Guidelines on

CHANGING BEHAVIOUR USING MENTAL IMAGERY & MENTAL SIMULATION

For Health Educators

Ministry of Health
Malaysia

This manual focuses on the use of imagery particularly mental simulations as a specific form of imagery and a means to change health behaviour. Imagery refers to a set of techniques that have been used in interventions to change behaviour in multiple contexts, including health. This manual will provide detail on the background and theory behind the use of imagery to change behaviour, introduce mental simulations as one form of imagery, outline how mental simulation interventions work, and provide a step-by-step guide on how to develop, implement, and evaluate an imagery behaviour-change intervention.

This guideline is meant to be a guide for practice, based on the best available evidence at the time of development. Adherence to this guideline may not necessarily guarantee the best outcome in every case. Every health educator is responsible for the management of his/her unique respondents based on the circumstances presented by the individual and the management options available locally.

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Introduction and Purpose

Many chronic illnesses and health conditions such as cardiovascular disease, certain cancers, and diabetes can be managed and prevented by changing behaviour (World Health Organization, 2008). Epidemiological research has identified a 'suite' of three key health behaviours associated with reduced risk of chronic illness: taking sufficient physical activity, eating healthily, and refraining from smoking tobacco (Ford, Zhao, Tsai, & Li, 2011). The development of large-scale initiatives to promote participation in health behaviours has been identified as a priority by governments and health organisations (Michie & West, 2013; World Health Organization, 2008). Such initiatives have included media campaigns and advertisements, web-based programs, one-on-one consultations, and initiatives based in schools, the workplace, community organisations, and universities. Interventionists have advocated evidence-based practice in the design of behaviour change interventions and have highlighted

behavioural science including the fields of health psychology and behavioural medicine as areas with considerable potential to inform the development of effective interventions (Michie, Churchill, & West, 2011).

This manual focuses on the use of imagery and, in particular, mental simulations as a specific form of imagery, as a means to change health behaviour. Imagery refers to a set of techniques that have been used in interventions to change behaviour in multiple contexts, including health. This manual will:

- provide details of the background and theory behind imagery as a method to change behavior
- introduce mental simulations as one form of imagery
- outline how mental simulation interventions work
- provide a step-by-step guide on how to develop, implement, and evaluate an imagery behaviour-change intervention.

Introducing Health Behaviour Change

Research has suggested that behavior change interventions are more effective if they are based on theory (Peters, Kok, Ten Dam, Buijs, & Paulussen, 2009; Webb, Joseph, Yardley, & Michie, 2010). Basic research guided by theory helps interventionists identify the psychological factors linked to health behaviour and the processes by which the factors affect health behaviour (Hagger, 2010; Kok et al., 2016). Assuming the identified factors are changeable, strategies and techniques that change the factors will likely result in

a change in behaviour. Research on these factors has provided evidence of the factors that should be targeted in behaviour change interventions. The research also provides evidence on the contextual, environmental, and interpersonal factors that may influence behaviour. In addition, the identification of strategies or techniques, that is, the content of interventions that will change the psychological factors, is essential to developing effective behavior change interventions. The basic processes behind behaviour interventions are summarized in the process 'model' shown in Figure 1.

Figure 1: Basic 'process' model showing how behaviour change techniques from behavioural interventions influence behaviour through psychological factors.

In the model, the strategies or techniques used in the interventions are proposed to change behaviour by changing the psychological factors ('mediators')

linked to the behaviour (Hagger & Chatzisarantis, 2014). The model can be used to guide interventions and provide an explanation of how they work.

Behaviour Change Techniques

There has been increased interest in identifying the strategies and techniques that have been used in behaviour change interventions (Kok et al., 2016; Michie et al., 2013). The techniques form the content of interventions that bring about changes in behaviour, often by changing a psychological factor, known as a 'mediator' (as illustrated in Figure 1). The techniques are frequently described as the 'active ingredients' of interventions, given that they are considered the components of the intention that 'do the work' in changing behaviour (Dombrowski et al., 2012). Recently, structured organizations, known as taxonomies of behaviour change techniques have been developed (Abraham & Michie, 2008; Michie et al., 2013). The taxonomies identify the multitude of individual behaviour change techniques available that cannot be further reduced to other individual techniques.

