Applying evidence-based theory to behavioural interventions

Dr Lou Atkins

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Wessex Public Health Network CPD Event
Behaviour Change Management – 25 April 2014

Slides: Dr Lou Atkins, Prof. Susan Michie, Dr Caroline Wood
Behavioural risk factors: UK

• Study of 20,000 women & men 45-79 yrs with no known cardiovascular disease or cancer

• 4 x more likely to have died 11 years later if
  – smoked
  – physically inactive
  – ate <5 portions of fruit & veg/day &
  – drank > recommended alcohol limits

• controlled for age, gender, body mass index and socio-economic status

When is behaviour important?

- To prevent ill health, manage illness, deliver effective health care
The ISLAGIATT\(^1\) principle of intervention design...

It **S**eemed **L**ike **A** **G**ood **I**dea **A**t **T**he **T**ime

So how can we do better?!

1. Martin Eccles, Emeritus Professor of Clinical Effectiveness
Applying theory to intervention design and evaluation: Why?

• Provides a framework to facilitate
  – accumulation of evidence
  – communication across research groups

• Identifies **barriers and facilitators** to change
  – and what needs to change

• Identifies **mechanisms of action**
  – evidence that can be used to
    • understand processes
    • design and improve interventions
Applying theory to intervention design and evaluation

• Apply individual theories
  – 83 theories of behaviour change identified in cross-disciplinary review

OR

• Use an integrative theoretical framework
  – Behaviour Change Wheel, *Michie et al, 2011*
  – Theoretical Domains Framework, *Cane et al, 2012*
Behaviours are different and contexts are different

- For example .... The behaviours to combat the obesity epidemic ....
  - Increase physical activity
  - Change diet
Behaviours are different ....

- Physical activity
  - requires **energisation**, “push”
  - begin doing things
  - create impulses
  - respond to cues

- Healthy eating
  - requires **self-control**, “pull”
  - avoid/stop doing things
  - resist impulses
  - **not** respond to cues
Understand the behaviour in context

- Why are behaviours as they are?
- What needs to change for the desired behaviour/s to occur?

- Answering this is helped by a model of behaviour...
COM-B: A simple model to understand behaviour...

- Psychological or physical ability to enact the behaviour

- Reflective and automatic mechanisms that activate or inhibit behaviour

Michie et al., 2011 *Implementation Science*
Reflective

A Polo is £9,790.
Honestly, a Polo is £9,790.
It’s true, a Polo is £9,790.
No really, a Polo is £9,790.
Trust us, a Polo is £9,790.
Look, a Polo is £9,790.
No joke, a Polo is £9,790.
Seriously, a Polo is £9,790.

Automatic

Emotions, impulses...

Evaluations, plans...
Physical and social environment that enables the behaviour

Psychological or physical ability to enact the behaviour

Reflective and automatic mechanisms that activate or inhibit behaviour

Capability

Motivation

Behaviour

Michie et al, 2011 *Implementation Science*
Using COM-B to understand barriers in primary care to offering support to increase physical activity in people with severe mental illness (SMI)...

- Didn’t know what specialist services were available for people with SMI
- Didn’t feel comfortable burdening the patient
- Didn’t have time in a standard appointment to offer behavioural support to increase physical activity
Using COM-B to understand barriers in primary care to offering support to increase physical activity in people with severe mental illness (SMI)...

• Didn’t feel comfortable burdening the patient
• Didn’t have time in a standard appointment to offer behavioural support to increase physical activity
• Did not know what specialist services were available for people with SMI
• Didn’t know the increased risk of cardiovascular disease

• Using this model, we can make the ‘behavioural diagnosis’
• This is the starting point for intervention design...

