Shape Physical Activity Behaviour with Personal Mobile Displays

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Aberystwyth University
Digital technology and interfaces: shaping consumer behaviour by informing conceptions of ‘normal’ practice

Kingston, Swansea, UWE
www.projectcharm.info
This talk

• What is influence?
• Social norms and examples
• How can we change social norms?
• Green or normal?
• Active Lifestyle: technologies and persuasion
• Swansea and Active Lifestyle
• Conclusions
Influence

• What other people do
• As we hear more about what others do we are encouraged to do what they do
• Peer pressure
• Social proof

"He's perfectly adjusted to his peer group. That's what I'm worried about."
Practice Theory

• ‘Social practice theory’ suggests that individual behaviours are best understood as emerging from social practices
  – ‘Normal’, taken-for-granted, routine and habitual
  – Combination of:
    • Established ways of thinking (norms)
    • Established ways of doing (norms)
    • Broader socioeconomic contexts (infrastructures, regulations, institutions)
    • Things (machines, technologies)
  – Immensely malleable, always changing
Social Norm Approach

- Descriptive social norms e.g. 75% of people …
- Has been applied to
  - Campus issues: alcohol, smoking, drugs
  - Sustainability: electricity consumption, hotel towel re-use, conservation,
- Nolan et al: Social norm messages more effective than appeals to self interest, social responsibility or environmental responsibility

Social Norm Approach

• Reference group effect

JOIN YOUR FELLOW GUESTS IN HELPING TO SAVE THE ENVIRONMENT.

In a study conducted in Fall 2003, 75% of guests who stayed in this room (No. xxx) participated in our new resource savings program do help by using their towels more than once. You can join your fellow guests in this program to help save the environment by reusing your towels during your stay.
Social Norm Approach

• Boomerang effect

  – Schultz et al.: people who use less electricity than the ‘norm’ increase their electricity consumption
  – Can be avoided by indicating social approval or rewarding: ‘injunctive norms’
  – Injunctive norms : What should people do

Social Norm Approach Guidelines

1. Telling people *what* other people do (descriptive norm)
   More effective when
   – credible, evidence-based, clearly expressed
   – related to a majority
   – related to a relevant reference group
   – there are misconceptions

2. Boomerang effect
   – movement is *towards* the norm (low energy users may use more, very active people may become less active)
   – This can be avoided by indicating social approval for a desired behaviour (injunctive norm)

3. Ill-advised majority norms are easily created
Examples

Social Norms
Example 1: Room Temperature

Accepted indoor temperature is 22 degree Celsius.

Buildings, clothing habits, and energy consumption.
Example 2: Cleaning

Taking a shower everyday

Washing bed linen every 2 weeks

Accepted norm for cleanliness and comfort in the UK
Example 3: Active Lifestyle

Walking/jogging 10000 steps everyday

Cycling 10 miles everyday

Accepted norm for being active and fit in Western countries
Successful Example
motivates millions to become more energy efficient

Trial in 35,000 US homes
Reduction in consumption of 2-3%
Shape Physical Activity Behaviour with Personal Mobile Displays
Why Active Lifestyle?

• Rise in obesity, diabetes, chronic diseases and many other diseases due to the lack of physical activities

• Financial pressure on families, health services and governments.
And the Challenge is

How to obtain desired changes without a significant disruption of one’s current lifestyle.
Technologies

Personal Activity Monitoring Devices (PAMD)
Step monitoring

Pedometers
25 PAM points per day is the norm

**Tesco Diets Active:**
The miband records everything on a weekly basis, from housework to workouts and everything in between. It can be synchronised on a weekly basis using the online coaching system.
Walk with me: walk and have fun!
Technologies

Personal Activity Monitoring on Mobile Platforms
iPhone Pedometer

Today's Totals

Steps: 1,616
Distance: 1.48 mi
Calories: 139 Cal

Time

03:17.9
Lap 1: 01:15.6
Lap 2: 01:04.6
Lap 3: 00:57.7

distance 0.32 mi
Calories 35.6
avg speed 5.9 mph
iMapMyWalk (Android, iOS)
Technologies

Beyond the Physical Devices
Fish ‘n’ Steps: Encouraging Physical Activity with an Interactive Computer Game
Flowers or a Robot Army? Encouraging Awareness & Activity (UbiFIT)


*Flowers or a robot army? encouraging awareness & activity with personal, mobile displays.* In UbiComp’08: Proceedings of the 10th international conference on Ubiquitous computing, pages 54-63, NY, USA, 2008. ACM.
Summary

• Cost effective devices
• Goal setting
• Social group/reference group
• Feedback: should be delivered at anytime and anywhere or just “in time”
• Reminders
• Incorporate emotional aspects or persuasive computing techniques
bActive

Computer Science
Swansea University
2009 - 2012
Initial Questions

1- Which phone is the best choice? (multitasking, built-in sensors, ...), purchasing the phones ...
2- How to design the persuasive app without being intrusive? e.g. app running in the background
3- How to recruit participants? Which agency?
4- Who is going to participate in the study? And how many?
5- Which activities to include?
6- When should we run the study? And for how long?
7- Which factors should be considered while doing the study? (weather, general health, diet, ...)
8- How to convince the ethics committee?
...

