The Behaviour Change Wheel: a method for designing effective interventions

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Acknowledgements

• Key collaborators
  – Prof Robert West, Prof Marie Johnston, UK
  – Dr James Cane, UK
  – Prof Sally Green, Dr Denise O’Connor, Dr Simon French, Australia
Translating evidence into practice: the gaps

• Basic science to promising application
  – “can it work?”: efficacy
  – 1st gap

• Promising to clinical application
  – “does it work in practice?”: effectiveness
  – 2nd gap

• Research trials to clinical practice
  – “is it routinely delivered as it should be?”: implementation
  – 3rd gap

• Patient/public engagement
  – “does it work in practice?”: uptake
  – 4th gap
Research trials to clinical practice

- Implementation of evidence-based practice
- Knowledge translation
- Quality improvement
- Best practice

- ..... All depend on people changing their behaviour
  - Health professionals, managers, ancillary staff, commissioners, policy-makers
Changing behaviour

• Intervene at many levels
• simultaneously & consistently

NICE Guidance for Behaviour change at population, community and individual levels (2007)

Source: Dahlgren and Whitehead, 1991
A system for designing effective behaviour change interventions

1. Which behaviour/s?
2. Understand the target behaviour/s
3. Consider full range of possible interventions
4. Identify specific behaviour change techniques
An approach to developing behaviour change interventions

1. Target behaviour
   - Select (which?)
   - Specify (precisely what?)
2. Design intervention
   - Understand (why?)
   - Intervention functions
   - BCTs
3. Deliver intervention
   - Mode of delivery
   - Policy categories
Which behaviours?

• Identify key specific behaviours (often several)
  – Who needs to do what differently, when, where, how?
  – Does recommended practice involve others?
Behaviour change at different levels in healthcare

**INDIVIDUAL LEVEL:** smoking cessation, increasing physical activity, medication adherence

**PRACTITIONER / PROFESSIONAL:** service delivery (procedures and techniques, communication)

**ORGANISATIONAL LEVEL:** adherence to guidelines, complying with policy
At each level, range of behaviours

• Improving hand hygiene in hospital staff
  – Nurses and doctors
    • Cleaning hands in identified situations
  – Infection control nurses
    • Conducting audits and feeding back results
  – Staff responsible for distributing alcohol handrub
    • Ensuring that dispensers contain alcohol handrub
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
The COM-B system: Behaviour occurs 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

Michie et al (2011) *Implementation Science*
An approach to developing behaviour change interventions

Target behaviour

Select (which?)
Specify (precisely what?)
Understand (why?)

Design intervention

Intervention functions
BCTs

Deliver intervention
Mode of delivery
Policy categories
Further analysing the problem: using theories of behaviour

• To make theory more usable for implementation researchers
  – 18 researchers in health psychology
  – 14 implementation researchers from UK, Netherlands and Canada

• Generated and synthesised 33 theories and 128 constructs ....

• into 14 domains: the “Theory Domains Framework”
  – Elaboration of COM-B


Cane et al (2011) Validation of the theoretical domains framework for use in behaviour change and implementation research, *Implementation Science*
<table>
<thead>
<tr>
<th>Physical capability</th>
<th>Physical skills</th>
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<tbody>
<tr>
<td>Psychological capability</td>
<td>Knowledge</td>
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<td>Cognitive and Interpersonal skills</td>
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<td>Memory, Attention and Decision processes</td>
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<td>Physical opportunity</td>
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<td>Environmental Context and Resources</td>
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<td>Social opportunity</td>
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<td>Social Influences</td>
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</table>
Sources of behaviour
Sources of behaviour

TDF Domains

Soc - Social influences
Env - Environmental Context and Resources
Id - Social/Professional Role and Identity
Bel Cap - Beliefs about Capabilities
Opt - Optimism
Int - Intentions
Goals - Goals
Bel Cons - Beliefs about Consequences
Reinf - Reinforcement
Em - Emotion
Know - Knowledge
Cog - Cognitive and interpersonal skills
Mem - Memory, Attention and Decision Processes
Beh Reg - Behavioural Regulation
Phys - Physical skills
Implementation interventions using this approach

• Improving implementation of guidelines for acute low back pain in primary care
  – Green et al, Australia
• Diagnosis and post-diagnosis management of people with dementia
  – Green et al, Australia
• Implementing preconception care guidelines in the general practice setting
  – Mazza et al, Australia
• Physicians’ transfusion practice
  – Eccles et al, UK
• Hospital staff hand hygiene
  – Sheldon et al, UK
• Midwives engaging with pregnant women about stopping smoking
  – Beenstock et al, UK
• Guidelines on tobacco and nicotine dependency treatment
  – Kinnunen et al, Finland
• A suite of dental guidelines across Scotland
  – Clarkson et al, Scotland
GPs managing low back pain: *Australia*

The implementation problem:

1. Too frequent referral for lumbar X-rays
2. Too infrequent recommendation to stay active

Example: Using the Theory Domains Framework to design an intervention to change GP behaviour

