EVALUATING AN MHEALTH APPLICATION FOR WORKERS' HEALTH AND WELLBEING: DIFFERENCES BETWEEN THREE QUALITATIVE METHODS

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Novel approaches for workers' health & wellbeing?

- Mobile & wireless technology is a growing area in supporting health behavior change
- Increasingly, mHealth applications are being developed for risk prevention and health promotion of workers.

mHealth: poor or no evidence base

- The vast majority of apps that are being developed for domains such as physical activity, diabetes, obesity and stress management have not been evaluated using scientific methods (e.g. Conroy et a, 2014)
- Research on the reach, utilization and effectiveness is in its infancy

(Kumar ea., 2013, Klasnja ea., 2011)

- Digital interventions take time to evaluate in part because they are so complex, making them intrinsically complicated to study (Baker ea., 2014)
- mHealth applications appear and change so quickly that they challenge the way we conduct research (Kumar ea., 2013)

What types of evaluations are appropriate and useful for mHealth?

Intervention evaluation: effectiveness

RCT has long been golden standard to evaluate efficacy, but are these kind of methods applicable in HCI research?

- Behavior change as long-term process: long time lag (to conclude whether intervention brought about behavior change),
- Size (number of subjects), costs
- Complexity of behavior change: content, user, social interaction, changing context, interface, etc.
- Not for early design stages
- Technology may be obsolete before trial is completed
- Assesses whether a technology brought about the intended behavior change,

  but not why technology worked or did not work

(Baker ea., 2014; Kumar ea., 2013; Klasnja ea., 2011)

Focusing on people's experiences with technology could help researchers understand *why* and *how* their system is working

- How is the system used by participants?
- How well fits system into daily lives, context?
- Which aspects of system participants find most helpful?
- What problems do participants face?
- How do different components of system work together?
- Why do participants decline to participate?
- Why do participants do not remained engaged over time?

- To answer such questions **qualitative methods** are needed

Aim and research questions

Aim

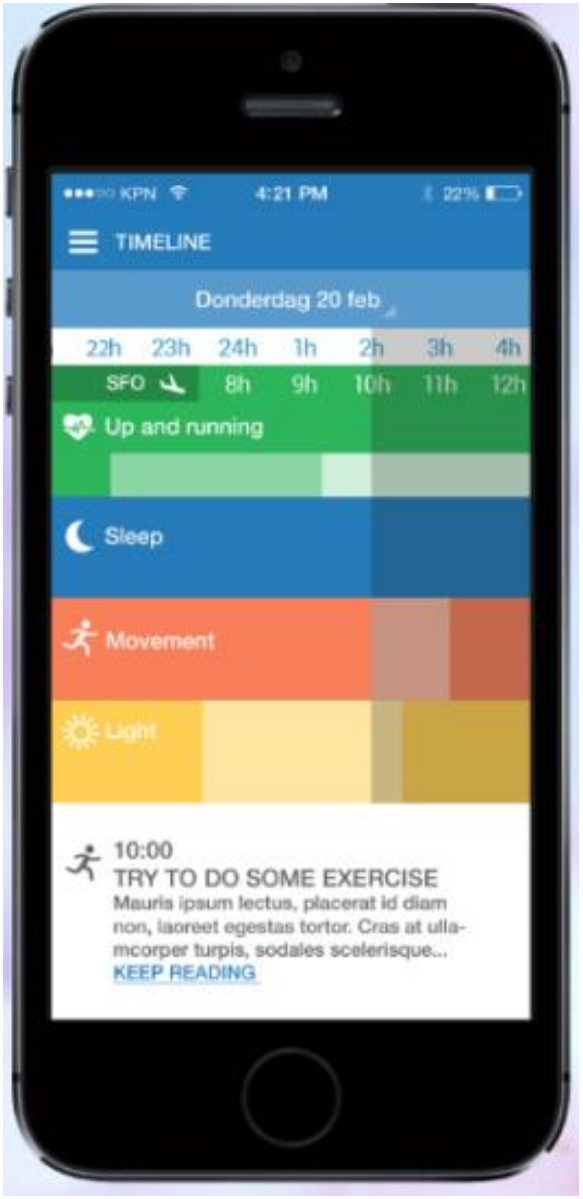
- To compare three different qualitative evaluation methods (end-user interviews, end-user focus-groups, expert focus-group)