• Didn’t have time in a standard appointment to offer behavioural support to increase physical activity
Effective principles of behaviour change

• Maximise **Capability** to regulate own behaviour
  – Develop relevant skills (e.g. goal setting, monitoring, feedback)
  – Develop specific plans to change

• Maximise **Opportunity** to support self-regulation
  – Elicit social support
  – Avoid social and other cues for current behaviour
  – Change routines and environment

• Increase **Motivation** to engage in the desired behaviour
  – Reward change
  – Develop appropriate beliefs
    • E.g. benefits of changing, others’ approval, personal relevance, confidence to change
  – Develop positive feelings about changing

• Reduce **Motivation** to continue with the undesired behaviour

_NICE Guidance for Behaviour change (2007)_

_NICE Guidance for Behaviour change (2014)_
The Behaviour Change Wheel

- **Sources of behaviour**
- **Intervention functions**
- **Policy categories**

**Michie et al., 2011 Implementation Science**
The Behaviour Change Wheel

- Synthesis of 19 frameworks to classify interventions (health, environment, culture change and social marketing)
  - Centre: COM-B model
  - Inner ring: Nine intervention functions (what purpose(s) the intervention serves)
  - Outer ring: Seven policy categories

Michie et al., 2011 Implementation Science
Using rules to reduce the opportunity to engage in the behaviour (or to increase behaviour by reducing opportunity to engage in competing behaviours)

Increasing knowledge or understanding

Using communication to induce positive or negative feelings to stimulate action

Creating an expectation of reward

Creating an expectation of punishment or cost

Imparting skills

Increasing means or reducing barriers to increase capability (beyond education or training) or opportunity (beyond environmental restructuring)

Provide an example for people to aspire to or emulate

Changing the physical or social context

Intervention functions
An intervention can have different functions...

- E.g. education and persuasion
# Selecting appropriate intervention functions

<table>
<thead>
<tr>
<th>Physical capability</th>
<th>Education</th>
<th>Persuasion</th>
<th>Incentivisation</th>
<th>Coercion</th>
<th>Training</th>
<th>Restriction</th>
<th>Environmental restructuring</th>
<th>Modelling</th>
<th>Enablement</th>
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<tbody>
<tr>
<td>Psychological capability</td>
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<td>Automatic motivation</td>
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<tr>
<td>Reflective motivation</td>
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</table>
Use the APEASE criteria to select intervention functions and policy categories...

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Description</th>
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<tbody>
<tr>
<td>Affordability</td>
<td>Can it be delivered to budget?</td>
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<tr>
<td>Practicability</td>
<td>Can it be delivered as designed?</td>
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<tr>
<td>Effectiveness and cost-effectiveness</td>
<td>Does it work (ratio of effect to cost)?</td>
</tr>
<tr>
<td>Acceptability</td>
<td>Is it judged appropriate by relevant stakeholders (publicly, professionally, politically)?</td>
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<tr>
<td>Side-effects/safety</td>
<td>Does it have any unwanted side-effects or unintended consequences?</td>
</tr>
<tr>
<td>Equity</td>
<td>Will it reduce or increase the disparities in health/wellbeing/standard of living?</td>
</tr>
</tbody>
</table>
A selection of BCW applications

• International Red Cross to train volunteers

• Improve paediatric health care in Kenya

• Increase adenoma detection rate in routine colonoscopy in the USA

• An organisational intervention tool in the Netherlands

• A weight management clinic in the UK
• An internet intervention to improve condom use
Collaboration between NICE, LGA and UCL - starting June 2014

- Investigating the barriers and facilitators of the implementation of NICE’s public health guidance and quality standards in local authorities
Specifying intervention content

• We have tools to understand behaviour (COM-B model)

• ...and a method for linking that understanding to identifying intervention functions from a comprehensive menu (Behaviour Change Wheel)

• ...but what about intervention content?
Despite guidelines for reporting there are problems specifying intervention content because of:

1. Under-reporting content

2. Variable terminology
1. Under-reporting content

Lorencatto et al., 2013 Implementation Science
## 2. Variable terminology

Descriptions of “behavioural counselling” in two interventions

<table>
<thead>
<tr>
<th>Title of journal article</th>
<th>Description of “behavioural counseling”</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. <em>AJPH</em> 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. <em>JAMA</em> 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</em> <em>(Cochrane, 2005)</em>:</td>
</tr>
</tbody>
</table>
| ![Chemical Structure](image) | - Review smoking history & motivation to quit  
- Help identify high risk situations  
- Generate problem-solving strategies  
- Non-specific support & encouragement |

*Mechanisms of action:*  
Activity at a subtype of the nicotinic receptor where its binding produces agonistic activity, while simultaneously preventing binding to a4b2 receptors.  

*Mechanisms of action:*  
None specified.
In a nutshell....

We lack a shared language!

