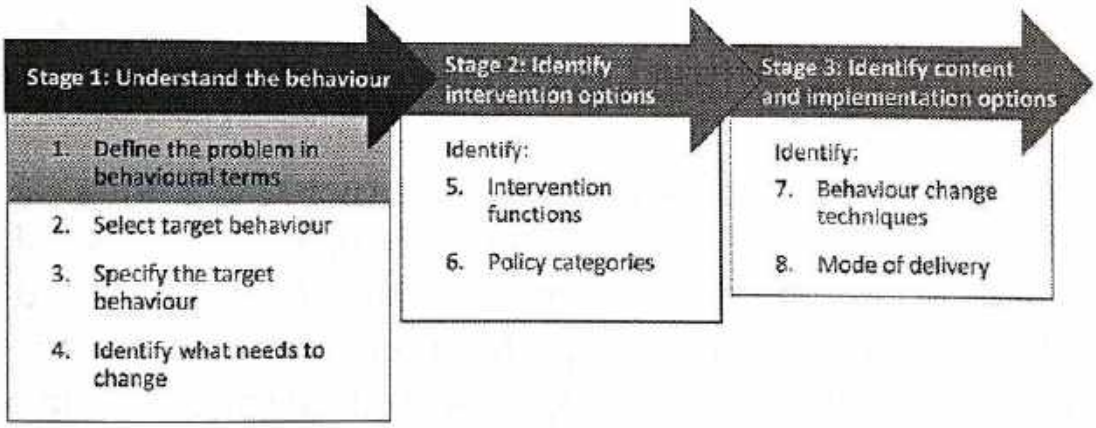
Chapter 1: Understand the behaviour

This chapter covers the four steps that lay the groundwork to understanding the 'target behaviour'. Step 1 - define the problem to be addressed in behavioural terms; Step 2 - select the target behaviour(s), i.e. the behaviour(s) most likely to bring about change to address the problem; Step 3 – specify the target behaviour in as much detail as possible; Step 4 – identify what needs to shift in order to achieve the target behaviour.

Step 1. Define the problem in behavioural terms



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Why define the problem in behavioural terms?

Defining the problem in behavioural terms means being specific about i) the target individual, group or population involved in the behaviour and ii) the behaviour itself.

For example, we might want to address environmental or health problems such as there being too much traffic, high rates of obesity, or infection rates in hospitals. However, stating the problems in this way does not indicate what behaviours we are trying to change or whose behaviour is involved.

Too much traffic involves car use but car use is also a consequence of car purchasing. Addressing the problem may require changing one or other or both of these. When it comes to car use, one could further consider use for particular journey types.

Weight loss is not a behavioural target; increasing physical activity and reducing calorie intake are broad behavioural targets while increasing the amount of walking and reducing consumption of high fat foods are more specific targets. One may be more specific and specify 'walking to and from work' or 'walking at least two miles each day'. The nature and specificity of the behavioural target will be important in determining how far the problem of overweight is solved.

Infection rates are not a behaviour. A number of different behaviours may be relevant, including hand-washing, effective use of protective clothing, cleaning surfaces,

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maintaining appropriate isolation etc. As with the other examples, each of these can be specified more precisely.

Worked examples

A worked example is given, together with a worksheet, at the end of each step. You are encouraged to select a behaviour change problem relevant to your work and use the worksheets to design an intervention to address this problem.

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How to define the problem in behavioural terms - completing Worksheet 1

Worksheet 1 contains three tasks: 1) identify as specifically as possible the behaviour or behaviours that need to be changed to solve the problem; 2) specify the location(s) in which the behaviour occurs 3) specify the individual, group or population involved. We will take one of the examples above: hospital staff hygiene practices. Box 1.1 shows an example of a completed worksheet.

Box 1.1 Example of a completed Worksheet 1

What behaviour?	**Improving hand hygiene practices in all opportunities identified by national or local guidelines**
Where does the behaviour occur?	Hospital wards
Who is involved in performing the behaviour?	Hospital nursing staff

Now it's your turn!
Please complete Worksheet 1

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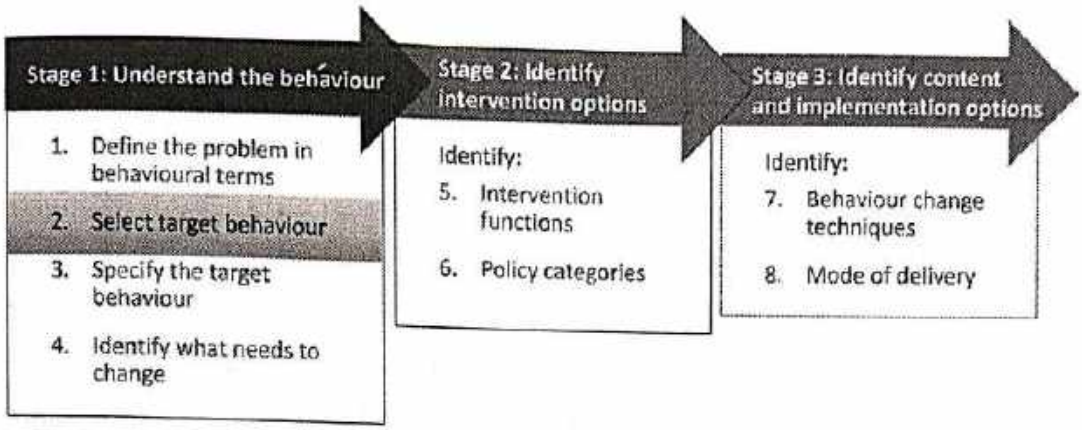
Step 2. Select the target behaviour



Why select a target behaviour?

Behaviours do not exist in a vacuum but occur within the context of other behaviours of the same or other individuals. These interact as a system.

Behaviours are part of a system – they do not occur in isolation

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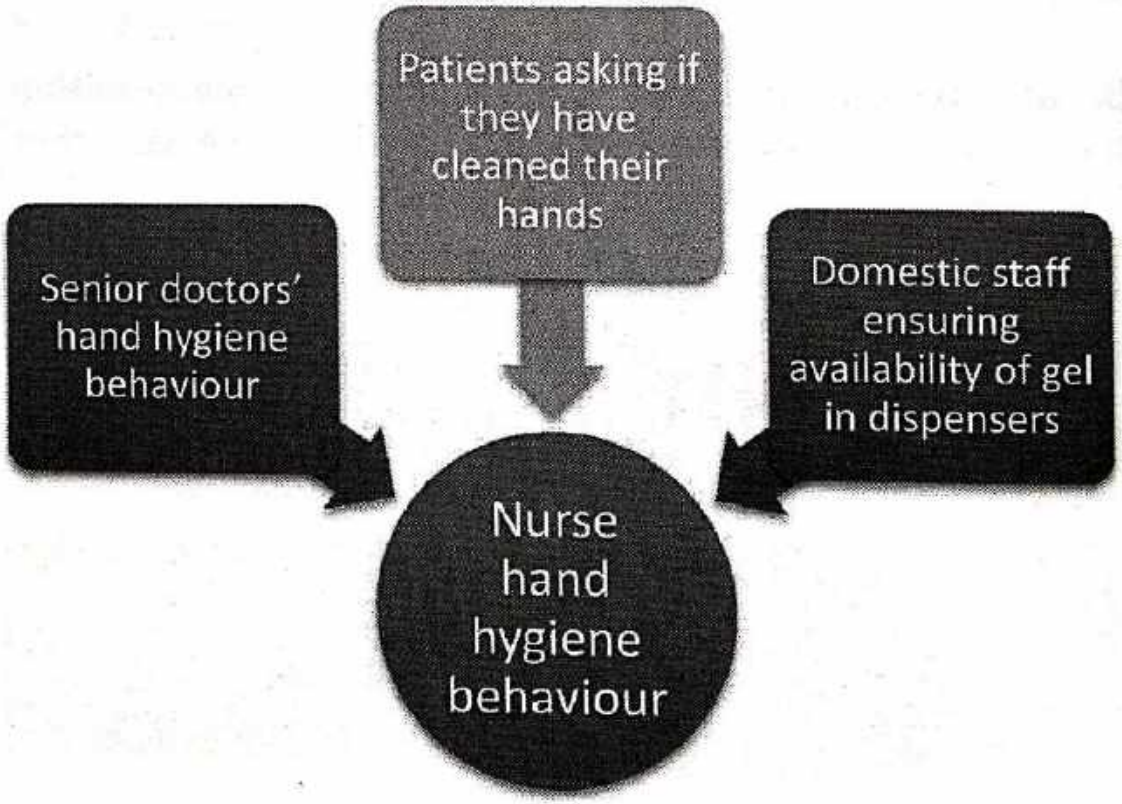
What might seem a simple set of behaviours, such as hospital nurses keeping their hands disinfected, is influenced by the behaviours of several others, including senior doctors disinfecting or not disinfecting, their hands, patients asking them whether they have cleaned their hands, and the domestic staff ensuring that there is enough alcohol gel in the dispensers (see Figure 1.2).

Figure 1.2 Example of nurse hand hygiene behaviours occurring within a system of behaviours