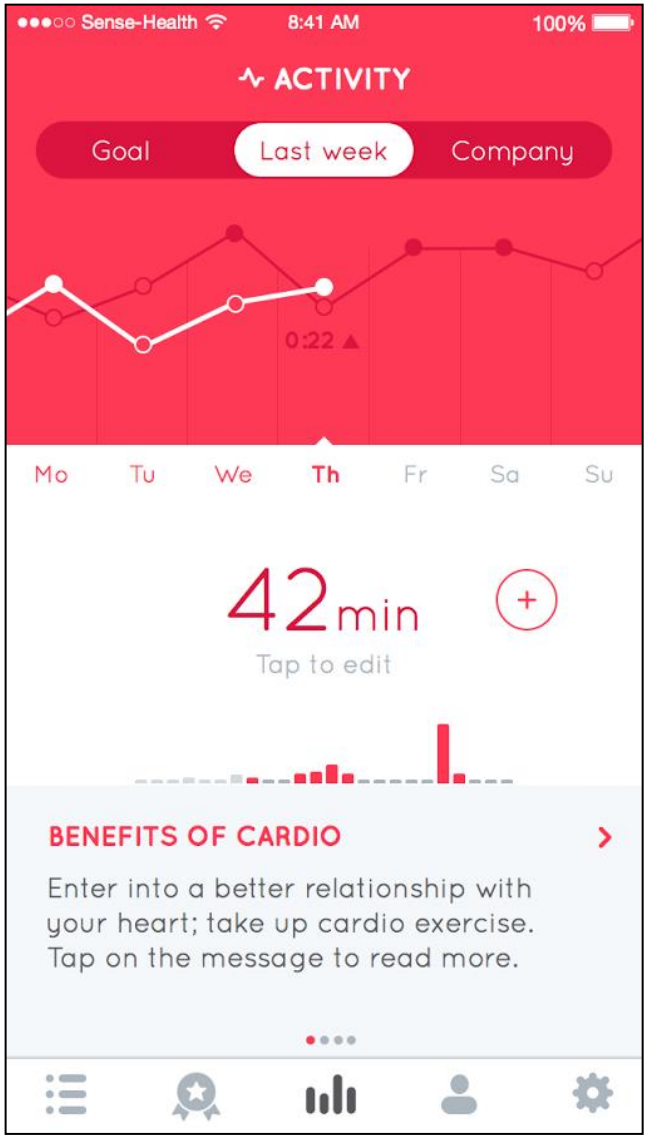
Research questions

- Do these three evaluation methods address the same issues when evaluating a mHealth application?
- Which issues are addressed?

The app: Brightr

- Platform to create healthy habits and improve productivity of industrial workers.
- Behavior change techniques
- Access to vitality coaches
- Real-time behavior tracking and personalised coaching
  - Physical activity
  - Sleep
  - Mental resilience
  - Shiftwork
  - Jetlag

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ACTIVITY
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42min
Tap to edit
BENEFITS OF CARDIO
Enter into a better relationship with your heart; take up cardio exercise. Tap on the message to read more.

Activity

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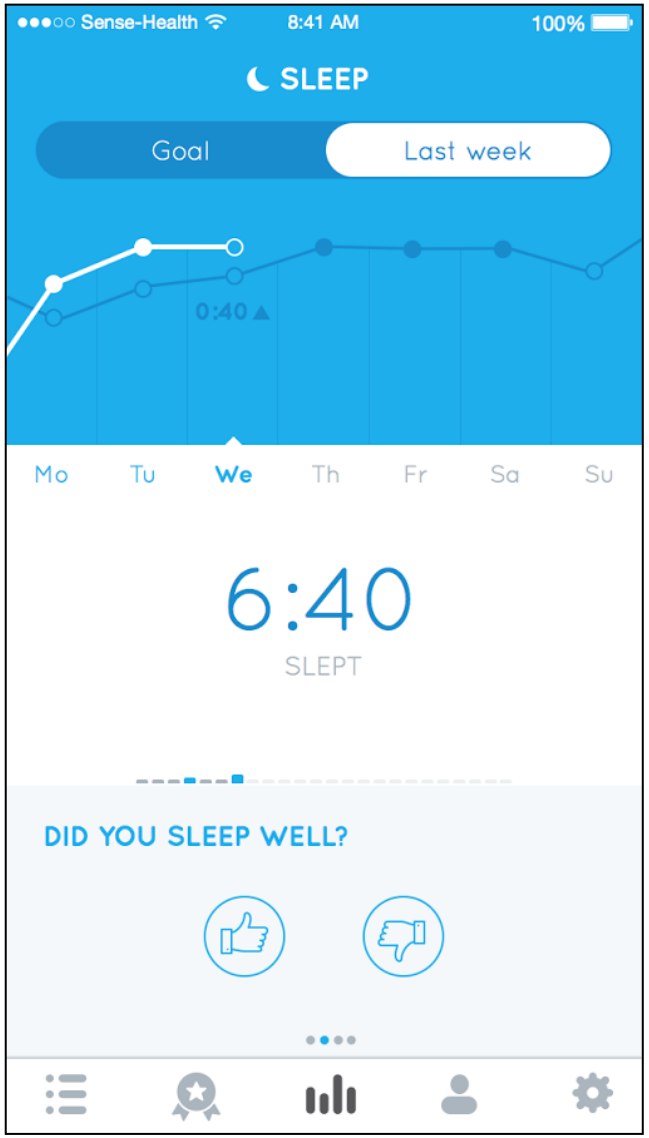

