The Behaviour Change Wheel: a new method for characterising and designing behaviour change interventions

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This talk

- Implementation as behaviour
- The Behaviour Change Wheel
  - Making a behavioural diagnosis using COM-B
  - Linking diagnosis to intervention functions and policies
  - Linking to specify behaviour change techniques
- Examples of guideline implementation
  - Improving hospital staff hand hygiene
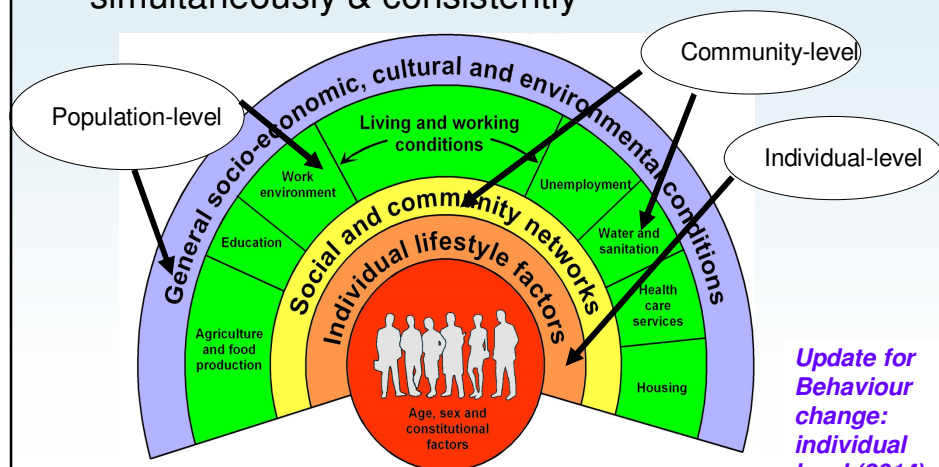 - Local government

Why focus on behaviour?

- Interventions to improve implementation of evidence-based practice
  - have achieved modest and variable success
- Improving implementation depends on changing the behaviour of
  - professionals,
  - managers,
  - commissioners and
  - others working within and with the care system

Effective interventions

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

- Intervene at many levels
- simultaneously & consistently

Population-level

Community-level

Individual-level

General socio-economic, cultural and environmental conditions

Living and working conditions

Work environment

Unemployment

Social and community networks

Education

Water and sanitation

Individual lifestyle factors

Health care services

Agriculture and food production

Housing

Age, sex and constitutional factors

Source: Dahlgren and Whitehead, 1991

Update for Behaviour change: individual level (2014)

How to design an intervention that is likely to be effective?

Traditional approaches to intervention design

ISLAGIATT principle

'It Seemed Like A Good Idea At The Time'

Martin Eccles, implementation researcher, UK

A systematic method …

1. **Understand the behaviour** you are trying to change
2. Use a **framework** that points to the types of intervention that are likely to be effective
3. Consider the **full range of options** open to you
4. Use a **systematic method** for selecting behaviour change techniques

Key steps in intervention design…

1. Identify your target behaviour **precisely**
   - Who need to do what, when, where, how
2. Recognise that behaviours are part of a **system**
   - of other behaviours within and between people
3. Make a "**behavioural diagnosis**"
   - A good behavioural diagnosis is more likely to lead to effective interventions
4. The most effective interventions target many levels simultaneously
   - The *Behaviour Change Wheel* is a comprehensive framework for designing interventions

Example …. hand hygiene in hospital staff

- Nurses and doctors
  - Cleaning han... ...ons
- Infectio...
  - ... back
- S... ...or distributing
  alc... ...drub
  - E...uring that dispensers contain
    alcohol handrub

*For each of these, **who** needs to do*
- **what,**
- **when,**
- **where,**
- **how?**

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1. Which behaviour to start with?

- Questions to ask yourself
  - If I change this, what is the likely impact?
  - How easy is it to bring about change?
  - Preference, acceptability, cost?
  - Spillover/generalisability to other behaviours and people?

2. Understand the behaviour in context

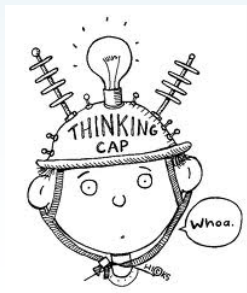- Why are behaviours as they are?
- What needs to change for the desired behaviour/s to occur?
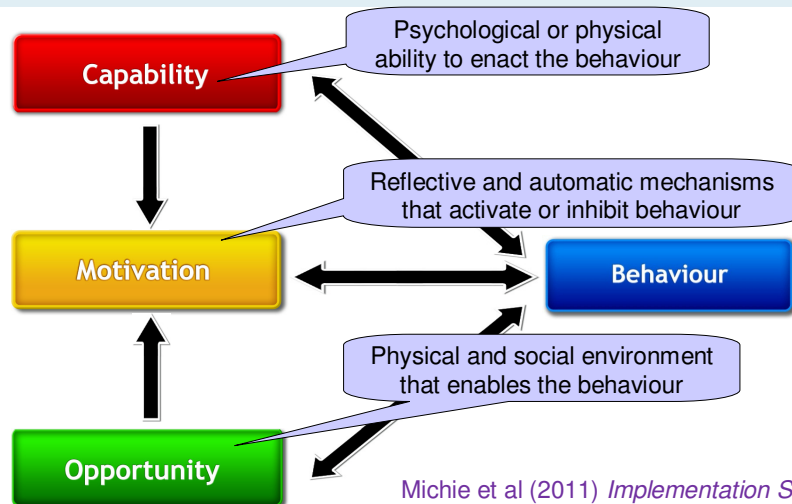
- Answering this is helped by a model of behaviour
  - COM-B
  - Behaviour is part of a system and itself is a system

