'Visiting your health club's web site is a start, but I prefer you actually go there and exercise.'
Can smartphone apps help people change their behaviour?

Stephen Sutton

Behavioural Science Group
Institute of Public Health
University of Cambridge

webpage: www.phpc.cam.ac.uk/pcu/research/research-groups/bsg/
email: srs34@medschl.cam.ac.uk
Why try to change behaviour?

- Smoking
- Not being physically active
- Unhealthy diet
- Drinking too much alcohol

Together, these account for a large proportion of chronic disease and premature deaths e.g.

Physical inactivity responsible for 6% of coronary heart disease, 7% of type 2 diabetes, 10% of breast and colon cancer, and 9% of premature mortality or >5.3 million deaths per year worldwide

Unhealthy behaviours are very common

- 15.1% of adults in the UK smoke – about 7.4 million smokers
- Fewer than 10% of UK adults meet the physical activity guidelines
  (at least 30 mins of moderate intensity activity on at least 5 days a week)

So millions of people in the UK engage in 1 or more of the ‘Big Four’ behaviours
How change behaviour?

• Smoking bans
• Tax/price increases
• Advertising campaigns
• Food labelling
• Provide cycle paths
• Advice from healthcare practitioners
Why smartphones?/Why smartphone apps?

• Smartphones very widely used: 78% of UK adults
  [Ofcom Communications Market Report August 2018]

• People can access apps at any time

• Information can be highly tailored

• Apps provide an interactive experience

• Apps easily updated

• Relatively inexpensive (once they’ve been developed)
Smartphone apps to

1. Increase vegetable consumption (Vegethon)

2. Support smoking cessation (Q sense)

Aim to give some insight into how we go about developing and evaluating such interventions within the constraints of time, funding and available expertise.
The Vegethon Challenge

At each meal, pile in as many delicious, energizing, cancer-fighting vegetables as you can.
Vegethon

• iPhone app to support increased consumption of vegetables in overweight adults

• Collaboration with Stanford University, funded by Gates PhD scholarship to Sarah Mummah

• Formative research:
  (i) Participants liked the idea of the app. But they wanted an easy way to monitor and record veg consumption;
  (ii) Participants also said the whole topic of eating more veg was pretty boring and that the app had to be fun, otherwise they wouldn’t use it.

Vegethon (contd)

- To make it fun, we used ‘gamification’ (the application of typical elements of game playing e.g. point scoring, competition with others, rules of play)

- Gaining points for the variety of vegetables consumed as well as quantity

- Surprise challenges e.g. *Eat a serving of an orange vegetable by 7pm today* or *Eat three vegetables of different colours today*.

- Colourful icons for the vegetables and brought colour in as much as possible

- Included a leaderboard so that the user could compare their progress with other users (‘Vegethoners’)

Vegethon (contd)

Outcome motivators and process motivators

• Outcome motivator: provide information that increasing vegetable consumption would help to reduce the risk of heart disease and cancer

• Process motivators: things that encourage use of the app and short-term positive aspects of eating more vegetables: fun; challenge; incentives and rewards; competition; ease of use; colour; variety; taste
Vegethon randomised controlled trial

• 135 overweight adults aged 18-50 years, taking part in a weight loss programme
• Randomised to app or wait-list control
• Self-reported veg consumption measured at baseline and 8 weeks using Food Frequency Questionnaire
• Baseline consumption was about 7 servings/day
• At 8 weeks, consumption was 2.0 servings/day higher in the app group
• Logging function was only used once a day but the app was quite highly rated:
  “Vegethon has made me aware of how few vegetables I eat” (4.1)
  “I have found Vegethon easy to use” (3.8)
  “Vegethon has helped me track my vegetable consumption” (3.7)

Vegethon randomised controlled trial (contd)

Limitations

• Short-term effectiveness
• Measure of vegetable consumption relied on participants reporting accurately and honestly

Nevertheless, findings quite encouraging

Would like to test the app in a larger sample of people in the general population
Q sense app
Combines tailored message libraries with a smartphone sensing system.

Delivers real-time ‘context-aware’ behavioural support triggered by the smoker’s proximity to a pre-identified high-risk location for smoking.
Q Sense

BEFORE QUIT DATE

IF REPORTS > 1 THEN ACTIVE GEOFENCE CREATED

1/4: How __ were you feeling just before you lit up?

2/4: Cravings and Urges.

3/4: Which of the following best describes the situation or place you are currently in?

4/4: Who are you with?
You Can Handle This!

When asked why they relapsed, a lot of smokers name 'stress' as the reason. Don't let this be a reason for you, Felix. Your efforts so far show that you CAN handle stress, at work or anywhere!
Q sense acceptability and feasibility study

• 3 out of 15 discontinued use of the app prematurely

• Pre-quit date, mean number of smoking reports received was 37.8 (2 per day per participant) = substantial under-reporting

• 50% of geofence-triggered message notifications were tapped within 30 minutes of being generated (which suggests that users were attending to the messages)

• Generally, participants were very positive about the support messages

Q sense next steps

- At an earlier stage of evaluation than Vegethon

- Next stage: larger study to assess use and acceptability in a larger sample of smokers and to assess whether it might help them to quit

- Rely on smokers to tell the app when they’re smoking
  Automatic detection of smoking?
  Requires smoker to wear a smartwatch

Concluding remarks

Two challenges with smartphone apps:

1. Getting people to start using them (easier in research context)

2. Keeping users engaged. 21% of downloaded health apps are used only once. Somehow need to ‘hook’ users.
   • Elements of gamification, competition, scoring points, use process motivators – app should be fun, rewarding, surprising, logging behaviour should be quick and easy etc. etc.
   • Encourage ‘holidays’ away from using the app e.g. 3 months ‘on’ followed by 1 month ‘off’
   • Shouldn’t necessarily think of an app as something to be used for a long time
Concluding remarks

Two generalisations:

Behaviour change apps that are publicly available have not been evaluated, and those that have been evaluated are not publicly available.

Most publicly available behaviour change apps do not make optimal use of behaviour change theory and evidence.

e.g. Morrissey et al. coded 166 medication adherence apps for the presence or absence of each of 96 established behaviour change techniques (BCTs). A total of 12 were found to be present across apps. They say “…this highlights an opportunity for health behaviour change experts to team with software developers to develop theory-based apps with improved quality and effectiveness”.

Collaborators

Vegethon
Sarah Mummah
Christopher Gardner
Abby King
Tom Robinson

Q sense
Felix Naughton
Cecilia Mascolo
Neal Lathia
Tim Coleman
Andy McEwen