It also provides a 'common language' for referring to and discussing behaviour change interventions.

Importantly, the 'matching' of intervention techniques with the factors known to change behaviour is an important process. This will enable the interventionist to identify the techniques that would be most appropriate for changing behaviour according to the factors that relate to behaviour in a given population and context. Research that identifies the factors that are related to behaviour and, importantly, which technique or combination of techniques will change that factor will guide the selection of the techniques that should be included in the intervention. For example, if a person has confidence or 'self-efficacy' for choosing healthy eating options when eating at a restaurant, and confidence is linked to making health choices, the a strategy to improve confidence (e.g., providing a strong role model) will be effective in changing behaviour.

'The 'matching' of intervention techniques with the factors known to change behaviour is an important process.'

Mental Imagery

Imagery is a set of strategies or techniques adopted in multiple contexts to change behaviour by enhancing confidence, attention and concentration, and motivation. Imagery is a broad category of techniques that involve an individual mentally rehearsing or picturing future actions in advance of doing the action. Imagery requires a person to draw on experience with the action to reproduce it mentally. In some cases, the imagery may also include people imagining the feelings linked to performing the action or how they would feel after doing it, rather than steps required to participate in the action itself. As with all other behaviour change techniques, mental imagery is proposed to lead to behaviour change by changing the factors as in the process model outlined in Figure 1. There are various forms of mental imagery which differ in terms of their content and focus, but they have some common elements. This manual will focus on one specific form of imagery, mental simulations. Mental simulations will be introduced in the next section including its definition, how it works, and how to develop interventions using it will be outlined.

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Mental Simulations

Mental simulations is one of many intervention techniques that utilize imagery as a means to promote motivation toward health behaviour. Mental simulations are defined as mental rehearsals of future events. Two types of mental simulation were proposed.

- 1. Outcome mental simulation.** Mentally rehearsing the feelings the person will experience when they have succeeded in doing a behaviour to achieve a goal such as reducing their fat intake in their diet or abstaining from smoking.
- 2. Process mental simulation.** Imagining the specific steps required to attain the goal is termed a process mental simulation. This strategy attends to the means required to attain the goal or outcome.

Outcome mental simulations requires a person to focus on imagining the feelings and positive emotions associated with achieving a health goal, such as being more physically active. Outcome mental simulations work by changing a person's attitudes and motivation toward the actions involved in reaching the desirable outcome.

Process mental simulations require a person to identify the specific sets of actions needed to successfully participate in a desired action or goal. This requires a lot of problem solving by the person to think through and identify the many steps involved. For example, a process mental simulation for increasing physical activity would require the individual to identify the type of physical activity, when it was going to be performed, for how long and how often it was going to be done, the equipment and location required, whether it will be alone or require another

person or team, the financial implications, potential barriers to engaging in the behaviour, and how to fit it in with everyday life. Imagining these processes will provide personal example (known as a 'self-model') for doing the behaviour. Visualising doing the behaviour and all of the relevant steps will increase a persons' confidence in doing the behaviour successfully.

Studies have shown that mental simulations of both types are effective in changing health behaviour. Mental simulations have been found to be successful in increasing physical activity (Koka & Hagger, 2016), reducing alcohol (Conroy, Sparks, & de Visser, 2015; Hagger, Lonsdale, & Chatzisarantis, 2011), healthy eating (Knauper et al., 2011), and achieving health goals (Greitemeyer & Würz, 2005). The research has also shown they tend to work by changing people's attitudes and confidence or 'self-efficacy'. A recent review of studies that have used imagery exercises, including mentals simulations, to change health behavior found that they were generally successful (Conroy & Hagger, 2017). Importantly, they found that imagery interventions were more effective if they were longer in duration and included additional imagery exercises.

Mental simulations are highly desirable as an intervention technique as they are self-administered and self-directed. This means that if a person is trained to identify their own actions and important outcomes for a particular action or behaviour that will be more effective in changing behaviour by themselves for themselves. Overall, mental simulations have been shown to be an effective strategy to change health behaviour (Conroy & Hagger, 2017).