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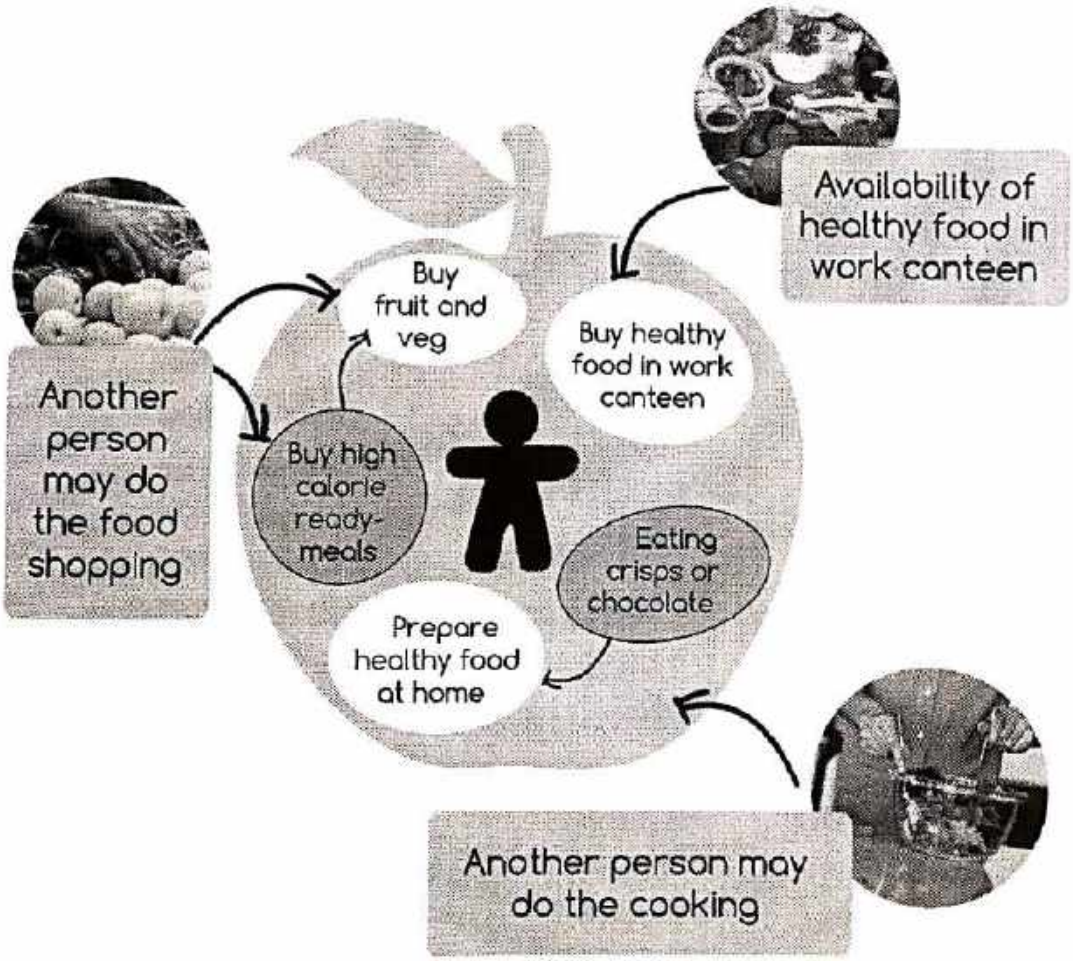
When considering which behaviour(s) on which to intervene, designers should think about all relevant behaviours performed by the target group or groups. If one selects a behaviour that is dependent on other behaviours, this needs to be taken into account in the design process as the intervention will need to target this set of behaviours. The inter-dependence of behaviours is shown in relation to eating healthily in Figure 1.3.

Figure 1.3 Behaviour as part of a system: the example of healthy eating behaviours



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How to select a target behaviour

Start by generating a 'long list' of all the potential behaviours that may be relevant to the problem one wants to solve. An example is the behaviours that are relevant to reducing energy use in homes (Box 1.2). This can be reduced to a 'short list' using a systematic method (see next section). Having identified the core behaviours, the next step is to link them in a 'conceptual map', along the lines of the examples given in Figures 1.2 and 1.3.

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Box 1.2 Listing candidate target behaviours

An example from the Townsville Residential Energy Demand Program (TRED Program)

Aim: To design an intervention to reduce residential energy consumption.

Method: A group of environmental experts listed potential target behaviours that could bring about lower energy use in the home.

Results: A total of 231 domestic energy reducing behaviours were identified:

- Reducing Electricity Consumption
  - Hot Water Systems - 24
  - Kitchen Appliances - 53
  - Entertainment Equipment - 18
  - Laundry Appliances and Bathroom - 28
  - Pools, Hot Tubs and Saunas - 7
  - Heating & Cooling – 40
  - Lighting - 17
- Complementing Energy Efficiency Behaviourswith Onsite Generation - 7
- Options for House Construction and Retrofit - 24
- Additional Behaviours related to Housing Construction – 13

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Less is more!

It is worth considering that it may be more effective to intervene intensively on one or two target behaviours than to intervene less intensively on multiple behaviours.

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Designers can select more than one target behaviour though it is advised to limit the intervention to just one or a few behaviours in the first instance. Introducing change incrementally and building on small successes can be more effective than trying to do too much too quickly; this is as true of organisational change as it is of individual change. It is important to remember that since each behaviour may have a different analysis (network of interlinking behaviours and COM-B analysis of each behaviour), an intervention should be informed by an assessment of all the relevant behaviours.

Having established which behaviours to target, the next step is to decide which to start with. There may be obvious indications as to which to choose, for example, from local knowledge or the research literature. The following criteria may be helpful in selecting the target behaviour:

1. The likely impact if the behaviour were to be changed.
2. How easy it is likely to be to change the behaviour; this will be influenced by local circumstances, for example, financial and human resources, acceptability and preference.
3. The centrality of the behaviour in the system of behaviours: thus, the positive 'spillover' effect if that behaviour were to be changed. Some behaviours are more 'central' in the system, and changing them is likely to have an impact on other behaviours, either positive in that it may support desired behaviour change or negative in that there may be negative consequences. Estimating this can be helped by gathering local evidence or by consulting the research literature.

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4. Ease of measurement: if one wishes to evaluate the extent to which the intervention has changed the target behaviour, it should be measurable, either by routine data or by introducing new data collection procedures.

Applying these criteria to the example of energy reduction in the home, the behaviour of changing use of incandescent light bulbs to compact florescent bulbs may be judged to have:

1. moderate impact on energy demand reduction
2. high difficulty of change because of initial cost and aesthetics
3. moderate 'spillover' in that research has shown that changing one energy reducing behaviour is likely to encourage other energy reducing behaviours
4. high measurability, for example using numbers of compact fluorescent bulbs sold in local shops and self-reported use.

How to select a target behaviour - completing Worksheet 2

Worksheet 2 guides you through the process of rating likely impact, likely ease of changing the behaviour, spillover effects and measurability and using these ratings to guide selection of a target behaviour.

Worksheet 2 contains two tasks: 1) generate a 'long list' of candidates for target behaviours; 2) select the target behaviour based on a decision making rule for each criterion. Boxes 1.3-1.5 show completed examples of these tasks.

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Box 1.3 Example of a completed Task 1, Worksheet 2

Task 1: Generate a 'long list' of candidate target behaviours that could bring about the desired outcome (in this example behaviours that could improve hygiene practices in hospitals)
Intervention Aim: improve hygiene practices in hospitals
Intervention designer response
Equipment • Keeping sterile single use items in packaging until use • Sterilising reusable medical equipment • Handling sharps appropriately
Patient care • Washing patients as appropriate, e.g. following incontinence
Hospital environment • Cleaning wards, toilets, offices and theatres • Changing bed linen as appropriate • Transporting soiled or infected bed linen in bags • Providing clean bed linen • Emptying and cleaning commodes and bed pans following use • Cleaning furniture including hospital bed frames and mattresses
Personal hygiene • Cleaning hands using alcohol gel • Cleaning hands using soap • Providing alcohol gel • Providing alcohol gel dispensers • Providing soap • Providing paper towels • Wearing clean uniform • Wearing personal protective equipment • Providing personal protective equipment • Covering mouth and nose with a tissue when sneezing

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Box continued.

Waste disposal

- Disposing of clinical waste in appropriate containers
- Ensuring availability of clinical waste containers
- Emptying waste bins before they overflow

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Task 2: Prioritise the behaviours by considering the following criteria:

1. How much of an impact changing the behaviour will have on desired outcome
2. How likely it is that the behaviour can be changed (when considering likelihood of change being achieved, think about the capability, opportunity and motivation to change of those performing the behaviour)
3. How likely it is that the behaviour (or group of behaviours) will have a positive or negative impact on other, related behaviours
4. How easy it will be to measure the behaviour

Different criteria will be more or less important in different situations. As a result of this prioritisation exercise, you are likely to reach one of the following decisions:

1. The behaviour appears very promising as a target behaviour
2. The behaviour is quite promising as a target behaviour
3. The behaviour appears unpromising but is worth considering as a target behaviour
4. The behaviour is not acceptable as the target behaviour (it doesn't matter what it is like on the other criteria, this behaviour cannot be selected as the intervention target)

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Box 1.4 An example of prioritising behaviours

Keeping sterile single use items in packaging until use

The behaviour 'keeping sterile single use items in packaging until use' is estimated to be unpromising but worth considering in terms of impact because it is judged that if this behaviour were changed, it would not have much impact on improving hygiene practices in hospitals as it is mostly already adopted by relevant health professionals. It is considered to be very promising in terms of likelihood of change as it is thought that the behaviour would be easy to change as it is already widely adopted and so modelled by other health professionals and is part of hygiene protocols. It is estimated to be unpromising but worth considering in terms of spillover as it is judged that if this behaviour were adopted, it would not have any impact on other behaviours. It is estimated to be unpromising but worth considering in terms of ease of measurement as it would be difficult to monitor all instances of when packages were opened.

Cleaning hands using alcohol gel

The behaviour 'cleaning hands using alcohol gel' is rated as very promising in terms of impact because evidence suggests it is not always done by health professionals and would have a great impact on improving hygiene practices in hospitals. It is estimated to be promising in terms of likelihood of change as it is judged that it would be fairly easy to bring about change given that it is a behaviour performed mostly in public and would be influenced by social desirability effects. It is estimated to be promising in terms of a spillover as more health professionals washing their hands are likely to prompt colleagues and visitors to do so. It is rated as promising in terms of 'ease of measurement' as it would be fairly simple to monitor a behaviour that is routinely observed by others.

So the behaviour of cleaning hands using alcohol gel is selected as the target behaviour because after considering all criteria it appears to show the greatest promise.

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Box 1.5 Example of completed Task 2, Worksheet 2

Potential target behaviours relevant to improving hygiene practices in hospitals	**Impact of behaviour change[a]**	**Likelihood of changing behaviour[a]**	**Spillover score[a]**	**Measurement score[a]**
Keeping sterile single use items in packaging until use	Unpromising but worth considering	Very promising	Unpromising but worth considering	Unpromising but worth considering
Cleaning hands using alcohol gel	Very promising	Promising	Promising	Promising
Record target behaviour here: Cleaning hands using alcohol gel				

[a] Rate as: unacceptable, unpromising but worth considering, promising, very promising

Now it's your turn!
Please complete Worksheet 2

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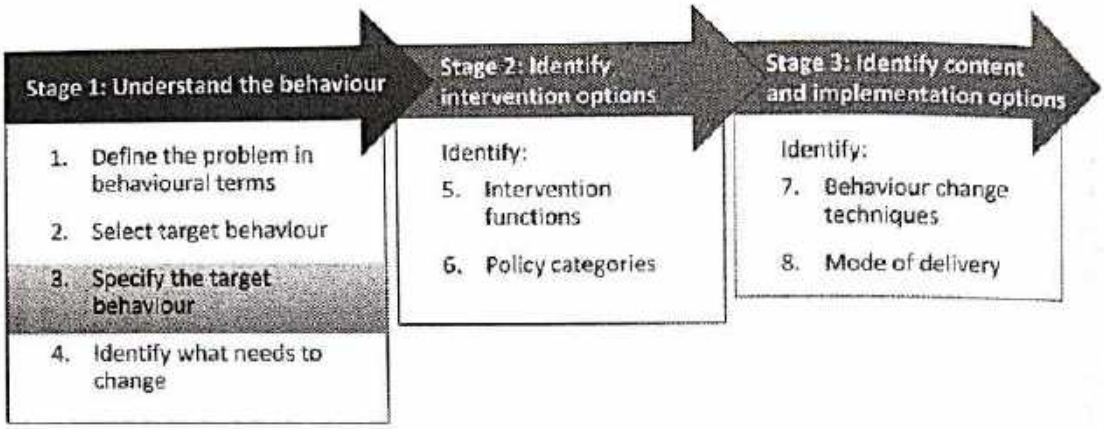
Step 3. Specify the target behaviour



Why specify the target behaviour?