Sleep

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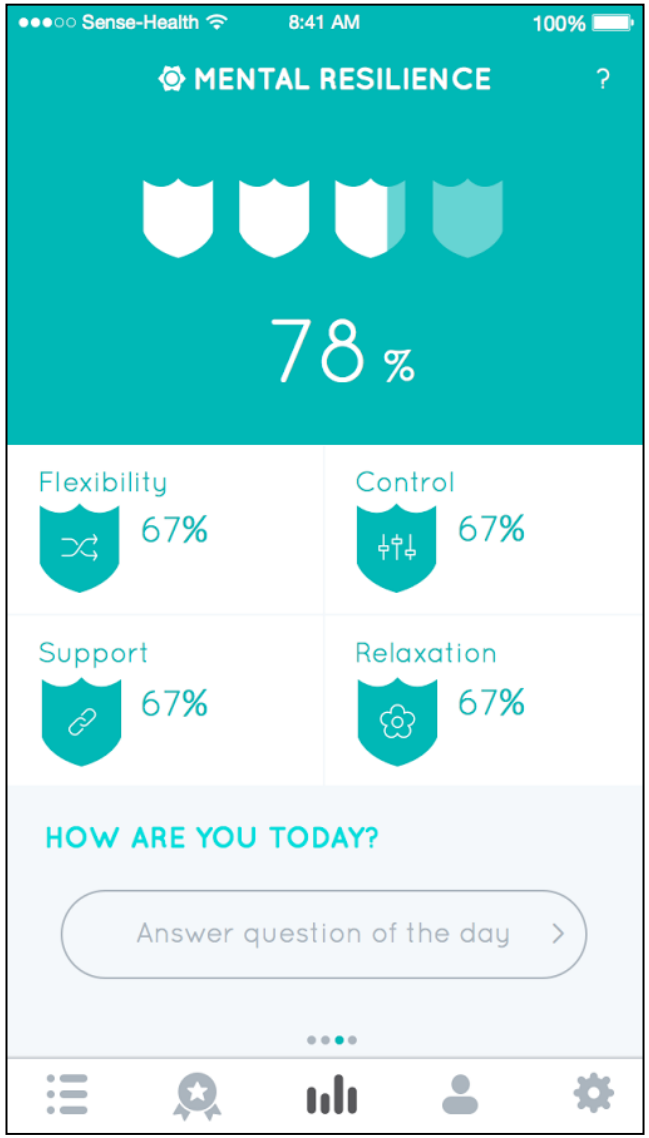