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How to Design a Mental Simulation Intervention

Mental simulations interventions require people who need to change to visualise the important consequences (for outcome mental simulations) or steps that will lead them to participate in the behaviour (for process mental simulations). Mental simulation interventions are made up of three important components:

- (1) Reason for change. Participants are presented with a brief passage which describes why the outcome or behaviour is important and how the mental simulation exercise might help.
- (2) Prompt formation of a behavioural goal or intention. Participants are prompted or asked to identify a goal to change their behaviour.
- (3) Prompt the mental simulation exercise. After the rationale and goal, participants are presented with the mental simulation exercise. The exercise can either be read by the individual themselves or read aloud by a facilitator or practitioner.

In the original mental simulation studies, the simulation exercises were presented as a passage of text describing the mental simulation exercise and individuals were asked to read the exercise to themselves (Pham & Taylor, 1999). However, in other studies, the passage was read aloud to groups of people while they read along with the paragraph in front of them (e.g., Meslot, Gauchet, Allenet, François, & Hagger, 2016). It has been suggested that reading aloud ensures that participants attend to the exercise and allows the practitioner to emphasise certain points, but there is no consensus as to whether the exercises should be read by the individual or read aloud.

The original mental simulation exercises used by Pham and Taylor's (1999) were designed to promote studying for exams. The basic template they have provided has been adapted for use in health behavior contexts. For example, Knauper and colleagues (2011) developed a mental simulation 'script' to help people achieve their goal or intention to increase their fruit intake. The script they used was:

"We would like you to consume extra portions of fruit each day for the next seven days, starting today. Please say to yourself: 'I will consume extra portions of fruit each day for the next seven days'. Please repeat this goal one more time to yourself. You are more likely to actually achieve your goal if you 'mentally imagine' performing the steps needed to achieve your goal in a very vivid manner! We would like you to do a mental imagery exercise in order to improve your chances of achieving the goal: Please imagine yourself consuming extra portions of fruit each day for the next seven days. Think of all the things you would need to do to achieve this, like purchasing them in the shop, storing them at home, and making them available at meal and snack time. Make sure you also use all of your senses in your mental imagery. Think about how the fruits or fruit juices look, feel, taste, and smell. Notice how it sounds when you bite into them or when you drink them. Really take a moment to close your eyes and imagine your goal".

This script uses Pham and Taylor's original ideas for a process mental simulation and conforms to the steps to forming a mental simulation. In addition to prompting the person to do the imagery exercise, the script also encourages the person to 'use their senses' to make the image more vivid and visceral.

This illustrates that mental simulation scripts can be easily adapted to refer to the behaviour of interest and embellished to encourage more detailed, emotive images. In the script, it is very important to identify the target outcome and the key behaviours that are important to gaining the outcome.

One of the appealing features of mental simulations is that they are effective in changing behaviour after a relatively brief exercise. For example, the original mental simulation studies required people to do the exercises for less than five minutes per day. In other studies, the exercises were only performed once, but people were asked to write down their imagined scenarios (e.g., Hagger et al., 2012). This is because research has shown that writing down a goal helps people to recall and act on it (Mueller & Oppenheimer, 2014). These additions were aimed at maximising the benefits of mental simulations and reducing the time taken. It seems that even brief mental simulations can be effective, at least in the short term. However, a recent review of studies on imagery and mental simulations has indicated that including 'follow-up' imagery exercises on a regular basis after the initial exercise results in far better behaviour change (Conroy & Hagger, 2017). The evidence seems to point to the

value of repeat mental simulation exercises regularly for successful long-term change.

In terms of the training required to deliver mental simulations, one of the advantages of the technique is that no specialist skills are required. For example, Pham and Taylor (1999) presented the simulation exercises with written text only and did not read the exercises to participants out aloud. In this case no training was required and no interaction with the people was necessary - and the exercises were standalone and could be presented in written form in many contexts (e.g., in a pamphlet or leaflet, via a webpage, or via social media or a smartphone app).

In some cases, the mental simulation exercise was read aloud by a facilitator or practitioner, but this required no formal training or instruction as the facilitator read the exercise script. The idea behind reading the exercise aloud was to increase people's attention to the exercise and prevent 'passive reading'. No additional training of the facilitator has been provided and the people receiving the mental simulation exercises have not been provided with additional instruction or training on how to better visualize or 'simulate' the content of the exercise.

