Development and Validation of the Theoretical Domains Framework

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Acknowledgements

• Key collaborators in this work
  – Prof Marie Johnston, UCL and University of Aberdeen
  – James Cane
  – Lou Atkins

• Funder
MRC Guidance for developing and evaluating complex interventions

Craig et al, 2009 *BMJ*

**Feasibility and piloting**
- Testing procedures
- Estimating recruitment and retention
- Determining sample size

**Development**
- Identifying the evidence base
- Identifying or developing theory
- Modelling process and outcomes

**Evaluation**
- Assessing effectiveness
- Understanding change process
- Assessing cost effectiveness

**Implementation**
- Dissemination
- Surveillance and monitoring
- Long term follow-up
A method for developing behaviour change interventions

1. Select (which?)
2. Specify (precisely what?)
3. Understand (why?)
4. Intervention functions
5. BCTs
6. Mode of delivery
7. Policy categories
What theory? Two general approaches

- Select a specific theory or combination of theories
  - Need to know about theory and be able to justify selection
  - Selecting may exclude areas of potential importance

- Use a comprehensive assessment, drawing on a wide range of theory
  - Useable by a wide range of disciplines without a thorough knowledge of psychological theory
  - Starts broad, less likely to miss areas of potential importance
Applying theory to Knowledge Translation

• KT requires behaviour change
  – Professionals, managers, policy-makers

• There are many theories and models of behaviour and behaviour change
  – Too many, and many overlapping/redundant

• Not generally used in KT research

• Need to integrate and simplify theory to make it useable
Consensus study to make theory more usable for KT researchers

- Participants
  - 18 researchers in health psychology with an interest in theory and implementation research
  - 14 implementation researchers from UK, Netherlands and Canada
- 33 theories and 128 constructs generated
- Simplified into 12 domains of theoretical constructs
- Interview questions associated with each domain

Theories and constructs: 3 broad groups

• **Motivational**: explain behaviour of people who have not yet established intention
  – e.g. Theory of Planned Behaviour

• **Action**: explain behaviour of people who have identified a need to change
  – e.g. Operant Conditioning

• **Organisational**: explain ‘institution’ level change
  – e.g. Diffusion of Innovation
Theories identified

**MOTIVATION THEORIES**
- Theory of planned behaviour (+ theory of reasoned action,
- protection motivation theory, health belief model)
- Social cognitive theory
- Locus of control theories
- Social learning theory
- Social comparison theory
- Cognitive adaptation theory
- Social identity theory
- Elaboration likelihood model
- Goal theories
- Intrinsic motivation theories
- Self-determination theory
- Attribution theory
- Decision making theories (e.g. social judgment theory, “fast and frugal” model, systematic versus heuristic decision making)
- Fear arousal theory

**ACTION THEORIES**
- Learning theory
- Operant theory
- Modelling
- Self-regulation theory
- Implementation theory/automotive model
- Goal theory
- Volitional control theory
- Social cognitive theory
- Cognitive behaviour therapy
- Transtheoretical model
- Social identity theory

**ORGANISATION THEORIES**
- Effort-reward imbalance
- Demand-control model
- Diffusion theory
- Group theory (e.g. group minority theory)
- Decision making theory
- Goal theory
- Social influence
- Person situation contingency models
Results: Theoretical domains

1. Knowledge
2. Skills
3. Professional role and identity
4. Beliefs about capabilities
5. Beliefs about consequences
6. Motivation and goals
7. Memory, attention and decision processes
8. Environmental context and resources
9. Social influences
10. Emotion
11. Action plans
12. Nature of the behaviour
Example of one domain

- Knowledge
- Skills
- Professional role and identity
- **Beliefs about capabilities**
- Beliefs about consequences
- Motivation and goals
- Memory, attention and decision processes
- Environmental context and resources
- Social influences
- Emotion
- Action plans

## Interview questions

- Knowledge
- Skills
- Professional role and identity
- **Beliefs about capabilities**
- Beliefs about consequences
- Motivation and goals
- Memory, attention and decision-making
- Environmental context and resources
- Social influences
- Emotion
- Action plans

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How difficult or easy is it for them to do x? (prompt re. internal and external capabilities/constraints)

What problems have they encountered?

What would help them?

How confident are they that they can do x despite the difficulties?

How capable are they of maintaining x?

How well equipped/comfortable do they feel to do x?

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## KT interventions using this approach

### Australia
- Improving implementation of guidelines for acute low back pain in primary care
  - McKenzie et al.
- Diagnosis and post-diagnosis management of people with dementia
  - Green et al.
- Implementing preconception care guidelines in the general practice setting
  - Mazza et al.

### Canada
- Chiropractors compliance with diagnostic imaging guideline recommendations for spine disorders
  - Bussieres et al.