Having selected the target behaviour, the next step is to specify the behaviour in appropriate detail and in its context. The more precise you can be about the behaviour, the better the behavioural analysis is likely to be but clearly the greater the challenge in terms of assessing it. So, for example, 'eating less' will be less likely to help you decide what to do than 'cutting out snacks between meals and substituting fruit for puddings'; 'exercising more' will be less helpful than, say, 'engaging in brisk walking for one hour on Wednesday and Saturday each week'.

Specify the behaviour in terms of:

- *Who* needs to perform the behaviour?
- *What* does the person need to do differently to achieve the desired change?
- *When* will they do it?
- *Where* will they do it?
- *How often* will they do it?
- *With whom* will they do it?

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Examples of behavioural recommendations that are too vague and more precisely specified alternatives are given in Table 1.1. These are taken from recommendations made by the NICE (the National Institute for Health and Care Excellence) with behaviourally specific alternatives generated by behavioural psychologists [18]. Following this BMJ article, NICE changed their methods so that recommendations are now made in behaviourally specific terms as described above.

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Table 1.1 NICE recommendations in published guidelines on schizophrenia and more precise behavioural specifications [18]

Published main recommendations	Behavioural specifications			
	What	Who	Where[b]	When[b]
Acute day hospitals should be considered as a clinical and cost effective option for the provision of acute care, both as an alternative to acute admission to inpatient care and to facilitate early discharge from inpatient care	Encourage [offer?] acute day hospital treatment to inpatients or those facing acute admission to inpatient care	Service manager responsible for making treatment decision	In acute day hospitals in the UK	When patients are in or facing hospital admission
Cognitive behavioural therapy (CBT) should be available as a treatment option for people with schizophrenia	Offer cognitive behavioural therapy to everyone with schizophrenia	Trust board and health professional responsible for offering treatment options	In secondary and tertiary care	During formation of a care plan
Family interventions should be available to the families of people with schizophrenia who are living with or who are in close contact with the service user	Offer family intervention to all those in close contact with someone with schizophrenia	Trust board and health professional responsible for offering interventions to people in close contact with someone with schizophrenia	In community setting	Anytime

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When providing family interventions, service users and their carers may prefer single family interventions rather than multifamily group interventions	Give information about and offer a choice of single family or multifamily group interventions when offering family interventions to people with schizophrenia or their carers	Health professional responsible for providing information to service users and carers about family interventions	In community setting	Anytime
For optimum effectiveness in preventing relapse, depot preparations should be prescribed within the standard recommended dosage and interval range	Prescribe depot preparations within the standard recommended dose and interval range [for all those with schizophrenia?]	Psychiatrist responsible for drug treatment	In community mental health team setting	During consultation with the patient

[b]These columns are in addition to the original paper by Michie and Johnston

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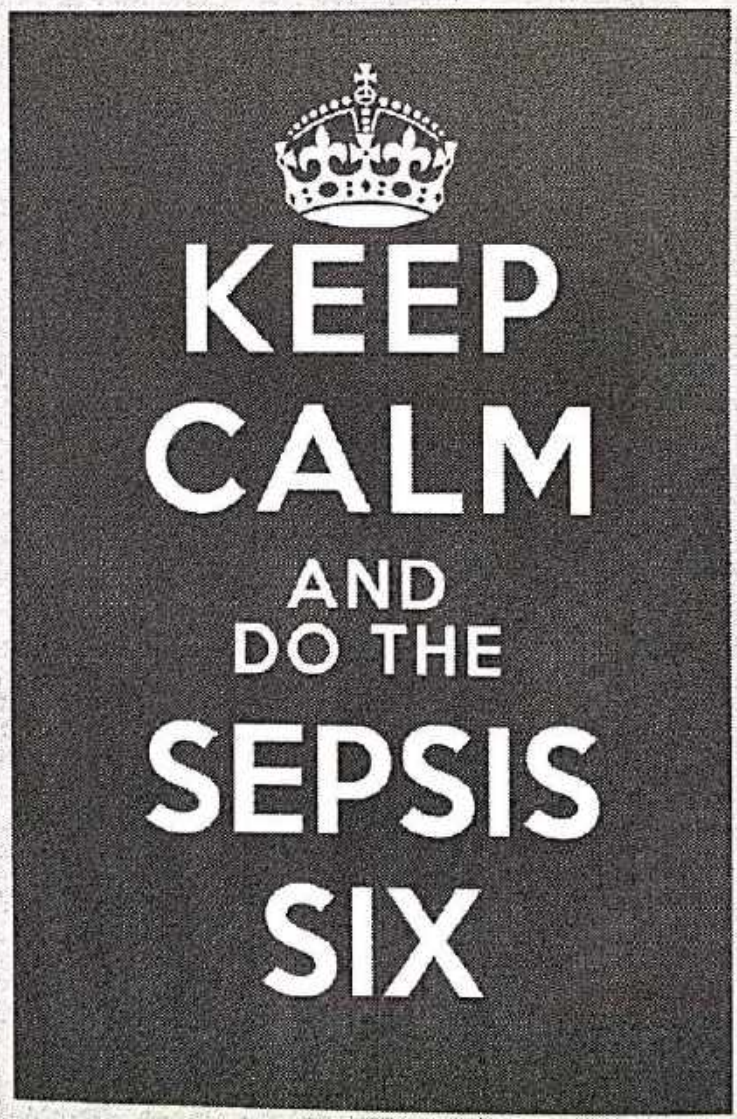
Box 1.6 gives an example of specifying the target behaviour of administering oxygen to hospital patients at risk of developing septicaemia. This is the first step in the Sepsis Six care pathway [19]. This example also illustrates the number of behaviours that are associated with what seems initially to be a simple task.

Box 1.6 Specifying target behaviour

An example from behaviour in a care pathway to prevent inpatient mortality from sepsis [19]



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The target behaviour in the first step of the Sepsis Six pathway is to administer oxygen. Summarised in Table 1.2 is who needs to do what, the tools they need, where they need to do it and when they need to do it.

Table 1.2 Behavioural specification of the Sepsis Six pathway

Who	What	Instruments	Where	When
Housekeeper, Porter or Nurse	Put oxygen administration implements in three locations	Nasal specs, fixed performance mask and non-rebreathe mask	a) Sepsis trolley, b) Sepsis grab bag in locked cupboard (keys kept with charge nurse), c) drawers beside beds in Resuscitation Room	Each morning.
Nurse	Check oxygen administration implements in three locations	Nasal specs, fixed performance mask and non-rebreathe mask	a) Sepsis trolley, b) Sepsis grab bag in locked cupboard, c) drawers beside beds in Resuscitation Room	Once a day late morning

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Table continued.

Doctor	Prescribe appropriate oxygen saturation and delivery mode Note saturation up to 94-98% for most or 88-92% for patients with respiratory problems. Mode of delivery based on desired flow of inspired O2: nasal spec for up to 24%, fixed performance mask for 20-30% or non-rebreathe mask for up to 80%.	Patient Causality Card (Cas)	With patient, at bedside	Before oxygen is administered
Doctor or Nurse	Circle a) appropriate oxygen saturation and b) delivery mode:	Pathway protocol document	Document kept in folder on Sepsis trolley	Before oxygen is administered
Nurse or Doctor	Administer oxygen	Nasal specs, fixed performance mask or non-rebreathe mask	At bedside	Within one hour of two triggers
Nurse	Record time that oxygen is administered	Pathway protocol document	Document in folder on Sepsis trolley, recorded at bedside	When completed

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How to specify the target behaviour - completing Worksheet 3

Worksheet 3 involves you specifying the target behaviour in as much detail as is practicable. Having selected the target behaviour of cleaning hands using alcohol gel in our previous example, we now describe this behaviour in detail (Box 1.7):

Box 1.7 Example of a completed Worksheet 3

Task: Describe the target behaviour according to who needs to do what, when, where, how often and with whom	
Target behaviour	Cleaning hands using alcohol gel
***Who* needs to perform the behaviour?**	All hospital staff
***What* do they need to do differently to achieve the desired change?**	Clean hands using alcohol gel
***When* do they need to do it?**	During each shift
***Where* do they need to do it?**	On hospital premises
***How often* do they need to do it?**	At the start of each shift After using the toilet Before physical contact with patients After physical contact with patients, visitors or staff members After contact with potentially contaminated materials
***With whom* do they need to do it?**	Alone

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Now it's your turn!
Please complete Worksheet 3

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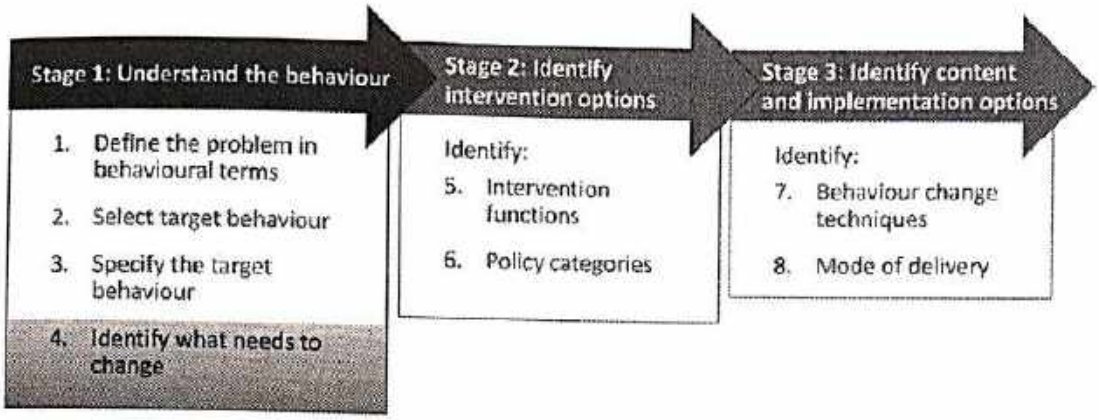
Step 4: Identify what needs to change



Why identify what needs to change?