Evaluating Compliance and Effectiveness of Mental Simulation Interventions

For maximum effectiveness, interventionists should ensure that people that participate in mental simulation exercises read and attend to the messages effectively, and that procedures are put in place to evaluate whether or not the intervention has been effective. It is important that people receiving the mental simulation exercise read the messages

and carry out the mental simulation exercises as directed. A number of means can be used to do this. For example, in some interventions people kept track of their participation in the exercises using a diary (Pham & Taylor, 1999). In another approach, people were asked to write down their imagined outcomes and actions immediately after they participated in the exercise (Hagger et al., 2011). The diaries and written scripts can be used by the interventionist to check that people were following the mental simulation exercise as instructed.

It is also important to put measures in place to evaluate the effectiveness of the mental simulation exercise. As mental simulations is a technique that aims to change behaviour, including a valid and reliable measure of behaviour alongside the intervention would be the most optimal way to evaluate its effectiveness. Objective measures of behaviour such as accelerometers for physical activity or breath tests for smokers are ideal means to evaluate the effectiveness of mental simulation interventions. However, such measures are difficult to use on a large scale and are expensive. Many studies have therefore relied on self-reported measures of behavior (e.g., Conroy et al., 2015; Hagger et al., 2011; Knauper et al., 2011). Although self-report have often shown to be valid and reliable, they may still carry some reporting bias (e.g., participants providing responses that they think the interventionist wants). This means that, wherever possible, interventionists should consider using an objective measure of behaviour. The measure of behaviour should be taken before people participate in the intervention and then at a later time point

after the intervention. By comparing changes in the measures over time the interventionist can at least gain a sense of whether the intervention has been effective. It is also important to include measures of psychological factors that are expected to change as a result of participating in the mental simulation exercises. Previous research has included measures of motivation, intentions, self-efficacy, attitudes, emotional responses, and planning as potential psychological factors that are likely to change as a result of participation in mental simulations. These psychological factors 'explain' how the intervention works to change behaviour. Consistent with our general 'model', mental simulations are viewed as changing one or more psychological factors, which results in behaviour change. For example, mental simulations may increase a person's situation-specific self-confidence (their 'self-efficacy'). Self-efficacy is linked to increased motivation to participate in the behaviour, so self-efficacy becomes the 'mediator' that explains how mental simulations change behaviour. In this case self-efficacy is an example, a number of other psychological factors may serve to mediate the link between mental simulation and behaviour changes. This is illustrated in Figure 2. Valid and reliable questionnaire measures of the factors are available and examples are presented in previous research on mental simulations and examples are provided in Appendix B. These can be adapted to the target behaviour of interest as required.

Figure 2. 'Process' model showing how mental simulations lead to behaviour change with a psychological factor (self-efficacy) as the 'mediator'.

A Step-by-Step Protocol: Mental Simulation Interventions

1. Identify the important outcome or behaviour.

It is important to decide on the outcome or behaviour that needs to be changed as a first step prior to designing a mental simulation intervention. For an outcome mental simulation, the target outcome needs to be identified. For example, this could be a specific goal such as losing weight or increasing physical fitness. But it could also be participation in a certain amount of the behaviour, such as participating in a certain number of hours of physical activity per week or eating a certain amount of healthy foods per day. For a process mental simulation, it is important to identify the behaviour, or behaviours, of interest that might lead to better health. Typically, the simulation exercise focuses on one key behaviour such as engaging in a number of hours of physical activity per week or remaining 'smoke free' for a target number of days. In some cases, the outcome and behaviour may be the same, as outlined earlier, but the focus of the process simulation is imagining the steps required to participate in the behaviour rather than imagining the satisfaction and positive emotions that a person might feel for doing the behaviour itself. The identification of the outcome and behaviour must be informed by the overall aim of the intervention for the group of people that need to change. The interventionist must have a clear idea of the aim of the intervention and goal (e.g., to promote weight loss, to increase physical activity) and the group of interest (e.g., adolescent and above, older adults, sedentary office workers). This is critical information that will inform the selection of the outcome and behaviour for the mental simulation exercises. Without clearly identifying the purpose and outcomes it will be difficult to identify the appropriate

outcomes and behaviours for the mental simulation exercise and will limit the effectiveness of the mental simulation intervention.

