Applying user centred development methods to create acceptable and persuasive digital health interventions

Discussant: Cindy Gray
Contributors: Leanne Morrison, Emma Davies, Kate Morton, Kristina Curtis
A think aloud study with adolescents and teachers to explore acceptability of a digital intervention to reduce alcohol misuse

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The UK has a high prevalence of adolescent alcohol consumption compared to other European countries (Hibell et al., 2012).

Adolescents are a risk of harmful short term outcomes, and early drinking is associated with later problems (Newbury-Birch et al., 2009).

School is an important place to deliver early universal prevention. But there is lack of evidence base for school based prevention programmes (Foxcroft & Tsertsvadze, 2012).
INTERVENTION DEVELOPMENT

- Theory based interventions are often more effective than those not based on theory (Albarracin et al., 2005; Webb, et al., 2010).

- But only if they appropriately target the constructs within the theory they are based on (Prestwich et al., 2014)

- Theory based intervention components can be defined and named using a common language (Michie et al., 2013)
The Prototype Willingness Model explains risky behaviour as driven by social reactions to risk conducive situations (Gibbons et al, 2008).

The images or ‘prototypes’ of typical people of your own age who drink are influential for ‘willingness’ to drink though social comparison.

Targeting drinker prototypes might be a more effective approach compared to education or information giving approach based on assumptions of rationality.
Logic model for Prototype Willingness Model intervention specifying constructs, behavioural antecedents and the assumed impact of targeting each construct.

<table>
<thead>
<tr>
<th>PWM construct</th>
<th>Description of construct</th>
<th>Antecedent targeted by construct</th>
<th>Behavioural impact of targeting specific construct</th>
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<tr>
<td>Attitudes (perceived vulnerability)</td>
<td>What you think about the personal risks and consequences</td>
<td>Intentions</td>
<td>Reduction in <em>intentional</em> harmful or ‘binge’ drinking</td>
</tr>
<tr>
<td>Injunctive norms</td>
<td>What other people (friends or parents) think you should do</td>
<td>Intentions</td>
<td>Reduction in <em>intentional</em> harmful or ‘binge’ drinking</td>
</tr>
<tr>
<td>Descriptive norms</td>
<td>What you perceive other people your age to be doing</td>
<td>Willingness</td>
<td>Reduction in <em>unplanned</em> harmful or ‘binge’ drinking</td>
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<tr>
<td>Prototype Perceptions (favourability and similarity)</td>
<td>What you think about the typical person who engages in the behaviour</td>
<td>Willingness</td>
<td>Reduction in <em>unplanned</em> harmful or ‘binge’ drinking</td>
</tr>
</tbody>
</table>
Online quiz, 10 questions plus additional materials for class discussion aimed at young adolescents (11-14)

Targets perceptions of the ‘drunk’ and ‘non-drinker’ prototype

Includes implementation intentions; plans that link situations to specific actions or behaviours to help them become automatic (Gollwitzer, 1999)

In the Alcohol Smart Quiz, the implementation intentions are used to plan refusal, and plan what to do if someone needs help during/after drinking
- Free open source software for health intervention designers
- Programming for novices step by step guides and blocks of code
- Useful for testing interventions in pilot trials and getting end user feedback
The Alcohol Smart Quiz

Question 1
Teenage drinking is often reported in the news. Every year the results of a large study are published and it often hits the headlines.

What do you think this study has found in the last ten years about the number of young people aged 11-15 who have tried alcohol?

Please answer the question. You can guess if you don’t know.

Well done, that's correct!
The number of young people aged 11-15 who have tried alcohol has decreased in the last ten years.
This information comes from the annual Smoking, Drinking and Drug Use Survey, which is carried out by the Health and Social Care Information Centre.

Your score is now <score> / 1

No more points this time
The most common was being sick (vomiting)
The most serious was being taken to hospital
The most embarrassing was having an unwanted photo posted on social media

Fact: 11,306 young people aged 17 and under were taken to hospital after drinking alcohol in 2013/2012.
Source of the fact: NHS Hospital Episode Statistics

Question 7
Sometimes we all do things that we have not planned to do.
What do you think is the most common reason that young people give for getting drunk when they had not intended to?