Having specified the target behaviour you wish to change, the next step is to identify what needs to change. Specifically we mean identifying what needs to change in the person and/or the environment in order to achieve the desired change in behaviour. Devoting time and effort to fully understanding the target behaviour is a critical and often overlooked step in intervention design. The more accurate this analysis of the target behaviour, the more likely it is that the intervention will change the behaviour in the desired direction.

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The cost of making assumptions about what needs to change...

Behaviour change interventions may fail because the wrong assumptions have been made about what needs to change. An example of this from the domain of driving behaviour is the assumption that novice drivers crash frequently because they lack the skills needed to avoid them. This has in the past led to recommendations for drivers thought to be at high risk to be encouraged or sometimes mandated to attend advanced driver courses which it was hoped would mitigate the problem. It turned out that the problem was not so much lack of skill but of motivation. Drivers were motivated to drive in ways that increased the risk of crashing, particularly driving too fast and not paying sufficient care and attention. Therefore, a different kind of intervention was required, one that made novice drivers give a higher priority to driving more slowly and taking more care.

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How to identify what needs to change using the COM-B model

COM-B stands for Capability Opportunity Motivation – Behaviour. The COM-B model is the starting point used by the BCW for understanding behaviour in the context in which it occurs. The central tenet of the model is that for any behaviour to occur:

1. there must be the 'capability' to do it: the person or people concerned must have the physical strength, knowledge, skills, stamina etc. to perform the behaviour;
2. there must be the 'opportunity' for the behaviour to occur in terms of a conducive physical and social environment: e.g. it must be physically accessible, affordable, socially acceptable and there must be sufficient time;
3. there must be sufficient strong 'motivation': i.e. they must be more highly motivated to do the behaviour at the relevant time than not to do the behaviour, or to engage in a competing behaviour (Figure 1.4).

Each of these components can be divided heuristically into two types. Capability can be either 'physical' (having the physical skills, strength or stamina) to perform the behaviour or 'psychological' (having the knowledge, psychological skills, strength or stamina) to perform the behaviour. Opportunity can be 'physical' (what the environment allows or facilitates in terms of time, triggers, resources, locations, physical barriers, etc.) or 'social' (including interpersonal influences, social cues and

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cultural norms). Motivation may be 'reflective' (involving self-conscious planning and evaluations (beliefs about what is good or bad) or 'automatic' (processes involving wants and needs, desires, impulses and reflex responses). These elements of reflective and automatic motivation form the different levels of the human motivational system described in PRIME Theory of Motivation: Plans, Responses, Impulses, Motives (wants and needs) and Evaluations [20].[2]

The COM-B model

Changing the incidence of any behaviour of an individual, group or population involves changing one or more of the following: capability, opportunity, and motivation relating either to the behaviour itself or behaviours that compete with or support it.

[2] More information on PRIME Theory can be found at www.primetheory.com

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These components interact as illustrated by the interlinking arrows so that, for example, increasing opportunity or capability can increase motivation. Increased motivation can lead people to do things that will increase their capability or opportunity by changing behaviour. For example, owning a bicycle (opportunity) or being able to ride a bicycle (capability) might increase motivation to ride a bicycle but motivation alone will not improve riding skills or afford access to a bicycle unless the individual acts (behaviour) on this motivation to buy a bike or to practise bicycle riding.

The components can be construed at any level from individual through group through sub-populations and even populations. For example, in an organisation one may wish to characterise an aggregate measure of motivation to engage in a particular behaviour in terms of the mean level or the proportion who report a given level of motivation. Similarly, with capability. Table 1.3 provides definitions and examples of the COM-B model components.

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Figure 1.4 The COM-B model

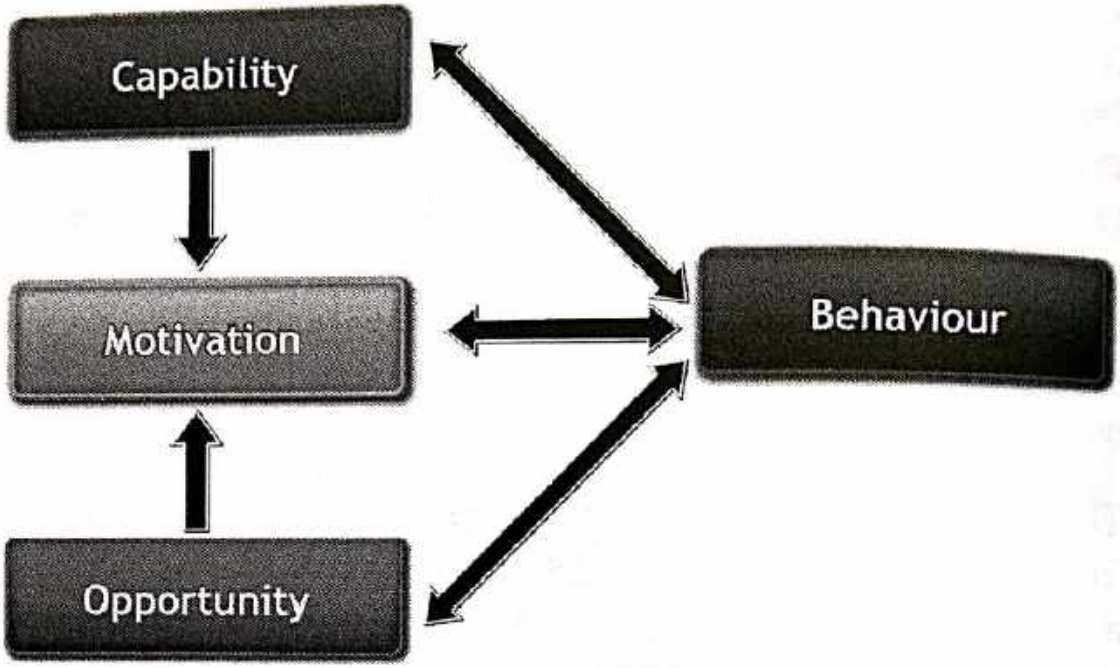

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Table 1.3 COM-B model components and examples

COM-B model component Definition	**Example**
Physical capability Physical skill, strength or stamina	*Having the skill to take a blood sample*
Psychological capability Knowledge or psychological skills, strength or stamina to engage in the necessary mental processes	*Understanding the impact of CO2 on the environment*
Physical opportunity Opportunity afforded by the environment involving time, resources, locations, cues, physical 'affordance'	*Being able to go running because one owns appropriate shoes*
Social opportunity Opportunity afforded by interpersonal influences, social cues and cultural norms that influence the way that we think about things, e.g. the words and concepts that make up our language	*Being able to smoke in the house of someone who smokes but not in the middle of a boardroom meeting*
Reflective motivation Reflective processes involving plans (self-conscious intentions) and evaluations (beliefs about what is good and bad)	*Intending to stop smoking*
Automatic motivation Automatic processes involving emotional reactions, desires (wants and needs), impulses, inhibitions, drive states and reflex responses	*Feeling anticipated pleasure at the prospect of eating a piece of chocolate cake*

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It may seem obvious that one should understand the target behaviour before designing the intervention. However, there are many examples of costly interventions that have been designed based on little or no understanding of the behaviour they aim to change which have failed to show an effect or worse, have had the opposite effect than intended. For example:

- DARE (Drug Abuse Resistance Education) programme in US schools: evidence that it was at best ineffective when students were followed up 10 years later [21]. The programme focused on reflective motivation but the anti-drug rhetoric was thought to alienate students. In addition, portraying drug abuse as more frequent than it was may have created a more conducive social environment for taking drugs.

- The UK government's alcohol strategy relies heavily on trying to make people believe that drinking responsibly is a good thing and drinking 'too much' is wrong – thus focusing on reflective motivation – an approach possibly influenced by vested interests and justified by little more than a common-sense analysis of how this kind of behaviour can be changed. Yet the evidence strongly and consistently shows that this approach has been ineffective and that changing opportunity and automatic motivation by raising the price and reducing the times and locations where alcohol can be obtained are effective [22].

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- During the 2009 pandemic flu outbreak, the UK government organised a national campaign to immunise health care professionals and high risk sections of the population. Despite major efforts to ensure adequate stocks of immunisation at points of delivery, uptake was low, largely because the motivation amongst target groups was not assessed or addressed and motivation remained low. As noted by Deidre Hine, author of an independent review of the Government's response to the pandemic, 'While the government tracked public opinion and tailored its communications work accordingly, it could have been more proactive in identifying and challenging inaccurate information or advice and responding to concerns and misunderstandings. A more aggressive communications campaign that focused on dispelling concerns that the vaccine was not safe and had been rushed into production without the usual rigorous testing and licensing may have helped uptake rates.' Results from a national weekly tracker survey about H1N1 communications identified a low level of concern about catching swine flu and that the strongest predictor of vaccine uptake was how concerned people were about catching swine flu [23].

The components of COM-B can be further elaborated into 14 domains, using a more detailed tool to understand behaviour, the Theoretical Domains Framework (TDF; see optional Step 4a at the end of this Chapter).

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How to identify what needs to change using the COM-B model – completing Worksheet 4

When collecting information to understand the target behaviour, data should be collected from as many relevant sources as possible as the most accurate picture will be informed by multiple perspectives. In a healthcare setting this might be frontline staff who perform the target behaviour, managers, patients, or other 'stakeholders'. It is well established that often we have poor insight into why we behave as we do (Nisbett and Wilson, 1977) so triangulating data using multiple sources will strengthen our understanding of behaviour. If possible, therefore, intervention designers should also collect data using a variety of methods, including interviews and focus groups, questionnaires, direct observation, review of relevant local documents such as service protocols and expert opinion. If a consistent picture of a behaviour and the factors influencing it is obtained from more than one source and using more than one method, it increases confidence in the analysis. However, the nature of the behaviour may constrain the method of data collection; for example, observation is obviously unlikely to be feasible if the behaviour occurs infrequently or privately as occurs behind screens in hospital wards.

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Collecting information by interview or focus group
In conducting interviews or focus groups, designers are advised to:

- Ask open-ended questions to promote exploration of ideas rather than yes/no responses;

- Be cautious when asking direct questions about influences on current behaviour because of social desirability and professional identity biases;

- Ask questions in relation to specific instances of current or recent behaviour and in relation to specific contexts (where and when). The third column of Table 1.2 provides examples of questions to ask to assess components of the COM-B model. Designers are encouraged to adapt these to the behaviours and contexts they are targeting.

