The Behaviour Change Wheel: a tool to promote consumer food safety

Dr Lou Atkins
Senior Teaching Fellow and Australasian Hub Lead, UCL Centre for Behaviour Change
UCL Centre for Behaviour Change

Who we are

• Core team of researchers, trainers & practitioners in behaviour change
• A cross-disciplinary community of academic experts at UCL & beyond
• Global network of over 4,000 contacts

Our aims

To harness the breadth and depth of academic expertise in behaviour change to
• Increase the quantity and quality of behaviour change research
• Translate that expertise to policy-makers, practitioners, industry, NGOs and researchers
to address key challenges facing society

What we do

Training
• International Summer Schools
• Bespoke and open short courses and workshops

Teaching
• MSc Behaviour Change (launching Sept 2017)
  http://eepurl.com/cbnZ2D

Research
• Methods and theories of behaviour change
• Behaviour change interventions applied to real world issues

Consultancy
• Behaviour change expertise provided to public, private and charity sector organisations

Events
• Digital Health Conferences (22 & 23 Feb 2017)
• Public talks and seminars

Resources

www.ucl.ac.uk/behavior-change  @UCLBehaveChange
Key collaborators in this work

Pr Susan Michie

Pr Robert West

UCL Health Psychology Research group
We know we can’t build bridges or perform open heart surgery.

We recognise these tasks require expert knowledge and skills.
Yet when it comes to changing behaviour......

we all behave and see others behave ....

and have our own theories about how to change behaviour ...

_and they can be wrong!

There is a science of behaviour change but it’s not always applied...
Many interventions designed according to The ISLAGIATT principle of intervention design...

*It Seemed Like A Good Idea At The Time*
This talk...

Some tools to apply the science of behaviour change to promote consumer food safety

Key words: Comprehensive, Systematic, Transparent
Which behaviours? Four core practices:

**Clean**
- Hand washing
- Cleaning utensils
- Cleaning surfaces
- Rinse fruit and veg

**Separate**
- Using cutting boards
- Cooked and raw food placement
- Food placement in cart and fridge

**Cook**
- Using a thermometer
- Cooking eggs until firm
- Reheating sauces
- Ensuring no cold spots

**Chill**
- Timely refrigeration
- Marinating
- Defrosting
- Timely disposal

http://www.fightbac.org/food-safety-basics/the-core-four-practices/
Which behaviours?

• Consider:
  
  – likely impact if undertaken
  
  – likelihood that such a behaviour will be implemented
  
  • ease, cost
  
  • preference, acceptability
  
  – spillover to other behaviours and people
  
  • every behaviour is within a network of the other behaviours and each person is within a network of other people

Less is more!
Specify the target behaviour

- Specify **who** needs to do **what**, **where** do they need to do it, **when**, **how often** and for **how long**?

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>What?</th>
<th>Who?</th>
<th>How long</th>
<th>Where/when?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning hands</td>
<td></td>
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</table>

- Being more specific about which behaviour(s) we are trying to change allows us to be more focussed when it comes to understanding these behaviours....
Understand the behaviour in context

• To change behaviour we need to understand it

• Why are behaviours as they are?

• What needs to change for the desired behaviour/s to occur?
The COM-B model

Behaviour as an interaction between three necessary conditions

- **Capability**
  - Psychological or physical ability to enact the behaviour

- **Motivation**
  - Reflective and automatic mechanisms that activate or inhibit behaviour

- **Opportunity**
  - Physical and social environment that enables the behaviour

**References**

Michie et al (2011) Implementation Science
Collecting data using the COM-B model

Questionnaires - for larger samples

Interviews/focus groups - for in-depth qualitative data

Observation

Structured discussion - if resource poor
Using COM-B to understand what needs to change for people to use separate cutting boards

**Capability**
- *Psychological* – Do they know to use separate cutting boards for raw meat?
- *Physical* – Possibly not relevant.

**Opportunity**
- *Physical* – Do they have more than one cutting board?
- *Social* – Possibly not relevant.

**Motivation**
- *Reflective* – Do they think it’s important to do (do they think there are benefits/harms of doing it)?
- *Automatic* – Do they need to develop a routine or habit of using separate cutting boards?
Intervening: Consider the full range of options

• Need a framework that is:

  1. Comprehensive
     • So don’t miss options that might be effective

  2. Coherent
     • So can have a systematic method for intervention design

  3. Linked to a model of behaviour
     • So that can draw on behavioural science

Useable by, and useful to, policy makers, service planners and intervention designers
Do we have such a framework?