2. Develop the mental simulation scripts.

People receiving the mental simulation exercise are required to read (or be read aloud) a script on how to do the imagined scenario. Numerous templates of mental simulations are available based on Pham and Taylor's (1999) original template. These scripts can be adapted to the behavioural context of interest by substituting the outcomes and/or behaviour for those identified in point (1).

A photograph of a person's legs running on a dirt path, with a quote overlay on the left side.

'Getting people to complete self-report measures as part of the evaluation of the mental simulation intervention is an important consideration.'

We provide examples of mental simulation scripts in Appendix A for physical activity, healthy eating, and smoking cessation. It is also important to provide an introductory passage to provide a rationale or reason for change and to prompt the people who need to change to form a goal or intention to change. Examples of introductory passages can be found in the sample mental simulation scripts provided in Appendix A. A further consideration is whether participants are going to write down any thoughts or reflections on their simulations after the exercise. In which case the inclusion of a series of ruled lines below the mental simulation script for the individual to write down their thoughts is recommended.

3. Develop measures.

As mentioned in the previous section, getting people to complete self-report measures as part of the evaluation of the mental simulation intervention is an important consideration. Such measures may include self-report measures of the behaviour and outcome as well as measures of the psychological factors expected to change as a result of the imagery exercise like attitudes, self-efficacy, motivation, intentions, emotional responses, and planning. The measure of the behaviour and outcome is important

so that the interventionist can evaluate whether the behaviour of interest as changed as a result of the intervention. Valid and reliable measures of the behaviour and psychological factors are available and can be adapted to the behaviour of interest. The adaptation is relatively easy to do by substituting the key behaviour or outcome of interest into the question. A further consideration is the inclusion of checks to ensure that participants have completed the exercises as specified such as diaries or asking people write down their imagined scenarios after participating in the mental simulation exercise. The interventionist needs to decide whether to include the writing exercise outlined in (2) if planning to evaluate whether participants sufficiently engaged in the exercise.

4. Decide on the 'design' of the intervention.

Intervention 'design' refers to how the intervention is going to be run in practice. An important consideration in intervention design is whether an evaluation of the effectiveness of the intervention is going to be conducted. If so, the interventionist needs to consider the standard against which the intervention is going to be evaluated. A high quality evaluation will include a comparison or 'control' group. This is a group that does not receive the intervention so that the interventionist can compare whether the intervention is effective in changing behaviour and psychological variables compared to people who did not receive the intervention. There are a lot of good resources outlining how to design interventions using 'controlled' designs, including 'randomized controlled designs', and interventionists interested in evaluating interventions is advised to read these resources carefully to adopt the appropriate design features (see Craig et al., 2008; Glasgow, Vogt, & Boles, 1999).

An alternative design to evaluate the intervention would be to compare changes in the behavioural measures before and after the intervention. In order to evaluate the intervention using this approach, measuring participants' behaviour before the mental simulation exercise and at least once afterwards should be considered. Comparison of the change in the behavioural measure before and after the intervention will provide an indication of its effectiveness.

It is also important to consider the method used to deliver the intervention. Mental simulations exercises have typically been delivered using a written format using a pen-and-paper format or by means of an online or smartphone delivery. Participants are required to read the instructions and participate in the exercise at their own pace. Previous interventions have also required the interventionist read the exercise aloud to participants with participants reading along. The type of administration will depend on resources and access to group of people that need to change. Reading the intervention out aloud may increase attention to the exercise but is also costly in terms of human resources. The frequency with which participants do the mental simulation exercises or 'intervention dose' should also be considered. This can range from a single administration to daily self-administered engagement in the exercises over time. Web-based administration of multiple dose interventions may have an advantage

as the interventionist can track whether the individual had visited the web page with the mental simulation and how long they spent on the web page, both of which may indicate compliance. As in pen-and-paper exercises, providing open-ended 'response boxes' on the web page so that participants can type their imagined scenarios would provide a further indication of whether the person has participated in the exercise.