Collecting information by questionnaire
Self-evaluation by questionnaire is a potentially useful source of information. It will be useful to the extent that respondents have insight into what it would take for them to change their behaviour and were willing to respond honestly. A preliminary version of the COM-B Self-Evaluation Questionnaire (COM-B-Qv1) is below in Box 1.8. At the time of writing it has yet to be evaluated. It may be better in some cases to use it as a basis for designing a questionnaire that addresses the behaviour more specifically. The important thing is to ensure that the full range of possible factors are addressed in a way that can elicit relevant ideas from respondents.

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Box 1.8 COM-B Self-Evaluation Questionnaire (COM-B-Qv1)

When it comes to you personally [doing or not doing x; e.g. stopping smoking], what do you think it would take for you to do it? (Circle any of the items on the list that you think apply; you can circle as many or as few as you think appropriate. Some of the items may look strange, but that is just because we need to include anything that might possibly apply for some people.)

In each case please would you say why you think it might be important for you.

I would have to ...

Capability

1.	know more about why it was important	e.g. have a better understanding of the benefits of stopping smoking
2.	know more about how to do it	e.g. have a better understanding of effective ways to lose weight
3.	have better physical skills	e.g. learn how to operate machinery more effectively in one's job
4.	have better mental skills	e.g. learn how to reason more effectively
5.	have more physical strength	e.g. build up muscles for demanding physical work
6.	have more mental strength	e.g. develop stronger resilience against cravings
7.	overcome physical limitations	e.g. get around problems of stature or disability
8.	overcome mental obstacles	e.g. reduce unwanted urges or feelings
9.	have more physical stamina	e.g. develop greater capacity to maintain physical effort
10.	have more mental stamina	e.g. develop greater capacity to maintain mental effort

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Opportunity

11.	have more time to do it	e.g. create dedicated time during the day
12.	have more money	e.g. be given or earn funds to support the behaviour
13.	have the necessary materials	e.g. acquire better tools for the job
14.	have it more easily accessible	e.g. provide easier access to facilities
15.	have more people around them doing it	e.g. be part of a 'crowd' who are doing it
16.	have more triggers to prompt them	e.g. have more reminders at strategic times
17.	have more support from others	e.g. have one's family or friends behind one

Motivation

18.	feel that you want to do it enough	e.g. feel more of a sense of pleasure or satisfaction from doing it
19.	feel that you need to do it enough	e.g. care more about the negative consequences of not doing it
20.	believe that it would be a good thing to do	e.g. have a stronger sense that one should do it
21.	develop better plans for doing it	e.g. have clearer and better developed plans for achieving it
22.	develop a habit of doing it	e.g. get into a pattern of doing it without having to think
23.	something else (please specify)	

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Recording the behavioural diagnosis

Items from the COM-B-Q can also be used to structure wider information gathering to undertake a behavioural diagnosis as in the COM-B Behavioural Diagnosis Form (COM-B-D) (Box 1.9). This may include evidence from randomized controlled trials, interviews, literature reviews, and theoretical analysis. The sources should be stated.

Box 1.9 COM-B Behavioural Diagnosis Form (COM-B-D)

When it comes to an individual/group/population [doing or not doing x; e.g. stopping smoking], use evidence and theory to form a judgement about which of the following needs to change and in each case whether it should be targeted directly or through one of the other elements of the COM-B system.

Note that it may be appropriate to apply this analysis to one or more supportive or competing behaviours.

The individual/group/population would have to ...

Capability

1.	know more about why it was important	e.g. have a better understanding of the benefits of stopping smoking
2.	know more about how to do it	e.g. have a better understanding of effective ways to lose weight
3.	have better physical skills	e.g. learn how to operate machinery more effectively in one's job
4.	have better mental skills	e.g. learn how to reason more effectively
5.	have more physical strength	e.g. build up muscles for demanding physical work
6.	have more mental strength	e.g. develop stronger resilience against cravings
7.	overcome physical limitations	e.g. get around problems of stature or disability

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8.	overcome mental obstacles	e.g. reduce unwanted urges or feelings
9.	have more physical stamina	e.g. develop greater capacity to maintain physical effort
10.	have more mental stamina	e.g. develop greater capacity to maintain mental effort

Opportunity

11.	have more time to do it	e.g. create dedicated time during the day
12.	have more money	e.g. be given or earn funds to support the behaviour
13.	have the necessary materials	e.g. acquire better tools for the job
14.	have it more easily accessible	e.g. provide easier access to facilities
15.	have more people around them doing it	e.g. be part of a 'crowd' who are doing it
16.	have more triggers to prompt them	e.g. have more reminders at strategic times
17.	have more support from others	e.g. have one's family or friends behind one

Motivation

18.	feel that they want to do it enough	e.g. feel more of a sense of pleasure or satisfaction from doing it
19.	feel that they need to do it enough	e.g. care more about the negative consequences of not doing it
20.	believe that it would be a good thing to do	e.g. have a stronger sense that one should do it
21.	develop better plans for doing it	e.g. have clearer and better developed plans for achieving it
22.	develop a habit of doing it	e.g. get into a pattern of doing it without having to think
23.	something else (please specify)	

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But I do not have the time or resources!

It may be that you don't have sufficient time or resources to collect data using methods such as experiments, surveys, interviews or focus groups and so you might need to adapt your methods. For example, one option requiring fewer resources and less time would be to conduct a structured discussion with stakeholders, or even just the staff team, based on the COM-B model components and/or domains in the TDF.

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Consideration of competing behaviours

In analysing the target behaviour it is important to remember the system within which the behaviour sits and consider alternative behaviours or goals that may be in competition with the target behaviour. For example, in the moment at which hand hygiene behaviours should be performed there are likely to be competing demands on the staff member. Reducing these demands or establishing procedures for these to be performed more efficiently will help achieve the target behaviour. Considering behaviours together as a system leads one not only to promote behaviours that support the desired behaviour but also to inhibit behaviours that compete with the desired behaviour. Bringing about changes in competing or facilitating behaviours will also be helped by analysing these behaviours in terms of COM-B.

While we have discussed promoting desired behaviours, the same approach can be used to decrease undesired behaviours. For example, promoting smoking cessation involves reducing both reflective and automatic motivation to reduce or cease the behaviour and promoting behaviours such as medication adherence and use of, for example, UK's NHS Stop Smoking Services that will assist with this.

Worksheet 4 (Box 1.10) guides the completion of a 'behavioural analysis' of what needs to change in order to make the target behaviour more likely to occur. This is based on the example of disinfecting hands using alcohol gel.

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Box 1.10 Example of a completed Worksheet 4

Task: Use the COM-B model to identify what needs to change in order for hospital staff to disinfect their hands using alcohol gel in identified high risk situations:		
COM-B components	**What needs to happen for the target behaviour to occur?**	**Is there a need for change?**
Physical capability	Have the physical skills to clean hands	No change needed as hospital staff have these skills
Psychological capability	Know the correct technique to clean hands	No change needed as knowledge of hand cleaning techniques is sufficient
	Know how to create 'if-then' rules to prompt hand cleaning	Change needed as hospital staff do not necessarily know how to create and routinely apply if-then rules
Physical opportunity	Have alcohol gel available	No change needed as gel is available at each bedside
Social opportunity	See senior health professionals clean their hands using alcohol gel	Change needed as staff do not always see seeing senior health professionals cleaning their hands using alcohol gel
Reflective motivation	Hold beliefs that using alcohol gel more frequently will reduce infection transmission	No change needed as research literature shows staff hold these beliefs
	Believing that consistent hand hygiene will require improved cognitive and self-regulation skills	Change needed as staff do not necessarily recognise the value of these skills
Automatic motivation	Have established routines and habits for hand cleaning	Change needed to establish routine and habit formation
Behavioural diagnosis of the relevant COM-B components:	Psychological capability, social opportunity, reflective and automatic motivation need to change in order for the target behaviour	

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Now it's your turn!
Please complete Worksheet 4

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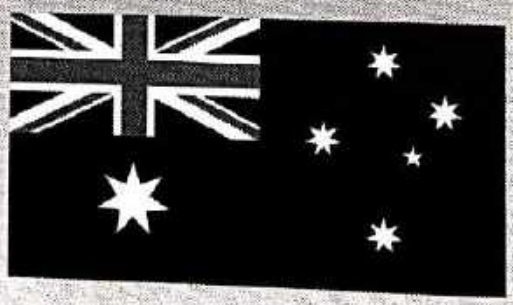
Case study examples of using the COM-B model to identify what needs to change

Case studies in Boxes 1.11-1.14 show how the COM-B model has been used to (i) understand why GPs use different strategies to assess cardiovascular disease risk, (ii) develop a conceptual model to understand non-adherence to cystic fibrosis treatment, (iii) analyse eating behaviours as part of the design of weight management smartphone applications, (iv) analyse GPs' use of 'fit notes' for patients to inform guidance and Government policy.

The COM-B model has been used to identify what it takes to change health professional behaviour (Box 1.11).

Box 1.11 Using the COM-B model to identify targets for interventions



General practitioners' use of different assessment strategies for cardiovascular disease risk [24]

Background: Guidelines for cardiovascular disease (CVD) prevention suggest that absolute risk (AR) assessment should be used to guide risk-reducing interventions. A number of AR models have been developed. Among these, the Framingham Risk Score (which estimates the risk of heart attack within 10 years) is

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recommended in Australian evidence-based guidelines on CVD risk reduction.

Aim: To identify factors that influence general practitioners' use of absolute risk (AR) in cardiovascular disease (CVD) risk assessment.

Method: Twenty five GPs working in New South Wales, Australia, participated in semi-structured interviews. The COM-B model was used to identify targets for interventions to promote GPs' use of AR assessment.

Results: Five different categories of AR use were identified. The authors categorised reasons for selecting these strategies into GP and patient factors and coded them using the COM-B model (Table 1.4):

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Box continued.