Developing theory-informed behaviour change interventions to implement evidence into practice: a systematic approach using the Theoretical Domains Framework


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A system for designing effective behaviour change interventions

1. Which behaviour/s?
2. Understand the target behaviour/s
3. Consider full range of possible interventions
4. Identify specific behaviour change techniques
Need a framework for designing interventions with following criteria:

1. Comprehensive coverage
2. Coherence
3. Clear link to a model of behaviour

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

- Systematic review identified 19 frameworks to classify behaviour change interventions
- Addressed behaviours relating to, e.g. health, environment, culture change

<table>
<thead>
<tr>
<th>Comprehensiveness</th>
<th>Covers all types of interventions</th>
<th>0/19</th>
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<tbody>
<tr>
<td>Coherence</td>
<td>Is structured logically and coherently</td>
<td>3/19</td>
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<tr>
<td>Model</td>
<td>Based on an overarching model of behaviour or behaviour change</td>
<td>7/19</td>
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Some of the frameworks included in the review:

1. Culture change \textit{(Culture capital framework, Knott et al., 2008)}
2. Health professional behaviour change \textit{(Cochrane EPOC, 2010)}
4. Injury control \textit{(Geller et al., 1990)}
5. Pro-environmental behaviour change \textit{(DEFRA’s 4E model, 2008)}
6. MINDSPACE \textit{(Institute for Government and Cabinet Office, 2010)}
7. Environmental policy framework \textit{(Vlek, 2000)}
8. Social marketing \textit{(Population Services International framework PSI, 2004)}
Synthesis into an integrated framework

- Model of behaviour at the hub of a wheel
- Synthesis of existing frameworks
  - 9 intervention functions
    - each include one or more behaviour change techniques
  - 7 policy categories
    - that could enable or support these interventions to occur

Behaviour at the hub .... COM-B
Interventions: activities designed to change behaviours
Intervention functions

Policies: decisions made by authorities concerning interventions

Sources of behaviour
TDF Domains
Intervention functions
Policy categories
An approach to developing behaviour change interventions

Use **Behaviour Change Wheel** to select broad categories of intervention type

Use **Taxonomy of Behaviour Change Techniques** to select active ingredients aimed at bringing about behaviour change
## Linking COM-B to intervention functions

<table>
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<tr>
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Interventions made up of Behaviour Change Techniques (BCTs)

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

• They are
  – observable,
  – replicable and
  – irreducible components of an intervention

• Can be used alone or in combination with other BCTs
Need an agreed, standard method of describing interventions

• To report interventions as accurately as possible
  – Replicate interventions in research to build evidence
  – Implement effective interventions

• To code and synthesise published reports in systematic reviewing

• Must be accessible and supported across
  – disciplines and countries
  – behaviors and contexts
### Example of the problem: 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 counselling</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 counselling</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>
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</table>
Biomedicine vs behavioural science ... example of smoking cessation effectiveness

Varenicline *JAMA, 2006*

- **Intervention content**
  - [Image of molecule]

- **Mechanism of action**
  - Activity at a subtype of the nicotinic receptor where its binding produces agonistic activity, while simultaneously preventing binding to α4β2 receptors

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Behavioural counselling *Cochrane, 2005*

- **Intervention content**
  - Review smoking history & motivation to quit
  - Help identify high risk situations
  - Generate problem-solving strategies
  - Non-specific support & encouragement

- **Mechanism of action**
  - *None mentioned*
Interventions are made up of specific behaviour change techniques (BCTs)

1. General information
2. Information on consequences
3. Information about approval
4. Prompt intention formation
5. Specific goal setting
6. Graded tasks
7. Barrier identification
8. Behavioral contract
9. Review goals
10. Provide instruction
11. Model/ demonstrate
12. Prompt practice
13. Prompt monitoring
14. Provide feedback
15. Social comparison
16. Contingent rewards
17. Teach to use cues
18. Follow up prompts
19. Social support/ change
20. Role model
21. Prompt self talk
22. Relapse prevention
23. Stress management
24. Motivational interviewing
25. Time management

Involves detailed planning of what the person will do including, at least, a very specific definition of the behaviour e.g., frequency (such as how many times a day/week), intensity (e.g., speed) or duration (e.g., for how long for). In addition, at least one of the following contexts i.e., where, when, how or with whom must be specified. This could include identification of sub-goals or preparatory behaviours and/or specific contexts in which the behaviour will be performed.

The person is asked to keep a record of specified behaviour/s. This could e.g. take the form of a diary or completing a questionnaire about their behaviour.

