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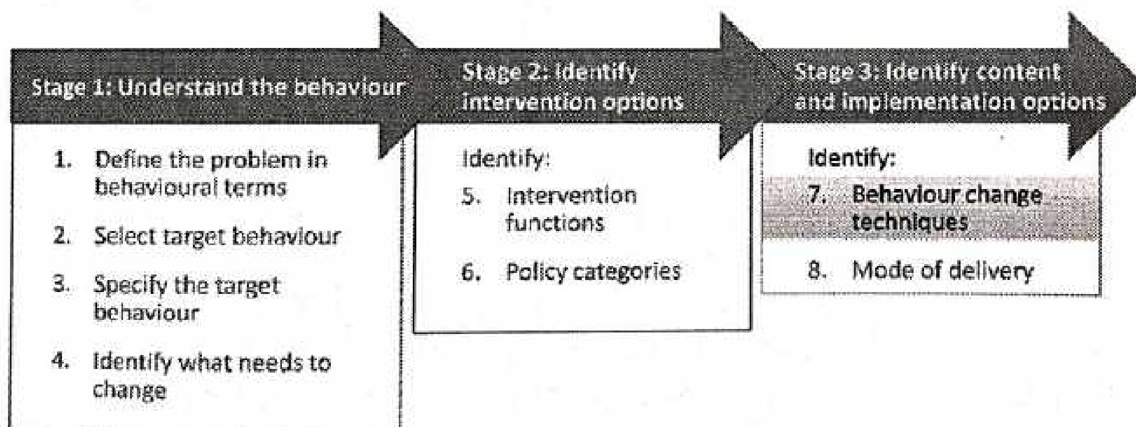
Chapter 3: Identify content and implementation options

Having identified the intervention functions and policy categories, the next step is to identify intervention content in terms of which BCTs best serve intervention functions and which mode of delivery is appropriate to implement the intervention. This chapter will guide you in the use of evidence and practical factors when identifying BCTs and mode of delivery.

Step 7: Identify behaviour change techniques (BCTs)



We are now concerned with identifying which BCTs can deliver the identified intervention functions under the relevant policy categories. A BCT is defined as "an active component of an intervention designed to change behaviour". The defining characteristics of a BCT are that it is observable, replicable, an irreducible component of an intervention designed to change behaviour and a postulated active ingredient within the intervention. It is

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thus the smallest component compatible with retaining the postulated active ingredients, i.e. the proposed mechanisms of change, and can be used alone or in combination with other BCTs" [69]. Box 3.1 gives three examples of BCTs with their definitions and examples taken from BCTTv1.

Box 3.1 Examples of BCTs in BCTTv1

Habit formation
Definition: Prompt rehearsal and repetition of the behaviour in the same context repeatedly so that the context elicits the behaviour.
Example: Prompt patients to take their statin tablet before brushing their teeth every evening.

Goal setting (behaviour)
Definition: Set or agree a goal defined in terms of the behaviour to be achieved.
Example: Agree a daily walking goal (e.g. to walk for at least 30 minutes every day) and reach agreement about the goal.

Self-monitoring of behaviour
Definition: Establish a method for the person to monitor and record their behaviour(s) as part of a behaviour change strategy.
Example: Ask the person to record daily, in a diary, whether they had brushed their teeth for at least two minutes before going to bed.

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The BCT Taxonomy (v1) - a standardised language for describing the active ingredients in interventions

BCTs have been identified in relation to particular types of behaviour such as physical activity, healthy eating, condom use, smoking, excessive alcohol use, professional practice and medication use [3-9, 70]. These behaviour-specific 'taxonomies' of BCTs have been synthesised and refined in an internationally supported piece of work to produce BCT Taxonomy v1, with 93 BCTs. Because 93 items are too many to keep in mind, they were organised into 16 groupings by experts using a 'card sort' technique [2] (see www.ucl.ac.uk/health-psychology/BCTtaxonomy/). The BCT labels within their groupings are shown below, along with full information about one BCT as an illustration (Tables 3.1 and 3.2). The full taxonomy with definitions and examples is given in Appendix 4[4].

[4] An interactive online resource is being developed which will provide training for new users of the taxonomy, 'top-up' or 'refresh' training and will continue to support those who have already completed training to use BCTTv1. The site will be accessible from the current BCT Taxonomy project website (http://www.ucl.ac.uk/health-psychology/BCTtaxonomy/). A BCTTv1 smartphone app is also being developed and will be available for android smartphones and iPhones. Links to download sites will be posted on BCT Taxonomy project website.

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Table 3.1 Labels of the BCTs within the taxonomy (each has a definition)

Grouping and BCTs

1. Goals and planning
1.1. Goal setting (behaviour)
1.2. Problem solving
1.3. Goal setting (outcome)
1.4. Action planning
1.5. Review behaviour goal(s)
1.6. Discrepancy between current behaviour and goal
1.7. Review outcome goal(s)
1.8. Behavioural contract
1.9. Commitment

2. Feedback and monitoring
2.1. Monitoring of behaviour by others without feedback
2.2. Feedback on behaviour
2.3. Self-monitoring of behaiour
2.4. Self-monitoring of outcome(s) of behaviour
2.5. Monitoring of outcome(s) of behaviour without feedback
2.6. Biofeedback
2.7. Feedback on outcome(s) of behaviour

3. Social support
3.1. Social support (unspecified)
3.2. Social support (practical)
3.3. Social support (emotional)

4. Shaping knowledge
4.1. Instruction on how to pe form the behaviour
4.2. Information about Antecedents
4.3. Re-attribution
4.4. Behavioural experiments