Table 1.4 Reasons for using AR strategy coded using COM-B

Strategy	Description	GP Factors	Patient Factors	Targets to Improve GP use of AR
AR focused	AR used when considered useful and appropriate for patient	1.Sees following guidelines as important 2.Is familiar with AR model and calculation tools 3.Trusts AR as objective and evidence-based, and helpful for clinical decision-making	1.Patient is borderline for medical treatment, and AR assists in decision-making 2.Patient has no additional risk factors 3.Patient has requested a general health check 4.Patient is interested in seeing evidence for treatment decisions 5.Patient is high risk but resistant, and needs motivation 6.Patient is low risk but concerned, and needs reassurance	Capability: Guidance on the use of the Framingham model versus alternative AR models
AR adjusted	AR adjusted up or down based on presence of additional risk/protective factors	1.Sees following guidelines as important 2.Is familiar with AR model and calculation tools 3.Trusts AR as objective and evidence-based, and helpful for clinical decision-making	1. Patient has additional risk factors that are not specified in AR tools, so risk adjusted upward 2. Patient has a very healthy lifestyle, so adjust risk downwards	Capability: Uncertainty about how to account for risk factors perceived to be outside of the AR model
Clinical judgement	Clinical judgement considered to be as good as or better than AR	1.Belief that clinical judgement takes more risk factors into account 2.Belief in capability to use clinical judgement due to experience	1.Patient is obviously low risk for CVD 2.Patient is obviously high risk for CVD 3. Patient has additional risk factors that are not specified in AR tools	Motivation: Perception that clinical judgement is as good as or better than AR

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Passive disregard	AR not used due to lack of time, access to AR calculation tools or experience with AR tools	1.Lack of experience using AR calculation tools 2.Views lack of time and access to AR tools as barriers 3. May acknowledge they should use AR more	1. Patient is used to individual risk factor assessment and so expects it 2. Patient's previous consultations have always been focused on monitoring one isolated risk factor	Opportunity: External barriers to AR assessment. Capability: Poor knowledge of AR model and tools Motivation: focus on individual risk factors out of habit or routine
Active disregard	AR rejected where considered unhelpful or inappropriate for patient	1.Views guidelines as flexible or irrelevant to individual patients 2.Concerned about overservicing patients with unnecessary assessment, and the related costs 3.Views population-based approach as irrelevant to individual patients 4.Focused on patient's agenda for GP appointment 5.More focused on lifestyle risk factors	1.Patient is seen as uninterested in CVD risk 2.Patient has more important health problems than CVD risk 3.Patient is low risk but has lifestyle risk factors, so seeing low AR could demotivate them 4.Patient is low risk but highly anxious, so may be made anxious even by low risk 5.Patient has low literacy so unlikely to understand AR percentage	Opportunity: Patient barriers to AR assessment Motivation: belief that AR is not helpful for individual patients

AR = absolute risk; CVD = cardiovascular disease

Conclusion: Using the COM-B model to categorise reasons for partial or non-use of AR assessment is the first step in designing interventions to promote its use in the assessment of CVD risk

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The case study in Box 1.12 illustrates how the COM-B model has been used to extend an existing model of medication adherence making it relevant to a particular context; in this example adherence to cystic fibrosis medication.

Box 1.12 Using the COM-B model to develop a conceptual model to understand non-adherence to cystic fibrosis treatment [25]

Understanding habit formation for cystic fibrosis treatment [25]

Aim: To use the COM-B model to extend a framework of adherence to medication in order to understand how medication-taking habits develop in people with cystic fibrosis.

Method: A framework to explain adherence to medication, the Necessity-Concerns Framework (Horne, 1997[i]), posits that the balance between beliefs about necessity for a prescribed medication and concerns about effects of medication explains the extent to which people adhere to medication. The COM-B model was used to extend this framework to cover capability and opportunity and to consider change over time in order to explain how adherence to nebulisers in the treatment of cystic fibrosis requires habit formation.

Results: A schematic representation of the process of habit formation based on the COM-B model and the Necessity-Concerns Framework is shown below in Figure 1.5. This figure illustrates how the COM-B model components are used to represent the potential barriers to adherence in those who won't ('motivation') and those who can't ('capability' and 'opportunity') adhere and how 'reflective motivation' gives way to 'automatic motivation' over time in those who develop habits.

[i]Horne R (1997) Representations of medication and treatment: Advances in theory and measurement In: Petrie KJ, Weinman JA, editors. Perceptions of Health and Illness: Current Research and Applications. London: Harwood Academic Press. 155–188.

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Figure 1.5 Using the COM-B model and Necessity-Concerns Framework to explain habit formation in medication adherence

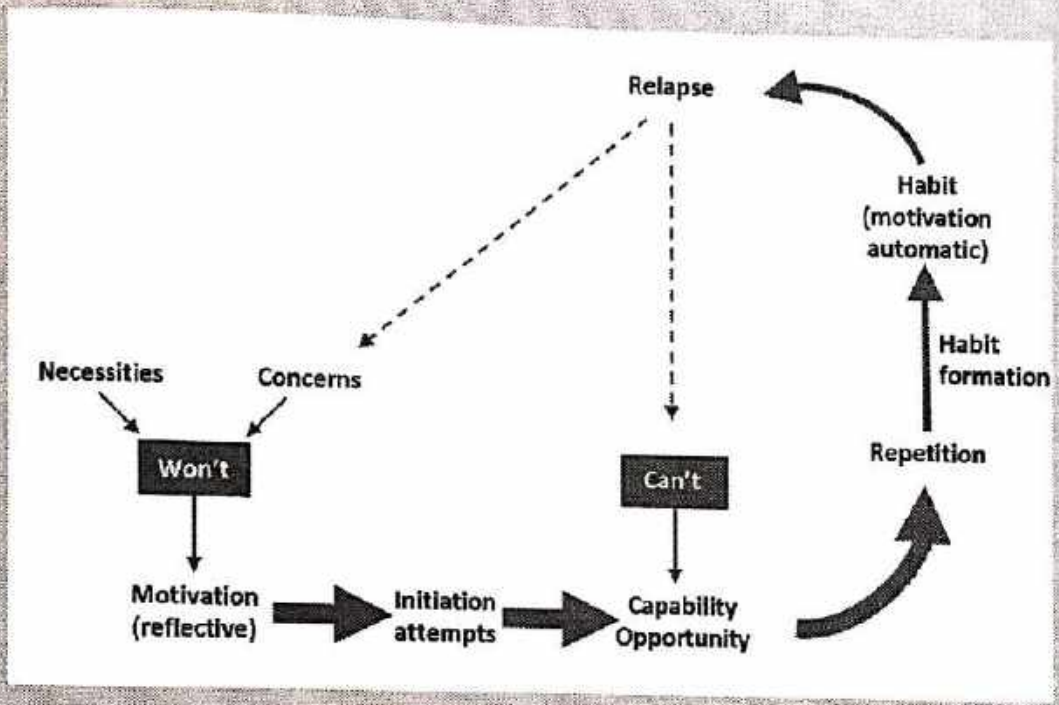

Figure 1.6 illustrates how the components of the COM-B model interact and change over time during the process of habit formation. The increasing size of circles over time shows increasing 'capability' and 'opportunities' as habits are formed. The increasing ratio of 'automatic' to 'reflective motivation' over time depicts the process by which control over behaviour passes from conscious decision-making to routines and environmental triggers which allow behaviour to occur with minimum effort.

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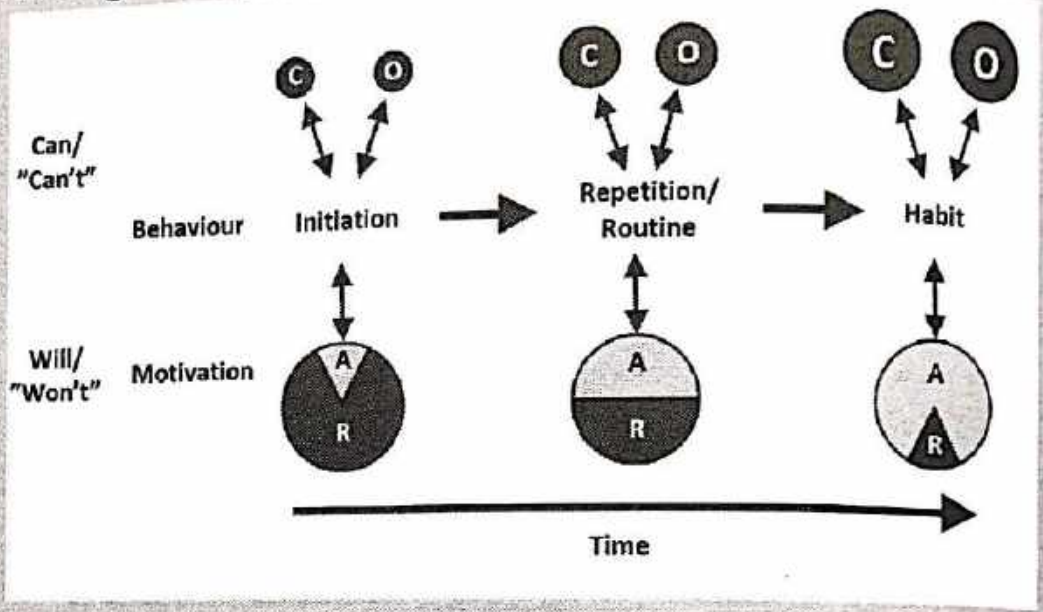
Box continued.

Figure 1.6 Interactions between COM-B components during habit formation



Using the COM-B model to extend an existing framework in this context helps to explain why there is often a gap between intention and behaviour. A person with cystic fibrosis might intend and plan to take their medication but repeatedly fail because of capability or opportunity problems or due to difficulties in establishing a habit. Conducting a behavioural analysis using the COM-B model prompts intervention designers to consider 'capability', 'opportunity' and 'motivation', including building routines and habit formation.

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The following case studies (Box 1.13) show how the COM-B can be used to understand behaviour as a first step in developing e-health interventions.

Box 1.13 Using the COM-B model as a starting point for intervention design

Design of a weight management smartphone 'app' for parents of overweight children [26]

Aim: To understand behaviours related to weight management in parents of overweight children as part of the design of a weight management mobile 'app'.

Method: Focus groups were conducted with parents of overweight children who had been referred to a weight management programme. Questions were framed using the COM-B model and parents were asked about what would need to change in order to achieve the following target behaviour: Providing appropriate portion sizes across the five food groups. The focus groups were audio-recorded and transcribed to facilitate the coding of statements using the COM-B model.

Results: The findings revealed shortfalls in capability, opportunity and motivation. Change was identified for 'psychological capability' in that parents reported a lack of knowledge and monitoring of appropriate food portion sizes as well as a difficulty in the comprehension of food packaging portion guidelines and measurements of food portions.

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Box continued.

Parents were not confident in their ability to provide correct portion sizes: this was coded as 'reflective motivation'. Parents were also unwilling to read portion and measurement guidelines on food labels due to difficulties understanding them and lack of time, and cited a preference for using household items such as tablespoons and cups as measuring tools instead of scales. This was coded as 'reflective motivation' and 'physical opportunity'. Lastly, partners were not always supportive of efforts to provide appropriate portion sizes and continued to give too big portion sizes: this was coded as 'social opportunity'.

Understanding these target behaviours within the framework of COM-B provides the first steps in selecting appropriate intervention strategies to bring about the desired change.

Development of a smart phone-based attentive eating intervention [27]

Aim: To understand attentive eating behaviour in its context as a starting point for intervention design.