A thought experiment

For behaviour to change, what three conditions need to exist?

The COM-B system: Behaviour occurs as an interaction between three necessary conditions

Michie et al (2011) *Implementation Science*
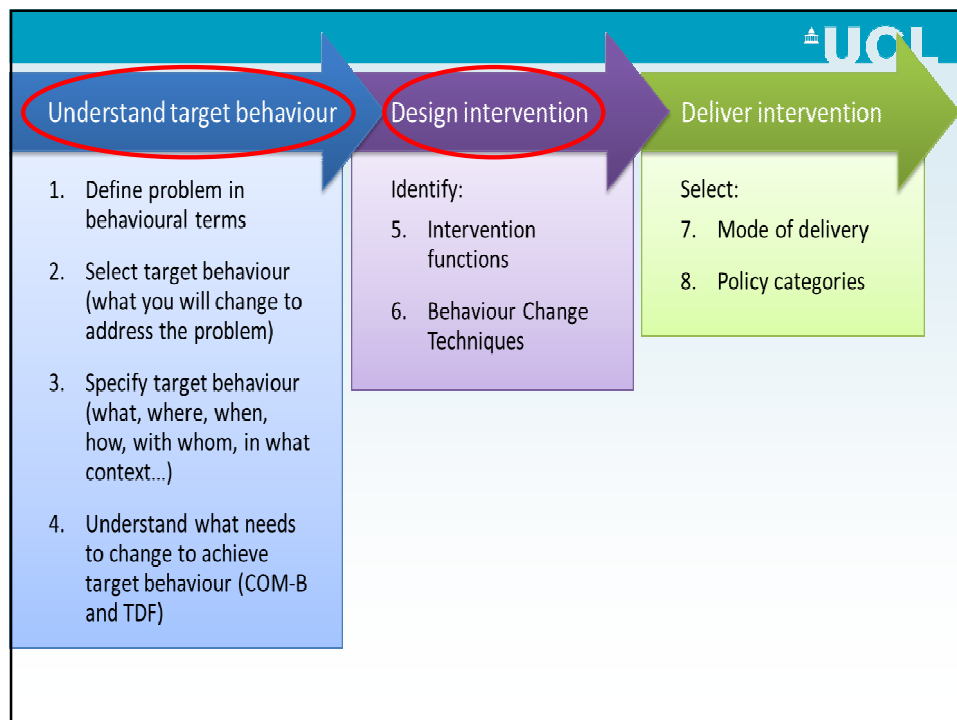

2004-2011

led by Sheldon Stone

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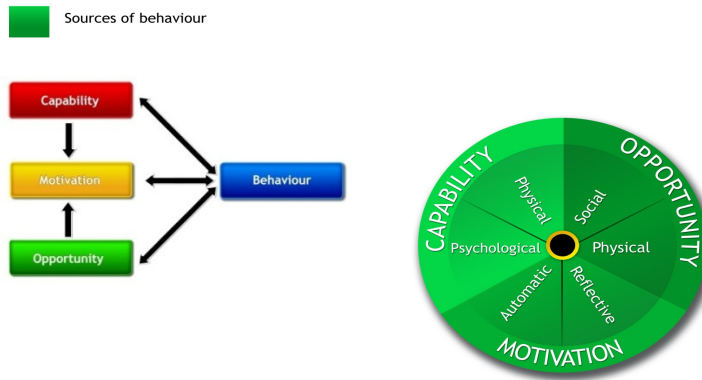- **Capability**
  - No intervention

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
- Train staff to set goals, observe their behaviour, develop action plans on the basis of feedback
  - *Developed at UCL, based on behavioural theory*

Understand target behaviour | Design intervention | Deliver intervention

1. Define problem in behavioural terms

2. Select target behaviour (what you will change to address the problem)

3. Specify target behaviour (what, where, when, how, with whom, in what context...)

4. Understand what needs to change to achieve target behaviour (COM-B and TDF)

Identify:

5. Intervention functions

6. Behaviour Change Techniques

Select:

7. Mode of delivery

8. Policy categories

3. Make the "behavioural diagnosis"

Sources of behaviour

Capability

Motivation

Opportunity

Behaviour

CAPABILITY

OPPORTUNITY

Physical

Social

Psychological

Physical

Automatic

Reflective

MOTIVATION

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4. Intervening: Consider all the options

- Frameworks make life easier
  - good frameworks make you more
- Need a framework that
  - Comprehensive
    - So you don't   e effective
  - Coheren
    - So   ematic method for intervention design
  - Lin   odel of behaviour
    - So that you can draw on behavioural science

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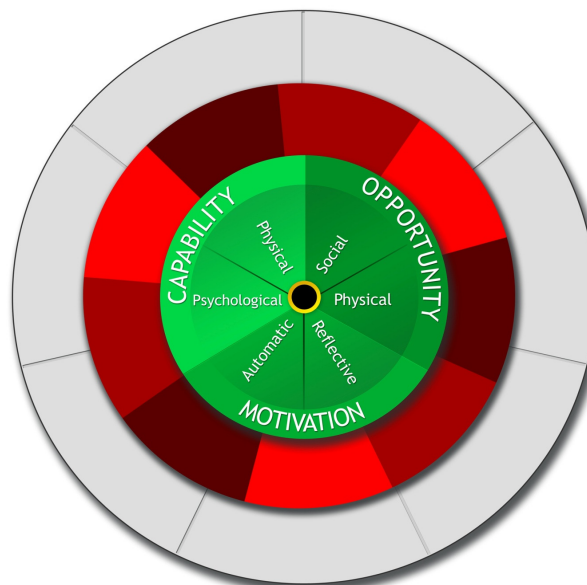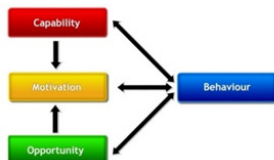
Do we have such a framework?

- Systematic literature review identified 19 frameworks of behaviour change interventions
  - related to many domains e.g. health, environment, culture change, social marketing
- None met all these three criteria
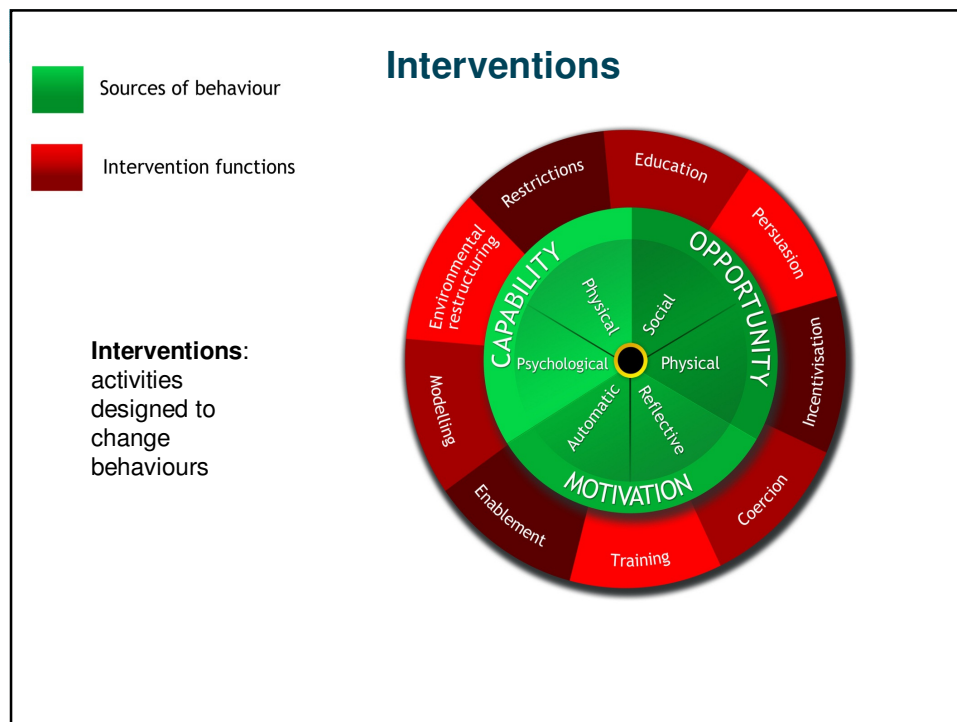- So …. Developed a synthesis of the 19 frameworks

Michie et al (2011) The Behaviour Change Wheel: a new method for characterising and designing behaviour change interventions, *Implementation Science*

www.behaviourchangewheel.com

Behaviour at the hub …. COM-B

Sources of behaviour

Intervention functions

Policy categories

CAPABILITY

OPPORTUNITY

Physical
Social
Psychological
Physical
Automatic
Reflective

MOTIVATION

Capability
Motivation
Opportunity
Behaviour

Interventions

Sources of behaviour

Intervention functions

Interventions: activities designed to change behaviours

From diagnosis to intervention

- Make a 'diagnosis' of the problem i.e. the behaviour to be changed
  - Profile of what needs to change using COM-B
- Identify intervention functions
  - using matrix of COM-B x 9 intervention functions
- Identify policy categories
  - using matrix of intervention functions x policy categories
- Select specify behaviour change techniques

Design: which intervention functions to use?