5. Develop an intervention protocol.

After identifying the target behaviour, developing the mental simulation script, and deciding upon the intervention design, the measures to be used and evaluation procedures, the interventionist is advised to develop a written 'protocol' of the intervention. The protocol is a brief step-by-step instruction sheet that those involved in the administering the intervention will be able to follow in order to effectively carry out the intervention. The protocol can be considered similar to a 'movie script', which provides details of the roles of the people carrying out the intervention with precise directions (like stage directions) on what is done and when, and scripts for what the interventionist will say (like movie dialogue) to the people receiving the intervention. Given the relative simplicity of mental simulation interventions with no requirement for special training, the protocol should make it possible for a non-specialist to deliver the mental simulation intervention with little previous experience or instruction.

6. Pilot testing and usability.

Prior to administration, it is a good idea to 'pilot test' the intervention on some volunteers that are similar to the people from the group of interest. The pilot participants can give feedback on the readability and

usability of the intervention materials. For example, some of the terms or language used in the exercises may not be understood, or the exercises may take longer than expected. This feedback may assist in fine-tuning of the intervention materials before it is ready to be administered.

7. Implementation and evaluation.

Once the development, design, and pilot processes are complete, the intervention is ready for implementation. In this stage the intervention is 'rolled out' to the people who need to change as outlined in the protocol developed in stage (5). It is important that the protocol is followed exactly to maximise its effectiveness. It is also important that any measures of the behaviour and psychological factors used to evaluate the intervention are given to the people who need to be changed at the right times and as specified in the protocol.

8. Analysis and interpretation.

After the intervention has been completed, it is important to evaluate whether it has led to the desired change in behaviour. This is where the measures of behaviour and other psychological variables given to the participants in the intervention become important. Changes in the measures of behaviour, such as increases in physical activity, or decreases in number of cigarettes smoked, will give the health professional an indication of whether the mental simulation techniques have been successful in changing behaviour. The evaluation may require the services of a data analyst or statistician to help to analyse the data. Conducting post-intervention or 'exit' interviews on a smaller sample of participants may also be helpful to provide additional information on how participants in the intervention interpreted the mental simulation exercises and provide valuable feedback to assist in the future development of the intervention.

'The pilot participants can give feedback on the readability and usability of the intervention materials.'

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APPENDIX A. Example mental simulation scripts.

Example 1: Physical activity PROCESS SIMULATION

A MENTAL EXERCISE TO HELP YOU

The World Health Organisation (WHO) recommends that adults aged 18–64, should do at least 150 minutes of moderate physical activity per week or at least 75 minutes of vigorous physical activity or a combination of both.

Moderate and vigorous activity includes leisure-time physical activity (walking, dancing, gardening, hiking, swimming), transportation (walking or cycling), occupational (hard physical work), household chores, playing games, or doing sports or planned exercise (aerobics, circuit training).

We would like you to try to set a goal to achieve this level of exercise so that you manage to do the recommended levels of activity per week. This amounts to about 20 minutes of moderate or vigorous physical activity per day. We suggest you do this progressively over the next three months. Think about the types of activity you would be able to and like to do, and how you might do your activities.

To help you do this we ask you to take 5 minutes of your time to complete this very simple mental exercise.

EXERCISE:

You are more likely to carry out your physical activity goal if you make a decision about where and when you will do so and imagine doing it. Decide now when and how you will do physical activity over the following weeks, what activity or activities you plan on doing, and how you will go about doing so. You may find it useful do your activity just before or just after something else that you do regularly, such as going to work, eating dinner, or going for lunch.

Now close your eyes and visualize carefully and in great detail your exercise plans. Think of the things you will need to do: the equipment you will need, what you will need to bring with you, who you will need to tell, how you will get there, what the environment will look like, how you will be dressed, what it will feel like doing the activity, and how you will feel afterwards. It is important that you actually see yourself doing your exercise. It is important that it is very detailed.

Now, write some brief notes on what you imagined on the lines below. This will help you remember what you imagined and help you achieve your goal.