Method: The target behaviour was attentive eating which involves recalling earlier food consumed immediately prior to eating. Drivers of this behaviour were identified using the COM-B model.

Results: The following COM-B components were identified as being relevant to the target behaviour:

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'Psychological capability': Individuals may lack knowledge of the potentially harmful effects of non-attentive eating and the skills of recording what they have eaten.

'Physical opportunity': Individuals may not have the physical opportunity in terms of the necessary tools to record what they have eaten in order to increase awareness of food already consumed.

'Automatic motivation': Non-attentive eating might occur because the individual is doing so out of habit.

The intervention designers then used the COM-B model to design an intervention suitable delivery as a smartphone app:

'Capability': Storage and relay of eating episodes using smartphone app technology increases capability of achieving key target behaviours. Automated instructions and guidance ensure target behaviours are fully completed without error.

'Opportunity': Smartphones are widely used, which should ensure: 1) Easy access to intervention tool (physical opportunity), 2) Socially acceptable tool (social opportunity). Automated reminders increase the number of appropriate opportunities to complete target behaviour (physical opportunity).

'Motivation': Personalisation of intervention tool and automatic reminders encourage continued use and promote habitual use (automatic motivation). Storage and presentation of information outlines why the intervention tool will be beneficial (reflective motivation).

Conclusion: The intervention designers have demonstrated how the COM-B model's use can be used to analyse behaviour in context as the basis for designing a smartphone app to deliver the intervention.

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The COM-B model has been applied retrospectively to identify and describe factors that may be inhibiting policy implementation (Box 1.14).

Box 1.14 Using the COM-B to inform policy implementation

Revising guidance for GPs on using the fit note [28]

Aim: To understand behaviours related to GP use of a note recording patients' fitness for work status and to improve GP use of the fit note through revised guidance.

Method: Behaviours relevant to the overall aim of effective use of the fit note were identified through qualitative research. Barriers to and facilitators of each behaviour were identified from the literature and coded into COM-B components. An example is provided here.

Results: The behaviour 'use the comments section every time an individual has been assessed as may be fit for work' was targeted for change. Barriers to this behaviour identified from the literature included (i) lack of information about what to write in this section which was coded as 'psychological capability' and (ii) expectation that the employer will read, value and where possible act upon GP advice which was coded as 'reflective motivation'.

Conclusion: Applying the COM-B model in this way provided a framework for identifying difficulties with completing the fit note as a step towards improving policy implementation and revising guidelines.

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Optional Step 4a: Identify what needs to change using the Theoretical Domains Framework (TDF)

The Theoretical Domains Framework (TDF; [10, 29]) was developed in response to requests from implementation researchers who recognised that implementation of evidence-based practice depends on changing behaviour and theories of behaviour change are therefore very relevant and potentially helpful in informing implementation interventions. However, they were aware of the large number of such theories and their overlapping constructs and lacked a method for selecting and applying such theories. (A recent cross-disciplinary review has identified 83 theories of behaviour change [30].) There is some indication that theory-based behaviour change interventions are more effective than those which are not [31-36] although the evidence is neither consistent nor strong [37]. The TDF is an integrative framework synthesising key theoretical constructs used in relevant theories[3] and was developed in a collaboration between psychologists and implementation researchers.

The framework consists of 14 domains: knowledge; skills; memory, attention and decision processes; behavioural regulation; social/professional role and identity; beliefs about capabilities; optimism; beliefs about consequences; intentions; goals; reinforcement;

[3]The original TDF [29] was developed by an international panel of 32 experts in behaviour change who identified 128 constructs from 33 behaviour change theories and simplified them into domains. Usability was developed with an international team of implementation scientists. The TDF has been validated and refined by an international panel of 36 experts in behaviour change [10]

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emotion; environmental context and resources; and social influences. Definitions of these domains and their component constructs are listed in Table 1.5, along with exemplar questions for use in interviews or focus groups to inform the behavioural analysis and the intervention. Questionnaires based on the 12-domain TDF [29] have been developed in the areas of patient safety [38] and physical activity [39]. A generic questionnaire for use in implementation research has also been developed based on the 14-domain TDF [40].

Table 1.5 TDF domain definitions, theoretical constructs and example questions

Domain Definition	**Theoretical constructs represented within each domain**	***Interview questions***[c]
Knowledge An awareness of the existence of something	Knowledge (including knowledge of condition / scientific rationale); procedural knowledge; knowledge of task environment	*Do you know about x?*
Skills An ability or proficiency acquired through practice	Skills; skills development; competence; ability; interpersonal skills; practice; skill assessment	*Do you know how to do x?*
Memory, attention and decision Processes The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives	Memory; attention; attention control; decision making; cognitive overload / tiredness	*Is x something you usually do?*
Behavioural regulation Anything aimed at managing or changing objectively observed or measured actions	Self-monitoring; breaking habit; action planning	*Do you have systems that you could use for monitoring whether or not you have carried x?*

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Social/professional role and identity A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting	Professional identity; professional role; social identity; identity; professional boundaries; professional confidence; group identity; leadership; organisational commitment	*Is doing x compatible or in conflict with professional standards/identity?*
Beliefs about capabilities Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use	Self-confidence; perceived competence; self-efficacy; perceived behavioural control; beliefs; self-esteem; empowerment; professional confidence	*How difficult or easy is it for you to do x?*
Optimism The confidence that things will happen for the best or that desired goals will be attained	Optimism; pessimism; unrealistic optimism; identity	*How confident are you that the problem of implementing x will be solved?*
Beliefs about consequences Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation)	Beliefs; outcome expectancies; characteristics of outcome expectancies; anticipated regret; consequents	*What do you think will happen if you do x?*
Intentions A conscious decision to perform a behaviour or a resolve to act in a certain way	Stability of intentions; stages of change model; transtheoretical model and stages of change	*Have they made a decision to do x?*
Goals Mental representations of outcomes or end states that an individual wants to achieve	Goals (distal / proximal) ; goal priority; goal / target setting; goals (autonomous / controlled); action planning; implementation intention	*How much do they want to do x?*
Reinforcement Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus	Rewards (proximal / distal, valued / not valued, probable / improbable); incentives; punishment; consequents; reinforcement; contingencies; sanctions	*Are there incentives to do x?*

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Table continued.

Emotion A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event	Fear; anxiety; affect; stress; depression; positive / negative affect; burn-out	*Does doing x evoke an emotional response?*
Environmental context and resources Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour	Environmental stressors ; resources / material resources ; organisational culture / climate ; salient events / critical incidents; person x environment interaction; barriers and facilitators	*To what extent do physical or resource factors facilitate or hinder x?*
Social influences Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours	Social pressure; social norms; group conformity; social comparisons; group norms; social support; power; intergroup conflict; alienation; group identity; modelling	*To what extent do social influences facilitate or hinder x?*

[c]Summarised from Michie et al. (2005)

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A large number of studies have used the TDF to assess implementation problems and design interventions to improve implementation of evidence-based practice in a variety of health settings [41]. These include: smoking cessation by midwives [42] and dental providers [43]; acute low back pain in primary care [44]; transfusion prescribing [45]; hand hygiene [46]; mental health [47]; GP prescribing for upper-respiratory tract infections [48]. The TDF has been used primarily in the context of health to understand behaviour at the individual level, but it can also be used in a variety of contexts to understand behaviour at the organizational and community level and to identify external factors influencing behaviours. These include the physical environment and organizational factors. If it is not feasible to assess all 14 domains, COM-B analysis can be used as a screening tool to give an indication of which domains to select in conducting more detailed diagnostic interviews.

Each domain of the TDF relates to a COM-B component. Figure 1.7 illustrates how domains of the TDF link to each COM-B component.

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Figure 1.7 TDF domains linked to COM-B components

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

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We encourage designers to read the paper 'Developing theory-informed behaviour change interventions to implement evidence into practice' [44] which describes how to collect and analyse data using the Theoretical Domains Framework. It is published in the open access journal, Implementation Science.

How to identify what needs to change using the TDF - completing Worksheet 4a

If a more detailed understanding of the behaviour is required, you can use the TDF to expand on COM-B components identified in the behavioural diagnosis. This is illustrated in Box 1.5 in relation to the target behaviour of cleaning hands.

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Box 1.15 Example of a completed Worksheet 4a Task: Use the TDF to expand on COM-B components identified in the behavioural diagnosis.

Task: Use the TDF to expand on COM-B components identified in the behavioural diagnosis.		
COM-B component identified in the behavioural analysis	**Domains linking to COM-B component**	**Relevance of domain**
Psychological capability	Knowledge	Know how to create and apply 'if-then' rules to prompt hand cleaning
	Cognitive and interpersonal skills	Not relevant to hand cleaning
	Memory attention and decision processes	Notice and remember to wash hands
	Behavioural regulation	Develop skills of goal setting, self-monitoring and applying 'if-then' rules
Social opportunity	Social influences	The opportunity to observe senior health professionals clean their hands using alcohol gel
Reflective motivation	Social professional role and identity	Not relevant - hand cleaning is already part of identity
	Beliefs about capabilities	Believing that consistent hand hygiene will require improved cognitive and self-regulation skills
	Optimism	Not relevant
	Intentions	Not relevant – staff intend to keep hands clean
	Goals	Not relevant – as above
	Beliefs about consequences	Not relevant – staff already believe that cleaning hands will reduce infection transmission
Automatic motivation	Reinforcement	Reinforce routines and habits
	Emotion	Not relevant

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Now it's your turn!
Please complete Worksheet 4a

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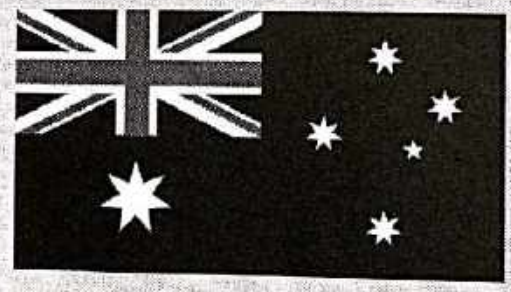
Case study examples of different applications of the TDF

The case study in Box 1.16 gives an example of how the TDF has been used to understand the barriers and facilitators of implementing an intervention.

Box 1.16 Using the TDF to understand an implementation problem



Developing theory-informed behaviour change interventions to implement evidence into practice: a systematic approach using the Theoretical Domains Framework [44]

Aim: To understand barriers and facilitators to the uptake of evidence-based guidelines for the management of acute non-specific low back pain in primary care.