5. Natural consequences
5.1. Information about health consequences
5.2. Salience of consequences
5.3. Information about social and environmental consequences
5.4. Monitoring of emotional consequences
5.5. Anticipated regret
5.6. Information about emotional consequences

6. Comparison of behaviour
6.1. Demonstration of the behaviour
6.2. Social comparison
6.3. Information about others' approval

7. Associations
7.1. Prompts/cues
7.2. Cue signalling reward
7.3. Reduce prompts/cues
7.4. Remove access to the reward
7.5. Remove aversive stimulus
7.6. Satiation
7.7. Exposure
7.8. Associative learning

8. Repetition and substitution
8.1. Behavioural practice/rehearsal
8.2. Behaviour substitution
8.3. Habit formation
8.4. Habit reversal
8.5. Overcorrection
8.6. Generalisation of target behaviour
8.7. Graded tasks

9. Comparison of outcomes
9.1. Credible source
9.2. Pros and cons
9.3. Comparative imagining of future outcomes

10. Reward and threat
10.1. Material incentive (behaviour)
10.2. Material reward (behaviour)
10.3. Non-specific reward
10.4. Social reward
10.5. Social incentive
10.6. Non-specific incentive
10.7. Self-incentive
10.8. Incentive (outcome)
10.9. Self-reward
10.10. Reward (outcome)
10.11. Future punishment

11. Regulation
11.1. Pharmacological support
11.2. Reduce negative emotions
11.3. Conserving mental resources
11.4. Paradoxical instructions

12. Antecedents
12.1. Restructuring the physical environment
12.2. Restructuring the social environment
12.3. Avoidance/reducing exposure to cues for the behaviour
12.4. Distraction
12.5. Adding objects to the environment
12.6. Body changes

13. Identity
13.1. Identification of self as role model
13.2. Framing/reframing
13.3. Incompatible beliefs
13.4. Valued self-identify
13.5 Identity associated with changed behaviour

14. Scheduled consequences
14.1. Behaviour cost
14.2. Punishment
14.3. Remove reward
14.4. Reward approximation
14.5. Rewarding completion
14.6. Situation-specific reward
14.7. Reward incompatible behaviour
14.8. Reward alternative behaviour
14.9. Reduce reward frequency
14.10. Remove punishment

15. Self-belief
15.1. Verbal persuasion about capability
15.2. Mental rehearsal of successful performance
15.3. Focus on past success
15.4. Self-talk

16. Covert learning
16.1. Imaginary punishment
16.2. Imaginary reward
16.3. Vicarious consequences

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Table 3.2 Example of BCT label, definition and example from BCTTv1

No.	Label	Definition	Examples
1. Goals and planning			
1.1	**Goal setting (behaviour)**	Set or agree a goal defined in terms of the behaviour to be achieved *Note: only code*[d] *goal-setting if there is sufficient evidence that goal set as part of intervention; if goal unspecified or a behavioural outcome, code* ***1.3, Goal setting (outcome)****; if the goal defines a specific context, frequency, duration or intensity for the behaviour, also code* ***1.4, Action planning***	Agree 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

[d]References to coding relate to using the Taxonomy to describe the content of published interventions.

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Linking intervention functions with BCTs

The first step is to consider all the BCTs that could be considered for any particular function. BCTs appropriate for each function, as judged by a consensus of four experts in behaviour change, are shown in Table 3.3. When considering BCTs, it is essential to be guided by the definition not by the label (see Appendix 4). The next step is to narrow the 'long list' of BCTs down to ones that are most likely to be appropriate for the situation in which you are intervening. In addition to considering the APEASE criteria (Table 1), another way of narrowing down the list is to first consider BCTs used most frequently[5] before considering less frequently used BCTs. These are also shown in bold in Table 3.3. It should be noted that the BCTs in BCTTv1 have been identified mostly from interventions directly targeting individuals and so are represented more frequently by some intervention functions (especially 'enablement') than others (most notably 'restriction' which does not feature in BCTTv1. Linking the BCW to BCTs has drawn attention to the need to develop taxonomies of BCTs across all the intervention functions. This will require detailed analyses of interventions targeting community, organisational and population levels in much the same way as has been done for interventions directly targeting individuals.

[5]BCTs were identified in a study using the BCT Taxonomy v1 to identify intervention content and defined as frequently used if they appeared in 16 or more of 40 intervention descriptions included in the study [72].

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Table 3.3 Linking intervention functions to BCTs

Intervention function	Individual BCTs
Education	**Most frequently used BCTs:** • **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** Less frequently used BCTs: • Biofeedback • Self-monitoring of outcome(s) of behaviour • Cue signalling reward • Satiation • Information about antecedents • Re-attribution • Behavioural experiments • Information about emotional consequences • Information about others' approval
Persuasion	**Most frequently used BCTs:** • **Credible source** • **Information about social and environmental consequences** • **Information about health consequences** • **Feedback on behaviour** • **Feedback on outcome(s) of the behaviour** Less frequently used BCTs: • Biofeedback • Re-attribution • Focus on past success • Verbal persuasion about capability • Framing/reframing • Identity associated with changed behaviour • Identification of self as role model • Information about emotional consequences • Salience of consequences • Information about others' approval • Social comparison

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Table continued.