- Systematic literature review identified 19 frameworks of behaviour change interventions
  - related to health, environment, culture change, social marketing etc.

- None met all these three criteria

- So .... Developed a synthesis of the 19 frameworks

- The Behaviour Change Wheel

Michie et al (2011) Implementation Science
Behaviour at the hub .... COM-B
Intervention functions (the purpose(s) an intervention serves)

- **Use rules to reduce the opportunity to engage in the behaviour**
- **Increase knowledge or understanding**
- **Use communication to induce positive or negative feelings to stimulate action**
- **Create an expectation of reward**
- **Create an expectation of punishment or cost**
- **Impart skills**
- **Increase means or reduce barriers to increase capability (beyond education or training) or opportunity (beyond environmental restructuring)**
- **Provide an example for people to aspire to or emulate**
- **Change the physical or social context**

**Capability**
- Physical
- Psychological
- Automatic
- Reflective

**Opportunity**
- Restrictions
- Education
- Persuasion
- Incentivisation
- Coercion

**Motivation**
- Modelling
- Enablement
- Training
Making or changing laws

Designing and/or controlling the physical or social environment

Creating documents that recommend or mandate practice. This includes all changes to service provision

Using the tax system to reduce or increase the financial cost

Establishing rules or principles of behaviour or practice

Delivering a service

Using print, electronic, telephonic or broadcast media

Policy categories (i.e. the channels through which an intervention is delivered)
• Intervention functions based on understanding the behaviour using COM-B

• Policy categories based on selected intervention functions

Matrices allow a systematic method for selecting...
The APEASE criteria: Making context-based decisions on intervention content

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affordability</td>
<td>Can it be delivered within an acceptable budget?</td>
</tr>
<tr>
<td>Practicability</td>
<td>Can it be delivered as designed and to scale?</td>
</tr>
<tr>
<td>Effectiveness/cost-effectiveness</td>
<td>How well does it work and is it worth the cost?</td>
</tr>
<tr>
<td>Acceptability</td>
<td>Is it judged appropriate to relevant stakeholders (policy makers, practitioners, the public) and engaging for potential users?</td>
</tr>
<tr>
<td>Side-effects/safety</td>
<td>Does it have unwanted side-effects or unintended consequences?</td>
</tr>
<tr>
<td>Equity</td>
<td>Will it reduce or increase disparities in health/wellbeing/standard of living?</td>
</tr>
</tbody>
</table>
We can design a broad intervention strategy specifying....

- What purpose (function) our intervention should serve, e.g. to educate, persuade, enable etc.

- How the intervention will be delivered, e.g. communication/marketing, guidelines etc.

.... but how exactly are we effecting change within this intervention strategy?
Behaviour Change Techniques (BCTs)

• “Active ingredients” within the intervention designed to change behaviour

• They are:
  • irreducible components of an intervention
  • observable/measurable
  • replicable

• Can be used alone or in combination with other BCTs

‘Goal setting’

‘Self-monitoring’
### Variable terminology

#### Descriptions of “behavioural counselling” in two interventions

<table>
<thead>
<tr>
<th>Title of journal article</th>
<th>Description of “behavioural counselling”</th>
</tr>
</thead>
<tbody>
<tr>
<td>The impact of <em>behavioral counseling</em> on stage of change fat intake, physical activity, and cigarette smoking in adults at increased risk of coronary heart disease</td>
<td>“educating patients about the benefits of lifestyle change, encouraging them, and suggesting what changes could be made” (Steptoe et al. AJP 2001)</td>
</tr>
<tr>
<td>Effects of internet <em>behavioral counseling</em> on weight loss in adults at risk for Type 2 diabetes</td>
<td>“feedback on self-monitoring record, reinforcement, recommendations for change, answers to questions, and general support” (Tate et al. JAMA 2003)</td>
</tr>
</tbody>
</table>
Different for biomedical interventions...

—i.e. Pharmacological ingredients/dose/frequency administration clearly stated for each medication in British National Formulary (BNF)

<table>
<thead>
<tr>
<th>Biomedical</th>
<th>Behavioural support</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Intervention content for varenicline/Champix (JAMA, 2006):</em></td>
<td><em>Intervention content (Cochrane, 2005):</em></td>
</tr>
<tr>
<td><img src="image" alt="Chemical structure of varenicline" /></td>
<td>- Review smoking history &amp; motivation to quit</td>
</tr>
<tr>
<td></td>
<td>- Help identify high risk situations</td>
</tr>
<tr>
<td></td>
<td>- Generate problem-solving strategies</td>
</tr>
<tr>
<td></td>
<td>- Non-specific support &amp; encouragement</td>
</tr>
<tr>
<td><em>Mechanisms of action:</em></td>
<td><em>Mechanisms of action:</em></td>
</tr>
<tr>
<td>Activity at a subtype of the nicotinic receptor where its binding produces agonistic activity, while simultaneously preventing binding to a4b2 receptors.</td>
<td>None specified.</td>
</tr>
</tbody>
</table>
In a nutshell....