	Educ	Pers	Incen	Coer	Train	Restr	Envir	Mod	Enabl
Cap Phys					■				■
Cap Psych	■				■				■
Opp Phys						■	■		■
Opp Social						■	■		
Mot Auto		■	■	■			■	■	■
Mot Reflec	■	■	■	■					

Hand Hygiene example: Capability

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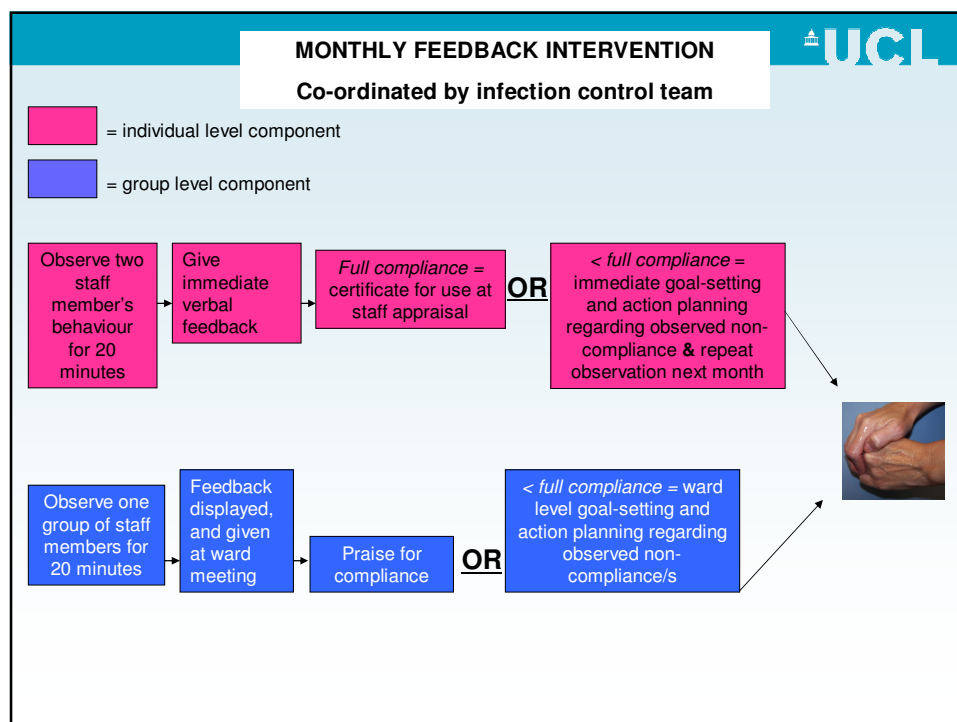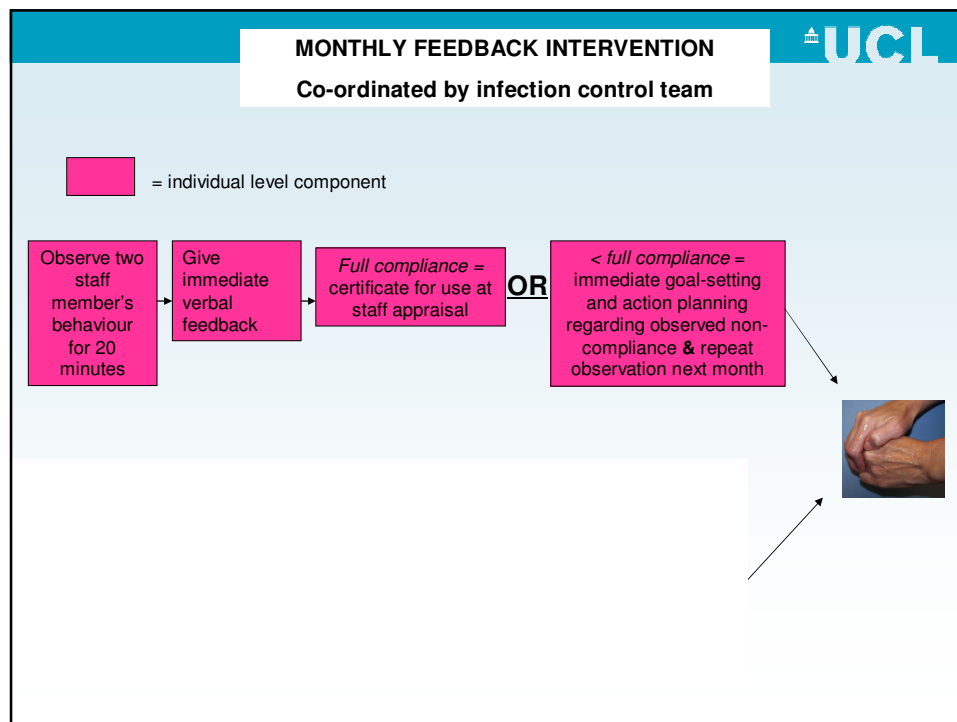   - develop routines for noticing when the behaviour does not occur, and plans for acting in future