Pressure from friends
Not remembering how much they had already had to drink
Not knowing how strong their drinks were

Please answer the question. You can guess if you don’t know.
Here are some examples of the plans that Pete and Lucy made to help them to deal with social situations where they were offered alcohol or felt under pressure to drink:

Pete said "I'm really into football so if someone is telling me to drink at a party, then I tell them that I need to be fit and healthy to stay on the team."

Lucy said "Alcohol is so full of calories! If someone pressures me to drink then I tell them that fact, they might laugh, but it is true."

What do you think of their plans? After the quiz you will think about making your own plans.

Activity

In questions 6 and 9 you saw how some young people had made plans in advance to help them to deal with situations where they might encounter alcohol.

Use your worksheet now to think about making plans of your own.

---

What is your quiz score?

0-5 – Need smartening up! Take a look at the factsheet as this might help you avoid some harm in the future

6-10 – Half smart. One day a friend may need you to be smart so make sure you look at the factsheet

11-15 – Getting smarter. This is an good score but hopefully this quiz has helped increase your knowledge

16-20 – You are alcohol smart! Your score shows that you have good alcohol knowledge.

Use the factsheet to help you remember the information from the quiz.
STUDY METHODS

- Semi-structured and think aloud interviews

- Nine teachers (all female) and 17 adolescents aged 11-14 (9 female)

- Analysed using thematic analysis using deductive (intervention specific) and inductive (participant experiences) approach
<table>
<thead>
<tr>
<th>Main theme</th>
<th>Subthemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking in moderation</td>
<td>Prototype perceptions</td>
</tr>
<tr>
<td></td>
<td>Avoiding the consequences</td>
</tr>
<tr>
<td>Influences</td>
<td>Pressure</td>
</tr>
<tr>
<td></td>
<td>Expectations</td>
</tr>
<tr>
<td></td>
<td>Planning</td>
</tr>
<tr>
<td>Facilitators and challenges</td>
<td>Classroom implementation</td>
</tr>
<tr>
<td></td>
<td>Content</td>
</tr>
<tr>
<td></td>
<td>Credibility</td>
</tr>
<tr>
<td></td>
<td>Social media and social image</td>
</tr>
</tbody>
</table>
[Non-drinkers are] maybe a little um too careful cause it’s alright to drink a little bit as long as you don’t drink too much and it’s kind of like a little less fun to not have a drink cause then you can meet people and like have fun (Aaron, M, 11)

Some would be absolutely disgusted because they knew their friend was in that state and the others would think ‘oh that was cool, I wish I’d had the nerve to do it (Mrs Jones)
MODERATION: PROTOTYPE PERCEPTIONS

- You can be different types of drunk, I know one of my friends is a happy drunk, I know someone else who just cries, it’s really weird actually, so it depends. (James, 14)
MODERATION: AVOIDING THE CONSEQUENCES

You are not completely in control when you have alcohol so you may do things that can impact your life. Then if it’s only a little bit of alcohol and it’s not like every week then I guess it’s kind of okay (Martha, F, 14).
INFLUENCES: PRESSURE

If you just wait until it happens then you probably, it’s, you probably get really flustered and if you already are drunk, it’s a bit late. If you plan beforehand then you have more time to think about it and actually clear headedly think about something what you could say, what implications it might actually have (Anna, F, 14).

You get pressured and that kind of makes you a bit nervous and makes you really want to do it cause they’re encouraging you to do it (Max, M, 12).
I think that trouble with planning when you’re talking about alcohol is that often your friends are drunk as well and you’ve just no idea how they’re going to respond or be during their drunkenness [laughs]. So you might well all agree that nobody is leaving on their own or that you know that you’re not going to get in anybody’s car on the way home or whatever but you know those become, plans can become shattered (Ms Smith)
I think you can use it in all different ways, we have net books that we can hire, or we could have it on the screen, answering their own questions online or we could just show it and answer the questions together, so I think it can quite adaptable (Ms Fox)
It’s good cause it hasn’t said anything about not doing it but it’s kind of like hinted in a way like bad things will happen if you overly drink but it hasn’t said anything about like ‘one glass of wine is going to make you do all this, or kill you’ (Kate, F, 13)
They need to know “How much is too much?” Like “what would you think is ok at a party?” You know like couple of beers to take. Yeah and those kinds of degrees of drunkenness that are acceptable. I wonder about that. Ah also the difference between binge drinking and regular drinking (Miss Day)
My friend had something put on Snap Chat that he really didn’t want and it was against his will but he was drunk and so he didn’t really know what he was doing! So everyone saw it for 24 hours and he was so embarrassed... at school he couldn’t look at anyone for like two weeks...it was a picture of him with no clothes on (James, M, 14).

