor Sieverink
• Theory based interventions, higher effects
• Persuasive designs increases adherence
• Use of different functionalities, cues result in higher effects
• Underestimation of effects, due to before/after measurements

Demonstrations
DEMO WORKSHOP
SWITCH SUB-GROUPS, AFTER 60 MINUTES

Development & design (subgroup 1)
- Nienke de Jong
- Jobke Wentzel
✓ Room: 5

Evaluation (subgroup 2)
- Olga Kulyk
- Floor Sieverink
✓ Room: 6
FUTURE DIRECTIONS
PERSUASIVE FORMATS

Personal health

- Multiple cues
- Mind–controlled technology
- Virtual environments
Human Touch in High Tech

- Emphatic interaction with users
- Does a robot trust us?

Persuasive Tech
Whenever we communicate with a purpose in mind, we are engaging in an act of persuasion. This is not new. But building machines that persuade on our behalf is.
PERSONAL-ASSISTANT

- Mobile device
- Virtual Agents
- Voice-activated PA

How much fun can you handle?
A clinic in Amsterdam has recently opened its door to video gaming addicts. Treatments last 8 weeks and include a gaming detox, group therapy and counselling sessions.

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PSYCHOLOGY & TECHNOLOGY

- Impact of (new) technology
  - Impact of technology on personality, identity; society
  - Impact of behavior on technology
- Technology to support self-care
  - personalized, persuasive design to increase adherence
  - virtual environments
- Technology, methodology to collect data
  - big data (monitoring tech)
  - long-time monitoring in one-person (continuous measurements)

...
DISCUSSION
FUTURE DIRECTIONS IN eHEALTH

- Investments needed to ground interventions theoretically
- Update of Health Behavioral Models
  - To develop dynamic, iterative interventions
  - To assess behavior over time
  - Beyond a focus on human characteristics
  - To predict dose of intervention components; prompts for persuasion
  - Fractional factorial designs (what components matter most)
DISCUSSION
FUTURE DIRECTIONS IN HEALTH TECHNOLOGY

- Investments in robust methods to improve interventions
  - Mixed methods
  - Methods for monitoring long-term interventions
  - Pragmatic measures (CAT, IRT)
  - Multidisciplinary research (improvement science)
- Standard description of technology development in research
CONTACT INFORMATION

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https://blog.utwente.nl/persuasive-health-technology/