Selecting relevant intervention functions

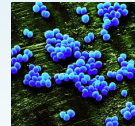|	Intervention functions								
	Education	Persuasion	Incentivisation	Coercion	Training	Restriction	Environmental restructuring	Modelling	Enablement
Physical capability					■				■
Psychological capability	✔				✔				✔
Physical opportunity					■	■	■		■
Social opportunity						■	■	■	■
Automatic motivation		■	■	■	■		■	■	■
Reflective motivation	■	■	■	■					

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

- *Based on behavioural theory (Control Theory)*

MONTHLY FEEDBACK INTERVENTION

Co-ordinated by infection control team

▮ = individual level component

| 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 |

MONTHLY FEEDBACK INTERVENTION

Co-ordinated by infection control team

▮ = individual level component

▮ = group level component

| 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 |

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

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*

Policies

Legend:
- Sources of behaviour
- Intervention functions
- Policy categories

Policies: decisions made by authorities concerning interventions

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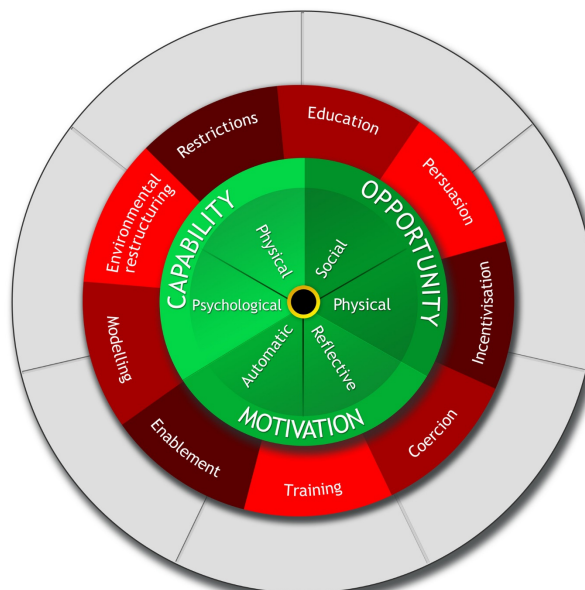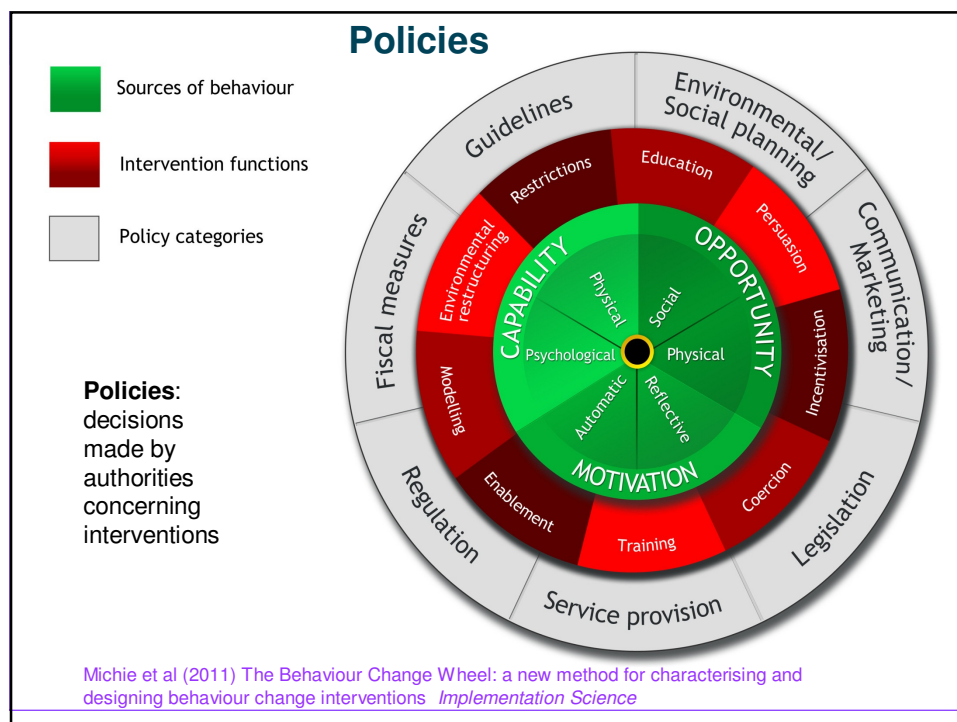
Which policy categories should be used?