Incentivisation	**Most frequently used BCTs:** • **Feedback on behaviour** • **Feedback on outcome(s) of behaviour** • **Monitoring of behaviour by others without evidence of feedback** • **Monitoring outcome of behaviour by others without evidence of feedback** • **Self-monitoring of behaviour** Less frequently used BCTs: • Paradoxical instructions • Biofeedback • Self-monitoring of outcome(s) of behaviour • Cue signalling reward • Remove aversive stimulus • Reward approximation • Rewarding completion • Situation-specify reward • Reward incompatible behaviour • Reduce reward frequency • Reward alternate behaviour • Remove punishment • Social reward • Material reward • Material reward (outcome) • Self-reward • Non-specific reward • Incentive • Behavioural contract • Commitment • Discrepancy between current behaviour and goal • Imaginary reward

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Coercion	Most frequently used BCTs: • **Feedback on behaviour** • **Feedback on outcome(s) of behaviour** • **Monitoring of behaviour by others without evidence of feedback** • **Monitoring outcome of behaviour by others without evidence of feedback** • **Self-monitoring of behaviour** Less frequently used BCTs: • Biofeedback • Self-monitoring of outcome(s) of behaviour • Remove access to the reward • Punishment • Behaviour cost • Remove reward • Future punishment • Behavioural contract • Commitment • Discrepancy between current behaviour and goal • Incompatible beliefs • Anticipated regret • Imaginary punishment
Training	Most frequently used BCTs: • **Demonstration of the behaviour** • **Instruction on how to perform a behaviour** • **Feedback on the behaviour** • **Feedback on outcome(s) of behaviour** • **Self-monitoring of behaviour** • **Behavioural practice/rehearsal** Less frequently used BCTs: • Biofeedback • Self-monitoring of outcome(s) of behaviour • Habit formation • Habit reversal • Graded tasks • Behavioural experiments • Mental rehearsal of successful performance • Self-talk • Self-reward

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Table continued.

Restriction	*No BCTs in BCTTv1 are linked to this intervention function because they are focused on changing the way that people think, feel and react rather than the way the external environment limits their behaviour.*
Environmental restructuring	**Most frequently used BCTs:** • **Adding objects to the environment** • **Prompts/cues** • **Restructuring the physical environment** Less frequently used BCTs: • Cue signalling reward • Remove access to the reward • Remove aversive stimulus • Satiation • Exposure • Associative learning • Reduce prompt/cue • Restructuring the social environment
Modelling	**Most frequently used BCTs:** • **Demonstration of the behaviour**
Enablement	**Most frequently used BCTs:** • **Social support (unspecified)** • **Social support (practical)** • **Goal setting (behaviour)** • **Goal setting (outcome)** • **Adding objects to the environment** • **Problem solving** • **Action planning** • **Self-monitoring of behaviour** • **Restructuring the physical environment** • **Review behaviour goal(s)** • **Review outcome goal(s)**

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	Less frequently used BCTs: • Social support (emotional) • Reduce negative emotions • Conserve mental resources • Pharmacological support • Self-monitoring of outcome(s) of behaviour • Behaviour substitution • Overcorrection • Generalisation of a target behaviour • Graded tasks • Avoidance/reducing exposure to cues for the behaviour • Restructuring the social environment • Distraction • Body changes • Behavioural experiments • Mental rehearsal of successful performance • Focus on past success • Self-talk • Verbal persuasion about capability • Self-reward • Behavioural contract • Commitment • Discrepancy between current behaviour and goal • Pros and cons • Comparative imagining of future outcomes • Valued self-identity • Framing/reframing • Incompatible beliefs • Identity associated with changed behaviour • Identification of self as role model • Salience of consequences • Monitoring of emotional consequences • Anticipated regret • Imaginary punishment • Imaginary reward • Vicarious consequences

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Linking TDF domains with BCTs

Some intervention designers proceed directly from understanding the behaviour using the TDF to selecting BCTs for the intervention (see [44] for an example of this process). This process has been guided by a matrix of domains and BCTs developed using the 2005 version of the TDF and a preliminary list of BCTs [49]. An example of how this process has been applied to design an intervention to promote adherence to evidence based-guidelines is shown in Box 3.3 at the end of this chapter. More recent work drawing on an expert consensus exercise using the 2012 update and BCTs has linked 12 of the domains to 59 BCTs from BCT Taxonomy v1. For those wishing to use this approach, this linking is shown in Table 3.4 [73].

Table 3.4 Expert consensus linking BCTs to TDF domains

TDF domain	BCT
Knowledge	Health consequences Biofeedback Antecedents Feedback on behaviour
Skills	Graded tasks Behavioural rehearsal / practice Habit reversal Body changes Habit formation
Professional Role and Identity	No BCTs are linked to this domain

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Beliefs about Capabilities	Verbal persuasion to boost self-efficacy Focus on past Success
Optimism	Verbal persuasion to boost self-efficacy
Beliefs about Consequences	Emotional consequences Salience of consequences Covert sensitisation Anticipated regret Social and environmental consequences Comparative imagining of future outcomes Vicarious reinforcement Threat Pros and cons Covert conditioning
Reinforcement	Threat Self-reward Differential reinforcement Incentive Thinning Negative reinforcement Shaping Counter conditioning Discrimination training Material reward Social reward Non-specific reward Response cost Anticipation of future rewards or removal of punishment Punishment Extinction Classical conditioning
Intentions	Commitment Behavioural contract

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Table continued.

Goals	Goal setting (outcome) Goal setting (behaviour) Review of outcome goal(s) Review behaviour goals Action planning (including implementation intentions)
Memory, Attention and Decision Processes	No BCTs are linked to this domain
Environmental Context and Resources	Restructuring the physical environment Discriminative (learned) cue Prompts / cues Restructuring the social environment Avoidance / changing exposure to cues for the behaviour
Social Influences	Social comparison Social support or encouragement (general) Information about others' approval Social support (emotional) Social support (practical) Vicarious reinforcement Restructuring the social environment Modelling or demonstrating the behaviour Identification of self as role model Social reward
Emotion	Reduce negative emotions Emotional consequences Self-assessment of affective consequences Social support (emotional)
Behavioural Regulation	Self-monitoring of behaviour

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How to identify BCTs - completing Worksheet 7

Worksheet 7 asks you to identify BCTs based on the intervention functions selected in Step 5; we selected incentivisation and enablement. For our example we will start by identifying the most frequently used BCTs that are relevant to these intervention functions and consider their appropriateness in terms of how well they meet the APEASE criteria in the context of promoting the cleaning hands using alcohol gel (Table 3.5).

