Behaviour change: theories, taxonomy and strategies

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Preventing waste in research

• We have good evidence for effective interventions
  – considerable investment in
    • trials of healthcare interventions, and
    • evidence syntheses (e.g. Cochrane, NICE)
• Much of that investment is avoidably wasted because research evidence is not
  – reported well
  – implemented effectively

Implementation depends on behaviour

- Of many different types of people/role
  - Health professionals, managers, support staff, policy-makers, commissioners

- Increasing implementation depends on changing behaviour
  - Evidence doesn’t implement itself
  - Guidelines don’t implement themselves

- Need to understand why behaviour is as it is
  - And what needs to change to change behaviour
    - at individual, group, organisational levels
The problem

• Many do not follow evidence-based guidelines for good practice e.g.
  – making referrals
  – giving advice
  – prescribing drugs
  – keeping hands clean

• Research
  – Netherlands: 30-40% of patients did not receive ‘evidence-based’ health care  \textit{Grol et al, 2001}
  – US: 20-25% received care that was unnecessary or even harmful  \textit{Schuster et al, 2005}
Example .... 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

For each of these, who needs to do what, when, where, how?
Changing behaviour

- Interventions to improve implementation of evidence-based health care have achieved modest and variable success.
- Improving implementation can be improved by using theories, taxonomies and systematic strategies to:
  - Describe and understand the problem
  - Plan the solution
Improving implementation: Changing behaviour

• Define implementation in terms of behaviour
  – Who needs to do what, when, where and how

• Analyse why implementation is poor
  – in behavioural terms
  – as a basis of developing the intervention

• Draw on the science of behaviour change
  – evidence-based theories and techniques of behaviour change
How can we most effectively intervene to improve implementation?

• Know what works
  – Good description

• Understand what works
  – Good theory
We need good descriptions to …

• **Report findings** so readers know what was done
  – to interpret evidence

• **Apply** evidence
  – to implement interventions found to be effective

• **Build** evidence
  – to replicate findings and synthesise evidence across trials
The current situation

• Interventions often “complex”
  – several, potentially interacting, techniques

• Poorly described
  – Interventions often described vaguely
    e.g. “behavioural counselling”
  – Equivalent of “big red round pill”

• Need to specify intervention components in sufficient detail to identify active ingredients

• We lack a shared language for describing the content of interventions
The same words may be used with different meanings  
e.g. *behavioural counselling*

<table>
<thead>
<tr>
<th>Tate, et al. (<em>JAMA</em> 2003). Effects of internet behavioral counseling on weight loss in adults at risk of Type 2 diabetes</th>
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<tbody>
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| --- | --- |
| • Feedback (on diaries)  
• Reinforcement  
• Recommendations for change  
• Answers to questions  
• General support | • Assessment of readiness to change  
• Attitude change  
• Goal setting  
• Specific behavioural advice |
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• Reinforcement  
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• Answers to questions  
• General support | • Assessment of readiness to change  
• Attitude change  
• Goal setting  
• Specific behavioural advice | • Behavioural contracting  
• Ongoing problem solving  
• Reinforcement  
• Developing goals  
• Request to self-monitor |
What is the ‘content or elements’ of an intervention?
We need a shared language for describing ‘active ingredients’ of interventions.

- **Replicate** effective interventions
- **Discard** ineffective interventions
- **Check** fidelity of intervention delivery
- **Validly synthesise evidence about** behaviour change interventions
- **Propose** how interventions work
  - causal mechanisms underlying behaviour change

*Method must be accessible and supported across disciplines and contexts*
A methodology: describe content in terms of behaviour change techniques (BCTs)

- “Active ingredients” within the intervention designed to change behaviour
- They are
  - observable,
  - replicable and
  - discrete, low-level components of an intervention that on their own have potential to change behaviour
- Can be used alone or in combination with other BCTs
“Taxonomies” of BCTs

- Physical activity/healthy eating/mixed: 26 BCTs
  Abraham & Michie, 2008
- Physical activity & healthy eating: 40 BCTs
  Michie et al, Psychology & Health, 2011
- Smoking cessation: 53 BCTs
  Michie et al, Annals behavioural Medicine, 2010
- Reducing excessive alcohol use: 42 BCTs
  Michie et al, Addiction, 2012
- Condom use: 47 BCTs
  Abraham et al, 2012
- General behaviour change: 137 BCTs
- Competence framework: 89 BCTs
  Dixon & Johnston, 2011

Fragmentation rather than integration
The Behavior Change Technique Taxonomy (v1) of 93 Hierarchically Clustered Techniques: Building an International Consensus for the Reporting of Behavior Change Interventions

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Abstract
Background CONSORT guidelines for reporting of behavior change interventions provide various methods of characterizing interventions with no common language. This resulted in 93 BCTs clustered into 16 groups. This resulted in 93 BCTs clustered into 16 groups. Of the 26 BCTs occurring at least five times, 23 had adjusted kappas of 0.60 or above.