### Finland
- Guidelines on tobacco and nicotine dependency treatment
  - Kinnunan et al.

### Ireland
- Primary care practitioners' HPV-related behaviours
  - McSherry et al.

### Netherlands
- Blood transfusion management in elective hip and knee arthroplasties
  - Voorn et al.

### UK
- Physicians’ transfusion practice
  - Eccles et al.
- Hospital staff hand hygiene
  - Sheldon et al.
- A suite of dental guidelines across Scotland
  - Clarkson et al.

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Michie et al. >150 citations (Web of Knowledge)
Validating the framework: would a different group of experts come up with a similar framework?

- 37 experts
  - recruited from behavioural medicine/psychology networks
  - good understanding of behaviour change theory
  - unaware of the original TDF
- 3 steps
  1. Identify optimal domain structure
     - Does this replicate original structure?
  2. Establish domain content
     - Is the content of the domains the same?
  3. Finalise domain labels
     - Do the labels given by participants match the original labels?

Cane J., O’Connor D., Michie S. (2012) Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implementation Science, 7*, 37
Validity tested using online sort tasks

• Open sort (n=19)
  – Sort constructs into groups based on their semantic similarity
  – Fuzzy Cluster Analysis
    • optimal domain structure &
  – Kendall's coefficient of concordance, W
    • reliability across experts

• Closed sort (n=18)
  – Sort constructs into the 12 labelled domains and give confidence ratings for each allocation made
  – Discriminant Content Validity (DCV): for each domain,
    • One-sample t-tests on confidence ratings &
    • ICCs reliability across raters
Task: Sort constructs into groups based on semantic similarity
Task: sort constructs into predefined domains and give confidence rating
## Refined framework: 14 domains with 83 component constructs

<table>
<thead>
<tr>
<th>Domain</th>
<th>Constructs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowledge</td>
<td>Knowledge (including knowledge of condition /scientific rationale), Procedural knowledge, Knowledge of task environment</td>
</tr>
<tr>
<td>2. Skills</td>
<td>Skills, Skills development, Competence, Ability, Interpersonal skills, Practice, Skill assessment</td>
</tr>
<tr>
<td>3. Professional Role and Identity</td>
<td>Professional identity, Professional role, Social identity, Identity, Professional boundaries, Professional confidence, Group identity, Leadership, Organisational commitment</td>
</tr>
<tr>
<td>4. Beliefs about Capabilities</td>
<td>Self-confidence, Perceived competence, Self-efficacy, Perceived behavioural control, Beliefs, Self-esteem, Empowerment, Professional confidence</td>
</tr>
<tr>
<td>5. Optimism</td>
<td>Optimism, Pessimism, Unrealistic optimism, Identity</td>
</tr>
<tr>
<td>6. Beliefs about Consequences</td>
<td>Beliefs, Outcome expectancies, Characteristics of outcome expectancies, Anticipated regret, Consequents</td>
</tr>
<tr>
<td>7. Reinforcement</td>
<td>Rewards (proximal / distal, valued / not valued, probable / improbable), Incentives, Punishment, Consequents, Reinforcement, Contingencies, Sanctions</td>
</tr>
<tr>
<td>Domain</td>
<td>Constructs</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>8. Intentions</strong></td>
<td>Stability of intentions, Stages of change model, Transtheoretical model and stages of change</td>
</tr>
<tr>
<td><strong>9. Goals</strong></td>
<td>Goals (distal / proximal), Goal priority, Goal / target setting, Goals (autonomous / controlled), Action planning, Implementation intention</td>
</tr>
<tr>
<td><strong>10. Memory, Attention and Decision Processes</strong></td>
<td>Memory, Attention, Attention control, Decision making, Cognitive overload / tiredness</td>
</tr>
<tr>
<td><strong>11. Environmental Context and Resources</strong></td>
<td>Environmental stressors, Resources / material resources, Organisational culture / climate, Salient events / critical incidents, Person x environment interaction, Barriers and facilitators</td>
</tr>
<tr>
<td><strong>12. Social influences</strong></td>
<td>Social pressure, Social norms, Group conformity, Social comparisons, Group norms, Social support, Power, Intergroup conflict, Alienation, Group identity, Modelling</td>
</tr>
<tr>
<td><strong>13. Emotions</strong></td>
<td>Fear, Anxiety, Affect, Stress, Depression, Positive / negative affect, Burn-out</td>
</tr>
<tr>
<td><strong>14. Behavioural Regulation</strong></td>
<td>Self-monitoring, Breaking habit, Action planning</td>
</tr>
<tr>
<td>TDF, 2005</td>
<td>TDF, 2012</td>
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<tr>
<td>------------------------------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Knowledge</td>
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<tr>
<td>Skills</td>
<td>Physical skills</td>
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<tr>
<td>Cognitive and Interpersonal skills</td>
<td></td>
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<tr>
<td>Memory, Attention and Decision processes</td>
<td>Memory, Attention and Decision processes</td>
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<td>Action plans</td>
<td>Behavioural regulation</td>
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<tr>
<td>Professional/Social Role &amp; Identity</td>
<td>Professional/Social Role &amp; Identity</td>
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<tr>
<td>Beliefs about Capabilities</td>
<td>Beliefs about Capabilities</td>
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<td><strong>Beliefs about Consequences</strong></td>
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<tr>
<td><strong>Beliefs about Consequences</strong></td>
<td>Optimism</td>
</tr>
<tr>
<td>Motivation and goals</td>
<td>Intentions</td>
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<tr>
<td>Goals</td>
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<tr>
<td>Emotion</td>
<td>Emotion</td>
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<tr>
<td>Environmental Context and Resources</td>
<td>Environmental Context and Resources</td>
</tr>
<tr>
<td><strong>Nature of the behaviour</strong></td>
<td>Reinforcement</td>
</tr>
</tbody>
</table>
Understand the nature of 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
  – TDF is a refined version of 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*
<table>
<thead>
<tr>
<th>COM-B</th>
<th>Theory Domains</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical capability</strong></td>
<td>Physical skills</td>
</tr>
<tr>
<td><strong>Psychological capability</strong></td>
<td>Knowledge</td>
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<tr>
<td></td>
<td>Cognitive and Interpersonal skills</td>
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<td></td>
<td>Memory, Attention and Decision processes</td>
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<td>Behavioural regulation</td>
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</table>
Sources of behaviour
A method for developing interventions to change behaviour