	Intervention Functions								
	Educ	Persuas	Incent	Coerc	Train	Restric	Envir	Model	Enabl
Comm	■	■	■	■				■	
Guid	■	■	■	■	■	■	■		■
Fiscal			■	■			■	■	
Regul	■	■	■	■	■	■	■		■
Legisl	■	■	■	■	■	■	■		■
Enviro							■		■
Service	■	■	■	■	■			■	■

Elaboration of COM-B:
Theoretical Domains Framework

Michie et al (2005) Making psychological theory useful for implementing evidence based practice: a consensus approach, *Quality and Safety in Health Care*

Cane et al (2011) Validation of the theoretical domains framework for use in behaviour change and implementation research, *Implementation Science*

■ 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

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

The Behaviour
Change Wheel
A Guide to Designing
Interventions

Susan Michie, Lou Atkins &
Robert West

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

International Red Cross
• Train volunteers
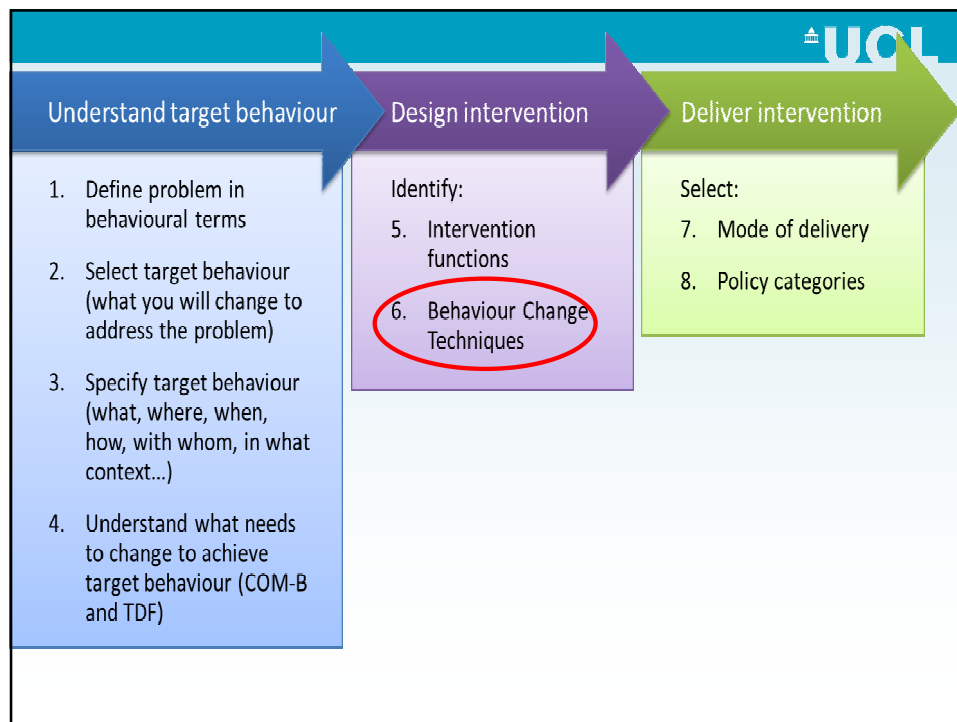
Interventions are made up of many behaviour change techniques

= discrete, low-level components of interventions that on their own have potential to change behaviour

An early reliable taxonomy to change frequently used behaviours

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. Behavioural contract
9. Review goals
10. Provide instruction
11. Model/ demonstrate
12. Prompt practice
13. Prompt monitoring
14. Provide feedback

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.

22. Prompt self-talk
23. Relapse prevention
24. Stress management
25. Motivational interviewing
26. Time management

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.

Abraham & Michie, 2008, *Health Psychology*

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ann. behav. med.
DOI 10.1007/s12160-013-9486-6

ORIGINAL ARTICLE

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 guideli[...] reporting of behavior chang[...] ous methods of cha[...] tions with pr[...]
*Obje[...] ex[...] on[...] used[...]
*Metho[...] bels an[...] classifica[...] ms. Another 18 experts grouped BCTs

[...] ngredients in an open-
[...] ment amongst six researchers
[...] tion descriptions by BCTs was
[...] This resulted in 93 BCTs clustered into 16 groups. Of the 26 BCTs occurring at least five times, 23 had adjust-ed kappas of 0.60 or above.
Conclusions "BCT taxonomy v1," an extensive taxonomy of 93 consensually agreed, distinct BCTs, offers a step change as a method for specifying interventions, but we anticipate further development and evaluation based on international, interdisciplinary consensus.

Electronic supplementary material The online version of this article (doi:10.1007/s12160-013-9486-6) contains supplementary material, which is available to authorized users.