Which Phone Does Take Participants Breath Away?

vs.
2009-2010

- 10 men (age 22-40) in Cafes and restaurants were interviewed in Swansea:
  - Happy to use HTC desire, and to use it as their own phone for 3 months for £80 : 8/10 said yes
  - 50% already had an unlimited data plan. 20% had limited data plan and 30% had no data plan.
  - 30% were fairly active already, (gym, football, running) 70% weren't overly active but do want to be more active.
  - 100% said they would have use of an activity monitoring application!
Winner!

HTC Desire
Android 2.2
How to Design the App on the Phone?
Built-in ACC on the phone

Mobile Network

GSM/GPRS

Database and Web Server

Update the animation of the average of the group on the screen

Update the animation of the participant on the screen

Calculate the accurate measure of number of steps and calories burnt for each participant
Keeping the Battery Alive

K = 30 seconds
M = 20 readings
6-week field trial (Aug-Sept 2011)

- Recruitment method: Field Work UK (FWUK) agency
- 30 Volunteers (22-40 men) approached in Bristol with a range of backgrounds.
- Physical Activity Readiness Questionnaire (PAR-Q)
- Agreed to use their own sim-card but our phone
- Accept the extra roaming charge if go abroad
- Fill-in a pre-study questionnaire
- Selected 10 (7 social group, 3 control group)
Cntd.

- Posted an HCT desire rooted and flashed with Android 2.3 and bActive installed
- Instant and online help for the bActive
- Regular emails and sms reminders to keep the phone in their trouser pockets.
- Post-study questionnaire
- Owned the handset
Activity (control & social averages)

- **control**
- **control (lin. fit)**
- **social**
- **social (lin. fit)**

Week range: 0 to 6

Avg steps range: 0 to 7000
Final trial
7-week final trial
(Oct-Dec 2011)

• Recruitment method: Field Work UK (FWUK) agency
• 190 Volunteers (22-40 men) approached in Bristol with a range of backgrounds.
• Physical Activity Readiness Questionnaire (PAR-Q)
• Agreed to use their own sim-card but our phone
• Accept the extra roaming charge if go abroad
• Fill-in a pre-study questionnaire
• Selected 165 (55 social group, 55 control group, 55 individual group)
Final Pilot (Oct-Dec 2011)
Survey results
(post-study survey)
"How much, if at all, has your walking activity changed because of your participation in this research?"

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Median</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>+11%</td>
<td>0%</td>
<td>(20 said it went up)</td>
</tr>
<tr>
<td>Individual</td>
<td>+13%</td>
<td>0%</td>
<td>(24 said no change)</td>
</tr>
<tr>
<td>Social</td>
<td>+24%</td>
<td>+20%</td>
<td>(15 said no change)</td>
</tr>
</tbody>
</table>

(14 - walking in place of public transport)
Accuracy of step-count

Confidence in accuracy of step count
  Social 3/5 = mean
  Individual 3/5 = mean

What % of steps did app record? 75% (mean)

Lack of accuracy caused me to use app less?
  - 8 individual participants agreed
  - 5 social participants agreed
Was the app interesting / fun?

<table>
<thead>
<tr>
<th>Type</th>
<th>Interesting</th>
<th>Fun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>91%</td>
<td>60%</td>
</tr>
<tr>
<td>Social</td>
<td>92%</td>
<td>74%</td>
</tr>
</tbody>
</table>
Boomerang? (social only)

When I saw how much I walk compared to others, I stopped trying to increase the amount I walk...
- 1 person agreed

The feedback about other people made me competitive
- 48% agreed
Depth interviews
Control (N=2)
1. “J”
   - overweight and trying to reduce
   - disappointed not to get feedback
   - walked more cos it made him more aware
2. “D”
   - walks for smoke less and to get away from partner
   - not aware of phone during study so didn’t change behaviour

Individual (N=2)
1. “C”
   - walks more since having kids, cos it tires them out
   - didn’t walk more during study cos
     a. No time
     b. lacks willpower
     c. Didn’t want to spoil the research
2. “A”
   - already v active, so no desire to walk more
   - didn’t think of walking as ‘exercise’
Social (N=3)

1. “K”
   - walking = “clearing your head” / “social activity”
   - some people just walk more cos of their jobs - there’s nothing to be competitive about
     - didn’t walk more cos would have spoiled the research

2. “J1”
   - previously walking = social (banter with mates); or for thinking things through
   - competition -> walked lots more
     - learnt: walking makes you feel better; even after long day’s work
       walking = exercise
       small walk = lots of steps

3. “J2”
   - overweight and trying to reduce
     - revealed unknown competitive tendency
       - went on more and longer walks
       - was more active at work
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