1. Target behaviour
   - Select (which?)
   - Specify (precisely what?)
   - Understand (why?)

2. Design intervention
   - Intervention functions
   - BCTs

3. Deliver intervention
   - Mode of delivery
   - Policy categories

Behaviour change techniques
Which behaviour change techniques appropriate for which domain?

- 35 techniques identified from behaviour change literature
- Independently mapped by 4 behavioural and implementation researchers
  - “Which behaviour change techniques would you use as part of an intervention to change each construct domain?”
  - 71% agreement

<table>
<thead>
<tr>
<th>Technique for behaviour change</th>
<th>Social/Professional role &amp; identity</th>
<th>Knowledge</th>
<th>Skills</th>
<th>Beliefs about capabilities</th>
<th>Beliefs about consequences</th>
<th>Motivation and goals</th>
<th>Memory, attention, decision processes</th>
<th>Environment and resources</th>
<th>Social influences</th>
<th>Emotion</th>
<th>Action planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal/target specified: behaviour or outcome</td>
<td>1</td>
<td>2</td>
<td>1.3</td>
<td>2 3</td>
<td>3 1</td>
<td>3 3 3 3</td>
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<td>1</td>
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<td>3 2 3 3</td>
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<tr>
<td>Monitoring</td>
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<td>2</td>
<td>3 3 3</td>
<td>1 2 2</td>
<td>1 2 2</td>
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<td>Self-monitoring</td>
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<td>3 2</td>
<td>2 2 2</td>
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<tr>
<td>Rewards; incentives (inc Self-evaluation)</td>
<td>1 2 1</td>
<td>1</td>
<td>3 3 3</td>
<td>2 1</td>
<td>2 1 2</td>
<td>2 3 3 3</td>
<td>1 1 2</td>
<td>1 1 1</td>
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<tr>
<td>Graded task, starting with easy tasks</td>
<td>1</td>
<td>1</td>
<td>3 3 2</td>
<td>2 2 3</td>
<td>2 3 2 2</td>
<td>1 2</td>
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<td>1 1 1</td>
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<tr>
<td>Increasing skills: problem solving, decision making, goal setting</td>
<td>1 2</td>
<td>3 3 3 3</td>
<td>2 2 3 2</td>
<td>1 2 3 2</td>
<td>1 2</td>
<td>1</td>
<td>2</td>
<td>3 1</td>
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<tr>
<td>Stress management</td>
<td>1</td>
<td>1 2</td>
<td>1 1 1</td>
<td>1 1 1</td>
<td>1 2 1</td>
<td>1 2 1</td>
<td>1 3 2 1</td>
<td>1 1</td>
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<tr>
<td>Coping skills</td>
<td>1</td>
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<td>2 2 2</td>
<td>1</td>
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<td>1 1</td>
<td>1 3 2 2</td>
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<tr>
<td>Rehearsal of relevant skills</td>
<td>1</td>
<td>3 3 3 3</td>
<td>2 3 2</td>
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<td>2 1</td>
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Conclusions

• Validation
  – Good support for basic structure. Minor modifications
  – Strengthened evidence for the structure and content of the domains
  – Increases confidence in the usefulness of the TDF as a method for making a comprehensive assessment of implementation and other behaviour problems

• Links to other intervention tools
  – Behaviour change techniques (Michie et al, 2013)