Until recently, we lacked a shared language!

What is the solution?
The Behavior Change Technique Taxonomy (v1) of 93 Hierarchically Clustered Techniques: Building an International Consensus for the Reporting of Behavior Change Interventions

Susan Michie DPhil, CPsychol, Michelle Richardson PhD, Marie Johnston PhD, CPsychol, Charles Abraham DPhil, CPsychol, Jill Francis PhD, CPsychol, Wendy Hardeman PhD, Martin P. Eccles MD, James Cane PhD, Caroline E. Wood PhD

Abstract

Background
CONSORT guidelines call for precise reporting of behavior change interventions: we need rigorous methods of characterizing active content of interventions with precision and specificity.

Objectives
The objective of this study is to develop an extensive, consensually agreed hierarchically structured
# BCT Taxonomy v1

- **93 BCTs**
- **Labels, definitions and examples**

## Table of Grouping and BCTs

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<th>Grouping and BCTs</th>
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<td>1. Goals and planning</td>
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<td>6. Comparison of behaviour</td>
<td>16</td>
<td>12. Antecedents</td>
</tr>
<tr>
<td></td>
<td>1.1. Goal setting (behavior)</td>
<td></td>
<td>6.1. Demonstration of the behavior</td>
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<td>12.1. Restructuring the physical environment</td>
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<td></td>
<td>1.2. Problem solving</td>
<td></td>
<td>6.2. Social comparison</td>
<td></td>
<td>12.2. Restructuring the social environment</td>
</tr>
<tr>
<td></td>
<td>1.3. Goal setting (outcome)</td>
<td></td>
<td>6.3. Information about others’ approval</td>
<td></td>
<td>12.3. Avoidance/reducing exposure to cues for the behavior</td>
</tr>
<tr>
<td></td>
<td>1.5. Review behavior goal(s)</td>
<td>7.1. Embedding in social context</td>
<td></td>
<td></td>
<td>12.4. Distraction</td>
</tr>
<tr>
<td></td>
<td>1.6. Discrepancy between current behavior and goal</td>
<td>7.2. Cue signalling reward</td>
<td></td>
<td></td>
<td>12.5. Adding objects to the environment</td>
</tr>
<tr>
<td></td>
<td>1.7. Review outcome goal(s)</td>
<td>7.3. Reduce prompts/cues</td>
<td></td>
<td></td>
<td>12.6. Body changes</td>
</tr>
<tr>
<td></td>
<td>1.8. Behavioral contract</td>
<td>7.4. Remove access to the behavior</td>
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<tr>
<td></td>
<td>1.9. Commitment</td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>2. Feedback and monitoring</td>
<td></td>
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</tr>
</tbody>
</table>

## Table of Definitions and Examples

<table>
<thead>
<tr>
<th>No.</th>
<th>Label</th>
<th>Definition</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Goal setting (behavior)</td>
<td>Set or agree on a goal defined in terms of the behavior to be achieved. <strong>Note:</strong> only code goal-setting if there is sufficient evidence that goal set as part of intervention; if goal unspecified or a behavioral outcome, code 1.3, Goal setting (outcome); if the goal defines a specific context, frequency, duration or intensity for the behavior, also code 1.4, Action planning.</td>
<td>Agree on a daily walking goal (e.g. 3 miles) with the person and reach agreement about the goal. Set the goal of eating 5 pieces of fruit per day as specified in public health guidelines.</td>
</tr>
</tbody>
</table>
Which BCTs are appropriate for my intervention?