Objectives To develop an extensive and comprehensive taxonomy of behavior change techniques (BCTs) used in health behavior change interventions. We also aimed to rate the overlap of taxonomic labels across 124 BCTs from six published classification systems. Another 18 experts grouped BCTs

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### BCT Taxonomy v1: 93 items in 16 groupings

#### 1. Goals and planning
1.1. Goal setting (behavior)
1.2. Problem solving
1.3. Goal setting (outcome)
1.4. Action planning
1.5. Review behavior goal(s)
1.6. Discrepancy between current behavior and goal
1.7. Review outcome goal(s)

#### 8. Comparison of behaviour
6.1. Demonstration of the behavior
6.2. Social comparison
6.3. Information about others’ approval

#### 16. Antecedents
12.1. Restructuring the physical environment
12.2. Restructuring the social environment
12.3. Avoidance/reducing exposure to cues for the behavior
12.4. Distraction
12.5. Adding objects to the

#### No. | Label | Definition | Examples
--- | --- | --- | ---
1.1 | Goal setting (behavior) | Set or agree on a goal defined in terms of the behavior to be achieved. 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 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**. | 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. |
BCT methodology provides an agreed, standard method to

• **Describe** interventions as accurately as possible
  – Replicate interventions in research to build evidence
  – Implement effective interventions
• **Design** interventions
  – Translate general intervention functions into specific BCTs
• **Evaluate** e.g. in factorial designs
  – Identify **active ingredients** (what)
  – Investigate **mechanisms of action** (how)
• **Synthesise** published reports in systematic reviews
The BCTTv1 smartphone app

- Fully searchable version of BCTTv1
- Search by BCT label, BCT grouping or alphabetically
- Increases familiarity with the taxonomy
- Increases speed and recall of BCT labels and definitions

* You’ll need an internet connection to use the app
Welcome
The Behaviour Change Technique Taxonomy – a resource for intervention designers, researchers, practitioners, systematic reviews and all those wishing to communicate the content of behaviour change interventions.

new / untrained users

Trained users

“Tasks and session materials made a great combination”

Tutorial trainee, Cambridge UK

Login

New User?

email

password

login

www.bct-taxonomy.com
Improving implementation: Strategy and theory

1. Define implementation in terms of behaviour
   – Who needs to do what, when, where and how

2. Understand the behaviours you are trying to change
   – Make a “behavioural diagnosis”

3. Use a framework that points to the types of intervention that are likely to be effective

4. Consider the full range of options open to you

5. Use a systematic method for selecting behaviour change techniques
Understand implementation 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
  - Behaviour is part of a system and itself is a system
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*
Intervening: Consider all the options

- Systematic literature review identified 19 frameworks of behaviour change interventions
- None met three criteria of
  - Comprehensive, coherent, linked to a model of behaviour
- So .... Developed a synthesis of the 19 frameworks


www.behaviourchangewheel.com
Interventions: activities designed to change behaviours
Add policies to maintain change long-term
Policies

decisions made by authorities concerning interventions

Where does Theoretical Domains Framework fit in?

• Independent piece of work based on synthesising 128 constructs from 33 theories relevant to implementation
  – Input from behavioural scientists and implementation researchers
  – Michie et al, 2005; Cane et al, 2013

• Elaborates COM-B, especially the ‘reflective motivation’ aspect
Narrowing down your options …

• General intervention functions
• Specific behaviour change techniques
Local context: The APEASE criteria

- **A**ffordability
- **P**racticability
- **E**ffectiveness/cost-effectiveness
- **A**cceptability
  - public
  - professional
  - political
- **S**ide-effects/safety
- **E**quity

www.behaviourchangewheel.com
Use the Behaviour Change Wheel to …

1. **Design** interventions and policies
   - COM-B links to intervention functions link to behaviour change techniques

2. “Retrofit” – **identify** what is in current interventions and policies

3. Provide a framework for **evaluation**
   - How are interventions working?

4. **Structure** systematic reviews
Some applications of Behaviour Change Wheel

**India**
- Smartphone app to reduce cardiovascular disease risk

**Kenya**
- Improve paediatric health care

**Netherlands**
- An organisational intervention tool

**Thailand**
- Preventing melioidosis

**USA**
- Improving colorectal cancer screening
- Providing long-acting reversible contraception to adolescents
- Improve parenting practices for children with challenging behaviour