Because of the access to mobile phones and things we’ve had young girls sending photographs of themselves to boys it’s then been uploaded and gone viral and it’s just horrific (Mrs Rowe)
IMPLICATIONS

- Intervention content and format appeared to be acceptable to adolescents and teachers.
- A ‘moderate’ prototype could be added as well as or instead of non-drinker or drunk prototype.
- Raises questions about how if-then plans could be enacted in high pressure situations.
- Delivering ASQ in the classroom would be feasible but perceived flexibility of intervention has implications for a trial.
FUTURE RESEARCH

- New version of ASQ in development
- ‘Moderate drinker’ prototypes to be added
- Short term positive and negative effects/ reasons for drinking will be discussed
- Focus on the avoidance of short term harms through action planning
- Discussion of social media and alcohol use
- Process evaluation and pilot trial
KEY REFERENCES


Thank you for listening

Thank you...
The adolescents and teachers who gave up their time to be interviewed
The parents of the adolescent participants
Aspa Paltoglou and Wakefield Carter for programming help
David Foxcroft and Jilly Martin who supervised my PhD, which informed this project
This project was funded by an Alcohol Research UK Small Grant

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Applying user centred development methods to create acceptable and persuasive digital health interventions

Discussant: Cindy Gray
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Health Heroes: Engaging parents in balancing their children’s food portions

Kristina Curtis, Ph.D.
The UK has one of the highest rates of childhood obesity among European countries (Public Health England, 2012).

Most prevalent determinants of CHO begin within the family environment (Knowlden & Sharma, 2012; Birch et al., 2001; Tabacchi et al., 2007).

mHealth offers a novel and innovative approach to childhood weight management.
Few industry led apps -

- **Target** parents
- **Underpinned** with theory and evidence
- **Involve** parents in the development process

Schoffman et al., (2013)
To develop a theory driven and user-centred app to support parents nutrition behaviours with their children
Behavioural Science Approach

The Behaviour Change Wheel (BCW: Michie et al., 2011; 2014)

COM-B Model: Michie et al., 2011
User-Centred Design (UCD) Approach

Simple interaction design model (Rogers et al., 2011)
mHealth intervention development process

Stage 1: Understanding the problem and user preferences
1. Define the problem
2. Select the target behaviour
3. Specify the target behaviour
4. (i) Understand the problem (COM-B & TDF);
   (ii) Understand user preferences for technological components

Stage 2: Translate research findings into app features
5. Apply criteria to user preferences
6. Select Intervention Functions (BCW)
7. Identify BCTs (BCTTV1)
8. Translate BCTs into app features

Stage 3: Pre-testing and refinement
9. Piloting and refinement potential app features with parents and experts
10. Usability Evaluation of the prototype app

Curtis et al., 2015
### Results of the BCW process

<table>
<thead>
<tr>
<th>Define problem</th>
<th>Select the target behaviour</th>
<th>Target group</th>
<th>Method for involving target group &amp; Analysis</th>
<th>Overview of COM-B Analysis</th>
</tr>
</thead>
</table>
| Too many overweight children in Warwickshire | Portion control | Parents | • Focus groups (n=6)  
• Thematic Analysis using inductive (user preferences) and deductive coding (using the COM-B as a coding framework). | Parents’ internal processes such as their knowledge and skills (Capability) emotional responses, habits and beliefs (Motivation), along with social influences such as partners and grandparents and the environmental influences relating to aspects such as schools, the media, and household objects (Opportunity), all interact and impact on their ability to manage their children’s portion sizes. |
Results of thematic analysis drawn from UCD process