Method: Focus groups with 42 GPs considered two target behaviours:

1. Restrict the ordering of plain film x-rays to situations in which fracture is suspected because plain film x-rays are rarely helpful in the management of acute low back pain and are potentially harmful.
2. Advise patients with acute non-specific low back pain to remain active because this reduces pain and disability.

Questions covering each of the domains of the TDF were asked about these target behaviours.

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Results: When asked about restricting the ordering of x-rays, GPs felt they did not have the communication skills to reassure concerned patients about not being given an x-ray; this was coded as 'skills'. GPs were also concerned that the consequences of not undertaking an x-ray of a patient with low back pain might result in missing an underlying pathology; this was coded as 'beliefs about consequences'. GPs thought that other health professionals would expect them to order an x-ray; this was coded as 'social influences'. For the second target behaviour, GPs said they often forgot to advise patients to stay active; this was coded as 'memory'. GPs perceived a lack of time for explaining to patients why an x-ray was not needed and for advising them to stay active; this was coded as 'environmental context and resources'.

Having identified domains of the TDF relevant to performing these two behaviours, the research team selected relevant BCTs. This was informed by expert consensus as to which BCTs are likely to be effective in bringing about change for given domains [49].

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Case studies in Box 1.17 show how the COM-B model and TDF have been combined to understand implementation problems in health and in environmental sustainability.

Box 1.17 Using COM-B and the TDF to understand implementation problems

Identifying factors influencing variation in physician adenoma detection rates for screening colonoscopy exams: A focus group study using the COM-B model and Theoretical Domains Framework [50]

Aim: To understand factors influencing variation in physician adenoma detection rates (ADRs) for screening colonoscopy exams.

Method: Six focus groups with gastroenterologists and endoscopy nurses at 3 different medical centres were conducted.

Results: Limited time was available to conduct focus groups with doctors who perform routine colonoscopies and with nurses who assist in the process. An adaptive interviewing approach was used in which the COM-B components were used as an initial screen to identify which TDF domains were key and should be discussed in more detail; this is helpful where time is limited. If respondents answered yes to one of the three COM-B filter questions (as shown below) they were prompted with further questions from the theoretical domains within that COM-B component.

1. Would physicians be more/less likely to do 'X' if they had greater physical and/or psychological ability?
Suggested prompts (TDF domains):
- Knowledge – do they know what they should do?

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- Physical skills – can they physically do it?
- Memory, Attention and Decision Processes – do they remember to do it?
- Behavioural regulation – are there procedures or ways of working that encourage them to do it?

2. Would physicians be more/less likely to do 'X' if aspects of the physical and/or social environment were changed?
Suggested prompts (TDF domains):
- Environmental Context and Resources - what aspects of the environment (physical vs. resource factors) influence whether or not they do it?
- Social Influences - how might views/opinions of others (colleagues, patients, professional groups) influence their decision to do it?

3. Would physicians be more/less likely to do 'X' if they held more positive beliefs or stronger intentions of doing 'X'.
Suggested prompts (TDF domains):
- Professional/Social Role & Identity - do they think it is part of their job to do it?
- Beliefs about Capabilities – are they confident in doing it?
- Optimism – do they think it's something that can be done?
- Beliefs about Consequences – do they think there are any benefits/harms of doing/not doing it?
- Intentions – have they made a decision (not) to do it?
- Goals – is there anything else that they might want to do or achieve that might interfere with them doing it (clearing email inbox etc)?
- Reinforcement – is there anything that might be reinforcing them to do it?
- Emotion – does doing it provoke an emotional response (e.g. feeling uncomfortable at patients crying out during the exam)?

Using this approach meant that all COM-B components and TDF domains were considered in a relatively short space of time.

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Box continued.

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Prediction and management of cardiovascular risk for people with severe mental illnesses

An example from primary care to manage cardiovascular risk in people with severe mental illness [51]

Aim: To change health professional behaviour to deliver an intervention to reduce cardiovascular disease (CVD) risk in people with severe mental illness (SMI)

Method: Focus groups were conducted with relevant primary care staff, service users and other relevant health professionals to identify what would need to change for the following target behaviours to be performed: Identify patients with SMI on practice register; engage patients; screen for CVD risk factors; offer behavioural support/medication/refer on to specialist services; conduct follow-up monitoring of CVD risk and intervention adherence. Responses were coded using COM-B and TDF.

Results: The following are exemplar preliminary findings from the focus groups:

Screening for CVD was not conducted in some cases because of time constraints – this was coded as COM-B 'physical opportunity' and TDF 'environmental context and resources'.

Practice staff were not always aware of relevant services available to SMI patients. This was coded as COM-B 'psychological capability' and TDF 'knowledge'.

Some practice staff felt uncomfortable 'burdening' the patient with management of their physical as well as mental health. This as coded as COM-B 'automatic motivation' and TDF 'emotion.'

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Doctors' perceptions of contraception counselling and provision [52]

Aim: To understand behaviours relating to primary care physicians' counselling about and provision of intrauterine and implantable contraception for adolescents.

Method: Behaviours relevant to counselling about and providing intrauterine devices (IUDs) and implantable contraception for adolescent patients were identified through interviews with 28 GPs, paediatricians, and obstetrician-gynaecologists. The interview schedule was based on the selected domains of the TDF [28] 'knowledge'; 'skills'; 'beliefs about capability' (self-efficacy); 'professional role and identity'; 'beliefs about consequences'; 'environmental context and resources' (environmental constraints); 'motivation and goals'; 'memory, attention and decision processes'; 'behavioural regulation'. Interview responses were coded using the COM-B model (identified by the researchers after conducting the interview study).

Results: All components of COM-B apart from automatic motivation were relevant to the target behaviours:

'Psychological capability' was a barrier to IUD counselling and provision. Some physicians were not aware it could be offered to adolescents in general or to adolescents who have not had children. Physicians did not often offer counselling about implantable contraception because of knowledge gaps. 'Physical capability', having the skills to insert an IUD, was identified as a facilitator of IUD counselling provision.

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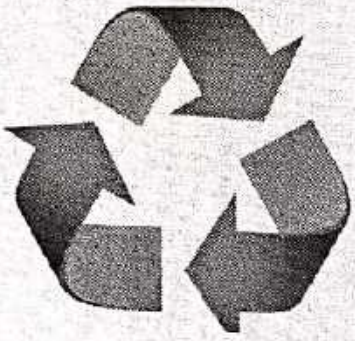
Box continued.

'Social opportunity' influenced provision of contraception in that the contraceptives were more likely to be prescribed in clinics with a culture of supporting adolescent contraception. 'Physical opportunity' such as the availability of IUDs and implantable contraception devices and a clinician to insert the device in the clinics also influenced counselling and provision.

'Reflective motivation' was identified as a target for change in that physicians' perceptions of the benefits and risks of IUD use influenced their practice.

Using the COM-B model to interpret these data is the first step to intervention design. Having conducted the behavioural analysis, the next step is to systematically link relevant COM-B components to intervention functions. This is covered in Step 5.



Establishing a method for evaluating an intervention to promote recycling [53]

Aims: To evaluate the effectiveness of an intervention to increase recycling in a London university.

Methods: An intervention to promote recycling at University College London was implemented in one campus building. The intervention comprised a new, three-bin recycling system: 1) dry recycling such as paper, plastic, and metal); 2) food waste; 3) non-recyclable waste such as polystyrene. New signage alerted building users to the locations of bins and described how they were to be used.

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Pre and post implementation data were collected and compared on the following outcomes: waste volume (kg per full time employee); waste profile (ratio of recyclable to non-recyclable waste); and waste contamination (e.g. recyclable waste placed in non-recyclable waste bin).

Where little or no improvement in outcomes was observed, interviews were conducted with a representative sample of building users to investigate why the intervention was not effective. Interview questions were structured by the COM-B model and TDF to identify whether 'capability', 'motivation' and/or 'opportunity' factors might explain why the new recycling system was not being used as intended; depending on responses, TDF domains within each of these components were also identified.

Results: The resulting interview schedule grouped by COM-B component and theoretical domain are shown below (Table 1.6).

Table 1.6 Adaptive interview schedule based on COM-B and TDF

COM-B	TDF	Questionnaire item
Psychological capability	Memory, attention and decision processes	1. What efforts have you noticed to promote recycling at UCL? 2. When is the last time you remember seeing a news item or having a conversation about recycling?
Reflective motivation	Beliefs about consequences	3. What Do you think about recycling (in this country) in general? - Do you think it is done well? Why? / Why not? - What impact do you think it has? 4. What do you think about recycling at UCL? - Do you think it is done well? Why? / Why not? - How easy do you think it is to recycle? - What impact do you hope or believe it has?

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Box continued.

Psychological capability	Knowledge	5. Please tick which of the following you think can be recycled in this building's recycling facilities: Paper Glass Empty aluminium steel cans Hazardous waste Toner cartridges Tea leaves/coffee grounds Leftover food Empty drink cartons Confectionary Cut flowers/plants Empty plastic bottles Food contaminated packaging (e.g. yoghurt pot) Card Recyclables with contaminated food (e.g. sandwich wrapper) Crisp packets Empty plastic/cardboard cups Sweet wrappers Polystyrene
Psychological capability	Knowledge	6. Have you ever used a bin and were unsure of whether it was intended to be used for recycling or general waste? - If yes, why?
Physical opportunity	Environmental context and resources	7. When you needed one, how often have you had access to a recycling bin? (Every time - most of the time - half of the time – rarely - never) 8. When you needed one, how often have you had access to a general waste bin? (All the time - most of the time - half of the time – rarely - never)
Reflective motivation	Identity	9. Do you think of yourself as someone who is: a committed recycler, casual recycler, not bothered either way about recycling? 10. Do you see recycling at UCL as something that you should be personally responsible for?

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Reflective motivation	Beliefs about consequences	11. What do you think are the benefits of recycling: - to you personally? - to the workplace? - to the wider community? 12. What do you think are the harms of not recycling?
Reflective motivation	Intention	13. Is recycling something you generally intend to do? - if 'yes' and you don't recycle, what are the reasons? On a scale of 1 – 7 (7 = very), how effortful do you feel it is to recycle your waste on a daily basis in UCL? 14. Have you ever knowingly put recycling into a general waste bin - if yes, why? 15. Have you ever knowingly put general waste in a recycling bin - if yes, why?
Automatic motivation	Reinforcement	16. Would you say that generally you are in the habit of recycling? - if 'no' what would be helpful in developing a routine/habit of recycling?
Reflective motivation	Goals	17. To what extent is recycling a priority for you?
Social opportunity	Social influences	18. Do you think most of your colleagues are committed recyclers, casual recyclers or and not bothered one way or the other? 19. Do you feel you recycle more when other people are around than you do when you are alone? Or the same?

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ISBN: 978-1-912141-00-5

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