**UK**
- Smartphone app for parents of overweight children
- Promote recycling behaviours in university staff and students
- Reduce cardiovascular disease risk in people with severe mental illness
- Improve management of postnatal depression
- Smartphone app to promote attentive eating
- Internet intervention to promote condom use

**Papua New Guinea**
- Change Betel nut chewing behaviour

**International Red Cross**
- Train volunteers
Example: increasing hand hygiene in hospital staff

- 5000 die a year in the UK, others disabled, due to hospital acquired infections (e.g. MRSA)
- Disinfecting hands effective in preventing infection
- Specific guidelines for clinical practice
- Poorly implemented
  - on average 40% occasions (5%-81%)
2004-2011 in the UK

- **Opportunity**
  - Alcohol hand rub beside every bed
- **Motivation**
  - Persuasive posters
  - Encouraging patients to ask
- **Capability**
  - No intervention
Hand Hygiene example: Capability

- Nurses have the capability to clean their hands
  - But *not* to
    - pay *attention* to this behaviour over other competing behaviours
    - develop *routines* for noticing when the behaviour does not occur,
    - and *plans* for acting in future
## Selecting relevant intervention functions

<table>
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<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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- **Education:** Information dissemination and instruction.
- **Persuasion:** Persuasion and argumentation.
- **Incentivisation:** Financial or material incentives.
- **Coercion:** Compulsion or threat.
- **Training:** Skills development.
- **Restriction:** Requiring or forbidding.
- **Environmental restructuring:** Changing the environment for a desired effect.
- **Modelling:** Demonstrating a process or behavior.
- **Enablement:** Enabling or facilitating action.

- ✓ Indicates relevant intervention functions.
Intervention to increase: **Capability**

- **Train** staff to
  - set goals and
  - make action plans
- **Enable**:
  - observe their behaviour and give feedback
  - support development of action plans
- **Incentivise**:
  - full compliance rewarded with certificate in notes

**Based on behavioural theory**
  - Control Theory and Learning Theory
Self-regulation (control) Theory: Carver & Scheier, 82

GOAL
- Compare behaviour with standard
  - Discrepancy noted
    - No discrepancy – goal reached
    - Disengage from goal – give up

Action-Planning
- Act to reduce discrepancy
  - Environmental influences
Observe two staff member’s behaviour for 20 minutes
Give immediate verbal feedback

*Full compliance = certificate for use at staff appraisal*

OR

< full compliance = immediate goal-setting and action planning regarding observed non-compliance & repeat observation next month

= individual level component
Observe two staff member’s behaviour for 20 minutes
Give immediate verbal feedback
Full compliance = certificate for use at staff appraisal
< full compliance = immediate goal-setting and action planning regarding observed non-compliance & repeat observation next month

Observe one group of staff members for 20 minutes
Feedback displayed, and given at ward meeting
Praise for compliance
< full compliance = ward level goal-setting and action planning regarding observed non-compliance/s

MONTHLY FEEDBACK INTERVENTION
Co-ordinated by infection control team

= individual level component

= group level component
Findings: 60 wards in 16 hospitals in England

- Use of soap and alcohol hand rub tripled from 21.8 to 59.8 ml per patient bed day
- Rates of MRSA bacteraemia and C difficile infection decreased
  - Stone, Fuller, Savage, Cookson et al, BMJ, 2012
- Giving 1-1 feedback led to staff being 13-18% more likely to clean their hands
  - Fuller, Michie, Savage, McAteer et al, PLoS One, 2012
Summary

• Implementing evidence-based practice depends on behaviour change
• Interventions have been only moderately effective and have largely not been informed by behavioural science
• The field of evidence based practice would be advanced by improving
  – Better methods for specifying interventions
  – Theoretical understanding of behaviour
  – Systematic method of intervention development
Acknowledgements

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  – Prof Robert West, UCL
  – Prof Marie Johnston, Aberdeen
  – Health Psychology Research Group

• Key funders
For more information

- Susan Michie
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- Books
  - www.behaviourchangewheel.com
  - www.behaviourchangetheories.com
- UCL Centre for Behaviour Change
  - www.ucl.ac.uk/behaviour-change

All proceeds from CBC teaching, training, books and products go to further development
ADDITIONAL SLIDES IF NEEDED
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

Changing the physical or social context

Provide an example for people to aspire to or emulate

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

Imparting skills
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

Using print, electronic, telephonic or broadcast media

Establishing rules or principles of behaviour or practice

Delivering a service

Making or changing laws
## Selecting interventions and policies

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