What is the solution?
Agreed, standard method of describing intervention content
  - using consistent terminology + clear labels

Usable: Organised hierarchically

“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
A few examples of BCTs...

- ‘Behaviour substitution’
- ‘Self-monitoring’
- ‘Goal setting’
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

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Abstract
Background CONSORT guidelines call for precise reporting of behavior change interventions: we need rigorously tested and validated taxonomies of behavior change techniques. The Behavior Change Technique Taxonomy (BCT Taxonomy) is the first attempt to systematically classify strategies, according to similarity of active ingredients in an open-sort task. Inter-rater agreement amongst six researchers coding 85 intervention descriptions by BCTs was
## BCT Taxonomy v1

<table>
<thead>
<tr>
<th>No.</th>
<th>Label</th>
<th>Definition</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Goals and planning</strong></td>
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<tr>
<td>1.1</td>
<td><strong>Goal setting (behavior)</strong></td>
<td>Set or agree on a goal defined in terms of the behavior to be achieved</td>
<td>Agree on a daily walking goal (e.g. 3 miles) with the person and reach agreement about the goal</td>
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<tr>
<td></td>
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<td>Note: only code goal-setting if there is sufficient evidence that goal set as part of intervention; if goal unspecified or a behavioral outcome, code <strong>1.3, Goal setting (outcome)</strong>; if the goal defines a specific context, frequency, duration or intensity for the behavior, also code <strong>1.4, Action planning</strong></td>
<td>Set the goal of eating 5 pieces of fruit per day as specified in public health guidelines</td>
</tr>
</tbody>
</table>
## Linking BCW intervention functions to BCTs (Michie, Atkins and West, 2014)

<table>
<thead>
<tr>
<th>Intervention function</th>
<th>Frequently used BCTs (as identified in Abraham et al. Testing the identification of behavior change techniques (BCTs) defined by the “BCT Taxonomy version 1” (BCTTv1) in intervention descriptions. <em>In preparation</em>)</th>
</tr>
</thead>
</table>
| **Education**         | Information about social and environmental consequences  
|                       | Information about health consequences  
|                       | Feedback on behaviour  
|                       | Feedback on outcome(s) of the behaviour  
|                       | Prompts/cues  
|                       | Self-monitoring of behaviour |
| **Persuasion**        | Credible source  
|                       | Information about social and environmental consequences  
|                       | Information about health consequences  
|                       | Feedback on behaviour  
|                       | Feedback on outcome(s) of the behaviour |
In summary ....

• Start by understanding the behaviour
  – Behavioural analysis and diagnosis using COM-B

• Systematically select appropriate intervention functions and policy categories to bring about change
  – Design the intervention using BCW based on the behavioural diagnosis

• Specify active ingredients in the intervention
  – Using BCT Taxonomy (v1)
The Behaviour Change Wheel
A Guide to Designing Interventions

Susan Michie, Lou Atkins & Robert West

6 May 2014
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Dr Lou Atkins  l.atkins@ucl.ac.uk
## COM-B-Qv1 – exemplar questions

<table>
<thead>
<tr>
<th>I would have to ...</th>
<th></th>
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<tbody>
<tr>
<td><strong>CAPABILITY</strong></td>
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<tr>
<td>2. know more about how to do it</td>
<td>e.g. have a better understanding of effective ways to lose weight</td>
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<tr>
<td>3. have better physical skills</td>
<td>e.g. learn how to operate machinery more effectively in one’s job</td>
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<tr>
<td><strong>OPPORTUNITY</strong></td>
<td></td>
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<tr>
<td>11. have more time to do it</td>
<td>e.g. create dedicated time during the day</td>
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<tr>
<td>15. have more people around me doing it</td>
<td>e.g. be part of a ‘crowd’ who are doing it</td>
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<tr>
<td><strong>MOTIVATION</strong></td>
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<tr>
<td>19. feel that I need to do it enough</td>
<td>e.g. care more about the negative consequences of not doing it</td>
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<td>20. believe that it would be a good thing to do</td>
<td>e.g. have a stronger sense that one should do it</td>
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Policy categories

Creating an expectation of punishment or cost

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

Creating an expectation of punishment or cost
Which policy categories should be used?

<table>
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<tr>
<th>Intervention functions</th>
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<th>Modelling</th>
<th>Enablement</th>
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