Mental resilience

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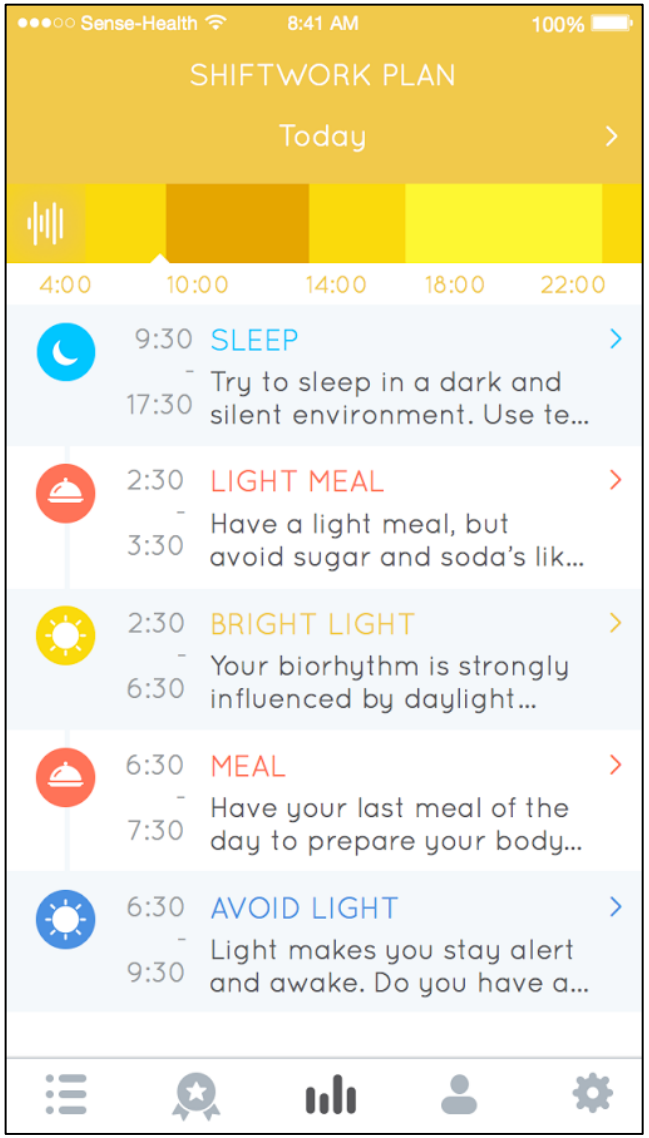
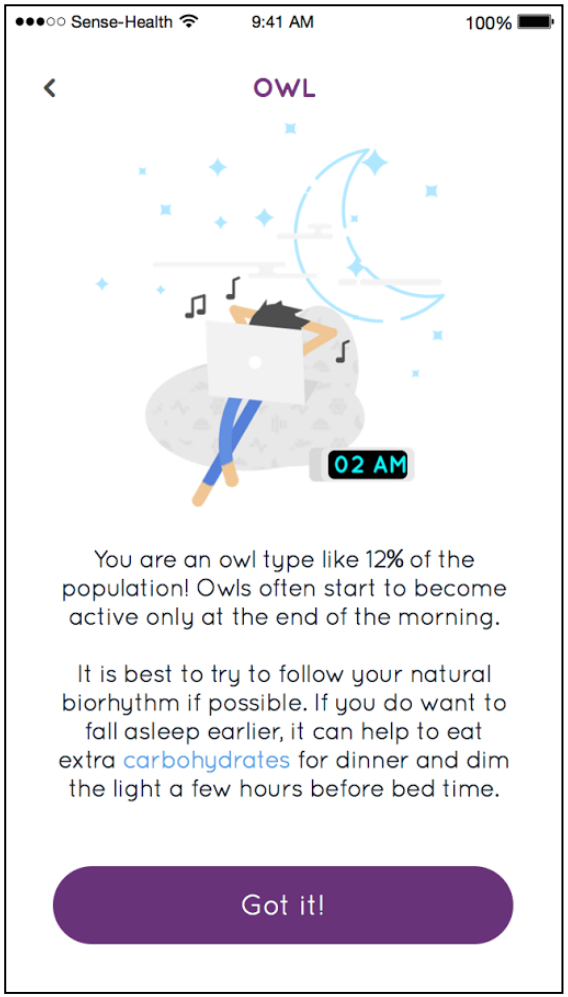
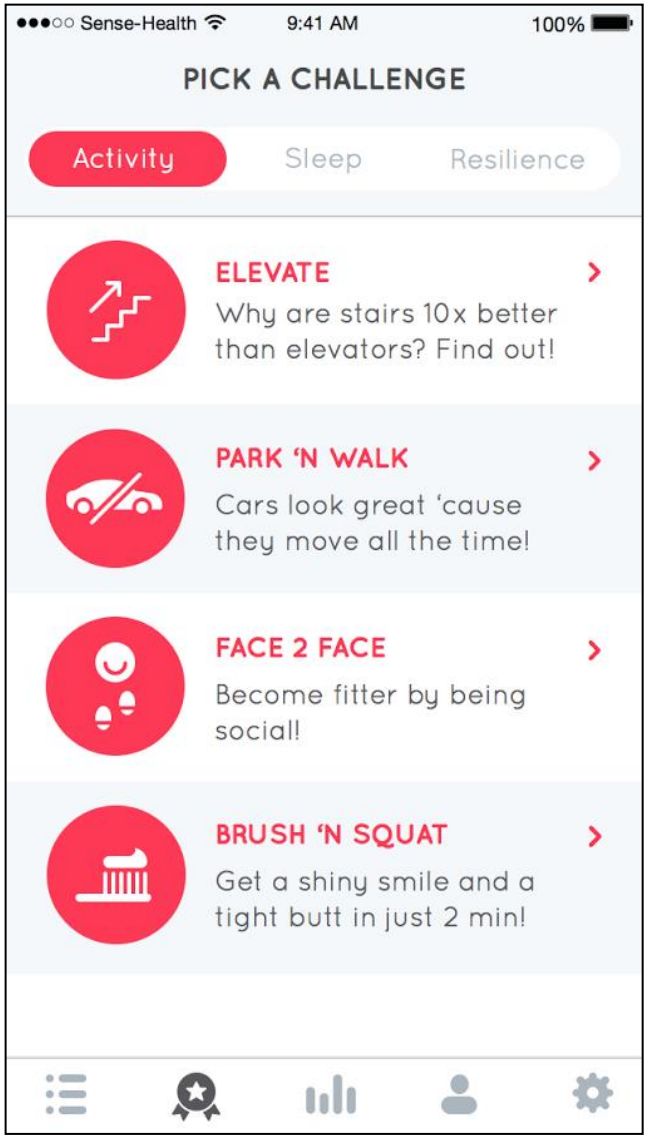
Shiftwork