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W. Hardeman

93 item BCT Taxonomy v1,
Annals of Behavioral Medicine, 2013

BCT Taxonomy v1: 93 items in 16 groupings

| Page	Grouping and BCTs	Page	Grouping and BCTs	Page	Grouping and BCTs
1	**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	8	**6. Comparison of behaviour** 6.1. Demonstration of the behavior 6.2. Social comparison 6.3. Information about others' approval	16	**12. Antecedents** 12.1. Restructuring the physical environment 12.2. Restructuring the social environment 12.3. Avoidance/reducing exposure to cues for the behavior

No.	Label	Definition	Examples
1. Goals and planning			
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, <u>also</u> 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

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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
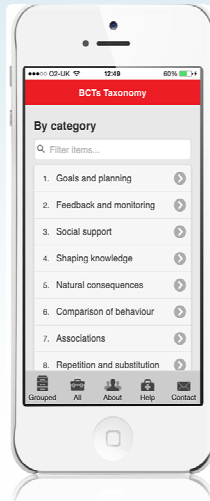
- Fully searchable version of BCTTv1

- Search by BCT label, BCT grouping or alphabetically

- Increases familiarity with the taxonomy

- Increases speed and recall of BCT labels and definitions
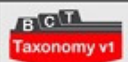
Search for: BCTs   bcts.23.co.uk*

Search for: BCTs*   bcts.23.co.uk*

* You'll need an internet connection to use the app

www.bct-taxonomy.com

Which behaviour change techniques to select?

Local context: The APEASE criteria

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

www.behaviourchangewheel.com

Maintaining behaviour change

- Changing behaviour is hard
  - Maintaining that change is harder
- Effective strategies
  - Don't rely on individual choice and decision-making
  - Do rely on the environment and making behaviour automatic
    - environmental support and prompts
    - building routines
    - feedback
    - rewards and incentives

How is local government using evidence?

Aims

1. To investigate how evidence-based guidelines are received and implemented in local government

2. To identify institutional, individual and systemic barriers and facilitators to implementation

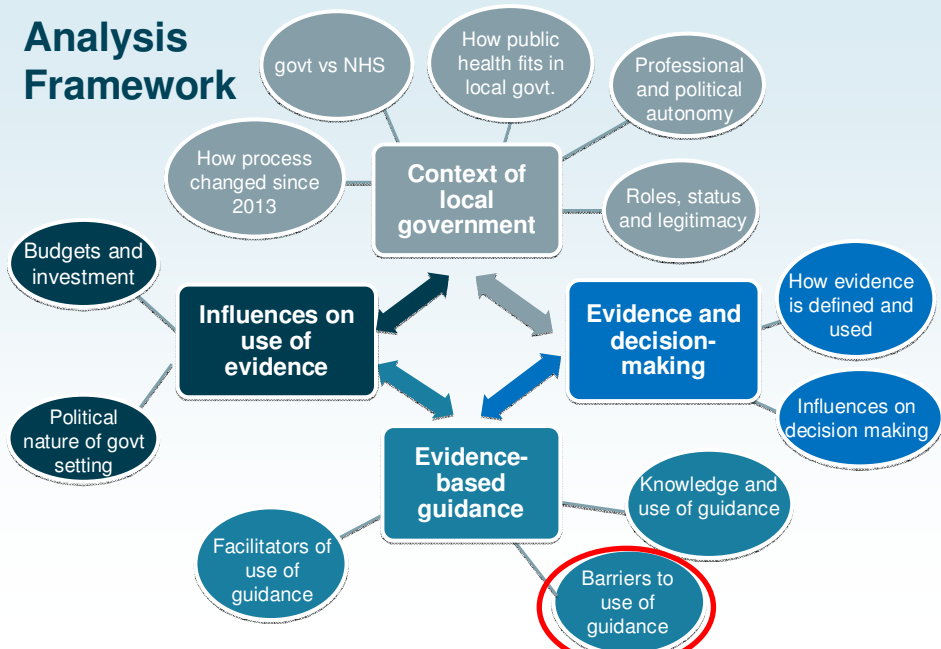3. To investigate data and mechanisms for monitoring and evaluating the process of implementation

1965 - 2015
50
E·S·R·C
50 YEARS SHAPING SOCIETY

NICE National Institute for Health and Care Excellence

Local Government Association

Analysis Framework

- govt vs NHS
- How public health fits in local govt.
- Professional and political autonomy
- How process changed since 2013
- **Context of local government**
- Roles, status and legitimacy
- Budgets and investment
- **Influences on use of evidence**
- **Evidence and decision-making**
- How evidence is defined and used
- Political nature of govt setting
- Influences on decision making
- **Evidence-based guidance**
- Knowledge and use of guidance
- Facilitators of use of guidance
- Barriers to use of guidance

Barriers to the use of NICE guidance – COM-B

Capability
- Lack of awareness/knowledge
- Evidence lacks detail to support expenditure decisions

> "I felt it was incumbent on NICE to say, not only do we think this is cost effective but we realise you've got a fixed budget… we think this is more cost-effective than something you currently do… And they never did that."
> *Director of PH, C*

Opportunity
- Volume of evidence difficult to digest
- Guidance not applicable or specific enough for local context
- Need for translation to local context

> "I get a bit embarrassed, to go to somebody, and they go, well show me what the guidance is like, and I'm like, I'm looking at it, thinking, how can I condense this, so that it looks less?" *PH Officer, B*

Motivation
- View that research doesn't apply in real world
- Premium not given to evidence-based guidance

> "There's not the same premium put on use of evidence as there used to be… there's other factors that trump evidence in decision making." *PH Officer, D*

Guideline implementation: "reversing the pipeline"

- Evidence-based medicine model
  - Research evidence ⟶ recommendations ⟶ implementation
- UK study of evidence in local government (2014-15)
  - Little culture of using research evidence
  - Culture of localism
  - Political incentives, short-termism
- For evidence to inform practice, need to reverse engineer the process
  - Local needs ⟶ types of recommendation ⟶ relevant evidence suitably presented ⟶ implementation

In summary …. To change behaviour ….