Table 3.5 Example of a completed Worksheet 7

Intervention function	COM-B component	Most recently used BCTs	Does the BCT meet the APEASE criteria (affordability, practicability, effectiveness/ cost-effectiveness, acceptability, side-effects/safety, equity) in the context of cleaning hands using alcohol gel?
Incentivisation	Reflective motivation Automatic motivation	Feedback on behaviour	Yes
		Feedback on outcome(s) of behaviour	Yes
		Monitoring of behaviour by others without evidence of feedback	Yes
		Monitoring outcome of behaviour by others without evidence of feedback	Unlikely to be effective in this context.
		Self-monitoring of behaviour	Not practicable to deliver.

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Box continued.

Enablement	Psychological capability Social opportunity Automatic motivation	Social support (unspecified)	Unlikely to be effective in this context
		Social support (practical)	Unlikely to be effective in this context
		Goal setting (behaviour)	Yes
		Goal setting (outcome)	Yes
		Adding objects to the environment	Not relevant in this context
		Problem solving	Not relevant in this context
		Action planning	Yes
		Self-monitoring of behaviour	Not practicable to deliver
		Restructuring the physical environment	Not relevant in this context
		Review behaviour goal(s)	Yes
		Review outcome goal(s)	Not relevant in this context

Frequently used BCTs selected:
Feedback on behaviour
Feedback on outcome(s) of behaviour
Monitoring of behaviour by others without evidence of feedback
Goal setting (behaviour)
Goal setting (outcome)
Action planning
Review behaviour goal(s)

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Drafting an intervention strategy to increase hand hygiene behaviour amongst hospital staff

Below we summarise the intervention functions, policy categories and BCTs that we have systematically selected to address the drivers of our target behaviour identified in the behavioural diagnosis. To this we have added a less frequently used BCT, 'non-specific reward' as this also meets the APEASE criteria in this context. Based on this selection we can now draft an intervention strategy, describing how BCTs will be delivered in this context and through the policy categories selected. The example is based on the Feedback Intervention Trial (FIT) which developed and evaluated an intervention using COM-B and the TDF. It was found, using a stepped wedge design across 16 UK hospitals, to be effective in increasing staff hand-hygiene behaviour [74] (Table 3.6).

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Table 3.6 Example of a completed draft intervention strategy

Intervention functions	COM-B components served by intervention functions	Policy categories through which BCTs can be delivered[e]	Intervention strategy BCTs delivered in an extract from the Feedback Intervention Trial (Fuller et al. 2012)
Incentivisation	Reflective motivation Automatic motivation	Service provision	The intervention was delivered by a 'ward co-ordinator' who observed hand hygiene practices of staff individually and in groups. Following observation, staff received feedback individually and in group meetings on the percentage of times the behaviour was appropriately performed. (BCT - feedback on behaviour). In cases of 100% compliance with hand hygiene practice staff received a certificate and feedback at their annual appraisal (BCT – non-specific reward). Where staff members were observed not cleaning their hands, a goal was set to clean their hands in identified high risk situations (BCT – goal setting behaviour) and an action plan formed to support achieving the goal (BCT – action planning).
Enablement	Psychological capability Social opportunity Automatic motivation		

[e] In Step 6, although communication/marketing and service provision were identified as potentially useful policy categories through which to deliver the intervention, the intervention strategy shown here is delivered through service provision only.

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This strategy illustrates how the BCTs 'feedback on behaviour', 'non-specific reward', 'goal setting (behaviour)' and 'action planning' could be delivered through changes to service provision in order to enable and incentivise staff to clean their hands using alcohol gel.

Designers are encouraged to pilot, review and amend the strategy as necessary with input from key stakeholders before launching the intervention. Process and outcome data should be collected to allow regular review and further improvement as necessary.

Now it's your turn!
Please complete Worksheet 7

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Case study examples of using BCTs in intervention design, to specify intervention content and inform evidence-based policy

An example of using BCTs identified in effective interventions to inform policy is given in Box 3.2.

Box 3.2 Using BCTs to inform evidence-based policy – the example of smoking cessation

The formulation of smoking cessation policy in England is an example of linking BCTs to evidence-based policy. Eight BCTs associated with higher success rates for smoking cessation were identified in published reports of effective interventions in a Cochrane review [75] and in the treatment manuals of English Stop Smoking services where the delivery of these techniques was compared with self-report and CO-verified quit rates [76]. The BCTs are summarized below together with the intervention function they serve (Table 3.7 - note these techniques are from a taxonomy of BCTs identified in behavioural support for smoking cessation [7] so the labels will be different to those in BCTTv1).

Table 3.7: Effective BCTs in smoking cessation linked to intervention functions

BCT	Intervention function
1. Provide information on consequences of smoking and smoking cessation	Education, persuasion
2. Measure CO	Education, persuasion, incentivisation, coercion, training
3. Facilitate barrier identification and problem solving	Enablement

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4.	Facilitate relapse prevention and coping	Enablement
5.	Facilitate goal setting	Enablement
6.	Advise on stop-smoking medication	Education
7.	Give options for additional and later support	Enablement
8.	Provide information on withdrawal symptoms	Education, persuasion

The intervention functions these BCTs are linked to can all be delivered through the policy categories service provision and guidelines. As a result, these BCTs now form the basis of the national, consensually determined set of competences for smoking cessation practitioners adopted by the NHS (policy category - guidelines) for the delivery of behavioural support in English Stop Smoking Services (policy category – service provision). This formed the basis of a national training programme, see www.ncsct.co.uk.