Further development

• Smoking cessation: 53 BCTs
  *Michie et al, Annals Behavioral Medicine, 2010*

• Physical activity & healthy eating: 40 BCTs
  *Michie et al, Psychology & Health, 2011*

• Reducing excessive alcohol use: 42 BCTs
  *Michie et al, Addiction, 2012*

• General behaviour change: 137 BCTs
  *Michie et al, Applied Psychology: An International Review, 2008*

• Current MRC funded study: 93 BCTs
  *www.ucl.ac.uk/health-psychology/BCTtaxonomy*
An approach to developing behaviour change interventions

1. Target behaviour
   - Select (which?)
   - Specify (precisely what?)
   - Understand (why?)
2. Design intervention
   - Intervention functions
   - BCTs
3. Deliver intervention
   - Mode of delivery
   - Policy categories
Modes of delivery

• Face-to-face
  – Individual
  – Group

• Distance
  – Population-level
    • Mass-media: internet, TV, radio, billboard, print media, leaflet
  – Individually-tailored
    • Phone: helpline, text, app.
    • Individually accessed computer programme
An approach to developing behaviour change interventions
Intervention functions

Policies

decisions made by authorities concerning interventions

Considerations when selecting interventions, mode of delivery and policy categories

- Evidence of effectiveness
- Local relevance
- Practicability
- Affordability
- Acceptability
  - public
  - professional
  - political
Summary

• Start by understanding the problem
  – Identifying the behaviours
    • Who, what, where, when
  – Understand the behaviours
    – Drawing on theories of behaviour
    – Then identify the techniques and the strategy

• Consider the full range of effective strategies to use when working with colleagues to implement guidance
For more information

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Extra slide
Interventions:

- **Restrictions**: Using rules to reduce the opportunity to engage in the target behaviour.
- **Environmental restructuring**: Changing the physical or social context.
- **Modelling**: Providing an example for people to aspire to or imitate.
- **Enablement**: Increasing means/reducing barriers to increase capability (beyond education and training) or opportunity (beyond environmental restructuring).
- **Education**: Increasing knowledge or understanding.
- **Training**: Imparting skills.
- **Coercion**: Creating an expectation of punishment or cost.
- **Incentivisation**: Creating an expectation of reward.
- **Persuasion**: Using communication to induce positive or negative feelings or stimulate action.
## Intervention functions

<table>
<thead>
<tr>
<th>Intervention function</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong></td>
<td>Increasing knowledge or understanding</td>
<td>Providing information to promote healthy eating</td>
</tr>
<tr>
<td><strong>Persuasion</strong></td>
<td>Using communication to induce positive or negative feelings or stimulate action</td>
<td>Using imagery to motivate increases in physical activity</td>
</tr>
<tr>
<td><strong>Incentivisation</strong></td>
<td>Creating expectation of reward</td>
<td>Using prize draws to induce attempts to stop smoking</td>
</tr>
<tr>
<td><strong>Coercion</strong></td>
<td>Creating expectation of punishment or cost</td>
<td>Raising the financial cost to reduce excessive alcohol consumption</td>
</tr>
<tr>
<td><strong>Training</strong></td>
<td>Imparting skills</td>
<td>Advanced driver training to increase safe driving</td>
</tr>
<tr>
<td><strong>Restriction</strong></td>
<td>Using rules that limit engagement in the target behaviour or competing or supporting behaviour</td>
<td>Prohibiting sales of solvents to people under 18 to reduce use for intoxication</td>
</tr>
<tr>
<td><strong>Environmental restructuring</strong></td>
<td>Changing the physical or social context</td>
<td>Providing on-screen prompts for GPs to ask about smoking behaviour</td>
</tr>
<tr>
<td><strong>Modelling</strong></td>
<td>Providing an example for people to aspire to or imitate</td>
<td>Using TV drama scenes involving safe-sex practices to increase condom use</td>
</tr>
<tr>
<td><strong>Enablement</strong></td>
<td>Increasing means/reducing barriers to increase capability or opportunity</td>
<td>Behavioural support for smoking cessation, medication for cognitive deficits, surgery to reduce obesity, prostheses to promote physical activity</td>
</tr>
</tbody>
</table>
## Policy categories

<table>
<thead>
<tr>
<th>Policy category</th>
<th>Example</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication / marketing</td>
<td>Using print, electronic, telephonic or broadcast media</td>
<td>Conducting mass media campaigns</td>
</tr>
<tr>
<td>Guidelines</td>
<td>Creating documents that recommend or mandate practice. This includes all changes to service provision</td>
<td>Producing and disseminating treatment protocols</td>
</tr>
<tr>
<td>Fiscal</td>
<td>Using the tax system to reduce or increase the financial cost</td>
<td>Increasing duty or increasing anti-smuggling activities</td>
</tr>
<tr>
<td>Regulation</td>
<td>Establishing rules or principles of behaviour or practice</td>
<td>Establishing voluntary agreements on advertising</td>
</tr>
<tr>
<td>Legislation</td>
<td>Making or changing laws</td>
<td>Prohibiting sale or use</td>
</tr>
<tr>
<td>Environmental/ social planning</td>
<td>Designing and/or controlling the physical or social environment</td>
<td>Using town planning</td>
</tr>
<tr>
<td>Service provision</td>
<td>Delivering a service</td>
<td>Establishing support services in workplaces, communities etc.</td>
</tr>
</tbody>
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