Source: Meslot, C., Gauchet, A., Allenet, B., François, O., & Hagger, M. S. (2016). Theory-based interventions combining mental simulation and planning techniques to improve physical activity: Null results from two randomized controlled trials. *Frontiers in Psychology*, 7, 1789. doi: 10.3389/fpsyg.2016.01789

Example 2: Physical activity OUTCOME SIMULATION

MENTAL 'SIMULATION' EXERCISE

Think about the exercise goal that you have just decided on. Visualise yourself having achieved that goal. You have put a lot of effort into the achievement of your task and you have finally accomplished it.

Imagine the effort you have made. See yourself standing at the point of success from where you look back on the work you did to get there. Imagine how your life is different since you started exercising regularly. Visualise the changes that resulted from the accomplishment of this goal. How does it feel to have started a new lifestyle that is good for you?

Picture your life as it is now. Concentrate on the feelings that you have when you do something that is really good for you. Visualise the satisfaction you feel at having achieved your goal. Picture the pride you feel, the confidence you feel in yourself, knowing you were successful. Try to feel the satisfaction you have with this accomplishment. Feel how proud and confident you are.

Think about your daily routine. What does your day look like, now that exercising is a firm part of it? Imagine a typical day and see yourself engaging in your new exercise routine.

See yourself standing at the point of success. Picture yourself thinking back to when you started working on your goal. How do you feel having successfully accomplished what you wanted?

Concentrate on the energy that your healthier lifestyle contributes to your life. How does it feel to have more energy, more confidence, and to know that you successfully started a new healthier lifestyle?

Source: Koka, A., & Hagger, M. S. (2016). A brief intervention to increase physical activity behavior among adolescents using mental simulations and action planning. *Psychology, Health & Medicine*. doi: 10.1080/13548506.2016.1211298

Example 3: PROCESS MENTAL SIMULATION exercise to increase fruit and vegetable intake

National guidelines suggest that people should eat at least half the proportion of their food as fruit and/or vegetables.

We are asking you to try to achieve this goal in your everyday diet over the next four weeks.

The next exercise will help you to achieve your goal.

In this exercise you are asked to visualize yourself eating at least half the proportion of your food as fruit and/or vegetables. From today and for the next four weeks, think carefully about how you would go about changing your diet so that you include enough fruit and vegetables so that at least half the proportion of your food is fruit and vegetables. Imagine the steps you would need to take to make sure that half of your food is taken as fruit and vegetables. It is very important that you see actually see yourself changing your diet so that half your food comprises fruit and vegetables and have that picture in your mind.

Now spend about 5 minutes, imagining those steps. Think about all the things you would need to do in order to achieve your goal and think about all the things you would need to overcome. You will find that it might help to close your eyes when doing your visualization.

Now you have finished your visualization, please write down a few sentences summarising the things you imagined you need to do to take half of your food as fruit and vegetables in the next 4 weeks. Please use the lines printed below. You should aim to make your writing as detailed as possible. These thoughts are personal, so write down for your eyes only. Spend about 5 minutes writing down your thoughts.

Source: Knauper, B., McCollam, A., Rosen-Brown, A., Lacaille, J., Kelso, E., & Roseman, M. (2011). Fruitful plans: Adding targeted mental imagery to implementation intentions increases fruit consumption. *Psychology & Health*, 26, 601-617. doi: 10.1080/08870441003703218

Example 4: Combined OUTCOME and PROCESS MENTAL SIMULATION exercise for smoking cessation

Everyone knows that smoking can cause serious harm and lead to many long term and possibly fatal illnesses. More than 22% of the population are smokers, and you are one of them. But you have made the first, very important step in the journey to become a non-smoker. So your long-term goal from today should be to quit smoking altogether for six months, you will then be considered a “non-smoker”. Along the way you will be faced with many obstacles, but with perseverance, willpower, and a lot of help from us and your friends and family you can do it, one step at a time.

The best way to get started is to set a short-term goal over the next four weeks. You should aim to stop smoking cigarettes for four weeks, it’s a challenging goal, but realistic and achievable for most smokers.

The next exercise will help you to achieve your goal.

In this exercise you are asked to visualize yourself smoking no cigarettes each day. From today and for the next four weeks, think carefully about how you would go about changing your lifestyle so that you do not smoke any cigarettes. Imagine the steps you would need to take. It is very important that you actually see yourself changing your daily routine so that you are not tempted to smoke cigarettes and have that picture in your mind. Think of the kinds of things you will need to do in order to stop smoking, especially when you might feel tempted to do so.