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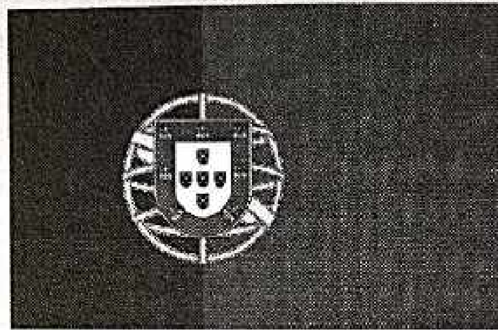
An example of selecting BCTs in intervention design based on formal theories is shown in Box 3.3.

Box 3.3 Selecting BCTs for an intervention using formal theories – the example of physical activity in school children



Development of a theory-based intervention to enhance physical activity among adolescents [77]

Aims: To develop a school-based physical activity (PA) intervention for adolescents in Portugal.

Methods: Using formal theories, Social Cognitive and Self-regulation Theories (SCT and SRT), 21 behaviour change techniques from Abraham and Michie's BCT taxonomy [3] were used to target the following SCT and SRT theoretical determinants of behaviour: general knowledge, outcome expectancies, self-efficacy, and behavioural intentions (from SCT) and action planning and coping planning (from SRT).

BCTs used: Provide general information, provide information on consequences, provide information on others' approval, prompt intention formation, prompt specific goal setting, set graded tasks, prompt barrier identification, agreement of behavioural contract, provide instruction, demonstration of behaviour, prompt behaviour practice, prompt self-monitoring, provide feedback, provide general encouragement, provide contingent rewards, teach to use prompts/cues, use follow up prompts, provide opportunities for social comparison, plan social support, prompt

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identification as role model, relapse prevention. Example items include: 'If I continue with my current level of PA....', 'I intend to engage in PA three times a week', and 'I am certain that I can engage in PA three times per week'. SRT constructs were measured pre and post intervention using items such as: 'I have made a detailed plan regarding when and how to engage in PA' and 'I have made a detailed plan regarding what to do if something interferes with my plans (e.g. If I have a test that week').

Self-reported PA was measured at baseline, directly after the intervention, three and nine months. SCT constructs were measured pre and post intervention.

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Two examples of selecting BCTs in intervention design based on the TDF is shown in Box 3.4

Box 3.4 Selecting BCTs for an intervention using the TDF – the example of adherence to evidence-based guidelines

Evidence-based care of older people with suspected cognitive impairment in general practice: the IRIS cluster randomised trial [78]

Aims: To design and test an intervention to promote Australian GPs' adherence to two recommendations in clinical guidelines for dementia: i) receipt of a formal cognitive assessment; ii) assessment of depression using a validated scale.

Methods: Interviews based on the TDF were conducted with GPs to identify barriers and facilitators to adhering to the two recommendations. Relevant domains were linked to BCTs using the matrix resulting from the expert consensus process[49].

Results: The trial protocol reported barriers and facilitators for one recommendation - receipt of a formal cognitive assessment (the barriers and facilitators for assessing co-morbid depression using a validated scale are available in Murphy et al [79]):

Barriers: Beliefs about consequences' (GPs held negative beliefs about formal cognitive testing); 'emotion' (GPS were not comfortable carrying out the assessments; 'skills' (GPs had limited training to carry out assessments); 'beliefs about capabilities' (GPs

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had limited confidence carrying out assessments); 'environmental context and resources' (GPs had limited access to tests or did not have the time or resources to carryout out the tests); 'social influences' (patients found the tests uncomfortable or they or their family refused testing.

Facilitators: 'Knowledge' (knowing when an assessment is needed); 'skills' (knowing how to carry out an assessment); 'beliefs about capabilities' (being confident to carry out assessments); 'environmental context and resources' (having enough time and resources to carry out assessments).

The following BCTs identified by the matrix were delivered in a workshop with GPs: *information provision, persuasive communication; information regarding behaviour, outcome; feedback; social processes of encouragement, pressure, support; self-monitoring; modelling/ demonstration of behaviour by others; increasing skills; coping skills; rehearsal of relevant skills; and action planning* (note the labels of the BCTs were from an earlier taxonomy and so may be slightly different than those in BCTTv1).

Conclusion: This is an example of using a theory-based tool to understand behaviour and then systematically selecting BCTs to change the target behaviour and test the resulting intervention in a randomised controlled trial.

Development of a behaviour change intervention: a case study on the practical application of theory [80]

Aim: To develop a behaviour change intervention to enhance GPs' adherence to clinical guidelines for consultations with patients with osteoarthritis.

Method: Intervention development followed the 'Implementation of Change Model' [81], which provides evidence-based and step-by-step guidance to implementing change in clinical practice. Guidance on what constitutes a 'model' osteoarthritis consultation was developed through a consensus exercise, and meetings

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Box continued.

were held with three advisory groups (two consisting of GPs in teaching or research roles; one consisting of primary healthcare practitioners from a general practice). The groups were asked about:

1. Their current clinical management of osteoarthritis.
2. Their awareness of, and agreement with, NICE guidelines on osteoarthritis.
3. Perceived discrepancies between their own practice and NICE guidance/model consultation.
4. Opinions about barriers to and incentives for delivering the model consultation.

Responses to these questions were coded into the domains of the TDF.