- Behaviour Change Wheel Guide sets out which frequently identified BCTs link to each intervention functions

<table>
<thead>
<tr>
<th>Intervention function</th>
<th>Individual BCTs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong></td>
<td>Most frequently used BCTs:</td>
</tr>
<tr>
<td></td>
<td>- Information about social and environmental consequences</td>
</tr>
<tr>
<td></td>
<td>- Information about health consequences</td>
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<tr>
<td></td>
<td>- Feedback on behaviour</td>
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<tr>
<td></td>
<td>- Feedback on outcome(s) of the behaviour</td>
</tr>
<tr>
<td></td>
<td>- Prompts/cues</td>
</tr>
<tr>
<td></td>
<td>- Self-monitoring of behaviour</td>
</tr>
<tr>
<td>Less frequently used BCTs:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Biofeedback</td>
</tr>
<tr>
<td></td>
<td>- Self-monitoring of outcome(s) of behaviour</td>
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<tr>
<td></td>
<td>- Cue signalling reward</td>
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<tr>
<td></td>
<td>- Satiation</td>
</tr>
<tr>
<td></td>
<td>- Information about antecedents</td>
</tr>
<tr>
<td></td>
<td>- Re-attribution</td>
</tr>
<tr>
<td></td>
<td>- Behavioural experiments</td>
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<td></td>
<td>- Information about emotional consequences</td>
</tr>
<tr>
<td></td>
<td>- Information about others’ approval</td>
</tr>
<tr>
<td><strong>Persuasion</strong></td>
<td>Most frequently used BCTs:</td>
</tr>
<tr>
<td></td>
<td>- Credible source</td>
</tr>
<tr>
<td></td>
<td>- Information about social and environmental consequences</td>
</tr>
<tr>
<td></td>
<td>- Information about health consequences</td>
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<td>- Feedback on outcome(s) of the behaviour</td>
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<td>Less frequently used BCTs:</td>
<td></td>
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<tr>
<td></td>
<td>- Biofeedback</td>
</tr>
<tr>
<td></td>
<td>- Re-attribution</td>
</tr>
<tr>
<td></td>
<td>- Focus on past success</td>
</tr>
<tr>
<td></td>
<td>- Verbal persuasion about capability</td>
</tr>
</tbody>
</table>
More than 200 diseases are spread through food

Proper food handling can prevent most foodborne diseases. Follow WHO’s five keys to safer food:

1. **Keep clean**
   - BCT: Instruction on performing the behaviour

2. **Separate raw and cooked food**
   - BCT: Demonstration of the behaviour

3. **Cook food thoroughly**
   - BCT: Information about health consequences

4. **Keep food at safe temperatures**
   - BCT: Salience of consequences

5. **Use safe water and raw materials**
   - BCT: Instruction on performing the behaviour

Source: WHO Five Keys to Safer Food, WHO 2001

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**Specifying intervention content**

**Function:** Education
**BCT:** Information about health consequences

**Function:** Modelling
**BCT:** Demonstration of the behaviour

**Function:** Education
**BCT:** Instruction on performing the behaviour

**Function:** Persuasion
**BCT:** Salience of consequences
**Function:** Persuasion  
**BCT:** Salience of consequences

**Function:** Modelling  
**BCT:** Demonstration of the behaviour

**Why specify content?**
- Aid replication
- Identify trends in use
- Identify underused, potentially effective functions and techniques
The Behaviour Change Wheel: A Guide to Designing Interventions (Michie, Atkins & West, 2014)

Stage 1: Understand the behaviour
1. Define the problem in behavioural terms
2. Select target behaviour
3. Specify the target behaviour
4. Identify what needs to change

Stage 2: Identify intervention options
Identify:
5. Intervention functions
6. Policy categories

Stage 3: Identify content and implementation options
Identify:
7. Behaviour change techniques
8. Mode of delivery

www.behaviourchangewheel.com
To wrap up, if we...

• Understand the behaviours we’re trying to change

• Systematically select from a comprehensive list of behaviour change strategies

• Articulate the active ingredients in interventions using a standardised language

• Take account of the context in which we are designing interventions

APEASE criteria
Then we can be....

- Transparent about
  - what we’ve done
  - why we’ve done it

- Accountable to funders
  - Have a clear rationale for how funds are spent

- Best serve those whose behaviour we seek to change
• Building an Artificial Intelligence system to continually scan the world literature on behaviour change, extract key information, and use this to build and update a model of human behaviour to answer the big question:

• ‘What behaviour change interventions work, how well, for whom, in what setting, for what behaviours and why?’

http://www.ucl.ac.uk/human-behaviour-change
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- 4 elective modules (selected from a choice of 9)
- Project

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For more information go to: [www.ucl.ac.uk/behaviour-change/teaching-training/msc-behaviour-change](http://www.ucl.ac.uk/behaviour-change/teaching-training/msc-behaviour-change)
l.atkins@ucl.ac.uk