Now spend 2-3 minutes, imagining those steps. Think about all the things you would need to do in order to achieve your goal and think about all the things you would need to overcome. You will find that it might help to close your eyes when doing your visualization.

Once you have finished your visualization, please write down on the lines below a few sentences summarising the things you imagined you need to do to refrain from smoking cigarettes in the next 4 weeks. It should be as detailed as possible. Spend about 2-3 minutes writing down your thoughts.

Now, think about your goal to not smoke any cigarettes in the next four weeks. Now close your eyes again and visualize yourself having achieved that goal. <<Pause>> Think of all the effort you put in to achieving your goal now that you have finally accomplished it. See yourself standing at the point of success from where you can look back on the work you did to get there. Imagine how your life is different since you stopped smoking. Visualize

the changes that resulted from the accomplishment of this goal. How does it feel to have started a new lifestyle that is good for you? <<Pause>> Picture your life as it is now, and compare it to how it will be if you stopped smoking for four weeks. Think about all of the benefits you will gain – health, financial, social. Visualize the satisfaction you feel at having achieved your goal. Picture the pride you feel, the confidence you feel in yourself, knowing you were successful. Try to feel the satisfaction you have with this accomplishment. Feel how proud and confident you are. Think about your daily routine. What does your day look like, without smoking a cigarette? Imagine a typical day and see yourself as someone who does not smoke cigarettes. Picture yourself thinking back to when you started working on your goal. How do you feel having successfully accomplished what you wanted? <<Pause>> Now, think about your loved ones, family, children, and friends. What will they think if you achieve your goal of not smoking for 4 weeks? Think of how proud they will be for putting in so much effort and how supportive they will be.

Now you have finished your visualization, using the lines below, please write down a few sentences summarising the positive benefits you imagined as a result of not smoking any cigarettes in the next 4 weeks. It should be as detailed as possible. Spend about 2-3 minutes writing down your thoughts.

Appendix B. Sample questionnaires for use in evaluation.

Intention

I intend to participate in moderate or vigorous physical activity for at least 20 mins per day over the next three months. (Please tick one box)

Extremely unlikely	Very unlikely	Quite unlikely	Quite likely	Very likely	Extremely likely
☐	☐	☐	☐	☐	☐

Attitude

For me, doing moderate or vigorous physical activity for at least 20 mins per day the next three months is...
(Please tick one box on each of the lines below)

	Extremely	Very	Quite	Quite	Very	Extremely	
Unimportant	☐	☐	☐	☐	☐	☐	Important
Not worthwhile	☐	☐	☐	☐	☐	☐	Worthwhile
Bad	☐	☐	☐	☐	☐	☐	Good

Self-efficacy/confidence

How confident are you that you will participate in moderate or vigorous physical activity for at least 20 mins per day over the next three months? (Please tick one box)

Extremely Unconfident	Very Unconfident	Quite Unconfident	Quite Confident	Very Confident	Extremely Confident
☐	☐	☐	☐	☐	☐

Motivation

How motivated are you to participate in moderate or vigorous physical activity for at least 20 mins per day over the next three months? (Please tick one box)

Not at all motivated	Not very motivated	A little motivated	Quite motivated	Very motivated	Extremely motivated
☐	☐	☐	☐	☐	☐

Anticipated emotion

If you were able to participate in moderate or vigorous physical activity for at least 20 mins per day over the next three months, how happy will that make you feel? (Please tick one box)

Not at all happy	Not very happy	A little happy	Quite happy	Very happy	Extremely happy
☐	☐	☐	☐	☐	☐

Planning

To what extent do you have a plan for when, where, and how you might participate in moderate or vigorous physical activity for at least 20 mins per day over the next three months? (Please tick one box)

I have no plan	☐	☐	☐	☐	☐	☐	I have an exact plan
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Source: Hagger, M. S., Lonsdale, A. J., & Chatzisarantis, N. L. D. (2012). A theory-based intervention to reduce alcohol drinking in excess of guideline limits among undergraduate students. *British Journal of Health Psychology*, 17, 18–43. doi: 10.1111/j.2044-8287.2010.02011.x

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