Results: The TDF domains identified were used to guide the selection of BCTs for the intervention, informed by expert consensus as to which techniques are most likely to effect change for each of the domains [49]. Identified domains and chosen techniques are shown in Table 3.8.

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Table 3.8 TDF domains linked to BCTs delivered in the intervention

TDF Domain	Behaviour Change Technique
Knowledge	Information provision
Skills	Rehearsal of relevant skills; graded task starting with easy tasks; increasing skills: problem-solving
Social/professional role and identity	Social processes of encouragement, pressure and support
Beliefs about capabilities	Social processes of encouragement, pressure and support
Beliefs about consequences	Information provision; persuasive communication
Motivation and goals	Contract; rewards; persuasive communication
Memory, attention and decision processes	Prompts, triggers, cues

Using the TDF alongside a practical model for changing clinical behaviour meant that a systematically developed theory-based complex intervention could be developed in a step-by-step and very 'do-able' manner.

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An example of using BCTTv1 to describe the content of an intervention and specify its mechanism of action, by linking to the COM-B model and TDF, is given in Box 3.5.

Box 3.5 Describing intervention content and mechanism of action using BCTTv1, BCW and TDF

Describing an intervention to support implementation: improving compliance with the 'Sepsis Six' care pathway [19].

Background: Sepsis is a systemic, deleterious response to infection leading to acute organ dysfunction and has a mortality rate of 40%. Severe sepsis is estimated to kill 37,000 in UK hospitals annually and consume 50% of critical care resources. Mortality can be halved if treated within the hour by implementing the 'Sepsis Six' care pathway: high flow oxygen, blood cultures, intravenous fluid & antibiotics, haemoglobin & lactate levels, measuring urine output.

A pragmatic nurse-led intervention to increase compliance with the Sepsis Six pathway was piloted in several wards of a large NHS hospital in London. Once 95% compliance was reached in pilot wards, the aim was to implement the Sepsis Six pathway in all wards. A first step in optimising implementation is to understand the content of the intervention by describing its active ingredients and drivers of behaviour it intends to target.

Aim: To use the BCW, BCTTv1 and the TDF to describe the intervention's content and mechanisms of action in order to facilitate implementation across settings.

Method: A detailed description of the intervention was obtained through analysis of (i) intervention documents, (ii) interviews with nurses and the intervention facilitator and (iii) observations of training and feedback sessions on pilot wards. A written description of the intervention was checked for accuracy by the implementation team. The BCW and BCTTv1 were used to code the functions of the intervention and its BCTs. The drivers of

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behaviour that each BCT was intended to target were mapped to the domains of the TDF and the COM-B model to identify their mechanisms of action.

Results: The description revealed six intervention functions (see Table 3.9).

- 'Education' to improve knowledge of susceptibility and severity of Sepsis and effectiveness of pathway.
- 'Training' to impart skills for pathway implementation
- 'Persuasion' to change beliefs and encourage action towards implementation
- 'Enablement' to increase means and reduce barriers for compliance
- 'Environmental restructuring' to improve physical opportunity to implement
- 'Incentivisation' to create an expectation of reward for pathway compliance

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Table 3.9 Content and mechanisms of change of the first eight BCTs (see Appendix 5 for the full version and below for key to abbreviations

			CAPABILITY				OPPORTUNITY		MOTIVATION					
			Physical	Psychological			Social	Physical	Reflective					Auto
BCT	Functions	Text description	Skills	Knowledge	Memory, attention & decision processes	Behavioural regulation	Social influences	Environmental context and resources	Beliefs about capabilities	Beliefs about consequences	Social professional role & identity	Optimism	Goals	Emotions
Information about health consequences	Education, Persuasion	Staff were told about dangers of Sepsis and effectiveness of following pathway.												
Salience of consequences	Persuasion	Staff were told a story of a young patient who had died from Sepsis needlessly.												
Social comparison	Persuasion	Staff were told about high compliance on other wards.												
Demonstration of behaviour	Training	Staff observed & participated in Sepsis Six training simulations.												
Instruction on how to perform the behaviour	Education													
Behavioural practice/ rehearsal Habit formation	Training													
Feedback on behaviour	Persuasion	Staff compliance was monitored by board and intervention implementers and verbal feedback was given in group meetings.												

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This exercise showed the intervention to be more complex than the developers had realised. Specifying it using theory and BCT methodology provided a more comprehensive understanding of its components, aims and functions.

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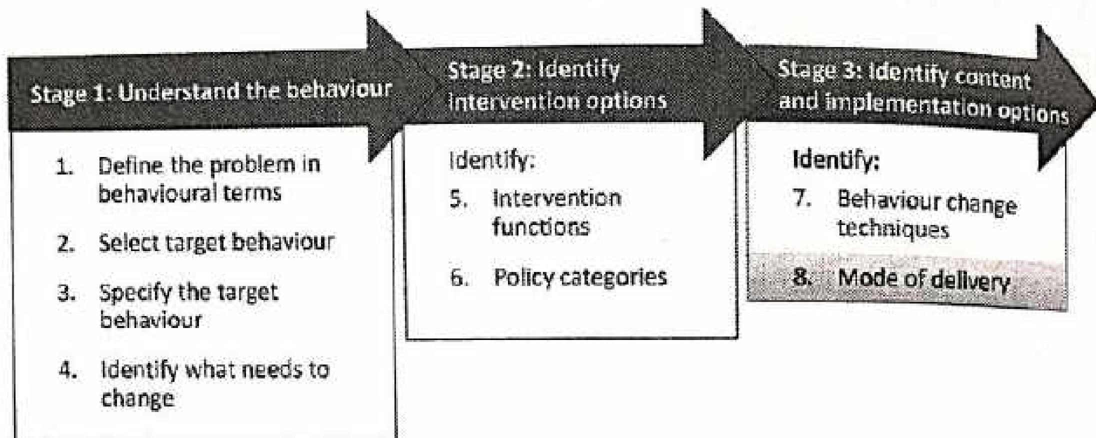
Step 8: Identify mode of delivery