- Start by understanding the problem
  - Identify the behaviours to change
    - Who, what, where, when
  - Understand the behaviours
    - COM-B
    - *Before* designing the intervention
- Consider the full range of effective interventions and supporting policies
- Select and implement appropriate behaviour change techniques

And evaluate ……

- ….. so it is possible to accumulate evidence to inform future interventions
- Plan evaluation in advance using a theoretical framework to increase understanding of
  - mechanisms of action
  - reasons for variation

Acknowledgements

- Key collaborators in this work
  - Prof Robert West, UCL
  - Prof Marie Johnston, Aberdeen

  - Health Psychology Research Group

- Key funders

For more information

- Susan Michie
  - s.michie@ucl.ac.uk
- 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

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ADDITIONAL SLIDES IF NEEDED

Frameworks included in systematic review

- **1. Epicure taxonomy** West (2006) Taxonomy of approaches designed to influence behaviour patterns
- **2. Culture capital framework** Knott *et al.* (2008) Framework of knowledge about culture change, offering practical tools for policymaking
- **3. EPOC taxonomy of interventions** Cochrane Effective Practice and Organisation of Care Review Group (EPOC) (2010) Checklist to guide systematic literature reviewers about the types of information to extract from primary studies
- **4. RURU: Intervention implementation taxonomy** Walter *et al.* (2003) Taxonomy covering a wide range of policy, practice and organisational targets aimed at increasing impact of research
- **5. MINDSPACE** Institute for Government and Cabinet Office (2010) Checklist for policy-makers aimed at changing or shaping behaviour
- **6. Taxonomy of behaviour change techniques** Abraham *et al.* (2010) Taxonomy of behaviour change techniques grouped by change targets
- **7. Intervention Mapping** Bartholomew *et al.* (2011) Protocol for a systematic development of theory- and evidence-based interventions
- **8. People and places framework** Maibach *et al.* (2007) Framework that explains how communication and marketing can be used to advance public health
- **9. Public health: ethical issues** Nuffield Council on Bioethics (2007) Ladder of interventions by government, industry, organisations and individuals to promote public health.

- **10. Injury control framework** Geller *et al.* (1990) Heuristic framework for categorising and evaluating behaviour change strategies aimed at controlling injuries
- **11. Implementation taxonomy** Leeman *et al.* (2007) Theory-based taxonomy of methods for implementing change in practice
- **12. Legal framework** Perdue *et al.* (2005) Conceptual framework for identifying possible legal strategies used for preventing cardiovascular diseases
- **13. PETeR** White (in prep.) Comprehensive and universally applicable model or taxonomy of health
- **14. DEFRA's 4E model** DEFRA (2008) Process model for policy makers aimed at promoting pro-environmental behaviours in accordance with social marketing principles
- **15. STD/ HIV framework** Cohen and Scribner (2000) Taxonomy to expand the scope of interventions that can be used to prevent STD and HIV transmission
- **16. Framework on public policy in physical activity** Dunton *et al.* (2010) Taxonomy aimed at understanding how and why policies successfully impact on behaviour change
- **17. Intervention framework for retail pharmacies** Goel *et al.* (1996) Framework that presents factors that may affect retail pharmacy describing and strategies for behaviour change to improve appropriateness of prescribing
- **18. Environmental policy framework** Vlek (2000) A taxonomy of major environmental problems, their different levels and global spheres of impact, and conceptual modelling of environmental problem- solving
- **19. Population Services International (PSI) framework** PSI (2004) A conceptual framework to guide and help conduct research on social marketing interventions

Legend:
- Sources of behaviour
- Theoretical Domains Framework
- Intervention functions
- Policy categories

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

Wheel labels:
- Guidelines
- Environmental/Social planning
- Communication/Marketing
- Legislation
- Service provision
- Regulation
- Fiscal measures

Intervention functions: Training, Restrictions, Persuasion, Incentivisation, Environmental restructuring, Education, Coercion, Enablement, Modelling

Inner labels: CAPABILITY, OPPORTUNITY, MOTIVATION, Physical, Social, Psychological, Automatic, Reflective

Domain labels: Phys, Soc, Env, Id, Bel Cap, Opt, Int, Goals, Bel Cons, Reinf, Em, Know, Cog, Mem, Beh Reg