Gamification

Fast, simple & convenient

Ideas for recipes and healthy food

Goal setting

Parental monitoring

Visual cues
Stage 2: Translating research findings into app features

<table>
<thead>
<tr>
<th>COM-B</th>
<th>TDF</th>
<th>IF</th>
<th>BCT*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Psychological Capability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>Education</td>
<td>4.1 Instruction on how to perform the behaviour, 8.3 Habit formation</td>
<td></td>
</tr>
<tr>
<td>Memory, attention and decision making skills</td>
<td>Training</td>
<td>4.1 Instruction on how to perform the behaviour, 8.1 Behavioural practice/rehearsal/8.3 Habit formation, Habit reversal</td>
<td></td>
</tr>
<tr>
<td>Skills (cognitive and interpersonal)</td>
<td>Training</td>
<td>4.1 Instruction on how to perform the behaviour, 8.1 Behavioural practice/rehearsal/8.3 Habit formation, Habit reversal</td>
<td></td>
</tr>
<tr>
<td>Behavioural Regulation</td>
<td>Training, Enablement, Modelling</td>
<td>2.1 Monitoring of behaviour by others without feedback, 2.3 Self-monitoring of behaviour, 2.2 Feedback on behaviour, 1.4 Goal setting</td>
<td></td>
</tr>
<tr>
<td>Intentions</td>
<td>Persuasion</td>
<td>1.9 Commitment</td>
<td></td>
</tr>
<tr>
<td>Social Identity</td>
<td>Persuasion, Modelling</td>
<td>13.1 Identification of self as role model, 13.4 Valued self-identity,</td>
<td></td>
</tr>
<tr>
<td>Beliefs about capabilities</td>
<td>Persuasion, Training</td>
<td>4.1 Instruction on how to perform the behaviour, 1.4 Goal setting, 2.2 Feedback on behaviour, 7.1 Prompts/cues</td>
<td></td>
</tr>
<tr>
<td>Beliefs about consequences</td>
<td>Education, persuasion</td>
<td>5.1 Information about health consequences, 5.3 Information about social and environmental consequences, 15.1 Verbal persuasion about capability,</td>
<td></td>
</tr>
<tr>
<td><strong>Reflective Motivation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automatic Motivation</td>
<td>Reinforcement</td>
<td>4.1 Instruction on how to perform the behaviour, 8.1 Behavioural practice/rehearsal/8.3 Habit formation, 8.4 Habit reversal,</td>
<td></td>
</tr>
<tr>
<td>Emotion</td>
<td>Persuasion</td>
<td>5.3 Information about emotional consequences, 5.5 Anticipated regret,</td>
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<tr>
<td>Physical opportunity</td>
<td>Environmental Context &amp; Resources</td>
<td>13.1 Adding objects to the environment, 12.1 Restructuring the physical environment,</td>
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<tr>
<td>Social opportunity</td>
<td>Social influences</td>
<td>Enablement</td>
<td>3.1 Social support (unspecified), 3.2 Social support (practical),</td>
</tr>
</tbody>
</table>

*The BCTs are listed with the numbers that they appear in the BCTT (v1) manual (Michie et al., 2014b)*
Stage 2: Translating research findings into app features

Consultation with experts

BCTs + User preferences
Physical opportunity

Environmental context & resources

Education, Environmental restructuring

Psychological capability

Skills

Training

Instruction on how to perform the behaviour

User preferences: visuals of food portions

App feature

EXCELLENCE WITH IMPACT

Coventry University
Stage 3: Pre-testing and refinement

- Interactive Mock-ups (three focus groups with a total of 20 parents)
- Usability workshop (19 parents)
- Think Aloud interviews (8 parents)
- Analysed using thematic analysis (inductive approach) and applying codes from Preece et al., (2002) model.
Usability and User Experience Goals (Preece et al., 2002)
## Example of results from pilot testing interactive mock-ups with parents