As well as identifying BCTs (Worksheet 7), decisions need to be made about the mode or modes of delivery for the intervention. Mode of delivery is one of seven dimensions of interventions identified [82]. The others are content (what was delivered); provider (who delivered it); setting (where it was delivered); recipient (to whom it was delivered); intensity (over how many contacts it was delivered); duration (over what period of time it was delivered); fidelity (the extent to which it was delivered as intended). In reports of interventions, there is often insufficient distinction made between intervention content and mode of delivery (e.g. telephone, face-to face) and often more detail about mode of delivery than content (i.e. the putative active ingredients).

Just as for intervention content and implementation through policy levers, it is important to consider the full panoply of possible modes of delivering interventions before deciding the most appropriate for the particular target behaviour, population group and setting. A simple taxonomy of modes of delivery is given in Figure 3.1.

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Clearly this only applies to a limited subset of intervention functions, but it should provide a start in thinking about how interventions can be delivered.

Figure 3.1 Taxonomy of modes of delivery for intervention functions that involve communication

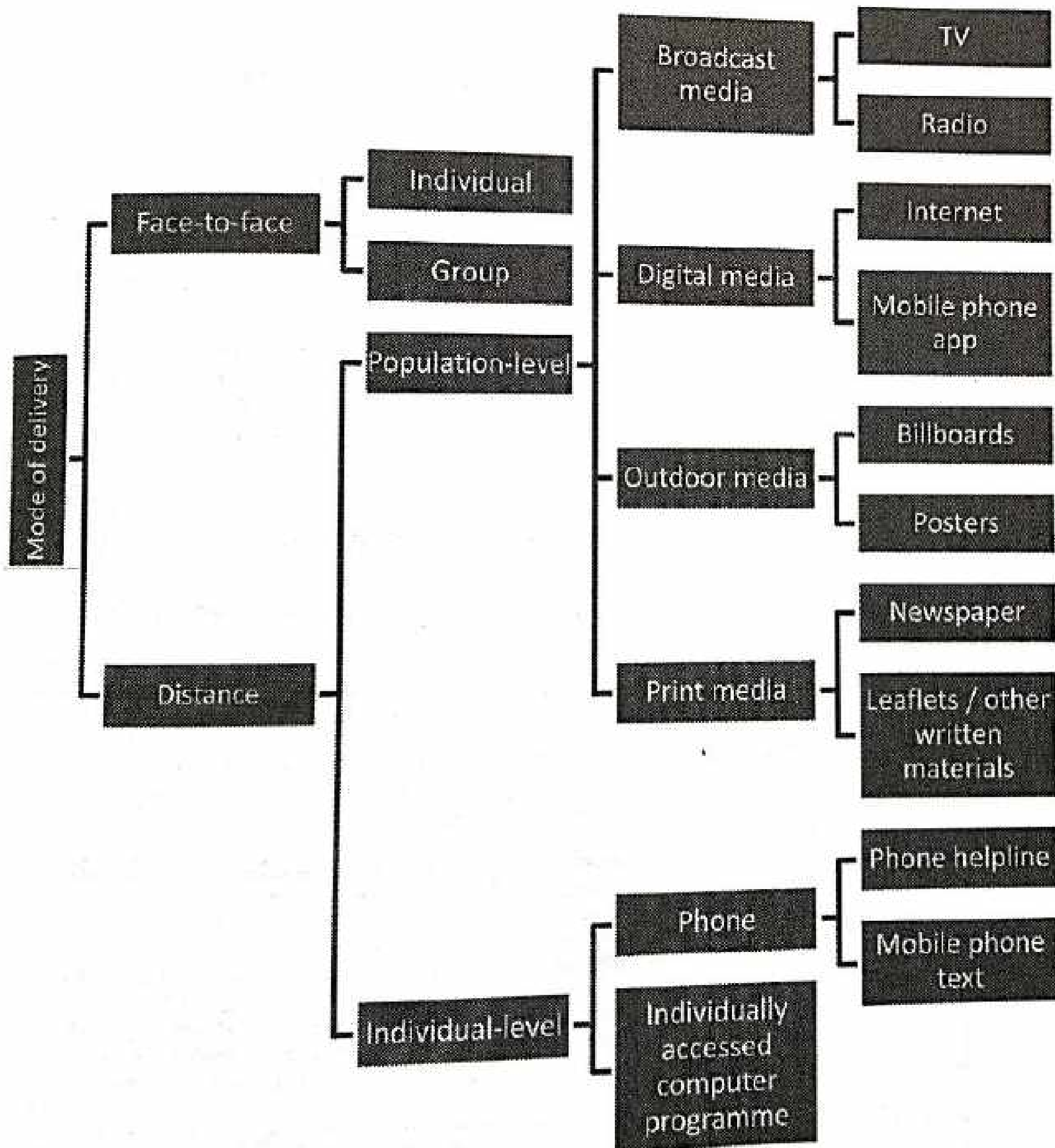

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Table 3.10 illustrates different modes of delivery used to deliver interventions with one target: smoking cessation

Table 3.10 Examples of different modes of delivery used to deliver smoking cessation interventions