Sense-Health
9:41 AM
100%
PICK A CHALLENGE
Activity
Sleep
Resilience
ELEVATE
Why are stairs 10x better than elevators? Find out!
PARK 'N WALK
Cars look great 'cause they move all the time!
FACE 2 FACE
Become fitter by being social!
BRUSH 'N SQUAT
Get a shiny smile and a tight butt in just 2 min!

Challenges

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Methods

- Three qualitative methods
  - focus-groups with industrial workers (3 groups, 15 participants in total),
  - individual interviews with industrial workers (22 participants)
  - a focus group with experts (7 participants, consisting of behavioral scientists, psychologists, ergonomists, designers, HCI researchers).
- Industrial workers at Dutch chip equipment manufacturer
  - shift-workers, cleanroom workers, office workers, travelling
- Constructs from user satisfaction and technology acceptance theories were used to categorize and compare the remarks extracted by each evaluation method. Codebook used by two researchers

(Wixom & Todd, 2005; Vosbergen ea., 2014; Bailey & Pearson, 1983)

Preliminary results: comparing focus-groups

	Industrial workers	Experts
Number of issues	93	52
Number of unique issues	60	19
Number of equivalent issues	33	33

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Preliminary results: comparing focus-groups

Domain	Ind. workers % issues in domain	Experts % issues in domain
System quality	21,1	23,5
Information quality	17,7	14,4
Service quality	1,1	-
Usefulness	27,4	22,7
Ease of use	3,0	8,3
Outcome expectations	14,7	12,9
Organizational factors	15,0	18,2

Examples of equivalent issues

Domain	Topic	Industrial worker	Expert
Ease of use	User friendliness	Because usability lacks I don't use it anymore	Usability is not good enough to motivate people to use the app spontaneously
Usefulness	Relevancy	Now I look to the shiftwork planning. You have to fill out a lot, but you need to know why you have to fill it in.	It was not clear what the reason was for filling out specific activities, I find it frustrating when that is not clear immediately
System quality	Tailoring	To tick things on or off, that would be handy	It is important that someone has room to choose which tips he would like to receive
Ease of use	Learnability	It appeared that much more can be done than I knew	After a week, I discovered that there was more than physical activity. When swiping accidentally, suddenly several modules appeared!

Examples of different issues within domains

Domain	Industrial worker	Expert
Usefulness	In the meantime I was so shocked about the information I got back, that I now live up to the advices. Otherwise, I am afraid that I will get heart problems (Usefulness)	Apps are very much based on intrinsic motivation (Adherence)
Outcome expectations	An app can enhance your health (health & performance effects)	The aim of the app is awareness (health & performance effects)
Organizational factors	Introduction seems fine (communication)	Embed the app in team sessions, and in a broader health program (communication)
Organizational factors	I don't care about data privacy (data security)	There is the risk that people do not trust the app. Data should be managed by a third party (data security)
Information quality	Sleeping and physical activity are important to me in an app	Shiftwork module is a nice part of the app, I don’t think it exists in other apps

First conclusions

- Less issues identified by experts
- Most discussed domains were system quality and usefulness
- Differences:
  - Within the system quality domain, workers mainly discussed the technical performance of (especially smartphone battery use), while experts discussed a lot on tailoring the app to the user
  - Within the organizational factors domain, experts discussed more on management involvement and organizational embedding
- Similarities:
  - Workers as well as experts positive about the different aspects of the app
  - Workers as well as experts were negative about the accuracy of the sleep measurements
  - App could be relevant for certain target groups (eg less active workers, shift workers) although it depends on individual which modules are relevant.

Next step

- Continue data analysis (interviews)
- Study on effectiveness with stepped-wedge design (randomizes the order in which groups receive intervention. Intervention group can be compared with both their pre-test an with other groups who did not receive intervention yet)
- Study on strategies to increase adherence (personalized feedback, gamification)

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