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sub-theme</th>
<th>U &amp; UX Code</th>
<th>Example quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>App feature</td>
<td>Portion guide</td>
<td>U: <em>easy to remember how to use</em> (+), <em>easy to learn</em> (+), UX: <em>satisfying</em> (+), <em>helpful</em> (+)</td>
<td>I think the bit with the hands and the portion sizes, I think that’s really really good as it’s so difficult to know what a portion size is and very easy to use (Parent, FG 9)</td>
</tr>
<tr>
<td>Gamification</td>
<td>Competition against other families</td>
<td>U: <em>safe to use</em> (-), UX: <em>motivating</em> (-)</td>
<td>Not too sure about that one as my son has a real complex about his weight so I think it would be tough on him to see other people and might get ‘oh well they are doing better than me’, do you know what I mean? It’s like a confidence thing (Parent, FG8)</td>
</tr>
<tr>
<td>App positioning</td>
<td>Healthy eating app</td>
<td>UX: <em>Emotionally fulfilling</em> (+), <em>satisfying</em> (+)</td>
<td>I like the idea that it’s about healthy eating, you know, not weight control, I like the name as well (Parent, FG9)</td>
</tr>
</tbody>
</table>

*(U) Usability (UX) User-experience *(-) negatively rated, *(+) positively rated
<table>
<thead>
<tr>
<th>Study</th>
<th>App feature/Content</th>
<th>Usability and user-experience rating*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Think Aloud</td>
<td>EULA</td>
<td>Efficient to use (-)</td>
</tr>
<tr>
<td></td>
<td>Welcome page</td>
<td>Helpful (-)</td>
</tr>
<tr>
<td></td>
<td>User Profile</td>
<td>Efficient to use (-), Satisfying (-)</td>
</tr>
<tr>
<td></td>
<td>Logging food</td>
<td>Efficient to use (-)</td>
</tr>
<tr>
<td></td>
<td>Tutorials</td>
<td>Efficient to use (-), Easy to learn (-),</td>
</tr>
<tr>
<td></td>
<td>Multi-touch display</td>
<td>Easy to learn (-), Satisfying (-)</td>
</tr>
<tr>
<td></td>
<td>Navigability</td>
<td>Efficient to use (-), Easy to learn (-)</td>
</tr>
<tr>
<td>Workshop</td>
<td>Overall impressions</td>
<td>Fun (+), Entertaining (+), Enjoyable (+), Aesthetically pleasing, Motivating (+)</td>
</tr>
<tr>
<td></td>
<td>Impressions of the Balance Wheel</td>
<td>Helpful (+), Safe to use (-)</td>
</tr>
<tr>
<td></td>
<td>Impressions of the quiz</td>
<td>Fun (+), Rewarding (+), Entertaining (+), Motivating (+)</td>
</tr>
<tr>
<td></td>
<td>The hand portion tool</td>
<td>Easy to learn (-) (+)</td>
</tr>
<tr>
<td></td>
<td>The Health Heroes logo</td>
<td>Fun (+), Aesthetically pleasing (-)</td>
</tr>
<tr>
<td></td>
<td>Tips and persuasive messaging content</td>
<td>Satisfying (+), Motivating (+)</td>
</tr>
</tbody>
</table>
Improving families’ diets: through portion control
Health Heroes

Take a photo of your meal for your records.
Next steps...

- Quantitative research (Usability Survey)

- National trial (using a single arm pre and post-test design) to balance families’ portion sizes in collaboration with Innovate UK and the Jamie Oliver Media Group
No such thing as a ‘completed’ mHealth app...

A systematic development process drawing on a range of disciplines

Collaboration with the digital media industry and behavioural scientists
Thank you for listening!

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References


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Applying user-centred development methods to create acceptable and persuasive digital health interventions

Discussant: Cindy M Gray
Opportunity of digital health interventions (DHI)

Huge potential for health and public health gain

- Ubiquitous support for health and health behaviour change
- Individualised, personally-relevant information at point of need
- Tailored, just-in-time messages and prompts
- Personalised goals/targets
- Real-time feedback, and historical graphs
- Easy access to social support
- Cost-effective and scalable
But.....

• Potential to be highly complex – problems/issues/feeling overwhelmed

• Usability is a key determinant of the overall impact of a DHI:
  • Understandability
  • Learnability
  • Operability
  • Flexibility
  • Attractiveness

→ A user/person/human centred approach is crucial to inform development of effective DHIs
Prioritising the user in digital intervention development: Introducing the person-based approach

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2nd December, UKSBM 2016, Cardiff

The person-based approach in action:

Developing a digital intervention for self-management of high blood pressure

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‘YOU CAN BE DIFFERENT TYPES OF DRUNK’

A think aloud study with adolescents and teachers to explore acceptability of a digital intervention to reduce alcohol misuse

Dr Emma L Davies
Oxford Brookes University
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Health Heroes: Engaging parents in balancing their children’s food portions

Kristina Curtis, Ph.D.