Mode of delivery				Example
Face-to-face	Individual			One-to-one behavioural support for smoking cessation in English NHS Stop Smoking Services [70]
	Group			Group behavioural support programmes for smoking cessation [83]
Distance	Population-level	Broadcast media	TV	A TV advert describing the toxic damage tobacco smoke does to vital organs - part of the Smokefree campaign, NHS, UK. http://www.youtube.com/user/smokefreevideos
			Radio	A radio advert aired in Victoria, Australia describing the symptoms of emphysema [84]
		Outdoor media	Billboard	A billboard advertising showing clotted blood dripping from a cigarette - part of the Smokefree campaign, NHS, UK. http://www.nhs.uk/smokefree
			Poster	Posters encouraging referral to a Liverpool hospital stop smoking service displayed as part of the "Time to Quit" campaign [85]
		Print media	Newspaper	Newspaper adverts delivering anti-tobacco messages [86]
			Leaflet	A leaflet highlighting the link between smoking and cervical cancer [87]
		Digital media	Internet	StopAdvisor – a theory-based interactive internet-based smoking cessation intervention [88]
			Mobile phone app	Smoke Free 28 (SF28) – A theory-based smoking cessation app [89]
	Individual-level	Phone	Phone helpline	Behavioural support for smoking cessation delivered over the phone. [90]
			Mobile phone text	txt2stop – a smoking cessation programme delivered via mobile phone text messaging [91]
		Individually accessed computer programme		Quitkey - A hand-held computer that creates a tailored smoking cessation program [92]

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In selecting the preferred mode or modes of delivery, the APEASE criteria (Table 1, p23) should be considered:

- **Affordability:** Cost considerations when selecting mode of delivery include not only how much it will cost to design but also how much it will cost to deliver. There are extensive costs when designing a website or mobile phone app but these are then relatively cheap to deliver once launched or made available for download. In comparison, a face-to-face intervention is likely to be less expensive to design than to deliver.

- **Practicability:** The selected mode of delivery should allow for the intervention to be delivered as designed. Some BCTs might be more effectively delivered through certain modes of delivery. For example, action planning or self-monitoring of the behaviour are more likely to be effective when delivered face to-face or over the phone rather than by billboard or poster.

- **Effectiveness and cost-effectiveness:** Where it exists, evidence of (cost-) effectiveness should be key in guiding selection of mode of delivery. Where the evidence base is lacking, other APEASE criteria should be used to guide selection.

- **Acceptability:** As illustrated in Table 1 in the Introduction (p23), how acceptable a mode of delivery is should be considered in terms of the recipient, those delivering the intervention and whether it is aligned with political objectives.

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- **Side-effects/safety**: Intervention designers should explore potential unintended consequences of modes of delivery under consideration. For example, an intervention targeting an identified and potentially life-threatening gap in health professional practice might result in unnecessary panic if delivered via broadcast or print media than face-to-face.

- **Equity:** Asking whether selecting a particular mode of delivery will result in the intervention reaching the intended recipients or whether it will disadvantage some groups will guide considerations around equity. For example when using digital media technologies, consider whether all intended groups of intervention recipients have broadly equal access.

An additional consideration when identifying mode of delivery relates to evaluating the intervention. Delivering an intervention face-to-face will allow the designer potentially to obtain more information about intervention recipients and to follow them up when evaluating the effect of the intervention. However, whilst broadcast media has the potential to reach more people than other modes of delivery, intervention recipients are not as easy to identify when evaluating the effectiveness of an intervention.

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How to identify mode of delivery – completing Worksheet 8

In this worksheet you are asked to identify the modes(s) through which the intervention will be delivered. In selecting relevant BCTs in the previous step we have already started to hint at the modes we might use to deliver these BCTs such as direct observation and face-to-face feedback on hand hygiene behaviour.

An example of using a systematic approach to selecting a mode of delivery is delivering the BCT, 'feedback on the behaviour' to hospital staff to increase the frequency of cleaning their hands using alcohol gel. This could be delivered face-to-face in meetings at the individual or group level, by written report on the proportion of staff members observed cleaning their hands or by an SMS messaging service or smartphone application. Where there is no effectiveness evidence to inform the choice, the APEASE criteria are a useful guide. Below we show the application of the APEASE criteria in relation to increasing hand hygiene in the UK hospital context (Table 3.11).

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Table 3.11 Example of a completed Worksheet 8

<table>
<tr><td colspan="4">Mode of delivery</td><td>Does the mode of delivery meet the APEASE criteria (affordability, practicability, effectiveness/ cost-effectiveness, acceptability, side-effects/safety, equity) in the context of cleaning hands using alcohol gel?</td></tr>
<tr><td rowspan="2">Face-to-face</td><td colspan="3">Individual</td><td>Yes</td></tr>
<tr><td colspan="3">Group</td><td>Yes</td></tr>
<tr><td rowspan="11">Distance</td><td rowspan="8">Population-level</td><td rowspan="2">Broadcast media</td><td>TV</td><td rowspan="11">These modes of delivery are not relevant as ward staff are unlikely to have access to phones, computers or be exposed to other forms of media whilst working on hospital wards.</td></tr>
<tr><td>Radio</td></tr>
<tr><td rowspan="2">Outdoor media</td><td>Billboard</td></tr>
<tr><td>Poster</td></tr>
<tr><td rowspan="2">Print media</td><td>Newspaper</td></tr>
<tr><td>Leaflet</td></tr>
<tr><td rowspan="2">Digital media</td><td>Internet</td></tr>
<tr><td>Mobile phone app</td></tr>
<tr><td rowspan="3">Individual-level</td><td rowspan="2">Phone</td><td>Phone helpline</td></tr>
<tr><td>Mobile phone text</td></tr>
<tr><td colspan="2">Individually accessed computer programme</td></tr>
</table>

Now it's your turn!
Please complete Worksheet 8

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