EXCELLENCE WITH IMPACT
4 Principles of human-centred design

4.1 General

4.2 The design is based upon an explicit understanding of users, tasks and environments

4.3 Users are involved throughout design and development

4.4 The design is driven and refined by user-centred evaluation

4.5 The process is iterative

4.6 The design addresses the whole user experience

4.7 The design team includes multidisciplinary skills and perspectives

5 Planning human-centred design

5.1 General

5.2 Responsibility

5.3 Content of plan

5.4 Integration with project plan

5.5 Timing and resources
Key considerations for user-centered approach to DHI design

- Will the target audience incorporate and sustain the DHI in their everyday lives/working practices?
- Context is critical
- User trials: real time data logging provides rich information about how people use DHI within daily routines
  - Which components do they use, and how?
  - Patterns of usage (different user typologies/personas)
Real time data logging – MyCity:Glasgow

Aims 1) increase PA and 2) increase engagement with Glasgow during 2014 Commonwealth Games

• BCTs
  • goal setting/review
  • self-monitoring of PA,
  • feedback

• Gamification
  • achievement (e.g., quizzes)
  • self-expression
  • status

Launched on app stores during summer 2014 – 1096 downloads
Real time data logging – MyCity: Glasgow
Real time data logging – MyCity:Glasgow

• Ratio of quiz-versus-goal-setting screen visits
  • 297 users visited quiz and/or goal setting screens
• 6 user personas – most engaged more with quiz than goal setting

• Large dataset to mine, but rich qualitative experience is lacking
User centred design – a hybrid approach

A Hybrid Mass Participation Approach to Mobile Software Trials

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ABSTRACT
User trials of mobile applications have followed a steady march out of the lab, and progressively further ‘into the wild’, recently involving ‘app store’-style releases of software to the general public. Yet from our experiences on these mass participation systems and a survey of the literature, we identify a number of reported difficulties. We propose a hybrid methodology that aims to address these, by combining a global software release with a concurrent local trial. A phone-based game, created to explore the uptake and use of ad hoc peer-to-peer networking, was evaluated using this new hybrid trial method, combining a small-scale local trial (11 users) with a ‘mass participation’ trial (over 10,000 users). Our hybrid method offers many benefits allowing localized user insights to be verified, confined to controlled laboratory conditions but there has been a general progress towards studies that take place in contexts more representative of the technologies’ eventual intended use, with systems trials taking evaluation out of the lab [8], and moving towards studying participants’ appropriation of technology in their everyday lives [3].

A recent step on this journey is the use of ‘app store’-style repositories to allow researchers to release applications that participants can install directly onto their own handsets, thereby extending the reach of the research to potentially very large numbers of users. The benefits of such ‘mass participation’ deployments have been discussed [7,20], such as a reduced cost to researchers and the ability to reach users from vastly diverse geographical backgrounds.
User centred design – a hybrid approach

- Combines global release (n=1,000s) with concurrent local user trial (n~10)
- Real-world context of use and diverse users
- Quantitative data *what* is happening’: qualitative data *why* it is happening
- Data collected from each user group feeds into and generates research questions for the other
- Iterative process – rich data to inform DHI development
“The development of evidence-based strategies for behavior change is iterative and involves “ongoing optimization” that carefully studies the “fit” between individuals, context, and interventions for producing a desired outcome”

Heckler 2016
Discussion

• What are the challenges of a user-centered approach to DHI development?

• How do we overcome them?
User consultation throughout DHI development lifecycle

• Pre-development
  • Identify needs of potential users – surveys/questionnaire
  • Identify potential components – focus groups of user experts (e.g. people who play games for My City: PA game-based mobile app)

• During development (iterative process)
  • Low fidelity: paper/wireframe, feedback on screen layouts through interviews/focus groups
  • High fidelity prototypes, feedback on components and functionality through talk through activities
  • User trials → short road testing (e.g. one week) in real life context with interviews/focus groups at end
Applying usercentred development methods to create acceptable and persuasive digital health interventions

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